

harman/kardon

# AVR235

7 X 50W 7.1 CHANNEL A/V RECEIVER

## SERVICE MANUAL



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## ELECTROSTATICALLY SENSITIVE (ES) DEVICES

Some semiconductor (solid state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive (ES) Devices. Examples of typical ES devices are integrated circuits and some field effect transistors and semiconductor "chip" components.

The following techniques should be used to help reduce the incidence of component damage caused by static electricity.

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed for potential shock reasons prior to applying power to the unit under test.
2. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge build-up or exposure of the assembly.
3. Use only a grounded-tip soldering iron to solder or unsolder ES devices.
4. Use only an anti-static solder removal device. Some solder removal devices not classified as "anti-static" can generate electrical charges sufficient to damage ES devices.
5. Do not use freon-propelled chemicals. These can generate electrical change sufficient to damage ES devices.
6. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material.)
7. Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.

**CAUTION :** Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.

8. Minimize bodily motions when handling unpackaged replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ES devices.

## PRODUCT SAFETY NOTICE

Each precaution in this manual should be followed during servicing.

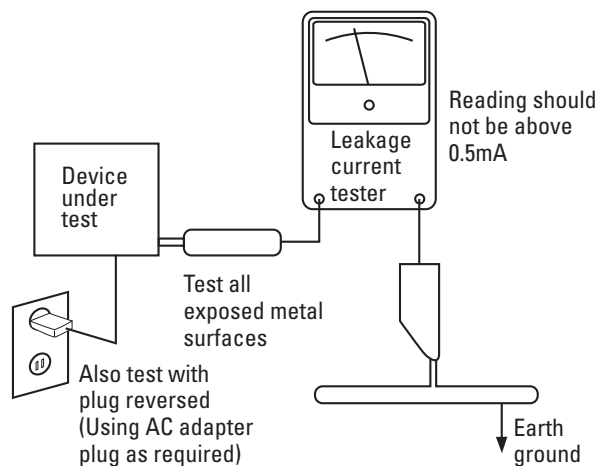
Components identified with the IEC symbol  in the parts list are of special significance to safety. When replacing a component identified with , use only the replacement parts designated, or parts with the same ratings or resistance, wattage, or voltage that are designated in the parts list in this manual. Leakage-current or resistance measurements must be made to determine that exposed parts are acceptably insulated from the supply circuit before returning the product to the customer.

## SAFETY PRECAUTIONS

The following check should be performed for the continued protection of the customer and service technician.

### LEAKAGE CURRENT CHECK

Measure leakage current to a known earth ground (water pipe, conduit, etc.) by connecting a leakage current tester between the earth ground and all exposed metal parts of the appliance (input/output terminals, screwheads, metal overlays, control shaft, etc.). Plug the AC line cord of the appliance directly into a 120V AC 60Hz outlet and turn the AC power switch on. Any current measured must not exceed 0.5mA.



### AC Leakage Test

**ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE ARE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND MUST BE CORRECTED BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.**

## AVR 235 TECHNICAL SPECIFICATIONS

**Audio Section**

Stereo Mode

Continuous Average Power (FTC)

65 Watts per channel, 20Hz–20kHz,  
@ <0.07% THD, both channels driven into 8 ohms

Seven-Channel Surround Modes

Power per Individual Channel

Front L&R channels:  
50 Watts per channel  
@ <0.07% THD, 20Hz–20kHz into 8 ohms

Center channel:  
50 Watts @ <0.07% THD, 20Hz–20kHz into 8 ohms

Surround (L & R side, L & R back) channels:  
50 Watts per channel  
@ <0.07% THD, 20Hz–20kHz into 8 ohms

Input Sensitivity/Impedance

Linear (High-Level) 200mV/47k ohms

Signal-to-Noise Ratio (IHF-A) 100dB

Surround System Adjacent Channel Separation

Pro Logic I/II 40dB

Dolby Digital (AC-3) 55dB

DTS 55dB

Frequency Response

@ 1W (+0dB, –3dB) 10Hz – 130kHz

High Instantaneous

Current Capability (HCC) ±35 Amps

Transient Intermodulation

Distortion (TIM) Unmeasurable

Slew Rate

40V/μsec

**FM Tuner Section**

Frequency Range 87.5–108.0MHz  
Usable Sensitivity IHF 1.3μV/13.2dB  
Signal-to-Noise Ratio Mono/Stereo 70/68dB  
Distortion Mono/Stereo 0.2/0.3%  
Stereo Separation 40dB @ 1kHz  
Selectivity ±400kHz, 70dB  
Image Rejection 80dB  
IF Rejection 90dB

**AM Tuner Section**

Frequency Range 520–1720kHz  
Signal-to-Noise Ratio 45dB  
Usable Sensitivity Loop 500μV  
Distortion 1kHz, 50% Mod 0.8%  
Selectivity ±10kHz, 30dB

**Video Section**

Television Format NTSC  
Input Level/Impedance 1Vp-p/75 ohms  
Output Level/Impedance 1Vp-p/75 ohms  
Video Frequency Response (Composite and S-Video) 10Hz–8MHz (–3dB)  
Video Frequency Response (Component Video) 10Hz–50MHz (–3dB)

**General**

Power Requirement AC 120V/60Hz  
Power Consumption 118W idle, 890W maximum (7 channels driven)

|            |                     |                     |
|------------|---------------------|---------------------|
| Dimensions | (Product)           | (Shipping)          |
| Width      | 17.3 inches (440mm) | 21.5 inches (545mm) |
| Height     | 6.6 inches (168mm)  | 9.9 inches (251mm)  |
| Depth      | 15 inches (381mm)   | 17.9 inches (455mm) |

|        |                  |                |
|--------|------------------|----------------|
| Weight | (Product)        | (Shipping)     |
|        | 33.0 lb (15.0kg) | 35.2 lb (16kg) |

Depth measurement includes knobs, buttons and terminal connections.

Height measurement includes feet and chassis.

All features and specifications are subject to change without notice.

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|||||EzSet™ is a trademark of Harman International Industries, Incorporated (patent no. 5,386,478).

\*Manufactured under license from Dolby Laboratories. "Dolby," "Pro Logic" and the Double-D symbol are trademarks of Dolby Laboratories.

DTS, DTS Surround, DTS-ES and DTS Neo:6 are registered trademarks of Digital Theater Systems, Inc.

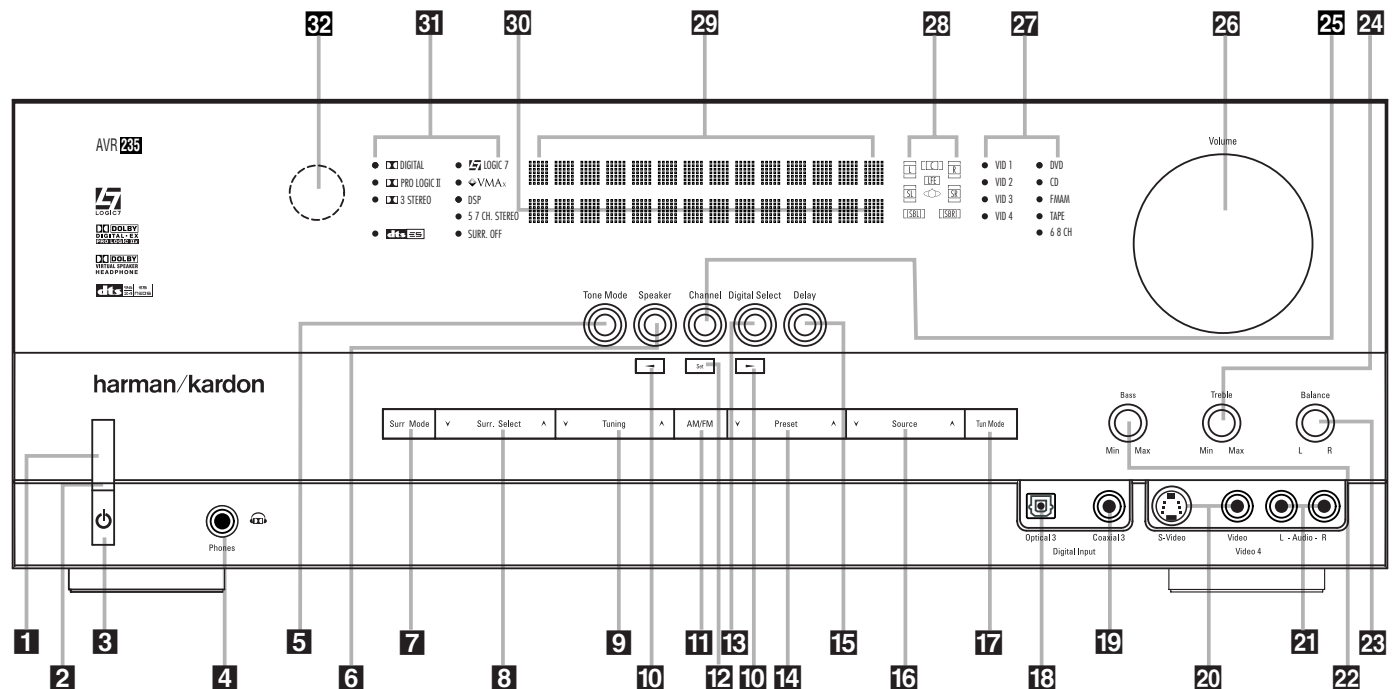
VMAx is a registered trademark of Harman International Industries, Incorporated, and is an implementation of Cooper Bauck Transaural Stereo under patent license.

Logic 7 is a registered trademark of Harman International Industries, Incorporated.

Cirrus and Cirrus Logic are registered trademarks of Cirrus Logic, Inc.



## FRONT - PANEL CONTROLS



- |                                       |                                         |                                            |
|---------------------------------------|-----------------------------------------|--------------------------------------------|
| <b>1</b> Main Power Switch            | <b>12</b> Set Button                    | <b>23</b> Balance Control                  |
| <b>2</b> Power Indicator              | <b>13</b> Digital Input Selector        | <b>24</b> Treble Control                   |
| <b>3</b> Standby/On Switch            | <b>14</b> Preset Stations Selector      | <b>25</b> Channel Adjust Selector          |
| <b>4</b> Headphone Jack               | <b>15</b> Delay Adjust Selector         | <b>26</b> Volume Control                   |
| <b>5</b> Tone Mode                    | <b>16</b> Input Source Selector         | <b>27</b> Input Indicators                 |
| <b>6</b> Speaker Selector             | <b>17</b> Tuner Mode Selector           | <b>28</b> Speaker/Channel Input Indicators |
| <b>7</b> Surround Mode Group Selector | <b>18</b> Optical 3 Digital Audio Input | <b>29</b> Upper Display Line               |
| <b>8</b> Surround Mode Selector       | <b>19</b> Coaxial 3 Digital Audio Input | <b>30</b> Lower Display Line               |
| <b>9</b> Tuning Selector              | <b>20</b> Video 4 Video Input Jacks     | <b>31</b> Surround Mode Indicators         |
| <b>10</b> ◀▶ Buttons                  | <b>21</b> Video 4 Audio Input Jacks     | <b>32</b> Remote Sensor Window             |
| <b>11</b> Tuner Band Selector         | <b>22</b> Bass Control                  |                                            |

**NOTE:** To make it easier to follow the instructions that refer to this illustration, a larger copy may be downloaded from the Product Support section for this product at [www.harmankardon.com](http://www.harmankardon.com).

**1 Main Power Switch:** Press this button to apply power to the AVR 235. When the switch is pressed in, the unit is in a Standby mode, as indicated by the amber **Power Indicator 2** above the **Standby/On Switch 3**. This button **MUST** be pressed in to operate the unit. To turn the unit off and prevent the use of the remote control, this switch should be pressed until it pops out from the front panel and the word "OFF" is seen at the top of the switch.

**NOTE:** This switch is normally left in the "ON" position.

**2 Power Indicator:** This LED lights amber when the unit is in the Standby mode to signal that the AVR is ready to be turned on. When the unit is in operation, the indicator is blue.

**3 Standby/On Switch:** When the **Main Power Switch 1** is "ON," press this button to turn on the

AVR 235; press it again to turn the unit off. The **Power Indicator 3** turns blue when the unit is on.

**4 Headphone Jack:** This jack may be used to listen to the AVR 235's output through a pair of headphones. The speakers will automatically be turned off when the headphone jack is in use.

**5 Tone Mode:** Pressing this button enables or disables the Bass and Treble tone controls. When the button is pressed so that **TONE IN** appears in the **Lower Display Line 30**, the **Bass 22** and **Treble 24** controls may be used to adjust the output signals. When the button is pressed once or twice so that the words **TONE OUT** appear in the **Lower Display Line 30**, the output signal will be "flat," no matter how the actual **Bass** and **Treble Controls 22/24** are adjusted.

**6 Speaker Select Button:** Press this button to begin the process of configuring the unit to match the type of speakers used in your listening room. (See pages 16 and 20–22 for more information on speaker setup and configuration.)

**7 Surround Mode Group Selector:** Press this button to select the top-level group of surround modes. Each press of the button will select the current or last used mode in each of the surround mode groups (e.g., Dolby, DTS, DTS Neo:6, Logic 7, DSP, Stereo). When the button is pressed so that the name of the desired surround mode group appears in the on-screen display and in the **Lower Display Line 30**, press the **Surround Mode Selector 8** to cycle through the individual modes available. For example, press this button to select Dolby modes, and then press the **Surround Mode Selector 8** to choose from the various mode options.

# FRONT - PANEL CONTROLS

**8 Surround Mode Selector:** Press this button to select from among the available surround mode options for the mode group selected. The specific modes will vary based on the number of speakers available, the mode group and if the input source is digital or analog. For example, press the **Surround Mode Group Selector 7** to select a mode grouping such as Dolby or Logic 7, and then press this button to see the specific mode choices available. For more information on mode selection, see page 26.

**9 Tuning Selector:** Press the left side of the button to tune lower-frequency stations and the right side of the button to tune higher-frequency stations. When the tuner is in the Manual mode, each tap will increase or decrease the frequency by one increment. When the tuner receives a strong enough signal for adequate reception, **MANUAL TUNED** will appear in the on-screen display and the **Lower Display Line 30**. When the tuner is in the Auto mode, press the button once, and the tuner will scan for a station with acceptable signal strength. When the next station with a strong signal is tuned, the scan will stop and the on-screen display and the **Lower Display Line 30** will indicate **AUTO TUNED**. When an FM Stereo station is tuned, the display will read **AUTO ST TUNED**.

To switch back and forth between the Auto and Manual tuning modes, press the **Tuner Mode Selector 17**.

**10 ◀▶ Buttons:** When configuring the AVR 235's settings, use these buttons to select from the available choices.

**11 Tuner Band Selector:** Press this button to turn the AVR 235 on and to select the Tuner as the input source. Press it again to switch between the AM and FM frequency bands. (See page 29 for more information on the tuner.)

**12 Set Button:** When making choices during the setup and configuration process, press this button to enter the desired setting into the AVR 235's memory.

**13 Digital Input Selector:** Press this button to select one of the digital inputs or the analog input for any source. (See pages 26–29 for more information on digital audio.)

**14 Preset Stations Selector:** Press this button to scroll up or down through the list of stations that have been entered into the preset memory. (See page 30 for more information on tuner presets.)

**15 Delay Adjust Selector:** Press this button to begin the steps required to enter delay settings. (See page 22 for more information on delay times.)

**16 Input Source Selector:** Press this button to change the input by scrolling up or down through the list of **Input Indicators 27**.

**17 Tuner Mode Selector:** Press this button to select Auto or Manual tuning. When the button is pressed so that **AUTO** appears in the **Lower Display Line 30**, the tuner will search for the next station with an acceptable signal when the **Tuning Selector 9 21** is pressed. When the button is pressed so that **MANUAL** appears in the **Lower Display Line 30**, each press of the **Tuning Selector 9 21** will increase the frequency. This button may also be used to switch between Stereo and Mono modes for FM radio reception. When weak reception is encountered, press the button so that **MANUAL** appears in the **Lower Display Line 30** and the on-screen display to switch to Mono reception. Press it again to switch back to Stereo mode. (See page 29 for more information on using the tuner.)

**18 Optical 3 Digital Audio Input:** Connect the optical digital audio output of an audio or video product to this jack. When the input is not in use, be certain to keep the plastic cap installed to avoid dust contamination that might degrade future performance.

**19 Coaxial 3 Digital Audio Input:** This jack is used for connection to the output of portable audio devices, video game consoles or other products that have a coax digital audio jack.

**20 Video 4 Video Input Jacks:** These jacks may be used for temporary connection to the composite or S-Video output of video games, camcorders or other portable video products. You may make a connection to either jack at any time, but not to both simultaneously.

**21 Video 4 Audio Input Jacks:** These audio jacks may be used for temporary connection to video games or portable audio/video products such as camcorders and portable audio players.

**22 Bass Control:** Turn this control to modify the low-frequency output of the left/right channels by as much as  $\pm 10\text{dB}$ .

**23 Balance Control:** Turn this control to change the relative volume for the front left/right channels.

**NOTE:** For proper operation of the surround modes, this control should be at the midpoint or "12 o'clock" position.

**24 Treble Control:** Turn this control to modify the high-frequency output of the left/right channels by as much as  $\pm 10\text{dB}$ .

**25 Channel Adjust Selector:** Press this button to begin the process of trimming the channel output levels using an external audio source. (For more information on output level trim adjustment, see page 30.)

**26 Volume Control:** Turn this knob clockwise to increase the volume, counterclockwise to decrease the volume. If the AVR 235 is muted, adjusting the **Volume Control 26 38** will automatically release the unit from the silenced condition.

**27 Input Indicators:** The current selected source will appear as one of these indicators. Note that when the unit is turned on, the entire list of available sources will light briefly, and then revert to normal operation with only the active source indicator illuminated.

**28 Speaker/Channel Input Indicators:** These indicators are multipurpose, indicating both the speaker type selected for each channel and the incoming data-signal configuration. The left, center, right, surround and surround back speaker indicators are composed of three boxes, while the subwoofer is a single box. The center box lights when a "small" speaker is selected, and the two outer boxes light when "large" speakers are selected. When none of the boxes are lit for the center, surround or subwoofer channels, no speaker has been assigned that position. (See page 19 for more information on configuring speakers.) The letters inside each box display the active input channels. For standard analog inputs, only the L and R will light, indicating a stereo input. For a digital source, the indicators will light to display the channels being received at the digital input. When the letters flash, the digital input has been interrupted. (See page 29 for more information on the Channel Indicators.)

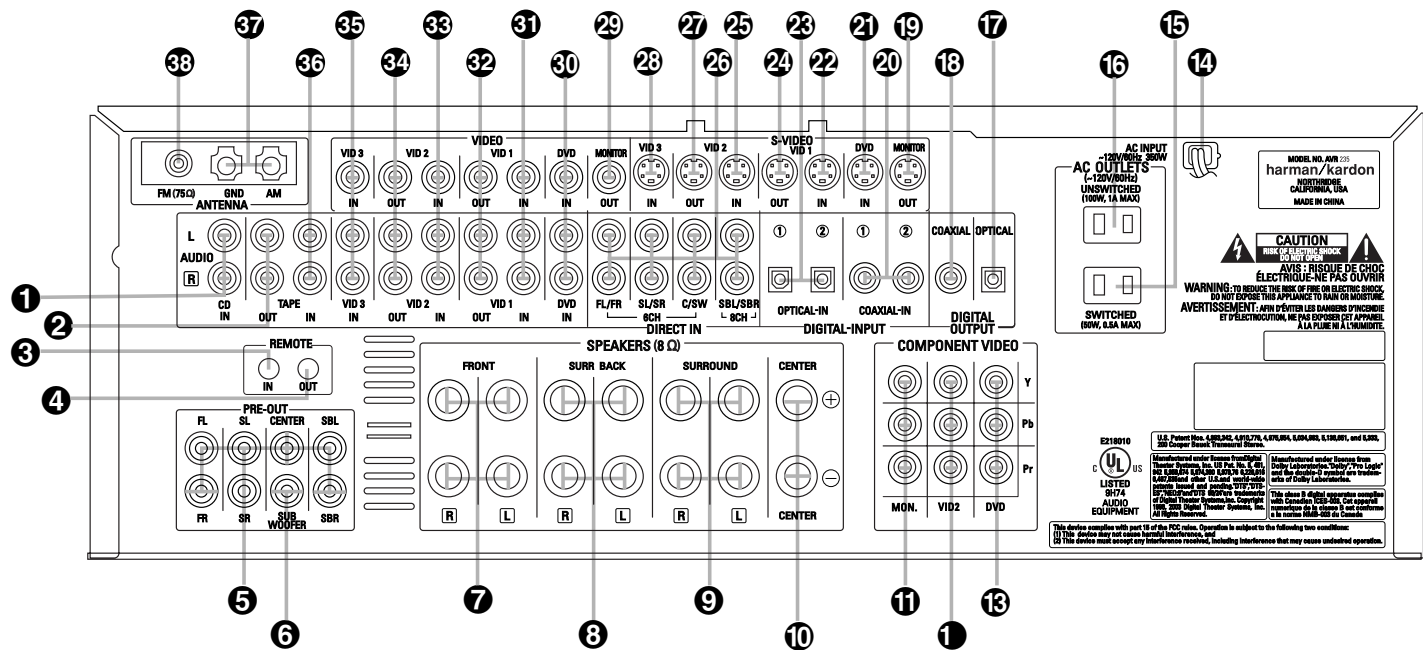
**29 Upper Display Line:** Depending on the unit's status, a variety of messages will appear here. In normal operation, this line will show the current input source and which analog or digital input is in use. When the tuner is the input, this line will identify the station as AM or FM and show the frequency and preset number, if any.

**30 Lower Display Line:** Depending on the unit's status, a variety of messages will appear here. In normal operation, the current surround mode will show here.

**31 Surround Mode Indicators:** The current selected surround mode will appear as one of these indicators. Note that when the unit is turned on, the entire list of available modes will light briefly, and then revert to normal operation with only the active mode indicator illuminated.

**32 Remote Sensor Window:** The sensor behind this window receives infrared signals from the remote control. Aim the remote at this area and do not block or cover it.

## REAR-PANEL CONNECTIONS



- |                                    |                                   |                                |
|------------------------------------|-----------------------------------|--------------------------------|
| 1 CD Audio Inputs                  | 14 AC Power Cord                  | 27 Video 2 S-Video Output      |
| 2 Tape Outputs                     | 15 Switched AC Accessory Outlet   | 28 Video 3 S-Video Input       |
| 3 Remote IR Input                  | 16 Unswitched AC Accessory Outlet | 29 Video Monitor Output        |
| 4 Remote IR Output                 | 17 Optical Digital Audio Output   | 30 DVD Audio/Video Inputs      |
| 5 Preamp Outputs                   | 18 Coaxial Digital Audio Output   | 31 Video 1 Audio/Video Inputs  |
| 6 Subwoofer Output                 | 19 S-Video Monitor Output         | 32 Video 1 Audio/Video Outputs |
| 7 Front Speaker Outputs            | 20 Coaxial Digital Audio Inputs   | 33 Video 2 Audio/Video Inputs  |
| 8 Surround Back Speaker Outputs    | 21 DVD S-Video Input              | 34 Video 2 Audio/Video Outputs |
| 9 Surround Speaker Outputs         | 22 Video 1 S-Video Input          | 35 Video 3 Audio/Video Inputs  |
| 10 Center Speaker Output           | 23 Optical Digital Audio Inputs   | 36 Tape Inputs                 |
| 11 Component Video Monitor Outputs | 24 Video 1 S-Video Output         | 37 AM Antenna Terminals        |
| 12 Video 2 Component Video Inputs  | 25 Video 2 S-Video Input          | 38 FM Antenna Jack             |
| 13 DVD Component Video Inputs      | 26 6/8-Channel Direct Inputs      |                                |

**NOTE:** To make it easier to follow the instructions that refer to this illustration, a larger copy may be downloaded from the Product Support section for this product at [www.harmankardon.com](http://www.harmankardon.com).

**NOTE:** To assist in making the correct connections for multichannel input, output and speaker connections, all connection jacks and terminals are color-coded in conformance with the CEA standards as follows:

|              |       |
|--------------|-------|
| Front Left:  | White |
| Front Right: | Red   |
| Center:      | Green |

|                        |        |
|------------------------|--------|
| Surround Left:         | Blue   |
| Surround Right:        | Gray   |
| Surround Back Left:    | Brown  |
| Surround Back Right:   | Tan    |
| Subwoofer:             | Purple |
| Coaxial Digital Audio: | Orange |
| Composite Video:       | Yellow |

|                       |       |
|-----------------------|-------|
| Component Video "Y":  | Green |
| Component Video "Pr": | Red   |
| Component Video "Pb": | Blue  |

**1 CD Audio Inputs:** Connect these jacks to the analog audio output of a compact disc player or changer.

**2 Tape Outputs:** Connect these jacks to the RECORD/INPUT jacks of an audio recorder.

**3 Remote IR Input:** If the AVR 235's front-panel

IR sensor is blocked due to cabinet doors or other obstructions, an external IR sensor may be used. Connect the output of the sensor to this jack.

**4 Remote IR Output:** This connection permits the IR sensor in the receiver to serve other remote controlled devices. Connect this jack to the "IR IN" jack on Harman Kardon (or other compatible) equipment.

**5 Preamp Outputs:** Connect these jacks to an optional, external power amplifier for applications for which higher power is desired.

**6 Subwoofer Output:** Connect this jack to the line-level input of a powered subwoofer. If an external subwoofer amplifier is used, connect this jack to the subwoofer amplifier input.

## REAR-PANEL CONNECTIONS

**7 Front Speaker Outputs:** Connect these outputs to the matching + or – terminals on your left and right speakers. When making speaker connections, always make certain to maintain correct polarity by connecting the color-coded (white for front left and red for front right) (+) terminals on the AVR 235 to the red (+) terminals on the speakers and the black (–) terminals on the AVR 235 to the black (–) terminals on the speakers. See page 14 for more information on speaker polarity.

**8 Surround Back Speaker Outputs:** These speaker terminals are used to power the surround back left/surround back right speakers in a 7.1 channel system. The brown and black terminals are the surround back left channel positive (+) and negative (–) connections and the tan and black terminals are the surround back right positive (+) and negative (–) terminals.

**9 Surround Speaker Outputs:** Connect these outputs to the matching + and – terminals on your surround channel speakers. In conformance with the CEA color-code specification, the blue terminal is the positive, or “+,” terminal that should be connected to the red (+) terminal on the Surround Left speaker with older color-coding, while the gray terminal should be connected to the red (+) terminal on the Surround Right speaker with the older color-coding. Connect the black (–) terminal on the AVR to the matching black negative (–) terminals for each surround speaker. (See page 14 for more information on speaker polarity.)

**10 Center Speaker Output:** Connect these outputs to the matching + and – terminals on your center channel speaker. In conformance with the CEA color-code specification, the green terminal is the positive, or “+,” terminal that should be connected to the red (+) terminal on speakers with the older color-coding. Connect the black (–) terminal on the AVR to the black (–) terminal on your speaker. (See page 14 for more information on speaker polarity.)

**11 Component Video Monitor Outputs:** Connect these outputs to the component video inputs of a video projector or monitor. When a source connected to one of the **Component Video Inputs 1 13** is selected, the signal will be sent to these jacks.

**1 Video 2 Component Video Inputs:** Connect the Y/Pr/Pb component video outputs of an HDTV set-top converter, satellite receiver or other video source device with component video outputs to these jacks.

**13 DVD Component Video Inputs:** Connect the Y/Pr/Pb component video outputs of a DVD player to these jacks.

**14 AC Power Cord:** Connect the AC power cord to a non-switched AC wall outlet.

**15 Switched AC Accessory Outlet:** This outlet may be used to power any device you wish to have turned on when the AVR 235 is turned on.

**16 Unswitched AC Accessory Outlet:** This outlet may be used to power any AC device. The power will remain on at this outlet, regardless of whether the AVR 235 is on or off.

**NOTE:** The total power consumption of all devices connected to the accessory outlets should not exceed 100 watts.

**17 Optical Digital Audio Output:** Connect this jack to the optical digital input connector on a CD-R/RW, MiniDisc or other digital recorder.

**18 Coaxial Digital Audio Output:** Connect this jack to the coaxial digital input of a CD-R/RW, MiniDisc or other digital recorder.

**19 S-Video Monitor Output:** When your television or other video display is equipped with an S-Video input and you are using at least one source with S-Video capability, connect this jack to the S-Video input on the display.

**20 Coaxial Digital Audio Inputs:** Connect the coax digital output from a DVD player, HDTV receiver, LD player or CD player to these jacks. The signal may be a Dolby Digital signal, DTS signal or a standard PCM digital source. Do not connect the RF digital output of an LD player to these jacks.

**21 DVD S-Video Input:** Connect the S-Video output of a DVD player or other video source to this jack.

**22 Video 1 S-Video Input:** If the product connected to the **Video 1 Audio Inputs 31** has S-Video capability, connect this jack to the PLAY/OUT S-Video jack on that unit and then make certain that the **S-Video Monitor Output 19** is connected as described above.

**23 Optical Digital Audio Inputs:** Connect the optical digital output from a DVD player, HDTV receiver, LD player or CD player to these jacks. The signal may be a Dolby Digital signal, a DTS signal or a standard PCM digital source.

**24 Video 1 S-Video Output:** If the product connected to the **Video 1 Audio Outputs 32** has S-Video capability, connect this jack to the REC/IN S-Video jack on that unit.

**25 Video 2 S-Video Input:** If the product connected to the **Video 2 Audio Inputs 33** has S-Video capability, connect this jack to the PLAY/OUT S-Video jack on that unit and then make certain that the **S-Video Monitor Output 19** is connected, as described above.

**26 6/8-Channel Direct Inputs:** These jacks are used for connection to source devices such as DVD-Audio or SACD players with discrete analog outputs. Depending on the source device in use, all eight jacks may be used, though in many cases only connections to the front left/right, center, surround left/right and LFE (subwoofer input) jacks will be used for standard 5.1 audio signals.

**27 Video 2 S-Video Output:** If the product connected to the **Video 2 Audio Outputs 34** has S-Video capability, connect this jack to the REC/IN S-Video jack on that unit.

**28 Video 3 S-Video Input:** If the product connected to the **Video 3 Audio Inputs 35** has S-Video capability, connect this jack to the PLAY/OUT S-Video jack on that unit and then make certain that the **S-Video Monitor Output 19** is connected as described above.

**29 Video Monitor Output:** Connect this jack to the composite video input of a TV monitor or video projector to view the on-screen menus and the output of a standard video source.

**30 DVD Audio/Video Inputs:** Connect the composite video and L/R analog audio output jacks of a DVD player or other video source to these jacks.

**31 Video 1 Audio/Video Inputs:** Connect the composite video and L/R analog audio PLAY/OUT jacks of a VCR or other video source to these jacks.

**32 Video 1 Audio/Video Outputs:** Connect the composite video and L/R analog audio REC/IN jacks of a VCR or other video recording device such as a DVD recorder or PVR to these jacks.

**33 Video 2 Audio/Video Inputs:** Connect the composite video and L/R analog audio PLAY/OUT jacks of a VCR or other video source to these jacks.

**34 Video 2 Audio/Video Outputs:** Connect the composite video and L/R analog audio REC/IN jacks of a VCR or other video recording device such as a DVD recorder or PVR to these jacks.

**35 Video 3 Audio/Video Inputs:** Connect the composite video and L/R analog audio PLAY/OUT jacks of a VCR or other video source to these jacks.

## REAR-PANEL CONNECTIONS

**36 Tape Inputs:** Connect these jacks to the **PLAY/OUT** jacks of an audio recorder.

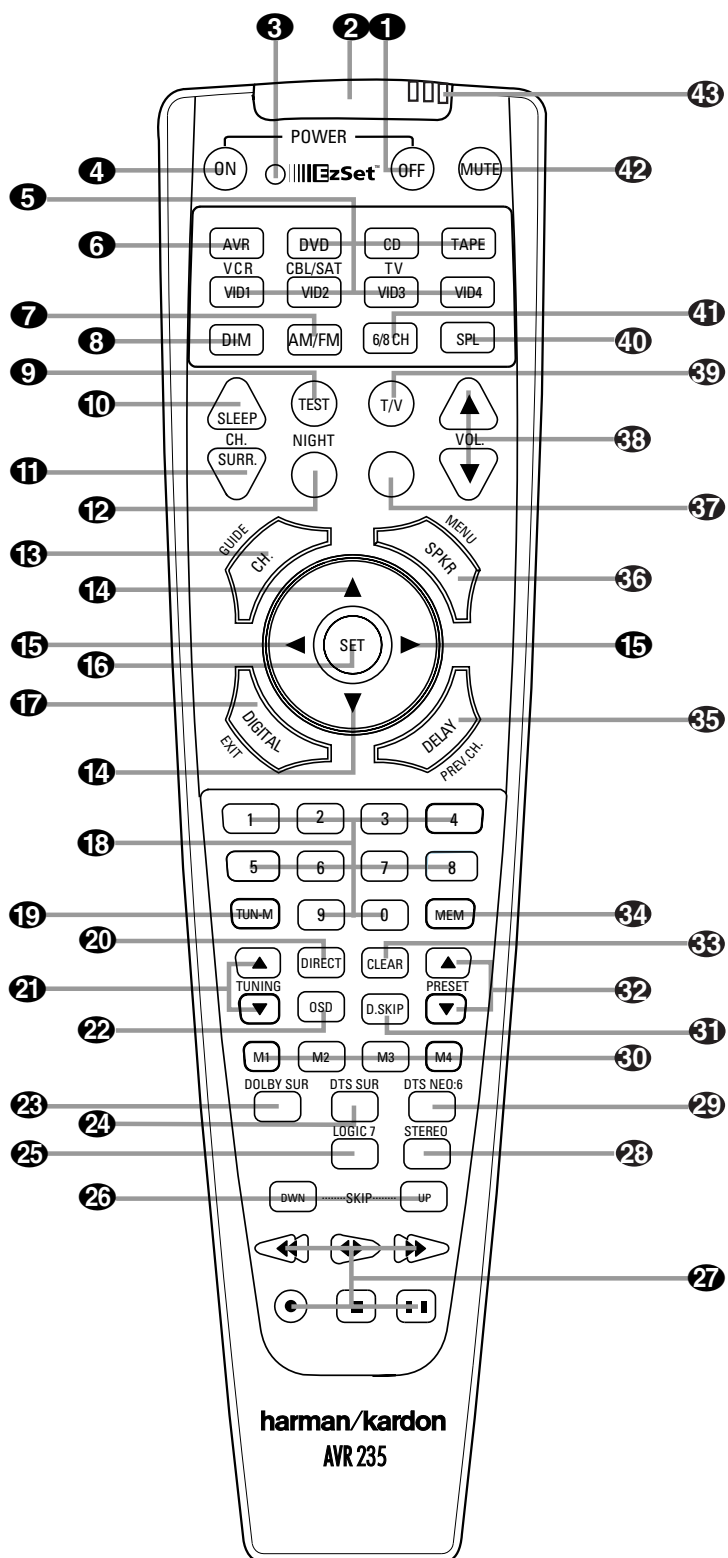
**37 AM Antenna Terminals:** Connect the AM loop antenna supplied with the receiver to these terminals. If an external AM antenna is used, make connections to the **AM** and **GND** terminals, in accordance with the instructions supplied with the antenna.

**38 FM Antenna Jack:** Connect the supplied indoor (or an optional external) FM antenna to this terminal.

**NOTE ON VIDEO CONNECTIONS:** When connecting a source device such as a VCR, DVD player, cable or satellite set-top box or video game to the AVR, use either a composite or S-Video connection for each input, but not both.

## REMOTE CONTROL FUNCTIONS

- 1 Power Off Button
- 2 IR Transmitter Window
- 3 Program/SPL Indicator
- 4 Power On Button
- 5 Input Selectors
- 6 AVR Selector
- 7 AM/FM Tuner Select
- 8 Dim Button
- 9 Test Button
- 10 Sleep Button
- 11 DSP Surround Mode Selector
- 12 Night Mode
- 13 Channel Select Button
- 14 ▲/▼ Buttons
- 15 ◀/▶ Buttons
- 16 Set Button
- 17 Digital Select
- 18 Numeric Keys
- 19 Tuner Mode
- 20 Direct Button
- 21 Tuning Up/Down
- 22 OSD Button
- 23 Dolby Mode Selector
- 24 DTS Digital Mode Selector
- 25 Logic 7 Mode Select Button
- 26 Skip Up/Down Buttons
- 27 Transport Controls
- Stereo Mode Select Button
- DTS Neo:6 Mode Select
- Macro Buttons
- Disc Skip Button
- Preset Up/Down
- Clear Button
- Memory Button
- Delay/Prev. Ch.
- Speaker Select
- Spare Button
- Volume Up/Down
- TV/Video Selector
- SPL Selector
- 6-Channel/8-Channel Direct Input
- Mute
- EzSet Sensor Microphone

**NOTE:**

- The function names shown here are each button's feature when used with the AVR 235. Most buttons have additional functions when used with other devices. See pages 38–39 for a list of these functions.
- To make it easier to follow the instructions that refer to this illustration, a larger copy may be downloaded from the Product Support section for this product at [www.harmankardon.com](http://www.harmankardon.com).



## REMOTE CONTROL FUNCTIONS

**IMPORTANT NOTE:** The AVR 235's remote may be programmed to control up to eight devices, including the AVR 235. Before using the remote, it is important to remember to press the **Input Selector Button 5** that corresponds to the unit you wish to operate. In addition, the AVR 235's remote is shipped from the factory to operate the AVR 235 and most Harman Kardon CD or DVD players and cassette decks. The remote is also capable of operating a wide variety of other products using the control codes that are part of the remote. Before using the remote with other products, follow the instructions on pages 35–36 to program the proper codes for the products in your system.

It is also important to remember that many of the buttons on the remote take on different functions, depending on the product selected using the Device Control Selectors. The descriptions shown here primarily detail the functions of the remote when it is used to operate the AVR 235. (See page 35 for information about alternate functions for the remote's buttons.)

**1 Power Off Button:** Press this button to place the AVR 235 or a selected device in the Standby mode.

**2 IR Transmitter Window:** Point this window towards the AVR 235 when pressing buttons on the remote to make certain that infrared commands are properly received.

**3 Program/SPL Indicator:** This three-color indicator is used to guide you through the process of programming the remote, and it is also used as a level indicator when using the remote's EzSet capabilities. (See page 23 for more information on setting output levels, and see page 35 for information on programming the remote.)

**4 Power On Button:** Press this button to turn on the power to a device selected by pressing one of the **Input Selectors 5**.

**5 Input Selectors:** Pressing one of these buttons will perform three actions at the same time. First, if the AVR 235 is not turned on, this will power up the unit. Next, it will select the source shown on the button as the input to the AVR 235. Finally, it will switch the remote control so that it controls the device selected. After pressing one of these buttons, you must press the **AVR Selector Button 6** again to operate the AVR 235's functions with the remote.

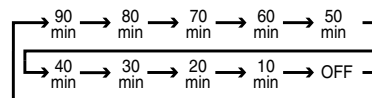
**6 AVR Selector:** Pressing this button will switch the remote so that it will operate the AVR 235's functions. If the AVR 235 is in the Standby mode, it will also turn the AVR 235 on.

**7 AM/FM Tuner Select:** Press this button to select the AVR 235's tuner as the listening choice. Pressing this button when the tuner is already in use will select between the AM and FM bands.

**8 Dim Button:** Press this button to activate the Dimmer function, which reduces the brightness of the front-panel display, or turns it off entirely. The first press of the button shows the default state, which is full brightness, by indicating **VFD FULL** in the **Lower Display Line 30**. Press the button again within five seconds to reduce the brightness by 50%, as indicated by **VFD HALF** showing in the **Lower Display Line 30**. Press the button again within five seconds and the main display will go completely dark. Note that this setting is temporary in that, regardless of any changes, the display will always return to full brightness when the AVR is turned on. In addition, the **Power Indicator 2** will always remain at full brightness, regardless of the setting. This is to remind you that the AVR is still turned on.

**9 Test Button:** Press this button to begin the sequence used to calibrate the AVR 235's output levels. (See page 23 for more information on calibrating the AVR 235.)

**10 Sleep Button:** Press this button to place the unit in the Sleep mode. After the time shown in the display, the AVR 235 will automatically go into the Standby mode. Each press of the button changes the time until turn-off in the following order:



This button is also used to change channels on your TV when the TV is selected.

When the AVR 235 remote is being programmed with the codes to operate another device, this button is also used in the "Auto Search" process. (See page 35 for more information on programming the remote.)

**11 DSP Surround Mode Selector:** Press this button to cycle through the DSP, VMaX and Stereo surround modes such as Hall, Theater, VMaX Near and Far, and Surround Off. This button is also used to tune channels when the TV is selected using the device **Input Selector 5**. When the AVR 235 remote is being programmed with the codes of another device, this button is also used in the "Auto Search" process. (See page 35 for more information on programming the remote.)

**12 Night Mode:** Press this button to activate the Night mode. This mode is available in specially encoded digital sources, and it preserves dialogue (center channel) intelligibility at low volume levels.

**13 Channel Select Button:** This button is used to start the process of setting the AVR 235's output levels to an external source. Once this button is pressed, use the **▲/▼ Buttons 14** to select the channel being adjusted, then press the **Set Button 16**, followed by the **▲/▼ Buttons 14** again, to change the level setting. (See page 30 for more information.)

**14 ▲/▼ Buttons:** These multipurpose buttons are used to change or scroll through items in the on-screen menus, make configuration settings such as digital inputs or delay timing, or to select surround modes. When changing a setting, first press the button for the function or setting to be changed (e.g., press the **DSP Surround Mode Selector 11** to select a sound field mode or the **Digital Select Button 17** to change a digital input) and then press one of these buttons to scroll through the list of options or to increase or decrease a setting. The sections in this manual describing the individual features and functions contain specific information on using these buttons for each application.

**15 ◀▶ Buttons:** These buttons are used to change the menu selection or setting during some of the setup procedures for the AVR 235.

**16 Set Button:** This button is used to enter settings into the AVR 235's memory. It is also used in the setup procedures for delay time, speaker configuration and channel output level adjustment.

**17 Digital Select:** Press this button to assign one of the digital inputs **18/19/20/23** to a source. (See page 26 for more information on using digital inputs.)

**18 Numeric Keys:** These buttons serve as a 10-button numeric keypad to enter tuner preset positions. They are also used to select channel numbers when TV, Cable or SAT has been selected on the remote, or to select track numbers on a CD, DVD or LD player, depending on how the remote has been programmed.

**19 Tuner Mode:** Press this button when the tuner is in use to select between automatic tuning and manual tuning. When the button is pressed so that **MANUAL** appears in the **Lower Display Line 30**, pressing the **Tuning Buttons 21/9** will move the frequency up or down in single-step increments. When the FM band is in use, pressing this button when a station's signal is weak will change to monaural reception. (See page 29 for more information.)

# REMOTE CONTROL FUNCTIONS

**20 Direct Button:** Press this button when the tuner is in use to start the sequence for direct entry of a station's frequency. After pressing the button, simply press the proper **Numeric Keys 18** to select a station. (See page 29 for more information on the tuner.)

**21 Tuning Up/Down:** When the tuner is in use, these buttons will tune up or down through the selected frequency band. If the **Tuner Mode Button 19/17** has been pressed so that **AUTO** appears in the on-screen and **Lower Display Line 30**, pressing and holding either of the buttons for three seconds will cause the tuner to seek the next station with acceptable signal strength for quality reception. When **MANUAL** appears in the **Lower Display Line 30**, pressing these buttons will tune stations in single-step increments. (See page 29 for more information.)

**22 OSD Button:** Press this button to activate the On-Screen Display (OSD) system used to set up or adjust the AVR 235's parameters.

**23 Dolby Mode Selector:** This button is used to select from among the available Dolby Surround processing modes. Each press of this button will select one of the Dolby Pro Logic II modes or Dolby 3 Stereo. When a Dolby Digital-encoded source is in use, the Dolby Digital mode may also be selected. (See page 27 for the available Dolby surround mode options.)

**24 DTS Digital Mode Selector:** When a DTS-encoded digital source is selected, each press of this button will scroll through the available DTS modes. The specific choice of modes will vary according to whether or not the source material contains DTS-ES 6.1 Discrete encoding. When a DTS source is not in use, this button has no function. (See page 27 for the available DTS Digital options.)

**25 Logic 7 Mode Select Button:** Press this button to select from among the available Logic 7 surround modes. (See page 27 for the available Logic 7 options.)

**26 Skip Up/Down Buttons:** These buttons do not have a direct function with the AVR 235, but when used with a compatibly programmed CD or DVD changer, they will change to the previous disc in the changer or carousel.

**27 Transport Controls:** These buttons do not have any direct functions for the AVR 235, but they may be programmed for the forward/reverse play operation of a wide variety of CD or DVD players, and audio or video cassette recorders. When the remote is used to control the AVR, the VID2/CBL/SAT device or the VID3/TV device, these buttons are programmed to operate the DVD player's transport controls. However, you may use the Transport Control Punch-Through

feature described on page 36 to program these buttons, to operate another device's transport controls when the AVR, VID2 or VID3 device has been selected. (See page 36 for more information.)

**28 Stereo Mode Select Button:** Press this button to select a stereo listening mode. When the button is pressed so that **DSP SURROUND OFF** appears in the **Lower Display Line 30**, the AVR will operate in a bypass mode with true, fully analog, two-channel left/right stereo mode with no surround processing or bass management, as opposed to other modes where digital processing is used. When the button is pressed so that **SURROUND OFF** appears in the **Lower Display Line 30**, you may enjoy a two-channel presentation of the sound, along with the benefits of bass management. Depending on whether your system is configured for 5.1 or 6.1/7.1 channels, the next press of the button will cause either **5 CH STEREO** or **7 CH STEREO** to appear, and the stereo signal will be routed to all five (or seven) speakers. (See page 27 for more information on stereo playback modes.)

**29 DTS Neo:6 Mode Select:** Press this button to select a DTS Neo:6 mode. These modes take a two-channel stereo- or matrix surround-encoded source and create a full five-, six- or seven-channel sound field. (See page 27 for the available DTS Neo:6 options.)

**30 Macro Buttons:** Press these buttons to store or recall a "Macro", which is a preprogrammed sequence of commands stored in the remote. (See page 34 for more information on storing and recalling macros.)

**31 Disc Skip Button:** This button has no direct function for the AVR 235 but is most often used to change to the next disc in a CD or DVD player when the remote is programmed for that type of device. When the remote is used to control the AVR, the VID2/CBL/SAT device or the VID3/TV device, these buttons are programmed to operate the DVD player's transport controls. However, you may use the Transport Control Punch-Through feature described on page 36 to program these buttons to operate another device's transport controls when the AVR, VID2 or VID3 device has been selected. (See page 35 for more information on using the remote with products other than the AVR 235.)

**32 Preset Up/Down:** When the tuner is in use, press these buttons to scroll through the stations programmed into the AVR 235's memory. When some source devices, such as CD players, VCRs and cassette decks, are selected using the device **Input Selectors 5**, these buttons may function as Chapter Step or Track Advance.

**33 Clear Button:** Press this button to clear incorrect entries when using the remote to directly enter a radio station's frequency.

**34 Memory Button:** Press this button to enter a radio station into the AVR 235's preset memory. First, tune the desired station, and then press this button. Two underline indicators will flash at the right side of the **Upper Display Line 29**, and within five seconds press the **Numeric Keys 18** for the preset number between 01 and 30 that you wish to assign to the station. (See page 29 for more information.)

**35 Delay/Prev Ch.:** Press this button to begin the process for setting the delay times used by the AVR 235 when processing surround sound or to compensate for video-to-audio delays caused by the use of digital sources or video displays. After pressing this button, the delay times are entered by pressing the **Set Button 16** and then using the **▲/▼ Buttons 14** to change the setting. Press the **Set Button 16** again to complete the process. (See page 22 for more information.)

**36 Speaker Select:** Press this button to begin the process of configuring the AVR 235's bass management system for use with the type of speakers used in your system. Once the button has been pressed, use the **▲/▼ Buttons 14** to select the channel you wish to set up. Press the **Set Button 16** and then select another channel to configure. When all adjustments have been completed, press the **Set Button 16** twice to exit the settings and return to normal operation. (See page 20 for more information.)

**37 Spare Button:** This button has no function when used with the AVR. When used with the DVD player, it controls the Subtitle On/Off function.

**38 Volume Up/Down:** Press these buttons to raise or lower the system volume.

**39 TV/Video Selector:** This button does not have a direct function on the AVR 235, but when used with a compatibly programmed VCR, DVD or satellite receiver that has a "TV/Video" function, pressing this button will switch between the output of the player or receiver and the external video input to that player. Consult the owner's manual for your specific player or receiver for the details of how it implements this function.

**40 SPL Selector:** This button activates the AVR 235's EzSet function to quickly and accurately calibrate the AVR 235's output levels. Press and hold the button for three seconds and then release it. Press the "5" or "7" **Numeric Key 18** to indicate whether you are using a 5.1-channel or a 6.1/7.1-channel speaker system with the AVR 235. The test tone will begin circulating, and the **Program/SPL Indicator**



## REMOTE CONTROL FUNCTIONS

**3** will change colors. During this sequence, EzSet will automatically adjust the output levels for all channels until they are equal, as shown by the **Program/SPL Indicator 3** lighting green for each channel. (See page 23 for more information on EzSet.)

**41 6-Channel/8-Channel Direct Input:** Press this button to select the device connected to the **6/8-Channel Direct Inputs 26** as the audio source. (See page 25 for more information.)

When you wish to use the **6-Channel/8-Channel Direct Input 26** in conjunction with a video source, you must first select the video source by pressing one of the **Input Selectors 5**, then press this button to choose the device connected to the **6-Channel/8-Channel Direct Input 26** as the audio source.

**42 Mute:** Press this button to momentarily silence the AVR 235 or TV set being controlled, depending on which device has been selected. When the AVR 235 remote is being programmed to operate another device, this button is pressed with the **Input Selector Button 5** to begin the programming process. (See page 35 for more information on programming the remote.)

**43 EzSet Sensor Microphone:** The sensor microphone for the EzSet microphone is behind these slots. When using the remote to calibrate speaker output levels using EzSet, be sure that you do not hold the remote in a way that covers these slots. (See page 23 for more information on using EzSet.)

# INSTALLATION AND CONNECTIONS

## System Installation

After unpacking the unit, locating it in a place with adequate ventilation and placing it on a solid surface capable of supporting its weight, you will need to make the connections to your audio and video equipment.

**IMPORTANT NOTE:** For your personal safety and to avoid possible damage to your equipment and speakers, it is always a good practice to turn off and unplug the AVR and ALL source equipment from the AC output before making any audio or video system connections.

## Audio Equipment Connections

We recommend that you use high-quality interconnect cables when making connections to source equipment and recorders to preserve the integrity of the signals.

1. Connect the analog output of a CD player to the **CD Audio Inputs ①**.

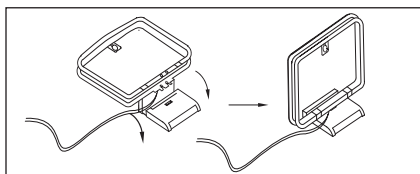
**NOTE:** When the CD player has both fixed and variable audio outputs, it is best to use the fixed output unless you find that the input to the receiver is so low that the sound is noisy, or so high that it is distorted.

2. Connect the analog Play/Out jacks of a cassette deck, MD, CD-R or other audio recorder to the **Tape Input Jacks ③⑥**. Connect the analog Record/In jacks on the recorder to the **Tape Output Jacks ②** on the AVR 235.

3. Connect the output of any digital sources such as a CD or DVD changer or player, advanced video game, a digital satellite receiver, HDTV tuner or digital cable set-top box or the output of a compatible computer sound card to the **Optical and Coaxial Digital Audio Inputs ②③⑪⑩**.

4. Connect the coaxial or optical **Digital Audio Outputs ⑪⑩** on the rear panel of the AVR 235 to the matching digital input connections on a CD-R or MiniDisc recorder.

5. Assemble the AM Loop Antenna supplied with the unit so that the tabs at the bottom of the antenna loop snap into the holes in the base. Connect it to the **AM Antenna Terminals ⑤⑦**.



6. Connect the supplied FM antenna to the **FM (75-ohm) Connection ③⑧**. The FM antenna may be an external roof antenna, an inside powered or wire-lead antenna or a connection from a cable TV system. If the antenna or connection uses 300-ohm twin-lead cable, you must use an optional 300-ohm-to-75-ohm adapter to make the connection.

7. Connect the front, center, surround and surround back speaker outputs **⑦⑧⑨⑩** to the respective speakers.

To ensure that all the audio signals are carried to your speakers without loss of clarity or resolution, we suggest that you use high-quality speaker cable. Many brands of cable are available and the choice of cable may be influenced by the distance between your speakers and the receiver, the type of speakers you use, personal preferences and other factors. Your dealer or installer is a valuable resource to consult in selecting the proper cable.

Regardless of the brand of cable selected, we recommend that you use a cable constructed of multistrand copper with a gauge of 14 or smaller. Remember that in specifying cable, the lower the number, the thicker the cable.

Cable with a gauge of 16 may be used for short runs of less than 10 feet. We do not recommend that you use cables with an AWG equivalent of 18 or higher, due to the power loss and degradation in performance that will occur.

Cables that are run inside walls should have the appropriate markings to indicate listing with UL, CSA or other appropriate testing agency standards. Questions about running cables inside walls should be referred to your installer or a licensed electrician who is familiar with the NEC and/or the applicable local building codes in your area.

When connecting wires to the speakers, be certain to observe proper polarity. Note that the positive (+) terminal of each speaker connection now carries a specific color code, as noted on page 7. However, most speakers still use a red terminal for the positive (+) connection. Connect the "negative" or "black" wire to the same terminal on both the receiver and the speaker.

**NOTE:** While most speaker manufacturers adhere to an industry convention of using black terminals for negative and red ones for positive, some may vary from this configuration. To ensure proper phase and optimal performance, consult the identification plate on your speaker or the speaker's manual to verify polarity. If you do not know the polarity of your speaker, ask your dealer for advice before proceeding, or consult the speaker's manufacturer.

We also recommend that the length of cable used to connect speaker pairs be identical. For example, use the same length piece of cable to connect the front-left and front-right or surround-left and surround-right speakers, even if the speakers are a different distance from the AVR 235.

It is appropriate to configure the AVR 235 for either 5.1- or 7.1-channel operation, but not for 6.1 channels. When 6.1-channel program material or a 6.1-channel processing mode is in use, material for the surround back channel will be outputted simultaneously through both the **Surround Back Left and Right Speaker Outputs ⑧**. Connecting only one loudspeaker to these speaker terminals will not only deprive you of the benefits of 7.1-channel surround modes, such as Logic 7, but will also interfere with the functioning of EzSet speaker calibration, as described on page 23. It may also put undesirable strain on the surround back amplifier circuits and power supplies.

8. Connections to a subwoofer are normally made via a line-level audio connection from the **Subwoofer Output ⑥** to the line-level input of a subwoofer with a built-in amplifier. When a passive subwoofer is used, the connection first goes to a power amplifier, which will be connected to one or more subwoofer speakers. If you are using a powered subwoofer that does not have line-level input connections, follow the instructions furnished with the speaker for connection information.

9. If an external multichannel audio source with 5.1 outputs such as an external digital processor/decoder, DVD-Audio or SACD player is used, connect the outputs of that device to the **6/8-Channel Direct Inputs ②⑤**.

## Video Equipment Connections

Video equipment is connected in the same manner as audio components. Again, the use of high-quality interconnect cables is recommended to preserve signal quality.

1. Connect a VCR's, personal video recorder's (PVR) or other video source's audio and video Play/Out jacks to the **Video 1 or Video 2 Audio/Video and S-Video Input Jacks ②⑤③① ③③** on the rear panel. The Audio and Video Record/In jacks on the VCR should be connected to the **Video 1 or Video 2 Audio/Video and S-Video Output Jacks ②④②⑦ ③② ③④** on the AVR 235.

Although any video device may be connected to these jacks, we recommend connecting your video recorder to the **Video 1 Audio/Video and S-Video Input and Output Jacks ②②④③① ③②** so that you may take advantage of the fact that the remote control is preprogrammed with video recorder product codes for the Video 1 device.

2. Connect the analog audio and video outputs of a satellite receiver, cable TV converter, television set or any other video source to the **Video 2 or Video 3 Audio/Video and S-Video Input Jacks ②⑤②⑦②⑧ ③⑤**.

# INSTALLATION AND CONNECTIONS

Although any video device may be connected to these jacks, we recommend connecting your cable TV converter or satellite receiver so that you may take advantage of the fact that the remote control is preprogrammed with the product codes of these device types for the Video 2 device. If your device is capable of switching component video, we particularly recommend connecting it to the **Video 2 Audio Input Jacks 33**, as the **Video 2 Component Video Inputs 1** are assigned to the Video 2 device.

3. Connect the analog audio and video outputs of a television or other video device to the **Video 3 Audio/Video and S-Video Input Jacks 28/35**. Although any video or audio device may be connected to these jacks, we recommend connecting your TV so that you may take advantage of the fact that the remote control is preprogrammed with television product codes for the Video 3 device. **IMPORTANT:** If you are only using the television as a display device (i.e., if you receive your television programs through a cable box or satellite receiver), do not connect the TV's outputs to the **Video 3 Audio/Video and S-Video Input Jacks 28/35**, or to any other inputs on the AVR 235.

4. Connect the analog audio and video outputs of a DVD or laser disc player to the **DVD Audio/Video and S-Video Inputs 21/30**.

5. Connect the digital audio outputs of a DVD player, satellite receiver, cable box or HDTV converter to the appropriate **Optical or Coaxial Digital Inputs 20/23/18/19**.

6. Connect the **Video and/or S-Video Monitor Output 19/29** jacks on the receiver to the composite or S-Video input of your television monitor or video projector.

7. If your DVD player and monitor both have component video connections, connect the component outputs of the DVD player to the **DVD Component Video Inputs 13**. Even when component video connections are used, the audio connections should still be made to either the analog **DVD Audio Inputs 30** or any of the **Optical or Coaxial Digital Input Jacks 20/23/18/19**.

8. If another device with component video outputs is available, connect it to the **Video 2 Component Video Inputs 1**. The audio connections for this device should be made to either the **Video 2 Audio Inputs 33** or any of the **Optical or Coaxial Digital Input Jacks 20/23/18/19**.

9. If the component video inputs are used, connect the **Component Video Monitor Outputs 11** to the component video inputs of your TV, projector or display device.

10. If you have a camcorder, video game or other audio/video device that is connected to the AVR on a temporary rather than permanent basis, connect the audio, video and digital audio outputs of that device to the **Front-Panel Inputs 18/19/20/21**. A device connected here is selected as the Video 4 input, and the digital inputs must be assigned to the Video 4 input. (See page 17 for more information on input configuration.)

## Video Connection Notes:

- When the component video jacks are used, the on-screen menus are not visible and you must switch to the standard composite or S-Video input on your TV to view them.
- The AVR 235 will accept either standard composite, S-Video or Y/Pr/Pb component video signals. However, it will not convert any of these signals to a different format.
- When connecting a video source to the AVR 235, you may use composite, component or S-Video, but only one type of video may be connected for each device.
- When more than one video format is used, it is necessary to make a separate connection from the AVR to your video display for each format. For example, if both composite and component sources are connected to the AVR 235, both the **Composite and Component Video Monitor Outputs 11/29** must be connected to the appropriate inputs on your video display.

## AC Power Connections

This unit is equipped with two accessory AC outlets. They may be used to power accessory devices, but they should not be used with high-current-draw equipment such as power amplifiers. The total power draw to each outlet may not exceed 100 watts.

The **Switched AC Accessory Outlet 15** will receive power only when the unit is on. This is recommended for devices that have no power switch or a mechanical power switch that may be left in the "ON" position.

**NOTE:** Many audio and video products go into a Standby mode when they are used with switched outlets, and cannot be fully turned on using the outlet alone without a remote control command.

The **Unswitched AC Accessory Outlet 16** will receive power as long as the unit is plugged into a powered AC outlet.

Once the **AC Power Cord 14** is connected, you are almost ready to enjoy the AVR 235's incredible power and fidelity!

## OPERATION

## Basic Operation

Once you have completed the initial setup and configuration of the AVR 235, it is simple to operate and enjoy. The following instructions will help you maximize the enjoyment of your new receiver:

## Turning the AVR 235 On or Off

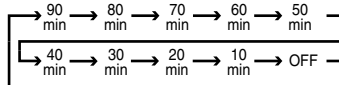
- When using the AVR 235 for the first time, you must press the **Main Power Switch 1** on the front panel to turn the unit on. This places the unit in a Standby mode, as indicated by the amber color of the **Power Indicator 2**. Once the unit is in Standby, you may begin a listening session by pressing the **Standby/On Switch 3** on the front panel, or the **Power On Button 4** or **AVR Selector 6** on the remote. The **Power Indicator 2** will turn blue. This will turn the unit on and return it to the input source that was last used. The unit may also be turned on from Standby by pressing any of the **Input Selector Buttons 5 7** on the remote or the **Input Source Selector Button 16** on the front panel.

**NOTE:** After pressing one of the **Input Selector Buttons 5 7** to turn the unit on, press the **AVR Selector 6** to set the remote control to the AVR 235 functions.

To turn the unit off at the end of a listening session, simply press the **Standby/On Switch 3** on the front panel or the **Power Off Button 1** on the remote. Power will be shut off to any equipment plugged into the rear-panel **Switched AC Accessory Outlet 15** and the **Power Indicator 2** will turn amber.

When the remote is used to turn the unit "off" it is actually placing the system in a Standby mode, as indicated by the amber color of the **Power Indicator 2**.

- To program the AVR 235 for automatic turn-off, press the **Sleep Button 10** on the remote. Each press of the button will decrease the time before shutdown in the following sequence:



The sleep time will be displayed in the **Lower Display Line 30** and it will count down until the time has elapsed.

When the programmed sleep time has elapsed, the unit will automatically turn off. The front-panel display will dim to one-half brightness when the Sleep function is programmed. To cancel the Sleep function, press and hold the **Sleep Button 10** until the information display returns to normal brightness; the Sleep indicator numbers will disappear and the words **SLEEP OFF** will appear in the **Lower Display Line 30**.

When you will be away from home for an extended period of time, it is always a good idea to completely turn the unit off with the front-panel **Main Power Switch 1**.

**NOTE:** All preset memories are lost if the unit is left turned off by using the **Main Power Switch 1** for more than four weeks.

## Source Selection

- To select a source, press any of the **Input Selector Buttons 5 7** on the remote.
- The input source may also be changed by pressing the front-panel **Input Source Selector Button 16**. Each press of the button will move the input selection through the list of available inputs.
- As the input is changed, the AVR 235 will automatically switch to the digital input (if selected), surround mode, speaker configuration, output levels, crossover frequency and night mode status that were entered during the configuration process for that source.
- The front-panel **Video 4 Inputs 20/21**, **Optical 3 Digital Input 18** or the **Coaxial 3 Digital Input 19** may be used to connect a device such as a video game or camcorder to your home entertainment system on a temporary basis.
- As the input source is changed, the new input name will appear momentarily as an on-screen display in the lower third of the video display. The input name will also appear in the **Upper Display Line 29** and in the front-panel **Input Indicators 27**.
- When an audio source is selected, the last video input used remains routed to the **Video 1/Video 2 Video Outputs 24/27/32 34** and **Video and S-Video Monitor Outputs 19/29**. This permits simultaneous viewing and listening to different sources. This also allows you to choose a video source and then select the **6/8-Channel Direct Inputs 26** as the audio source.
- When a composite or S-Video source is selected, the video signal for that input will be routed to the **S-Video Monitor Output 19** and will be viewable on a TV monitor connected to the AVR 235.

## 6-Channel/8-Channel Direct Input

- There are two input choices available for use with sources such as a DVD-Audio or SACD player that are connected to the **6/8-Channel Direct Inputs 26**. Select the appropriate input according to the way your system and source equipment are configured:

**6 CH DIRECT** should be used when the SBR and SBL inputs are NOT in use. The AVR 235 operates on the assumption that the input source device has its own internal bass-management system. This input passes the input from the source directly through to the volume control without any analog to digital conversion and it mutes the unused input jacks to prevent unwanted noise from interfering with system performance.

**8 CH DIRECT** should be used when an input is connected to all eight **8-Channel Direct Inputs 26**. The AVR 235 operates on the assumption that the input source device has its own internal bass-management system. This input passes the input from the source directly through to the volume control without any analog-to-digital conversion, and it mutes the unused input jacks to prevent unwanted noise from interfering with system performance.

## Volume Control

- Adjust the volume to a comfortable level using the front-panel **Volume Control 26** or remote **Volume Up/Down Buttons 38**.
- When listening in one of the Stereo modes with the surround circuits off, the **Balance Control 23** may be used to adjust the relative sound output between the front left and right speakers. For all other modes, it is important that the **Balance Control 23** remain in the "12 o'clock" position in order to ensure a proper sound field presentation.
- To temporarily silence all speaker outputs, press the **Mute Button 42**. This will interrupt the output to all speakers and the headphone jack, but it will not affect any recording or dubbing that may be in progress. When the system is muted, the word **MUTE** will flash in the **Lower Display Line 30**. Press the **Mute Button 42** again to return to normal operation.
- You may adjust the bass and treble tone controls at any point during a listening session by simply turning the **Bass Control 22** or **Treble Control 24** until the desired setting is achieved. You may also totally remove the tone controls from the circuit so that the output is "flat" at any time by pressing the **Tone Mode Button 5** and then pressing the **Button 10** so that **TONE OFF** appears in the on-screen display and the **Lower Display Line 30**.



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- For private listening, plug the 1/4" stereo phone plug from a pair of stereo headphones into the front-panel **Headphone Jack 4**. When the headphone plug is connected, all speakers will be silenced and **DOLBY H:BP** will scroll once across the **Lower Display Line 30**, indicating that the headphone output is in the Bypass mode, and to confirm that no processing is being used. When the headphone plug is removed, the audio feed to the speakers will be restored.
- When the headphones are in use, you may take advantage of the Dolby Headphone modes to bring added spaciousness to headphone listening. Press the **Dolby Mode Select Button 23** or the **Surround Mode Group Selector 7** to cycle through the three Dolby Headphone modes and select the one that you prefer.

## Surround Mode Selection

One of the most important features of the AVR 235 is its ability to reproduce a full multichannel surround sound field from digital sources, analog matrix surround-encoded programs and standard stereo programs.

Selection of a surround mode is based on personal taste, as well as the type of program source material being used. For example, motion pictures or TV programs bearing the logo of one of the major surround-encoding processes, such as Dolby Surround or DTS Stereo, may be played in either the Dolby Digital, Dolby Pro Logic II Cinema, Dolby Pro Logic IIx Cinema, DTS Neo:6 Cinema or Logic 7 Cinema surround modes, depending on the source material.

**NOTE:** Once a program has been encoded with matrix surround information, it retains the surround information as long as the program is broadcast in stereo. Thus, movies with surround sound may be decoded via any of the analog surround modes such as Dolby Pro Logic II Movie, Logic 7 Cinema or DTS Neo:6 Cinema, when they are broadcast via conventional TV stations, cable, pay-TV and satellite transmission. In addition, a growing number of made-for-television programs, sports broadcasts, radio dramas and music CDs are also recorded in surround sound.

Even when a program is not listed as carrying intentional surround information, you may find that the Dolby Pro Logic II, Logic 7 Enhanced or DTS Neo:6, VMAx and the Hall or Theater modes often deliver enveloping surround presentations through the use of the natural information present in all stereo recordings.

Surround modes may be changed at any time by using either the front panel or remote control. To select a new surround mode from the front panel, first

press the **Surround Mode Group Selector Button 7** until the desired major surround mode group such as Dolby, DTS or Logic 7 is selected. Next, press the **Surround Mode Selector Button 8** to choose the specific individual surround mode.

To select a surround mode using the remote, press the button for the major surround mode group that includes the mode you wish to choose from: **Dolby 23**, **DTS Surround 24**, **DTS Neo:6 29**, **Logic 7 25**, **Stereo 28** or **DSP Surround 11**. The first press of the button will show the current mode from that group if it is already in use, or the first available mode if you are currently using another mode. To cycle through the available modes in that group, press the button again until the desired mode appears in the **Lower Display Line 30**, in the on-screen display and in the **Surround Mode Indicators 31**.

As the surround modes change, the appropriate **Surround Mode Indicator 31** will light to indicate which mode has been selected.

The Dolby Digital, Dolby Digital EX and DTS 5.1, DTS-ES Matrix and DTS-ES Discrete modes may only be selected when a digital input is in use. In addition, when a digital source is present, the AVR 235 will automatically select and switch to the correct mode, regardless of the mode that has been previously selected. For more information on selecting digital sources, see the Digital Audio Playback section below.

The Dolby Pro Logic IIx modes are available only when the AVR 235 has been configured for 6.1/7.1 operation by configuring the Surround Back speakers as either "Large" or "Small" as described on page 21. These modes provide a matrixed 6.1-channel presentation of analog sources. See page 27 for more information.

When the 6-channel/8-channel direct inputs are in use there is no surround processing, as these inputs take the analog output signals from an optional, external DVD-Audio or SACD player, or another source device and carry them straight through to the volume control without any further digital processing.

To listen to a program in traditional two-channel stereo, using the front left and front right speakers only (plus the subwoofer, if installed and configured), press the **Stereo Button 28** until **SURR OFF** appears in the **Lower Display Line 30**, or press the **Surround Mode Group Selector 7** until the Stereo modes appear in the on-screen display and **Lower Display Line 30**. Next, press the **Surround Mode Select Button 8** until **SURROUND OFF** appears in the on-screen display and **Lower Display Line 30**. The Surround Off mode provides an analog bypass of the digital processing, including bass management. Scroll until

**SURROUND OFF DSP** appears if you require bass management (usually used when the system includes a separate subwoofer).

## Digital Audio Playback

Digital audio is a major advancement over older analog surround processing systems such as Dolby Pro Logic. It delivers five (or six as of this writing) discrete channels: left front, center, right front, left surround and right surround (or back surround, if it is a 6.1-channel format). Each channel reproduces full frequency range (20Hz to 20kHz) and offers dramatically improved dynamic range and significant improvements to signal-to-noise ratios. In addition, digital systems have the capability to deliver an additional channel that is specifically devoted to low-frequency information. This is the ".1" channel referred to when you see these systems described as "5.1," "6.1" or "7.1." The bass channel is separate from the other channels, but since it is intentionally bandwidth-limited, sound designers have given it that unique designation.

### Dolby Digital

Dolby Digital is a standard part of DVD, and is available on specially encoded LD discs and satellite broadcasts and it is a part of the high-definition television (HDTV) system.

An optional, external RF demodulator is required to use the AVR 235 to listen to the Dolby Digital soundtracks available on laser discs. Connect the RF output of the LD player to the demodulator and then connect the digital output of the demodulator to the **Optical or Coaxial Inputs 18/19/20/23** of the AVR 235. No demodulator is required for use with DVD players or DTS-encoded laser discs.

### DTS

DTS is another digital audio system that is capable of delivering 5.1 or 6.1 discrete or matrix sound field reproduction. Although both DTS and Dolby Digital are digital, they use different methods of encoding the signals, and thus they require different decoding circuits to convert the digital signals back to analog.

DTS-encoded soundtracks are available on select DVD and LD discs, as well as on special audio-only DTS discs. You may use any LD or CD player equipped with a digital output to play DTS-encoded discs with the AVR 235. All that is required is to connect the player's output to either an **Optical or Coaxial Input** on the rear panel **20/23** or front panel **18/19**.

In order to listen to DVDs encoded with DTS soundtracks, the DVD player must be compatible with the DTS signal as indicated by a DTS logo on the player's front panel. Early DVD players may not be able to play DTS-encoded DVDs. This does not indicate a problem

(Continued on p. 28)

## OPERATION

## Surround Mode Chart

| MODE                                               | FEATURES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dolby Digital                                      | Available only with digital input sources encoded with Dolby Digital data. It provides up to five separate main audio channels and a special dedicated low-frequency effects (LFE) channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Dolby Digital EX                                   | Available when the receiver is configured for 6.1/7.1-channel operation, Dolby Digital EX is the latest version of Dolby Digital. When used with movies or other programs that have special encoding, Dolby Digital EX reproduces specially encoded soundtracks so that a full 6.1/7.1 sound field is available. When the receiver is set for 6.1/7.1 operation and a Dolby Digital signal is present, the EX mode is automatically selected. Even if specific EX encoding is not available to provide the additional channel, the special algorithms will derive a 6.1/7.1 output.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| DTS 5.1                                            | When the speaker configuration is set for 5.1-channel operation, the DTS 5.1 mode is available when DVD, audio-only music or laser discs encoded with DTS data are played. DTS 5.1 provides up to five separate main audio channels and a special dedicated low-frequency channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| DTS-ES 6.1 Matrix<br>DTS-ES 6.1 Discrete           | When the speaker configuration is set for 6.1/7.1 operation, playback of a DTS-encoded program source will automatically trigger the selection of one of the two DTS-ES modes. Newer discs with special DTS-ES discrete encoding will be decoded to provide six discrete, full-bandwidth channels plus a separate low-frequency channel. All other DTS discs will be decoded using the DTS-ES Matrix mode, which creates a 6.1-channel sound field from the original 5.1-channel soundtrack.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Dolby Pro Logic II<br>Movie<br>Music<br>Pro Logic  | Dolby Pro Logic II is the latest version of Dolby Laboratory's benchmark surround technology that decodes full-range, discrete left, center right, right surround and left surround channels from either matrix surround-encoded programs and conventional stereo sources when an analog input is in use. The Dolby Pro Logic II Movie mode is optimized for movie soundtracks, while the Pro Logic II Music mode should be used with musical selections. The Pro Logic mode activates original Pro Logic processing for those who prefer that presentation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Logic 7 Cinema<br>Logic 7 Music<br>Logic 7 Enhance | Exclusive to Harman Kardon for A/V receivers, Logic 7 is an advanced mode that extracts the maximum surround information from either surround-encoded programs or conventional stereo material. Depending on the number of speakers in use and the selection made in the <b>SURROUND SELECT</b> menu, the "5.1" versions of Logic 7 modes are available when the 5.1 option is chosen, while the "7.1" versions of Logic 7 produce a full sound field presentation, including back surround speakers when the "6.1/7.1" option is chosen. The Logic 7 C (or Cinema) mode should be used with any source that contains Dolby Surround or similar matrix encoding. Logic 7 C delivers increased center-channel intelligibility, and more accurate placement of sounds with fades and pans that are much smoother and more realistic than with other decoding techniques. The Logic 7 M or Music mode should be used with analog or PCM stereo sources. Logic 7 M enhances the listening experience by presenting a wider front soundstage and greater rear ambience. Both Logic 7 modes also direct low-frequency information to the subwoofer (if installed and configured) to deliver maximum bass impact. The Logic 7 E (or Enhance) mode, available only when the 5.1 option is chosen, is an extension of the Logic 7 mode that is primarily used with musical programs. Logic 7 adds additional bass enhancement that circulates low frequencies in the 40Hz to 120Hz range to the front and surround speakers to deliver a less localized soundstage that appears broader and wider than when the subwoofer is the sole source of bass energy. |
| DTS Neo:6 Cinema<br>DTS Neo:6 Music                | These two modes are available when any analog source is playing to create a six-channel surround presentation from conventional Matrix-encoded and traditional Stereo sources. Select the Cinema version of Neo:6 when a program with any type of analog Matrix surround encoding is present. Select the Music version of Neo:6 for optimal processing when a nonencoded, two-channel stereo program is being played.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Dolby Virtual Speaker                              | Dolby Virtual Speaker uses advanced technology to simulate the sonic signature of a speaker location even when there is no speaker physically present in that location. The Reference ("REF") mode activates any missing speakers to simulate a 5.1 presentation with accurate localization. The Wide mode virtualizes the locations of the front-channel speakers to create a wider image and a more enveloping sound field. It is available no matter how many speakers are present.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Theater                                            | The Theater mode creates a sound field that resembles the acoustic feeling of a standard live-performance theater.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Hall 1, Hall 2                                     | The two Hall modes create sound fields that resemble a small (Hall 1) and medium-sized (Hall 2) concert hall.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| VMAx Near<br>VMAx Far                              | When only the two front-channel loudspeakers are used, Harman's patented VMAx mode delivers a three-dimensional sound space with the illusion of "phantom speakers" at the center and surround positions. The VMAx N, or "Near Field," mode should be selected when your listening position is less than five feet from the speakers. The VMAx F, or "Far Field," mode should be selected when your listening position is greater than five feet from the speakers. The VMAx modes are also available using the <b>Headphones Output 4</b> . When headphones are being used, the Far Field mode will appear to push the sound field away from your ears, reducing the "inside the head" sensation often experienced when using headphones.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 5-Channel Stereo<br>7-Channel Stereo               | This mode takes advantage of multiple speakers to place a stereo signal at both the front and back of a room. Depending on whether the AVR has been configured for either 5.1 or 6.1/7.1 operation, one of these modes, but not both, is available at any time. Ideal for playing music in situations such as a party, it places the same signal at the front-left and surround-left, and front-right and surround-right speakers. The center channel is fed a summed mono mix of the in-phase material of the left and right channels.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Surround<br>Off (Stereo)                           | This mode turns off all surround processing and presents the pure left- and right-channel presentation of two-channel stereo programs. When <b>SURROUND OFF</b> is selected, the unit is in a "bypass" mode with no bass management. When <b>SURROUND OFF + DSP</b> is selected, the signal is digitized and bass management settings are applied.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Dolby Headphone<br>DH 1<br>DH 2<br>DH 3            | Dolby Headphone enables ordinary stereo headphones to portray the sound of a five-speaker surround-playback system. The DH1 mode creates a headphone presentation that resembles a small, well-damped room and is appropriate for use with both movies and music-only recordings. The DH2 mode creates a more acoustically live room particularly suited to music listening. The DH3 mode creates a larger room, more like a concert hall or movie theater. The Bypass mode bypasses any Dolby Headphone processing.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

For additional information on the specifics of surround modes and processing, information on Dolby modes may be found at [www.dolby.com/Consumer/Technologies](http://www.dolby.com/Consumer/Technologies), and information on DTS modes is available at [www.dtsonline.com/home&car/overview.php](http://www.dtsonline.com/home&car/overview.php).



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with the AVR 235, as some players cannot pass the DTS signal through to the digital outputs. If you are in doubt as to the capability of your DVD player to handle DTS discs, consult the player's owner's manual.

**IMPORTANT NOTE:** Many DVD players have a default setting that does not pass through the DTS data, even though the machine is capable of doing so. If your DVD player has the "DTS Digital Out" logo but does not trigger DTS playback in the AVR 235, change the player's settings in the "Audio" or "Bitstream" configuration menu so that DTS playback is enabled. The method for doing this will vary with each player. In some cases, the proper menu choice will be "Original," while in others it will be "DTS." Consult the owner's manual for your player to find the specific information to find the proper setting.

## Selecting a Digital Source

To utilize either digital mode, you must have properly connected a digital source to the AVR 235. Connect the digital outputs from DVD players, HDTV receivers, satellite systems or CD players to the **Optical** or **Coaxial Inputs 18/19/20/23**. In order to provide a backup signal and a source for analog stereo recording, the analog outputs provided on digital source equipment should also be connected to their appropriate inputs on the AVR 235 rear panel (e.g., connect the analog stereo audio output from a DVD to the **DVD Audio Inputs 30** on the rear panel when you connect the source's digital outputs).

If you have not already configured an input for a digital source using the on-screen menus as shown on pages 17–18, first select the input using the remote or front-panel controls, as outlined in this manual. Next, select the digital source by pressing the **Digital Select Button 17/13** and then using the **▲/▼ Buttons 14** on the remote or the **◀▶ Selector Buttons 10** on the front panel to choose any of the **OPTICAL** or **COAXIAL** inputs, as they appear in the **Upper Display Line 29** or on-screen display. When the digital source is playing, the AVR 235 will automatically detect which type of digital data stream is being decoded and display that information in the **Upper Display Line 29**.

## Digital Bitstream Indications

When a digital source is playing, the AVR 235 senses the type of bitstream data that is present. Using this information, the correct surround mode will automatically be selected. For example, DTS bitstreams will cause the unit to switch to DTS decoding, and Dolby Digital bitstreams will enable Dolby Digital decoding. When the unit senses PCM data from CDs or LDs, you may select any of the standard surround modes, such as Dolby Pro Logic II or Logic 7. Since the range of available surround modes is dependent on the type of digital data that is present, the AVR 235 uses a variety

of indicators to let you know what type of signal is present. This will help you to understand the choice of modes.

When a digital source is playing, the AVR 235 will display a variety of messages to indicate the type of bitstream being received. These messages will appear shortly after an input or surround mode is changed, and they will remain in the **Lower Display Line 30** for about five seconds before that portion of the display returns to the normal surround mode indication.

## Surround Mode Types

For Dolby Digital and DTS sources, a three-digit indication will appear, showing the number of channels present in the data. An example of this type of display is 3/2/1.

The first number indicates how many discrete front-channel signals are present.

- A "3" tells you that separate front left, center and front right signals are available. This will be displayed for Dolby Digital 5.1 and DTS 5.1 programs.
- A "2" tells you that separate front left and right signals are available, but there is no discrete center channel signal. This will be displayed for Dolby Digital bitstreams that have stereo program material.
- A "1" tells you that there is only a mono channel available in the Dolby Digital bitstream.

The middle number indicates how many discrete surround channel signals are present.

- A "2" tells you that separate surround left and right signals are available. This will be displayed for Dolby Digital 5.1 and DTS 5.1 programs.
- A "1" tells you that there is only a single, surround-encoded surround channel. This will appear for Dolby Digital bitstreams that have matrix encoding.
- A "0" indicates that there is no surround channel information. This will be displayed for two-channel stereo programs.

The last number indicates whether there is a discrete low-frequency effects (LFE) channel. This is the ".1" in the common abbreviation of "5.1" sound and it is a special channel that contains only bass frequencies.

- A ".1" tells you that an LFE channel is present. This will be displayed for Dolby Digital 5.1 and DTS 5.1 programs, as available.
- A "0" indicates that there is no LFE channel information available. However, even when there is no dedicated LFE channel, low-frequency sound will be present at the subwoofer output when the speaker configuration is set to show the presence of a subwoofer.

The information in the right side of the display will tell you if the digital audio data contains a special flag signal that will automatically activate the appropriate 6.1 mode. This will be shown as **EX-ON** or **EX-OFF** for Dolby Digital bitstreams, and **ES-ON** or **ES-OFF** for DTS bitstreams.

An **UNLOCK** message may appear in the **Lower Display Line 30**. This is your indication that the digital audio data stream has been interrupted or is no longer present. When that occurs, the unit's digital signal processor has no signal to lock onto, and is thus "unlocked." You may see this message when a DVD is first started until the stream is playing and the processor determines which mode to apply; or any time the data stream is stopped or paused, such as when the menus of some discs are displayed or when the player is switching between the different sections of a disc. You may also see the message when a satellite receiver, cable set-top or HDTV tuner is in use if the digital audio is temporarily interrupted when channels are changed or when a cable box switches from a channel with a digital data stream to a channel with analog audio only. The **UNLOCK** message is normal, and does not indicate any problem with your receiver. Rather, it tells you that the incoming data has simply been paused or is not present for a variety of possible reasons.

When Dolby Digital 3/2/1 or DTS 3/2/1 signals are being played, the AVR will automatically switch to the proper surround mode, and no other processing may be selected. When a Dolby Digital signal with a 3/1/0 or 2/0/0 signal is detected, you may select any of the Dolby surround modes.

It is always a good idea to check the readout for the channel data to make certain that it matches the audio logo information shown on the back of a DVD package. In some cases, you will see an indication for "2/0/0" even when the disc contains a full 5.1, or 3/2/1, signal. When this happens, check the audio output settings for your DVD player or the audio menu selections for the specific disc being played to make certain that the player is sending the correct signal to the AVR.

## PCM Playback Indications

PCM is the abbreviation for Pulse Code Modulation, which is the type of digital signal used for standard CD playback, and other non-Dolby Digital and non-DTS digital sources such as Mini-Disc. When a PCM signal is detected, the **Lower Display Line 30** will briefly show a message with the letters PCM, in addition to a readout of the sampling frequency of the digital signal.

In most cases, this will be **48kHz**, though in the case of specially mastered, high-resolution audio discs, you will see a **96kHz** indication.

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**Speaker/Channel Indicators**

In addition to the bitstream indicators, the AVR 235 features a set of unique channel-input indicators that tell you how many channels of digital information are being received and/or whether the digital signal is interrupted (see Figure 9).

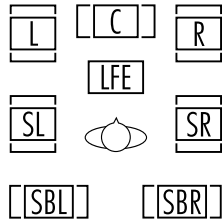


Figure 9

These indicators are the L/C/R/LFE/SL/SR/SBL/SBR letters that are inside the center boxes of the **Speaker/Channel Input Indicators 28** on the front panel. When a standard analog signal is in use, only the "L" and "R" indicators will light, as analog signals have only left and right channels.

Digital signals, however, may have two, five, six or seven channels, depending on the program material, the method of transmission and the way in which it was encoded. When a digital signal is playing, the letters in these indicators will light in response to the specific signal being received. It is important to note that although Dolby Digital, for example, is referred to as a "5.1" system, not all Dolby Digital DVDs or programs are encoded for 5.1. Thus, it is sometimes normal for a DVD with a Dolby Digital soundtrack to trigger only the "L" and "R" indicators.

**NOTE:** Many DVD discs are recorded with both "5.1" and "2.0" versions of the same soundtrack. When playing a DVD, always be certain to check the type of material on the disc. Most discs show this information in the form of a listing or icon on the back of the disc jacket. When a disc does offer multiple soundtrack choices, you may have to make some adjustments to your DVD player (usually with the "Audio Select" button or in a menu screen on the disc) to send a full 5.1 feed to the AVR 235. It is also possible for the type of signal feed to change during the course of a DVD playback. In some cases, the previews of special material will only be recorded in 2.0 audio, while the main feature is available in 5.1 audio. The AVR 235 will automatically sense changes to the bitstream and channel count and reflect them in these indicators.

The letters used by the **Speaker/Channel Input Indicators 28** also flash to indicate when a bitstream has been interrupted. This will happen when a digital input source is selected before the playback starts, or when a digital source such as a DVD is paused. The **UNL OCK** message will also appear on-screen and in the **Lower Display Line 30**. The **UNL OCK**

message will also appear on screen and in the **Lower Display Line 30**. The flashing indicators remind you that the playback has stopped due to the absence of a digital signal and not through any fault of the AVR 235. This is normal, and the digital playback will resume once the playback is started again.

**Night Mode**

A special feature of Dolby Digital is the Night mode, which enables specially encoded Dolby Digital input sources to be played back with full digital intelligibility while reducing the minimum peak level by 1/4 to 1/3. This prevents abruptly loud transitions from disturbing others, without reducing the impact of the digital source. The Night mode is available only when Dolby Digital signals with special data are being played.

The Night mode may be engaged when a Dolby Digital DVD is playing by pressing the **Night Mode Button 12** on the remote. Next, press the **▲/▼ Buttons 14** to select either the middle range or full-compression versions of the Night mode. To turn the Night mode off, press the **▲/▼ Buttons 14** until the message in the lower third of the video display and in the **Lower Display Line 30** reads **D - RANGE OFF**.

The Night mode may also be selected to always be on at either level of compression using the options in the **DOLBY** menu. See page 19 for information on using the menus to set this option.

**IMPORTANT NOTES ON DIGITAL PLAYBACK:**

- When the digital playback source is stopped, or in a pause, fast forward or chapter search mode, the digital audio data will momentarily stop, and the channel position letters inside the **Speaker/Channel Input Indicators 28** will flash. The **UNL OCK** message will also appear on-screen and in the **Lower Display Line 30**. This is normal and does not indicate a problem with either the AVR 235 or the source machine. The AVR 235 will return to digital playback as soon as the data is available and when the machine is in a standard play mode.
- Although the AVR 235 will decode virtually all current DVD movies, CDs and HDTV sources, it is possible that some future digital sources may not be compatible with the AVR 235.
- Not all digitally encoded programs contain full 5.1- or 6.1-channel audio. Consult the program guide that accompanies the DVD or laser disc to determine which type of audio has been recorded on the disc. The AVR 235 will automatically sense the type of digital surround encoding used and adjust to accommodate it.

- When a digital source is playing, you may not be able to select some of the analog surround modes such as Dolby Pro Logic II, Dolby 3, Stereo, Hall, Theater or Logic 7.
- When a Dolby Digital or DTS source is playing, it is not possible to make an analog recording using the **Tape Outputs 2** and **Video 1** or **Video 2 Audio Outputs 32 34**. However, the digital signals will be passed through to the **Digital Audio Outputs 17 18**.

**PCM Audio Playback**

PCM (Pulse Code Modulation) is the noncompressed digital audio system used for compact discs and laser discs. The digital circuits in the AVR 235 are capable of high-quality digital-to-analog decoding, and they may be connected directly to the digital audio output of your CD or LD player.

Connections may be made to either the rear-panel **Optical or Coaxial Inputs 20 23** or the front-panel **Digital Inputs 18 19**.

To listen to a PCM digital source, first select the input for the desired source (e.g., CD). Next press the **Digital Select Button 13 17** and then use the **▲/▼ Buttons 14** on the remote, or the **◀▶ Selector Buttons 10** on the front panel, until the desired choice appears in the **Upper Display Line 29**.

During PCM playback, you may select any Surround mode except Dolby Digital or DTS.

**Tuner Operation**

The AVR 235's tuner is capable of tuning AM, FM and FM Stereo broadcast stations. Stations may be tuned manually, or they may be stored as favorite station presets and recalled from a 30-position memory.

**Station Selection**

1. Press the **AM/FM Tuner Select Button 7** on the remote to select the tuner as an input. The tuner may be selected from the front panel by either pressing the **Input Source Selector 16** until the tuner is active or by pressing the **AM/FM Band Selector 11**.
2. Press the **AM/FM Tuner Select Button 7** or **AM/FM Band Selector 11** again to switch between AM and FM so that the desired frequency band is selected.
3. Press the **Tuner Mode Button 17 19** to select manual or automatic tuning.

When the button is pressed so that **AUTO** appears in the **Lower Display Line 30** each press of the **Tuning Selectors 9 21** will put the tuner in a scan mode that seeks the next higher or

# OPERATION

lower frequency station with acceptable signal strength. An **AUTO ST TUNED** indication will momentarily appear when the station stops at a stereo FM station, and an **AUTO TUNED** indication will momentarily appear when an AM or monaural FM station is tuned. Press the Tuning buttons again to scan to the next receivable station.

When the button is pressed so that **MANUAL** appears in the **Lower Display Line 30** each tap of the Selector will increase or decrease the frequency by one increment. When the tuner receives a strong enough signal for adequate reception, **MANUAL TUNED** will appear in the **Lower Display Line 30**.

- Stations may also be tuned directly in either the automatic or manual mode. To enter a station's frequency directly, first select the AM or FM band as desired by pressing the **AM/FM Tuner Select Button 7 11**. Next, press the **Direct Button 20**. Within five seconds of when **DIRECT IN** scrolls in the **Upper Display Line 29**, enter the station frequency by pressing the **Numeric Keys 18**. If you press an incorrect button while entering a direct frequency, press the **Clear Button 35** to start over.

**NOTE:** When the FM reception of a station is weak, audio quality will be increased by switching to Mono mode by pressing the **Tuner Mode Button 17 19** so that **MANUAL** appears momentarily in the **Lower Display Line 30** and then goes out. This will also activate manual tuning mode.

## Preset Tuning

Using the remote, up to 30 stations may be stored in the AVR 235's memory for easy recall using the front-panel controls or the remote.

To enter a station into the memory, first tune the station using the steps outlined above. Then:

- Press the **Memory Button 48** on the remote. The two underscore lines will appear at the far right side of the **Upper Display Line 29**.
- Within five seconds, press the **Numeric Keys 18** corresponding to the location where you wish to store this station's frequency. Once entered, the preset number will appear in the **Upper Display Line 29**.
- Repeat the process after tuning any additional stations to be preset.

## Recalling Preset Stations

- To manually select a station previously entered in the preset memory, press the **Numeric Keys 18**

that correspond to the desired station's memory location.

- To manually tune through the list of stored preset stations one by one, press the **Preset Stations Selector Buttons 14 34** on the front panel or remote.

## Recording

In normal operation, the audio or video source selected for listening through the AVR 235 is sent to the record outputs. This means that any program you are watching or listening to may be recorded simply by placing machines connected to the **Tape Outputs 2** or **Video 1/Video 2 Audio and Video Outputs 24 27 32 34** in the Record mode.

When a digital audio recorder is connected to the **Digital Audio Outputs 17 18**, you are able to record the digital signal using a CD-R, MiniDisc or other digital recording system.

### NOTES:

- The digital outputs are active only when a digital signal is present, and they do not convert an analog input to a digital signal, or change the format of the digital signal. In addition, the digital recorder must be compatible with the output signal. For example, the PCM digital input from a CD player may be recorded on a CD-R or MiniDisc, but Dolby Digital or DTS signals may not.
- Please make certain that you are aware of any copyright restrictions on any material you copy. Unauthorized duplication of copyrighted materials is prohibited by federal law.

## Output Level Trim Adjustment

Normal output level adjustment for the AVR 235 is established using the test tone, as outlined on pages 23–24. In some cases, however, it may be desirable to adjust the output levels using program material such as a test disc, or a selection you are familiar with. Additionally, the output level for the subwoofer can only be adjusted using this procedure.

To adjust the output levels using program material, first set the reference volume for the front left and front right channels using the **Volume Control 26 38 1**.

If you are using a disc with test signals or an external signal generator as the source from which to trim the output levels, you may use the EzSet feature of the remote to guide you to the correct SPL level. To use the remote for this purpose, press and quickly release the **SPL Selector Button 40** to activate the sensor. While the test tone is circulating, the **Program/SPL Indicator 3** will change color to indicate the level.

Adjust the level using the **▲/▼ Buttons 14** until the LED lights green for all channels. When it is red, the level is too high; when it is amber, the level is too low. Press the **SPL Selector Button 40** to turn the sensor and indicator off.

If you prefer, you may use a handheld SPL meter to guide you to the correct SPL levels. Set the meter to the C-Weighting Slow scale, and adjust the volume until the meter reads 75dB.

Once the reference level has been set, press the **Channel Select Button 13** and **FRONT LEVEL** will appear in the **Lower Display Line 30**. To change the level, first press the **Set Button 16**, and then use the **▲/▼ Buttons 14** to raise or lower the level. DO NOT use the volume control, as this will alter the reference setting.

Once the change has been made, press the **Set Button 16** and then press the **▲/▼ Buttons 14** to select the next output channel location that you wish to adjust. To adjust the subwoofer level, press the **▲/▼ Buttons 14** until **WOOFER LEVEL** appears in the **Lower Display Line 30**.

Repeat the procedure as needed until all channels requiring adjustment have been set. When all adjustments have been made and no further adjustments are made for five seconds, the AVR 235 will return to normal operation.

The channel output for any input may also be adjusted using the full-OSD on-screen menu system. First, set the volume to a comfortable listening level using the **Volume Control 26 38**. Then, press the **OSD Button 22** to bring up the **MASTER MENU** (Figure 1). Press the **▼ Button 14** until the on-screen ► cursor is next to the **CHANNEL ADJUST** line. Press the **Set Button 16** to activate the **CHANNEL ADJUST** menu.

Once the menu appears on your video screen, first use the **▲/▼ Buttons 14** to move the on-screen ► cursor so that it is next to the **TEST TONE** line. Press the **◀▶ Buttons 15** so that **OFF** appears. This will turn off the test tone and allow you to use your external test disc or other source material as the reference. Then, use the **▲/▼ Buttons 14** to select the channels to be adjusted. At each channel position, use the **◀▶ Buttons 15** to change the output level. Remember, the goal is to have the output level at each channel equal when heard at the listening position.

If you wish to reset all the levels to their original factory default of 0dB offset, press the **▲/▼ Buttons 14** so that the on-screen cursor is next to the **CHANNEL RESET** line and press the **◀▶ Buttons 15** so that the word **ON** appears. After the

levels are reset, resume the procedure outlined above to reset the levels to the desired settings. When all adjustments are done, press the ▲/▼ Buttons **14** to move the on-screen ► cursor so that it is next to **BACK TO MASTER MENU** and then press the **Set Button 16** if you wish to go back to the main menu to make other adjustments. If you have no other adjustments to make, press the **OSD Button 22** to exit the menu system.

**NOTE:** The output levels may be separately trimmed for each digital and analog surround mode. If you wish to have different trim levels for a specific mode, select that mode and then follow the instructions in the steps shown earlier.

### Memory Backup

This product is equipped with a memory backup system that preserves the system configuration information and tuner presets if the unit is accidentally unplugged or subjected to a power outage. This memory will last for approximately four weeks, after which time all information must be reentered.

# TROUBLESHOOTING GUIDE

| SYMPTOM                                                                | CAUSE                                                                                                                                                                          | SOLUTION                                                                                                                                                                                                                                                                                              |
|------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Unit does not function when Main Power Switch is pushed                | <ul style="list-style-type: none"> <li>No AC power</li> </ul>                                                                                                                  | <ul style="list-style-type: none"> <li>Make certain AC power cord is plugged into a live outlet.</li> <li>Check to see whether outlet is switch-controlled.</li> </ul>                                                                                                                                |
| Display lights, but no sound or picture                                | <ul style="list-style-type: none"> <li>Intermittent input connections</li> <li><b>Mute</b> is on</li> <li>Volume control is down</li> </ul>                                    | <ul style="list-style-type: none"> <li>Make certain that all input and speaker connections are secure.</li> <li>Press <b>Mute Button 42</b>.</li> <li>Turn up volume control.</li> </ul>                                                                                                              |
| Unit turns on, but front-panel display does not light up               | <ul style="list-style-type: none"> <li>Display brightness is turned off</li> </ul>                                                                                             | <ul style="list-style-type: none"> <li>Follow the instructions in the Display Brightness section on page 32 so that the display is set to <b>VFD FULL</b>.</li> </ul>                                                                                                                                 |
| No sound from any speaker; light around power switch is red            | <ul style="list-style-type: none"> <li>Amplifier is in protection mode due to possible short</li> <li>Amplifier is in protection mode due to internal problems</li> </ul>      | <ul style="list-style-type: none"> <li>Check speaker wire connections for shorts at receiver and speaker ends.</li> <li>Contact your local Harman Kardon service center.</li> </ul>                                                                                                                   |
| No sound from surround or center speakers                              | <ul style="list-style-type: none"> <li>Incorrect surround mode</li> <li>Input is monaural</li> <li>Incorrect configuration</li> <li>Stereo or Mono program material</li> </ul> | <ul style="list-style-type: none"> <li>Select a mode other than Stereo.</li> <li>There is no surround information from mono sources.</li> <li>Check speaker mode configuration.</li> <li>The surround decoder may not create center- or rear-channel information from nonencoded programs.</li> </ul> |
| Unit does not respond to remote commands                               | <ul style="list-style-type: none"> <li>Weak batteries in remote</li> <li>Wrong device selected</li> <li>Remote sensor is obscured</li> </ul>                                   | <ul style="list-style-type: none"> <li>Change remote batteries.</li> <li>Press the AVR selector.</li> <li>Make certain front-panel sensor is visible to remote, or connect remote sensor.</li> </ul>                                                                                                  |
| Intermittent buzzing in tuner                                          | <ul style="list-style-type: none"> <li>Local interference</li> </ul>                                                                                                           | <ul style="list-style-type: none"> <li>Move unit or antenna away from computers, fluorescent lights, motors or other electrical appliances.</li> </ul>                                                                                                                                                |
| Letters flash in the channel indicator display and digital audio stops | <ul style="list-style-type: none"> <li>Digital audio feed paused</li> </ul>                                                                                                    | <ul style="list-style-type: none"> <li>Resume play for DVD.</li> <li>Check that Digital Input is selected.</li> </ul>                                                                                                                                                                                 |
| Fan does not appear to operate                                         | <ul style="list-style-type: none"> <li>Additional cooling may not be required</li> </ul>                                                                                       | <ul style="list-style-type: none"> <li>The fan is activated only when additional cooling is required due to high internal temperature. It is normal for the fan to be inactive at normal volume levels.</li> </ul>                                                                                    |

In addition to the items shown above, additional information on troubleshooting possible problems with your AVR 235, or installation-related issues, may be found in the list of "Frequently Asked Questions" which is located in the Product Support section of our Web site at [www.harmankardon.com](http://www.harmankardon.com).

## Processor Reset

In the rare case in which the unit's operation or the displays seem abnormal, the cause may involve the erratic operation of the system's memory or microprocessor.

To correct this problem, first unplug the unit from the AC wall outlet and wait at least three minutes. After the pause, reconnect the AC power cord and check the unit's operation. If the system still malfunctions, a system reset may clear the problem.

To clear the AVR 235's entire system memory including tuner presets, output level settings, delay times and speaker configuration data, press and hold the **Tone Mode Button 5** buttons for three seconds. The unit will turn on automatically.

**NOTE:** Resetting the processor will erase any configuration settings you have made for speakers, output levels, surround modes and digital input assignments, as well as the tuner presets. The unit will be returned to the factory presets, and all settings for these items must be reentered.

If the system is still operating incorrectly, there may have been an electronic discharge or severe AC line interference that has corrupted the memory or microprocessor.

If these steps do not solve the problem, consult an authorized Harman Kardon service center.

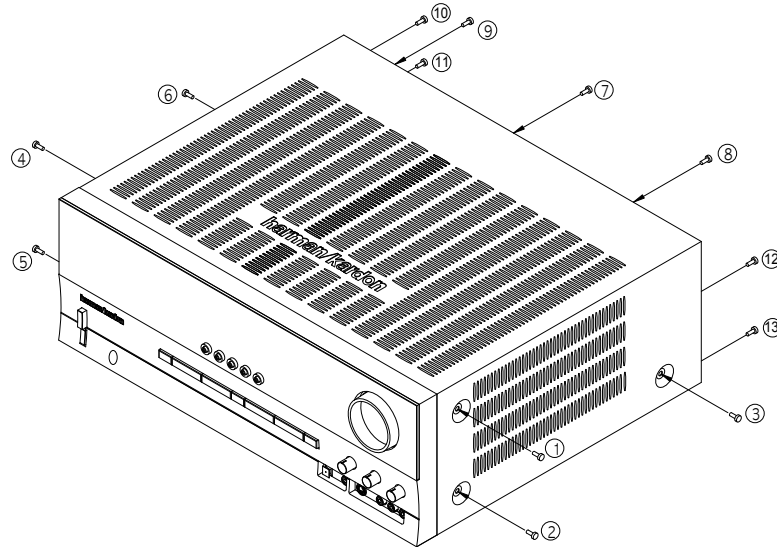


# DISASSEMBLY

# AVR235

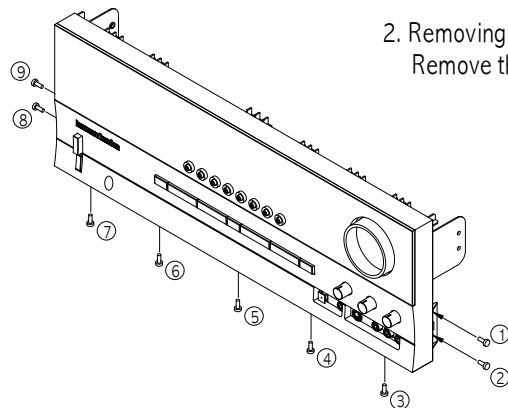
## 1. Removing the Top Cabinet Remove the Screws

① ~ ⑬



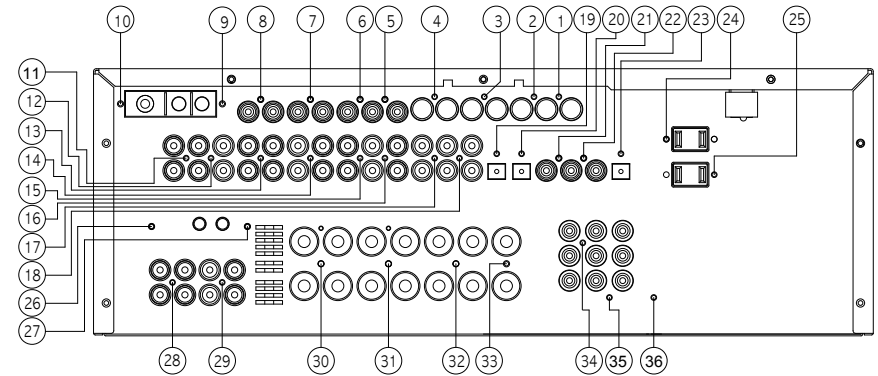
## 2. Removing the Front Panel Remove the Screws

① ~ ⑨



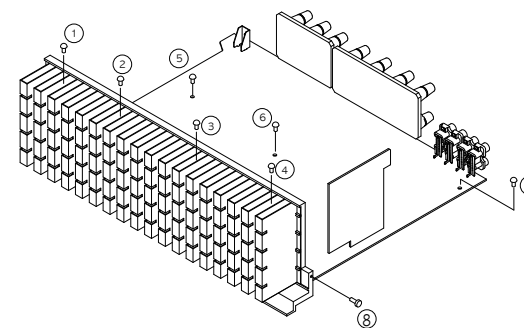
## 3. Removing the Rear Panel Remove the Screws

① ~ ③⑥



## 4. Removing the Main PCB Remove the Screws

① ~ ⑧



## ***DISASSEMBLY PROCEDURES(AVR235)***

### **I TOP-COVER (21) REMOVAL**

1. Remove 13 screws (S1,S7) and then remove the Top-cover.

### **II FRONT PANEL ASS'Y REMOVAL**

1. Remove the Top-cover, referring to the previous step1.
2. Disconnect the lead wire (BN72-32p) on the Fip PCB (37-1) from connector (CN72) on the Input PCB (39-1)
3. Disconnect the lead wire (BN80-11P) on the Fip PCB (37-1) from connector (CN80) on the Main PCB (38-1).
4. Disconnect the lead wire (BN16-8P,BN10-4P) on the Tone PCB (37-3) from connector (CN16,CN10) on the Connect PCB (37-7).
5. Disconnect the lead wire (BN41-6P) on the Tone PCB (37-3) from connector (CN41) on the Video PCB (40-1).
6. Disconnect the lead wire (BN18-5P) on the Digital input PCB (37-8) from connector (CN18) on the Input PCB (39-1).
7. Disconnect the lead wire (BN81-8P) on the Fip PCB (37-1) from connector (CN81) on the Trans PCB (40-5).
8. Disconnect the lead wire (BN15-6P) on the Fip PCB (37-1) from connector (CN15) on the Download PCB (37-9).
9. Remove 1 screw (S10) and then lead wire (JW82-2P) on the Phone PCB (37-4).
10. Remove 1screw (S10) and then lead wire (JW84-1P) on the Tone PCB (37-3)
11. Remove 10 screws (S1) and then remove the Front Panel ASS'Y.

### **III TONE PCB (37-3) REMOVAL**

1. Remove the Top-cover, referring to the previous step1.
2. Remove the Front Panel ASS'Y, referring to the previous step2.
3. Pull out the Volume Knob ASS'Y & 3 Rotary Knobs (5).
4. Remove 10 screws (S2,S14), and then remove the Tone PCB (37-3).
5. Disconnect the lead wire (BN84-5P,BN90-2P) One the Tone PCB (37-3) from connector (CN84,CN90) on the Fip PCB (37-1)
6. Disconnect the lead wire (BN87-6P) One the Tone PCB (37-3) from connector (CN87) on the Phone PCB (37-4)

### **IV PHONE PCB (37-4) REMOVAL**

1. Remove the Top-cover, referring to the previous step1.
2. Remove the Front Panel ASS'Y, referring to the previous step2.
3. Disconnect the lead wire (BN87-6P) One the Tone PCB (37-3) from connector (CN87) on the Phone PCB (37-4)
4. Disconnect the lead wire (BN85-2P) One the Fip PCB (37-1) from connector (CN85) on the Phone PCB (37-4)
5. Remove 2 screws (S2,S3) and then remove the Phone PCB (37-4)

### **V POWER LED PCB (37-6) REMOVAL**

1. Remove the Top-cover, referring to the previous step1.
2. Remove the Front Panel ASS'Y, referring to the previous step2.
3. Remove 2 screws (S2) and then remove the Power led PCB (37-6).
4. Disconnect the lead wire (BN88-4P) from connector (CN88) on the Fip PCB (37-1).

### **VI FIP PCB (37-1) REMOVAL**

1. Remove the Top-cover, referring to the previous step1.
2. Remove the Front Panel ASS'Y, referring to the previous step2.
3. Remove the Tone PCB (37-3), referring to the previous step3.
4. Remove the Phone PCB (37-4), referring to the previous step4.
5. Remove the Power led PCB (37-6), referring to the previous step5.
6. Remove 6 screws (S2) and then remove the Fip PCB (37-1)

## VII TUNER MODULE(41) REMOVAL

1. Remove the Top-cover, referring to the previous step1.
2. Disconnect the connector (CN1-Card cable) from connector (CN13) on the Input PCB ASS'Y (39-1).
3. Remove 2 screws (S8) and then remove the Tuner Module (40).

## VIII VIDEO PCB (40-1) REMOVAL

1. Remove the Top-cover, referring to the previous step1.
2. Disconnect the lead wire (BN41-6P) on the Tone PCB (37-3) from connector (CN41) on the Video PCB (40-1)
3. Disconnect the connector (CN15-Card cable) on the Input PCB (39-1) from connector (CN43) on the Video PCB (40-1).
4. Remove 6 screws (S8) and then remove the Video PCB (39-2).

## IX INPUT PCB (39-1,39-2) REMOVAL

1. Remove the Top-cover, referring to the previous step1.
2. Remove the Connect PCB (37-7).
3. Disconnect the lead wire (BN18-5P) on the Digital input PCB (37-8) from connector (CN18) on the Input PCB (39-1).
4. Disconnect the connect (BN72-Card cable) on the Fip PCB (37-1) from connector (CN72) on the Input PCB (39-1)
5. Remove 13 screws (S8,S11) and then remove the Input PCB (39-1).

## X Download PCB (37-9) REMOVAL

1. Remove the Top-cover, referring to the previous step1.
2. Disconnect the connector (CN15) from lead wire (BN15-6P) on the Fip PCB (37-2)
3. Remove 2 screws (S4) and then remove the Download PCB (37-9).

## XI POWER TRANS(31) REMOVAL

1. Remove the Top-cover, referring to the previous step1.
2. Disconnect the connector (BN20,BN96) on the Trans PCB (40-4) from lead wire (CN20-3P,CN96-6P) on the Main PCB (38-1).
3. Remove 4 Trans screws(S9) and then remove the Power Trans(36).

## XII MAIN PCB ASS'Y(38-1) REMOVAL

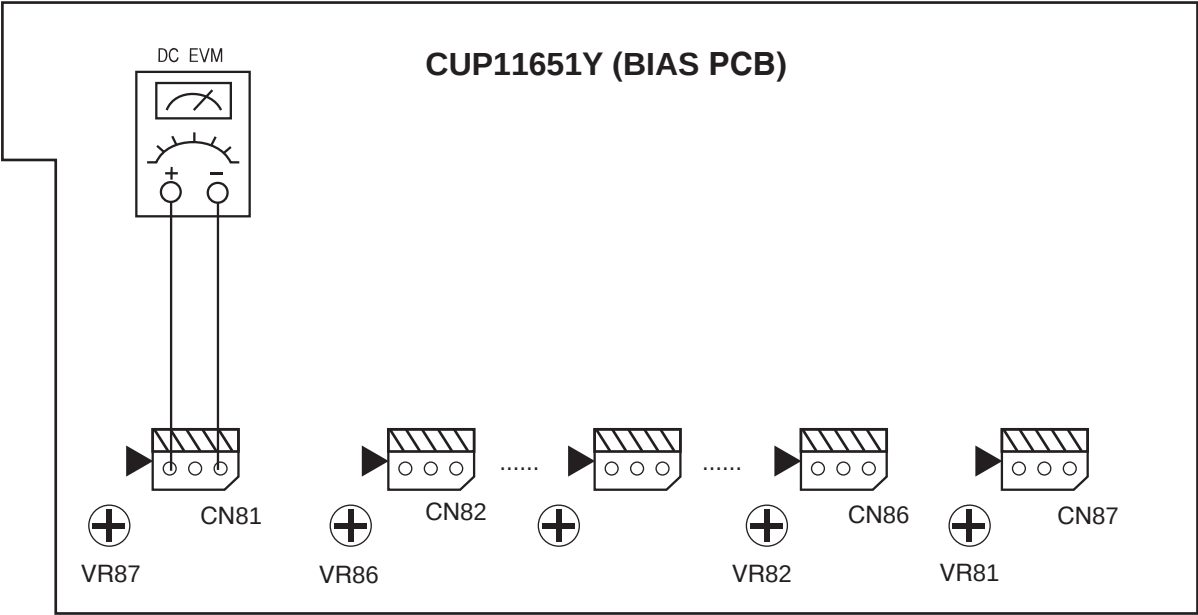
1. Remove the Top-cover, referring to the previous step1.
2. Remove the Tuner module, referring to the previous step7.
3. Remove the Video PCB, referring to the previous step8.
4. Remove the Input PCB, referring to the previous step9.
5. Disconnect the connector (CN80) from lead wire (CN80-11P) on the Fip PCB (37-1).
6. Disconnect the connector (CN86) from lead wire (CN86-2P) on the Moms PCB (37-5).
7. Disconnect the connector (CN20,BN96) from lead wire (CN20-3P,BN96-8P) on the Trans PCB (40-4,40-5)
8. Remove 11screws (S1-1EA, S4-2EA, S6-2EA, S8-6EA) and then remove the Main PCB ASS'Y (38-1).

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AMPLIFIER SECTION BIAS ADJUSTMENT

Measurement condition  
. No input signal or volume position is minimum.

- Standard value.
- . Ideal current = 48mA ( ± 5%)
  - . Ideal DC Voltage = 25.92mV ( ± 5%)



DC VOLTMETER.....Connect to CN81,CN82,CN83,CN84,CN85,CN86,CN87

| NO. | Channel             | Adjust for    | Adjustment |
|-----|---------------------|---------------|------------|
| 1   | Front Left          | 25.92mV (±5%) | VR83       |
| 2   | Front Right         | 25.92mV (±5%) | VR84       |
| 3   | Center              | 25.92mV (±5%) | VR85       |
| 4   | Surround Left       | 25.92mV (±5%) | VR86       |
| 5   | Surround Right      | 25.92mV (±5%) | VR87       |
| 6   | Surround Back Left  | 25.92mV (±5%) | VR82       |
| 7   | Surround Back Right | 25.92mV (±5%) | VR81       |



# harman/kardon

# TECH TIPS

## Troubleshooting tips and solutions to common service problems

For models:

TIP# HKTT2003-01 Rev3

AVR7000/7200/7300/8000

AVR100/200/300/500

AVR110/210/310/510

AVR120/220/320/520

AVR125/225/325/525

AVR130/230/330/430/630

AVR135/235/335/435/635

AVR10

DPR1001

DPR1005

DPR2005

HK3370/3470/3375/3475

HK3250

**Subject:** Backup Memory on AVR/DPR/HK series receivers

**In the event of the complaint: “the receiver is losing its memory (any programmed system settings) when the unit is turned off, or after the unit is unplugged (briefly\*)”:**

Check and replace:

| Model                                    | Designator   | Location         | Description                                    | Part number                      |
|------------------------------------------|--------------|------------------|------------------------------------------------|----------------------------------|
| AVR10                                    | C712<br>D709 | Front PCB        | 0.047 Farad 5.5v capacitor<br>and 1N4148 diode | #3439247315<br>#2058322101       |
| AVR7000                                  | C730         | Front PCB        | 0.047 Farad 5.5v capacitor                     | # 55134360 or<br># J3432147324X  |
| AVR7200                                  | C106         | Front PCB        | 0.047 Farad 5.5v capacitor                     | # 55134360                       |
| AVR7300                                  | C657         | DSP PCB          | 0.047 Farad 5.5v capacitor                     | # H01-CEZXA0479MN-5              |
| AVR8000                                  | C726         | Front PCB        | 0.047 Farad 5.5v capacitor                     | # 55230310NR or<br># 55134360    |
| AVR100/200                               | C412         | Front PCB        | 0.047 Farad 5.5v capacitor                     | # CEGT-B473J-0J0                 |
| AVR300                                   | C906         | Front PCB        | 0.1Farad 5.5v capacitor                        | # J4433210421X<br>or # P10791-ND |
| AVR500                                   | C906         | Front PCB        | 0.1Farad 5.5v capacitor                        | # J4433210421X<br>or # P10791-ND |
| AVR110/210/310/510<br>AVR120/220/320/520 | C216         | Front PCB        | 0.047 Farad 5.5v capacitor                     | # 55134360                       |
| AVR125/225                               | C734,C885    | Front PCB        | two 0.1F capacitors in parallel                | # BCESOHD104                     |
| AVR325/525                               | C106         | Front PCB        | 0.047 Farad 5.5v capacitor                     | # 55134360                       |
| AVR130/230/330                           | BAT1         | Front PCB        | 3.6v Battery                                   | # HABGP40BVH3A3H                 |
| AVR135/235/335                           | BAT1         | Front PCB        | 3.6v Battery                                   | # HGP15BNH3A3H                   |
| AVR430/630                               | C657         | DSP PCB          | 0.047 Farad 5.5v capacitor                     | # CEZXA0479MN-5                  |
| AVR435/635                               | C557         | DSP PCB          | 0.047 Farad 5.5v capacitor                     | # H03-CEZXA0479MN-0              |
| DPR1001                                  | BC601        | Main PCB         | 0.1Farad 5.5v capacitor                        | # CEGT-B104J-0J0                 |
| DPR1005/2005                             | C437         | Processor<br>PCB | 0.047 Farad 5.5v capacitor                     | # CEZXA0479MN-5                  |
| HK3370/3470                              | C301         | Front PCB        | 0.1Farad 5.5v capacitor                        | # CEGT-B104J-0J0                 |
| HK3375/3475                              | C301         | Front PCB        | 0.1Farad 5.5v capacitor                        | # CEGT-B104J-0J0                 |
| HK3250                                   | C712<br>D709 | Front PCB        | 0.047 Farad 5.5v capacitor<br>and 1N4148 diode | #3439247315<br>#2058322101       |

\* After approximately two weeks of being disconnected from AC supply, even a normally functioning receiver may lose any programmed settings and switch to default settings. (Four weeks for the DPR1005 & 2005)



| AVR235 Electrical Parts List |              |               |                   |
|------------------------------|--------------|---------------|-------------------|
| Ref. Designator              | Part Number  | Description   |                   |
| <b>FRONT PCB ASS'Y</b>       |              |               |                   |
| <i>Capacitors</i>            |              |               |                   |
| C703                         | HCBS1H821KBT | CAP , CERAMIC | 820PF 50V K       |
| C704                         | HCEA1VH100T  | CAP , ELECT   | 10UF 35V          |
| C712                         | HCEA1HH1R0T  | CAP , ELECT   | 1UF 50V           |
| C713                         | HCBS1H223ZFT | CAP , CERAMIC | 0.022UF 50V Z     |
| C714                         | HCBS1H151KBT | CAP , CERAMIC | 150PF 50V K       |
| C715                         | HCEA1HH4R7T  | CAP , ELECT   | 4.7UF 50V         |
| C716                         | HCEA1CH331T  | CAP , ELECT   | 330UF,16V         |
| C717                         | HCBS1H221KBT | CAP , CERAMIC | 220PF 50V K       |
| C718                         | HCBS1H221KBT | CAP , CERAMIC | 220PF 50V K       |
| C719                         | HCBS1H181KBT | CAP , CERAMIC | 180PF 50V K       |
| C720                         | HCBS1H181KBT | CAP , CERAMIC | 180PF 50V K       |
| C721                         | HCBS1H181KBT | CAP , CERAMIC | 180PF 50V K       |
| C722                         | HCEA1CH101T  | CAP , ELECT   | 100UF 16V         |
| C723                         | HCBS1H104ZFT | CAP , CERAMIC | 0.1UF 50V Z       |
| C724                         | HCBS1H223ZFT | CAP , CERAMIC | 0.022UF 50V Z     |
| C725                         | CCKT1H473ZF  | CAP , CERAMIC | 0.047UF 50V ZF    |
| C726                         | HCEA1CH101T  | CAP , ELECT   | 100UF 16V         |
| C727                         | HCBS1H221KBT | CAP , CERAMIC | 220PF 50V K       |
| C728                         | HCBS1H104ZFT | CAP , CERAMIC | 0.1UF 50V Z       |
| C729                         | CCKT1H473ZF  | CAP , CERAMIC | 0.047UF 50V ZF    |
| C730                         | HCBS1H104ZFT | CAP , CERAMIC | 0.1UF 50V Z       |
| C731                         | HCEA1HH100T  | CAP , ELECT   | 10UF 50V          |
| C735                         | CCEA1CH101T  | CAP , ELE     | 100UF/16V/-40~+85 |
| C736                         | HCBS1H223ZFT | CAP , CERAMIC | 0.022UF 50V Z     |
| C737                         | HCBS1H120JCT | CAP , CERAMIC | 12PF 50V J        |
| C738                         | HCBS1H120JCT | CAP , CERAMIC | 12PF 50V J        |
| C739                         | CCEA1AH221T  | CAP , ELECT   | 220UF/10V         |
| C740                         | CCEA1VH100T  | CAP , ELECT   | 10UF 35V          |
| C770                         | HCBS1H223ZFT | CAP , CERAMIC | 0.022UF 50V Z     |
| C771                         | HCBS1H223ZFT | CAP , CERAMIC | 0.022UF 50V Z     |
| C773                         | HCEA1VH100T  | CAP , ELECT   | 10UF 35V          |
| C774                         | HCEA1VH100T  | CAP , ELECT   | 10UF 35V          |
| C775                         | HCBS1H151KBT | CAP , CERAMIC | 150PF 50V K       |
| C776                         | HCBS1H151KBT | CAP , CERAMIC | 150PF 50V K       |
| C777                         | HCEA1VH100T  | CAP , ELECT   | 10UF 35V          |
| C778                         | HCEA1VH100T  | CAP , ELECT   | 10UF 35V          |
| C779                         | HCEA1CKS470T | CAP , ELECT   | 47UF 16V KS       |
| C780                         | HCEA1CKS470T | CAP , ELECT   | 47UF 16V KS       |
| C781                         | HCEA1CKS100T | CAP , ELECT   | 10UF 16V KS       |
| C782                         | HCEA1CKS100T | CAP , ELECT   | 10UF 16V KS       |
| C785                         | HCBS1H470JT  | CAP , CERAMIC | 47PF 50V J        |
| C786                         | HCBS1H470JT  | CAP , CERAMIC | 47PF 50V J        |
| C787                         | HCEA1CKS100T | CAP , ELECT   | 10UF 16V KS       |
| C788                         | HCEA1CKS100T | CAP , ELECT   | 10UF 16V KS       |
| C789                         | HCEA1CKS100T | CAP , ELECT   | 10UF 16V KS       |
| C790                         | HCEA1CKS100T | CAP , ELECT   | 10UF 16V KS       |
| C791                         | HCEA1CKS470T | CAP , ELECT   | 47UF 16V KS       |
| C792                         | HCEA1CKS470T | CAP , ELECT   | 47UF 16V KS       |
| C793                         | KCFE1J183JBT | CAP , FILM    | 0.018UF 63V J     |
| C794                         | KCFE1J183JBT | CAP , FILM    | 0.018UF 63V J     |
| C795                         | KCFE1J823JBT | CAP , FILM    | 0.082UF 63V J     |
| C796                         | KCFE1J823JBT | CAP , FILM    | 0.082UF 63V J     |
| C797                         | KCFE1J332JBT | CAP , FILM    | 0.0033UF 63V J    |
| C798                         | KCFE1J332JBT | CAP , FILM    | 0.0033UF 63V J    |
| C799                         | KCFE1J183JBT | CAP , FILM    | 0.018UF 63V J     |
| C800                         | KCFE1J183JBT | CAP , FILM    | 0.018UF 63V J     |
| C805                         | HCBS1H223ZFT | CAP , CERAMIC | 0.022UF 50V Z     |
| C806                         | HCBS1H223ZFT | CAP , CERAMIC | 0.022UF 50V Z     |

| Ref. Designator        | Part Number  | Description            |               |
|------------------------|--------------|------------------------|---------------|
| <b>FRONT PCB ASS'Y</b> |              |                        |               |
| C807                   | CCFT1H104ZF  | CAP , SEMICONDUCTOR    | 0.1UF 50V ZF  |
| C808                   | CCKT1H181KB  | CAP , CERAMIC          | 180PF 50V KB  |
| C809                   | HCEA1AH471T  | CAP , ELECT            | 470UF 10V     |
| C810                   | HCEA1CH101T  | CAP , ELECT            | 100UF 16V     |
| C811                   | HCEA1CH101T  | CAP , ELECT            | 100UF 16V     |
| C813                   | HCEA1HH4R7T  | CAP , ELECT            | 4.7UF 50V     |
| C814                   | HCEA1HH4R7T  | CAP , ELECT            | 4.7UF 50V     |
| C850                   | HCBS1H471KBT | CAP , CERAMIC          | 470PF,50V     |
| C851                   | HCBS1H471KBT | CAP , CERAMIC          | 470PF,50V     |
| C852                   | HCBS1H104ZFT | CAP , CERAMIC          | 0.1UF 50V Z   |
| C855                   | HCBS1H101KBT | CAP , CERAMIC          | 100PF 50V K   |
| C856                   | HCBS1H101KBT | CAP , CERAMIC          | 100PF 50V K   |
| C857                   | HCBS1H104ZFT | CAP , CERAMIC          | 0.1UF 50V Z   |
| C859                   | HCBS1H223ZFT | CAP , CERAMIC          | 0.022UF 50V Z |
| C860                   | HCBS1H223ZFT | CAP , CERAMIC          | 0.022UF 50V Z |
| C861                   | HCBS1H223ZFT | CAP , CERAMIC          | 0.022UF 50V Z |
| C862                   | HCBS1H101KBT | CAP , CERAMIC          | 100PF 50V K   |
| C863                   | HCBS1H101KBT | CAP , CERAMIC          | 100PF 50V K   |
| C866                   | HCEA1CKS100T | CAP , ELECT            | 10UF 16V KS   |
| C867                   | HCEA1CKS100T | CAP , ELECT            | 10UF 16V KS   |
| C868                   | HCEA1CKS470T | CAP , ELECT            | 47UF 16V KS   |
| C869                   | HCEA1CKS470T | CAP , ELECT            | 47UF 16V KS   |
| C870                   | HCBS1H681KBT | CAP , CERAMIC          | 680PF,50V     |
| C871                   | HCBS1H681KBT | CAP , CERAMIC          | 680PF,50V     |
| C872                   | HCEA1CH331T  | CAP , ELECT            | 330UF,16V     |
| C873                   | HCEA1CH331T  | CAP , ELECT            | 330UF,16V     |
| C874                   | HCBS1H101KBT | CAP , CERAMIC          | 100PF 50V K   |
| C875                   | HCBS1H101KBT | CAP , CERAMIC          | 100PF 50V K   |
| C876                   | HCBS1H101KBT | CAP , CERAMIC          | 100PF 50V K   |
| C877                   | HCBS1H473ZFT | CAP , CERAMIC          | 0.047UF 50V Z |
| C878                   | HCBS1H473ZFT | CAP , CERAMIC          | 0.047UF 50V Z |
| C882                   | HCBS1H104ZFT | CAP , CERAMIC          | 0.1UF 50V Z   |
| C886                   | CCEA0JH102T  | CAP , ELECT            | 1000UF 6.3V   |
| C889                   | HCBS1H220JCT | CAP , CERAMIC          | 22PF 50V J    |
| C890                   | HCBS1H220JCT | CAP , CERAMIC          | 22PF 50V J    |
| C891                   | HCBS1H223ZFT | CAP , CERAMIC          | 0.022UF 50V Z |
| C892                   | HCBS1H223ZFT | CAP , CERAMIC          | 0.022UF 50V Z |
| C893                   | HCBS1H223ZFT | CAP , CERAMIC          | 0.022UF 50V Z |
| C894                   | HCBS1H223ZFT | CAP , CERAMIC          | 0.022UF 50V Z |
| C895                   | HCEA1AH471T  | CAP , ELECT            | 470UF 10V     |
| C896                   | HCBS1H223ZFT | CAP , CERAMIC          | 0.022UF 50V Z |
| C897                   | HCEA1AH471T  | CAP , ELECT            | 470UF 10V     |
| C900                   | HCBS1H104ZFT | CAP , CERAMIC          | 0.1UF 50V Z   |
| C901                   | HCBS1H104ZFT | CAP , CERAMIC          | 0.1UF 50V Z   |
| C903                   | HCEA1HH2R2T  | CAP , ELECT            | 2.2UF 50V     |
| C905                   | HCEA1HH2R2T  | CAP , ELECT            | 2.2UF 50V     |
| C812                   | CCFT1H104ZF  | CAP , SEMICONDUCTOR    | 0.1UF 50V ZF  |
| C817                   | CCCT1H100DC  | CAP , CERAMIC          | 10PF 50V DC   |
| C853                   | KCKDKS471ME  | CAP , CERAMIC(KH TYPE) | DKS471ME      |
| C864                   | CCEA0JH102T  | CAP , ELECT            | 1000UF 6.3V   |
| C865                   | CCEA0JH102T  | CAP , ELECT            | 1000UF 6.3V   |
| <b>Semiconductors</b>  |              |                        |               |
| D724                   | HVD1SS133MT  | DIODE                  | 1SS133T-77    |
| D725                   | HVD1SS133MT  | DIODE                  | 1SS133T-77    |
| D726                   | HVD1SS133MT  | DIODE                  | 1SS133T-77    |
| D727                   | HVD1SS133MT  | DIODE                  | 1SS133T-77    |
| D728                   | HVD1SS133MT  | DIODE                  | 1SS133T-77    |
| D729                   | HVD1SS133MT  | DIODE                  | 1SS133T-77    |
| D730                   | HVD1SS133MT  | DIODE                  | 1SS133T-77    |
| D774                   | HVD1SS133MT  | DIODE                  | 1SS133T-77    |

| Ref. Designator        | Part Number     | Description                  |                 |
|------------------------|-----------------|------------------------------|-----------------|
| <b>FRONT PCB ASS'Y</b> |                 |                              |                 |
| D778                   | KVD1N4003ST     | DIODE                        | 1N4003          |
| D779                   | HVD1SS133MT     | DIODE                        | 1SS133T-77      |
| D780                   | HVD1SS133MT     | DIODE                        | 1SS133T-77      |
| D781                   | HVD1SS133MT     | DIODE                        | 1SS133T-77      |
| D782                   | KVD1N4003ST     | DIODE                        | 1N4003          |
| D783                   | HVD1SS133MT     | DIODE                        | 1SS133T-77      |
| D784                   | HVD1SS133MT     | DIODE                        | 1SS133T-77      |
| D785                   | HVD1SS133MT     | DIODE                        | 1SS133T-77      |
| D786                   | HVDMTZJ5.6BT    | DIODE , ZENER                | 5.6V            |
| D787                   | HVDMTZJ5.6BT    | DIODE , ZENER                | 5.6V            |
| IC87                   | HVIRE5VL28CATZ  | IC , RESET                   |                 |
| Q701                   | HVTKRC107MT     | TRANSISTOR                   | KRC107M         |
| Q702                   | HVTKRC107MT     | TRANSISTOR                   | KRC107M         |
| Q703                   | HVTKRC107MT     | TRANSISTOR                   | KRC107M         |
| Q705                   | HVTKRC107MT     | TRANSISTOR                   | KRC107M         |
| Q706                   | HVTKRC107MT     | TRANSISTOR                   | KRC107M         |
| Q722                   | HVTKRA107MT     | TRANSISTOR                   | KRA107M         |
| Q724                   | HVTKRC107MT     | TRANSISTOR                   | KRC107M         |
| Q725                   | HVTKRC107MT     | TRANSISTOR                   | KRC107M         |
| Q726                   | HVTKRC107MT     | TRANSISTOR                   | KRC107M         |
| Q727                   | HVTKRC107MT     | TRANSISTOR                   | KRC107M         |
| Q728                   | HVTKRC107MT     | TRANSISTOR                   | KRC107M         |
| Q729                   | HVTKRC107MT     | TRANSISTOR                   | KRC107M         |
| Q731                   | KVTKSA1175YT    | TRANSISTOR                   | KSA1175Y        |
| Q732                   | HVTKRC107MT     | TRANSISTOR                   | KRC107M         |
| Q733                   | KVTKSC2785YT    | TRANSISTOR                   | KSC2785Y        |
| Q734                   | HVTKTC2874BT    | TRANSISTOR , MUTE            | KTC2874B        |
| Q735                   | HVTKTC2874BT    | TRANSISTOR , MUTE            | KTC2874B        |
| Q736                   | HVTKTC2874BT    | TRANSISTOR , MUTE            | KTC2874B        |
| Q737                   | HVTKTC2874BT    | TRANSISTOR , MUTE            | KTC2874B        |
| Q738                   | HVTKRC107MT     | TRANSISTOR                   | KRC107M         |
| Q739                   | HVTKTA1271YT    | TRANSISTOR                   | KTA1271Y        |
| Q743                   | HVTKRA107MT     | TRANSISTOR                   | KRA107M         |
| D701                   | CVD52CSBBCEAB2  | BLUE L.E.D                   |                 |
| D703                   | CVD52CSBBCEAB2  | BLUE L.E.D                   |                 |
| D705                   | CVD52CSBBCEAB2  | BLUE L.E.D                   |                 |
| D723                   | CVD50BOBBWGA    | L.E.D , 2 COLOR (ORG , BLUE) | TOL-50BOBBWGA   |
| IC72                   | BVIMB90F476APFG | IC , FLASH U-COM JP          | FUJITSU         |
| IC73                   | HRVRPM6938H4    | SENSOR , REMOTE              | RPM6938-H4      |
| IC74                   | HVIANAM1385AT   | I.C , U-COM                  | S3C84BBX14-QWRB |
| IC75                   | HVI74ACT04MTR   | I.C , HEX                    | 74ACT04M        |
| IC76                   | HVITC74HCU04AFN | IC , INVERTER                | TC74HCU04AFN    |
| IC80                   | HVIHCF4053M013T | I.C                          | HCF4053M        |
| IC81                   | HVINJM2068MDTE1 | I.C , OP AMP                 | NJM2068MD-TE1   |
| IC82                   | HVINJM2068MDTE1 | I.C , OP AMP                 | NJM2068MD-TE1   |
| IC83                   | HVI74ACT04MTR   | I.C , HEX                    | 74ACT04M        |
| IC84                   | HVI74ACT04MTR   | I.C , HEX                    | 74ACT04M        |
| IC85                   | HVIRH5VT18C     | I.C , RESET                  | RICOH 1.8V      |
| IC86                   | HVINJM4556AL    | I.C , HEADPHONE              | NJM4556AL       |
| IC88                   | HVINJM2068MDTE1 | I.C , OP AMP                 | NJM2068MD-TE1   |
| <b>Resistors</b>       |                 |                              |                 |
| R701                   | CRD20TJ103T     | RES , CARBON                 | 10K OHM 1/5W J  |
| R702                   | CRD20TJ1R0T     | RES , CARBON                 | 1 OHM 1/5W J    |
| R703                   | CRD20TJ103T     | RES , CARBON                 | 10K OHM 1/5W J  |
| R704                   | CRD20TJ100T     | RES , CARBON                 | 10 OHM 1/5W J   |
| R705                   | CRD20TJ820T     | RES , CARBON                 | 82 OHM 1/5W J   |
| R706                   | CRD20TJ820T     | RES , CARBON                 | 82 OHM 1/5W J   |
| R707                   | CRD20TJ820T     | RES , CARBON                 | 82 OHM 1/5W J   |
| R708                   | CRD20TJ820T     | RES , CARBON                 | 82 OHM 1/5W J   |
| R709                   | CRD20TJ470T     | RES , CARBON                 | 47 OHM 1/5W J   |

| Ref. Designator        | Part Number | Description  |                 |
|------------------------|-------------|--------------|-----------------|
| <b>FRONT PCB ASS'Y</b> |             |              |                 |
| R710                   | CRD20TJ470T | RES , CARBON | 47 OHM 1/5W J   |
| R711                   | CRD20TJ470T | RES , CARBON | 47 OHM 1/5W J   |
| R712                   | CRD20TJ470T | RES , CARBON | 47 OHM 1/5W J   |
| R713                   | CRD20TJ332T | RES , CARBON | 3.3K OHM 1/5W J |
| R714                   | CRD20TJ470T | RES , CARBON | 47 OHM 1/5W J   |
| R715                   | CRD20TJ470T | RES , CARBON | 47 OHM 1/5W J   |
| R716                   | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R717                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R718                   | CRD20TJ222T | RES , CARBON | 2.2K OHM 1/5W J |
| R719                   | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R721                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R730                   | CRD20TJ112T | RES,CABON    | 1.1K,1/5W       |
| R731                   | CRD20TJ223T | RES , CARBON | 22K OHM 1/5W J  |
| R732                   | CRD20TJ202T | RES , CARBON | 2K,1/5W         |
| R733                   | CRD20TJ272T | RES , CARBON | 2.7K OHM 1/5W J |
| R734                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R735                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R736                   | CRD20TJ272T | RES , CARBON | 2.7K OHM 1/5W J |
| R737                   | CRD20TJ100T | RES , CARBON | 10 OHM 1/5W J   |
| R738                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R739                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R740                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R741                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R742                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R743                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R744                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R745                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R746                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R747                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R748                   | CRD20TJ223T | RES , CARBON | 22K OHM 1/5W J  |
| R753                   | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R754                   | CRD20TJ152T | RES , CARBON | 1.5K OHM 1/5W J |
| R755                   | CRD20TJ182T | RES , CARBON | 1.8K OHM 1/5W J |
| R756                   | CRD20TJ272T | RES , CARBON | 2.7K OHM 1/5W J |
| R757                   | CRD20TJ332T | RES , CARBON | 3.3K OHM 1/5W J |
| R758                   | CRD20TJ562T | RES , CARBON | 5.6K OHM 1/5W J |
| R759                   | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R760                   | CRD20TJ152T | RES , CARBON | 1.5K OHM 1/5W J |
| R761                   | CRD20TJ182T | RES , CARBON | 1.8K OHM 1/5W J |
| R762                   | CRD20TJ272T | RES , CARBON | 2.7K OHM 1/5W J |
| R763                   | CRD20TJ332T | RES , CARBON | 3.3K OHM 1/5W J |
| R764                   | CRD20TJ562T | RES , CARBON | 5.6K OHM 1/5W J |
| R765                   | CRD20TJ752T | RES , CARBON | 7.5K OHM 1/5W J |
| R766                   | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R767                   | CRD20TJ152T | RES , CARBON | 1.5K OHM 1/5W J |
| R768                   | CRD20TJ182T | RES , CARBON | 1.8K OHM 1/5W J |
| R769                   | CRD20TJ272T | RES , CARBON | 2.7K OHM 1/5W J |
| R770                   | CRD20TJ100T | RES , CARBON | 10 OHM 1/5W J   |
| R771                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R772                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R773                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R774                   | CRD20TJ222T | RES , CARBON | 2.2K OHM 1/5W J |
| R775                   | CRD20TJ470T | RES , CARBON | 47 OHM 1/5W J   |
| R776                   | CRD20TJ470T | RES , CARBON | 47 OHM 1/5W J   |
| R778                   | CRD20TJ1R0T | RES , CARBON | 1 OHM 1/5W J    |
| R779                   | CRD20TJ1R0T | RES , CARBON | 1 OHM 1/5W J    |
| R780                   | CRD20TJ100T | RES , CARBON | 10 OHM 1/5W J   |
| R781                   | CRD20TJ123T | RES , CARBON | 12K OHM 1/5W J  |
| R805                   | CRD20TJ104T | RES , CARBON | 100K OHM 1/5W J |
| R806                   | CRD20TJ472T | RES , CARBON | 4.7K OHM 1/5W J |
| R810                   | CRD20TJ101T | RES , CARBON | 100 OHM 1/5W J  |
| R811                   | CRD20TJ101T | RES , CARBON | 100 OHM 1/5W J  |



| Ref. Designator        | Part Number | Description  |                 |
|------------------------|-------------|--------------|-----------------|
| <b>FRONT PCB ASS'Y</b> |             |              |                 |
| R813                   | CRD20TJ104T | RES , CARBON | 100K OHM 1/5W J |
| R814                   | CRD20TJ104T | RES , CARBON | 100K OHM 1/5W J |
| R824                   | CRD20TJ221T | RES , CARBON | 220 OHM 1/5W J  |
| R825                   | CRD20TJ681T | RES , CARBON | 680 OHM 1/5W J  |
| R826                   | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R827                   | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R829                   | CRD20TJ184T | RES , CARBON | 180K,1/5W       |
| R830                   | CRD20TJ184T | RES , CARBON | 180K,1/5W       |
| R831                   | CRD20TJ562T | RES , CARBON | 5.6K OHM 1/5W J |
| R832                   | CRD20TJ562T | RES , CARBON | 5.6K OHM 1/5W J |
| R833                   | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R834                   | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R835                   | CRD20TJ184T | RES , CARBON | 180K,1/5W       |
| R836                   | CRD20TJ184T | RES , CARBON | 180K,1/5W       |
| R837                   | CRD20TJ101T | RES , CARBON | 100 OHM 1/5W J  |
| R838                   | CRD20TJ101T | RES , CARBON | 100 OHM 1/5W J  |
| R839                   | CRD20TJ104T | RES , CARBON | 100K OHM 1/5W J |
| R840                   | CRD20TJ104T | RES , CARBON | 100K OHM 1/5W J |
| R841                   | CRD20TJ473T | RES , CARBON | 47K OHM 1/5W J  |
| R842                   | CRD20TJ473T | RES , CARBON | 47K OHM 1/5W J  |
| R843                   | CRD20TJ105T | RES , CARBON | 1M OHM 1/5W J   |
| R844                   | CRD20TJ105T | RES , CARBON | 1M OHM 1/5W J   |
| R845                   | CRD20TJ104T | RES , CARBON | 100K OHM 1/5W J |
| R846                   | CRD20TJ104T | RES , CARBON | 100K OHM 1/5W J |
| R847                   | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R848                   | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R849                   | CRD20TJ223T | RES , CARBON | 22K OHM 1/5W J  |
| R850                   | CRD20TJ223T | RES , CARBON | 22K OHM 1/5W J  |
| R851                   | CRD20TJ392T | RES , CARBON | 3.9K OHM 1/5W   |
| R852                   | CRD20TJ392T | RES , CARBON | 3.9K OHM 1/5W   |
| R853                   | CRD20TJ222T | RES , CARBON | 2.2K OHM 1/5W J |
| R854                   | CRD20TJ222T | RES , CARBON | 2.2K OHM 1/5W J |
| R855                   | CRD20TJ681T | RES , CARBON | 680 OHM 1/5W J  |
| R856                   | CRD20TJ681T | RES , CARBON | 680 OHM 1/5W J  |
| R857                   | CRD20TJ221T | RES , CARBON | 220 OHM 1/5W J  |
| R858                   | CRD20TJ221T | RES , CARBON | 220 OHM 1/5W J  |
| R864                   | CRD20TJ272T | RES , CARBON | 2.7K OHM 1/5W J |
| R865                   | CRD20TJ101T | RES , CARBON | 100 OHM 1/5W J  |
| R866                   | CRD20TJ272T | RES , CARBON | 2.7K OHM 1/5W J |
| R869                   | CRD20TJ750T | RES , CARBON | 75 OHM 1/5W J   |
| R871                   | CRD20TJ104T | RES , CARBON | 100K OHM 1/5W J |
| R872                   | CRD20TJ104T | RES , CARBON | 100K OHM 1/5W J |
| R873                   | CRD20TJ471T | RES , CARBON | 470 OHM 1/5W J  |
| R874                   | CRD20TJ471T | RES , CARBON | 470 OHM 1/5W J  |
| R875                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R876                   | CRD20TJ750T | RES , CARBON | 75 OHM 1/5W J   |
| R877                   | CRD20TJ750T | RES , CARBON | 75 OHM 1/5W J   |
| R878                   | CRD20TJ750T | RES , CARBON | 75 OHM 1/5W J   |
| R881                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R882                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R883                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R884                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R885                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R886                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R887                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R888                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R889                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R890                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R891                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R892                   | CRD20TJ222T | RES , CARBON | 2.2K OHM 1/5W J |
| R893                   | CRD20TJ333T | RES , CARBON | 33K OHM 1/5W J  |
| R895                   | CRD20TJ101T | RES , CARBON | 100 OHM 1/5W J  |

| Ref. Designator        | Part Number    | Description                   |                 |
|------------------------|----------------|-------------------------------|-----------------|
| <b>FRONT PCB ASS'Y</b> |                |                               |                 |
| R896                   | CRD20TJ101T    | RES , CARBON                  | 100 OHM 1/5W J  |
| R897                   | CRD20TJ101T    | RES , CARBON                  | 100 OHM 1/5W J  |
| R898                   | CRD20TJ101T    | RES , CARBON                  | 100 OHM 1/5W J  |
| R899                   | CRD20TJ104T    | RES , CARBON                  | 100K OHM 1/5W J |
| R900                   | CRD20TJ104T    | RES , CARBON                  | 100K OHM 1/5W J |
| R901                   | CRD20TJ152T    | RES , CARBON                  | 1.5K OHM 1/5W J |
| R902                   | CRD20TJ152T    | RES , CARBON                  | 1.5K OHM 1/5W J |
| R903                   | CRD20TJ102T    | RES , CARBON                  | 1K OHM 1/5W J   |
| R904                   | CRD20TJ102T    | RES , CARBON                  | 1K OHM 1/5W J   |
| R905                   | CRD20TJ104T    | RES , CARBON                  | 100K OHM 1/5W J |
| R906                   | CRD20TJ104T    | RES , CARBON                  | 100K OHM 1/5W J |
| R907                   | CRD20TJ562T    | RES , CARBON                  | 5.6K OHM 1/5W J |
| R908                   | CRD20TJ562T    | RES , CARBON                  | 5.6K OHM 1/5W J |
| R909                   | CRD20TJ221T    | RES , CARBON                  | 220 OHM 1/5W J  |
| R910                   | CRD20TJ221T    | RES , CARBON                  | 220 OHM 1/5W J  |
| R911                   | CRD20TJ221T    | RES , CARBON                  | 220 OHM 1/5W J  |
| R912                   | CRD20TJ221T    | RES , CARBON                  | 220 OHM 1/5W J  |
| R913                   | CRD20TJ102T    | RES , CARBON                  | 1K OHM 1/5W J   |
| R914                   | CRD20TJ473T    | RES , CARBON                  | 47K OHM 1/5W J  |
| R915                   | CRD20TJ473T    | RES , CARBON                  | 47K OHM 1/5W J  |
| R917                   | CRD20TJ223T    | RES , CARBON                  | 22K OHM 1/5W J  |
| R918                   | CRD20TJ562T    | RES , CARBON                  | 5.6K OHM 1/5W J |
| R919                   | CRD20TJ562T    | RES , CARBON                  | 5.6K OHM 1/5W J |
| R923                   | CRD25TJ332T    | RES , CARBON                  | 3.3K OHM 1/4W J |
| VR71                   | CVV2X05M104Z   | RES , VARIABLE(BALANCE)       | RK14128030214Y  |
| VR72                   | CVV2X07C104Z   | RES , VARIABLE(TONE)          | RK14128030214C  |
| VR73                   | CVV2X07C104Z   | RES , VARIABLE(TONE)          | RK14128030214C  |
| VR74                   | HSR2A029Z      | VR , ENCODER                  |                 |
| <i>Miscellaneous</i>   |                |                               |                 |
| FIP1                   | HFLHCA18ML01   | F.I.P                         |                 |
| L702                   | HLQ02C100KT    | COIL , AXAIL                  |                 |
| BAT1                   | HGP15BNH3A3H   | BATTERY , RECHARGEABLE        | GP15BNH3A3H     |
| S701 - S720            | HST1A020ZT     | SW , TACT                     |                 |
| BK71                   | CMD1A209       | BRACKET , FLT                 | A4-92-1739      |
| BK72                   | CMD1A209       | BRACKET , FLT                 | A4-92-1739      |
| BK73                   | CMD1A387       | BRACKET , PCB                 |                 |
| BK74                   | CMD1A209       | BRACKET , FLT                 | A4-92-1739      |
| BN10                   | CWZAVR230BN10  | WIRE ASS'Y (SHIELD)           |                 |
| BN15                   | CWB2B906150EN  | WIRE ASS'Y                    |                 |
| BN16                   | CWZAVR2550BN16 | WIRE ASS'Y (SHIELD)           |                 |
| BN18                   | CWZAVR125BN18  | WIRE ASS'Y (SHIELD)           |                 |
| BN41                   | CWZAVR130BN41  | WIRE ASS'Y (SHIELD)           |                 |
| BN72                   | HJP32GA179ZJ   | CONN,FFC 1M/M 32P STR,SMD_JST | 32FMNNBMTTNATF  |
| BN80                   | CWB2B911420EW  | WIRE ASS'Y                    |                 |
| BN81                   | CWB2B908250BM  | WIRE , ASS'Y                  |                 |
| BN84                   | CWB2B905080EN  | WIRE ASS'Y                    |                 |
| BN85                   | CWB2B902090EN  | WIRE ASS'Y                    |                 |
| BN87                   | CWZAVR2550BN87 | WIRE ASS'Y (SHIELD)           |                 |
| BN88                   | CWB2B904070EN  | WIRE ASS'Y                    |                 |
| BN89                   | CWB2B905080EN  | WIRE ASS'Y                    |                 |
| BN90                   | CWB2B902090EN  | WIRE ASS'Y                    |                 |
| BN94                   | KJP13GB99ZM    | CONNECTOR                     | MOLEX35237-1310 |
| BN95                   | KJP08GB99ZM    | CONNECTOR , HOUSING           | MOLEX35237-0810 |
| CN10                   | KJP04GB46ZM    | WAFER                         | MOLEX 53015     |
| CN11                   | KJP15GA98ZM    | WAFER                         | MOLEX35336-1510 |
| CN12                   | KJP15GA98ZM    | WAFER                         | MOLEX35336-1510 |
| CN15                   | CJP06GA19ZY    | WAFER, STRAIGHT, 6PIN         |                 |
| CN16                   | KJP08GB46ZM    | WAFER                         |                 |
| CN79                   | KJP05GA19ZM    | WAFER                         | MOLEX53014-0510 |
| CN82                   | KJP06HA37ZM    | WAFER                         | MOLEX42140-2206 |

| Ref. Designator             | Part Number    | Description                    |                 |
|-----------------------------|----------------|--------------------------------|-----------------|
| <b>FRONT PCB ASS'Y</b>      |                |                                |                 |
| CN84                        | KJP05GA19ZM    | WAFER                          | MOLEX53014-0510 |
| CN85                        | KJP02GA19ZM    | WAFER                          |                 |
| CN86                        | KJP02GA89ZM    | WAFER                          | MOLEX35328-02   |
| CN87                        | KJP06GA19ZM    | WAFER                          | MOLEX53014-0610 |
| CN88                        | KJP04GA19ZM    | WAFER                          |                 |
| CN89                        | KJP05GA19ZM    | WAFER                          | MOLEX53014-0510 |
| CN90                        | KJP02GA19ZM    | WAFER                          |                 |
| CN91                        | KJP06HA37ZM    | WAFER                          | MOLEX42140-2206 |
| JK81                        | CJJ4M041Y      | JACK , BOARD (COAX)            |                 |
| JK82                        | HJSTORX179L    | MODULE , OPTICAL(RX)           | TORX179L        |
| JK83                        | CJJ2E026Z      | JACK , HEADPHONE(SILVER PLATE) |                 |
| JK85                        | CJJ9M003Z      | JACK , S-VIDEO                 |                 |
| JK86                        | CJJ4S023Y      | JACK , BOARD                   |                 |
| JW81                        | CWE7202090AA   | WIRE ASS'Y                     |                 |
| JW82                        | CWZAVR2550JW82 | WIRE , ASS'Y                   |                 |
| JW83                        | CWE8202150RV   | WIRE ASS'Y                     |                 |
| JW84                        | CWE8202110RV   | WIRE, ASS'Y                    |                 |
| JW85                        | CWE8202070AA   | WIRE ASS'Y                     |                 |
| SW01                        | CSH1A008ZV     | SW , PUSH (MOMS)               |                 |
| X701                        | HOX04194E120CS | CRYSTAL                        | 4.194MHZ        |
| X703                        | HOX10000E220CS | CRYSTAL                        | 10MHZ           |
|                             | CBT1A819K128   | KNOB , DELAY                   |                 |
|                             | CBT1A903MMZC22 | KNOB , POWER                   |                 |
|                             | CBT1A904MBZC22 | KNOB , SET                     |                 |
|                             | CBT1A905MBZC22 | KNOB , FUNCTION                |                 |
|                             | CGL1A221       | INDICATOR , POWER              |                 |
|                             | CGW1A366RDXH43 | PANEL , FRONT                  |                 |
|                             | CHG1A309       | RUBBER                         |                 |
|                             | CMC1A200       | PLATE , SHIELD                 |                 |
|                             | CMC1A261       | PLATE , EARTH                  |                 |
|                             | CMD1A443       | BRACKET , SIDE                 |                 |
|                             | CMD1A555       | BRACKET , SIDE (L)             |                 |
|                             | CMH1A215       | HOLDER , LED                   |                 |
|                             | CMK1A010       | BRACKET , PCB                  |                 |
|                             | CMX1A148       | INSULATOR , FUNCTION           |                 |
|                             | CMX1A149       | INSULATOR , SET                |                 |
|                             | CMX1A170       | INSULATOR , POWER              |                 |
|                             | CMX1A173       | INSULATOR , FUNCTION(L)        |                 |
|                             | CMZ1A088       | FILTER , FIP                   |                 |
|                             | CTB3+10G       | SCREW                          |                 |
|                             | CTB3+16GFZ     | SCREW                          |                 |
|                             | CTWS3+10G      | SCREW                          |                 |
|                             | KHR301         | CLAMPER                        |                 |
| CB72                        | CWC1B2A32A250B | CABLE , CARD                   |                 |
| <b>BOTTOM CHASSIS ASS'Y</b> |                |                                |                 |
|                             | CHD1A012Z      | SCREW , SPECIAL                |                 |
|                             | CHD1A023       | SCREW , TRANS                  | M4X10(SP/WA)    |
|                             | CHD4A012       | SCREW , TR                     | AVR130          |
|                             | CHE170         | HOLDER , PCB                   |                 |
|                             | CHG1A104       | CUSHION , EVA                  | H=9.5(15X20)    |
|                             | CHG1A157       | CUSHION , RUBBER               |                 |
|                             | CHG1A160       | RUBBER                         | H=16 (15X20)    |
|                             | CJA523FBYA     | CORD , POWER                   |                 |
|                             | CKF9A254Z      | PANEL , REAR                   |                 |
|                             | CKL2A069H43    | FOOT                           |                 |
|                             | CLZ9W003Z      | FERRITE , RING                 | 29X7.7X19       |
|                             | CMD1A487       | BRACKET , TRANS                |                 |
|                             | CNVM9014MS070L | TUNER MODULE(USA)              |                 |
|                             |                |                                |                 |
|                             |                |                                |                 |

| Ref. Designator       | Part Number  | Description   |              |
|-----------------------|--------------|---------------|--------------|
| <b>MAIN PCB ASS'Y</b> |              |               |              |
| <i>Capacitors</i>     |              |               |              |
| C501                  | HCEA1VH100T  | CAP , ELECT   | 10UF 35V     |
| C502                  | HCEA1VH100T  | CAP , ELECT   | 10UF 35V     |
| C503                  | HCEA1VH100T  | CAP , ELECT   | 10UF 35V     |
| C504                  | HCEA1VH100T  | CAP , ELECT   | 10UF 35V     |
| C505                  | HCEA1VH100T  | CAP , ELECT   | 10UF 35V     |
| C506                  | CCKT1H331KB  | CAP , CERAMIC | 330PF 50V KB |
| C507                  | CCKT1H331KB  | CAP , CERAMIC | 330PF 50V KB |
| C508                  | CCKT1H331KB  | CAP , CERAMIC | 330PF 50V KB |
| C509                  | CCKT1H331KB  | CAP , CERAMIC | 330PF 50V KB |
| C510                  | CCKT1H331KB  | CAP , CERAMIC | 330PF 50V KB |
| C561                  | HCEA1CH101T  | CAP , ELECT   | 100UF 16V    |
| C562                  | HCEA1CH101T  | CAP , ELECT   | 100UF 16V    |
| C563                  | HCEA1CH101T  | CAP , ELECT   | 100UF 16V    |
| C564                  | HCEA1CH101T  | CAP , ELECT   | 100UF 16V    |
| C565                  | HCEA1CH101T  | CAP , ELECT   | 100UF 16V    |
| C566                  | HCEA1CH101T  | CAP , ELECT   | 100UF 16V    |
| C567                  | HCEA1CH101T  | CAP , ELECT   | 100UF 16V    |
| C568                  | HCEA1CH101T  | CAP , ELECT   | 100UF 16V    |
| C569                  | HCEA1CH101T  | CAP , ELECT   | 100UF 16V    |
| C570                  | HCEA1CH101T  | CAP , ELECT   | 100UF 16V    |
| C571                  | HCBS1H681KBT | CAP , CERAMIC | 680PF,50V    |
| C572                  | HCBS1H681KBT | CAP , CERAMIC | 680PF,50V    |
| C573                  | HCBS1H681KBT | CAP , CERAMIC | 680PF,50V    |
| C574                  | HCBS1H681KBT | CAP , CERAMIC | 680PF,50V    |
| C575                  | HCBS1H681KBT | CAP , CERAMIC | 680PF,50V    |
| C601                  | CCCT1H120JC  | CAP , CERAMIC | 12PF 50V JC  |
| C602                  | CCCT1H120JC  | CAP , CERAMIC | 12PF 50V JC  |
| C603                  | CCCT1H120JC  | CAP , CERAMIC | 12PF 50V JC  |
| C604                  | CCCT1H120JC  | CAP , CERAMIC | 12PF 50V JC  |
| C605                  | CCCT1H120JC  | CAP , CERAMIC | 12PF 50V JC  |
| C606                  | CCCT1H330JC  | CAP , CERAMIC | 33PF 50V JC  |
| C607                  | CCCT1H330JC  | CAP , CERAMIC | 33PF 50V JC  |
| C608                  | CCCT1H330JC  | CAP , CERAMIC | 33PF 50V JC  |
| C609                  | CCCT1H330JC  | CAP , CERAMIC | 33PF 50V JC  |
| C610                  | CCCT1H330JC  | CAP , CERAMIC | 33PF 50V JC  |
| C681                  | HCEA1HH100T  | CAP , ELECT   | 10UF 50V     |
| C682                  | HCEA1HH100T  | CAP , ELECT   | 10UF 50V     |
| C683                  | HCEA1HH100T  | CAP , ELECT   | 10UF 50V     |
| C684                  | HCEA1HH100T  | CAP , ELECT   | 10UF 50V     |
| C685                  | HCEA1HH100T  | CAP , ELECT   | 10UF 50V     |
| C721                  | CCKT1H221KB  | CAP , CERAMIC | 220PF 50V KB |
| C722                  | CCKT1H221KB  | CAP , CERAMIC | 220PF 50V KB |
| C723                  | CCKT1H221KB  | CAP , CERAMIC | 220PF 50V KB |
| C724                  | CCKT1H221KB  | CAP , CERAMIC | 220PF 50V KB |
| C725                  | CCKT1H221KB  | CAP , CERAMIC | 220PF 50V KB |
| C726                  | CCKT1H221KB  | CAP , CERAMIC | 220PF 50V KB |
| C727                  | CCKT1H221KB  | CAP , CERAMIC | 220PF 50V KB |
| C728                  | CCKT1H221KB  | CAP , CERAMIC | 220PF 50V KB |
| C801                  | HCEA1HH100T  | CAP , ELECT   | 10UF 50V     |
| C802                  | HCEA1HH100T  | CAP , ELECT   | 10UF 50V     |
| C803                  | CCCT1H330JC  | CAP , CERAMIC | 33PF 50V JC  |
| C804                  | CCCT1H330JC  | CAP , CERAMIC | 33PF 50V JC  |
| C805                  | CCCT1H120JC  | CAP , CERAMIC | 12PF 50V JC  |
| C806                  | CCCT1H120JC  | CAP , CERAMIC | 12PF 50V JC  |
| C811                  | HCEA1CH101T  | CAP , ELECT   | 100UF 16V    |
| C812                  | HCEA1CH101T  | CAP , ELECT   | 100UF 16V    |
| C813                  | HCEA1CH101T  | CAP , ELECT   | 100UF 16V    |
| C814                  | HCEA1CH101T  | CAP , ELECT   | 100UF 16V    |
| C815                  | CCKT1H331KB  | CAP , CERAMIC | 330PF 50V KB |
| C816                  | CCKT1H331KB  | CAP , CERAMIC | 330PF 50V KB |

| Ref. Designator       | Part Number     | Description             |                |
|-----------------------|-----------------|-------------------------|----------------|
| <b>MAIN PCB ASS'Y</b> |                 |                         |                |
| C817                  | HCEA1VH100T     | CAP , ELECT             | 10UF 35V       |
| C818                  | HCEA1VKS100T    | CAP , ELECT             | 10UF 35V       |
| C819                  | HCBS1H681KBT    | CAP , CERAMIC           | 680PF,50V      |
| C820                  | HCBS1H681KBT    | CAP , CERAMIC           | 680PF,50V      |
| C900                  | HCQI1H473JZT    | CAP , MYLAR             | 0.047UF 50V J  |
| C901                  | HCQI1H473JZT    | CAP , MYLAR             | 0.047UF 50V J  |
| C905                  | CCKT1H223ZF     | CAP , CERAMIC           | 0.022UF 50V ZF |
| C907                  | HCEA1CH101T     | CAP , ELECT             | 100UF 16V      |
| C908                  | CCKT1H223ZF     | CAP , CERAMIC           | 0.022UF 50V ZF |
| C910                  | HCQI1H473JZT    | CAP , MYLAR             | 0.047UF 50V J  |
| C911                  | HCEA1CH471T     | CAP , ELECT             | 470UF,16V      |
| C912                  | HCEA1CH221T     | CAP , ELECT             | 220UF,16V      |
| C913                  | CCFT1H104ZF     | CAP , SEMICONDUCTOR     | 0.1UF 50V ZF   |
| C914                  | HCQI1H473JZT    | CAP , MYLAR             | 0.047UF 50V J  |
| C917                  | HCQI1H473JZT    | CAP , MYLAR             | 0.047UF 50V J  |
| C918                  | HCQI1H473JZT    | CAP , MYLAR             | 0.047UF 50V J  |
| C919                  | HCQI1H473JZT    | CAP , MYLAR             | 0.047UF 50V J  |
| C923                  | HCBS1H104ZFT    | CAP , CERAMIC           | 0.1UF 50V Z    |
| C924                  | HCBS1H104ZFT    | CAP , CERAMIC           | 0.1UF 50V Z    |
| C925                  | HCBS1H104ZFT    | CAP , CERAMIC           | 0.1UF 50V Z    |
| C932                  | HCEA1CH101T     | CAP , ELECT             | 100UF 16V      |
| C933                  | HCEA1CH221T     | CAP , ELECT             | 220UF,16V      |
| C934                  | CCKT1H223ZF     | CAP , CERAMIC           | 0.022UF 50V ZF |
| C939                  | HCEA1HH4R7T     | CAP , ELECT             | 4.7UF 50V      |
| C940                  | HCEA1AH471T     | CAP , ELECT             | 470UF 10V      |
| C950                  | HCEA1CH101T     | CAP , ELECT             | 100UF 16V      |
| C955                  | CCKT1H101KB     | CAP , CERAMIC           | 100PF 50V KB   |
| C971                  | HCQI1H562JZT    | CAP , MYLAR             | 5600PF 50V J   |
| C972                  | HCQI1H562JZT    | CAP , MYLAR             | 5600PF 50V J   |
| C973                  | HCQI1H562JZT    | CAP , MYLAR             | 5600PF 50V J   |
| C974                  | HCQI1H562JZT    | CAP , MYLAR             | 5600PF 50V J   |
| C975                  | HCQI1H562JZT    | CAP , MYLAR             | 5600PF 50V J   |
| C980                  | HCQI1H562JZT    | CAP , MYLAR             | 5600PF 50V J   |
| C981                  | HCQI1H562JZT    | CAP , MYLAR             | 5600PF 50V J   |
| C990                  | HCQI1H473JZT    | CAP , MYLAR             | 0.047UF 50V J  |
| C991                  | HCEA1HH1R0T     | CAP , ELECT             | 1UF 50V        |
| C992                  | HCQI1H473JZT    | CAP , MYLAR             | 0.047UF 50V J  |
| C993                  | HCQI1H473JZT    | CAP , MYLAR             | 0.047UF 50V J  |
| C994                  | HCQI1H473JZT    | CAP , MYLAR             | 0.047UF 50V J  |
| C995                  | HCQI1H473JZT    | CAP , MYLAR             | 0.047UF 50V J  |
| C996                  | HCQI1H473JZT    | CAP , MYLAR             | 0.047UF 50V J  |
| C997                  | HCQI1H473JZT    | CAP , MYLAR             | 0.047UF 50V J  |
| C999                  | CCKT1H223ZF     | CAP , CERAMIC           | 0.022UF 50V ZF |
| C631                  | CCEA1JH221E     | CAP , ELECT             | 220UF 63V      |
| C632                  | CCEA1JH221E     | CAP , ELECT             | 220UF 63V      |
| C633                  | CCEA1JH221E     | CAP , ELECT             | 220UF 63V      |
| C634                  | CCEA1JH221E     | CAP , ELECT             | 220UF 63V      |
| C635                  | CCEA1JH221E     | CAP , ELECT             | 220UF 63V      |
| C636                  | CCEA1JH221E     | CAP , ELECT             | 220UF 63V      |
| C637                  | CCEA1JH221E     | CAP , ELECT             | 220UF 63V      |
| C638                  | CCEA1JH221E     | CAP , ELECT             | 220UF 63V      |
| C639                  | CCEA1JH221E     | CAP , ELECT             | 220UF 63V      |
| C640                  | CCEA1JH221E     | CAP , ELECT             | 220UF 63V      |
| C807                  | CCEA1JH221E     | CAP , ELECT             | 220UF 63V      |
| C808                  | CCEA1JH221E     | CAP , ELECT             | 220UF 63V      |
| C809                  | CCEA1JH221E     | CAP , ELECT             | 220UF 63V      |
| C810                  | CCEA1JH221E     | CAP , ELECT             | 220UF 63V      |
| C902                  | CCET50VKL4822NK | CAP , ELECT             | 8200UF/50V     |
| C904                  | KCKDKS472ME     | CAP , CERAMIC(X1/Y2/SC) | 0.0047UF/2.5KV |
| C906                  | HCEA1EH102E     | CAP , ELECT             | 1000UF 25V     |
| C909                  | CCET50VKL4822NK | CAP , ELECT             | 8200UF/50V     |
| C915                  | CCET50VKL4103NK | CAP , ELECT             | 10000UF/50V    |

| Ref. Designator       | Part Number     | Description |             |
|-----------------------|-----------------|-------------|-------------|
| <b>MAIN PCB ASS'Y</b> |                 |             |             |
| C916                  | CCET50VKL4103NK | CAP , ELECT | 10000UF/50V |
| <i>Semiconductors</i> |                 |             |             |
| D501                  | HVD1SS133MT     | DIODE       | 1SS133T-77  |
| D502                  | HVD1SS133MT     | DIODE       | 1SS133T-77  |
| D503                  | HVD1SS133MT     | DIODE       | 1SS133T-77  |
| D504                  | HVD1SS133MT     | DIODE       | 1SS133T-77  |
| D505                  | HVD1SS133MT     | DIODE       | 1SS133T-77  |
| D581                  | HVD1SS133MT     | DIODE       | 1SS133T-77  |
| D582                  | HVD1SS133MT     | DIODE       | 1SS133T-77  |
| D583                  | HVD1SS133MT     | DIODE       | 1SS133T-77  |
| D584                  | HVD1SS133MT     | DIODE       | 1SS133T-77  |
| D585                  | HVD1SS133MT     | DIODE       | 1SS133T-77  |
| D601                  | HVD1SS133MT     | DIODE       | 1SS133T-77  |
| D801                  | HVD1SS133MT     | DIODE       | 1SS133T-77  |
| D802                  | HVD1SS133MT     | DIODE       | 1SS133T-77  |
| D803                  | HVD1SS133MT     | DIODE       | 1SS133T-77  |
| D804                  | HVD1SS133MT     | DIODE       | 1SS133T-77  |
| D901                  | KVD1N4003ST     | DIODE       | 1N4003      |
| D902                  | HVD1SS133MT     | DIODE       | 1SS133T-77  |
| D911                  | HVD1SS133MT     | DIODE       | 1SS133T-77  |
| D912                  | HVD1SS133MT     | DIODE       | 1SS133T-77  |
| D914                  | HVD1SS133MT     | DIODE       | 1SS133T-77  |
| D917                  | HVD1SS133MT     | DIODE       | 1SS133T-77  |
| D951                  | HVD1SS133MT     | DIODE       | 1SS133T-77  |
| D952                  | HVD1SS133MT     | DIODE       | 1SS133T-77  |
| D953                  | HVD1SS133MT     | DIODE       | 1SS133T-77  |
| D954                  | KVD1N4003SRT    | DIODE       | 1N4003      |
| D955                  | KVD1N4003SRT    | DIODE       | 1N4003      |
| D961                  | KVD1N4003ST     | DIODE       | 1N4003      |
| D962                  | KVD1N4003ST     | DIODE       | 1N4003      |
| D963                  | KVD1N4003ST     | DIODE       | 1N4003      |
| D964                  | HVD1SS133MT     | DIODE       | 1SS133T-77  |
| D965                  | HVD1SS133MT     | DIODE       | 1SS133T-77  |
| D966                  | HVD1SS133MT     | DIODE       | 1SS133T-77  |
| D967                  | HVD1SS133MT     | DIODE       | 1SS133T-77  |
| D968                  | HVD1SS133MT     | DIODE       | 1SS133T-77  |
| D969                  | HVD1SS133MT     | DIODE       | 1SS133T-77  |
| D971                  | HVD1SS133MT     | DIODE       | 1SS133T-77  |
| D972                  | HVD1SS133MT     | DIODE       | 1SS133T-77  |
| D973                  | HVD1SS133MT     | DIODE       | 1SS133T-77  |
| D974                  | HVD1SS133MT     | DIODE       | 1SS133T-77  |
| Q501                  | HVTKTA1268GRT   | TRANSISTOR  | KTA1268GR   |
| Q502                  | HVTKTA1268GRT   | TRANSISTOR  | KTA1268GR   |
| Q503                  | HVTKTA1268GRT   | TRANSISTOR  | KTA1268GR   |
| Q504                  | HVTKTA1268GRT   | TRANSISTOR  | KTA1268GR   |
| Q505                  | HVTKTA1268GRT   | TRANSISTOR  | KTA1268GR   |
| Q511                  | HVTKTC3200GRT   | TRANSISTOR  | KTC3200GR   |
| Q512                  | HVTKTC3200GRT   | TRANSISTOR  | KTC3200GR   |
| Q513                  | HVTKTC3200GRT   | TRANSISTOR  | KTC3200GR   |
| Q514                  | HVTKTC3200GRT   | TRANSISTOR  | KTC3200GR   |
| Q515                  | HVTKTC3200GRT   | TRANSISTOR  | KTC3200GR   |
| Q516                  | HVTKTC3200GRT   | TRANSISTOR  | KTC3200GR   |
| Q517                  | HVTKTC3200GRT   | TRANSISTOR  | KTC3200GR   |
| Q518                  | HVTKTC3200GRT   | TRANSISTOR  | KTC3200GR   |
| Q519                  | HVTKTC3200GRT   | TRANSISTOR  | KTC3200GR   |
| Q520                  | HVTKTC3200GRT   | TRANSISTOR  | KTC3200GR   |
| Q541                  | HVTKTC3198YT    | TRANSISTOR  | KTC3198     |
| Q542                  | HVTKTC3198YT    | TRANSISTOR  | KTC3198     |
| Q543                  | HVTKTC3198YT    | TRANSISTOR  | KTC3198     |
| Q544                  | HVTKTC3198YT    | TRANSISTOR  | KTC3198     |

| Ref. Designator       | Part Number   | Description       |           |
|-----------------------|---------------|-------------------|-----------|
| <b>MAIN PCB ASS'Y</b> |               |                   |           |
| Q545                  | HVTKTC3198YT  | TRANSISTOR        | KTC3198   |
| Q556                  | HVTKTC3200GRT | TRANSISTOR        | KTC3200GR |
| Q557                  | HVTKTC3200GRT | TRANSISTOR        | KTC3200GR |
| Q558                  | HVTKTC3200GRT | TRANSISTOR        | KTC3200GR |
| Q559                  | HVTKTC3200GRT | TRANSISTOR        | KTC3200GR |
| Q560                  | HVTKTC3200GRT | TRANSISTOR        | KTC3200GR |
| Q561                  | HVTKTC3200GRT | TRANSISTOR        | KTC3200GR |
| Q562                  | HVTKTC3200GRT | TRANSISTOR        | KTC3200GR |
| Q563                  | HVTKTC3200GRT | TRANSISTOR        | KTC3200GR |
| Q564                  | HVTKTC3200GRT | TRANSISTOR        | KTC3200GR |
| Q565                  | HVTKTC3200GRT | TRANSISTOR        | KTC3200GR |
| Q601                  | HVTKTA1268GRT | TRANSISTOR        | KTA1268GR |
| Q602                  | HVTKTA1268GRT | TRANSISTOR        | KTA1268GR |
| Q603                  | HVTKTA1268GRT | TRANSISTOR        | KTA1268GR |
| Q604                  | HVTKTA1268GRT | TRANSISTOR        | KTA1268GR |
| Q605                  | HVTKTA1268GRT | TRANSISTOR        | KTA1268GR |
| Q681                  | KVTKSC2785YT  | TRANSISTOR        | KSC2785Y  |
| Q682                  | KVTKSC2785YT  | TRANSISTOR        | KSC2785Y  |
| Q683                  | KVTKSC2785YT  | TRANSISTOR        | KSC2785Y  |
| Q684                  | KVTKSC2785YT  | TRANSISTOR        | KSC2785Y  |
| Q685                  | KVTKSC2785YT  | TRANSISTOR        | KSC2785Y  |
| Q701                  | HVTKTC2874BT  | TRANSISTOR , MUTE | KTC2874B  |
| Q702                  | HVTKTC2874BT  | TRANSISTOR , MUTE | KTC2874B  |
| Q703                  | HVTKTC2874BT  | TRANSISTOR , MUTE | KTC2874B  |
| Q704                  | HVTKTC2874BT  | TRANSISTOR , MUTE | KTC2874B  |
| Q705                  | HVTKTC2874BT  | TRANSISTOR , MUTE | KTC2874B  |
| Q706                  | HVTKTC2874BT  | TRANSISTOR , MUTE | KTC2874B  |
| Q707                  | HVTKTC2874BT  | TRANSISTOR , MUTE | KTC2874B  |
| Q708                  | HVTKTC2874BT  | TRANSISTOR , MUTE | KTC2874B  |
| Q801                  | KVTKSC2785YT  | TRANSISTOR        | KSC2785Y  |
| Q802                  | KVTKSC2785YT  | TRANSISTOR        | KSC2785Y  |
| Q812                  | HVTKTA1268GRT | TRANSISTOR        | KTA1268GR |
| Q813                  | HVTKTC3200GRT | TRANSISTOR        | KTC3200GR |
| Q814                  | HVTKTA1268GRT | TRANSISTOR        | KTA1268GR |
| Q815                  | HVTKTC3200GRT | TRANSISTOR        | KTC3200GR |
| Q816                  | HVTKTA1268GRT | TRANSISTOR        | KTA1268GR |
| Q817                  | HVTKTA1268GRT | TRANSISTOR        | KTA1268GR |
| Q818                  | HVTKTC3200GRT | TRANSISTOR        | KTC3200GR |
| Q819                  | HVTKTC3200GRT | TRANSISTOR        | KTC3200GR |
| Q820                  | HVTKTC3200GRT | TRANSISTOR        | KTC3200GR |
| Q821                  | HVTKTC3200GRT | TRANSISTOR        | KTC3200GR |
| Q822                  | HVTKTC3200GRT | TRANSISTOR        | KTC3200GR |
| Q823                  | HVTKTC3200GRT | TRANSISTOR        | KTC3200GR |
| Q824                  | HVTKTC3198YT  | TRANSISTOR        | KTC3198   |
| Q825                  | HVTKTC3198YT  | TRANSISTOR        | KTC3198   |
| Q826                  | HVTKTC2874BT  | TRANSISTOR , MUTE | KTC2874B  |
| Q827                  | HVTKTC2874BT  | TRANSISTOR , MUTE | KTC2874B  |
| Q901                  | KVTKSC2785YT  | TRANSISTOR        | KSC2785Y  |
| Q911                  | HVTKTA1271YT  | TRANSISTOR        | KTA1271Y  |
| Q912                  | HVTKTA1271YT  | TRANSISTOR        | KTA1271Y  |
| Q913                  | HVTKTA1271YT  | TRANSISTOR        | KTA1271Y  |
| Q914                  | HVTKTA1271YT  | TRANSISTOR        | KTA1271Y  |
| Q915                  | KVTKSC2785YT  | TRANSISTOR        | KSC2785Y  |
| Q916                  | KVTKSC2785YT  | TRANSISTOR        | KSC2785Y  |
| Q917                  | KVTKSC2785YT  | TRANSISTOR        | KSC2785Y  |
| Q918                  | KVTKSC2785YT  | TRANSISTOR        | KSC2785Y  |
| Q938                  | HVTKRA107MT   | TRANSISTOR        | KRA107M   |
| Q939                  | HVTKRA107MT   | TRANSISTOR        | KRA107M   |
| Q942                  | KVTKSC2785YT  | TRANSISTOR        | KSC2785Y  |
| Q943                  | KVTKSC2785YT  | TRANSISTOR        | KSC2785Y  |
| Q951                  | HVTKRC107MT   | TRANSISTOR        | KRC107M   |
| Q952                  | HVTKRA107MT   | TRANSISTOR        | KRA107M   |



| Ref. Designator       | Part Number    | Description        |                 |
|-----------------------|----------------|--------------------|-----------------|
| <b>MAIN PCB ASS'Y</b> |                |                    |                 |
| Q960                  | HVTKRC107MT    | TRANSISTOR         | KRC107M         |
| Q961                  | HVTKTA1024YT   | TRANSISTOR         | KTA1024         |
| Q969                  | HVTKTC2874BT   | TRANSISTOR , MUTE  | KTC2874B        |
| Q970                  | HVTKTC2874BT   | TRANSISTOR , MUTE  | KTC2874B        |
| Q971                  | HVTKTC2874BT   | TRANSISTOR , MUTE  | KTC2874B        |
| Q972                  | HVTKTC2874BT   | TRANSISTOR , MUTE  | KTC2874B        |
| Q973                  | HVTKTC2874BT   | TRANSISTOR , MUTE  | KTC2874B        |
| Q991                  | HVTKRC107MT    | TRANSISTOR         | KRC107M         |
| Q992                  | HVTKRA107MT    | TRANSISTOR         | KRA107M         |
| Q995                  | HVTKRA107MT    | TRANSISTOR         | KRA107M         |
| Q652                  | BVT2SB1560-OKM | TRANSISTOR , POWER | 2SB1560         |
| Q653                  | BVT2SB1560-OKM | TRANSISTOR , POWER | 2SB1560         |
| Q654                  | BVT2SB1560-OKM | TRANSISTOR , POWER | 2SB1560         |
| Q655                  | BVT2SB1560-OKM | TRANSISTOR , POWER | 2SB1560         |
| Q657                  | BVT2SD2390-OKM | TRANSISTOR , POWER | 2SD2390         |
| Q658                  | BVT2SD2390-OKM | TRANSISTOR , POWER | 2SD2390         |
| Q659                  | BVT2SD2390-OKM | TRANSISTOR , POWER | 2SD2390         |
| Q660                  | BVT2SD2390-OKM | TRANSISTOR , POWER | 2SD2390         |
| Q661                  | BVT2SB1560-OKM | TRANSISTOR , POWER | 2SB1560         |
| Q670                  | BVT2SD2390-OKM | TRANSISTOR , POWER | 2SD2390         |
| Q803                  | BVT2SD2390-OKM | TRANSISTOR , POWER | 2SD2390         |
| Q804                  | BVT2SB1560-OKM | TRANSISTOR , POWER | 2SB1560         |
| Q805                  | BVT2SD2390-OKM | TRANSISTOR , POWER | 2SD2390         |
| Q807                  | BVT2SB1560-OKM | TRANSISTOR , POWER | 2SB1560         |
| IC94                  | HVIMC7805C     | I.C. REGULATOR     | KA7805-ABTU     |
| IC95                  | BVIKP1010B     | IC, PHOTO COUPLER  |                 |
| Q858                  | HVT2SA1360O    | TRANSISTOR         | 2SA1360O        |
| Q871                  | HVT2SA1360O    | TRANSISTOR         | 2SA1360O        |
| Q872                  | HVT2SA1360O    | TRANSISTOR         | 2SA1360O        |
| Q874                  | HVT2SA1360O    | TRANSISTOR         | 2SA1360O        |
| Q875                  | HVT2SA1360O    | TRANSISTOR         | 2SA1360O        |
| Q876                  | HVT2SA1360O    | TRANSISTOR         | 2SA1360O        |
| Q877                  | HVT2SA1360O    | TRANSISTOR         | 2SA1360O        |
| Q881                  | HVT2SC3423O    | TRANSISTOR         | 2SC3423O        |
| Q882                  | HVT2SC3423O    | TRANSISTOR         | 2SC3423O        |
| Q883                  | HVT2SC3423O    | TRANSISTOR         | 2SC3423O        |
| Q884                  | HVT2SC3423O    | TRANSISTOR         | 2SC3423O        |
| Q885                  | HVT2SC3423O    | TRANSISTOR         | 2SC3423O        |
| Q886                  | HVT2SC3423O    | TRANSISTOR         | 2SC3423O        |
| Q887                  | HVT2SC3423O    | TRANSISTOR         | 2SC3423O        |
| <b>Resistors</b>      |                |                    |                 |
| R501                  | CRD20TJ433T    | RES , CARBON       | 43K OHM 1/5W J  |
| R502                  | CRD20TJ433T    | RES , CARBON       | 43K OHM 1/5W J  |
| R503                  | CRD20TJ433T    | RES , CARBON       | 43K OHM 1/5W J  |
| R504                  | CRD20TJ433T    | RES , CARBON       | 43K OHM 1/5W J  |
| R505                  | CRD20TJ433T    | RES , CARBON       | 43K OHM 1/5W J  |
| R506                  | CRD20TJ333T    | RES , CARBON       | 33K OHM 1/5W J  |
| R507                  | CRD20TJ333T    | RES , CARBON       | 33K OHM 1/5W J  |
| R508                  | CRD20TJ333T    | RES , CARBON       | 33K OHM 1/5W J  |
| R509                  | CRD20TJ333T    | RES , CARBON       | 33K OHM 1/5W J  |
| R510                  | CRD20TJ333T    | RES , CARBON       | 33K OHM 1/5W J  |
| R511                  | CRD20TJ152T    | RES , CARBON       | 1.5K OHM 1/5W J |
| R512                  | CRD20TJ152T    | RES , CARBON       | 1.5K OHM 1/5W J |
| R513                  | CRD20TJ152T    | RES , CARBON       | 1.5K OHM 1/5W J |
| R514                  | CRD20TJ152T    | RES , CARBON       | 1.5K OHM 1/5W J |
| R515                  | CRD20TJ152T    | RES , CARBON       | 1.5K OHM 1/5W J |
| R516                  | CRD20TJ152T    | RES , CARBON       | 1.5K OHM 1/5W J |
| R517                  | CRD20TJ152T    | RES , CARBON       | 1.5K OHM 1/5W J |
| R518                  | CRD20TJ152T    | RES , CARBON       | 1.5K OHM 1/5W J |
| R519                  | CRD20TJ152T    | RES , CARBON       | 1.5K OHM 1/5W J |

| Ref. Designator       | Part Number | Description  |                 |
|-----------------------|-------------|--------------|-----------------|
| <b>MAIN PCB ASS'Y</b> |             |              |                 |
| R520                  | CRD20TJ152T | RES , CARBON | 1.5K OHM 1/5W J |
| R521                  | CRD20TJ471T | RES , CARBON | 470 OHM 1/5W J  |
| R522                  | CRD20TJ471T | RES , CARBON | 470 OHM 1/5W J  |
| R523                  | CRD20TJ471T | RES , CARBON | 470 OHM 1/5W J  |
| R524                  | CRD20TJ471T | RES , CARBON | 470 OHM 1/5W J  |
| R525                  | CRD20TJ471T | RES , CARBON | 470 OHM 1/5W J  |
| R531                  | CRD20TJ221T | RES , CARBON | 220 OHM 1/5W J  |
| R532                  | CRD20TJ221T | RES , CARBON | 220 OHM 1/5W J  |
| R533                  | CRD20TJ221T | RES , CARBON | 220 OHM 1/5W J  |
| R534                  | CRD20TJ221T | RES , CARBON | 220 OHM 1/5W J  |
| R535                  | CRD20TJ221T | RES , CARBON | 220 OHM 1/5W J  |
| R536                  | CRD20TJ221T | RES , CARBON | 220 OHM 1/5W J  |
| R537                  | CRD20TJ221T | RES , CARBON | 220 OHM 1/5W J  |
| R538                  | CRD20TJ221T | RES , CARBON | 220 OHM 1/5W J  |
| R539                  | CRD20TJ221T | RES , CARBON | 220 OHM 1/5W J  |
| R540                  | CRD20TJ221T | RES , CARBON | 220 OHM 1/5W J  |
| R541                  | CRD20TJ271T | RES , CARBON | 270 OHM 1/5W J  |
| R542                  | CRD20TJ271T | RES , CARBON | 270 OHM 1/5W J  |
| R543                  | CRD20TJ271T | RES , CARBON | 270 OHM 1/5W J  |
| R544                  | CRD20TJ271T | RES , CARBON | 270 OHM 1/5W J  |
| R545                  | CRD20TJ271T | RES , CARBON | 270 OHM 1/5W J  |
| R556                  | CRD20TJ273T | RES , CARBON | 27K OHM 1/5W J  |
| R557                  | CRD20TJ273T | RES , CARBON | 27K OHM 1/5W J  |
| R558                  | CRD20TJ273T | RES , CARBON | 27K OHM 1/5W J  |
| R559                  | CRD20TJ273T | RES , CARBON | 27K OHM 1/5W J  |
| R560                  | CRD20TJ273T | RES , CARBON | 27K OHM 1/5W J  |
| R561                  | CRD20TJ182T | RES , CARBON | 1.8K OHM 1/5W J |
| R562                  | CRD20TJ182T | RES , CARBON | 1.8K OHM 1/5W J |
| R563                  | CRD20TJ182T | RES , CARBON | 1.8K OHM 1/5W J |
| R564                  | CRD20TJ182T | RES , CARBON | 1.8K OHM 1/5W J |
| R565                  | CRD20TJ182T | RES , CARBON | 1.8K OHM 1/5W J |
| R566                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R567                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R568                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R569                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R570                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R571                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R572                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R573                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R574                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R575                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R576                  | CRD20TJ100T | RES , CARBON | 10 OHM 1/5W J   |
| R577                  | CRD20TJ100T | RES , CARBON | 10 OHM 1/5W J   |
| R578                  | CRD20TJ100T | RES , CARBON | 10 OHM 1/5W J   |
| R579                  | CRD20TJ100T | RES , CARBON | 10 OHM 1/5W J   |
| R580                  | CRD20TJ100T | RES , CARBON | 10 OHM 1/5W J   |
| R581                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R582                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R583                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R584                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R585                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R586                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R587                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R588                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R589                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R590                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R591                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R592                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R593                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R594                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R595                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R596                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |

| Ref. Designator       | Part Number | Description  |                 |
|-----------------------|-------------|--------------|-----------------|
| <b>MAIN PCB ASS'Y</b> |             |              |                 |
| R597                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R598                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R599                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R600                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R601                  | CRD20TJ223T | RES , CARBON | 22K OHM 1/5W J  |
| R602                  | CRD20TJ223T | RES , CARBON | 22K OHM 1/5W J  |
| R603                  | CRD20TJ223T | RES , CARBON | 22K OHM 1/5W J  |
| R604                  | CRD20TJ223T | RES , CARBON | 22K OHM 1/5W J  |
| R605                  | CRD20TJ223T | RES , CARBON | 22K OHM 1/5W J  |
| R606                  | CRD20TJ223T | RES , CARBON | 22K OHM 1/5W J  |
| R607                  | CRD20TJ223T | RES , CARBON | 22K OHM 1/5W J  |
| R608                  | CRD20TJ223T | RES , CARBON | 22K OHM 1/5W J  |
| R609                  | CRD20TJ223T | RES , CARBON | 22K OHM 1/5W J  |
| R610                  | CRD20TJ223T | RES , CARBON | 22K OHM 1/5W J  |
| R611                  | CRD20TJ100T | RES , CARBON | 10 OHM 1/5W J   |
| R612                  | CRD20TJ100T | RES , CARBON | 10 OHM 1/5W J   |
| R631                  | KRD25FJ180T | RES , CARBON | 18,1/4W         |
| R632                  | KRD25FJ180T | RES , CARBON | 18,1/4W         |
| R633                  | KRD25FJ180T | RES , CARBON | 18,1/4W         |
| R634                  | KRD25FJ180T | RES , CARBON | 18,1/4W         |
| R635                  | KRD25FJ180T | RES , CARBON | 18,1/4W         |
| R636                  | KRD25FJ180T | RES , CARBON | 18,1/4W         |
| R637                  | KRD25FJ180T | RES , CARBON | 18,1/4W         |
| R638                  | KRD25FJ180T | RES , CARBON | 18,1/4W         |
| R639                  | KRD25FJ180T | RES , CARBON | 18,1/4W         |
| R640                  | KRD25FJ180T | RES , CARBON | 18,1/4W         |
| R646                  | KRD25FJ3R3T | RES , CARBON | 3.3,1/4W        |
| R647                  | KRD25FJ3R3T | RES , CARBON | 3.3,1/4W        |
| R648                  | KRD25FJ3R3T | RES , CARBON | 3.3,1/4W        |
| R649                  | KRD25FJ3R3T | RES , CARBON | 3.3,1/4W        |
| R650                  | KRD25FJ3R3T | RES , CARBON | 3.3,1/4W        |
| R651                  | KRD25FJ3R3T | RES , CARBON | 3.3,1/4W        |
| R652                  | KRD25FJ3R3T | RES , CARBON | 3.3,1/4W        |
| R653                  | KRD25FJ3R3T | RES , CARBON | 3.3,1/4W        |
| R654                  | KRD25FJ3R3T | RES , CARBON | 3.3,1/4W        |
| R655                  | KRD25FJ3R3T | RES , CARBON | 3.3,1/4W        |
| R666                  | CRD25TJ470T | RES , CARBON | 47,1/4W         |
| R667                  | CRD25TJ470T | RES , CARBON | 47,1/4W         |
| R668                  | CRD25TJ470T | RES , CARBON | 47,1/4W         |
| R669                  | CRD25TJ470T | RES , CARBON | 47,1/4W         |
| R670                  | CRD25TJ470T | RES , CARBON | 47,1/4W         |
| R671                  | CRD20TJ911T | RES , CARBON | 910 OHM 1/5W J  |
| R672                  | CRD20TJ911T | RES , CARBON | 910 OHM 1/5W J  |
| R673                  | CRD20TJ911T | RES , CARBON | 910 OHM 1/5W J  |
| R674                  | CRD20TJ911T | RES , CARBON | 910 OHM 1/5W J  |
| R675                  | CRD20TJ911T | RES , CARBON | 910 OHM 1/5W J  |
| R676                  | CRD20TJ182T | RES , CARBON | 1.8K OHM 1/5W J |
| R677                  | CRD20TJ182T | RES , CARBON | 1.8K OHM 1/5W J |
| R678                  | CRD20TJ182T | RES , CARBON | 1.8K OHM 1/5W J |
| R679                  | CRD20TJ182T | RES , CARBON | 1.8K OHM 1/5W J |
| R680                  | CRD20TJ182T | RES , CARBON | 1.8K OHM 1/5W J |
| R681                  | CRD20TJ562T | RES , CARBON | 5.6K OHM 1/5W J |
| R682                  | CRD20TJ562T | RES , CARBON | 5.6K OHM 1/5W J |
| R683                  | CRD20TJ562T | RES , CARBON | 5.6K OHM 1/5W J |
| R684                  | CRD20TJ562T | RES , CARBON | 5.6K OHM 1/5W J |
| R685                  | CRD20TJ562T | RES , CARBON | 5.6K OHM 1/5W J |
| R686                  | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R687                  | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R688                  | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R689                  | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R690                  | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R696                  | CRD25TJ470T | RES , CARBON | 47,1/4W         |

| Ref. Designator       | Part Number | Description  |                 |
|-----------------------|-------------|--------------|-----------------|
| <b>MAIN PCB ASS'Y</b> |             |              |                 |
| R697                  | CRD25TJ470T | RES , CARBON | 47,1/4W         |
| R698                  | CRD25TJ470T | RES , CARBON | 47,1/4W         |
| R699                  | CRD25TJ470T | RES , CARBON | 47,1/4W         |
| R700                  | CRD25TJ470T | RES , CARBON | 47,1/4W         |
| R701                  | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R702                  | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R703                  | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R704                  | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R705                  | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R706                  | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R707                  | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R708                  | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R711                  | CRD20TJ472T | RES , CARBON | 4.7K OHM 1/5W J |
| R712                  | CRD20TJ472T | RES , CARBON | 4.7K OHM 1/5W J |
| R713                  | CRD20TJ472T | RES , CARBON | 4.7K OHM 1/5W J |
| R714                  | CRD20TJ472T | RES , CARBON | 4.7K OHM 1/5W J |
| R715                  | CRD20TJ472T | RES , CARBON | 4.7K OHM 1/5W J |
| R716                  | CRD20TJ472T | RES , CARBON | 4.7K OHM 1/5W J |
| R717                  | CRD20TJ472T | RES , CARBON | 4.7K OHM 1/5W J |
| R718                  | CRD20TJ472T | RES , CARBON | 4.7K OHM 1/5W J |
| R721                  | CRD20TJ104T | RES , CARBON | 100K OHM 1/5W J |
| R722                  | CRD20TJ104T | RES , CARBON | 100K OHM 1/5W J |
| R723                  | CRD20TJ104T | RES , CARBON | 100K OHM 1/5W J |
| R724                  | CRD20TJ104T | RES , CARBON | 100K OHM 1/5W J |
| R725                  | CRD20TJ104T | RES , CARBON | 100K OHM 1/5W J |
| R726                  | CRD20TJ104T | RES , CARBON | 100K OHM 1/5W J |
| R727                  | CRD20TJ104T | RES , CARBON | 100K OHM 1/5W J |
| R728                  | CRD20TJ104T | RES , CARBON | 100K OHM 1/5W J |
| R771                  | CRD20TJ750T | RES , CARBON | 75 OHM 1/5W J   |
| R772                  | CRD20TJ750T | RES , CARBON | 75 OHM 1/5W J   |
| R773                  | CRD20TJ750T | RES , CARBON | 75 OHM 1/5W J   |
| R774                  | CRD20TJ750T | RES , CARBON | 75 OHM 1/5W J   |
| R775                  | CRD20TJ750T | RES , CARBON | 75 OHM 1/5W J   |
| R776                  | CRD20TJ750T | RES , CARBON | 75 OHM 1/5W J   |
| R777                  | CRD20TJ750T | RES , CARBON | 75 OHM 1/5W J   |
| R781                  | CRD20TJ750T | RES , CARBON | 75 OHM 1/5W J   |
| R782                  | CRD20TJ750T | RES , CARBON | 75 OHM 1/5W J   |
| R783                  | CRD20TJ750T | RES , CARBON | 75 OHM 1/5W J   |
| R784                  | CRD20TJ750T | RES , CARBON | 75 OHM 1/5W J   |
| R785                  | CRD20TJ750T | RES , CARBON | 75 OHM 1/5W J   |
| R786                  | CRD20TJ750T | RES , CARBON | 75 OHM 1/5W J   |
| R787                  | CRD20TJ750T | RES , CARBON | 75 OHM 1/5W J   |
| R801                  | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R802                  | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R803                  | CRD20TJ562T | RES , CARBON | 5.6K OHM 1/5W J |
| R804                  | CRD20TJ562T | RES , CARBON | 5.6K OHM 1/5W J |
| R805                  | CRD20TJ911T | RES , CARBON | 910 OHM 1/5W J  |
| R807                  | CRD20TJ911T | RES , CARBON | 910 OHM 1/5W J  |
| R808                  | CRD20TJ182T | RES , CARBON | 1.8K OHM 1/5W J |
| R809                  | CRD20TJ182T | RES , CARBON | 1.8K OHM 1/5W J |
| R812                  | CRD25TJ470T | RES , CARBON | 47,1/4W         |
| R813                  | CRD25TJ470T | RES , CARBON | 47,1/4W         |
| R814                  | CRD25TJ470T | RES , CARBON | 47,1/4W         |
| R815                  | CRD25TJ470T | RES , CARBON | 47,1/4W         |
| R817                  | KRD25FJ3R3T | RES , CARBON | 3.3,1/4W        |
| R818                  | KRD25FJ3R3T | RES , CARBON | 3.3,1/4W        |
| R819                  | KRD25FJ3R3T | RES , CARBON | 3.3,1/4W        |
| R820                  | KRD25FJ3R3T | RES , CARBON | 3.3,1/4W        |
| R821                  | KRD25FJ180T | RES , CARBON | 18,1/4W         |
| R822                  | KRD25FJ180T | RES , CARBON | 18,1/4W         |
| R823                  | KRD25FJ180T | RES , CARBON | 18,1/4W         |
| R824                  | KRD25FJ180T | RES , CARBON | 18,1/4W         |

| Ref. Designator       | Part Number | Description  |                 |
|-----------------------|-------------|--------------|-----------------|
| <b>MAIN PCB ASS'Y</b> |             |              |                 |
| R830                  | CRD20TJ223T | RES , CARBON | 22K OHM 1/5W J  |
| R831                  | CRD20TJ223T | RES , CARBON | 22K OHM 1/5W J  |
| R832                  | CRD20TJ223T | RES , CARBON | 22K OHM 1/5W J  |
| R833                  | CRD20TJ223T | RES , CARBON | 22K OHM 1/5W J  |
| R834                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R835                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R836                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R837                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R838                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R839                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R840                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R841                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R842                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R843                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R844                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R845                  | CRD20TJ561T | RES , CARBON | 560 OHM 1/5W J  |
| R848                  | CRD20TJ273T | RES , CARBON | 27K OHM 1/5W J  |
| R849                  | CRD20TJ273T | RES , CARBON | 27K OHM 1/5W J  |
| R850                  | CRD20TJ182T | RES , CARBON | 1.8K OHM 1/5W J |
| R851                  | CRD20TJ182T | RES , CARBON | 1.8K OHM 1/5W J |
| R852                  | CRD20TJ152T | RES , CARBON | 1.5K OHM 1/5W J |
| R853                  | CRD20TJ152T | RES , CARBON | 1.5K OHM 1/5W J |
| R854                  | CRD20TJ152T | RES , CARBON | 1.5K OHM 1/5W J |
| R855                  | CRD20TJ152T | RES , CARBON | 1.5K OHM 1/5W J |
| R856                  | CRD20TJ221T | RES , CARBON | 220 OHM 1/5W J  |
| R857                  | CRD20TJ221T | RES , CARBON | 220 OHM 1/5W J  |
| R858                  | CRD20TJ221T | RES , CARBON | 220 OHM 1/5W J  |
| R859                  | CRD20TJ221T | RES , CARBON | 220 OHM 1/5W J  |
| R860                  | CRD20TJ271T | RES , CARBON | 270 OHM 1/5W J  |
| R861                  | CRD20TJ271T | RES , CARBON | 270 OHM 1/5W J  |
| R862                  | CRD20TJ333T | RES , CARBON | 33K OHM 1/5W J  |
| R863                  | CRD20TJ333T | RES , CARBON | 33K OHM 1/5W J  |
| R864                  | CRD20TJ331T | RES , CARBON | 330 OHM 1/5W J  |
| R865                  | CRD20TJ331T | RES , CARBON | 330 OHM 1/5W J  |
| R866                  | CRD20TJ472T | RES , CARBON | 4.7K OHM 1/5W J |
| R867                  | CRD25TJ472T | RES , CARBON | 4.7K,1/4W       |
| R868                  | CRD20TJ473T | RES , CARBON | 47K OHM 1/5W J  |
| R869                  | CRD20TJ473T | RES , CARBON | 47K OHM 1/5W J  |
| R870                  | CRD20TJ433T | RES , CARBON | 43K OHM 1/5W J  |
| R871                  | CRD20TJ433T | RES , CARBON | 43K OHM 1/5W J  |
| R872                  | CRD20TJ471T | RES , CARBON | 470 OHM 1/5W J  |
| R873                  | CRD20TJ471T | RES , CARBON | 470 OHM 1/5W J  |
| R900                  | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R901                  | CRD25TJ393T | RES , CARBON | 39K,1/4W        |
| R902                  | CRD25TJ393T | RES , CARBON | 39K,1/4W        |
| R903                  | CRD25TJ393T | RES , CARBON | 39K,1/4W        |
| R906                  | CRD25TJ393T | RES , CARBON | 39K,1/4W        |
| R910                  | CRD20TJ105T | RES , CARBON | 1M OHM 1/5W J   |
| R911                  | CRD25TJ680T | RES , CARBON | 68 OHM 1/4W J   |
| R915                  | CRD20TJ470T | RES , CARBON | 47 OHM 1/5W J   |
| R916                  | CRD20TJ473T | RES , CARBON | 47K OHM 1/5W J  |
| R917                  | CRD25TJ393T | RES , CARBON | 39K,1/4W        |
| R918                  | CRD25TJ393T | RES , CARBON | 39K,1/4W        |
| R919                  | CRD25TJ393T | RES , CARBON | 39K,1/4W        |
| R920                  | CRD25TJ393T | RES , CARBON | 39K,1/4W        |
| R921                  | KRD25FJ180T | RES , CARBON | 18,1/4W         |
| R922                  | CRD25TJ470T | RES , CARBON | 47 OHM 1/4W J   |
| R924                  | CRD20TJ473T | RES , CARBON | 47K OHM 1/5W J  |
| R925                  | CRD20TJ473T | RES , CARBON | 47K OHM 1/5W J  |
| R926                  | CRD20TJ473T | RES , CARBON | 47K OHM 1/5W J  |
| R927                  | CRD20TJ473T | RES , CARBON | 47K OHM 1/5W J  |
| R928                  | CRD20TJ222T | RES , CARBON | 2.2K OHM 1/5W J |

| Ref. Designator       | Part Number   | Description  |                 |
|-----------------------|---------------|--------------|-----------------|
| <b>MAIN PCB ASS'Y</b> |               |              |                 |
| R929                  | CRD20TJ222T   | RES , CARBON | 2.2K OHM 1/5W J |
| R930                  | CRD20TJ222T   | RES , CARBON | 2.2K OHM 1/5W J |
| R931                  | CRD20TJ222T   | RES , CARBON | 2.2K OHM 1/5W J |
| R932                  | CRD20TJ103T   | RES , CARBON | 10K OHM 1/5W J  |
| R933                  | CRD20TJ472T   | RES , CARBON | 4.7K OHM 1/5W J |
| R934                  | CRD20TJ104T   | RES , CARBON | 100K OHM 1/5W J |
| R935                  | CRD20TJ154T   | RES , CARBON | 150K OHM 1/5W   |
| R936                  | CRD20TJ184T   | RES , CARBON | 180K,1/5W       |
| R937                  | CRD20TJ103T   | RES , CARBON | 10K OHM 1/5W J  |
| R938                  | CRD20TJ271T   | RES , CARBON | 270 OHM 1/5W J  |
| R939                  | CRD20TJ472T   | RES , CARBON | 4.7K OHM 1/5W J |
| R940                  | CRD20TJ152T   | RES , CARBON | 1.5K OHM 1/5W J |
| R941                  | CRD20TJ223T   | RES , CARBON | 22K OHM 1/5W J  |
| R942                  | CRD20TJ223T   | RES , CARBON | 22K OHM 1/5W J  |
| R943                  | CRD20TJ223T   | RES , CARBON | 22K OHM 1/5W J  |
| R944                  | CRD25TJ223T   | RES , CARBON | 22K OHM 1/4W J  |
| R945                  | CRD20TJ223T   | RES , CARBON | 22K OHM 1/5W J  |
| R946                  | CRD25TJ223T   | RES , CARBON | 22K OHM 1/4W J  |
| R947                  | CRD20TJ223T   | RES , CARBON | 22K OHM 1/5W J  |
| R949                  | CRD20TJ331T   | RES , CARBON | 330 OHM 1/5W J  |
| R950                  | CRD20TJ273T   | RES , CARBON | 27K OHM 1/5W J  |
| R951                  | CRD20TJ103T   | RES , CARBON | 10K OHM 1/5W J  |
| R952                  | CRD20TJ223T   | RES , CARBON | 22K OHM 1/5W J  |
| R953                  | CRD20TJ223T   | RES , CARBON | 22K OHM 1/5W J  |
| R954                  | CRD20TJ223T   | RES , CARBON | 22K OHM 1/5W J  |
| R955                  | CRD20TJ203T   | RES , CARBON | 20K OHM 1/5W    |
| R956                  | CRD20TJ394T   | RES , CARBON | 390K,1/5W       |
| R957                  | CRD20TJ153T   | RES , CARBON | 15K OHM 1/5W J  |
| R958                  | CRD20TJ563T   | RES , CARBON | 56K OHM 1/5W J  |
| R959                  | CRD20TJ223T   | RES , CARBON | 22K OHM 1/5W J  |
| R960                  | CRD20TJ222T   | RES , CARBON | 2.2K OHM 1/5W J |
| R961                  | CRD20TJ331T   | RES , CARBON | 330 OHM 1/5W J  |
| R962                  | CRD20TJ273T   | RES , CARBON | 27K OHM 1/5W J  |
| R963                  | CRD20TJ105T   | RES , CARBON | 1M OHM 1/5W J   |
| R966                  | CRD20TJ472T   | RES , CARBON | 4.7K OHM 1/5W J |
| R969                  | CRD20TJ472T   | RES , CARBON | 4.7K OHM 1/5W J |
| R970                  | CRD20TJ472T   | RES , CARBON | 4.7K OHM 1/5W J |
| R971                  | CRD20TJ472T   | RES , CARBON | 4.7K OHM 1/5W J |
| R972                  | CRD20TJ472T   | RES , CARBON | 4.7K OHM 1/5W J |
| R973                  | CRD20TJ472T   | RES , CARBON | 4.7K OHM 1/5W J |
| R974                  | CRD20TJ331T   | RES , CARBON | 330 OHM 1/5W J  |
| R975                  | CRD20TJ331T   | RES , CARBON | 330 OHM 1/5W J  |
| R976                  | CRD20TJ331T   | RES , CARBON | 330 OHM 1/5W J  |
| R977                  | CRD20TJ331T   | RES , CARBON | 330 OHM 1/5W J  |
| R978                  | CRD20TJ331T   | RES , CARBON | 330 OHM 1/5W J  |
| R979                  | CRD20TJ473T   | RES , CARBON | 47K OHM 1/5W J  |
| R980                  | CRD20TJ473T   | RES , CARBON | 47K OHM 1/5W J  |
| R981                  | CRD20TJ473T   | RES , CARBON | 47K OHM 1/5W J  |
| R982                  | CRD20TJ473T   | RES , CARBON | 47K OHM 1/5W J  |
| R983                  | CRD20TJ473T   | RES , CARBON | 47K OHM 1/5W J  |
| R986                  | CRD20TJ102T   | RES , CARBON | 1K OHM 1/5W J   |
| R987                  | CRD20TJ561T   | RES , CARBON | 560 OHM 1/5W J  |
| R988                  | CRD20TJ562T   | RES , CARBON | 5.6K OHM 1/5W J |
| R989                  | CRD20TJ1R0T   | RES , CARBON | 1 OHM 1/5W J    |
| R991                  | CRD20TJ822T   | RES , CARBON | 8.2K OHM 1/5W J |
| R992                  | CRD20TJ562T   | RES , CARBON | 5.6K OHM 1/5W J |
| R998                  | CRD20TJ103T   | RES , CARBON | 10K OHM 1/5W J  |
| R656                  | CRF5EKR27HX2K | RES , CEMENT | 0.27OHM(*2) ,5W |
| R657                  | CRF5EKR27HX2K | RES , CEMENT | 0.27OHM(*2) ,5W |
| R658                  | CRF5EKR27HX2K | RES , CEMENT | 0.27OHM(*2) ,5W |
| R659                  | CRF5EKR27HX2K | RES , CEMENT | 0.27OHM(*2) ,5W |
| R660                  | CRF5EKR27HX2K | RES , CEMENT | 0.27OHM(*2) ,5W |

| Ref. Designator       | Part Number     | Description               |                 |
|-----------------------|-----------------|---------------------------|-----------------|
| <b>MAIN PCB ASS'Y</b> |                 |                           |                 |
| R810                  | CRF5EKR27HX2K   | RES , CEMENT              | 0.27OHM(*2) ,5W |
| R811                  | CRF5EKR27HX2K   | RES , CEMENT              | 0.27OHM(*2) ,5W |
| R904                  | BRDERC12UGK335T | RES , CARBON JP           | 3.3M OHM 1/2W   |
| R905                  | CRG1ANJ100H     | RES , METAL OXIDE FILM    | 10 ohms,1W      |
| R923                  | CRD25TJ220T     | RES , CARBON              | 22,1/4W         |
| R990                  | CRG1ANJ100H     | RES , METAL OXIDE FILM    | 10 ohms,1W      |
| R993                  | CRG1ANJ100H     | RES , METAL OXIDE FILM    | 10 ohms,1W      |
| R994                  | CRG1ANJ100H     | RES , METAL OXIDE FILM    | 10 ohms,1W      |
| R995                  | CRG1ANJ100H     | RES , METAL OXIDE FILM    | 10 ohms,1W      |
| R996                  | CRG1ANJ100H     | RES , METAL OXIDE FILM    | 10 ohms,1W      |
| R997                  | CRG1ANJ100H     | RES , METAL OXIDE FILM    | 10 ohms,1W      |
| R999                  | CRG1ANJ100H     | RES , METAL OXIDE FILM    | 10 ohms,1W      |
| <i>Miscellaneous</i>  |                 |                           |                 |
| TH91                  | KRTP42T7D330B   | THERMAL SENSOR , POSISTOR | P42T7D330BW20   |
| T902                  | CLT5J033ZU      | TRANS , SUB               | SR-68           |
|                       | CMYAVR235       | HEAT SINK ASS'Y           |                 |
|                       | CHD1A012Z       | SCREW , SPECIAL           |                 |
|                       | CHD1A036FZ      | SCREW , SPECIAL           |                 |
|                       | CHD3A012        | SCREW , TR                | ACR130          |
|                       | CMD1A398        | BRACKET , PCB             | AG-D9320        |
|                       | CMD1A417        | BRACKET , PCB             | AG-D8900        |
|                       | CMD1A488        | BRACKET , FAN             |                 |
|                       | CMY1A249        | HEAT SINK                 |                 |
|                       | CMY2A205        | HEAT SINK                 |                 |
|                       | CTB3+10J        | SCREW                     |                 |
|                       | CTB3+8J         | SCREW                     |                 |
|                       | CTW3+12J        | SCREW                     |                 |
|                       | HDMKD1206PTS3   | MOTOR , FAN(60X60X25MM)   | KD1206PTS3      |
|                       | CTW3+8J         | SCREW                     |                 |
| BN19                  | CWB3FE03250UP   | WIRE ASS'Y                |                 |
| BN20                  | CWB3FB43280UP   | WIRE ASS'Y                |                 |
| BN79                  | CWZAVR230BN79   | WIRE ASS'Y (SHIELD)       |                 |
| BN81                  | CWB1C902050EN   | WIRE ASS'Y                |                 |
| BN82                  | CWB1C902050EN   | WIRE ASS'Y                |                 |
| BN83                  | CWB1C902050EN   | WIRE ASS'Y                |                 |
| BN84                  | CWB1C902050EN   | WIRE ASS'Y                |                 |
| BN85                  | CWB1C902050EN   | WIRE ASS'Y                |                 |
| BN86                  | CWB1C902050EN   | WIRE ASS'Y                |                 |
| BN87                  | CWB1C902050EN   | WIRE ASS'Y                |                 |
| BN88                  | CWB2B904070EN   | WIRE ASS'Y                |                 |
| BN98                  | BJP08GA130ZK    | WAFER                     |                 |
| CN61                  | KJP02GA01ZM     | WAFER                     | MOLEX 5267-02A  |
| CN62                  | KJP02GA01ZM     | WAFER                     | MOLEX 5267-02A  |
| CN63                  | KJP02GA01ZM     | WAFER                     | MOLEX 5267-02A  |
| CN64                  | KJP02GA01ZM     | WAFER                     | MOLEX 5267-02A  |
| CN65                  | KJP02GA01ZM     | WAFER                     | MOLEX 5267-02A  |
| CN66                  | KJP02GA01ZM     | WAFER                     | MOLEX 5267-02A  |
| CN67                  | KJP02GA01ZM     | WAFER                     | MOLEX 5267-02A  |
| CN80                  | KJP11GA19ZM     | WAFER                     | MOLEX-53014     |
| CN88                  | CJP04GA19ZY     | WAFER, STRAIGHT, 4PIN     | 00906-0027      |
| CN89                  | KJP02GA01ZM     | WAFER                     | MOLEX 5267-02A  |
| CN91                  | KJP03GA89ZM     | WAFER                     | MOLEX35328-0310 |
| CN94                  | KJP13GA98ZM     | WAFER                     | MOLEX35336-1310 |
| CN95                  | KJP08GA98ZM     | WAFER                     | MOLEX35336-0810 |
| ET01                  | CMD1A387        | BRACKET , PCB             |                 |
| ET01                  | CNE75           | PLATE , EARTH             |                 |
| ET02                  | CMD1A387        | BRACKET , PCB             |                 |
| ET03                  | CNE75           | PLATE , EARTH             |                 |
| ET04                  | CMD1A387        | BRACKET , PCB             |                 |
| ET05                  | CMD1A387        | BRACKET , PCB             |                 |



| Ref. Designator        | Part Number  | Description         |               |
|------------------------|--------------|---------------------|---------------|
| <b>MAIN PCB ASS'Y</b>  |              |                     |               |
| JK91                   | CJJ5R006Z    | TERMINAL , SPEAKER  |               |
| JK92                   | CJJ5Q012Z    | TERMINAL , SPEAKER  |               |
| JK94                   | CJJ2D008Z    | JACK , STEREO       |               |
| JK95                   | CJJ2D008Z    | JACK , STEREO       |               |
| JK97                   | CJJ4P041W    | JACK IN/OUT         |               |
| JK98                   | CJJ4P042W    | JACK IN/OUT         |               |
| JW90                   | CWEE212120VV | WIRE ASS'Y          |               |
| JW91                   | CWE8212180VV | WIRE ASS'Y          |               |
| JW99                   | CWE8202150AA | WIRE ASS'Y          |               |
| L501                   | CLEY0R5KAK   | COIL , SPEAKER      | 0.5UH K       |
| L502                   | CLEY0R5KAK   | COIL , SPEAKER      | 0.5UH K       |
| L503                   | CLEY0R5KAK   | COIL , SPEAKER      | 0.5UH K       |
| L504                   | CLEY0R5KAK   | COIL , SPEAKER      | 0.5UH K       |
| L505                   | CLEY0R5KAK   | COIL , SPEAKER      | 0.5UH K       |
| L506                   | CLEY0R5KAK   | COIL , SPEAKER      | 0.5UH K       |
| L507                   | CLEY0R5KAK   | COIL , SPEAKER      | 0.5UH K       |
| RY94                   | HSL1A008ZE   | RELAY               | SDT-S-112DMR  |
| <b>VIDEO PCB ASS'Y</b> |              |                     |               |
| <i>Capacitors</i>      |              |                     |               |
| C107                   | CCKT1H103ZF  | CAP , CERAMIC       | 0.01UF 50V ZF |
| C108                   | CCKT1H103ZF  | CAP , CERAMIC       | 0.01UF 50V ZF |
| C109                   | CCFT1H104ZF  | CAP , SEMICONDUCTOR | 0.1UF 50V ZF  |
| C110                   | CCFT1H104ZF  | CAP , SEMICONDUCTOR | 0.1UF 50V ZF  |
| C111                   | CCKT1H103ZF  | CAP , CERAMIC       | 0.01UF 50V ZF |
| C112                   | CCKT1H103ZF  | CAP , CERAMIC       | 0.01UF 50V ZF |
| C117                   | HCEA1HH4R7T  | CAP , ELECT         | 4.7UF 50V     |
| C118                   | CCKT1H103ZF  | CAP , CERAMIC       | 0.01UF 50V ZF |
| C119                   | HCEA1HH470T  | CAP , ELECT         | 47UF 50V      |
| C120                   | HCEA1HH470T  | CAP , ELECT         | 47UF 50V      |
| C121                   | CCKT1H103ZF  | CAP , CERAMIC       | 0.01UF 50V ZF |
| C401                   | CCEA1VH100T  | CAP , ELECT         | 10UF 35V      |
| C402                   | CCKT1H101KB  | CAP , CERAMIC       | 100PF 50V KB  |
| C403                   | HCEA1VH100T  | CAP , ELECT         | 10UF 35V      |
| C404                   | CCKT1H101KB  | CAP , CERAMIC       | 100PF 50V KB  |
| C405                   | HCEA1VH100T  | CAP , ELECT         | 10UF 35V      |
| C406                   | HCEA1VH100T  | CAP , ELECT         | 10UF 35V      |
| C407                   | CCKT1H101KB  | CAP , CERAMIC       | 100PF 50V KB  |
| C408                   | CCEA1VH100T  | CAP , ELECT         | 10UF 35V      |
| C409                   | CCKT1H101KB  | CAP , CERAMIC       | 100PF 50V KB  |
| C410                   | CCKT1H101KB  | CAP , CERAMIC       | 100PF 50V KB  |
| C411                   | HCBS1H101KBT | CAP , CERAMIC       | 100PF 50V K   |
| C412                   | HCBS1H101KBT | CAP , CERAMIC       | 100PF 50V K   |
| C413                   | HCBS1H101KBT | CAP , CERAMIC       | 100PF 50V K   |
| C414                   | HCBS1H101KBT | CAP , CERAMIC       | 100PF 50V K   |
| C415                   | CCEA1VH100T  | CAP , ELECT         | 10UF 35V      |
| C416                   | HCEA1CH101T  | CAP , ELECT         | 100UF 16V     |
| C417                   | HCEA1CH101T  | CAP , ELECT         | 100UF 16V     |
| C418                   | HCBS1H223ZFT | CAP , CERAMIC       | 0.022UF 50V Z |
| C419                   | HCEA1VH100T  | CAP , ELECT         | 10UF 35V      |
| C420                   | HCBS1H223ZFT | CAP , CERAMIC       | 0.022UF 50V Z |
| C421                   | HCEA1CH101T  | CAP , ELECT         | 100UF 16V     |
| C422                   | HCBS1H223ZFT | CAP , CERAMIC       | 0.022UF 50V Z |
| C423                   | HCEA1CH101T  | CAP , ELECT         | 100UF 16V     |
| C424                   | HCEA1VH100T  | CAP , ELECT         | 10UF 35V      |
| C425                   | HCEA1VH100T  | CAP , ELECT         | 10UF 35V      |
| C426                   | HCEA1VH100T  | CAP , ELECT         | 10UF 35V      |
| C427                   | HCBS1H223ZFT | CAP , CERAMIC       | 0.022UF 50V Z |
| C428                   | HCEA1CH101T  | CAP , ELECT         | 100UF 16V     |
| C429                   | HCBS1H223ZFT | CAP , CERAMIC       | 0.022UF 50V Z |

| Ref. Designator        | Part Number  | Description         |                |
|------------------------|--------------|---------------------|----------------|
| <b>VIDEO PCB ASS'Y</b> |              |                     |                |
| C430                   | HCEA1CH101T  | CAP , ELECT         | 100UF 16V      |
| C431                   | HCEA1VH100T  | CAP , ELECT         | 10UF 35V       |
| C432                   | HCEA1VH100T  | CAP , ELECT         | 10UF 35V       |
| C433                   | HCEA1VH100T  | CAP , ELECT         | 10UF 35V       |
| C434                   | CCEA1VH100T  | CAP , ELECT         | 10UF 35V       |
| C435                   | HCEA1VH100T  | CAP , ELECT         | 10UF 35V       |
| C436                   | HCBS1H223ZFT | CAP , CERAMIC       | 0.022UF 50V Z  |
| C437                   | HCEA1CH101T  | CAP , ELECT         | 100UF 16V      |
| C438                   | HCBS1H223ZFT | CAP , CERAMIC       | 0.022UF 50V Z  |
| C439                   | HCEA1CH101T  | CAP , ELECT         | 100UF 16V      |
| C442                   | HCBS1H103ZFT | CAP , CERAMIC       | 0.01UF 50V Z   |
| C443                   | HCEA1VKS100T | CAP , ELECT         | 10UF 35V       |
| C444                   | HCEA1VKS100T | CAP , ELECT         | 10UF 35V       |
| C445                   | HCBS1H103ZFT | CAP , CERAMIC       | 0.01UF 50V Z   |
| C446                   | HCEA1VH100T  | CAP , ELECT         | 10UF 35V       |
| C447                   | HCEA1VH100T  | CAP , ELECT         | 10UF 35V       |
| C448                   | HCBS1H223ZFT | CAP , CERAMIC       | 0.022UF 50V Z  |
| C449                   | HCEA1CH101T  | CAP , ELECT         | 100UF 16V      |
| C450                   | HCBS1H223ZFT | CAP , CERAMIC       | 0.022UF 50V Z  |
| C451                   | HCEA1CH101T  | CAP , ELECT         | 100UF 16V      |
| C452                   | HCBS1H223ZFT | CAP , CERAMIC       | 0.022UF 50V Z  |
| C453                   | HCEA1CH101T  | CAP , ELECT         | 100UF 16V      |
| C454                   | HCBS1H223ZFT | CAP , CERAMIC       | 0.022UF 50V Z  |
| C455                   | HCEA1CH101T  | CAP , ELECT         | 100UF 16V      |
| C456                   | HCBS1H104ZFT | CAP , CERAMIC       | 0.1UF 50V Z    |
| C457                   | HCEA1CH101T  | CAP , ELECT         | 100UF 16V      |
| C458                   | HCEA1CH101T  | CAP , ELECT         | 100UF 16V      |
| C459                   | HCBS1H104ZFT | CAP , CERAMIC       | 0.1UF 50V Z    |
| C460                   | HCBS1C272MXT | CAP , CERAMIC       | 2700PF,16V     |
| C461                   | HCEA1CH101T  | CAP , ELECT         | 100UF 16V      |
| C462                   | HCEA1CH101T  | CAP , ELECT         | 100UF 16V      |
| C463                   | HCBS1H473ZFT | CAP , CERAMIC       | 0.047UF 50V Z  |
| C501                   | HCBS1H330JT  | CAP , CERAMIC       | 33PF,50V       |
| C502                   | HCBS1H330JT  | CAP , CERAMIC       | 33PF,50V       |
| C503                   | HCBS1H181KBT | CAP , CERAMIC       | 180PF 50V K    |
| C504                   | HCEA1HHR47T  | CAP , ELECT         | 0.47UF,50V     |
| C505                   | HCBS1H223ZFT | CAP , CERAMIC       | 0.022UF 50V Z  |
| C506                   | HCEA1AH471T  | CAP , ELECT         | 470UF 10V      |
| C509                   | HCEA1HH1R0T  | CAP , ELECT         | 1UF 50V        |
| C510                   | HCEA1HH1R0T  | CAP , ELECT         | 1UF 50V        |
| C511                   | HCQ1H682JZT  | CAP , MYLAR         | 6800PF 50V J   |
| C512                   | HCEA1HH1R0T  | CAP , ELECT         | 1UF 50V        |
| C513                   | HCBS1H560JT  | CAP , CERAMIC       | 56PF 50V J     |
| C514                   | HCBS1H220JCT | CAP , CERAMIC       | 22PF 50V J     |
| C515                   | HCEA1AH471T  | CAP , ELECT         | 470UF 10V      |
| C517                   | HCBS1H223ZFT | CAP , CERAMIC       | 0.022UF 50V Z  |
| C518                   | HCBS1H223ZFT | CAP , CERAMIC       | 0.022UF 50V Z  |
| C519                   | CCFT1H104ZF  | CAP , SEMICONDUCTOR | 0.1UF 50V ZF   |
| C555                   | HCEA1AH471T  | CAP , ELECT         | 470UF 10V      |
| C556                   | HCEA1CH101T  | CAP , ELECT         | 100UF 16V      |
| C557                   | HCEA1CH101T  | CAP , ELECT         | 100UF 16V      |
| C561                   | HCEA1CH101T  | CAP , ELECT         | 100UF 16V      |
| C568                   | HCBS1H104ZFT | CAP , CERAMIC       | 0.1UF 50V Z    |
| C610                   | HCBS1H223ZFT | CAP , CERAMIC       | 0.022UF 50V Z  |
| C611                   | HCEA1CH101T  | CAP , ELECT         | 100UF 16V      |
| C612                   | HCBS1H223ZFT | CAP , CERAMIC       | 0.022UF 50V Z  |
| C613                   | HCEA1CH101T  | CAP , ELECT         | 100UF 16V      |
| C614                   |              | WIRE , COPPER       | SN95/PB5 , 0.6 |
| C615                   |              | WIRE , COPPER       | SN95/PB5 , 0.6 |
| C616                   |              | WIRE , COPPER       | SN95/PB5 , 0.6 |
| C617                   |              | WIRE , COPPER       | SN95/PB5 , 0.6 |
| C618                   |              | WIRE , COPPER       | SN95/PB5 , 0.6 |

| Ref. Designator        | Part Number   | Description         |                |
|------------------------|---------------|---------------------|----------------|
| <b>VIDEO PCB ASS'Y</b> |               |                     |                |
| C619                   |               | WIRE , COPPER       | SN95/PB5 , 0.6 |
| C620                   | HCBS1H223ZFT  | CAP , CERAMIC       | 0.022UF 50V Z  |
| C621                   | HCBS1H223ZFT  | CAP , CERAMIC       | 0.022UF 50V Z  |
| C622                   | HCBS1H223ZFT  | CAP , CERAMIC       | 0.022UF 50V Z  |
| C701                   | HCEA1AH471T   | CAP , ELECT         | 470UF 10V      |
| C702                   | HCEA1AH471T   | CAP , ELECT         | 470UF 10V      |
| C703                   | CCKT1H181KB   | CAP , CERAMIC       | 180PF 50V KB   |
| C704                   | CCFT1H104ZF   | CAP , SEMICONDUCTOR | 0.1UF 50V ZF   |
| C705                   | CCKT1H181KB   | CAP , CERAMIC       | 180PF 50V KB   |
| C706                   | CCFT1H104ZF   | CAP , SEMICONDUCTOR | 0.1UF 50V ZF   |
| C707                   | CCKT1H101KB   | CAP , CERAMIC       | 100PF 50V KB   |
| C708                   | HCEA1CKS101T  | CAP , ELECT         | 100UF 16V KS   |
| C709                   | HCBS1H104ZFT  | CAP , CERAMIC       | 0.1UF 50V Z    |
| C711                   | HCEA1CH101T   | CAP , ELECT         | 100UF 16V      |
| C712                   | HCBS1H473ZFT  | CAP , CERAMIC       | 0.047UF 50V Z  |
| C921                   | HCQI1H104JZT  | CAP , MYLAR         | 0.1UF 50V J    |
| C922                   | HCQI1H104JZT  | CAP , MYLAR         | 0.1UF 50V J    |
| C923                   | HCQI1H104JZT  | CAP , MYLAR         | 0.1UF 50V J    |
| C924                   | HCQI1H104JZT  | CAP , MYLAR         | 0.1UF 50V J    |
| C925                   | HCQI1H103JZT  | CAP , MYLAR         | 0.01UF 50V J   |
| C926                   | HCQI1H103JZT  | CAP , MYLAR         | 0.01UF 50V J   |
| C927                   | HCQI1H103JZT  | CAP , MYLAR         | 0.01UF 50V J   |
| C928                   | HCQI1H103JZT  | CAP , MYLAR         | 0.01UF 50V J   |
| C931                   | HCQI1H473JZT  | CAP , MYLAR         | 0.047UF 50V J  |
| C932                   | HCQI1H473JZT  | CAP , MYLAR         | 0.047UF 50V J  |
| C933                   | HCQI1H473JZT  | CAP , MYLAR         | 0.047UF 50V J  |
| C934                   | HCQI1H473JZT  | CAP , MYLAR         | 0.047UF 50V J  |
| C122                   | HCEA1JH101E   | CAP , ELECT         | 100UF 63V      |
| C124                   | BCQE2E104KDE  | CAP , LINE ACROSS   | 0.1UF 250V KD  |
| C507                   | CCCT1H270JC   | CAP , CERAMIC       | 22PF 50V JC    |
| C508                   | CCCT1H270JC   | CAP , CERAMIC       | 22PF 50V JC    |
| C520                   | CCEA0JKR3222E | CAP , ELECTROLYTIC  | 2200UF , 6.3V  |
| C523                   | CCEA0JKR3222E | CAP , ELECTROLYTIC  | 2200UF , 6.3V  |
| <b>Semiconductors</b>  |               |                     |                |
| D101                   | HVDMTZJ15BT   | DIODE , ZENER       | 15V 1/2W       |
| D102                   | HVDMTZJ27BT   | DIODE , ZENER       | 27V            |
| D104                   | KVD1N4003ST   | DIODE               | 1N4003         |
| D105                   | KVD1N4003ST   | DIODE               | 1N4003         |
| D108                   | KVD1N4003ST   | DIODE               | 1N4003         |
| D109                   | HVDMTZJ12BT   | DIODE , ZENER       | 12V 1/2W       |
| D111                   | HVDMTZJ12BT   | DIODE , ZENER       | 12V 1/2W       |
| D401                   | HVD1SS133MT   | DIODE               | 1SS133T-77     |
| D402                   | HVD1SS133MT   | DIODE               | 1SS133T-77     |
| D403                   | HVD1SS133MT   | DIODE               | 1SS133T-77     |
| D404                   | HVD1SS133MT   | DIODE               | 1SS133T-77     |
| D405                   | HVD1SS133MT   | DIODE               | 1SS133T-77     |
| Q104                   | HVTKSC2316YT  | TRANSISTOR          | KSC2316Y       |
| Q402                   | HVTKSA733CYT  | TRANSISTOR          | KSA733C        |
| Q403                   | HVTKRA107MT   | TRANSISTOR          | KRA107M        |
| Q404                   | HVTKRC107MT   | TRANSISTOR          | KRC107M        |
| Q405                   | HVTKSA733CYT  | TRANSISTOR          | KSA733C        |
| Q406                   | HVTKRA107MT   | TRANSISTOR          | KRA107M        |
| Q407                   | HVTKRC107MT   | TRANSISTOR          | KRC107M        |
| Q408                   | HVTKRC107MT   | TRANSISTOR          | KRC107M        |
| Q409                   | HVTKRA104MT   | TRANSISTOR          | KRA104M        |
| Q410                   | HVTKTD1302T   | TRANSISTOR          | KTD1302        |
| Q411                   | HVTKTD1302T   | TRANSISTOR          | KTD1302        |
| Q412                   | HVTKRA104MT   | TRANSISTOR          | KRA104M        |
| Q501                   | KVTKSC2785YT  | TRANSISTOR          | KSC2785Y       |
| Q502                   | KVTKSA1175YT  | TRANSISTOR          | KSA1175Y       |

| Ref. Designator        | Part Number     | Description        |                 |
|------------------------|-----------------|--------------------|-----------------|
| <b>VIDEO PCB ASS'Y</b> |                 |                    |                 |
| Q556                   | KVTKSA1175YT    | TRANSISTOR         | KSA1175Y        |
| Q568                   | HVTKTC2874BT    | TRANSISTOR , MUTE  | KTC2874B        |
| Q569                   | HVTKRC107MT     | TRANSISTOR         | KRC107M         |
| Q601                   | HVTKRC114MT     | TRANSISTOR         | KTC114M         |
| IC41                   | HVINJM2296M     | I.C , VIDEO SW     | NJM2296M        |
| IC42                   | HVINJM2296M     | I.C , VIDEO SW     | NJM2296M        |
| IC43                   | HVINJM2296M     | I.C , VIDEO SW     | NJM2296M        |
| IC44                   | HVIHCF4053M013T | I.C                | HCF4053M        |
| IC45                   | HVIHCF4053M013T | I.C                | HCF4053M        |
| IC46                   | HVINJM2581MTE1  | I.C                | NJM2581         |
| IC47                   | HVIMM1511XNRE   | IC, Y/C-MIX        | R59-4174        |
| IC48                   | CVIL7805CPNA    | I.C ASS'Y          |                 |
|                        | HVIL7805CP      | I.C, REGULATOR     | 7805            |
| IC49                   | CVIL7905CPNA    | I.C ASS'Y          |                 |
|                        | HVIL7905CP      | I.C, REGULATOR     | 7905            |
| IC51                   | HVILC74763M     | I.C , OSD          | LC74763         |
| IC52                   | HVI74ACT04MTR   | I.C , HEX          | 74ACT04M        |
| IC61                   | HVINJM2586MTE1  | I.C , VIDEO SW     | NJM2586M        |
| IC71                   | HVITC74HCU04AFN | IC , INVERTER      | TC74HCU04AFN    |
| D991                   | CVDKBU804FMA    | BRIDGE DIODE ASS'Y | KBU804F         |
|                        | HVDKBU804F      | DIODE , BRIDGE     |                 |
| D992                   | CVDKBU804FMA    | BRIDGE DIODE ASS'Y | KBU804F         |
| <b>Resistors</b>       |                 |                    |                 |
| R101                   | KRD25FJ3R3T     | RES , CARBON       | 3.3,1/4W        |
| R108                   | CRD20TJ4R7T     | RES , CARBON       | 4.7,1/5W        |
| R109                   | CRD20TJ100T     | RES , CARBON       | 10 OHM 1/5W J   |
| R110                   | CRD20TJ4R7T     | RES , CARBON       | 4.7,1/5W        |
| R112                   | CRD20TJ122T     | RES , CARBON       | 1.2K OHM 1/5W J |
| R113                   | CRD20TJ473T     | RES , CARBON       | 47K OHM 1/5W J  |
| R401                   | CRD20TJ750T     | RES , CARBON       | 75 OHM 1/5W J   |
| R402                   | CRD20TJ750T     | RES , CARBON       | 75 OHM 1/5W J   |
| R403                   | CRD20TJ332T     | RES , CARBON       | 3.3K OHM 1/5W J |
| R404                   | CRD20TJ750T     | RES , CARBON       | 75 OHM 1/5W J   |
| R405                   | CRD20TJ750T     | RES , CARBON       | 75 OHM 1/5W J   |
| R406                   | CRD20TJ332T     | RES , CARBON       | 3.3K OHM 1/5W J |
| R407                   | CRD20TJ750T     | RES , CARBON       | 75 OHM 1/5W J   |
| R408                   | CRD20TJ750T     | RES , CARBON       | 75 OHM 1/5W J   |
| R409                   | CRD20TJ750T     | RES , CARBON       | 75 OHM 1/5W J   |
| R410                   | CRD20TJ332T     | RES , CARBON       | 3.3K OHM 1/5W J |
| R411                   | CRD20TJ750T     | RES , CARBON       | 75 OHM 1/5W J   |
| R412                   | CRD20TJ750T     | RES , CARBON       | 75 OHM 1/5W J   |
| R413                   | CRD20TJ750T     | RES , CARBON       | 75 OHM 1/5W J   |
| R414                   | CRD20TJ332T     | RES , CARBON       | 3.3K OHM 1/5W J |
| R415                   | CRD20TJ750T     | RES , CARBON       | 75 OHM 1/5W J   |
| R416                   | CRD20TJ332T     | RES , CARBON       | 3.3K OHM 1/5W J |
| R417                   | CRD20TJ750T     | RES , CARBON       | 75 OHM 1/5W J   |
| R418                   | CRD20TJ750T     | RES , CARBON       | 75 OHM 1/5W J   |
| R419                   | CRD20TJ750T     | RES , CARBON       | 75 OHM 1/5W J   |
| R420                   | CRD20TJ332T     | RES , CARBON       | 3.3K OHM 1/5W J |
| R421                   | CRD20TJ750T     | RES , CARBON       | 75 OHM 1/5W J   |
| R422                   | CRD20TJ332T     | RES , CARBON       | 3.3K OHM 1/5W J |
| R423                   | CRD20TJ750T     | RES , CARBON       | 75 OHM 1/5W J   |
| R424                   | CRD20TJ750T     | RES , CARBON       | 75 OHM 1/5W J   |
| R425                   | CRD20TJ750T     | RES , CARBON       | 75 OHM 1/5W J   |
| R426                   | CRD20TJ332T     | RES , CARBON       | 3.3K OHM 1/5W J |
| R427                   | CRD20TJ750T     | RES , CARBON       | 75 OHM 1/5W J   |
| R428                   | CRD20TJ332T     | RES , CARBON       | 3.3K OHM 1/5W J |
| R430                   | CRD20TJ1R8T     | RES , CARBON       | 1.8 OHM 1/5W J  |
| R431                   | CRD20TJ102T     | RES , CARBON       | 1K OHM 1/5W J   |
| R432                   | CRD20TJ1R0T     | RES , CARBON       | 1 OHM 1/5W J    |

| Ref. Designator        | Part Number | Description  |                 |
|------------------------|-------------|--------------|-----------------|
| <b>VIDEO PCB ASS'Y</b> |             |              |                 |
| R433                   | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R434                   | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R435                   | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R436                   | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R437                   | CRD25TJ102T | RES , CARBON | 1K OHM 1/4W     |
| R438                   | CRD25TJ1R0T | RES , CARBON | 1,1/4W          |
| R439                   | CRD20TJ750T | RES , CARBON | 75 OHM 1/5W J   |
| R440                   | CRD20TJ1R8T | RES , CARBON | 1.8 OHM 1/5W J  |
| R441                   | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R442                   | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R443                   | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R444                   | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R445                   | CRD20TJ1R0T | RES , CARBON | 1 OHM 1/5W J    |
| R446                   | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R447                   | CRD20TJ750T | RES , CARBON | 75 OHM 1/5W J   |
| R448                   | CRD20TJ1R8T | RES , CARBON | 1.8 OHM 1/5W J  |
| R449                   | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R450                   | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R451                   | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R452                   | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R453                   | CRD20TJ332T | RES , CARBON | 3.3K OHM 1/5W J |
| R454                   | CRD25TJ562T | RES , CARBON | 5.6K OHM 1/4W J |
| R455                   | CRD20TJ105T | RES , CARBON | 1M OHM 1/5W J   |
| R456                   | CRD20TJ680T | RES , CARBON | 68 OHM 1/5W J   |
| R457                   | CRD20TJ333T | RES , CARBON | 33K OHM 1/5W J  |
| R458                   | CRD20TJ123T | RES , CARBON | 12K OHM 1/5W J  |
| R459                   | CRD20TJ680T | RES , CARBON | 68 OHM 1/5W J   |
| R460                   | CRD20TJ333T | RES , CARBON | 33K OHM 1/5W J  |
| R461                   | CRD20TJ123T | RES , CARBON | 12K OHM 1/5W J  |
| R462                   | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R463                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R464                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R465                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R466                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R467                   | CRD20TJ103T | RES , CARBON | 10K OHM 1/5W J  |
| R468                   | CRD20TJ100T | RES , CARBON | 10 OHM 1/5W J   |
| R469                   | CRD20TJ100T | RES , CARBON | 10 OHM 1/5W J   |
| R470                   | CRD20TJ100T | RES , CARBON | 10 OHM 1/5W J   |
| R471                   | CRD20TJ100T | RES , CARBON | 10 OHM 1/5W J   |
| R472                   | CRD20TJ151T | RES , CARBON | 150 OHM 1/5W J  |
| R473                   | CRD20TJ181T | RES , CARBON | 180 OHM 1/5W J  |
| R474                   | CRD20TJ1R8T | RES , CARBON | 1.8 OHM 1/5W J  |
| R475                   | CRD20TJ1R0T | RES , CARBON | 1 OHM 1/5W J    |
| R476                   | CRD20TJ101T | RES , CARBON | 100 OHM 1/5W J  |
| R478                   | CRD20TJ223T | RES , CARBON | 22K OHM 1/5W J  |
| R479                   | CRD20TJ181T | RES , CARBON | 180 OHM 1/5W J  |
| R480                   | CRD25TJ223T | RES , CARBON | 22K OHM 1/4W J  |
| R481                   | CRD20TJ183T | RES , CARBON | 18K OHM 1/5W J  |
| R482                   | CRD20TJ392T | RES , CARBON | 3.9K OHM 1/5W   |
| R501                   | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R502                   | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R503                   | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R504                   | CRD20TJ104T | RES , CARBON | 100K OHM 1/5W J |
| R505                   | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R506                   | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R507                   | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R508                   | CRD20TJ682T | RES , CARBON | 6.8K OHM 1/5W J |
| R509                   | CRD20TJ152T | RES , CARBON | 1.5K OHM 1/5W J |
| R510                   | CRD20TJ393T | RES , CARBON | 39K OHM 1/5W    |
| R511                   | CRD20TJ222T | RES , CARBON | 2.2K OHM 1/5W J |
| R512                   | CRD20TJ102T | RES , CARBON | 1K OHM 1/5W J   |
| R513                   | CRD20TJ822T | RES , CARBON | 8.2K OHM 1/5W J |

| Ref. Designator        | Part Number   | Description            |                 |
|------------------------|---------------|------------------------|-----------------|
| <b>VIDEO PCB ASS'Y</b> |               |                        |                 |
| R514                   | CRD20TJ103T   | RES , CARBON           | 10K OHM 1/5W J  |
| R516                   | CRD20TJ221T   | RES , CARBON           | 220 OHM 1/5W J  |
| R517                   | CRD20TJ273T   | RES , CARBON           | 27K OHM 1/5W J  |
| R555                   | CRD20TJ101T   | RES , CARBON           | 100 OHM 1/5W J  |
| R556                   | CRD20TJ183T   | RES , CARBON           | 18K OHM 1/5W J  |
| R557                   | C3A206        | WIRE , COPPER          | SN95/PB5 , 0.6  |
| R558                   | CRD20TJ102T   | RES , CARBON           | 1K OHM 1/5W J   |
| R568                   | CRD20TJ223T   | RES , CARBON           | 22K OHM 1/5W J  |
| R569                   | CRD20TJ223T   | RES , CARBON           | 22K OHM 1/5W J  |
| R601                   | CRD20TJ750T   | RES , CARBON           | 75 OHM 1/5W J   |
| R602                   | CRD20TJ750T   | RES , CARBON           | 75 OHM 1/5W J   |
| R603                   | CRD20TJ750T   | RES , CARBON           | 75 OHM 1/5W J   |
| R604                   | CRD20TJ750T   | RES , CARBON           | 75 OHM 1/5W J   |
| R605                   | CRD20TJ750T   | RES , CARBON           | 75 OHM 1/5W J   |
| R606                   | CRD20TJ750T   | RES , CARBON           | 75 OHM 1/5W J   |
| R607                   | CRD20TJ750T   | RES , CARBON           | 75 OHM 1/5W J   |
| R608                   | CRD20TJ750T   | RES , CARBON           | 75 OHM 1/5W J   |
| R609                   | CRD20TJ750T   | RES , CARBON           | 75 OHM 1/5W J   |
| R610                   | CRD20TJ4R7T   | RES , CARBON           | 4.7,1/5W        |
| R611                   | CRD20TJ4R7T   | RES , CARBON           | 4.7,1/5W        |
| R612                   | CRD20TJ472T   | RES , CARBON           | 4.7K OHM 1/5W J |
| R701                   | CRD20TJ103T   | RES , CARBON           | 10K OHM 1/5W J  |
| R702                   | CRD20TJ1R0T   | RES , CARBON           | 1 OHM 1/5W J    |
| R703                   | CRD20TJ103T   | RES , CARBON           | 10K OHM 1/5W J  |
| R704                   | CRD20TJ1R0T   | RES , CARBON           | 1 OHM 1/5W J    |
| R705                   | CRD20TJ750T   | RES , CARBON           | 75 OHM 1/5W J   |
| R706                   | CRD20TJ750T   | RES , CARBON           | 75 OHM 1/5W J   |
| R707                   | CRD20TJ270T   | RES , CARBON           | 27 OHM 1/5W J   |
| R708                   | CRD20TJ271T   | RES , CARBON           | 270 OHM 1/5W J  |
| R709                   | CRD20TJ111T   | RES , CARBON           | 110 OHM 1/5W J  |
| R710                   | CRD20TJ1R0T   | RES , CARBON           | 1 OHM 1/5W J    |
| R711                   | CRD20TJ1R0T   | RES , CARBON           | 1 OHM 1/5W J    |
| R713                   | CRD20TJ104T   | RES , CARBON           | 100K OHM 1/5W J |
| R714                   | CRD20TJ104T   | RES , CARBON           | 100K OHM 1/5W J |
| R715                   | CRD20TJ102T   | RES , CARBON           | 1K OHM 1/5W J   |
| R716                   | CRD20TJ102T   | RES , CARBON           | 1K OHM 1/5W J   |
| R717                   | CRD20TJ472T   | RES , CARBON           | 4.7K OHM 1/5W J |
| R718                   | CRD20TJ472T   | RES , CARBON           | 4.7K OHM 1/5W J |
| R719                   | CRD20TJ102T   | RES , CARBON           | 1K OHM 1/5W J   |
| R720                   | CRD20TJ102T   | RES , CARBON           | 1K OHM 1/5W J   |
| J304                   | CRD25TJ2R2T   | RES , CARBON           | 2.2,1/4W        |
| J519                   | CRD25TJ102T   | RES , CARBON           | 1K OHM 1/4W     |
| R104                   | KRQ1AJR47H    | RES , FUSE             | 0.47 OHM 1W J   |
| R105                   | KRQ1AJR47H    | RES , FUSE             | 0.47 OHM 1W J   |
| R106                   | CRQ1AJR33H    | RES , FUSE             | 0.33 OHM 1W     |
| R107                   | CRQ1AJR33H    | RES , FUSE             | 0.33 OHM 1W     |
| <i>Miscellaneous</i>   |               |                        |                 |
|                        |               |                        |                 |
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|                        |               |                        |                 |
| L501                   | HLQ02C101JT   | COIL , AXAIL           | 100UH,J         |
| L502                   | KLQ5R6G405T   | COIL , PEAKING(RADIAL) |                 |
| L503                   | KLQ220J405T   | COIL , PEAKING(RADIAL) | 22UH J 4X5      |
|                        | CMC1A213      | PLATE , SHIELD         |                 |
| BN14                   | CWB4F232450PU | WIRE ASS'Y             |                 |
| BN17                   | KJP12GB143ZP  | DIP SOCKET             | 3011 - DR12 - G |

| Ref. Designator        | Part Number   | Description              |                 |
|------------------------|---------------|--------------------------|-----------------|
| <b>VIDEO PCB ASS'Y</b> |               |                          |                 |
| BN61                   | CWB2B907120EN | WIRE ASS'Y               |                 |
| BN91                   | CWB4FE53130PU | WIRE ASS'Y               |                 |
| BN96                   | CWB1C908150BM | WIRE ASS'Y               |                 |
| CN13                   | KJP05GA01ZM   | WAFER                    | MOLEX 5267-05A  |
| CN19                   | KJP03GA90ZM   | WAFER                    | MOLEX35313-0310 |
| CN20                   | KJP04GA90ZM   | WAFER                    | MOLEX35313-0310 |
| CN21                   | KJP02GA89ZM   | WAFER                    | MOLEX35328-02   |
| CN41                   | KJP06GA19ZM   | WAFER                    | MOLEX53014-0610 |
| CN43                   | CJP13GA115ZY  | WAFER , CARD CABLE       |                 |
| CN61                   | KJP07GA19ZM   | WAFER                    | MOLEX53014-0710 |
| CN81                   | CJP08GA01ZY   | WAFER, STRAIGHT, 8PIN    |                 |
| CN84                   | KJP02KA060ZY  | WAFER                    | 7.92MM(YUNHO)   |
|                        | CTB3+12J      | SCREW                    |                 |
|                        | CMY1A219      | HEAT SINK (BRIDGE DIODE) |                 |
|                        | CMY1A218      | HEAT SINK(TR)            |                 |
|                        | CTB3+8J       | SCREW                    |                 |
| JK41                   | CJJ9N001Z     | JACK , S-VIDEO (2P/H)    |                 |
| JK42                   | CJJ9N001Z     | JACK , S-VIDEO (2P/H)    |                 |
| JK43                   | CJJ9S001Z     | JACK , S-VIDEO (3P/H)    |                 |
| JK48                   | CJJ4N043Z     | JACK , BOARD             |                 |
| JK49                   | CJJ4N043Z     | JACK , BOARD             |                 |
| JK50                   | CJJ4S010Z     | JACK , BOARD             |                 |
| JK61                   | CJJ4L009Z     | JACK 9P (RRR/BBB/GGG)    | RCA-902AA-16    |
| JK71                   | HJSTORX179L   | MODULE , OPTICAL(RX)     | TORX179L        |
| JK72                   | HJSTORX179L   | MODULE , OPTICAL(RX)     | TORX179L        |
| JK73                   | CJJ4S022Z     | JACK , BOARD             |                 |
| JK74                   | HJSTOTX179L   | MODULE , OPTICAL(TX)     | TOTX179L        |
| JW11                   |               | WIRE                     |                 |
| SW91                   | KST1A010Z     | SW , TACT                |                 |
| X501                   | HOX14318E220C | CRYSTAL                  |                 |
| OL91                   | KJJ7A015Z     | OUTLET , AC(UL/2P/SEP)   | A204D0041P      |
| <b>INPUT PCB ASS'Y</b> |               |                          |                 |
| <i>Capacitors</i>      |               |                          |                 |
| C105                   | HCUS1H223ZF   | CAP , CHIP               | 0.022uF         |
| C106                   | HCUS1H223ZF   | CAP , CHIP               | 0.022uF         |
| C201                   | HCUS1H221JA   | CAP , CHIP               | 220pF           |
| C202                   | HCUS1H221JA   | CAP , CHIP               | 220pF           |
| C203                   | HCUS1H221JA   | CAP , CHIP               | 220pF           |
| C204                   | HCUS1H221JA   | CAP , CHIP               | 220pF           |
| C205                   | HCUS1H221JA   | CAP , CHIP               | 220pF           |
| C206                   | HCUS1H221JA   | CAP , CHIP               | 220pF           |
| C207                   | HCUS1H221JA   | CAP , CHIP               | 220pF           |
| C208                   | HCUS1H221JA   | CAP , CHIP               | 220pF           |
| C209                   | HCUS1H221JA   | CAP , CHIP               | 220pF           |
| C210                   | HCUS1H221JA   | CAP , CHIP               | 220pF           |
| C211                   | HCUS1H221JA   | CAP , CHIP               | 220pF           |
| C212                   | HCUS1H221JA   | CAP , CHIP               | 220pF           |
| C213                   | HCUS1H221JA   | CAP , CHIP               | 220pF           |
| C214                   | HCUS1H221JA   | CAP , CHIP               | 220pF           |
| C215                   | HCUS1H221JA   | CAP , CHIP               | 220pF           |
| C216                   | HCUS1H221JA   | CAP , CHIP               | 220pF           |
| C217                   | HCUS1H221JA   | CAP , CHIP               | 220pF           |
| C218                   | HCUS1H221JA   | CAP , CHIP               | 220pF           |
| C219                   | HCUS1H221JA   | CAP , CHIP               | 220pF           |
| C220                   | HCUS1H221JA   | CAP , CHIP               | 220pF           |
| C221                   | HCUS1H221JA   | CAP , CHIP               | 220pF           |
| C222                   | HCUS1H221JA   | CAP , CHIP               | 220pF           |
| C223                   | HCUS1H221JA   | CAP , CHIP               | 220pF           |
| C224                   | HCUS1H221JA   | CAP , CHIP               | 220pF           |

| Ref. Designator        | Part Number | Description |         |
|------------------------|-------------|-------------|---------|
| <b>INPUT PCB ASS'Y</b> |             |             |         |
| C225                   | HCUS1H221JA | CAP , CHIP  | 220pF   |
| C226                   | HCUS1H221JA | CAP , CHIP  | 220pF   |
| C241                   | HCUS1H181JA | CAP , CHIP  | 220pF   |
| C242                   | HCUS1H471JA | CAP , CHIP  | 470pF   |
| C253                   | HCUS1H181JA | CAP , CHIP  | 180pF   |
| C254                   | HCUS1H471JA | CAP , CHIP  | 470pF   |
| C255                   | HCUS1H223ZF | CAP , CHIP  | 0.022uF |
| C256                   | HCUS1H223ZF | CAP , CHIP  | 0.022uF |
| C270                   | HCUS1H181JA | CAP , CHIP  | 180pF   |
| C271                   | HCUS1H471JA | CAP , CHIP  | 470pF   |
| C291                   | HCUS1H104ZF | CAP , CHIP  | 0.1uF   |
| C292                   | HCUS1H104ZF | CAP , CHIP  | 0.1uF   |
| C293                   | HCUS1H104ZF | CAP , CHIP  | 0.1uF   |
| C294                   | HCUS1H104ZF | CAP , CHIP  | 0.1uF   |
| C295                   | HCUS1H104ZF | CAP , CHIP  | 0.1uF   |
| C296                   | HCUS1H104ZF | CAP , CHIP  | 0.1uF   |
| C297                   | HCUS1H104ZF | CAP , CHIP  | 0.1uF   |
| C298                   | HCUS1H104ZF | CAP , CHIP  | 0.022uF |
| C309                   | HCUS1H102KC | CAP , CHIP  | 0.022uF |
| C310                   | HCUS1H102KC | CAP , CHIP  | 0.022uF |
| C311                   | HCUS1H102KC | CAP , CHIP  | 0.022uF |
| C312                   | HCUS1H102KC | CAP , CHIP  | 560pF   |
| C313                   | HCUS1H102KC | CAP , CHIP  | 560pF   |
| C314                   | HCUS1H102KC | CAP , CHIP  | 560pF   |
| C315                   | HCUS1H102KC | CAP , CHIP  | 560pF   |
| C316                   | HCUS1H102KC | CAP , CHIP  | 560pF   |
| C317                   | HCUS1H223ZF | CAP , CHIP  | 560pF   |
| C318                   | HCUS1H223ZF | CAP , CHIP  | 560pF   |
| C319                   | HCUS1H223ZF | CAP , CHIP  | 560pF   |
| C320                   | HCUS1H223ZF | CAP , CHIP  | 560pF   |
| C321                   | HCUS1H271JA | CAP , CHIP  | 560pF   |
| C322                   | HCUS1H122KC | CAP , CHIP  | 560pF   |
| C323                   | HCUS1H122KC | CAP , CHIP  | 560pF   |
| C324                   | HCUS1H271JA | CAP , CHIP  | 560pF   |
| C325                   | HCUS1H271JA | CAP , CHIP  | 560pF   |
| C326                   | HCUS1H122KC | CAP , CHIP  | 560pF   |
| C327                   | HCUS1H122KC | CAP , CHIP  | 560pF   |
| C328                   | HCUS1H561JA | CAP , CHIP  | 560pF   |
| C329                   | HCUS1H271JA | CAP , CHIP  | 560pF   |
| C330                   | HCUS1H122KC | CAP , CHIP  | 560pF   |
| C331                   | HCUS1H122KC | CAP , CHIP  | 560pF   |
| C332                   | HCUS1H271JA | CAP , CHIP  | 560pF   |
| C333                   | HCUS1H271JA | CAP , CHIP  | 560pF   |
| C334                   | HCUS1H122KC | CAP , CHIP  | 560pF   |
| C335                   | HCUS1H122KC | CAP , CHIP  | 560pF   |
| C336                   | HCUS1H271JA | CAP , CHIP  | 560pF   |
| C337                   | HCUS1H223ZF | CAP , CHIP  | 0.022uF |
| C338                   | HCUS1H223ZF | CAP , CHIP  | 0.022uF |
| C339                   | HCUS1H223ZF | CAP , CHIP  | 0.022uF |
| C340                   | HCUS1H223ZF | CAP , CHIP  | 0.022uF |
| C350                   | HCUS1H331JA | CAP , CHIP  | 330pF   |
| C351                   | HCUS1H331JA | CAP , CHIP  | 330pF   |
| C352                   | HCUS1H331JA | CAP , CHIP  | 330pF   |
| C353                   | HCUS1H331JA | CAP , CHIP  | 330pF   |
| C354                   | HCUS1H331JA | CAP , CHIP  | 330pF   |
| C355                   | HCUS1H331JA | CAP , CHIP  | 330pF   |
| C356                   | HCUS1H331JA | CAP , CHIP  | 330pF   |
| C357                   | HCUS1H331JA | CAP , CHIP  | 330pF   |
| C371                   | HCUS1H221JA | CAP , CHIP  | 220pF   |
| C372                   | HCUS1H221JA | CAP , CHIP  | 220pF   |
| C373                   | HCUS1H221JA | CAP , CHIP  | 220pF   |
| C374                   | HCUS1H221JA | CAP , CHIP  | 220pF   |



| Ref. Designator        | Part Number | Description           |         |
|------------------------|-------------|-----------------------|---------|
| <b>INPUT PCB ASS'Y</b> |             |                       |         |
| C375                   | HCUS1H223ZF | CAP , CHIP            | 0.022uF |
| C376                   | HCUS1H223ZF | CAP , CHIP            | 0.022uF |
| C378                   | HCUS1H223ZF | CAP , CHIP            | 0.022uF |
| C379                   | HCUS1H223ZF | CAP , CHIP            | 0.022uF |
| C381                   | HCUS1H561JA | CAP , CHIP            | 560pF   |
| C382                   | HCUS1H223ZF | CAP , CHIP            | 0.022uF |
| C383                   | HCUS1H223ZF | CAP , CHIP            | 0.022uF |
| C413                   | HCUS1H223ZF | CAP , CHIP            | 0.022uF |
| C414                   | HCUS1H223ZF | CAP , CHIP            | 0.022uF |
| C415                   | HCUS1H223ZF | CAP , CHIP            | 0.022uF |
| C416                   | HCUS1H223ZF | CAP , CHIP            | 0.022uF |
| C417                   | HCUS1H223ZF | CAP , CHIP            | 0.022uF |
| C418                   | HCUS1H223ZF | CAP , CHIP            | 0.022uF |
| C419                   | HCUS1H223ZF | CAP , CHIP            | 0.022uF |
| C420                   | HCUS1H223ZF | CAP , CHIP            | 0.022uF |
| C425                   | HCUS1H151JA | CAP , CHIP , 150PF JA | 150pF   |
| C427                   | HCUS1H151JA | CAP , CHIP , 150PF JA | 150pF   |
| C428                   | HCUS1H151JA | CAP , CHIP , 150PF JA | 150pF   |
| C429                   | HCUS1H151JA | CAP , CHIP , 150PF JA | 150pF   |
| C430                   | HCUS1H151JA | CAP , CHIP , 150PF JA | 150pF   |
| C471                   | HCUS1H181JA | CAP , CHIP            | 180pF   |
| C472                   | HCUS1H181JA | CAP , CHIP            | 180pF   |
| C474                   | HCUS1H181JA | CAP , CHIP            | 180pF   |
| C701                   | HCUS1H330JA | CAP , CHIP            | 33pF    |
| C702                   | HCUS1H330JA | CAP , CHIP            | 33pF    |
| C704                   | HCUS1H104ZF | CAP , CHIP            | 0.1uF   |
| C705                   | HCUS1H104ZF | CAP , CHIP            | 0.1uF   |
| C707                   | HCUS1H102KC | CAP , CHIP            | 1000pF  |
| C708                   | HCUS1H104ZF | CAP , CHIP            | 0.1uF   |
| C718                   | HCUS1H104ZF | CAP , CHIP            | 0.1uF   |
| C719                   | HCUS1H104ZF | CAP , CHIP            | 0.1uF   |
| C722                   | HCUS1H104ZF | CAP , CHIP            | 0.1uF   |
| C723                   | HCUS1H473ZF | CAP , CHIP            | 0.047pF |
| C725                   | HCUS1H104ZF | CAP , CHIP            | 0.1uF   |
| C727                   | HCUS1H104ZF | CAP , CHIP            | 0.1uF   |
| C729                   | HCUS1H104ZF | CAP , CHIP            | 0.1uF   |
| C731                   | HCUS1H104ZF | CAP , CHIP            | 0.1uF   |
| C733                   | HCUS1H104ZF | CAP , CHIP            | 0.1uF   |
| C734                   | HCUS1H122KC | CAP , CHIP            | 1200pF  |
| C735                   | HCUS1H680JA | CAP , CHIP            | 68pF    |
| C738                   | HCUS1C105ZF | CAP , CHIP            | 1uF     |
| C739                   | HCUS1H103KC | CAP , CHIP            | 0.01uF  |
| C740                   | HCUS1H104ZF | CAP , CHIP            | 0.1uF   |
| C742                   | HCUS1H104ZF | CAP , CHIP            | 0.1uF   |
| C743                   | HCUS1H104ZF | CAP , CHIP            | 0.1uF   |
| C744                   | HCUS1H104ZF | CAP , CHIP            | 0.1uF   |
| C745                   | HCUS1H104ZF | CAP , CHIP            | 0.1uF   |
| C747                   | HCUS1H104ZF | CAP , CHIP            | 0.1uF   |
| C748                   | HCUS1H104ZF | CAP , CHIP            | 0.1uF   |
| C750                   | HCUS1H104ZF | CAP , CHIP            | 0.1uF   |
| C751                   | HCUS1H104ZF | CAP , CHIP            | 0.1uF   |
| C752                   | HCUS1H104ZF | CAP , CHIP            | 0.1uF   |
| C754                   | HCUS1H104ZF | CAP , CHIP            | 0.1uF   |
| C756                   | HCUS1H104ZF | CAP , CHIP            | 0.1uF   |
| C757                   | HCUS1H104ZF | CAP , CHIP            | 0.1uF   |
| C758                   | HCUS1H104ZF | CAP , CHIP            | 0.1uF   |
| C759                   | HCUS1H104ZF | CAP , CHIP            | 0.1uF   |
| C760                   | HCUS1H104ZF | CAP , CHIP            | 0.1uF   |
| C761                   | HCUS1H104ZF | CAP , CHIP            | 0.1uF   |
| C762                   | HCUS1H104ZF | CAP , CHIP            | 0.1uF   |
| C763                   | HCUS1H104ZF | CAP , CHIP            | 0.1uF   |
| C765                   | HCUS1H104ZF | CAP , CHIP            | 0.1uF   |

| Ref. Designator        | Part Number  | Description                |              |
|------------------------|--------------|----------------------------|--------------|
| <b>INPUT PCB ASS'Y</b> |              |                            |              |
| C767                   | HCUS1H104ZF  | CAP , CHIP                 | 0.1uF        |
| C768                   | HCUS1H104ZF  | CAP , CHIP                 | 0.1uF        |
| C769                   | HCUS1H104ZF  | CAP , CHIP                 | 0.1uF        |
| C770                   | HCUS1H104ZF  | CAP , CHIP                 | 0.1uF        |
| C771                   | HCUS1H104ZF  | CAP , CHIP                 | 0.1uF        |
| C772                   | HCUS1H104ZF  | CAP , CHIP                 | 0.1uF        |
| C773                   | HCUS1H104ZF  | CAP , CHIP                 | 0.1uF        |
| C101                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C102                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C103                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C104                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C237                   | CCEA1CH101T  | CAP, ELE 100UF/16V/-40~+85 |              |
| C238                   | CCEA1CH101T  | CAP, ELE 100UF/16V/-40~+85 |              |
| C239                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C240                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C251                   | CCEA1CH101T  | CAP, ELE 100UF/16V/-40~+85 |              |
| C252                   | CCEA1CH101T  | CAP, ELE 100UF/16V/-40~+85 |              |
| C261                   | CCEA1CH101T  | CAP, ELE 100UF/16V/-40~+85 |              |
| C262                   | CCEA1CH101T  | CAP, ELE 100UF/16V/-40~+85 |              |
| C263                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C264                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C265                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C267                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C268                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C269                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C341                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C342                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C343                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C344                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C345                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C346                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C347                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C348                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C349                   | CCEA1HH1R0T  | CAP, ELE 1UF/50V/-40~+85   |              |
| C403                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C404                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C405                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C406                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C407                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C408                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C409                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C410                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C426                   | HCQI1H182JZT | CAP , MYLAR                | 1800PF 50V J |
| C433                   | CCEA1CH101T  | CAP, ELE 100UF/16V/-40~+85 | 100UF 16V    |
| C434                   | CCEA1CH101T  | CAP, ELE 100UF/16V/-40~+85 | 100UF 16V    |
| C435                   | CCEA1CH101T  | CAP, ELE 100UF/16V/-40~+85 | 100UF 16V    |
| C436                   | CCEA1CH101T  | CAP, ELE 100UF/16V/-40~+85 | 100UF 16V    |
| C437                   | CCEA1CH101T  | CAP, ELE 100UF/16V/-40~+85 | 100UF 16V    |
| C438                   | CCEA1CH101T  | CAP, ELE 100UF/16V/-40~+85 | 100UF 16V    |
| C439                   | CCEA1CH101T  | CAP, ELE 100UF/16V/-40~+85 | 100UF 16V    |
| C440                   | CCEA1CH101T  | CAP, ELE 100UF/16V/-40~+85 | 100UF 16V    |
| C453                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C454                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C455                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C456                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C457                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C458                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C459                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C460                   | CCEA1VH100T  | CAP , ELECT                | 10UF 35V     |
| C703                   | CCEA1EH220T  | CAP , ELECT                | 22UF/25V     |
| C706                   | CCEA1EH220T  | CAP , ELECT                | 22UF/25V     |
| C709                   | CCEA1EH220T  | CAP , ELECT                | 22UF/25V     |

| Ref. Designator        | Part Number     | Description                  |               |
|------------------------|-----------------|------------------------------|---------------|
| <b>INPUT PCB ASS'Y</b> |                 |                              |               |
| C710                   | CCEA1EH220T     | CAP , ELECT                  | 22UF/25V      |
| C711                   | CCEA1EH220T     | CAP , ELECT                  | 22UF/25V      |
| C712                   | CCEA1EH220T     | CAP , ELECT                  | 22UF/25V      |
| C713                   | CCEA1EH220T     | CAP , ELECT                  | 22UF/25V      |
| C714                   | CCEA1EH220T     | CAP , ELECT                  | 22UF/25V      |
| C715                   | CCEA1EH220T     | CAP , ELECT                  | 22UF/25V      |
| C716                   | CCEA1EH220T     | CAP , ELECT                  | 22UF/25V      |
| C717                   | CCEA1CH101T     | CAP, ELE 100UF/16V/-40~+85   | 100UF 16V     |
| C720                   | CCEA1AH471T     | CAP, ELECT 470UF/10V/-40~+85 | 470UF 10V     |
| C721                   | CCEA1CH101T     | CAP, ELE 100UF/16V/-40~+85   | 100UF 16V     |
| C724                   | CCEA1CH101T     | CAP, ELE 100UF/16V/-40~+85   | 100UF 16V     |
| C726                   | CCEA1AH101T     | CAP. ELECT                   | 100UF 10V     |
| C728                   | CCEA1AH471T     | CAP, ELECT 470UF/10V/-40~+85 | 470UF 10V     |
| C730                   | CCEA1AH101T     | CAP. ELECT                   | 100UF 25V     |
| C732                   | CCEA1EH220T     | CAP , ELECT                  | 22UF/25V      |
| C736                   | CCEA1HH2R2T     | CAP, ELECT 2.2UF/50V/-40~+85 | 2.2UF 50V     |
| C737                   | CCEA1CH470T     | CAP, ELE 47UF/16V/-40~+85    | 47UF 25V      |
| C741                   | CCEA1EH220T     | CAP , ELECT                  | 22UF/25V      |
| C755                   | CCEA1EH220T     | CAP , ELECT                  | 22UF/25V      |
| C764                   | CCEA0JH102T     | CAP , ELECT                  | 1000UF 6.3V   |
| C766                   | CCEA0JH102T     | CAP , ELECT                  | 1000UF 6.3V   |
| C746                   | CCEA1AH471T     | CAP, ELECT 470UF/10V/-40~+85 | 470UF 10V     |
| C749                   | CCEA1AH471T     | CAP, ELECT 470UF/10V/-40~+85 | 470UF 10V     |
| C753                   | CCEA1EH220T     | CAP , ELECT                  | 22UF/25V      |
| <i>Semiconductors</i>  |                 |                              |               |
| IC13                   | HVINJM2068MTE1  | I.C , OP AMP                 | NJM2068M-TE1  |
| IC23                   | HVITC9164AF     | I.C , FUNCTION               | TC9164AF      |
| IC24                   | HVITC9163AF     | I.C , FUNCTION               | TC9163AF      |
| IC25                   | HVINJM2068MTE1  | I.C , OP AMP                 | NJM2068M-TE1  |
| IC26                   | HVITC9162AF     | I.C , FUNCTION               | TC9162AF      |
| IC31                   | HVINJM2068MTE1  | I.C , OP AMP                 | NJM2068M-TE1  |
| IC32                   | HVINJM2068MTE1  | I.C , OP AMP                 | NJM2068M-TE1  |
| IC33                   | HVINJM2068MTE1  | I.C , OP AMP                 | NJM2068M-TE1  |
| IC34                   | HVINJM2068MTE1  | I.C , OP AMP                 | NJM2068M-TE1  |
| IC35                   | HVINJM2068MTE1  | I.C , OP AMP                 | NJM2068M-TE1  |
| IC36                   | HVINJM2068MTE1  | I.C , OP AMP                 | NJM2068M-TE1  |
| IC37                   | HVINJM2068MTE1  | I.C , OP AMP                 | NJM2068M-TE1  |
| IC40                   | HVITC9459F      | I.C , VOLUME                 |               |
| IC42                   | HVITC9459F      | I.C , VOLUME                 |               |
| IC43                   | HVITC9459F      | I.C , VOLUME                 |               |
| IC44                   | HVITC9459F      | I.C , VOLUME                 |               |
| IC46                   | HVINJM2068MTE1  | I.C , OP AMP                 | NJM2068M-TE1  |
| IC47                   | HVINJM2068MTE1  | I.C , OP AMP                 | NJM2068M-TE1  |
| IC48                   | HVINJM2068MTE1  | I.C , OP AMP                 | NJM2068M-TE1  |
| IC49                   | HVINJM2068MTE1  | I.C , OP AMP                 | NJM2068M-TE1  |
| IC72                   | HVITC74HCU04AFN | IC , INVERTER                | TC74HCU04AFN  |
| IC73                   | HVIAK4588VQ-T   | I.C , CODEC + DIR            | AK4588        |
| IC74                   | HVI74LCX32TTR   | I.C , OR-GATE                | 74LCX32       |
| IC75                   | HVICS49400-CQ   | I.C , DECODER                | CS49400-CQ    |
| IC76                   | HVIM29W800DT70N | I.C, 8M FLASH MEMORY         | M29W800DT-70N |
| IC78                   | HVINJM2391DL133 | I.C , CHIP REGULATOR (+3.3V) | NJM2391DL133  |
| IC79                   | HVINJM2391DL125 | I.C , CHIP REGULATOR (+2.5V) | NJM2391DL125  |
| <i>Resistors</i>       |                 |                              |               |
| RN71                   | CRJ104DJ101T    | RES, ARRAY, 100R (1608)      | 100R (1608)   |
| RN72                   | CRJ104DJ101T    | RES, ARRAY, 100R (1608)      | 100R (1608)   |
| RN73                   | CRJ104DJ101T    | RES, ARRAY, 100R (1608)      | 100R (1608)   |
| RN74                   | CRJ104DJ101T    | RES, ARRAY, 100R (1608)      | 100R (1608)   |

| Ref. Designator        | Part Number  | Description               |             |
|------------------------|--------------|---------------------------|-------------|
| <b>INPUT PCB ASS'Y</b> |              |                           |             |
| RN75                   | CRJ104DJ101T | RES, ARRAY, 100R (1608)   | 100R (1608) |
| RN76                   | CRJ104DJ101T | RES, ARRAY, 100R (1608)   | 100R (1608) |
| RN77                   | CRJ104DJ101T | RES, ARRAY, 100R (1608)   | 100R (1608) |
| RN78                   | CRJ104DJ101T | RES, ARRAY, 100R (1608)   | 100R (1608) |
| RN79                   | CRJ104DJ101T | RES, ARRAY, 100R (1608)   | 100R (1608) |
| R101                   | CRJ10DJ562T  | RES, CHIP 5.6KOHM/1608/5% | 5.6K Ohm    |
| R102                   | CRJ10DJ562T  | RES, CHIP 5.6KOHM/1608/5% | 5.6K Ohm    |
| R103                   | CRJ10DJ682T  | RES, CHIP                 | 6.8K Ohm    |
| R104                   | CRJ10DJ682T  | RES, CHIP                 | 6.8K Ohm    |
| R105                   | CRJ10DJ151T  | RES, CHIP 150 OHM/1608/5% | 150 Ohm     |
| R106                   | CRJ10DJ151T  | RES, CHIP 150 OHM/1608/5% | 150 Ohm     |
| R107                   | CRJ10DJ101T  | RES, CHIP 100 OHM/1608/5% | 100 Ohm     |
| R108                   | CRJ10DJ101T  | RES, CHIP 100 OHM/1608/5% | 100 Ohm     |
| R201                   | CRJ10DJ471T  | RES, CHIP 470 OHM/1608/5% | 470 Ohm     |
| R202                   | CRJ10DJ471T  | RES, CHIP 470 OHM/1608/5% | 470 Ohm     |
| R203                   | CRJ10DJ471T  | RES, CHIP 470 OHM/1608/5% | 470 Ohm     |
| R204                   | CRJ10DJ471T  | RES, CHIP 470 OHM/1608/5% | 470 Ohm     |
| R205                   | CRJ10DJ471T  | RES, CHIP 470 OHM/1608/5% | 470 Ohm     |
| R206                   | CRJ10DJ471T  | RES, CHIP 470 OHM/1608/5% | 470 Ohm     |
| R207                   | CRJ10DJ471T  | RES, CHIP 470 OHM/1608/5% | 470 Ohm     |
| R208                   | CRJ10DJ471T  | RES, CHIP 470 OHM/1608/5% | 470 Ohm     |
| R209                   | CRJ10DJ471T  | RES, CHIP 470 OHM/1608/5% | 470 Ohm     |
| R210                   | CRJ10DJ471T  | RES, CHIP 470 OHM/1608/5% | 470 Ohm     |
| R211                   | CRJ10DJ471T  | RES, CHIP 470 OHM/1608/5% | 470 Ohm     |
| R212                   | CRJ10DJ471T  | RES, CHIP 470 OHM/1608/5% | 470 Ohm     |
| R213                   | CRJ10DJ471T  | RES, CHIP 470 OHM/1608/5% | 470 Ohm     |
| R214                   | CRJ10DJ471T  | RES, CHIP 470 OHM/1608/5% | 470 Ohm     |
| R215                   | CRJ10DJ471T  | RES, CHIP 470 OHM/1608/5% | 470 Ohm     |
| R216                   | CRJ10DJ471T  | RES, CHIP 470 OHM/1608/5% | 470 Ohm     |
| R217                   | CRJ10DJ471T  | RES, CHIP 470 OHM/1608/5% | 470 Ohm     |
| R218                   | CRJ10DJ471T  | RES, CHIP 470 OHM/1608/5% | 470 Ohm     |
| R219                   | CRJ10DJ471T  | RES, CHIP 470 OHM/1608/5% | 470 Ohm     |
| R220                   | CRJ10DJ471T  | RES, CHIP 470 OHM/1608/5% | 470 Ohm     |
| R221                   | CRJ10DJ471T  | RES, CHIP 470 OHM/1608/5% | 470 Ohm     |
| R222                   | CRJ10DJ471T  | RES, CHIP 470 OHM/1608/5% | 470 Ohm     |
| R223                   | CRJ10DJ471T  | RES, CHIP 470 OHM/1608/5% | 470 Ohm     |
| R224                   | CRJ10DJ272T  | RES, CHIP 2.7KOHM/1608/5% | 2.7K Ohm    |
| R225                   | CRJ10DJ471T  | RES, CHIP 470 OHM/1608/5% | 470 Ohm     |
| R226                   | CRJ10DJ471T  | RES, CHIP 470 OHM/1608/5% | 470 Ohm     |
| R227                   | CRJ10DJ474T  | RES, CHIP                 | 470K Ohm    |
| R228                   | CRJ10DJ474T  | RES, CHIP                 | 470K Ohm    |
| R229                   | CRJ10DJ474T  | RES, CHIP                 | 470K Ohm    |
| R230                   | CRJ10DJ474T  | RES, CHIP                 | 470K Ohm    |
| R231                   | CRJ10DJ474T  | RES, CHIP                 | 470K Ohm    |
| R232                   | CRJ10DJ474T  | RES, CHIP                 | 470K Ohm    |
| R233                   | CRJ10DJ474T  | RES, CHIP                 | 470K Ohm    |
| R234                   | CRJ10DJ474T  | RES, CHIP                 | 470K Ohm    |
| R235                   | CRJ10DJ474T  | RES, CHIP                 | 470K Ohm    |
| R236                   | CRJ10DJ474T  | RES, CHIP                 | 470K Ohm    |
| R237                   | CRJ10DJ474T  | RES, CHIP                 | 470K Ohm    |
| R238                   | CRJ10DJ474T  | RES, CHIP                 | 470K Ohm    |
| R239                   | CRJ10DJ474T  | RES, CHIP                 | 470K Ohm    |
| R240                   | CRJ10DJ474T  | RES, CHIP                 | 470K Ohm    |
| R241                   | CRJ10DJ474T  | RES, CHIP                 | 470K Ohm    |
| R242                   | CRJ10DJ474T  | RES, CHIP                 | 470K Ohm    |
| R243                   | CRJ10DJ474T  | RES, CHIP                 | 470K Ohm    |
| R244                   | CRJ10DJ474T  | RES, CHIP                 | 470K Ohm    |
| R245                   | CRJ10DJ474T  | RES, CHIP                 | 470K Ohm    |
| R246                   | CRJ10DJ474T  | RES, CHIP                 | 470K Ohm    |
| R247                   | CRJ10DJ474T  | RES, CHIP                 | 470K Ohm    |
| R248                   | CRJ10DJ474T  | RES, CHIP                 | 470K Ohm    |
| R249                   | CRJ10DJ474T  | RES, CHIP                 | 470K Ohm    |

| Ref. Designator        | Part Number | Description               |                    |
|------------------------|-------------|---------------------------|--------------------|
| <b>INPUT PCB ASS'Y</b> |             |                           |                    |
| R250                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  | 10K Ohm            |
| R251                   | CRJ10DJ474T | RES, CHIP                 | 470K Ohm           |
| R252                   | CRJ10DJ474T | RES, CHIP                 | 470K Ohm           |
| R265                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% | 100 Ohm            |
| R267                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% | 100 Ohm            |
| R268                   | CRJ10DJ184T | RES, CHIP                 | 180K Ohm           |
| R269                   | CRJ10DJ184T | RES, CHIP                 | 180K Ohm           |
| R270                   | CRJ10DJ472T | RES, CHIP 4.7KOHM/1608/5% | 4.7K Ohm           |
| R271                   | CRJ10DJ472T | RES, CHIP 4.7KOHM/1608/5% | 4.7K Ohm           |
| R272                   | CRJ10DJ472T | RES, CHIP 4.7KOHM/1608/5% | 4.7K Ohm           |
| R273                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% | 100 Ohm            |
| R274                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% | 100 Ohm            |
| R275                   | CRJ10DJ472T | RES, CHIP 4.7KOHM/1608/5% | 4.7K Ohm           |
| R276                   | CRJ10DJ472T | RES, CHIP 4.7KOHM/1608/5% | 4.7K Ohm           |
| R277                   | CRJ10DJ472T | RES, CHIP 4.7KOHM/1608/5% | 4.7K Ohm           |
| R278                   | CRJ10DJ104T | RES, CHIP 100KOHM/1608/5% | 100K Ohm           |
| R279                   | CRJ10DJ104T | RES, CHIP 100KOHM/1608/5% | 100K Ohm           |
| R280                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% | 100 Ohm            |
| R281                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% | 100 Ohm            |
| R283                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% | 100 Ohm            |
| R284                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% | 100 Ohm            |
| R285                   | CRJ10DJ184T | RES, CHIP                 | 180K Ohm           |
| R286                   | CRJ10DJ184T | RES, CHIP                 | 180K Ohm           |
| R287                   | CRJ10DJ184T | RES, CHIP                 | 180K Ohm           |
| R288                   | CRJ10DJ184T | RES, CHIP                 | 180K Ohm           |
| R289                   | CRJ10DJ184T | RES, CHIP                 | 180K Ohm           |
| R290                   | CRJ10DJ184T | RES, CHIP                 | 180K Ohm           |
| R291                   | CRJ10DJ472T | RES, CHIP 4.7KOHM/1608/5% |                    |
| R292                   | CRJ10DJ472T | RES, CHIP 4.7KOHM/1608/5% |                    |
| R293                   | CRJ10DJ472T | RES, CHIP 4.7KOHM/1608/5% |                    |
| R301                   | CRJ10DJ152T | RES, CHIP 1.5KOHM/1608/5% | 1.5K OHM RES, CHIP |
| R304                   | CRJ10DJ152T | RES, CHIP 1.5KOHM/1608/5% | 1.5K OHM RES, CHIP |
| R305                   | CRJ10DJ152T | RES, CHIP 1.5KOHM/1608/5% | 1.5K OHM RES, CHIP |
| R308                   | CRJ10DJ152T | RES, CHIP 1.5KOHM/1608/5% | 1.5K OHM RES, CHIP |
| R309                   | CRJ10DJ152T | RES, CHIP 1.5KOHM/1608/5% | 1.5K OHM RES, CHIP |
| R312                   | CRJ10DJ152T | RES, CHIP 1.5KOHM/1608/5% | 1.5K OHM RES, CHIP |
| R313                   | CRJ10DJ152T | RES, CHIP 1.5KOHM/1608/5% | 1.5K OHM RES, CHIP |
| R316                   | CRJ10DJ152T | RES, CHIP 1.5KOHM/1608/5% | 1.5K OHM RES, CHIP |
| R317                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% | 100 Ohm            |
| R318                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% | 100 Ohm            |
| R319                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% | 100 Ohm            |
| R320                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% | 100 Ohm            |
| R321                   | CRJ10DJ183T | RES, CHIP                 | 18K Ohm            |
| R322                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  | 10K Ohm            |
| R323                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  | 10K Ohm            |
| R324                   | CRJ10DJ183T | RES, CHIP                 | 18K Ohm            |
| R325                   | CRJ10DJ183T | RES, CHIP                 | 18K Ohm            |
| R326                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  | 10K Ohm            |
| R327                   | CRJ10DJ332T | RES, CHIP 3.3KOHM/1608/5% | 3.3K Ohm           |
| R328                   | CRJ10DJ183T | RES, CHIP                 | 18K Ohm            |
| R329                   | CRJ10DJ183T | RES, CHIP                 | 18K Ohm            |
| R330                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  | 10K Ohm            |
| R331                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  | 10K Ohm            |
| R332                   | CRJ10DJ183T | RES, CHIP                 | 18K Ohm            |
| R333                   | CRJ10DJ183T | RES, CHIP                 | 18K Ohm            |
| R334                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  | 10K Ohm            |
| R335                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  | 10K Ohm            |
| R336                   | CRJ10DJ183T | RES, CHIP                 | 18K Ohm            |
| R337                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% | 100 Ohm            |
| R338                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% | 100 Ohm            |
| R339                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% | 100 Ohm            |
| R340                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% | 100 Ohm            |

| Ref. Designator        | Part Number | Description               |          |
|------------------------|-------------|---------------------------|----------|
| <b>INPUT PCB ASS'Y</b> |             |                           |          |
| R341                   | CRJ10DJ102T | RES, CHIP 1KOHM/1608/5%   | 1K Ohm   |
| R344                   | CRJ10DJ102T | RES, CHIP 1KOHM/1608/5%   | 1K Ohm   |
| R345                   | CRJ10DJ102T | RES, CHIP 1KOHM/1608/5%   | 1K Ohm   |
| R348                   | CRJ10DJ102T | RES, CHIP 1KOHM/1608/5%   | 1K Ohm   |
| R349                   | CRJ10DJ102T | RES, CHIP 1KOHM/1608/5%   | 1K Ohm   |
| R352                   | CRJ10DJ102T | RES, CHIP 1KOHM/1608/5%   | 1K Ohm   |
| R353                   | CRJ10DJ102T | RES, CHIP 1KOHM/1608/5%   |          |
| R356                   | CRJ10DJ102T | RES, CHIP 1KOHM/1608/5%   |          |
| R361                   | CRJ10DJ104T | RES, CHIP 100KOHM/1608/5% |          |
| R362                   | CRJ10DJ104T | RES, CHIP 100KOHM/1608/5% |          |
| R363                   | CRJ10DJ104T | RES, CHIP 100KOHM/1608/5% |          |
| R364                   | CRJ10DJ104T | RES, CHIP 100KOHM/1608/5% |          |
| R365                   | CRJ10DJ104T | RES, CHIP 100KOHM/1608/5% |          |
| R366                   | CRJ10DJ104T | RES, CHIP 100KOHM/1608/5% |          |
| R367                   | CRJ10DJ104T | RES, CHIP 100KOHM/1608/5% |          |
| R368                   | CRJ10DJ104T | RES, CHIP 100KOHM/1608/5% |          |
| R371                   | CRJ10DJ332T | RES, CHIP 3.3KOHM/1608/5% |          |
| R372                   | CRJ10DJ332T | RES, CHIP 3.3KOHM/1608/5% |          |
| R373                   | CRJ10DJ332T | RES, CHIP 3.3KOHM/1608/5% |          |
| R374                   | CRJ10DJ332T | RES, CHIP 3.3KOHM/1608/5% |          |
| R375                   | CRJ10DJ332T | RES, CHIP 3.3KOHM/1608/5% |          |
| R376                   | CRJ10DJ332T | RES, CHIP 3.3KOHM/1608/5% |          |
| R377                   | CRJ10DJ332T | RES, CHIP 3.3KOHM/1608/5% |          |
| R378                   | CRJ10DJ332T | RES, CHIP 3.3KOHM/1608/5% |          |
| R379                   | CRJ10DJ332T | RES, CHIP 3.3KOHM/1608/5% |          |
| R380                   | CRJ10DJ332T | RES, CHIP 3.3KOHM/1608/5% |          |
| R381                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% |          |
| R382                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% |          |
| R383                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% |          |
| R384                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% |          |
| R385                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% |          |
| R386                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% |          |
| R389                   | CRJ10DJ332T | RES, CHIP 3.3KOHM/1608/5% |          |
| R390                   | CRJ10DJ332T | RES, CHIP 3.3KOHM/1608/5% |          |
| R391                   | CRJ10DJ105T | RES, CHIP 1MOHM/1608/5%   |          |
| R392                   | CRJ10DJ105T | RES, CHIP 1MOHM/1608/5%   |          |
| R393                   | CRJ10DJ332T | RES, CHIP 3.3KOHM/1608/5% |          |
| R394                   | CRJ10DJ153T | RES, CHIP 15KOHM/1608/5%  |          |
| R395                   | CRJ10DJ153T | RES, CHIP 15KOHM/1608/5%  |          |
| R396                   | CRJ10DJ332T | RES, CHIP 3.3KOHM/1608/5% |          |
| R397                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% |          |
| R398                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% |          |
| R403                   | CRJ10DJ184T | RES , CHIP                | 180K Ohm |
| R404                   | CRJ10DJ184T | RES , CHIP                | 180K Ohm |
| R405                   | CRJ10DJ184T | RES , CHIP                | 180K Ohm |
| R406                   | CRJ10DJ184T | RES , CHIP                | 180K Ohm |
| R407                   | CRJ10DJ184T | RES , CHIP                | 180K Ohm |
| R408                   | CRJ10DJ184T | RES , CHIP                | 180K Ohm |
| R409                   | CRJ10DJ184T | RES , CHIP                | 180K Ohm |
| R410                   | CRJ10DJ184T | RES , CHIP                | 180K Ohm |
| R415                   | CRJ10DJ562T | RES, CHIP 5.6KOHM/1608/5% |          |
| R416                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |          |
| R417                   | CRJ10DJ562T | RES, CHIP 5.6KOHM/1608/5% |          |
| R418                   | CRJ10DJ562T | RES, CHIP 5.6KOHM/1608/5% |          |
| R419                   | CRJ10DJ562T | RES, CHIP 5.6KOHM/1608/5% |          |
| R420                   | CRJ10DJ562T | RES, CHIP 5.6KOHM/1608/5% |          |
| R425                   | CRJ10DJ102T | RES, CHIP 1KOHM/1608/5%   |          |
| R426                   | CRJ10DJ102T | RES, CHIP 1KOHM/1608/5%   |          |
| R427                   | CRJ10DJ102T | RES, CHIP 1KOHM/1608/5%   |          |
| R428                   | CRJ10DJ102T | RES, CHIP 1KOHM/1608/5%   |          |
| R429                   | CRJ10DJ102T | RES, CHIP 1KOHM/1608/5%   |          |
| R430                   | CRJ10DJ102T | RES, CHIP 1KOHM/1608/5%   |          |

| Ref. Designator        | Part Number | Description               |              |
|------------------------|-------------|---------------------------|--------------|
| <b>INPUT PCB ASS'Y</b> |             |                           |              |
| R433                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% |              |
| R434                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% |              |
| R435                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% |              |
| R436                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% |              |
| R437                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% |              |
| R438                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% |              |
| R439                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% |              |
| R440                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% |              |
| R453                   | CRJ10DJ184T | RES, CHIP                 | 180K Ohm     |
| R454                   | CRJ10DJ184T | RES, CHIP                 | 180K Ohm     |
| R455                   | CRJ10DJ184T | RES, CHIP                 | 180K Ohm     |
| R456                   | CRJ10DJ184T | RES, CHIP                 | 180K Ohm     |
| R457                   | CRJ10DJ184T | RES, CHIP                 | 180K Ohm     |
| R458                   | CRJ10DJ184T | RES, CHIP                 | 180K Ohm     |
| R459                   | CRJ10DJ184T | RES, CHIP                 | 180K Ohm     |
| R460                   | CRJ10DJ184T | RES, CHIP                 | 180K Ohm     |
| R471                   | CRJ10DJ272T | RES, CHIP 2.7KOHM/1608/5% | 2.7K Ohm     |
| R472                   | CRJ10DJ272T | RES, CHIP 2.7KOHM/1608/5% | 2.7K Ohm     |
| R473                   | CRJ10DJ272T | RES, CHIP 2.7KOHM/1608/5% | 2.7K Ohm     |
| R481                   | CRJ10DJ223T | RES, CHIP 22KOHM/1608/5%  |              |
| R482                   | CRJ10DJ223T | RES, CHIP 22KOHM/1608/5%  |              |
| R483                   | CRJ10DJ223T | RES, CHIP 22KOHM/1608/5%  |              |
| R484                   | CRJ10DJ223T | RES, CHIP 22KOHM/1608/5%  |              |
| R485                   | CRJ10DJ223T | RES, CHIP 22KOHM/1608/5%  |              |
| R486                   | CRJ10DJ223T | RES, CHIP 22KOHM/1608/5%  |              |
| R487                   | CRJ10DJ223T | RES, CHIP 22KOHM/1608/5%  |              |
| R488                   | CRJ10DJ223T | RES, CHIP 22KOHM/1608/5%  |              |
| R491                   | CRJ10DJ4R7T | RES, CHIP 4.7 OHM/1608/5% |              |
| R492                   | CRJ10DJ4R7T | RES, CHIP 4.7 OHM/1608/5% |              |
| R493                   | CRJ10DJ4R7T | RES, CHIP 4.7 OHM/1608/5% |              |
| R494                   | CRJ10DJ4R7T | RES, CHIP 4.7 OHM/1608/5% |              |
| R495                   | CRJ10DJ4R7T | RES, CHIP 4.7 OHM/1608/5% |              |
| R496                   | CRJ10DJ4R7T | RES, CHIP 4.7 OHM/1608/5% |              |
| R497                   | CRJ10DJ4R7T | RES, CHIP 4.7 OHM/1608/5% |              |
| R498                   | CRJ10DJ4R7T | RES, CHIP 4.7 OHM/1608/5% |              |
| R701                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% |              |
| R702                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% |              |
| R703                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% |              |
| R704                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% |              |
| R705                   | CRJ10DJ102T | RES, CHIP 1KOHM/1608/5%   |              |
| R706                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% |              |
| R707                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% |              |
| R708                   | CRJ10DJ0R0T | RES, CHIP 0 OHM/1608/5%   |              |
| R714                   | CRJ10DJ104T | RES, CHIP 100KOHM/1608/5% |              |
| R715                   | CRJ10DJ104T | RES, CHIP 100KOHM/1608/5% |              |
| R716                   | CRJ10DJ472T | RES, CHIP 4.7KOHM/1608/5% |              |
| R717                   | CRJ10DJ3R3T | RES, CHIP                 | 1/10W 3.3OHM |
| R718                   | CRJ10DJ123T | RES, CHIP                 |              |
| R719                   | CRJ10DJ473T | RES, CHIP 47KOHM/1608/5%  |              |
| R720                   | CRJ10DJ473T | RES, CHIP 47KOHM/1608/5%  |              |
| R721                   | CRJ10DJ330T | RES, CHIP 33 OHM/1608/5%  |              |
| R723                   | CRJ10DJ1R8T | RES, CHIP                 | 1/10W 1.8OHM |
| R724                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% |              |
| R725                   | CRJ10DJ473T | RES, CHIP 47KOHM/1608/5%  |              |
| R726                   | CRJ10DJ473T | RES, CHIP 47KOHM/1608/5%  |              |
| R727                   | CRJ10DJ473T | RES, CHIP 47KOHM/1608/5%  |              |
| R728                   | CRJ10DJ330T | RES, CHIP 33 OHM/1608/5%  |              |
| R729                   | CRJ10DJ330T | RES, CHIP 33 OHM/1608/5%  |              |
| R730                   | CRJ10DJ330T | RES, CHIP 33 OHM/1608/5%  |              |
| R758                   | CRJ10DJ330T | RES, CHIP 33 OHM/1608/5%  |              |
| R759                   | CRJ10DJ181T | RES, CHIP 180 OHM/1608/5% |              |
| R760                   | CRJ10DJ105T | RES, CHIP 1MOHM/1608/5%   |              |

| Ref. Designator        | Part Number | Description               |             |
|------------------------|-------------|---------------------------|-------------|
| <b>INPUT PCB ASS'Y</b> |             |                           |             |
| R761                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R762                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R763                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R764                   | CRJ10DJ330T | RES, CHIP 33 OHM/1608/5%  |             |
| R765                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R766                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R767                   | CRJ10DJ152T | RES, CHIP 1.5KOHM/1608/5% |             |
| R768                   | CRJ10DJ152T | RES, CHIP 1.5KOHM/1608/5% |             |
| R769                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R770                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R771                   | CRJ10DJ330T | RES, CHIP 33 OHM/1608/5%  |             |
| R772                   | CRJ10DJ330T | RES, CHIP 33 OHM/1608/5%  |             |
| R773                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R774                   | CRJ10DJ330T | RES, CHIP 33 OHM/1608/5%  |             |
| R775                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R776                   | CRJ10DJ332T | RES, CHIP 3.3KOHM/1608/5% |             |
| R777                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% |             |
| R778                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R779                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R780                   | CRJ10DJ332T | RES, CHIP 3.3KOHM/1608/5% |             |
| R783                   | CRJ10DJ332T | RES, CHIP 3.3KOHM/1608/5% |             |
| R784                   | CRJ10DJ332T | RES, CHIP 3.3KOHM/1608/5% |             |
| R785                   | CRJ10DJ332T | RES, CHIP 3.3KOHM/1608/5% |             |
| R786                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R787                   | CRJ10DJ332T | RES, CHIP 3.3KOHM/1608/5% |             |
| R788                   | CRJ10DJ332T | RES, CHIP 3.3KOHM/1608/5% |             |
| R789                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R790                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R791                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R792                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R793                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R794                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R795                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R796                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R797                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R798                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R799                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R800                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R801                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R802                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R803                   | CRJ10DJ330T | RES, CHIP 33 OHM/1608/5%  |             |
| R804                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R805                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R806                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R807                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R808                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R809                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R810                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R811                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R812                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R813                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R814                   | CRJ10DJ100T | RES , CHIP                | 10 Ohm      |
| R815                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R816                   | CRJ10DJ330T | RES, CHIP 33 OHM/1608/5%  |             |
| R817                   | CRJ10DJ103T | RES, CHIP 10KOHM/1608/5%  |             |
| R818                   | CRJ10DJ330T | RES, CHIP 33 OHM/1608/5%  |             |
| R819                   | CRJ10DJ330T | RES, CHIP 33 OHM/1608/5%  |             |
| R820                   | CRJ10DJ330T | RES, CHIP 33 OHM/1608/5%  |             |
| R821                   | CRJ10DJ330T | RES, CHIP 33 OHM/1608/5%  |             |
| R822                   | CRJ10DJ330T | RES, CHIP 33 OHM/1608/5%  |             |
| R823                   | CRJ10DJ101T | RES, CHIP 100 OHM/1608/5% |             |
| R781                   | CRG2ANJ270H | RES , METAL OXIDE FILM    | 27 OHM 2W J |



| Ref. Designator                  | Part Number     | Description            |                 |
|----------------------------------|-----------------|------------------------|-----------------|
| <b>INPUT PCB ASS'Y</b>           |                 |                        |                 |
| R782                             | CRG2ANJ330H     | RES , METAL OXIDE FILM | 33 OHM 2W J     |
| <i>Semiconductors</i>            |                 |                        |                 |
| D201                             | HVD1SS133MT     | DIODE                  | 1SS133T-77      |
| D202                             | HVD1SS133MT     | DIODE                  | 1SS133T-77      |
| D203                             | HVD1SS133MT     | DIODE                  | 1SS133T-77      |
| D204                             | HVD1SS133MT     | DIODE                  | 1SS133T-77      |
| D205                             | HVD1SS133MT     | DIODE                  | 1SS133T-77      |
| D206                             | HVD1SS133MT     | DIODE                  | 1SS133T-77      |
| D207                             | HVD1SS133MT     | DIODE                  | 1SS133T-77      |
| D208                             | HVD1SS133MT     | DIODE                  | 1SS133T-77      |
| D209                             | HVD1SS133MT     | DIODE                  | 1SS133T-77      |
| D210                             | HVD1SS133MT     | DIODE                  | 1SS133T-77      |
| D211                             | HVD1SS133MT     | DIODE                  | 1SS133T-77      |
| D212                             | HVD1SS133MT     | DIODE                  | 1SS133T-77      |
| D213                             | HVD1SS133MT     | DIODE                  | 1SS133T-77      |
| D214                             | HVD1SS133MT     | DIODE                  | 1SS133T-77      |
| D215                             | HVD1SS133MT     | DIODE                  | 1SS133T-77      |
| D216                             | HVD1SS133MT     | DIODE                  | 1SS133T-77      |
| D701                             | KVD1N4003ST     | DIODE                  | 1N4003          |
| Q201                             | HVTKTC2874BT    | TRANSISTOR , MUTE      | KTC2874B        |
| Q202                             | HVTKTC2874BT    | TRANSISTOR , MUTE      | KTC2874B        |
| Q203                             | HVTKTC2874BT    | TRANSISTOR , MUTE      | KTC2874B        |
| Q204                             | HVTKRA107MT     | TRANSISTOR             | KRA107M         |
| IC77                             | HVI57V161610ET7 | SDRAM 16M 70NS         | HY57V161610ET-7 |
| <i>Miscellaneous</i>             |                 |                        |                 |
| L704                             | HLZ9Z014Z       | CHIP , BEAD            | HU-1H4516-600JT |
| BN11                             | KJP15GB99ZM     | WAFER                  | 35237(15PIN)    |
| BN12                             | KJP15GB99ZM     | WAFER                  | 35237(15PIN)    |
| CN13                             | CJP13GA115ZY    | WAFER , CARD CABLE     |                 |
| CN15                             | CJP13GA115ZY    | WAFER , CARD CABLE     |                 |
| CN17                             | KJP12GB142ZP    | PIN HEADER             | 2110 - DR12 - G |
| CN18                             | CJP05GA19ZY     | WAFER, STRAIGHT, 5PIN  |                 |
| CN72                             | KJP32GA117ZG    | WAFER , CARD CABLE     | GF102-32S-TS    |
| JK11                             | CJJ4R019W       | TERMINAL , IN/OUT      |                 |
| JK12                             | CJJ4P014W       | JACK , IN/OUT          |                 |
| JK13                             | CJJ4P014W       | JACK , IN/OUT          |                 |
| JK14                             | CJJ4R019W       | TERMINAL , IN/OUT      |                 |
| JK15                             | CJJ4R037W       | JACK , BOARD           |                 |
| JW21                             | CWE7202090AA    | WIRE ASS'Y             |                 |
| L701                             | KLZ9H001Z       | BEAD , CORE            |                 |
| L702                             | KLZ9H001Z       | BEAD , CORE            |                 |
| L703                             | KLZ9H001Z       | BEAD , CORE            |                 |
| X701                             | HOX12288E220CS  | CRYSTAL                | 2.288MHZ , 22PF |
| <b>BIAS TRANSISTOR PCB ASS'Y</b> |                 |                        |                 |
| <i>Capacitors</i>                |                 |                        |                 |
| C851                             | HCEA1HH100T     | CAP , ELECT            | 10UF 50V        |
| C852                             | HCEA1HH100T     | CAP , ELECT            | 10UF 50V        |
| C853                             | HCEA1HH100T     | CAP , ELECT            | 10UF 50V        |
| C854                             | HCEA1HH100T     | CAP , ELECT            | 10UF 50V        |
| C855                             | HCEA1HH100T     | CAP , ELECT            | 10UF 50V        |
| C856                             | HCEA1HH100T     | CAP , ELECT            | 10UF 50V        |
| C857                             | HCEA1HH100T     | CAP , ELECT            | 10UF 50V        |
| C922                             | HCEA1EH101T     | CAP , ELECT            | 100UF 25V       |
| C923                             | HCEA1EH101T     | CAP , ELECT            | 100UF 25V       |
| C924                             | HCEA1EH101T     | CAP , ELECT            | 100UF 25V       |

| Ref. Designator                  | Part Number   | Description               |                 |
|----------------------------------|---------------|---------------------------|-----------------|
| <b>BIAS TRANSISTOR PCB ASS'Y</b> |               |                           |                 |
| C925                             | CCKT1H223ZF   | CAP , CERAMIC             | 0.022UF 50V ZF  |
| C926                             | CCKT1H223ZF   | CAP , CERAMIC             | 0.022UF 50V ZF  |
| C927                             | CCKT1H223ZF   | CAP , CERAMIC             | 0.022UF 50V ZF  |
| C931                             | HCEA1HH4R7T   | CAP , ELECT               | 4.7UF 50V       |
| C928                             | CCEA1CKR3103E | CAP , ELECTROLYTIC        | 10000UF , 16V   |
| C929                             | CCEA1EH332F   | CAP , ELECT               | 3300UF,25V      |
| C930                             | CCEA1EH222E   | CAP. ELECT.               | 2200UF 25V      |
| <i>Semiconductors</i>            |               |                           |                 |
| D904                             | KVD1N4003ST   | DIODE                     | 1N4003          |
| D905                             | KVD1N4003ST   | DIODE                     | 1N4003          |
| D906                             | KVD1N4003ST   | DIODE                     | 1N4003          |
| D907                             | KVD1N4003ST   | DIODE                     | 1N4003          |
| D915                             | HVD1SS133MT   | DIODE                     | 1SS133T-77      |
| D916                             | HVD1SS133MT   | DIODE                     | 1SS133T-77      |
| D903                             | HVD1N5819T    | DIODE , SCHOTTKY          | 1N5819          |
| IC91                             | HVIL7815CP    | I.C, REGULATOR            |                 |
| IC92                             | HVIL7915CP    | I.C, REGULATOR            | L7915           |
| IC93                             | HVIL7805CP    | I.C, REGULATOR            | L7805           |
| Q851                             | HVTKTD600KGR  | TRANSISTOR , BIAS         | KTD600KGR       |
| Q852                             | HVTKTD600KGR  | TRANSISTOR , BIAS         | KTD600KGR       |
| Q853                             | HVTKTD600KGR  | TRANSISTOR , BIAS         | KTD600KGR       |
| Q854                             | HVTKTD600KGR  | TRANSISTOR , BIAS         | KTD600KGR       |
| Q855                             | HVTKTD600KGR  | TRANSISTOR , BIAS         | KTD600KGR       |
| Q856                             | HVTKTD600KGR  | TRANSISTOR , BIAS         | KTD600KGR       |
| Q857                             | HVTKTD600KGR  | TRANSISTOR , BIAS         | KTD600KGR       |
| <i>Resistors</i>                 |               |                           |                 |
| R874                             | CRD20TJ331T   | RES , CARBON              | 330 OHM 1/5W J  |
| R875                             | CRD20TJ331T   | RES , CARBON              | 330 OHM 1/5W J  |
| R876                             | CRD20TJ331T   | RES , CARBON              | 330 OHM 1/5W J  |
| R877                             | CRD20TJ331T   | RES , CARBON              | 330 OHM 1/5W J  |
| R878                             | CRD20TJ331T   | RES , CARBON              | 330 OHM 1/5W J  |
| R879                             | CRD20TJ331T   | RES , CARBON              | 330 OHM 1/5W J  |
| R880                             | CRD20TJ331T   | RES , CARBON              | 330 OHM 1/5W J  |
| R882                             | CRD20TJ122T   | RES , CARBON              | 1.2K OHM 1/5W J |
| R883                             | CRD20TJ122T   | RES , CARBON              | 1.2K OHM 1/5W J |
| R884                             | CRD20TJ122T   | RES , CARBON              | 1.2K OHM 1/5W J |
| R885                             | CRD20TJ122T   | RES , CARBON              | 1.2K OHM 1/5W J |
| R886                             | CRD20TJ122T   | RES , CARBON              | 1.2K OHM 1/5W J |
| R887                             | CRD20TJ122T   | RES , CARBON              | 1.2K OHM 1/5W J |
| R888                             | CRD20TJ122T   | RES , CARBON              | 1.2K OHM 1/5W J |
| R912                             | CRD20TJ153T   | RES , CARBON              | 15K OHM 1/5W J  |
| R913                             | CRD20TJ153T   | RES , CARBON              | 15K OHM 1/5W J  |
| R914                             | CRD20TJ103T   | RES , CARBON              | 10K OHM 1/5W J  |
| VR81                             | HVN1RA221B01T | RES , SEMI FIXED(220 OHM) | RH0615C100221   |
| VR82                             | HVN1RA221B01T | RES , SEMI FIXED(220 OHM) | RH0615C100221   |
| VR83                             | HVN1RA221B01T | RES , SEMI FIXED(220 OHM) | RH0615C100221   |
| VR84                             | HVN1RA221B01T | RES , SEMI FIXED(220 OHM) | RH0615C100221   |
| VR85                             | HVN1RA221B01T | RES , SEMI FIXED(220 OHM) | RH0615C100221   |
| VR86                             | HVN1RA221B01T | RES , SEMI FIXED(220 OHM) | RH0615C100221   |
| VR87                             | HVN1RA221B01T | RES , SEMI FIXED(220 OHM) | RH0615C100221   |
| <i>Miscellaneous</i>             |               |                           |                 |
| CN81                             | KJP02GB46ZM   | WAFER                     |                 |
| CN82                             | KJP02GB46ZM   | WAFER                     |                 |
| CN83                             | KJP02GB46ZM   | WAFER                     |                 |
| CN84                             | KJP02GB46ZM   | WAFER                     |                 |
| CN85                             | KJP02GB46ZM   | WAFER                     |                 |

| Ref. Designator                  | Part Number            | Description                 |                |
|----------------------------------|------------------------|-----------------------------|----------------|
| <b>BIAS TRANSISTOR PCB ASS'Y</b> |                        |                             |                |
| CN86                             | KJP02GB46ZM            | WAFER                       |                |
| CN87                             | KJP02GB46ZM            | WAFER                       |                |
| CN96                             | KJP08GA01ZM            | WAFER                       | MOLEX 5267-08A |
| CN98                             | BJP08GB131ZK           | WAFER                       |                |
| <b>Miscellaneous</b>             |                        |                             |                |
| T901                             | CLT5W011ZU             | TRANS , POWER               |                |
|                                  | CTB3+10GFZ             | SCREW                       |                |
|                                  | CTB3+6J                | SCREW                       |                |
|                                  | CTB3+8J                | SCREW                       |                |
|                                  | CTB3+8JFZ              | SCREW                       |                |
|                                  | CTW3+12J               | SCREW                       |                |
|                                  | CTW3+8J                | SCREW                       |                |
|                                  | CUA1A229               | CHASSIS , BOTTOM            |                |
|                                  | KHE36-3                | CLAMPER , WIRE              |                |
|                                  | KHG1A050               | RUBBER , CUSHION            |                |
|                                  | KHG1A308               | CUSHION , TOP               |                |
|                                  | KHR1A028               | BUSHING , AC CORD           |                |
|                                  | KHR301                 | CLAMPER                     |                |
|                                  | KHS1A032               | TAPE , HEMELON              |                |
| CB13                             | CWC1C4A13B080B         | CABLE , CARD                |                |
| CB15                             | CWC1C4A13B100B         | CABLE , CARD                |                |
| F901                             | KBA2D2500TLET          | FUSE                        | 2.5A,250V      |
| F902                             | KBA2D2500TLET          | FUSE                        | 2.5A,250V      |
| F903                             | KBA2C8000TLUZ          | FUSE                        | 6.3A,250V      |
| F904                             | KBA2C8000TLUZ          | FUSE                        | 6.3A,250V      |
| F905                             | KBA2C6300TLUZ          | FUSE                        | 6.3A,250V      |
| F906                             | KBA2C6300TLUZ          | FUSE                        | 6.3A,250V      |
| F907                             | KBA2C6300TLUZ          | FUSE                        | 6.3A,250V      |
|                                  | KJCFC5S                | HOLDER , FUSE               | for F903       |
|                                  | KJCFC5S                | HOLDER , FUSE               | for F904       |
|                                  | KJCFC5S                | HOLDER , FUSE               | for F905       |
|                                  | KJCFC5S                | HOLDER , FUSE               | for F906       |
|                                  | KJCFC5S                | HOLDER , FUSE               | for F907       |
|                                  | CBN1A174MBC22          | KNOB , ROTARY               |                |
|                                  | CGB1A152Z              | BADGE , HARMAN/KARDON(TOP)  |                |
|                                  | CGL1A222               | INDICATOR , VOLUME          |                |
|                                  | CGU1A318Z              | ORNAMENT , VOLUME           |                |
|                                  | KGB1A111X              | BADGE , HARMAN/KARDON       |                |
|                                  | CGX1A338MBC22          | CAP , VOLUME                |                |
|                                  | CKC4B145S46            | CABINET , TOP               |                |
|                                  | CLZ9Z028Z              | FERRITE CORE(21.2X6.4X12.7) | K5C T          |
|                                  | CMH1A214               | HOLDER , VOLUME             |                |
|                                  | CMZ1A090               | SHEET , VOLUME              |                |
|                                  | CTB3+8JFC              | SCREW                       |                |
|                                  | CTB4+6FFC              | SCREW                       |                |
|                                  | CGUAVR235              | WINDOW ASS'Y                |                |
|                                  | CGU1A366Y              | WINDOW , FIP                |                |
|                                  | KGB1A147Z              | BADGE , MODEL NO            |                |
|                                  |                        |                             |                |
|                                  | <b>CNVKSTM9014MS07</b> | <b>AVR 235 TUNER MODULE</b> |                |



November 1988  
Revised November 1999

74ACT04SC : IC52,75,83,84

# 74AC04 • 74ACT04

## Hex Inverter

### General Description

The AC/ACT04 contains six inverters.

### Features

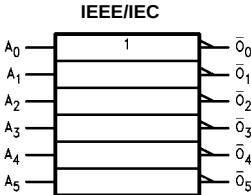
- I<sub>CC</sub> reduced by 50% on 74AC only
- Outputs source/sink 24 mA
- ACT04 has TTL-compatible inputs

### Ordering Code:

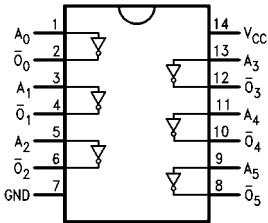
| Order Number | Package Number | Package Description                                                               |
|--------------|----------------|-----------------------------------------------------------------------------------|
| 74AC04SC     | M14A           | 14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150" Narrow Body |
| 74AC04SJ     | M14D           | 14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide                     |
| 74AC04MTC    | MTC14          | 14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide       |
| 74AC04PC     | N14A           | 14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide            |
| 74ACT04SC    | M14A           | 14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150" Narrow Body |
| 74ACT04MTC   | MTC14          | 14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide       |
| 74ACT04PC    | N14A           | 14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide            |

Device also available in Tape and Reel. Specify by appending suffix letter "X" to the ordering code. (PC not available in Tape and Reel.)

### Logic Symbol



### Connection Diagram

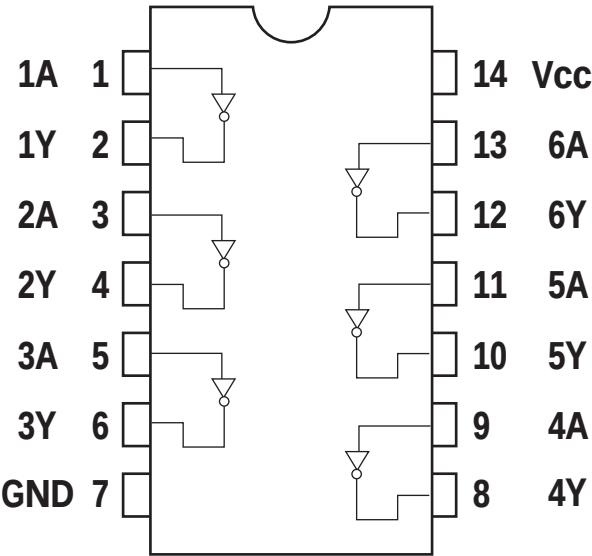


### Pin Descriptions

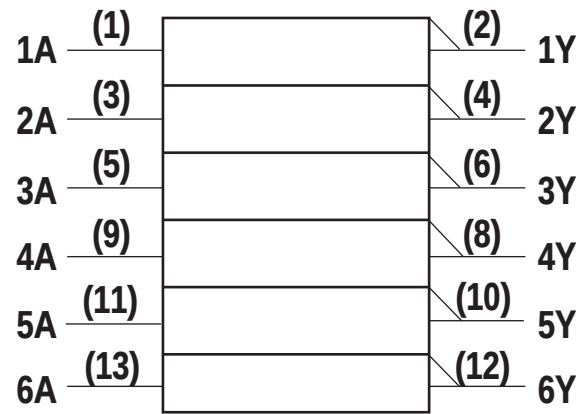
| Pin Names      | Description |
|----------------|-------------|
| A <sub>n</sub> | Inputs      |
| O <sub>n</sub> | Outputs     |

74AC04 • 74ACT04 Hex Inverter

■ PIN ASSIGNMENT (74HCU04AFN : IC71,72,76 )



■ LOGIC SYMBOL

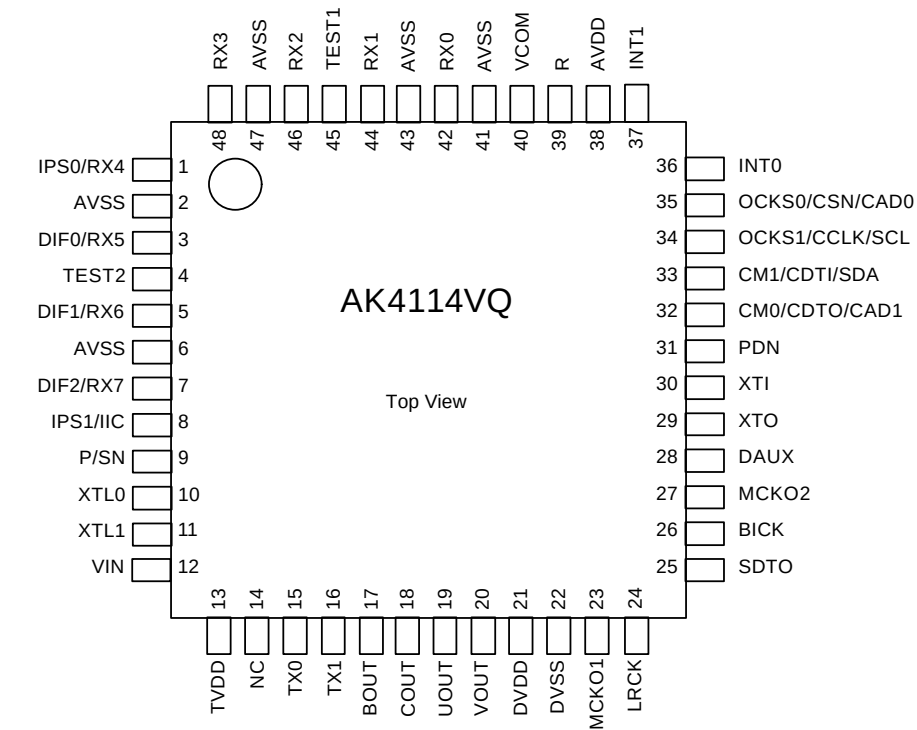


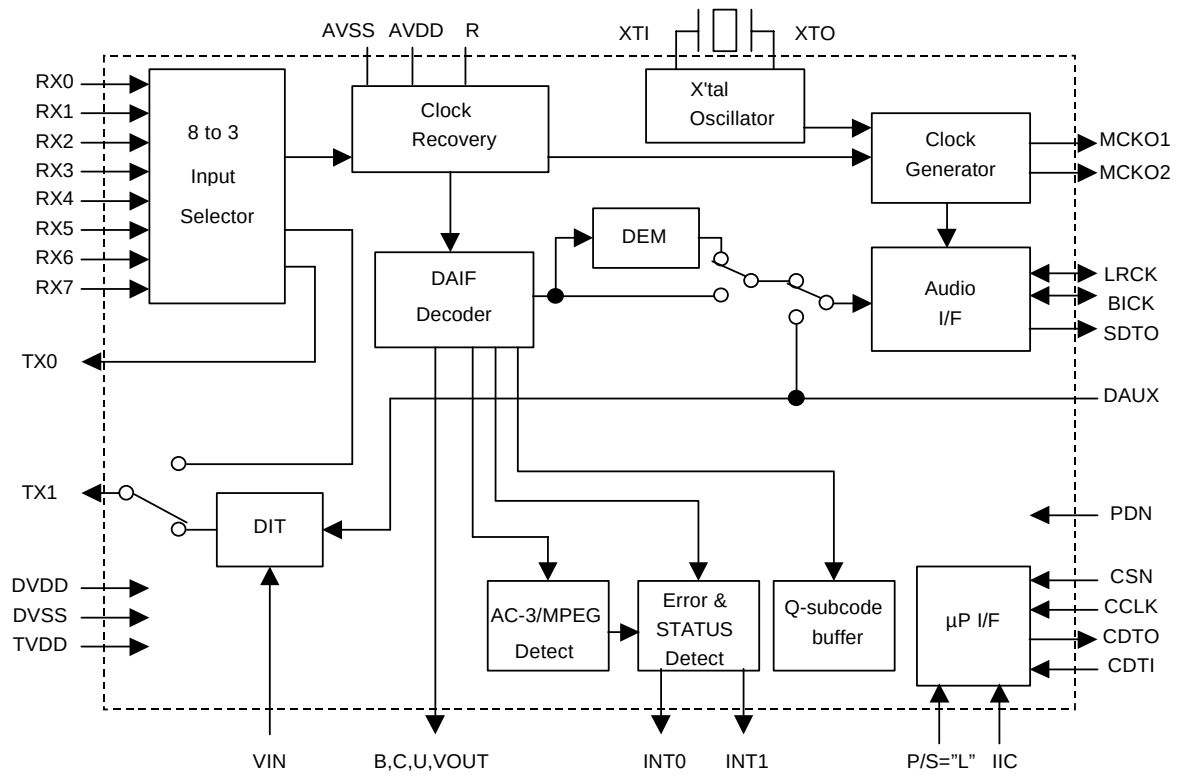
■ TRUTH TABLE

| A | Y |
|---|---|
| L | H |
| H | L |

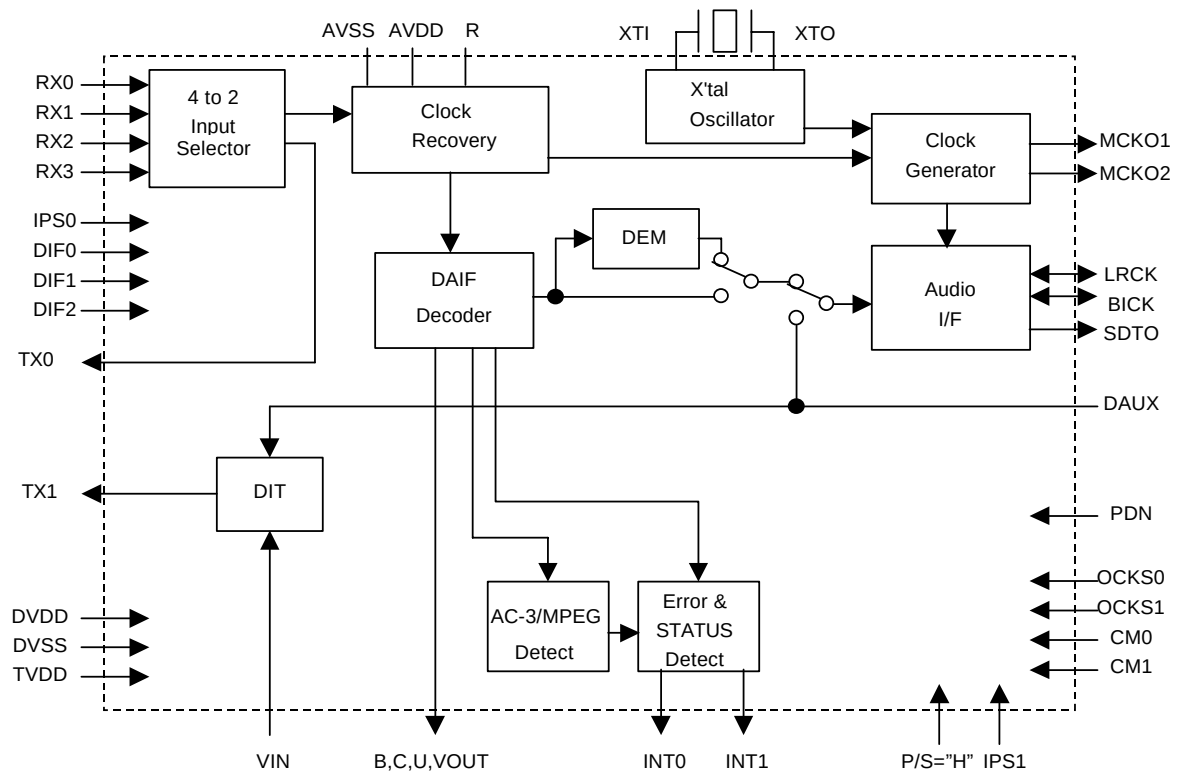
DIR IC PIN ASSIGNMENT & BLOCK DIAGRAM

PIN ASSIGNMENT (TOP VIEW) : IC73





Serial Control Mode



Parallel Control Mode

**DIR IC PIN FUNCTION (AK4114VQ) : IC73 □**

| PIN/FUNCTION |          |     |                                                                                                                                           |
|--------------|----------|-----|-------------------------------------------------------------------------------------------------------------------------------------------|
| No.          | Pin Name | I/O | Function                                                                                                                                  |
| 1            | IPS0     | I   | Input Channel Select 0 Pin in Parallel Mode                                                                                               |
|              | RX4      | I   | Receiver Channel 4 Pin in Serial Mode (Internal biased pin)                                                                               |
| 2            | NC(AVSS) | I   | No Connect<br>No internal bonding. This pin should be connected to AVSS.                                                                  |
| 3            | DIF0     | I   | Audio Data Interface Format 0 Pin in Parallel Mode                                                                                        |
|              | RX5      | I   | Receiver Channel 5 Pin in Serial Mode (Internal biased pin)                                                                               |
| 4            | TEST2    | I   | TEST 2 pin<br>This pin should be connect to AVSS.                                                                                         |
| 5            | DIF1     | I   | Audio Data Interface Format 1 Pin in Parallel Mode                                                                                        |
|              | RX6      | I   | Receiver Channel 6 Pin in Serial Mode (Internal biased pin)                                                                               |
| 6            | NC(AVSS) | I   | No Connect<br>No internal bonding. This pin should be connected to AVSS.                                                                  |
| 7            | DIF2     | I   | Audio Data Interface Format 2 Pin in Parallel Mode                                                                                        |
|              | RX7      | I   | Receiver Channel 7 Pin in Serial Mode (Internal biased pin)                                                                               |
| 8            | IPS1     | I   | Input Channel Select 1 Pin in Parallel Mode                                                                                               |
|              | IIC      | I   | IIC Select Pin in Serial Mode.<br>“L”: 4-wire Serial, “H”: IIC                                                                            |
| 9            | P/SN     | I   | Parallel/Serial Select Pin<br>“L”: Serial Mode, “H”: Parallel Mode                                                                        |
| 10           | XTL0     | I   | X’tal Frequency Select 0 Pin                                                                                                              |
| 11           | XTL1     | I   | X’tal Frequency Select 1 Pin                                                                                                              |
| 12           | VIN      | I   | V-bit Input Pin for Transmitter Output                                                                                                    |
| 13           | TVDD     | I   | Input Buffer Power Supply Pin, 3.3V or 5V                                                                                                 |
| 14           | NC       | I   | No Connect<br>No internal bonding. This pin should be open or connected to DVSS.                                                          |
| 15           | TX0      | O   | Transmit Channel (Through Data) Output 0 Pin                                                                                              |
| 16           | TX1      | O   | When TX bit = “0”, Transmit Channel (Through Data) Output 1 Pin.<br>When TX bit = “1”, Transmit Channel (DAUX Data) Output Pin (Default). |
| 17           | BOUT     | O   | Block-Start Output Pin for Receiver Input<br>“H” during first 40 frames.                                                                  |
| 18           | COUT     | O   | C-bit Output Pin for Receiver Input                                                                                                       |
| 19           | UOUT     | O   | U-bit Output Pin for Receiver Input                                                                                                       |
| 20           | VOOUT    | O   | V-bit Output Pin for Receiver Input                                                                                                       |
| 21           | DVDD     | I   | Digital Power Supply Pin, 3.3V                                                                                                            |
| 22           | DVSS     | I   | Digital Ground Pin                                                                                                                        |
| 23           | MCKO1    | O   | Master Clock Output 1 Pin                                                                                                                 |
| 24           | LRCK     | I/O | Channel Clock Pin                                                                                                                         |
| 25           | SDTO     | O   | Audio Serial Data Output Pin                                                                                                              |
| 26           | BICK     | I/O | Audio Serial Data Clock Pin                                                                                                               |
| 27           | MCKO2    | O   | Master Clock Output 2 Pin                                                                                                                 |
| 28           | DAUX     | I   | Auxiliary Audio Data Input Pin                                                                                                            |
| 29           | XTO      | O   | X’tal Output Pin                                                                                                                          |
| 30           | XTI      | I   | X’tal Input Pin                                                                                                                           |



**PIN/FUNCTION (Continued)**

| No. | Pin Name | I/O | Function                                                                                     |
|-----|----------|-----|----------------------------------------------------------------------------------------------|
| 31  | PDN      | I   | Power-Down Mode Pin<br>When “L”, the AK4114 is powered-down and reset.                       |
| 32  | CM0      | I   | Master Clock Operation Mode 0 Pin in Parallel Mode                                           |
|     | CDTO     | O   | Control Data Output Pin in Serial Mode, IIC= “L”.                                            |
|     | CAD1     | I   | Chip Address 1 Pin in Serial Mode, IIC= “H”.                                                 |
| 33  | CM1      | I   | Master Clock Operation Mode 1 Pin in Parallel Mode                                           |
|     | CDTI     | I   | Control Data Input Pin in Serial Mode, IIC= “L”.                                             |
|     | SDA      | I/O | Control Data Pin in Serial Mode, IIC= “H”.                                                   |
| 34  | OCKS1    | I   | Output Clock Select 1 Pin in Parallel Mode                                                   |
|     | CCLK     | I   | Control Data Clock Pin in Serial Mode, IIC= “L”                                              |
|     | SCL      | I   | Control Data Clock Pin in Serial Mode, IIC= “H”                                              |
| 35  | OCKS0    | I   | Output Clock Select 0 Pin in Parallel Mode                                                   |
|     | CSN      | I   | Chip Select Pin in Serial Mode, IIC= “L”.                                                    |
|     | CAD0     | I   | Chip Address 0 Pin in Serial Mode, IIC= “H”.                                                 |
| 36  | INT0     | O   | Interrupt 0 Pin                                                                              |
| 37  | INT1     | O   | Interrupt 1 Pin                                                                              |
| 38  | AVDD     | I   | Analog Power Supply Pin, 3.3V                                                                |
| 39  | R        | -   | External Resistor Pin<br>18k $\Omega$ +/-1% resistor should be connected to AVSS externally. |
| 40  | VCOM     | -   | Common Voltage Output Pin<br>0.47 $\mu$ F capacitor should be connected to AVSS externally.  |
| 41  | AVSS     | I   | Analog Ground Pin                                                                            |
| 42  | RX0      | I   | Receiver Channel 0 Pin (Internal biased pin)<br>This channel is default in serial mode.      |
| 43  | NC(AVSS) | I   | No Connect<br>No internal bonding. This pin should be connected to AVSS.                     |
| 44  | RX1      | I   | Receiver Channel 1 Pin (Internal biased pin)                                                 |
| 45  | TEST1    | I   | TEST 1 pin.<br>This pin should be connected to AVSS.                                         |
| 46  | RX2      | I   | Receiver Channel 2 Pin (Internal biased pin)                                                 |
| 47  | NC(AVSS) | I   | No Connect<br>No internal bonding. This pin should be connected to AVSS.                     |
| 48  | RX3      | I   | Receiver Channel 3 Pin (Internal biased pin)                                                 |

Note 1. All input pins except internal biased pins should not be left floating.

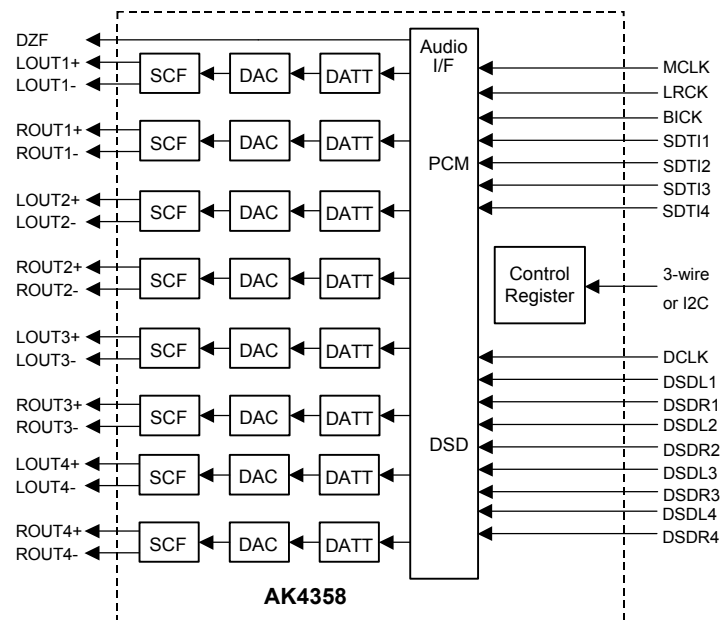
|                                                                                   |                                                                                        |               |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|---------------|
|  | <b>= Target Spec =</b><br><b>AK4358</b><br><b>192kHz 24-Bit 8ch DAC with DSD Input</b> | <b>AK4358</b> |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|---------------|

### GENERAL DESCRIPTION

The AK4358 is eight channels 24bit DAC corresponding to digital audio system. Using AKM's advanced multi bit architecture for its modulator the AK4358 delivers a wide dynamic range while preserving linearity for improved THD+N performance. The AK4358 has full differential SCF outputs, removing the need for AC coupling capacitors and increasing performance for systems with excessive clock jitter. The AK4358 accepts 192kHz PCM data and 1-Bit DSD data, ideal for a wide range of applications including DVD-Audio and SACD.

### FEATURES

- ☐ Sampling Rate Ranging from 8kHz to 192kHz
- ☐ 24Bit 8 times Digital Filter with Slow roll-off option
- ☐ THD+N: -94dB
- ☐ DR, S/N: 114dB
- ☐ High Tolerance to Clock Jitter
- ☐ Low Distortion Differential Output
- ☐ DSD Data input available
- ☐ Channel Independent Digital De-emphasis for 32, 44.1 & 48kHz sampling
- ☐ Zero Detect function
- ☐ Channel Independent Digital Attenuator with soft-transition (3 Speed mode)
- ☐ Soft Mute
- ☐ 3-wire Serial and I<sup>2</sup>C Bus  $\mu$ P I/F for mode setting
- ☐ I/F format: MSB justified, LSB justified (16bit, 20bit, 24bit), I<sup>2</sup>S, TDM or DSD
- ☐ Master clock: 256fs, 384fs, 512fs or 768fs (PCM Normal Speed Mode)  
                                   128fs, 192fs, 256fs or 384fs (PCM Double Speed Mode)  
                                   128fs or 192fs (PCM Quad Speed Mode)  
                                   512fs or 768fs (DSD Mode)
- ☐ Power Supply: 4.75 to 5.25V
- ☐ 48pin LQFP Package



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[AK4358]

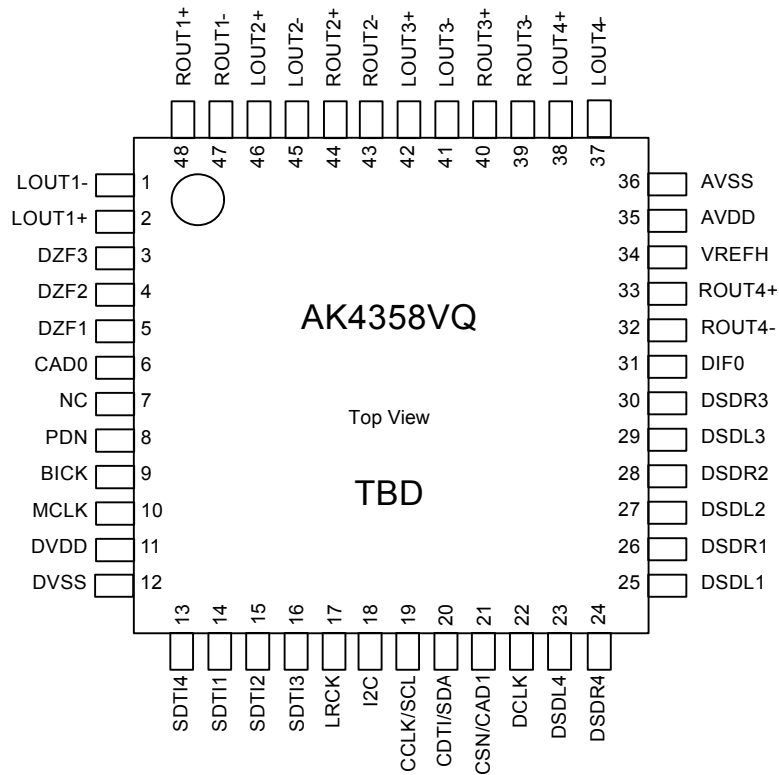
## ■ Ordering Guide

AK4358VQ  
AKD4358

-40 ~ +85°C  
Evaluation Board for AK4358

48LQFP

## ■ Pin Layout (To be determined)



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[AK4358]

## ■ Compatibility with AK4357

### 1. Function & Performance

| Functions                | AK4357        | AK4358       |
|--------------------------|---------------|--------------|
| # of channels            | 6             | 8            |
| DR                       | 106dB         | 114B         |
| 48kHz/96kHz TDM          | Not available | Available    |
| I2C                      | Not available | Available    |
| DSDM control             | Pin/Register  | Register     |
| Input channel of DZF pin | Fixed         | Programmable |

### 2. Pin Configuration (To be determined)

| Pin # | AK4357 | AK4358 |
|-------|--------|--------|
| 3     | DZFL1  | DZF3   |
| 4     | DZFR1  | DZF2   |
| 5     | DZF23  | DZF1   |
| 7     | CAD1   | NC     |
| 12    | NC     | DVSS   |
| 13    | DVSS   | SDTI4  |
| 18    | SMUTE  | I2C    |
| 22    | DSDM   | DCLK   |
| 23    | DCLK   | DSDL4  |
| 24    | NC     | DSDR4  |
| 32    | DIF1   | ROUT4- |
| 33    | DIF2   | ROUT4+ |
| 37    | AVSS   | LOUT4- |
| 38    | AVSS   | LOUT4- |

### 3. Register

| Addr | Bit    | AK4357        | AK4358            |
|------|--------|---------------|-------------------|
| 00H  | D5     | DZFM          | 0                 |
| 01H  | D6     | 0             | PW4               |
| 04H  | D7     | ATT7          | ATTE              |
| 05H  | D7     | ATT7          | ATTE              |
| 06H  | D7     | ATT7          | ATTE              |
| 07H  | D7     | ATT7          | ATTE              |
| 08H  | D7     | ATT7          | ATTE              |
| 09H  | D7     | ATT7          | ATTE              |
| 0AH  | D7, D6 | 0, 0          | TDM1, TDM0        |
| 0BH  |        | Not available | LOUT4 ATT Control |
| 0CH  |        | Not available | ROUT4 ATT Control |
| 0DH  |        | Not available | DZF1 control      |
| 0EH  |        | Not available | DZF2 control      |
| 0FH  |        | Not available | DZF3 control      |

## IC 74

| No. | Pin Name | I/O | Function                                                                                                                                           |
|-----|----------|-----|----------------------------------------------------------------------------------------------------------------------------------------------------|
|     | LOUT1-   | O   | DAC1 Lch Negative Analog Output Pin                                                                                                                |
|     | LOUT1+   | O   | DAC1 Lch Positive Analog Output Pin                                                                                                                |
|     | DZF1     | O   | Zero Input Detect 1 Pin                                                                                                                            |
|     | DZF2     | O   | Zero Input Detect 2 Pin                                                                                                                            |
|     | DZF3     | O   | Zero Input Detect 3 Pin                                                                                                                            |
|     | CAD0     | I   | Chip Address 0 Pin                                                                                                                                 |
|     | PDN      | I   | Power-Down Mode Pin<br>When at “L”, the AK4358 is in the power-down mode and is held in reset.<br>The AK4358 should always be reset upon power-up. |
|     | BICK     | I   | Audio Serial Data Clock Pin                                                                                                                        |
|     | MCLK     | I   | Master Clock Input Pin<br>An external TTL clock should be input on this pin.                                                                       |
|     | DVDD     | -   | Digital Power Supply Pin, +4.75~+5.25V                                                                                                             |
|     | DVSS     | -   | Digital Ground Pin                                                                                                                                 |
|     | SDTI1    | I   | DAC1 Audio Serial Data Input Pin                                                                                                                   |
|     | SDTI2    | I   | DAC2 Audio Serial Data Input Pin                                                                                                                   |
|     | SDTI3    | I   | DAC3 Audio Serial Data Input Pin                                                                                                                   |
|     | SDTI4    | I   | DAC4 Audio Serial Data Input Pin                                                                                                                   |
|     | LRCK     | I   | L/R Clock Pin                                                                                                                                      |
|     | I2C      | I   | Control Mode Select Pin<br>“L”: 3-wire Serial, “H”: I <sup>2</sup> C Bus                                                                           |
|     | CCLK/SCL | I   | Control Data Clock Pin<br>I2C = “L”: CCLK (3-wire Serial), I2C = “H”: SCL (I <sup>2</sup> C Bus)                                                   |
|     | CDTI/SDA | I/O | Control Data Input Pin<br>I2C = “L”: CDTI (3-wire Serial), I2C = “H”: SDA (I <sup>2</sup> C Bus)                                                   |
|     | CSN/CAD1 | I   | Chip Select Pin<br>I2C = “L”: CSN (3-wire Serial), I2C = “H”: CAD1 (I <sup>2</sup> C Bus)                                                          |
|     | DCLK     | I   | DSD Clock Pin                                                                                                                                      |
|     | DSDL1    | I   | DAC1 DSD Lch Data Input Pin                                                                                                                        |
|     | DSDR1    | I   | DAC1 DSD Rch Data Input Pin                                                                                                                        |
|     | DSDL2    | I   | DAC2 DSD Lch Data Input Pin                                                                                                                        |
|     | DSDR2    | I   | DAC2 DSD Rch Data Input Pin                                                                                                                        |
|     | DSDL3    | I   | DAC3 DSD Lch Data Input Pin                                                                                                                        |
|     | DSDR3    | I   | DAC3 DSD Rch Data Input Pin                                                                                                                        |
|     | DSDL4    | I   | DAC4 DSD Lch Data Input Pin                                                                                                                        |
|     | DSDR4    | I   | DAC4 DSD Rch Data Input Pin                                                                                                                        |
|     | DIF0     | I   | Audio Data Interface Format 0 Pin                                                                                                                  |
|     | VREFH    | I   | Positive Voltage Reference Input Pin                                                                                                               |
|     | AVDD     | -   | Analog Power Supply Pin, +4.75~+5.25V                                                                                                              |
|     | AVSS     | -   | Analog Ground Pin                                                                                                                                  |
|     | ROUT4-   | O   | DAC4 Rch Negative Analog Output Pin                                                                                                                |
|     | ROUT4+   | O   | DAC4 Rch Positive Analog Output Pin                                                                                                                |
|     | LOUT4-   | O   | DAC4 Lch Negative Analog Output Pin                                                                                                                |
|     | LOUT4+   | O   | DAC4 Lch Positive Analog Output Pin                                                                                                                |
|     | ROUT3-   | O   | DAC3 Rch Negative Analog Output Pin                                                                                                                |
|     | ROUT3+   | O   | DAC3 Rch Positive Analog Output Pin                                                                                                                |
|     | LOUT3-   | O   | DAC3 Lch Negative Analog Output Pin                                                                                                                |
|     | LOUT3+   | O   | DAC3 Lch Positive Analog Output Pin                                                                                                                |
|     | ROUT2-   | O   | DAC2 Rch Negative Analog Output Pin                                                                                                                |
|     | ROUT2+   | O   | DAC2 Rch Positive Analog Output Pin                                                                                                                |
|     | LOUT2-   | O   | DAC2 Lch Negative Analog Output Pin                                                                                                                |
|     | LOUT2+   | O   | DAC2 Lch Positive Analog Output Pin                                                                                                                |
|     | ROUT1-   | O   | DAC1 Rch Negative Analog Output Pin                                                                                                                |

IC 76

AKM

= Preliminary =

# AK5381

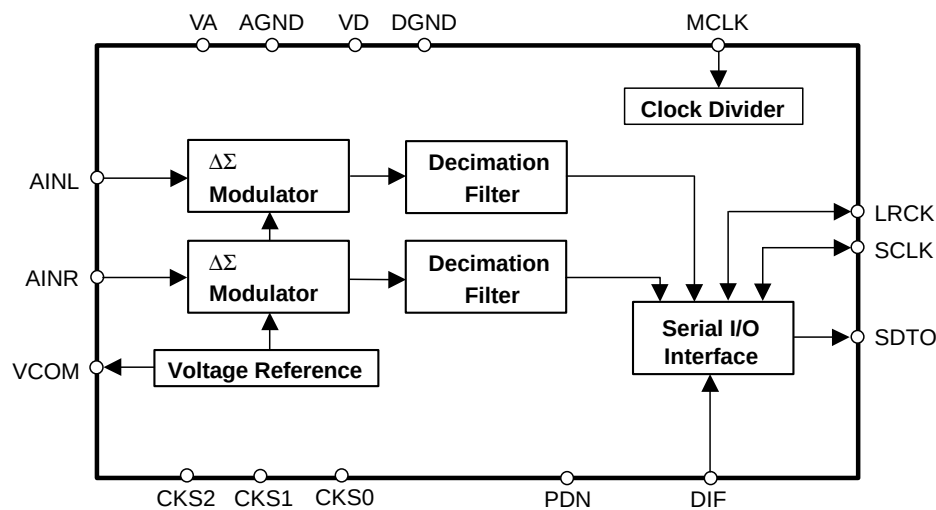
## 24Bit 96kHz $\Delta\Sigma$ ADC

### GENERAL DESCRIPTION

The AK5381 is a stereo A/D Converter with wide sampling rate of 4kHz ~ 96kHz and is suitable for High-end audio system. The AK5381 achieves high accuracy and low cost by using Enhanced dual bit  $\Delta\Sigma$  techniques. The AK5381 requires no external components because the analog inputs are single-ended. The audio interface has two formats (MSB justified,  $I^2S$ ) and can correspond to many systems like music instrument and AV receiver.

### FEATURES

- ☐ Stereo  $\Delta\Sigma$  ADC
- ☐ On-Chip Digital Anti-Alias Filtering
- ☐ Single-ended Input
- ☐ Digital HPF for DC-Offset cancel
- ☐ S/(N+D): 96dB@5V for 48kHz
- ☐ DR: 106dB@5V for 48kHz
- ☐ S/N: 106dB@5V for 48kHz
- ☐ Sampling Rate Ranging from 4kHz to 96kHz
- ☐ Master Clock:
  - 256fs/384fs/512fs/768fs (~ 48kHz)
  - 256fs/384fs (~ 96kHz)
- ☐ Audio Interface: Master or Slave Mode selectable
- ☐ Input level: TTL/CMOS selectable
- ☐ Output format: 24bit MSB justified /  $I^2S$  selectable
- ☐ Power Supply: 4.5 ~ 5.5V (VA)
  - 2.7 ~ 5.5V (VD at 48kHz)
  - 3.0 ~ 5.5V (VD at 96kHz)
- ☐ Ta = -40 ~ 85°C
- ☐ Small 16pin TSSOP Package
- ☐ AK5380 Pin-compatible



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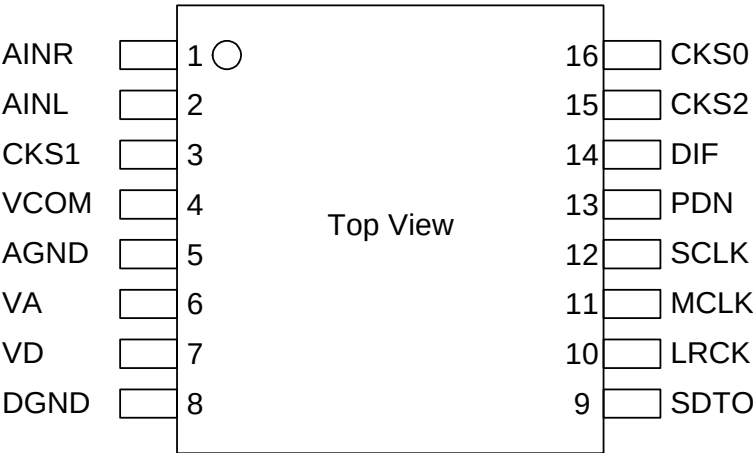
AKM CONFIDENTIAL

[AK5381]

■ Ordering Guide

|          |                             |                            |
|----------|-----------------------------|----------------------------|
| AK5381VT | −40 ~ +85°C                 | 16pin TSSOP (0.65mm pitch) |
| AKD5381  | Evaluation Board for AK5381 |                            |

■ Pin Layout



■ Compatibility with AK5380

|                     | AK5380               | AK5381               |
|---------------------|----------------------|----------------------|
| Master Mode         | Not Available        | Available            |
| HPF OFF             | Not Available        | Available            |
| VD (Digital Supply) | 4.5 to 5.5V@fs=96kHz | 3.0 to 5.5V@fs=96kHz |
| Pin #3              | NC                   | CKS1                 |
| Pin #15             | TTL                  | CKS2                 |
| Pin #16             | TST                  | CKS0                 |

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[AK5381]

| PIN / FUNCTION |          |     |                                                                                                  |
|----------------|----------|-----|--------------------------------------------------------------------------------------------------|
| No.            | Pin Name | I/O | Function                                                                                         |
| 1              | AINR     | I   | Rch Analog Input Pin                                                                             |
| 2              | AINL     | I   | Lch Analog Input Pin                                                                             |
| 3              | CKS1     | I   | Mode Select 1 Pin                                                                                |
| 4              | VCOM     | O   | Common Voltage Output Pin, VA/2<br>Bias voltage of ADC input.                                    |
| 5              | AGND     | -   | Analog Ground Pin                                                                                |
| 6              | VA       | -   | Analog Power Supply Pin, 4.5 ~ 5.5V                                                              |
| 7              | VD       | -   | Digital Power Supply Pin, 2.7 ~ 5.5V(fs=4k ~ 48kHz), 3.0 ~ 5.5V(fs=48k ~ 96kHz)                  |
| 8              | DGND     | -   | Digital Ground Pin                                                                               |
| 9              | SDTO     | O   | Audio Serial Data Output Pin<br>“L” Output at Power-down mode.                                   |
| 10             | LRCK     | I/O | Output Channel Clock Pin<br>“L” Output in Master Mode at Power-down mode.                        |
| 11             | MCLK     | I   | Master Clock Input Pin                                                                           |
| 12             | SCLK     | I/O | Audio Serial Data Clock Pin<br>“L” Output in Master Mode at Power-down mode.                     |
| 13             | PDN      | I   | Power Down Mode Pin<br>“H”: Power up, “L”: Power down                                            |
| 14             | DIF      | I   | Audio Interface Format Pin<br>“H” : 24bit I <sup>2</sup> S Compatible, “L” : 24bit MSB justified |
| 15             | CKS2     | I   | Mode Select 2 Pin                                                                                |
| 16             | CKS0     | I   | Mode Select 0 Pin                                                                                |

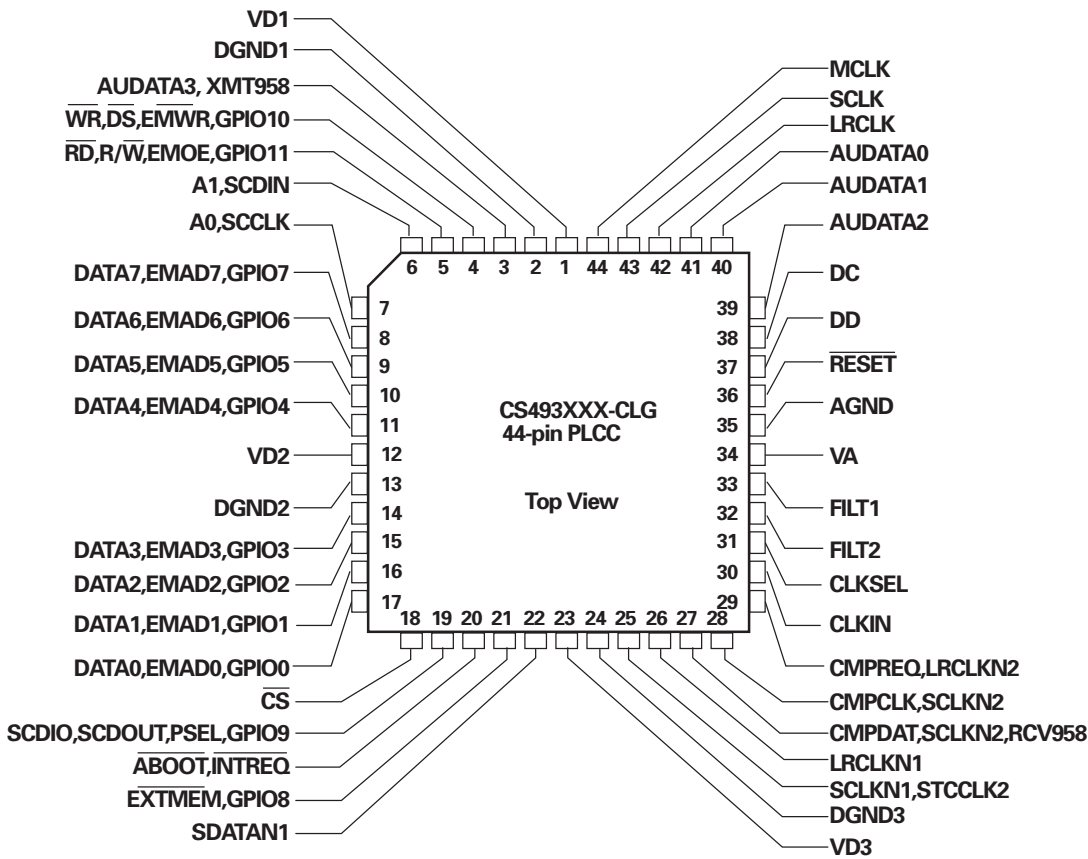
Note: All digital input pins should not be left floating.



## AUDIO DSP (CS493263 - CLG : IC75)

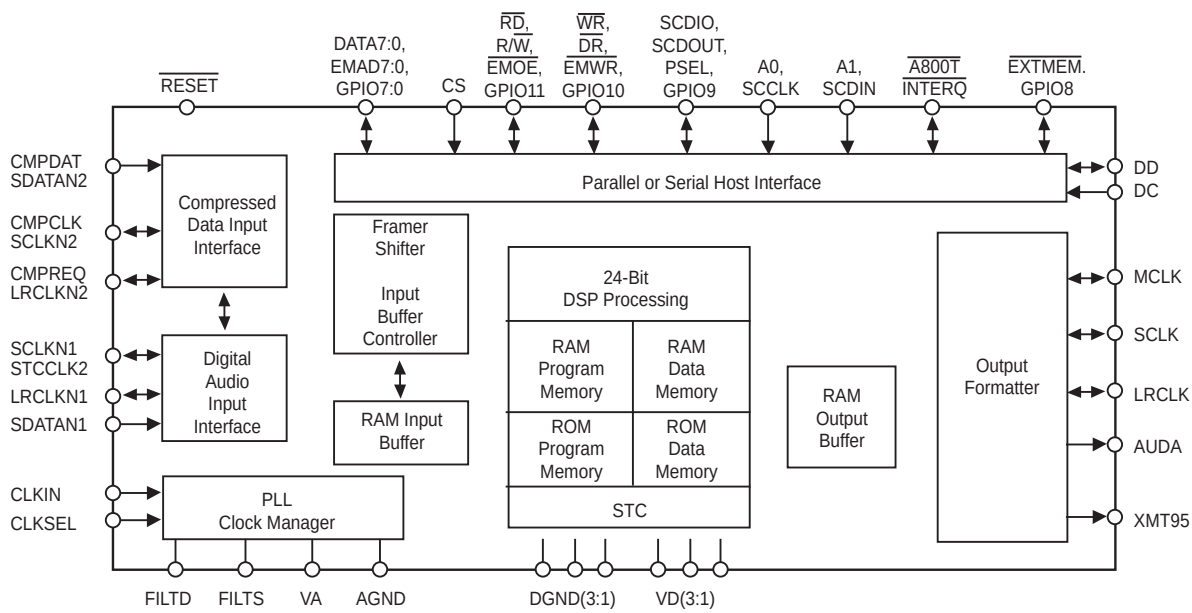
| PIN No. | Pin Name       | I/O | Function                                                             |
|---------|----------------|-----|----------------------------------------------------------------------|
| 1,12,23 | +VD1           | -   | Digital Power supply. Normally +2.5v                                 |
| 2,13,24 | DGND           | -   | Digital Ground                                                       |
| 3       | AUD3           | O   | SPDIF transmitter output/Digital audio output(N.C)                   |
| 4       | WR             | I   | Host write strobe pin(connected to GND with an external resistor)    |
| 5       | RD             | I   | Host parallel output enable pin(pulled up with an external resistor) |
| 6       | CS_DA          | I   | SPI Serial data input pin                                            |
| 7       | CS_CK          | I   | Serial control clock input pin                                       |
| 8       | EMAD7          | I/O | Serial data IN/OUTPUT pins(pulled up with an external resistor)      |
| 9       | EMAD6          | I/O |                                                                      |
| 10      | EMAD5          | I/O |                                                                      |
| 11      | EMAD4          | I/O |                                                                      |
| 14      | EMAD3          | I/O |                                                                      |
| 15      | EMAD2          | I/O |                                                                      |
| 16      | EMAD1          | I/O |                                                                      |
| 17      | EMAD0          | I/O |                                                                      |
| 18      | CS_CE          | I   | Host parallel chip select pin                                        |
| 19      | SCDIO(AK_DOUT) | O   | Serial control port data output pin                                  |
| 20      | INTREQ         | O   | Control port interrupt request output pin                            |
| 21      | EXTMEM         | I/O | External Memory Chip Selector(pulled up with an external resistor)   |
| 22      | SDATAN1(SDI)   | I   | PCM audio data input number 1 pin                                    |
| 25      | SCLKN1(BICK)   | I   | PCM audio input bit clock pin                                        |
| 26      | LRCLKN1(LRCK)  | I   | PCM audio input sample rate clock pin                                |
| 27      | CMPDAT(SDI)    | I   | PCM audio data input number 2 pin                                    |
| 28      | CMPCLK(BICK)   | I   | PCM audio input bit clock pin                                        |
| 29      | CREQ(LRCK)     | I   | PCM audio input sample rate clock pin                                |
| 30      | CLKIN(XIN)     | I   | Master clock input(used external clock)                              |
| 31      | CLKSEL(GND)    | I   | DSP clock mode select pin: connect the GND                           |
| 32      | FILT1          |     | Connects to an external filter for the on-chip phase-locked loop     |
| 33      | FILT1          |     | Connects to an external filter for the on-chip phase-locked loop     |
| 34      | +2.5V          | -   | Analog Power supply for clock generator . Normally +2.5V             |
| 35      | AGND           | -   | Analog ground supply for clock generator PLL.                        |
| 36      | RESET(CS_RST)  | I   | Master reset input pin                                               |
| 37      | DBDATA         | -   | Reserved pin and should be pulled up with an external resistor.      |
| 38      | DBCLK          | -   | Reserved pin and should be pulled up with an external resistor.      |
| 39      | AUD2(SDO2)     | O   | PCM multi-format digital-audio data output2 pin                      |
| 40      | AUD1(SDO1)     | O   | PCM multi-format digital-audio data output1 pin                      |
| 41      | AUD0(SDO0)     | O   | PCM multi-format digital-audio data output0 pin                      |
| 42      | LRCLK          | I   | Audio output sample rate clock pin                                   |
| 43      | SCLK(BICK)     | I   | Audio output bit clock pin                                           |
| 44      | MCLK           | I   | Audio master clock output pin                                        |

PIN ASSIGNMENT.(CS493263)

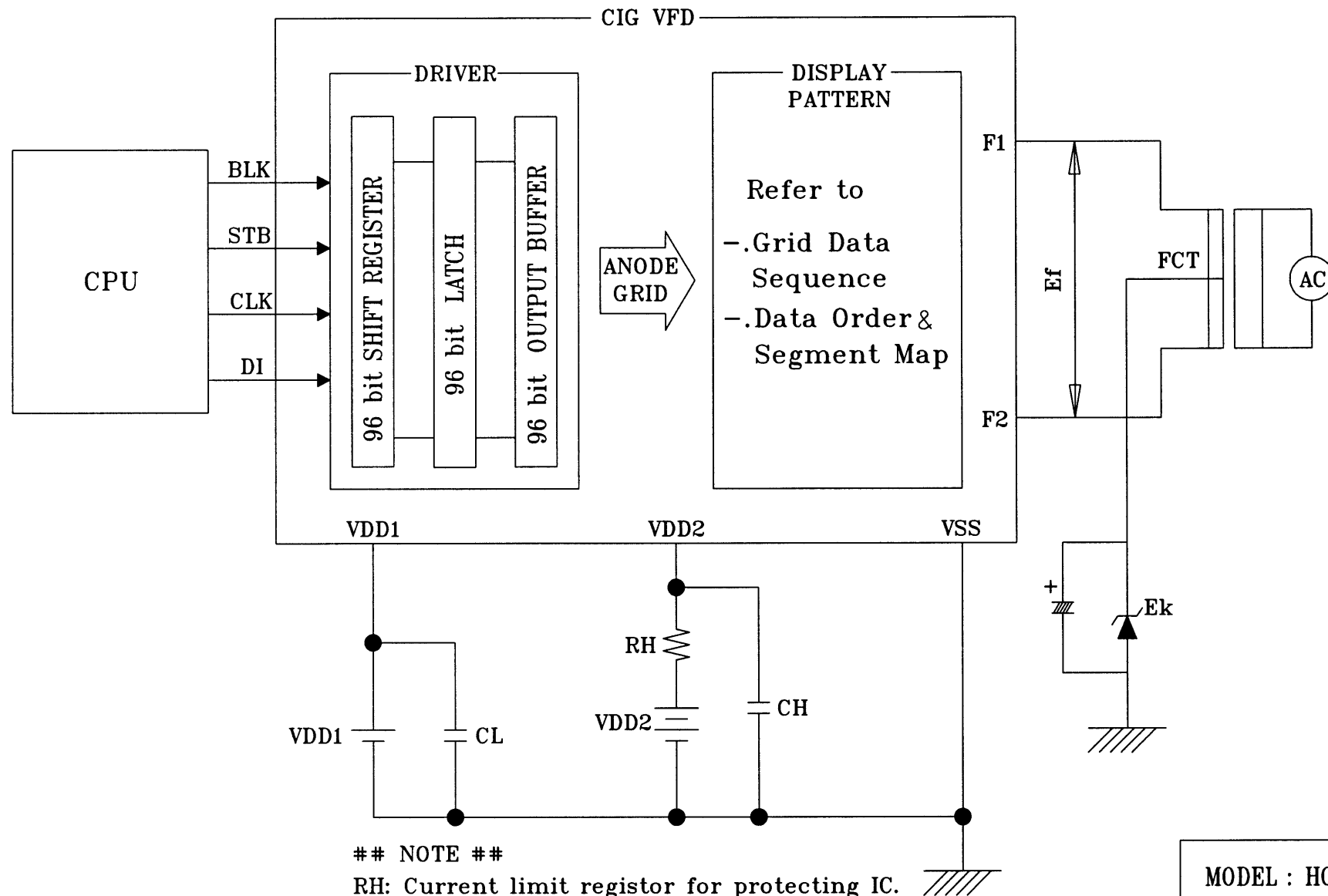


(TOP VIEW)

BLOCK DIAGRAM(CS493263)

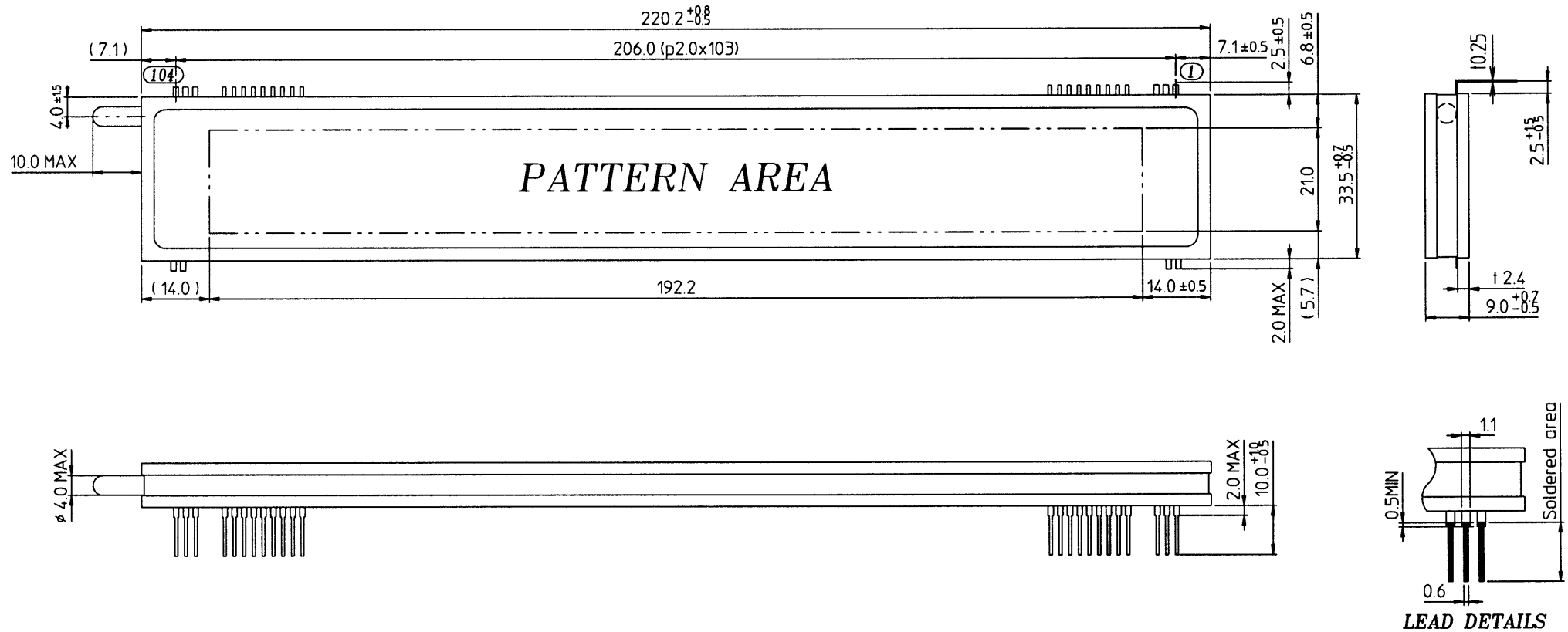


## BLOCK DIAGRAM



MODEL : HCA-18ML01  
BLOCK DIAGRAM  
Rev. ① 20-Feb-2003

# OUTER DIMENSIONS



## PIN CONNECTION

| PIN NO.    | 104 | 103 | 102 | 101 | 100 | 99   | 98  | 97  | 96  | 95 | 94 | 93  | 92  | 91   | 90~15 | 14~6 | 5  | 4  | 3  | 2  | 1  |
|------------|-----|-----|-----|-----|-----|------|-----|-----|-----|----|----|-----|-----|------|-------|------|----|----|----|----|----|
| CONNECTION | F2  | F2  | F2  | NP  | NP  | VDD2 | VSS | VSS | CLK | D0 | DI | BLK | STB | VDD1 | NP    | NC   | NP | NP | F1 | F1 | F1 |

### \*Notes

Fn : Filament Pin

NP : No Pin

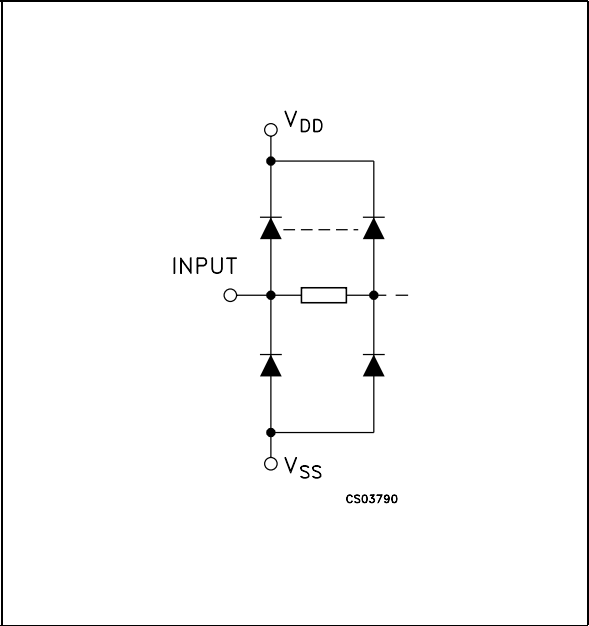
NC : No Connection Pin

\* D0(Serial data output) : Be left open if not used.

MODEL : HCA-18ML01  
OUTER DIMENSIONS  
Rev. ① 20-Feb-2003

HCF4053B FUNCTION DIAGRAM & PIN DESCRIPTION

INPUT EQUIVALENT CIRCUIT



PIN DESCRIPTION (IC44,45,51,80,89)

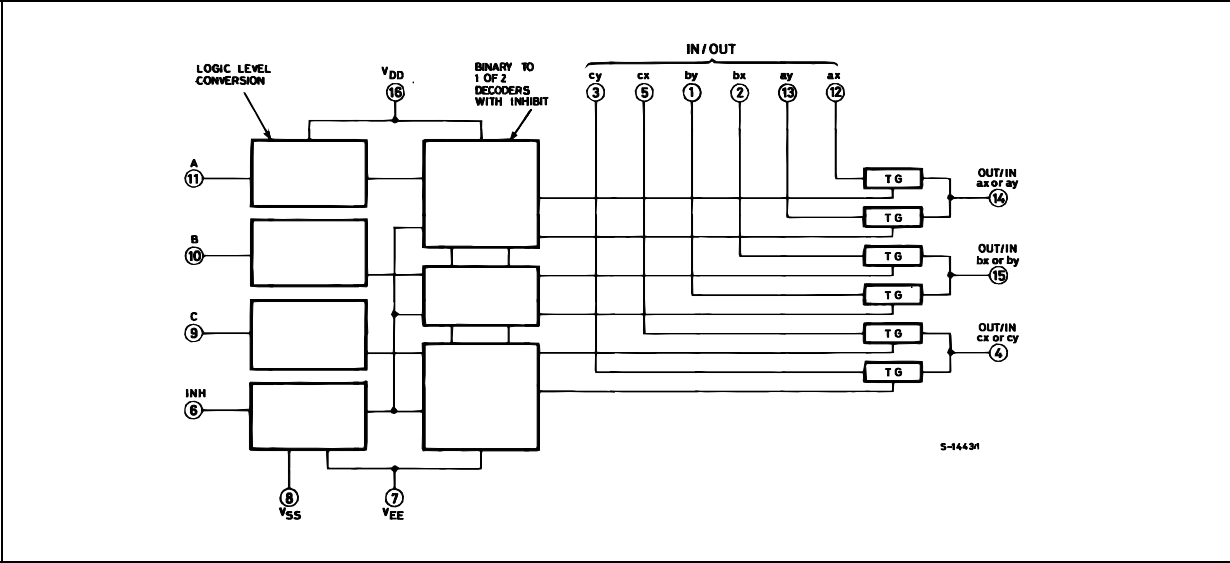
| PIN No             | SYMBOL          | NAME AND FUNCTION               |
|--------------------|-----------------|---------------------------------|
| 11, 10, 9          | A, B, C         | Binary Control Inputs           |
| 6                  | INH             | Inhibit Inputs                  |
| 12, 13, 2, 1, 5, 3 | IN/OUT          | ax,ay,bx,by,cx,cy Input/ Output |
| 14                 | OUT/IN          | ax or ay                        |
| 15                 | OUT/IN          | bx or by                        |
| 4                  | OUT/IN          | cx or cy                        |
| 7                  | V <sub>EE</sub> | Supply Voltage                  |
| 8                  | V <sub>SS</sub> | Negative Supply Voltage         |
| 16                 | V <sub>DD</sub> | Positive Supply Voltage         |

TRUTH TABLE

| INHIBIT | C or B or A |                |
|---------|-------------|----------------|
| 0       | 0           | ax or bx or cx |
| 0       | 1           | ay or by or cy |
| 1       | X           | NONE           |

X : Don't Care

FUNCTIONAL DIAGRAM (IC44,45,51,80,89)



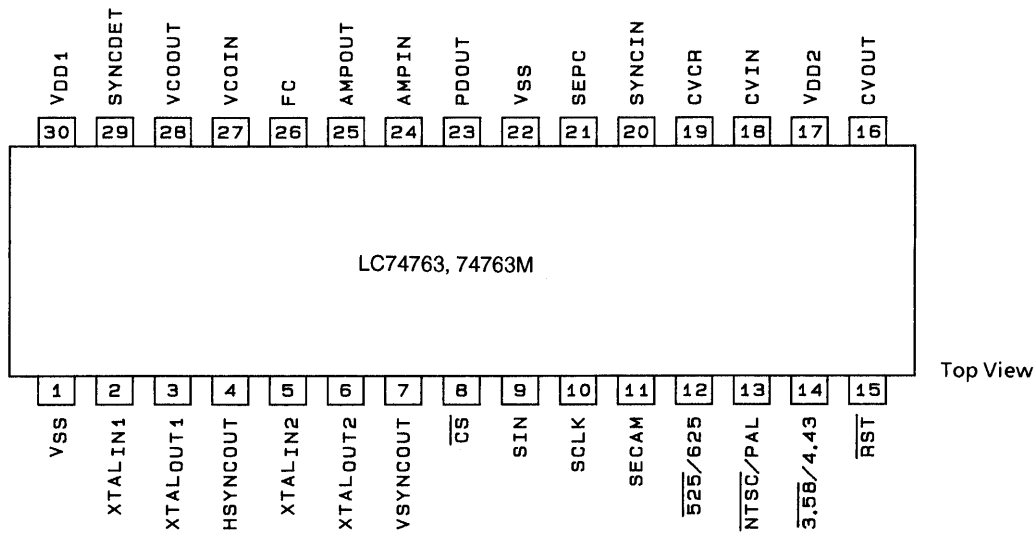
## O.S.D IC (74763M)

## Pin Functions (IC51)

| Pin No. | Symbol                       | Function                                         | Description                                                                                                                                                                                                      |
|---------|------------------------------|--------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | V <sub>SS</sub>              | Ground                                           | Ground connection                                                                                                                                                                                                |
| 2       | Xtal <sub>IN1</sub>          | Crystal oscillator connection                    | Connection for the crystal and capacitor used to form the crystal oscillator that generates the internal synchronization signal. The oscillator can be selected with a command switch.                           |
| 3       | Xtal <sub>OUT1</sub>         |                                                  |                                                                                                                                                                                                                  |
| 4       | HSYNC <sub>OUT</sub>         | Horizontal synchronization output                | Outputs the horizontal synchronization signal (AFC). The output polarity can be selected (metal option). Also functions as general output port (command switch).                                                 |
| 5       | Xtal <sub>IN2</sub>          | Crystal oscillator connection                    | Connection for the crystal and capacitor used to form the crystal oscillator that generates the internal synchronization signal.                                                                                 |
| 6       | Xtal <sub>OUT2</sub>         |                                                  |                                                                                                                                                                                                                  |
| 7       | VSYNC <sub>OUT</sub>         | Vertical synchronization output                  | Outputs the vertical synchronization signal. The output polarity can be selected (metal option). Also functions as general output port (command switch).                                                         |
| 8       | $\overline{\text{CS}}$       | Enable input                                     | Enables/disables serial data input. Serial data is enabled when this pin is low (hysteresis input). Pull-up resistor built in (metal option).                                                                    |
| 9       | SIN                          | Data input                                       | Serial data input (hysteresis input). Pull-up resistor built in (metal option).                                                                                                                                  |
| 10      | SCLK                         | Clock input                                      | Clock input for serial data input (hysteresis input). Pull-up resistor built in (metal option).                                                                                                                  |
| 11      | SECAM                        | SECAM mode switch input/output (command switch)  | During input, switches between SECAM and other modes. During output, functions as general output port or internal V output (command switch). Low = other modes, high = SECAM mode                                |
| 12      | $\overline{525/625}$         | 525/625 switch input/output (command switch)     | During input, switches between 525 scan lines and 625 scan lines. During output, functions as general output port or character data output (command switch). Low = 525 lines, high = 625 lines                   |
| 13      | $\overline{\text{NTSC/PAL}}$ | NTSC/PAL switch input/output (command switch)    | Switches the color mode between NTSC and PAL. During output, functions as general output port or frame data output (command switch). Low = NTSC, high = PAL                                                      |
| 14      | $\overline{3.58/4.43}$       | 3.58/4.43 switch input/output (command switch)   | Switch FSC between 3.58 MHz and 4.43 MHz. During output, functions as general output port or halftone output (command switch). Low = 3.58, high = 4.43                                                           |
| 15      | $\overline{\text{RST}}$      | Reset input                                      | System reset input pin, low is active (hysteresis input). Pull-up resistor built in (metal option).                                                                                                              |
| 16      | CV <sub>OUT</sub>            | Video signal output                              | Composite video output                                                                                                                                                                                           |
| 17      | V <sub>DD2</sub>             | Power supply connection                          | Power supply connection for composite video signal level generation                                                                                                                                              |
| 18      | CV <sub>IN</sub>             | Video signal input                               | Composite video input                                                                                                                                                                                            |
| 19      | CV <sub>CR</sub>             | Video signal input                               | SECAM chroma signal input                                                                                                                                                                                        |
| 20      | SYNC <sub>IN</sub>           | Sync separator circuit input                     | Built-in sync separator circuit video signal input                                                                                                                                                               |
| 21      | SEP <sub>C</sub>             | Sync separator circuit                           | Built-in sync separator circuit                                                                                                                                                                                  |
| 22      | V <sub>SS</sub>              | Ground                                           | Ground connection                                                                                                                                                                                                |
| 23      | PD <sub>OUT</sub>            | Control voltage output                           | AFC control voltage output                                                                                                                                                                                       |
| 24      | AMP <sub>IN</sub>            | AFC filter connection                            | Filter connection                                                                                                                                                                                                |
| 25      | AMP <sub>OUT</sub>           |                                                  |                                                                                                                                                                                                                  |
| 26      | FC                           | Control voltage input                            | AFC control voltage input                                                                                                                                                                                        |
| 27      | VCO <sub>IN</sub>            | LC oscillator connection                         | VCO LC oscillator circuit coil and capacitor connection                                                                                                                                                          |
| 28      | VCO <sub>OUT</sub>           |                                                  |                                                                                                                                                                                                                  |
| 29      | SYNC <sub>DET</sub>          | External synchronization signal detection output | Outputs the exclusive NOR of the horizontal synchronization signal (AFC) and CSYNC (sync separator). The output polarity can be selected (metal option). Also functions as general output port (command switch). |
| 30      | V <sub>DD1</sub>             | Power supply connection                          | Power supply connection (+5 V: digital system power supply)                                                                                                                                                      |

LC74763, 74763M

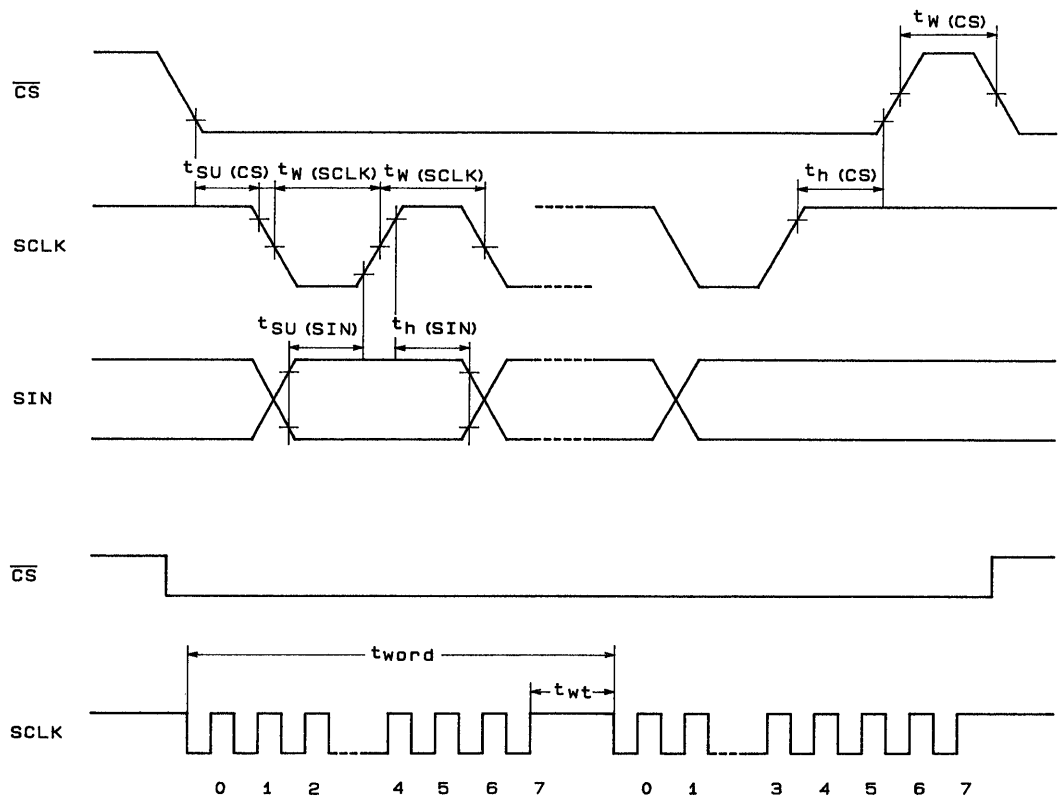
Pin Assignment



A03518

Top view

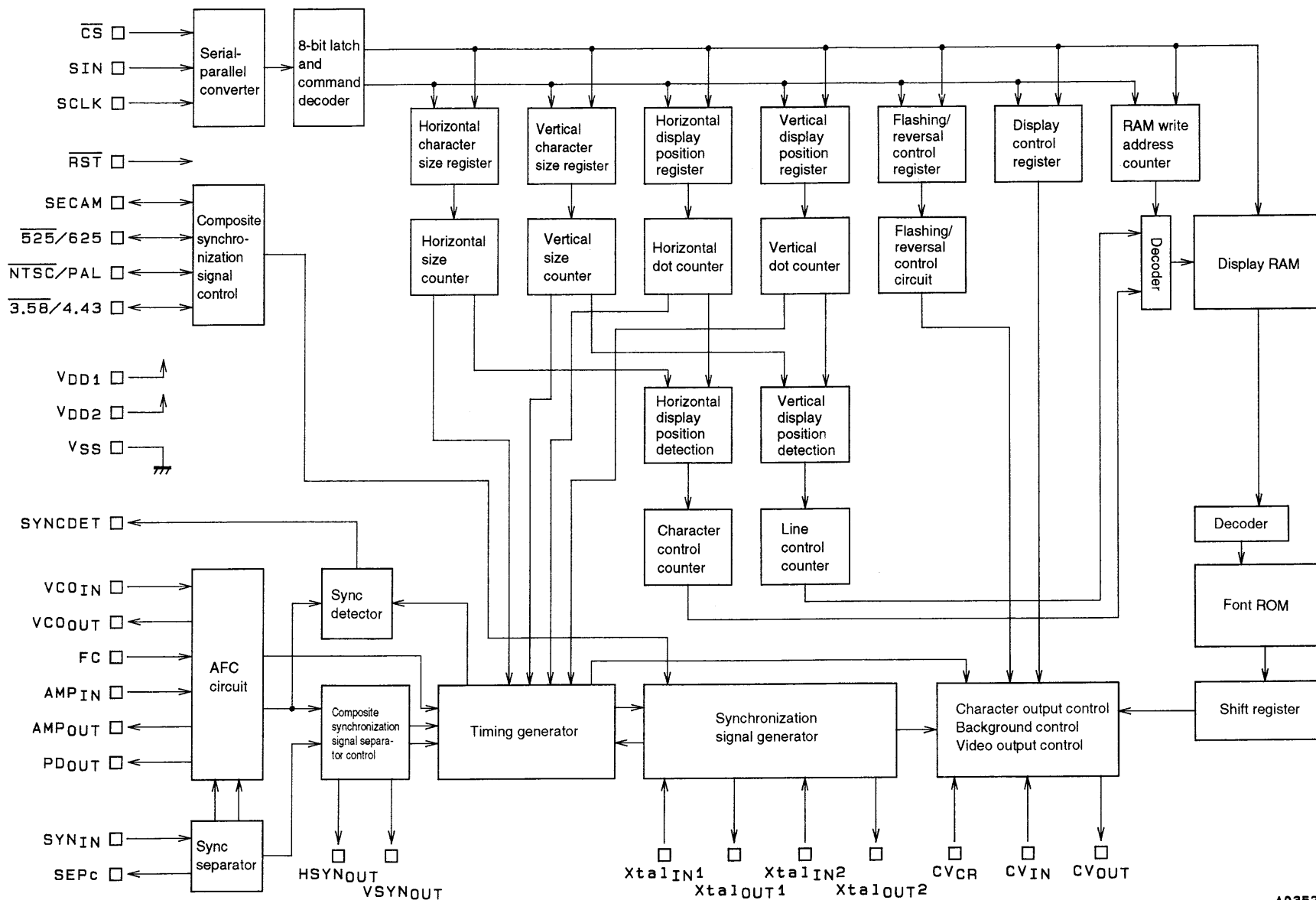
Serial Data Input Timing



A03519

## LC74763, 74763M

## System Block Diagram



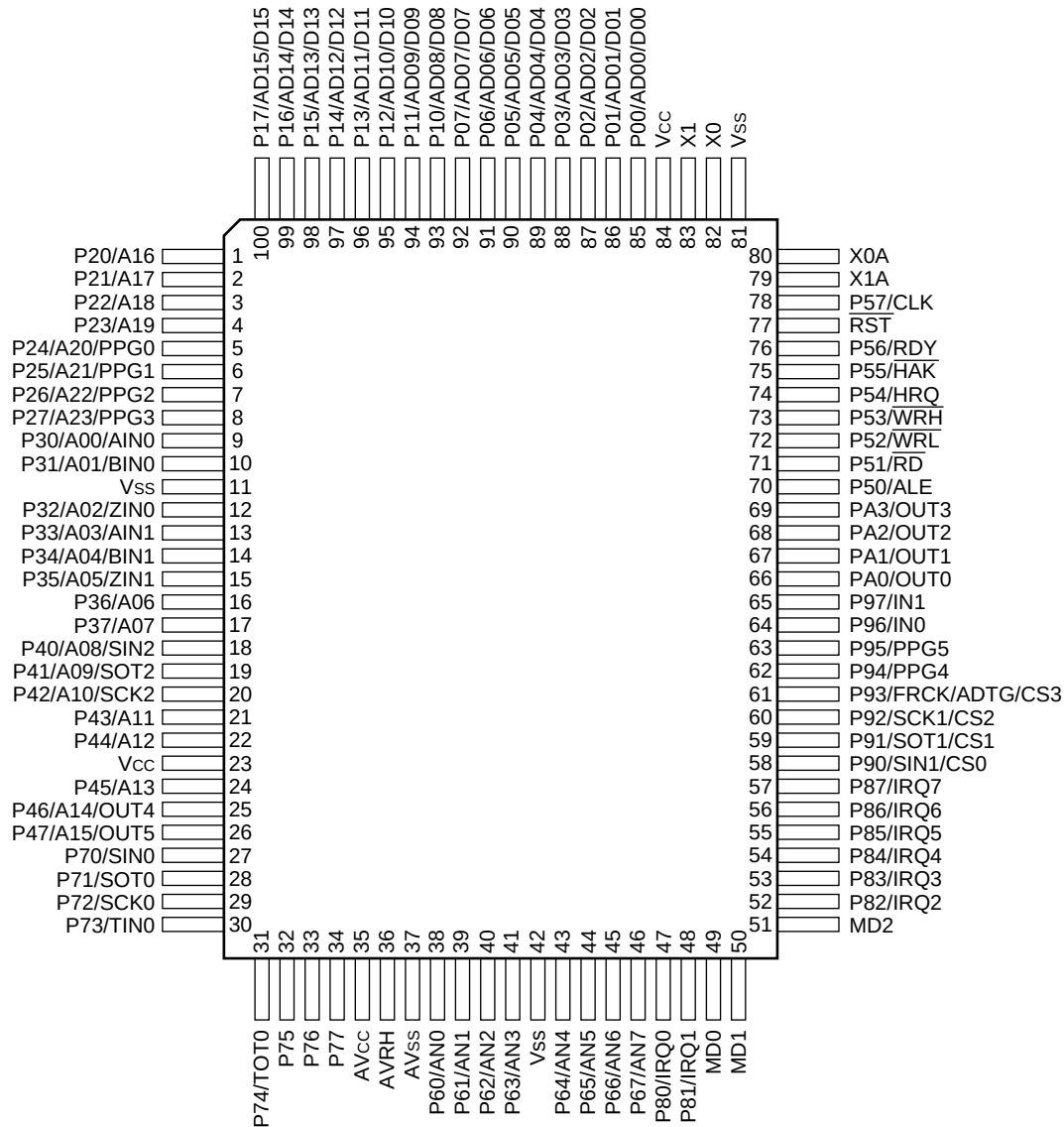
A03520



# U-COM IC PIN ASSIGNMENT & DESCRIPTIONS

## ■ PIN ASSIGNMENT (IC72)

(TOP VIEW)



(FPT-100P-M06)

# MB90482

## ■ PIN DESCRIPTIONS (IC72)

| Pin No.       |           | Pin name                | Circuit type  | Function                                                                                                                                                                                           |
|---------------|-----------|-------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LQFP*1        | QFP*2     |                         |               |                                                                                                                                                                                                    |
| 80            | 82        | X0                      | A             | Oscillator pin                                                                                                                                                                                     |
| 81            | 83        | X1                      | A             | Oscillator pin                                                                                                                                                                                     |
| 78            | 80        | X0A                     | A             | 32 kHz oscillator pin                                                                                                                                                                              |
| 77            | 79        | X1A                     | A             | 32 kHz oscillator pin                                                                                                                                                                              |
| 75            | 77        | $\overline{\text{RST}}$ | B             | Reset input pin                                                                                                                                                                                    |
| 83 to 90      | 85 to 92  | P00 to P07              | C<br>(CMOS)   | This is a general purpose I/O port. A setting in the pull-up resistance setting register (RDR0) can be used to apply pull-up resistance (RD00-RD07 = "1") . (Disabled when pin is set for output.) |
|               |           | AD00 to AD07            |               | In multiplex mode, these pins function as the external address/data bus low I/O pins.                                                                                                              |
|               |           | D00 to D07              |               | In non-multiplex mode, these pins function as the external data bus low output pins.                                                                                                               |
| 91 to 98      | 93 to 100 | P10 to P17              | C<br>(CMOS)   | This is a general purpose I/O port. A setting in the pull-up resistance setting register (RDR1) can be used to apply pull-up resistance (RD10-RD17 = "1") . (Disabled when pin is set for output.) |
|               |           | AD08 to AD15            |               | In multiplex mode, these pins function as the external address/data bus high I/O pins.                                                                                                             |
|               |           | D08 to D15              |               | In non-multiplex mode, these pins function as the external data bus high output pins.                                                                                                              |
| 99, 100, 1, 2 | 1 to 4    | P20 to P23              | E<br>(CMOS/H) | This is a general purpose I/O port. When the bits of external address output control register (HACR) are set to "1" in external bus mode, these pins function as general purpose I/O ports.        |
|               |           | A16 to A19              |               | When the bits of external address output control register (HACR) are set to "0" in multiplex mode, these pins function as address high output pins (A16-A19).                                      |
|               |           | A16 to A19              |               | When the bits of external address output control register (HACR) are set to "0" in non-multiplex mode, these pins function as address high output pins (A16-A19).                                  |
| 3 to 6        | 5 to 8    | P24 to P27              | E<br>(CMOS/H) | This is a general purpose I/O port. When the bits of external address output control register (HACR) are set to "1" in external bus mode, these pins function as general purpose I/O ports.        |
|               |           | A20 to A23              |               | When the bits of external address output control register (HACR) are set to "0" in multiplex mode, these pins function as address high output pins (A20-A23).                                      |
|               |           | A20 to A23              |               | When the bits of external address output control register (HACR) are set to "0" in non-multiplex mode, these pins function as address high output pins (A20-A23).                                  |
|               |           | PPG0 to PPG3            |               | PPG timer output pins.                                                                                                                                                                             |

(Continued)

## MB90482

| Pin No. |       | Pin name | Circuit type  | Function                                                              |
|---------|-------|----------|---------------|-----------------------------------------------------------------------|
| LQFP*1  | QFP*2 |          |               |                                                                       |
| 7       | 9     | P30      | E<br>(CMOS/H) | This is a general purpose I/O port.                                   |
|         |       | A00      |               | In non-multiplex mode, this pin functions as an external address pin. |
|         |       | AIN0     |               | 8/16-bit up/down timer input pin (channel 0) .                        |
| 8       | 10    | P31      | E<br>(CMOS/H) | This is a general purpose I/O port.                                   |
|         |       | A01      |               | In non-multiplex mode, this pin functions as an external address pin. |
|         |       | BIN0     |               | 8/16-bit up/down counter input pin (channel0) .                       |
| 10      | 12    | P32      | E<br>(CMOS/H) | This is a general purpose I/O port.                                   |
|         |       | A02      |               | In non-multiplex mode, this pin functions as an external address pin. |
|         |       | ZIN0     |               | 8/16-bit up/down counter input pin (channel 0)                        |
| 11      | 13    | P33      | E<br>(CMOS/H) | This is a general purpose I/O port.                                   |
|         |       | A03      |               | In non-multiplex mode, this pin functions as an external address pin. |
|         |       | AIN1     |               | 8/16-bit up/down counter input pin (channel 1) .                      |
| 12      | 14    | P34      | E<br>(CMOS/H) | This is a general purpose I/O port.                                   |
|         |       | A04      |               | In non-multiplex mode, this pin functions as an external address pin. |
|         |       | BIN1     |               | 8/16-bit up/down counter input pin (channel 1) .                      |
| 13      | 15    | P35      | E<br>(CMOS/H) | This is a general purpose I/O port.                                   |
|         |       | A05      |               | In non-multiplex mode, this pin functions as an external address pin. |
|         |       | ZIN1     |               | 8/16-bit up/down counter input pin (channel 1)                        |
| 14      | 16    | P36, P37 | D*3<br>(CMOS) | This is a general purpose I/O port.                                   |
| 15      | 17    | A06, A07 |               | In non-multiplex mode, this pin functions as an external address pin. |
| 16      | 18    | P40      | G<br>(CMOS/H) | This is a general purpose I/O port.                                   |
|         |       | A08      |               | In non-multiplex mode, this pin functions as an external address pin. |
|         |       | SIN2     |               | Simple serial I/O input pin.                                          |
| 17      | 19    | P41      | F<br>(CMOS)   | This is a general purpose I/O port.                                   |
|         |       | A09      |               | In non-multiplex mode, this pin functions as an external address pin. |
|         |       | SOT2     |               | Simple serial I/O output pin.                                         |
| 18      | 20    | P42      | G<br>(CMOS/H) | This is a general purpose I/O port.                                   |
|         |       | A10      |               | In non-multiplex mode, this pin functions as an external address pin. |
|         |       | SCK2     |               | Simple serial I/O clock input/output pin.                             |

(Continued)

# MB90482

| Pin No.  |          | Pin name         | Circuit type  | Function                                                                                                                                                                                                                              |
|----------|----------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LQFP*1   | QFP*2    |                  |               |                                                                                                                                                                                                                                       |
| 19<br>20 | 21<br>22 | P43, P44         | F<br>(CMOS)   | This is a general purpose I/O port.                                                                                                                                                                                                   |
|          |          | A11, A12         |               | In non-multiplex mode, this pin functions as an external address pin.                                                                                                                                                                 |
| 22       | 24       | P45              | F*4<br>(CMOS) | This is a general purpose I/O port.                                                                                                                                                                                                   |
|          |          | A13              |               | In non-multiplex mode, this pin functions as an external address pin.                                                                                                                                                                 |
| 23<br>24 | 25<br>26 | P46, P47         | F<br>(CMOS)   | This is a general purpose I/O port.                                                                                                                                                                                                   |
|          |          | A14, A15         |               | In non-multiplex mode, this pin functions as an external address pin.                                                                                                                                                                 |
|          |          | OUT4/OUT5        |               | Output compare event output pins.                                                                                                                                                                                                     |
| 68       | 70       | P50              | D<br>(CMOS)   | This is a general purpose I/O port. In external bus mode, this pin functions as the ALE pin.                                                                                                                                          |
|          |          | ALE              |               | In external bus mode, this pin functions as the address load enable (ALE) signal pin.                                                                                                                                                 |
| 69       | 71       | P51              | D<br>(CMOS)   | This is a general purpose I/O port. In external bus mode, this pin functions as the $\overline{RD}$ pin.                                                                                                                              |
|          |          | $\overline{RD}$  |               | In external bus mode, this pin functions as the read strobe output ( $\overline{RD}$ ) signal pin.                                                                                                                                    |
| 70       | 72       | P52              | D<br>(CMOS)   | This is a general purpose I/O port. In external bus mode, when the WRE pin in the EPCR register is set to "1", this pin functions as the $\overline{WRL}$ pin.                                                                        |
|          |          | $\overline{WRL}$ |               | In external bus mode, this pin functions as the lower data write strobe output ( $\overline{WRL}$ ) pin. When the WRE bit in the EPCR register is set to "0", this pin functions as a general purpose I/O port.                       |
| 71       | 73       | P53              | D<br>(CMOS)   | This is a general purpose I/O port. In external bus mode with 16-bit bus width, when the WRE bit in the EPCR register is set to "1", this pin functions as the $\overline{WRH}$ pin.                                                  |
|          |          | $\overline{WRH}$ |               | In external bus mode with 16-bit bus width, this pin functions as the upper data write strobe output ( $\overline{WRH}$ ) pin. When the WRE bit in the EPCR register is set to "0", this pin functions as a general purpose I/O port. |
| 72       | 74       | P54              | D<br>(CMOS)   | This is a general purpose I/O port. In external bus mode, when the HDE bit in the EPCR register is set to "1", this pin functions as the HRQ pin.                                                                                     |
|          |          | HRQ              |               | In external bus mode, this pin functions as the hold request input (HRQ) pin. When the HDE bit in the EPCR register is set to "0", this pin functions as a general purpose I/O port.                                                  |
| 73       | 75       | P55              | D<br>(CMOS)   | This is a general purpose I/O port. In external bus mode, when the HDE bit in the EPCR register is set to "1", this pin functions as the $\overline{HAK}$ pin.                                                                        |
|          |          | $\overline{HAK}$ |               | In external bus mode, this pin functions as the hold acknowledge ( $\overline{HAK}$ ) pin. When the HDE bit in the EPCR register is set to "0", this pin functions as a general purpose I/O port.                                     |

(Continued)

## MB90482

| Pin No.   |           | Pin name     | Circuit type  | Function                                                                                                                                                                                     |
|-----------|-----------|--------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LQFP*1    | QFP*2     |              |               |                                                                                                                                                                                              |
| 74        | 76        | P56          | D<br>(CMOS)   | This is a general purpose I/O port. In external bus mode, when the RYE bit in the EPCR register is set to "1", this pin functions as the RDY pin.                                            |
|           |           | RDY          |               | In external bus mode, this pin functions as the external ready (RDY) input pin. When the RYE bit in the EPCR register is set to "0", this pin functions as a general purpose I/O port.       |
| 76        | 78        | P57          | D<br>(CMOS)   | This is a general purpose I/O port. In external bus mode, when the CKE bit in the EPCR register is set to "1", this pin functions as the CLK pin.                                            |
|           |           | CLK          |               | In external bus mode, this pin functions as the machine cycle clock (CLK) output pin. When the CKE bit in the EPCR register is set to "0", this pin functions as a general purpose I/O port. |
| 36 to 39  | 38 to 41  | P60 to P63   | H<br>(CMOS)   | These are general purpose I/O ports.                                                                                                                                                         |
|           |           | AN0 to AN3   |               | These are the analog input pins.                                                                                                                                                             |
| 41 to 44  | 43 to 46  | P64 to P67   | H<br>(CMOS)   | These are general purpose I/O ports.                                                                                                                                                         |
|           |           | AN4 to AN7   |               | These are the analog input pins.                                                                                                                                                             |
| 25        | 27        | P70          | G<br>(CMOS/H) | This is a general purpose I/O port.                                                                                                                                                          |
|           |           | SIN0         |               | This is the UART data input pin.                                                                                                                                                             |
| 26        | 28        | P71          | F<br>(CMOS)   | This is a general purpose I/O port.                                                                                                                                                          |
|           |           | SOT0         |               | This is the UART data output pin.                                                                                                                                                            |
| 27        | 29        | P72          | G<br>(CMOS/H) | This is a general purpose I/O port.                                                                                                                                                          |
|           |           | SCK0         |               | This is the UART clock I/O pin.                                                                                                                                                              |
| 28        | 30        | P73          | G<br>(CMOS/H) | This is a general purpose I/O port.                                                                                                                                                          |
|           |           | TIN0         |               | This is the 16-bit reload timer event input pin.                                                                                                                                             |
| 29        | 31        | P74          | F<br>(CMOS)   | This is a general purpose I/O port.                                                                                                                                                          |
|           |           | TOT0         |               | This is the 16-bit reload timer output pin.                                                                                                                                                  |
| 30        | 32        | P75          | F*4<br>(CMOS) | This is a general purpose I/O port.                                                                                                                                                          |
| 31        | 33        | P76          | F*5<br>(CMOS) | This is a general purpose I/O port.                                                                                                                                                          |
| 32        | 34        | P77          | F*5<br>(CMOS) | This is a general purpose I/O port.                                                                                                                                                          |
| 45,<br>46 | 47,<br>48 | P80, P81     | E<br>(CMOS/H) | These are general purpose I/O ports.                                                                                                                                                         |
|           |           | IRQ0, IRQ1   |               | External interrupt input pins.                                                                                                                                                               |
| 50 to 55  | 52 to 57  | P82 to P87   | E<br>(CMOS/H) | These are general purpose I/O ports.                                                                                                                                                         |
|           |           | IRQ2 to IRQ7 |               | External interrupt input pins.                                                                                                                                                               |

(Continued)

# MB90482

(Continued)

| Pin No.   |            | Pin name         | Circuit type  | Function                                                                                |
|-----------|------------|------------------|---------------|-----------------------------------------------------------------------------------------|
| LQFP*1    | QFP*2      |                  |               |                                                                                         |
| 56        | 58         | P90              | E<br>(CMOS/H) | This is a general purpose I/O port.                                                     |
|           |            | SIN1             |               | Simple serial I/O data input pin.                                                       |
|           |            | CS0              |               | Chip select 0.                                                                          |
| 57        | 59         | P91              | D<br>(CMOS)   | This is a general purpose I/O port.                                                     |
|           |            | SOT1             |               | Simple serial I/O data output pin.                                                      |
|           |            | CS1              |               | Chip select 1.                                                                          |
| 58        | 60         | P92              | E<br>(CMOS/H) | This is a general purpose I/O port.                                                     |
|           |            | SCK1             |               | Simple serial I/O data input/output pin.                                                |
|           |            | CS2              |               | Chip select 2.                                                                          |
| 59        | 61         | P93              | E<br>(CMOS/H) | This is a general purpose I/O port.                                                     |
|           |            | FRCK             |               | When the free run timer is in use, this pin functions as the external clock input pin.  |
|           |            | ADTG             |               | When the A/D converter is in use, this pin functions as the external trigger input pin. |
|           |            | CS3              |               | Chip select 3.                                                                          |
| 60        | 62         | P94              | D<br>(CMOS)   | This is a general purpose I/O port.                                                     |
|           |            | PPG4             |               | PPG timer output pin.                                                                   |
| 61        | 63         | P95              | D<br>(CMOS)   | This is a general purpose I/O port.                                                     |
|           |            | PPG5             |               | PPG timer output pin.                                                                   |
| 62        | 64         | P96              | E<br>(CMOS/H) | This is a general purpose I/O port.                                                     |
|           |            | IN0              |               | Input capture channel 0 trigger input pin.                                              |
| 63        | 65         | P97              | E<br>(CMOS/H) | This is a general purpose I/O port.                                                     |
|           |            | IN1              |               | Input capture channel 1 trigger input pin.                                              |
| 64 to 67  | 66 to 69   | PA0 to PA3       | D<br>(CMOS)   | These are general purpose I/O ports.                                                    |
|           |            | OUT0 to OUT3     |               | Output compare event output pins.                                                       |
| 33        | 35         | AV <sub>cc</sub> | —             | A/D converter power supply pin.                                                         |
| 34        | 36         | AVRH             | —             | A/D converter external reference voltage supply pin.                                    |
| 35        | 37         | AV <sub>ss</sub> | —             | A/D converter power supply pin.                                                         |
| 47 to 49  | 49 to 51   | MD0 to MD2       | J<br>(CMOS/H) | Operating mode selection input pins.                                                    |
| 21, 82    | 23, 84     | V <sub>cc</sub>  | —             | 3.3 V ± 0.3 V power supply pins (V <sub>cc3</sub> ) .                                   |
| 9, 40, 79 | 11, 42, 81 | V <sub>ss</sub>  | —             | Power supply input pins (GND) .                                                         |

\*1 : LQFP : FPT-100P-M05

\*2 : QFP : FPT-100P-M06

\*3 : The circuit type of MB90V480 is E (CMOS/H).

\*4 : The circuit type of MB90V480 is G (CMOS/H).

\*5 : The circuit type of MB90V480 is I (NMOS/H)



NJM2068M (OP - AMP)

NJM2068

LOW-NOISE DUAL OPERATIONAL AMPLIFIER

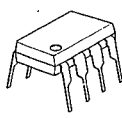
■ GENERAL DESCRIPTION

The NJM2068 is a high performance, low noise dual operational amplifier. This amplifier features popular pin-out, superior noise performance, and superior total harmonic distortion. This amplifier also features guaranteed noise performance with substantially higher gain-bandwidth product and slew rate which far exceeds that of the 4558 type amplifier. The specially designed low noise input transistors allow the NJM2068 to be used in very low noise signal processing applications such as audio preamplifiers and servo error amplifier.

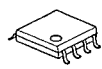
■ FEATURES

- Operating Voltage (±4V ~ ±18V)
- Low Total Harmonic Distortion (0.001% typ.)
- Low Noise Voltage (FLAT+JISA, 0.56 μV typ.)
- High Slew Rate (6V/μs typ.)
- Unity Gain Bandwidth (27MHz @f=10kHz)
- Package Outline DIP8, DMP8, SIP8, SSOP8
- Bipolar Technology

■ PACKAGE OUTLINE



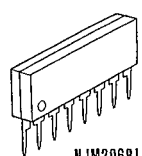
NJM2068D



NJM2068M

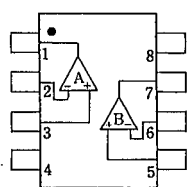


NJM2068V

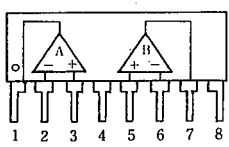


NJM2068L

■ PIN CONFIGURATION



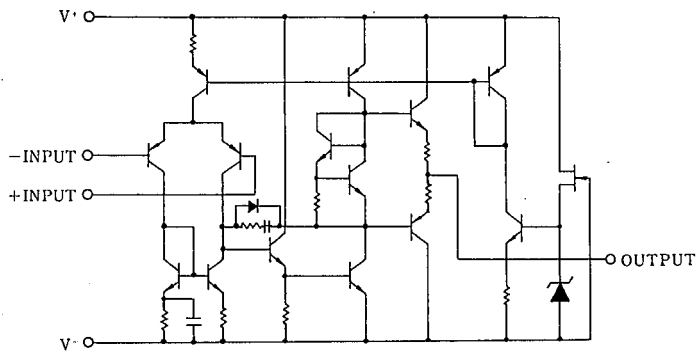
NJM2068D  
NJM2068M  
NJM2068V



NJM2068L

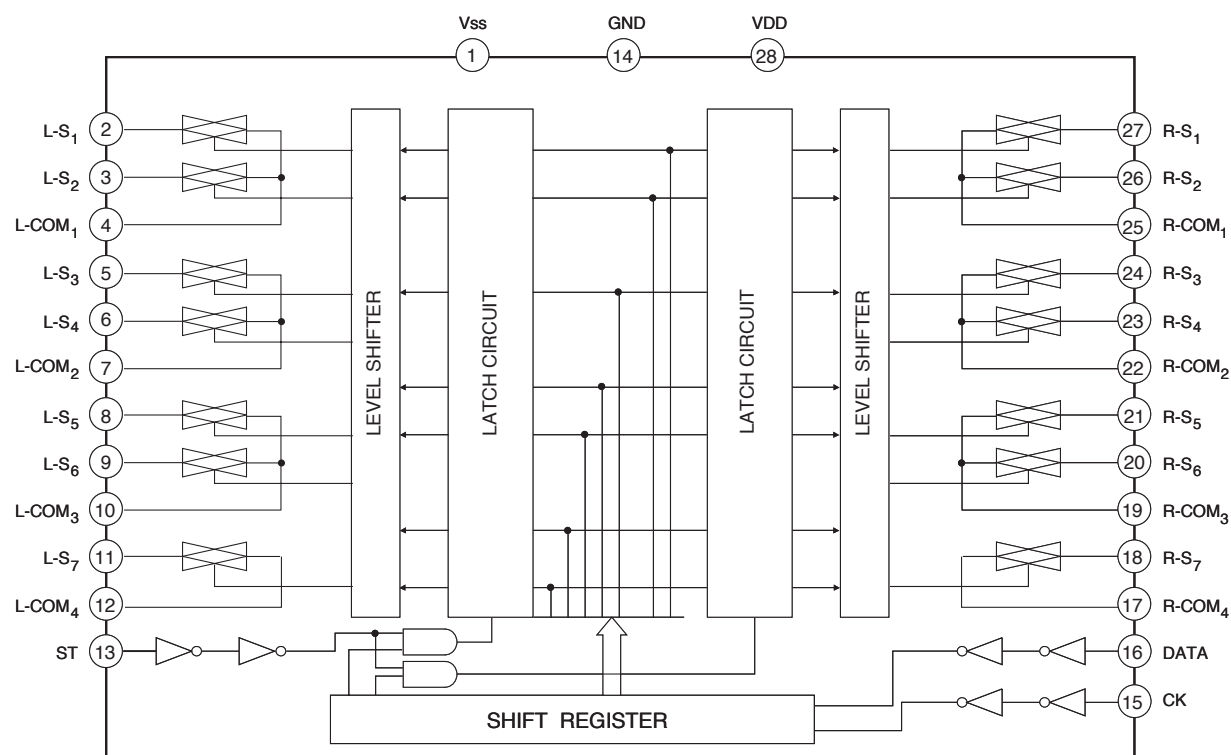
- PIN FUNCTION
1. A OUTPUT
  2. A-ININPUT
  3. A+INPUT
  4. V-
  5. B+INPUT
  6. B-ININPUT
  7. B OUTPUT
  8. V+

■ EQUIVALENT CIRCUIT (1/2 Shown)

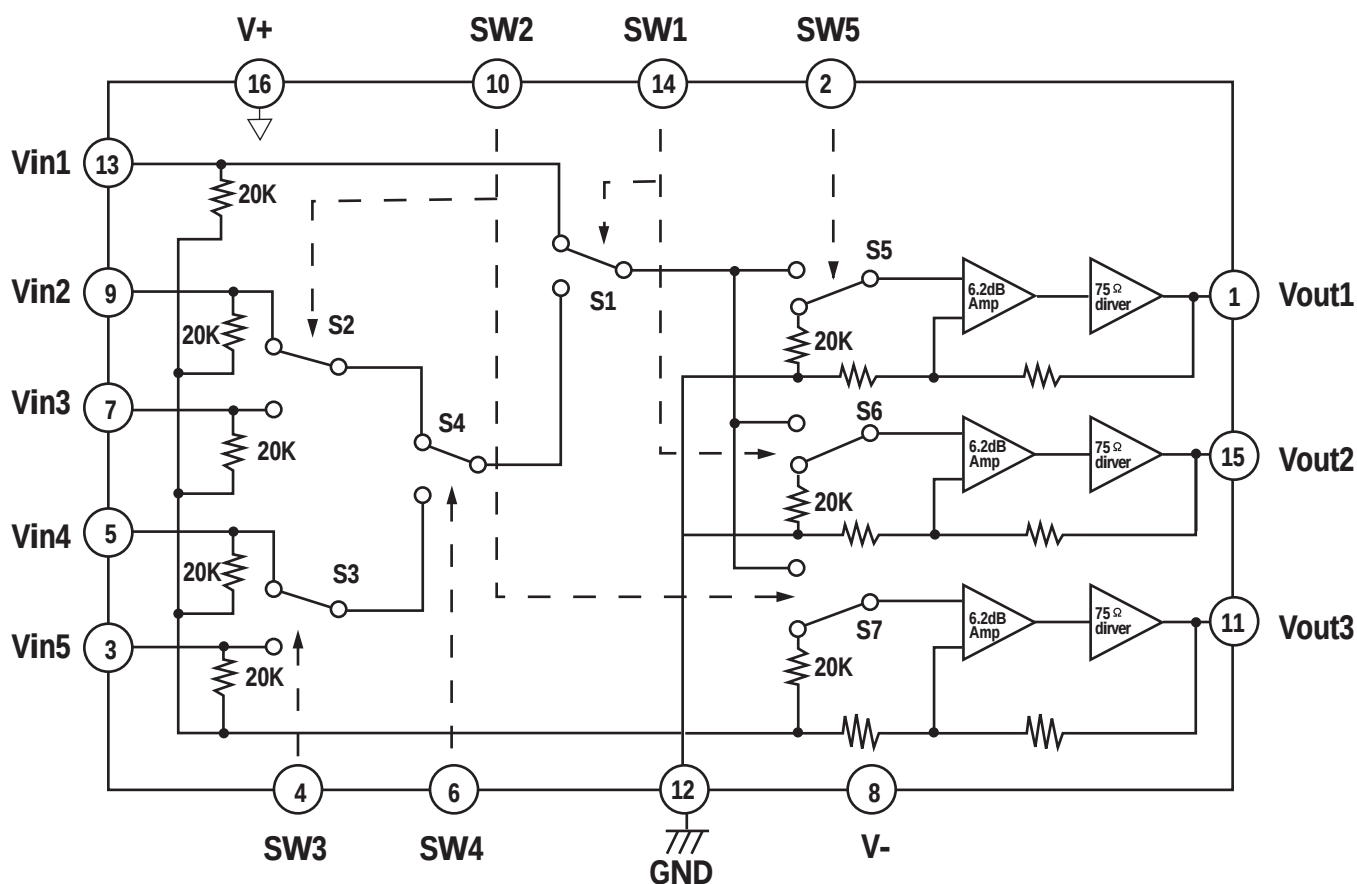


## TC9162AF (FUNCTION/INPUT : IC30)

## ■ BLOCK DIAGRAM



**BLOCK DIAGAM (NJM2296M ) : IC41, 42, 43**



**\* Normally mute**

**Above circuits show that the switches are set at low.**





IC86

NJM4556A

## DUAL HIGH CURRENT OPERATIONAL AMPLIFIER

### ■ GENERAL DESCRIPTION

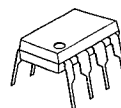
The NJM4556A integrated circuit is a high-gain, high output current dual operational amplifier capable of driving  $\pm 70\text{mA}$  into  $150\Omega$  loads ( $\pm 10.5\text{V}$  output voltage), and operating low supply voltage ( $V^+/V^- = \pm 2\text{V} \sim$ ).

The NJM4556A combines many of the features of the popular NJM4558 as well as having the capability of driving  $150\Omega$  loads. In addition, the wide band-width, low noise, high slew rate and low distortion of the NJM4556A make it ideal for many audio, telecommunications and instrumentation applications.

### ■ FEATURES

- Operating Voltage ( $\pm 2\text{V} \sim \pm 18\text{V}$ )
- High Output Current ( $I_o = 70\text{mA}$ )
- Slew Rate ( $3\text{V}/\mu\text{s}$  typ.)
- Gain Band Width Product ( $8\text{MHz}$  typ.)
- Package Outline DIP8, DMP8, SIP8, SSOP8
- Bipolar Technology

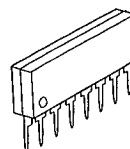
### ■ PACKAGE OUTLINE



NJM4556AD



NJM4556AM

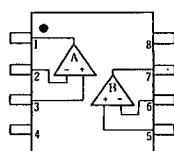


NJM4556AL

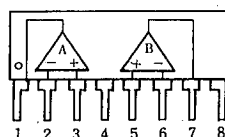


NJM4556AV

### ■ PIN CONFIGURATION



NJM4556AD.  
NJM4556AM  
NJM4556AV

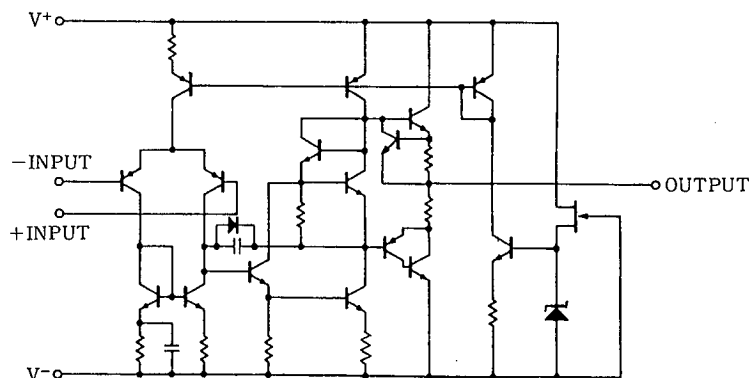


NJM4556AL

#### PIN FUNCTION

1. A OUTPUT
2. A- INPUT
3. A+ INPUT
4.  $V^-$
5. B+ INPUT
6. B- INPUT
7. B OUTPUT
8.  $V^+$

### ■ EQUIVALENT CIRCUIT (1/2 Shown)



# NJM4556A

## ■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

| PARAMETER                   | SYMBOL                         | RATINGS     | UNIT |
|-----------------------------|--------------------------------|-------------|------|
| Supply Voltage              | V <sup>+</sup> /V <sup>-</sup> | ±18         | V    |
| Differential Input Voltage  | V <sub>ID</sub>                | ±30         | V    |
| Input Voltage               | V <sub>IC</sub>                | ±15 (note)  | V    |
| Power Dissipation           | P <sub>D</sub>                 | (DIP8) 700  | mW   |
|                             |                                | (DMP8) 300  | mW   |
|                             |                                | (SSOP8) 250 | mW   |
|                             |                                | (SIP8) 800  | mW   |
| Operating Temperature Range | T <sub>opr</sub>               | -20~+75     | °C   |
| Storage Temperature Range   | T <sub>stg</sub>               | -40~+125    | °C   |

(note) For supply voltage less than ±15V, the absolute maximum input voltage is equal to the supply voltage.

## ■ ELECTRICAL CHARACTERISTICS (NJM4556AD/NJM4556AS)

(V<sup>+</sup>/V<sup>-</sup>=±15V Ta=25°C)

| PARAMETER                       | SYMBOL           | TEST CONDITION                              | MIN.  | TYP.  | MAX. | UNIT |
|---------------------------------|------------------|---------------------------------------------|-------|-------|------|------|
| Input Offset Voltage            | V <sub>IO</sub>  | R <sub>S</sub> ≤ 10kΩ                       | —     | 0.5   | 6.0  | mV   |
| Input Offset Current            | I <sub>IO</sub>  |                                             | —     | 5     | 60   | nA   |
| Input Bias Current              | I <sub>B</sub>   |                                             | —     | 50    | 500  | nA   |
| Input Resistance                | R <sub>IN</sub>  |                                             | 0.3   | 5     | —    | MΩ   |
| Large Signal Voltage Gain       | A <sub>v</sub>   | R <sub>L</sub> ≥ 2kΩ, V <sub>O</sub> = ±10V | 86    | 100   | —    | dB   |
| Maximum Output Voltage Swing 1  | V <sub>OM1</sub> | R <sub>L</sub> ≥ 2kΩ                        | ±12   | ±13.5 | —    | V    |
| Maximum Output Voltage Swing 2  | V <sub>OM2</sub> | R <sub>L</sub> ≥ 150Ω                       | ±10.5 | ±11   | —    | V    |
| Input Common Mode Voltage Range | V <sub>ICM</sub> |                                             | ±13.5 | ±14   | —    | V    |
| Common Mode Rejection Ratio     | CMR              | R <sub>S</sub> ≤ 10kΩ                       | 70    | 90    | —    | dB   |
| Supply Voltage Rejection Ratio  | SVR              | R <sub>S</sub> ≤ 10kΩ                       | 76.5  | 90    | —    | dB   |
| Operating Current               | I <sub>CC</sub>  |                                             | —     | 9     | 12   | mA   |
| Slew Rate                       | SR               |                                             | —     | 3     | —    | V/μS |
| Gain Bandwidth Product          | GB               |                                             | —     | 8     | —    | MHz  |

## ■ ELECTRICAL CHARACTERISTICS (NJM4556AM/NJM4556AV)

| PARAMETER                         | SYMBOL            | TEST CONDITION                                                                                                   | MIN. | TYP. | MAX. | UNIT |
|-----------------------------------|-------------------|------------------------------------------------------------------------------------------------------------------|------|------|------|------|
| Input Offset Voltage              | V <sub>IO</sub>   | R <sub>S</sub> ≤ 10kΩ                                                                                            | —    | 0.5  | 6.0  | mV   |
| Input Offset Current              | I <sub>IO</sub>   |                                                                                                                  | —    | 5    | 60   | nA   |
| Input Bias Current                | I <sub>B</sub>    |                                                                                                                  | —    | 50   | 500  | nA   |
| Large Signal Voltage Gain         | A <sub>v</sub>    | R <sub>L</sub> ≥ 2kΩ, V <sub>O</sub> = ±10V                                                                      | 86   | 100  | —    | dB   |
| Maximum Output Voltage Swing 1    | V <sub>OM1</sub>  | V <sub>IN</sub> <sup>+</sup> =4V, V <sub>IN</sub> <sup>-</sup> =3V, V <sup>+</sup> =9V I <sub>source</sub> =40mA | 7.5  | —    | —    | V    |
| Maximum Output Voltage Swing 2    | V <sub>OM2</sub>  | V <sub>IN</sub> <sup>+</sup> =3V, V <sub>IN</sub> <sup>-</sup> =4V, V <sup>+</sup> =9V I <sub>sink</sub> =40mA   | —    | —    | 2.1  | V    |
| Input Common Mode Voltage Range 1 | V <sub>ICM1</sub> | V <sup>+</sup> =9V, V <sub>IL</sub>                                                                              | —    | —    | 1.5  | V    |
| Input Common Mode Voltage Range 2 | V <sub>ICM2</sub> | V <sup>+</sup> =9V, V <sub>IH</sub>                                                                              | 8    | —    | —    | V    |
| Common Mode Rejection Ratio       | CMR               | R <sub>S</sub> ≤ 10kΩ                                                                                            | 70   | 90   | —    | dB   |
| Supply Voltage Rejection Ratio    | SVR               | R <sub>S</sub> ≤ 10kΩ                                                                                            | 76.5 | 90   | —    | dB   |
| Supply Current                    | I <sub>CC</sub>   | V <sup>+</sup> =9V                                                                                               | —    | 8    | 12   | mA   |
| Slew Rate                         | SR                |                                                                                                                  | —    | 3    | —    | V/μS |
| Gain Bandwidth Product            | GB                |                                                                                                                  | —    | 8    | —    | MHz  |

## S3C84BB/F84BB

## U-COM BLOCK DIAGRAM , PIN ASSIGNMENT &amp; PIN DESCRIPTIONS

## BLOCK DIAGRAM (IC74)

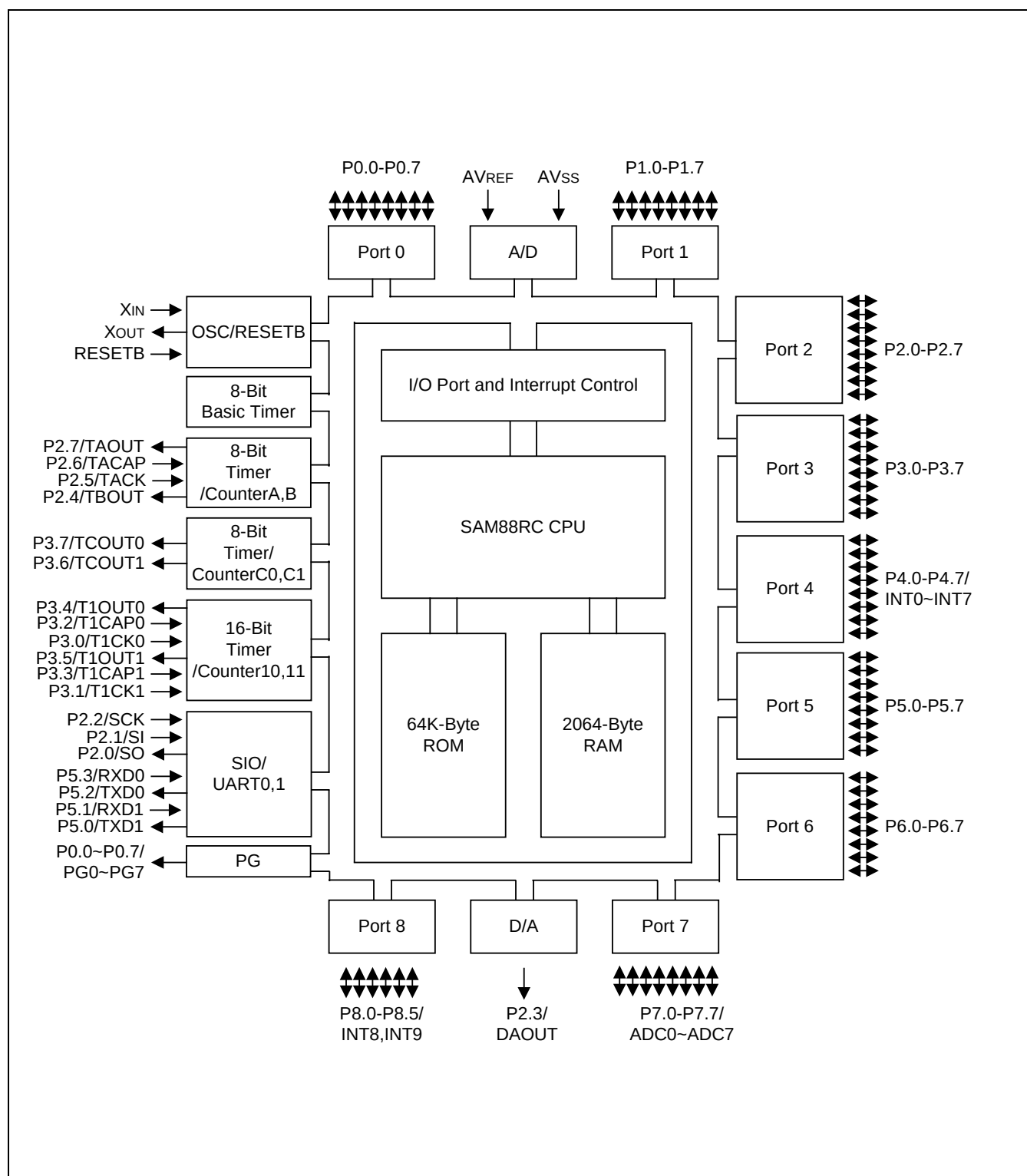


Figure 1-1. S3C84BB/F84BB Block Diagram

PIN ASSIGNMENT (IC74)

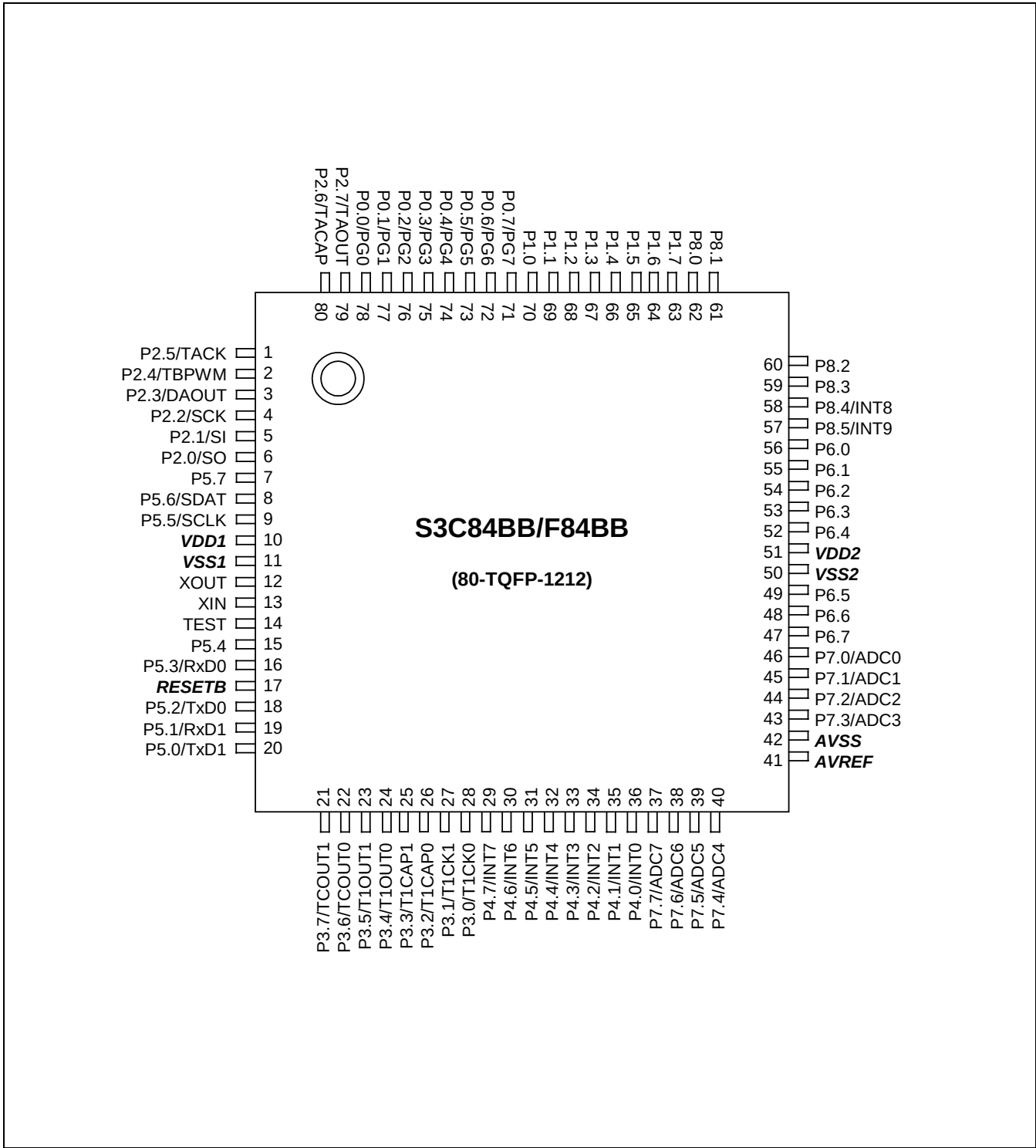


Figure 1-3. S3C84BB/F84BB Pin Assignment (80-TQFP)

## PRODUCT OVERVIEW

## S3C84BB/F84BB

## PIN DESCRIPTIONS (IC74)

Table 1-1. S3C84BB/F84BB Pin Descriptions (80-QFP)

| Pin Name    | Pin Type | Pin Description                                                                                                                                                                                  | Circuit Type | Pin Number | Share Pins                                                                 |
|-------------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|------------|----------------------------------------------------------------------------|
| P0.0 - P0.7 | I/O      | Bit programmable port; input or output mode selected by software; input or push-pull output. Software assignable pull-up. Alternately, P0.0-P0.7 can be used as the PG output port (PG0-PG7).    | D            | 80-73      | PG0-PG7                                                                    |
| P1.0 - P1.7 | I/O      | Bit programmable port; input or output mode selected by software; input or push-pull output. Software assignable pull-up.                                                                        | D            | 72-65      |                                                                            |
| P2.0 - P2.7 | I/O      | Bit programmable port; input or output mode selected by software; input or push-pull output. Software assignable pull-up. Alternately, P2.0~P2.7 can be used as I/O for TIMERA, TIMERB, D/A, SIO | D,D-2        | 8-1        | SO<br>SI<br>SCK<br>DAOUT<br>TBPWM<br>TACK<br>TACAP<br>TAOUT                |
| P3.0 - P3.7 | I/O      | Bit programmable port; input or output mode selected by software; input or push-pull output. Software assignable pull-up. Alternately, P3.0~P3.7 can be used as I/O for TIMERC0/C1, TIMER10/11   | D            | 30-23      | T1CK0<br>T1CK1<br>T1CAP0<br>T1CAP1<br>T1OUT0<br>T1OUT1<br>TCOUT0<br>TCOUT1 |

## S3C84BB/F84BB

## PRODUCT OVERVIEW

Table 1-1. S3C84BB/F84BB Pin Descriptions (80-QFP) (Continued)

| Pin Name    | Pin Type | Pin Description                                                                                                                                                                                                                                                       | Circuit Type | Pin Number  | Share Pins                   |
|-------------|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-------------|------------------------------|
| P4.0 - P4.7 | I/O      | Bit programmable port; input or output mode selected by software; input or push-pull output. Software assignable pull-up. P4.0-P4.7 can alternately be used as inputs for external interrupts INT0-INT7, respectively (with noise filters and interrupt controller)   | D-1          | 38-31       | INT0-INT7                    |
| P5.0 - P5.7 | I/O      | Bit programmable port; input or output mode selected by software; input or push-pull output. Software assignable pull-up. Alternately, P5.0~P5.3 can be used as I/O for serial por, UART0, UART1, respectively.                                                       | G            | 22-17,11-9  | TxD1<br>RxD1<br>TxD0<br>RxD0 |
| P6.0 - P6.7 | O        | N-channel, open-drain output only port.                                                                                                                                                                                                                               | F            | 58-54,51-49 |                              |
| P7.0 - P7.7 | I        | General-purpose digital input ports. Alternatively used as analog input pins for A/D converter modules.                                                                                                                                                               | E            | 48-45,42-39 | ADC0-ADC7                    |
| P8.0 - P8.5 | I/O      | Bit programmable port; input or output mode selected by software; input or push-pull output. Software assignable pull-up. P8.4, P8.5 can alternately be used as inputs for external interrupts INT8, INT9, respectively (with noise filters and interrupt controller) | D,D-1        | 64-59       | INT8,INT9                    |

## PRODUCT OVERVIEW

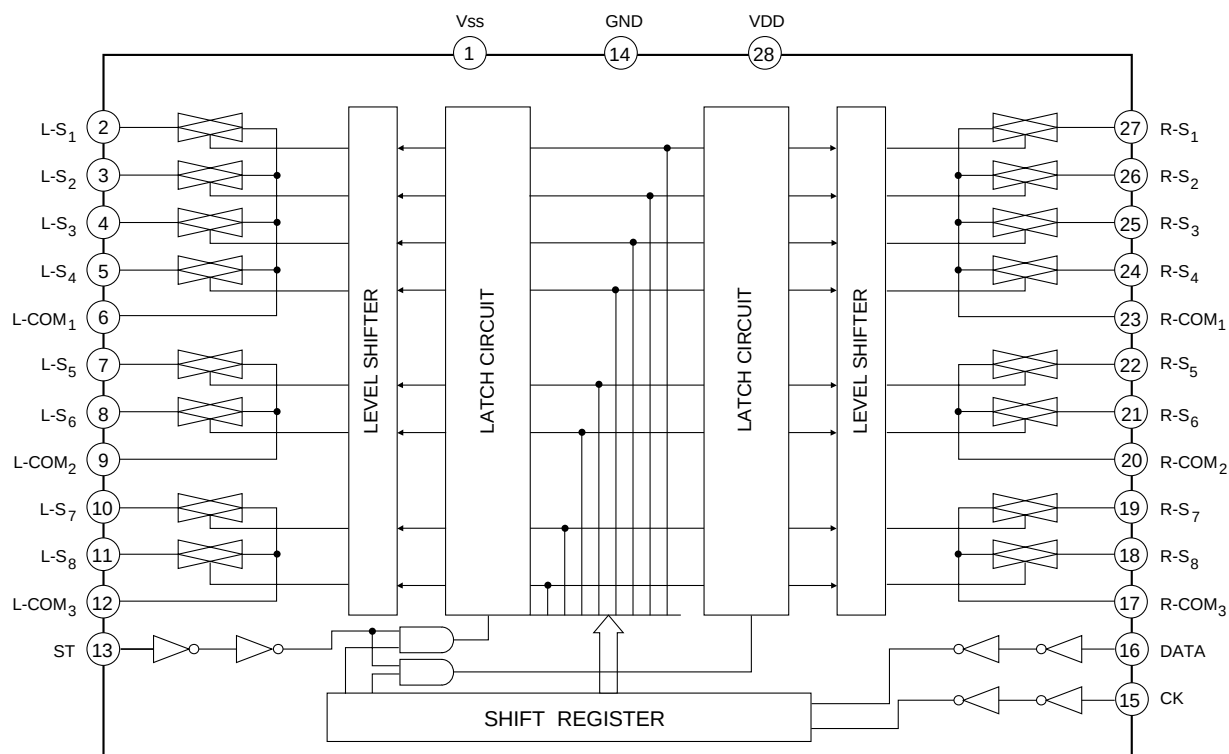
## S3C84BB/F84BB

Table 1-1. S3C84BB/F84BB Pin Descriptions (80-QFP) (Continued)

| Pin Name                  | Pin Type | Pin Description                                                                                         | Circuit Type | Pin Number      | Share Pins         |
|---------------------------|----------|---------------------------------------------------------------------------------------------------------|--------------|-----------------|--------------------|
| AD0 - AD7                 | I        | Analog input pins for A/D converter module. Alternatively used as general-purpose digital input port 7. | E            | 48–45<br>42–39  | P7.0–P7.7          |
| AVREF, AVSS               | -        | A/D converter reference voltage and ground                                                              | -            | 43, 44          | -                  |
| RxD0, RxD1                | I/O      | Serial data RxD pin for receive input and transmit output (mode 0)                                      | D            | 18, 21          | P5.3, P5.1         |
| TxD0, TxD1                | O        | Serial data TxD pin for transmit output and shift clock input (mode 0)                                  | D            | 20, 22          | P5.2, P5.0         |
| TACK                      | I        | External clock input pins for timer A                                                                   | D            | 3               | P2.5               |
| TACAP                     | I        | Capture input pins for timer A                                                                          | D            | 2               | P2.6               |
| TAOUT                     | O        | Pulse width modulation output pins for timer A                                                          | D            | 1               | P2.7               |
| TBPWM                     | O        | Carrier frequency output pins for timer B                                                               | D            | 4               | P2.4               |
| TCOUT0<br>TCOUT1          | O        | Timer C 8-bit PWM mode output or counter match toggle output pins                                       | D            | 24,23           | P3.6,P3.7          |
| T1CK0<br>T1CK1            | I        | External clock input pins for timer 1                                                                   | D            | 39,30           | P3.0,P3.1          |
| T1CAP0<br>T1CAP1          | I        | Capture input pins for timer 1                                                                          | D            | 28,27           | P3.2,P3.3          |
| T1OUT0<br>T1OUT1          | O        | Timer 1 16-bit PWM mode output or counter match toggle output pins                                      | D            | 26,25           | P3.4,P3.5          |
| SI,SO,SCK                 | I/O      | Synchronous SIO pins                                                                                    | D            | 7,8,9           | P2.1,P2.0,<br>P2.2 |
| RESETB                    | I        | System reset pin (pull-up resistor: 240 k $\Omega$ )                                                    | B            | 19              | -                  |
| TEST                      | I        | Pull – down register connected internally                                                               | -            | 16              | -                  |
| VDD1, VDD2,<br>VSS1, VSS2 | -        | Power input pins                                                                                        | -            | 12,53,<br>13,52 | -                  |
| XIN, XOUT                 | -        | Main oscillator pins                                                                                    | -            | 15,14           | -                  |

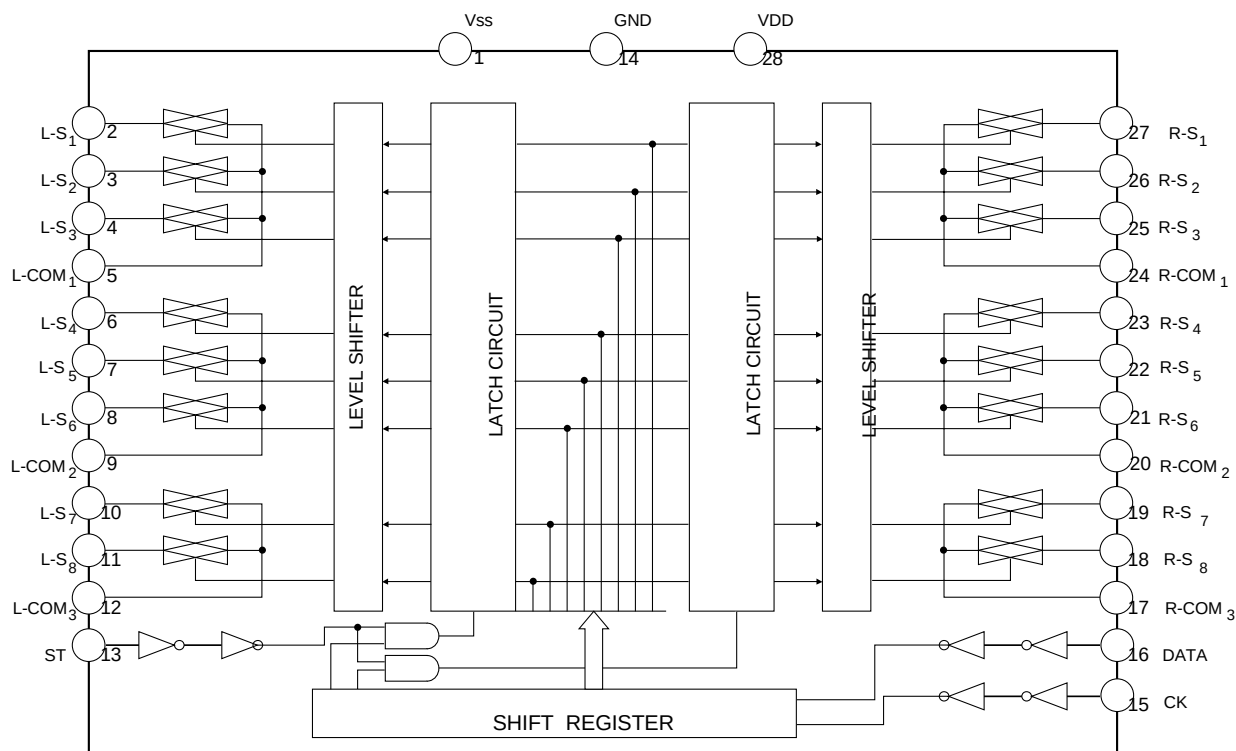
TC9164AF (FUNCTION/INPUT) : IC23

■ BLOCK DIAGRAM



TC9163AF (FUNCTION/INPUT) : IC21,24

■ BLOCK DIAGRAM



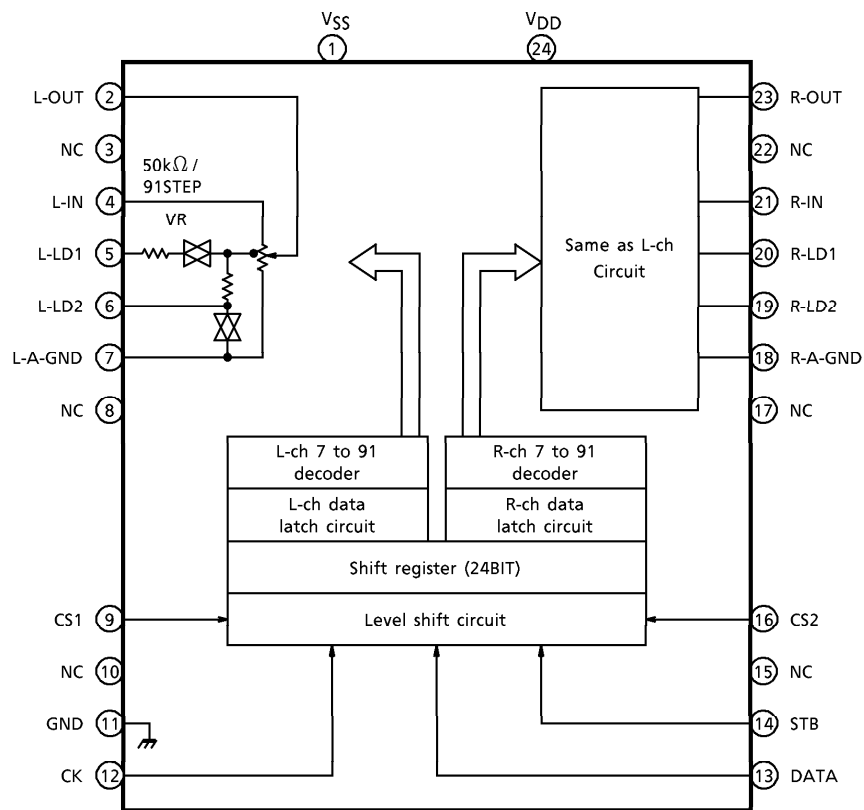


# TOSHIBA

TC9459N/F

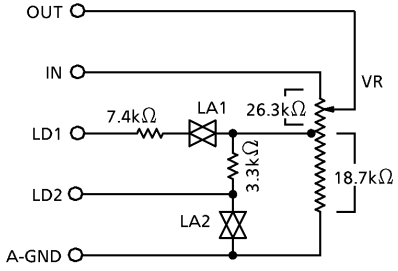
## ELECTRONIC VOLUME CONTROL IC (IC40~44)

### BLOCK DIAGRAM (TC9459F)



**TOSHIBA****TC9459N/F****PIN DESCRIPTION**

Numeral in ( ) means the pin No. of TC9459F.

| PIN No.        | SYMBOL          | PIN NAME                  | FUNCTION                                                                                                                                                                                                                                                                                         | REMARK                        |     |     |               |    |     |                |     |    |   |
|----------------|-----------------|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-----|-----|---------------|----|-----|----------------|-----|----|---|
| 1 (1)          | V <sub>SS</sub> | Negative power supply pin | When using dual power supplies<br><div><div>V<sub>DD</sub> = 6.0~17V</div><div>GND = 0V</div><div>V<sub>SS</sub> = - 6.0~ - 17V</div></div><br>When using a single power supply<br><div><div>V<sub>DD</sub> = 6.0~18V</div><div>GND = V<sub>SS</sub> = 0V</div></div>                            | —                             |     |     |               |    |     |                |     |    |   |
| 28 (24)        | V <sub>DD</sub> | Positive power supply pin |                                                                                                                                                                                                                                                                                                  |                               |     |     |               |    |     |                |     |    |   |
| 13 (11)        | GND             | Digital GND pin           |                                                                                                                                                                                                                                                                                                  |                               |     |     |               |    |     |                |     |    |   |
| 3 (2)          | L-OUT           | Volume output pin         | <div>• Volume circuit</div>  <div><table><tr><th></th><th>LA1</th><th>LA2</th></tr><tr><td>LOUDNESS "ON"</td><td>ON</td><td>OFF</td></tr><tr><td>LOUDNESS "OFF"</td><td>OFF</td><td>ON</td></tr></table></div> |                               | LA1 | LA2 | LOUDNESS "ON" | ON | OFF | LOUDNESS "OFF" | OFF | ON | — |
|                | LA1             |                           |                                                                                                                                                                                                                                                                                                  | LA2                           |     |     |               |    |     |                |     |    |   |
| LOUDNESS "ON"  | ON              | OFF                       |                                                                                                                                                                                                                                                                                                  |                               |     |     |               |    |     |                |     |    |   |
| LOUDNESS "OFF" | OFF             | ON                        |                                                                                                                                                                                                                                                                                                  |                               |     |     |               |    |     |                |     |    |   |
| 26 (23)        | R-OUT           |                           |                                                                                                                                                                                                                                                                                                  |                               |     |     |               |    |     |                |     |    |   |
| 5 (4)          | L-IN            | Volume input pin          |                                                                                                                                                                                                                                                                                                  |                               |     |     |               |    |     |                |     |    |   |
| 24 (21)        | R-IN            |                           |                                                                                                                                                                                                                                                                                                  |                               |     |     |               |    |     |                |     |    |   |
| 6 (5)          | L-LD1           | Loudness tap output pin   |                                                                                                                                                                                                                                                                                                  |                               |     |     |               |    |     |                |     |    |   |
| 23 (20)        | R-LD1           |                           |                                                                                                                                                                                                                                                                                                  |                               |     |     |               |    |     |                |     |    |   |
| 7 (6)          | L-LD2           |                           |                                                                                                                                                                                                                                                                                                  |                               |     |     |               |    |     |                |     |    |   |
| 22 (19)        | R-LD2           |                           |                                                                                                                                                                                                                                                                                                  |                               |     |     |               |    |     |                |     |    |   |
| 8 (7)          | L-A-GND         | Analog GND pin            |                                                                                                                                                                                                                                                                                                  |                               |     |     |               |    |     |                |     |    |   |
| 21 (18)        | R-A-GND         |                           |                                                                                                                                                                                                                                                                                                  |                               |     |     |               |    |     |                |     |    |   |
| 10 (9)         | CS1             | Chip select input pin     | Up to 4 chips on the same bus can be used by switching over chip select code.                                                                                                                                                                                                                    | —                             |     |     |               |    |     |                |     |    |   |
| 19 (16)        | CS2             |                           |                                                                                                                                                                                                                                                                                                  |                               |     |     |               |    |     |                |     |    |   |
| 14 (12)        | CK              | Clock input pin           | Data transfer clock input                                                                                                                                                                                                                                                                        | Low threshold value input pin |     |     |               |    |     |                |     |    |   |
| 15 (13)        | DATA            | Data input pin            | Volume setup serial data input                                                                                                                                                                                                                                                                   |                               |     |     |               |    |     |                |     |    |   |
| 16 (14)        | STB             | Strobe input pin          | Data write strobe input                                                                                                                                                                                                                                                                          |                               |     |     |               |    |     |                |     |    |   |
| 2 (3)          | NC              | No connection             | —                                                                                                                                                                                                                                                                                                | —                             |     |     |               |    |     |                |     |    |   |
| 27 (22)        |                 |                           |                                                                                                                                                                                                                                                                                                  |                               |     |     |               |    |     |                |     |    |   |
| 4              |                 |                           |                                                                                                                                                                                                                                                                                                  |                               |     |     |               |    |     |                |     |    |   |
| 25             |                 |                           |                                                                                                                                                                                                                                                                                                  |                               |     |     |               |    |     |                |     |    |   |
| 9 (8)          |                 |                           |                                                                                                                                                                                                                                                                                                  |                               |     |     |               |    |     |                |     |    |   |
| 20 (17)        |                 |                           |                                                                                                                                                                                                                                                                                                  |                               |     |     |               |    |     |                |     |    |   |
| 11             |                 |                           |                                                                                                                                                                                                                                                                                                  |                               |     |     |               |    |     |                |     |    |   |
| 18             |                 |                           |                                                                                                                                                                                                                                                                                                  |                               |     |     |               |    |     |                |     |    |   |
| 12 (10)        |                 |                           |                                                                                                                                                                                                                                                                                                  |                               |     |     |               |    |     |                |     |    |   |
| 17 (15)        |                 |                           |                                                                                                                                                                                                                                                                                                  |                               |     |     |               |    |     |                |     |    |   |



VOLTAGE DETECTOR

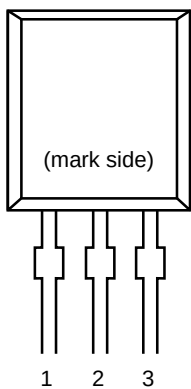
R×5VL SERIES

R×5VT SERIES

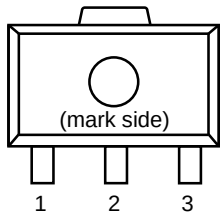
R×5VL

PIN CONFIGURATION

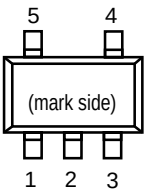
• TO-92



• SOT-89



• SOT-23-5



PIN DESCRIPTION

• TO-92

| Pin No | Symbol          |
|--------|-----------------|
| 1      | OUT             |
| 2      | V <sub>DD</sub> |
| 3      | GND             |

• SOT-89

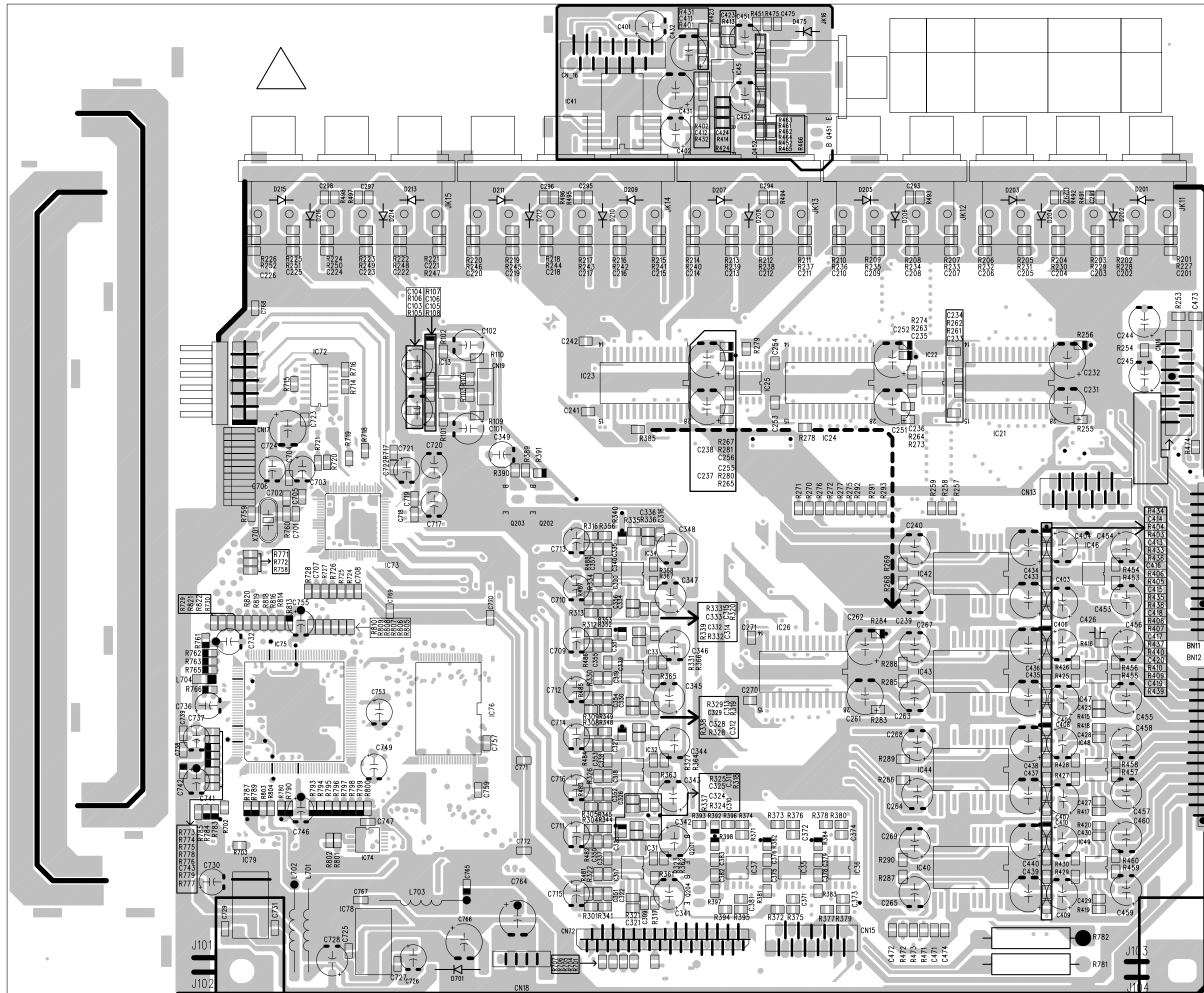
| Pin No | Symbol          |
|--------|-----------------|
| 1      | OUT             |
| 2      | V <sub>DD</sub> |
| 3      | GND             |

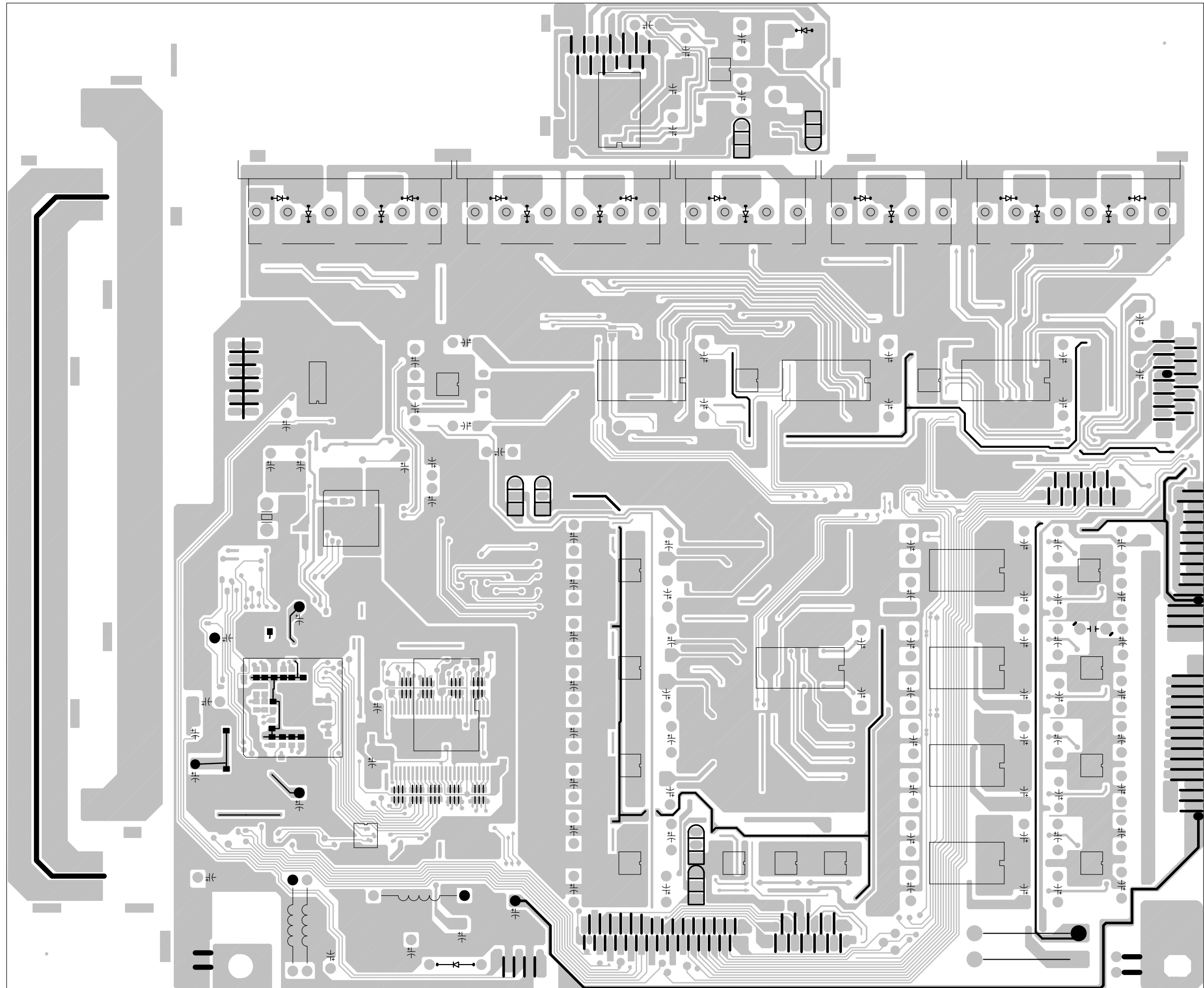
• SOT-23-5

| Pin No | Symbol          |
|--------|-----------------|
| 1      | OUT             |
| 2      | V <sub>DD</sub> |
| 3      | GND             |
| 4      | NC              |
| 5      | NC              |

TRANSISTOR, REGULATOR IC BLOCK DIAGRAM

|                                                                                                                                                                                                              |                                                                                                                                                                                                                              |                                                                                                                                                                                 |                                                                                                                                                                                         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>TO-92M</p>  <p>123</p> <p>1. Emitter<br/>2. Collector<br/>3. Base</p> <p>KTC2874B    KSC2785Y<br/>KRA107M    KRC107M</p> | <p>TO-92</p>  <p>123</p> <p>1. Emitter<br/>2. Collector<br/>3. Base</p> <p>KTD1302T    KTA1268GR<br/>KTC3200GR    KTC3198Y<br/>KTA1271Y</p> | <p>TO-220</p>  <p>123</p> <p>1. GND<br/>2. INPUT<br/>3. OUTPUT</p> <p>MCNJM7905    MC7915C</p> | <p>TO-92L</p>  <p>123</p> <p>1. Emitter<br/>2. Collector<br/>3. Base</p> <p>KTA1024Y    KSC2316Y</p> |
| <p>TO-126</p>  <p>123</p> <p>1. Emitter<br/>2. Collector<br/>3. Base</p> <p>2SA1360O    2SC3423O<br/>KTD600KG</p>           | <p>TO-220</p>  <p>123</p> <p>1. Base<br/>2. Collector<br/>3. Emitter</p> <p>KSA614Y</p>                                                     | <p>TO-220</p>  <p>123</p> <p>1. INPUT<br/>2. GND<br/>3. OUTPUT</p> <p>MC7815C    MC7805C</p>   | <p>TO-3P</p>  <p>1 2 3</p> <p>2SB1560<br/>2SD2390</p>                                                |



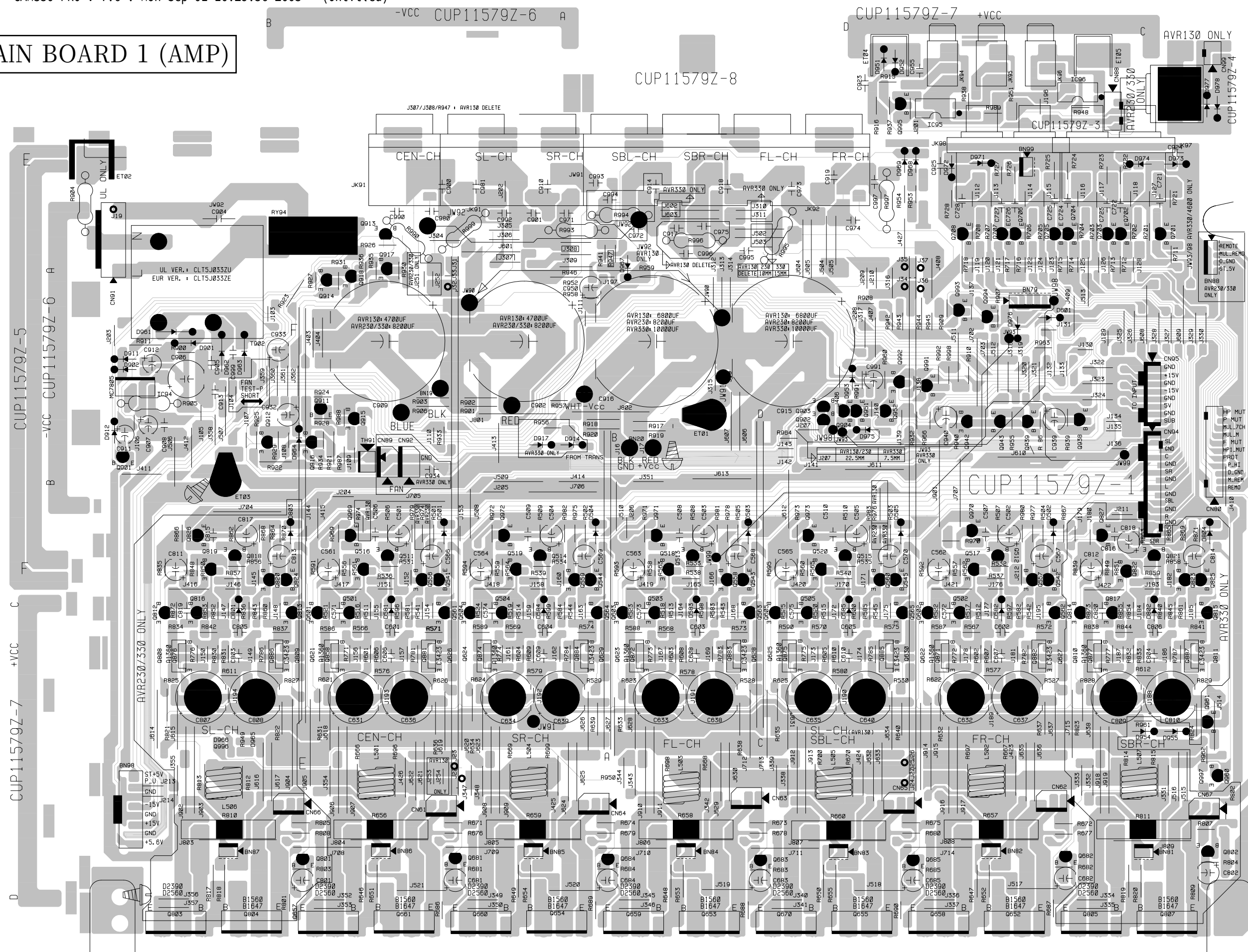




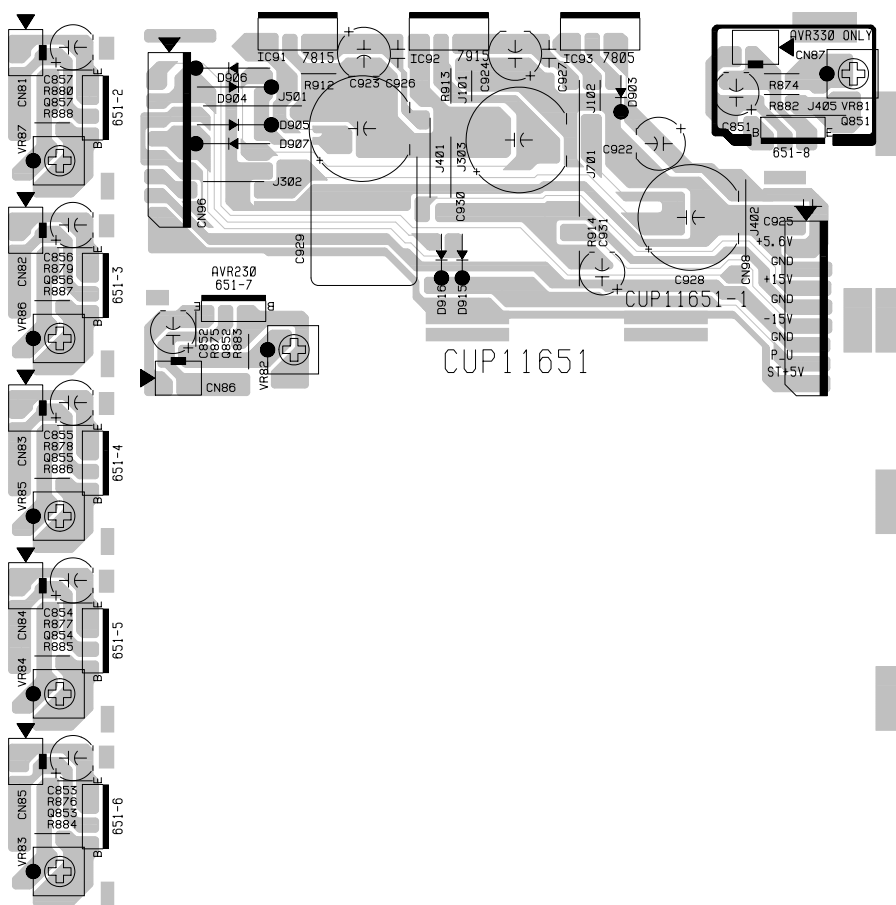




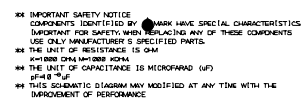
## MAIN BOARD 1 (AMP)



# MAIN BOARD 2 (BIAS & REGULATOR)

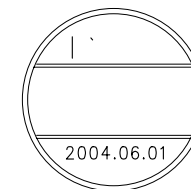


CUP11651

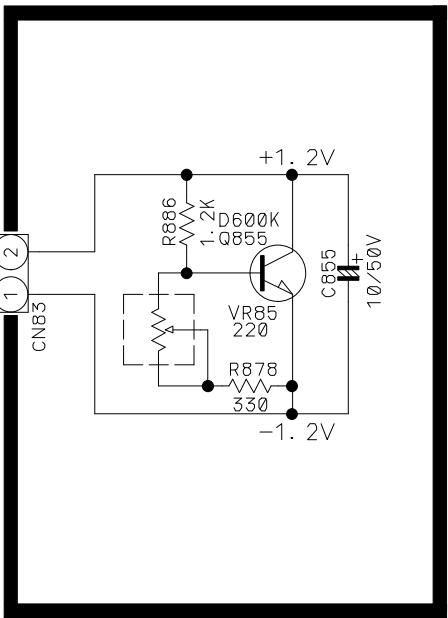
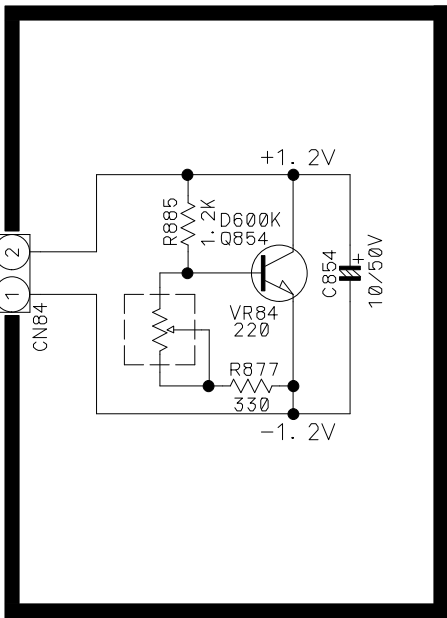
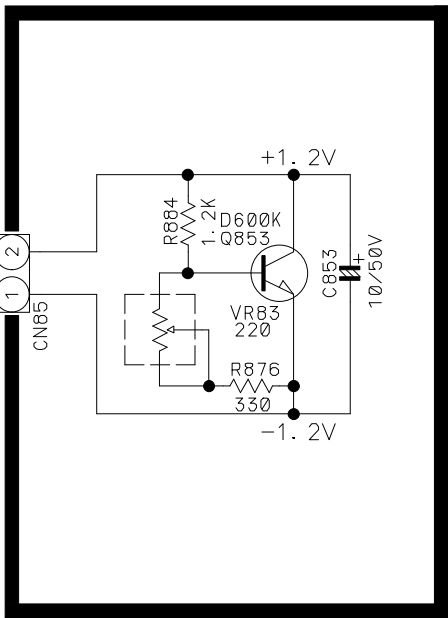
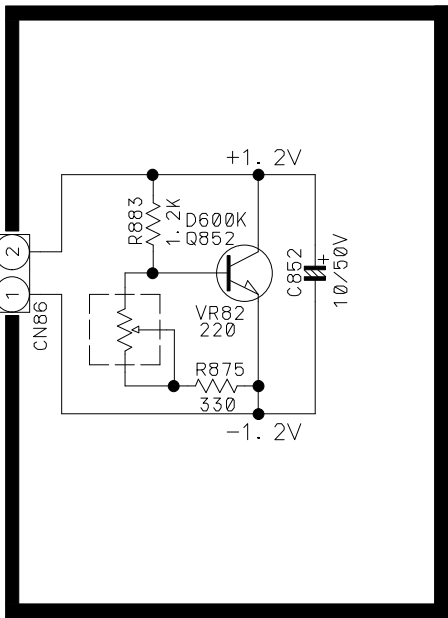
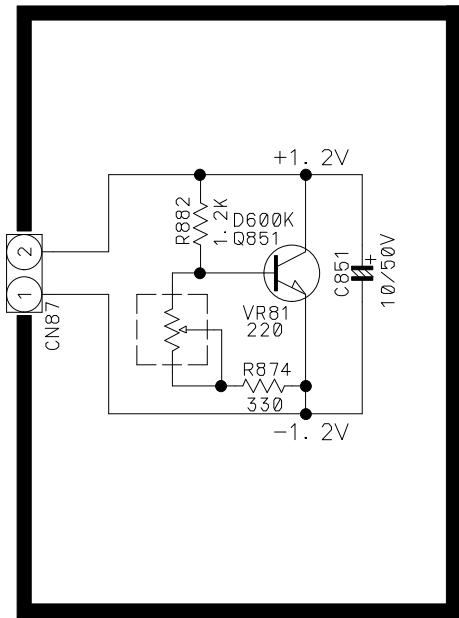




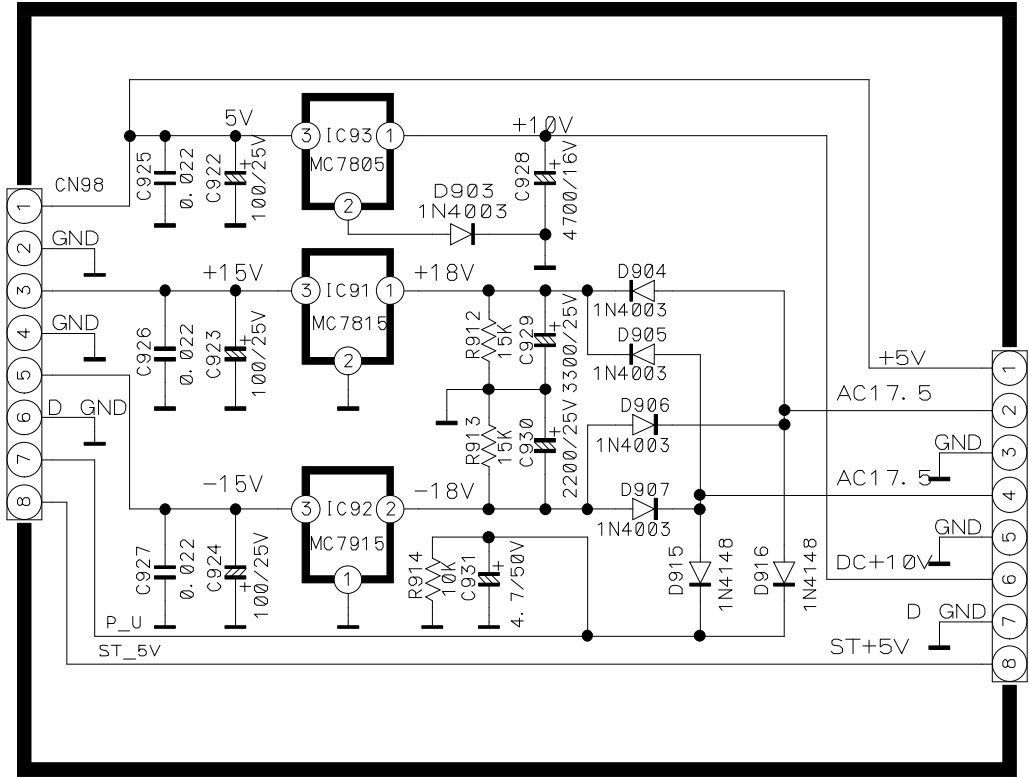
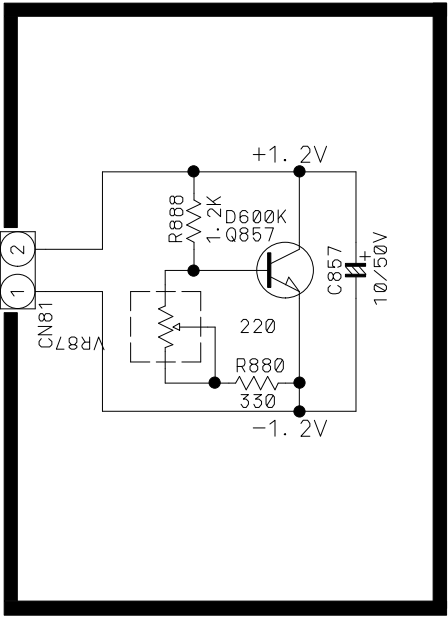
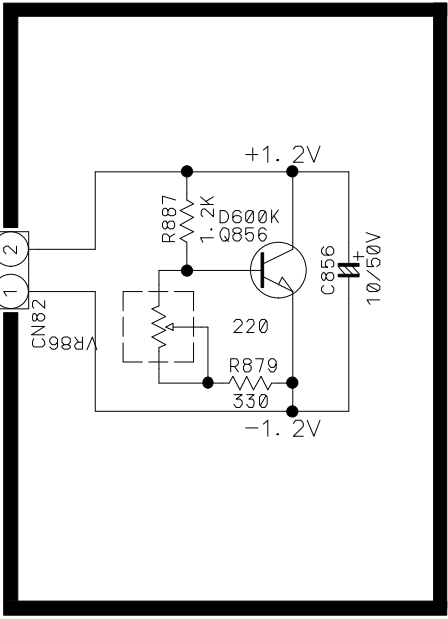
LPP







\*\* IMPORTANT SAFETY NOTICE.  
COMPONENTS IDENTIFIED BY  MARK HAVE SPECIAL CHARACTERISTICS.  
IMPORTANT FOR SAFETY. WHEN REPLACING ANY OF THESE COMPONENTS  
USE ONLY MANUFACTURER'S SPECIFIED PARTS.  
\*\* THE UNIT OF RESISTANCE IS OHM.  
K=1000 OHM, M=1000 KOHM.  
\*\* THE UNIT OF CAPACITANCE IS MICROFARAD (uF)  
pF=10<sup>-6</sup> uF  
\*\* THIS SCHEMATIC DIAGRAM MAY MODIFIED AT ANY TIME WITH THE  
IMPROVEMENT OF PERFORMANCE

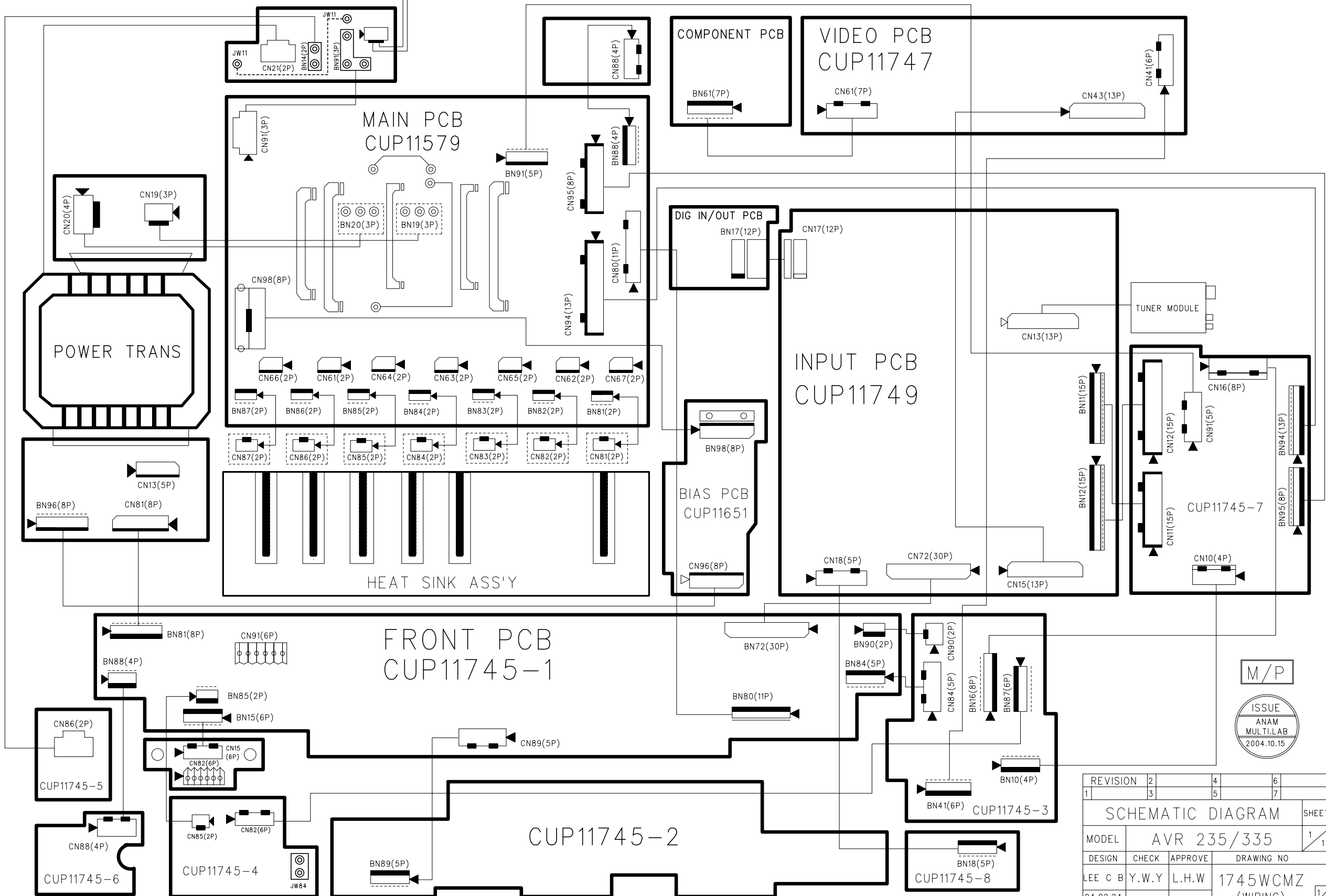




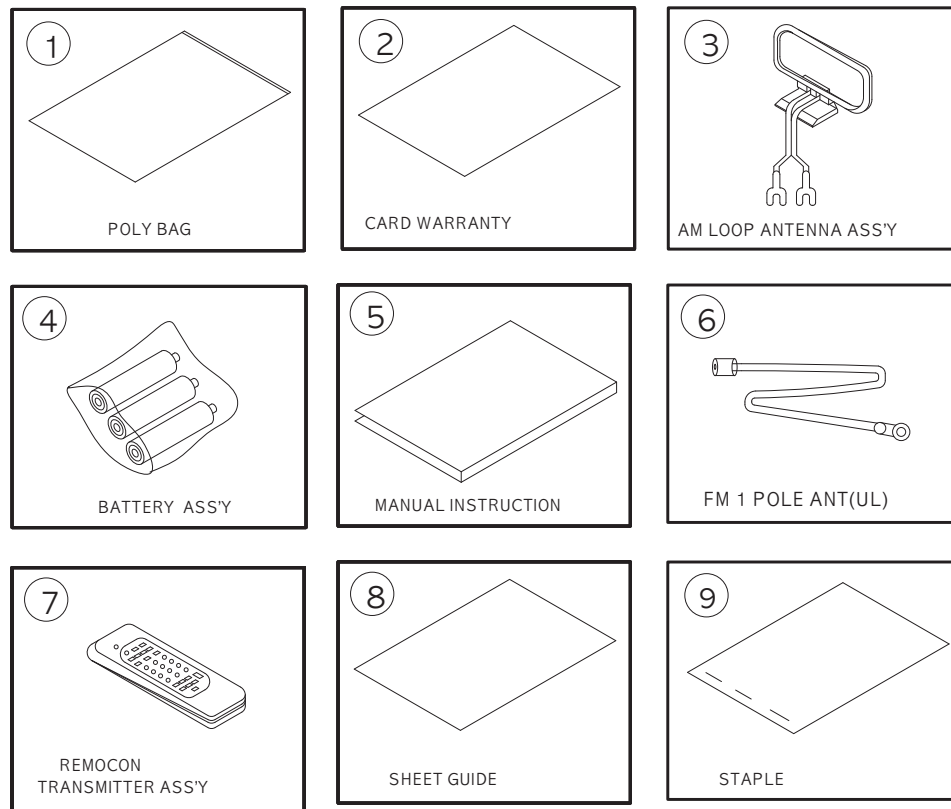




USA : 120V 60Hz  
EUR : 230V 50Hz



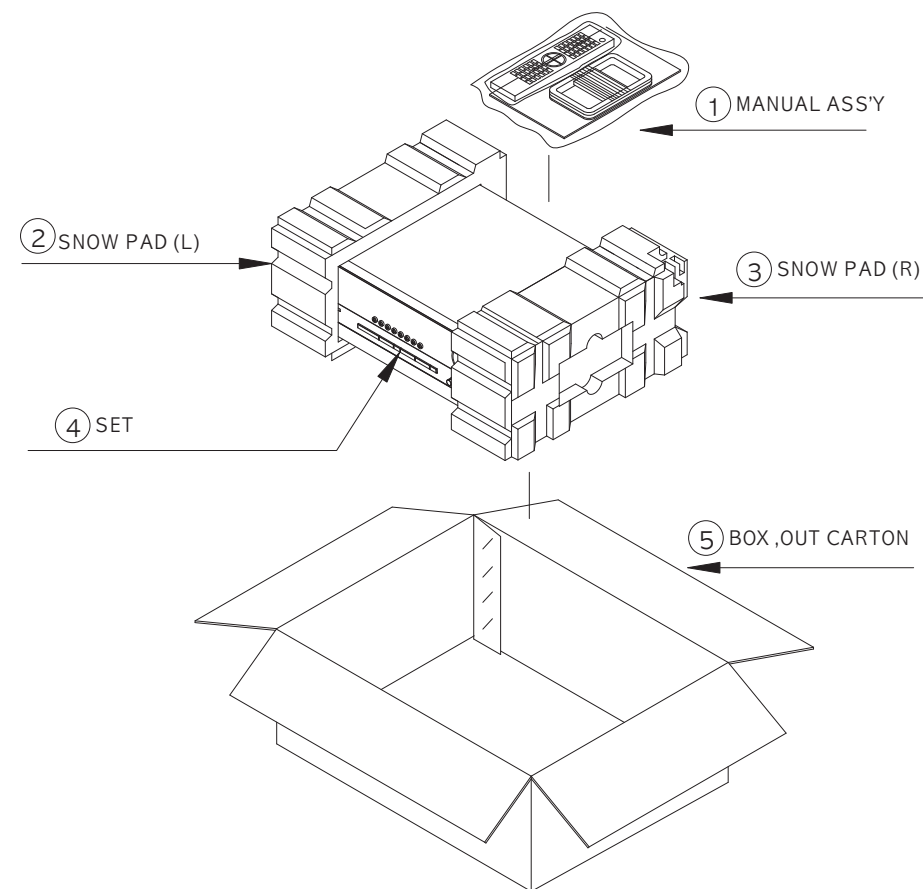
## 1. Instruction manual ass'y - Accessories



| NO | DESCRIPTION               | PARTS NO.     | Q.ty |
|----|---------------------------|---------------|------|
| 1  | POLY BAG                  |               | 1    |
| 2  | CARD WARRANTY             | ZKC1113HA00-9 | 1    |
| 3  | AM LOOP ANTENNA ASS'Y     | CSA1A027Z     | 1    |
| 4  | BATTERY                   |               | 3    |
| 5  | OWNER'S MANUAL            | CQX1A950Z     | 1    |
| 6  | FM 1 POL ANT(UL)          | CSA1A019Z     | 1    |
| 7  | REMOCON TRANSMITTER ASS'Y | RB30C00       | 1    |
| 8  | SHEET GUIDE               | CQE1A227Z     | 1    |
| 9  | STAPLE                    |               | 3    |

## 2. Package Drawing

AVR235



| NO | DESCRIPTION         | PARTS NO. | Q.ty |
|----|---------------------|-----------|------|
| 1  | MANUAL ASS'Y        |           | 1    |
| 2  | SNOW,PAD(L)         | CPS4A564  | 1    |
| 3  | SNOW,PAD(R)         | CPS4A565  | 1    |
| 4  | SET                 | AVR 235   | 1    |
| 5  | AVR235 OUTER CARTON | CPG1A775Z | 1    |