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IOT747 IDC777 Bluetooth Module User Manual

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Contents

IDC777 Bluetooth Module

IDC777
Product Information Data Sheet
Ref: IDC777-DTS-V002
Latest Update: April 7, 2023

Device description

- Bluetooth 5.4 Audio and Data Module
- UART/GPIO Command
- 11.8mmx22.2mm form factor
- LE and Classic Audio and Data
- Connect to Apps (iOS/Android/etc.)
- Qualcomm Snapdragon Sound (inc. aptX-Loss-less)

Applications

- High-End Audio Visual-Products
- Industrial Data/Audio Applications
- Automotive/Aerospace Applications
- Teleconference Equipment
- POS/Retail Sports/Leisure Equipment

Features

- LE and Classic Audio and High-Speed Data Bluetooth 5.4 Module
- Music Receiver (HFP, A2DP Sink) and Transmitter (AG-HFP, A2DP Source)
- LE Unicast and Auracast
- Profiles: HFP, HSP, AG-HFP, A2DP Sink, A2DP Source, AVRCP, SPP, BLE
- Analog and Digital Audio connection (I2S, PCM, SPDIF)
- Snapdragon Sound (aptX, aptX HD, aptX Lossless), AAC, Wide Band Speech
- Simple UART or GPIO interface for control
- Integrated Antenna, Small form factor (11.8mm x 22.2mm x 3.2mm)
- Bluetooth, FCC(US), RED(Europe), MIC(Japan), KCC(Korea) and SRRC(China) certified

Summary
IDC777-1 is ideal for developers who want to quickly and cost effectively integrate high performance Audio and Data Bluetooth functionality into their products. It is controlled through a simple UART interface that also serves for data transmissions. For the Audio, it has Analog or Digital Outputs. The module can connect to multiple devices with multiple profiles, including the new LE Audio Unicast and Auracast (Broadcast). The power consumption is <1mAmp when connected, <1mAmp in Pairing mode and <4mAmp when streaming music at 3.3V. It is supplied FCC, CE, IC, Korea, Japan and Bluetooth 5.4 certified. It is also supplied with sample Android and iOS Applications to help integrate the Bluetooth functionality with the product end Application. IDC777-1 features can be also customised for specific complex use cases and scenarios. Please contact **info@iot747.com** for customisation requests.
For additional questions or to submit technical question, go to www.iot747.com or send an email to

General Specifications

No	Pin Name
Bluetooth Standard	Bluetooth 5.4
Interfaces	UART, AIO, GPIO, USB, PCM, I2S, I2C, SPDIF
Size	11.8mm x 22.2mm x 3.2mm
Weight	1g
Frequency Band	2,402 MHz to 2,480 MHz
Modulation	8 DPSK, PI/4 DQPSK, GFSK
Maximum Data Rate	3Mbps (typical 1.6Mbps)
Operating Range	25m
RF Sensitivity	0.1% BER at -97dBm (Typical)
Transmit Power For EU	<10dBm
DAC resolution	16 bits
DAC Out Sample Rate	8 KHz to 90 KHz
DAC SNR	Class D typ: 105.1dB, Class A-B typ: 103.9 dB
Stereo Separation	Min: 80dB
Supply Voltage	3.3V to 4.7 V DC (Supports Li Ion battery voltage range)
Typical Current	4mA (Music streaming)
Typical Current Idle	<1mA (Connectable)
Typical Current Discoverable	<1mA (Pairing Mode)
Operating Temperature	-40°C to 85°C
Storage Temperature	-40°C to 105°C

Footprint
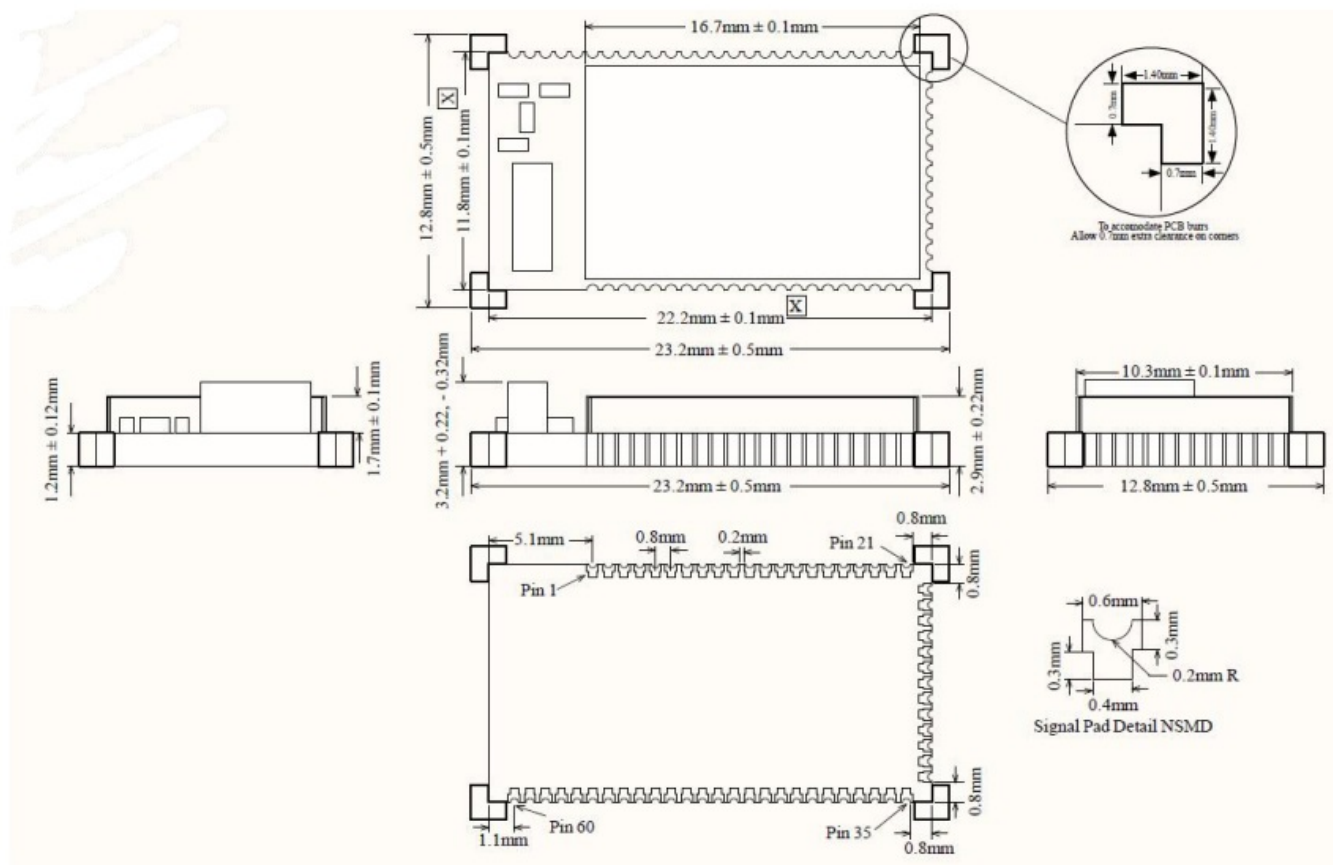
Pinout

No	Pin Name	Pin Type	Pin Description
1	GND	GND	Common Ground
2	PIO_34	Bi-directional	Digital: Bidirectional with programmable
3	PIO_35	Bi-directional	Digital: Bidirectional with programmable
4	PIO_32	Bi-directional	Digital: Bidirectional with programmable
5	PIO_29	Bi-directional	Digital: Bidirectional with programmable
6	PIO_31	Bi-directional	Digital: Bidirectional with programmable
7	PIO_26	Bi-directional	Digital: Bidirectional with programmable
8	PIO_30	Bi-directional	Digital: Bidirectional with programmable
9	PIO_33	Bi-directional	Digital: Bidirectional with programmable
10	USB_N	Bi-directional	USB Full Speed device D- I/O
11	USB_P	Bi-directional	USB Full Speed device D+ I/O
12	GND	GND	Common Ground
13	SYS_CTRL	Digital input	Drive high to boot module, also usable as a
14	AIO(1)	Bi-directional	General-purpose analog/digital input or
15	AIO(2)/LED(2)	Bi-directional	General-purpose analog/digital input or

16	AIO(3)/LED(3)	Bi-directional	General-purpose analog/digital input or
17	AIO(0)/LED(0)	Bi-directional	General-purpose analog/digital input or
18	GND	GND	Common Ground
19	GND	GND	Common Ground
20	AIO(4)/LED(4)	Bi-directional	General-purpose analog/digital input or
21	GND	GND	Common Ground
22	GND	GND	Common Ground
23	PIO_3	Bi-directional	Digital: Bidirectional with programmable
24	PIO_6	Bi-directional	Digital: Bidirectional with programmable
25	PIO_5	Bi-directional	Digital: Bidirectional with programmable
26	PIO_48	Bi-directional	Digital: Bidirectional with programmable
27	GND	GND	Common Ground
28	CHG_EXT	Analog Supply Current	External charger transistor current
29	VCHG	Analog Supply Input	Supply to SMPS power switch from
30	VBAT_SENSE	Analog Supply Input	Battery voltage sense input
31	VBAT	Analog Supply Input	Battery voltage input
32	VDD_PADS	Supply	I/O pins supply voltage input
33	VCHG_SENSE	Supply	Charger input sense pin after external
34	GND	GND	Common Ground
35	GND	GND	Common Ground
36	RST#	Digital Input	Reset on boot, active low, internal pull up
37	UART_CTS	Input	UART Clear to Send, active low
38	UART_TX	Output	UART TX Data
39	UART_RX	Input	UART RX Data
40	UART_RTS	Output	UART request to send, active low
41	GND	GND	Common Ground
42	SPKR_HP2_P	Audio output	Headphone/speaker differential 2 output,
43	SPKR_HP2_N	Audio output	Headphone/speaker differential 2 output,
44	SPKR_HP1_N	Audio output	Headphone/speaker differential 1 output,
45	SPKR_HP1_P	Audio output	Headphone/speaker differential 1 output,

46	MIC_BIAS	Analog voltage o utput	Microphone bias output
47	MIC1_N	Analog input	Microphone differential 1 input, negative,
48	MIC1_P	Analog input	Microphone differential 1 input, positive,
49	MIC2_N	Analog input	Microphone differential 2 input, negative,
50	MIC2_P	Analog input	Microphone differential 2 input, positive,
51	GND	GND	Common Ground
52	PCM_SYNC	Bi-directional	Synchronous data sync
53	PCM_CLK	Bi-directional	Synchronous data clock
54	PCM_OUT	CMOS output	Synchronous data output
55	PCM_IN	CMOS input	Synchronous data input
56	GND	GND	Common Ground
57	EXT_RF	RF I/O	RF to EXT Antenna (Ext ANT SKU – IDC767)
58	GND	GND	Common Ground
59	GND	GND	Common Ground
60	GND	GND	Common Ground

Notes:
PIO_X are bidirectional with weak pull down
Reset Input is with strong pull-up
USB data positive with selectable internal 1.5kΩ pull up resistor
UART are Bidirectional with weak pull up

Hardware Design Guidelines

Antenna Placement Considerations
The IDC777 requires specific layout conditions to achieve the maximum range from the onboard Antenna. The module is designed to be placed in the top left-hand corner or edge of an application board, ideally butted up to the edge of the board to allow for maximum free space radiation from the antenna. Orientate the front of the module to face the direction that you want the maximum range for your product in the application.
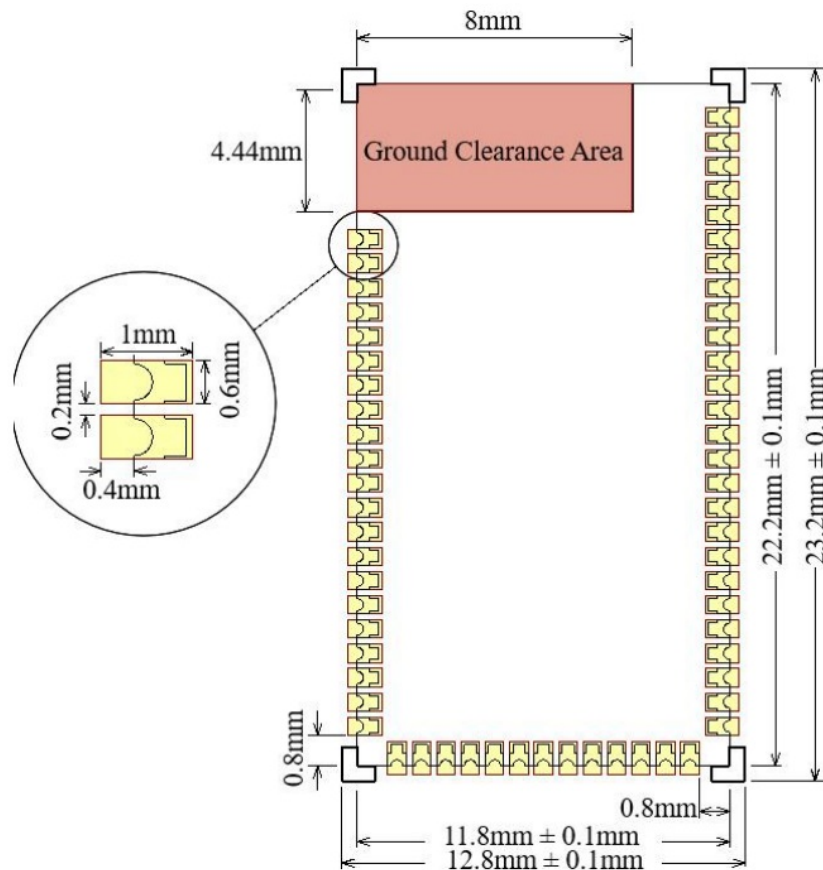
The hashed area in the diagram represents the area that should be removed of metal (ground or signal tracking) on the application board. All metal should be removed in this area on all layers of the application PCB to avoid detuning the antenna. Additionally for maximum radiation, there should be no metal or metallized plastic in this area of the PCB housing or mechanical solution into which the PC is placed. A good rule of thumb is to ensure that no metallic components are placed with 25cm of the module edge in the hashed area.

Ground vias should be used on the application PCB at the edge of this clearance area to ensure good ground connectivity through all layers of the pcb. These vias should extend to the edge of the application PCB where possible.

Supply Configuration

The IDC777 is typically powered by a fixed 3V supply where the module is included in a larger portable device and charging of the battery is supported by alternative functionality outside the remit of the IDC777. This is the Fixed Voltage Supply Configuration.

Fixed Voltage Supply Configuration

For a single supply application as part of a larger portable application circuit, a regulated voltage can be used to power the IDC777 directly. There is no direct battery connection and the IDC777 is not used to charge the battery. In this fixed voltage configuration, the pins VBAT, VBAT_SENSE and VDD_PADS are all connected to a single supply voltage rail. VCHG and VCHG_SENSE and CHG_EXT are left unconnected as per the figure below. Alternatively, we recommend connecting them to test points if possible. Test points can help debug and testing in some cases prior to production.

Pin #	Pin Name	Connection	Voltage Input Range
28	CHG_EXT	Not Connected/Test Point	NA
29	VCHG	Not Connected/Test Point	NA
30	VBAT_SENSE	Connect to 3.3V Supply	3.0V** to 4.6V
31	VBAT	Connect to 3.3V Supply	3.0V** to 4.6V
32	VDD_PADS	Connect to 3.3V Supply	1.7V to 3.6V
33	VCHG_SENSE	Not Connected/Test Point	NA

Battery Voltage Supply Configuration

Alternatively, for portable applications, the module supports an internal charger function where no extra external components are required for charging operation. In this case, the main power is supplied by a battery, typically a Li Po cell with a nominal 3.1-3.3V supply. A 5V charger input, typically supplied by a USB source, is used to charge the battery. The IDC777 integrated Li-Ion charger is designed to support single Li-Ion cells with a wide range of cell capacities and variable VFLOAT voltages. It supports charge rates of 2mA to 200mA with no additional external components required. This is the Battery Voltage Supply Configuration.
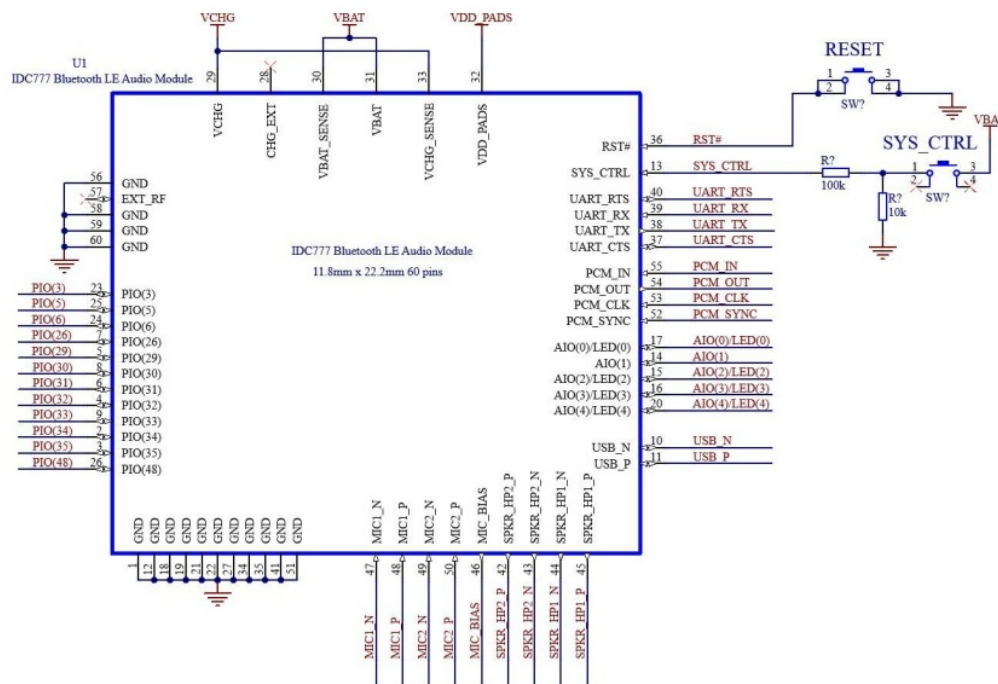
Pin #	Pin Name	Connection	Voltage Input Range
28	CHG_EXT	Not Connected	
29	VCHG	Charger Source (VBUS)	4.75V* to 6.5V
30	VBAT_SENSE	Connect to Battery	3.0V** to 4.6V
31	VBAT	Connect to Battery	3.0V** to 4.6V
32	VDD_PADS	Connect to regulated 3.3V Supply	1.7V to 3.6V
33	VCHG_SENSE	Charger Source (VBUS)	NA

* Can operate at a reduced capacity down to 4.0V, VCHG minimum is 4.0V
** Devices operates down to 2.8V recommended software shut off is at 3.0V

VDD_PADS is generated by a fixed voltage regulator in this configuration to provide a constant voltage reference for the IO supply domain. When connected to a battery a buck/boost synchronous regulator is recommended, the circuit below provides an example.
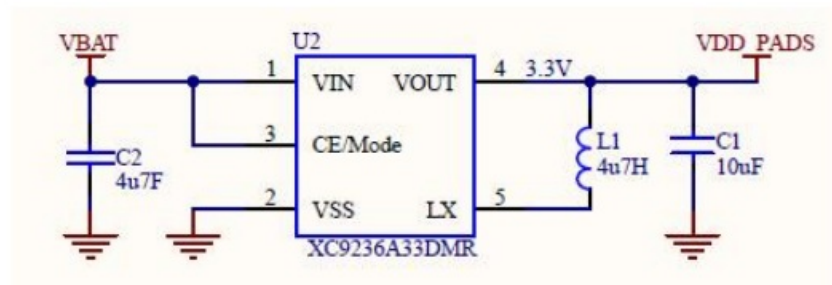
To save the cost of an external regulator the VDD_PADS input can be connected direct to the battery input as long as all digital peripherals are tolerant of the variation of the battery voltage over its entire operating range of 2.8V to 4.24V (VFloatmax).

Module Boot Modes

If the device is 'No Power' state (No voltage applied to the module), a connection (voltage applied) to VBAT or VCHG will transition the module from unpowered to Active.

The device can also be in 'Power Off' State while there is voltage applied to VBAT. The 'Power Off' state is different to the No Power state because the IDC777 has voltage on VBAT. In the 'Power Off' state the following events boot the chip and transition it to the Active state: (1) a rising edge on SYS_CTRL held high for 20 ms or (2) a rising edge on VCHG held high for 20 ms. NOTE that the device cannot be in 'Power Off' when voltage is present on VCHG input. The device can transition from Active to 'Power Off' with a UART command (See UART Manual) or a rising edge on SYS_CTRL.

Depending on the software configuration SYS_CTRL can be used to boot the module or wake from a dormant or sleep state. An example application below shows the SYS_CTRL driven by a push button connected to the VBAT supply, pressing the button connects the source voltage via the resistor divider network to the SYS_CTRL input enabling the device.

Please refer to the UART Command Manual for the SYS_CTRL function once the module is booted.
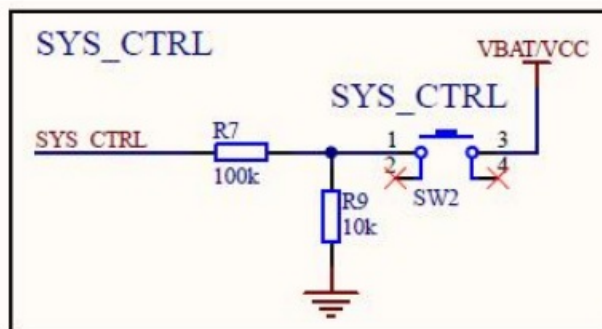
To Wake-Up an external processor on Connection, PIOs can be used. With GPIO control disabled, PIOs will go High when a Bluetooth connection is established. Please refer to the UART command line manual for more details.

ESD protection

The module has no supplementary ESD protection other than that provided by the IC within the module. The Bluetooth IC ESD protection is limited to:

Human Body Model Contact Discharge per ANSI/ESDA/JEDEC JS-001

Class 2 – 2kV (all pins except CHG_EXT; CHG_EXT rated at 1kV)

Machine Model Contact Discharge per JEDEC/EIA JESD22-A115 200V (all pins)

Charged Device Model Contact Discharge per JEDEC/EIA JESD22-C101 Class II – 200V (all pins)

It is recommended to adding supplementary ESD protection to externally available interfaces in the end application.

GPIOs and UART

The module is controlled by GPIOs. This can be configured. If GPIO control is not used, these GPIOs should be left

floating. The UART by default does not use RTS/CTS flow control. If the users do not expect to use it, these lines should be left floating.

Digital Pin States on RESET or after Power Up

The following table shows the Digital Pin States on RESET or after power up.

Pin Name/Group	I/O Type	State after PowerUp/RESET
USB_DP	Digital bi-directional	N/A
USB_DN	Digital bi-directional	N/A
UART_RX	Digital bi-directional with PU	Strong PU
UART_TX	Digital bi-directional with PU	Weak PU
UART_CTS	Digital bi-directional with PD	Weak PD
UART_RTS	Digital bi-directional with PU	Weak PU
PCM_IN	Digital bi-directional with PD	Weak PD
PCM_OUT	Digital bi-directional with PD	Weak PD
PCM_SYNC	Digital bi-directional with PD	Weak PD
PCM_CLK	Digital bi-directional with PD	Weak PD
RST#	Digital input with PU	Strong PU
PIO_X	Digital bi-directional with PD	Weak PD

PD = Pull Down, PU = Pull Up

Input and Tri-state Currents	Min	Typ	Max	Unit
Strong pull-up	-150	-40	-10	µA
Strong pull-down	10	40	150	µA
Weak pull-up	-5	-1	-0.33	µA
Weak pull-down	0.33	1	5	µA

Audio Interfaces

IDC777 supports high quality analogue and digital audio interfaces supported by an audio application processor, high performance analogue and digital audio codecs driving Class-AB and Class-D headphone drivers.

Analogue Audio Inputs

IDC777's analogue input pins support mono, stereo and line-in, single ended and differential input configurations. The internal High Quality 24bit ADCs support a maximum input voltage of 2.4V (at 0dB gain) and provides over 60dBs of digital and analogue gain with a minimum 80dB of stereo separation (crosstalk). An integrated microphone bias driver with a tuneable bias voltage range from 1.5V to 2.1V delivers up to 3mA of bias current with a typical output noise of 5uVrms suitable for driving most Electret and MEMS microphones.

The analogue audio input is configured via the software API and supports 4 standard modes Dual differential

Dual single-ended noninverted (positive inputs)

Dual single-ended inverted (negative inputs)

Single differential

Or each input can be configured individually for differential or single ended microphone or line-in input configuration. Analogue audio inputs should be AC coupled with a minimum of 2.2uF capacitor, capacitor values

below this degrade the low frequency response.

Analogue Gain

An internal pre-amplifier prior to the HQADC provides a 0-39dB of programmable gain in 3dB steps. At 0dB gain the preamplifier maximum input voltage swing is 2.4V as the gain increases the input voltage swing must reduce to avoid compressing the ADC. The table below shows the maximum recommended analogue input voltage swing vs analogue preamplifier gain settings.

Analogue Gain	Input Impedance (kΩ)	Input amplitude (mVpk-pk)
0	20	2400
3	20	1699
6	20	1203
9	20	852
12	20	603
15	20	427
18	20	302
21	20	214
24	20	151
27	10	107
30	10	76
33	10	54
36	10	38
39	10	27

For line-in input applications a gain of 0dB is recommended

Example Application Schematics

IDC777 Analogue Audio Nets
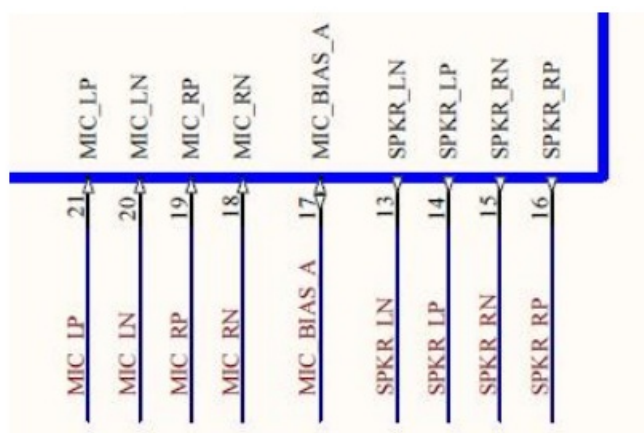
All analogue inputs are DC coupled and must be externally ac coupled for correct operation.

Stereo Line In

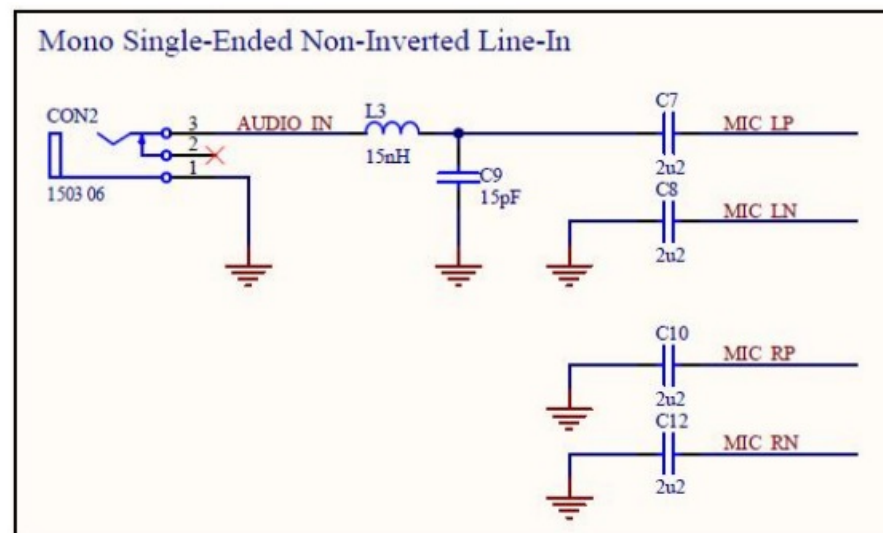A single 4-pole audio jack provides L and R audio channels:

Stereo Line-In Application Example
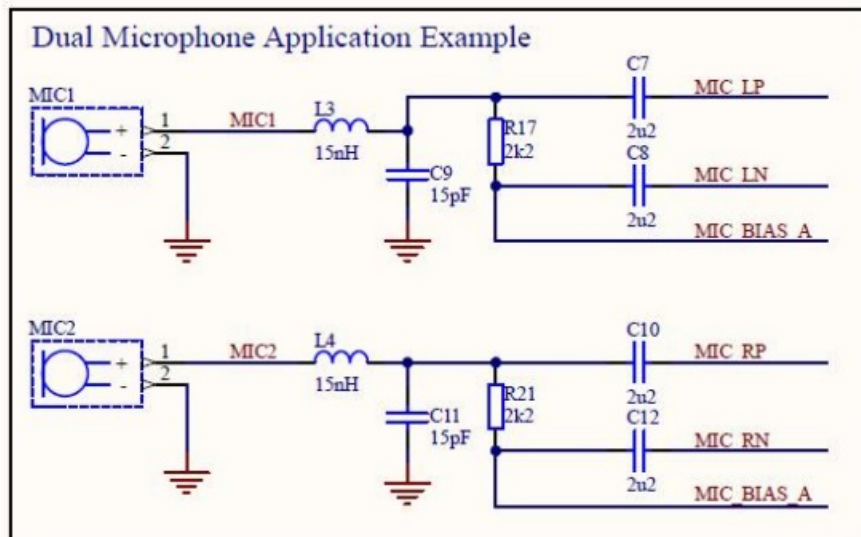
CON2
2
4
3
1
3.5mm Stereo jack

AUDIO IN L
L3
15nH
C9
15pF
R17
2k2
C7
2u2
MIC LP
C8
2u2
MIC LN

AUDIO IN R
L4
15nH
C11
15pF
R21
2k2
C10
2u2
MIC RP
C12
2u2
MIC RN
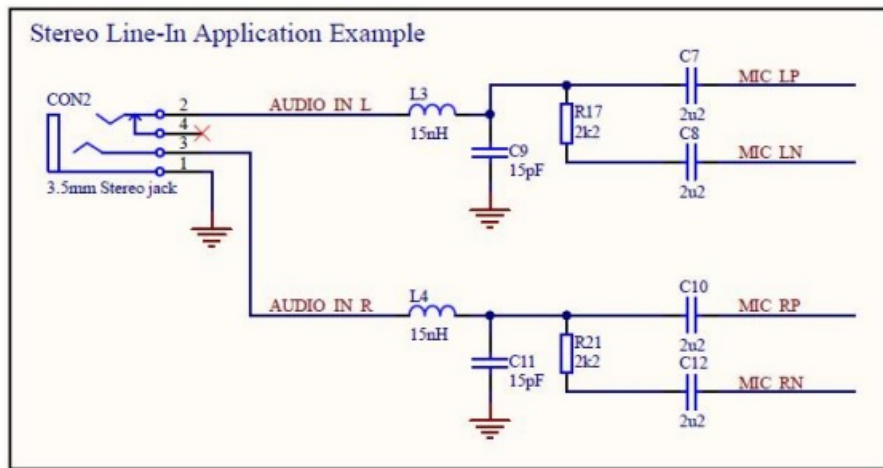
Mono Line In
Two 2-pole audio jacks providing independent audio channels

Dual Single-Ended Non-Inverted Mono Line-In

CON2
3
2
1
1503 06

AUDIO IN1
L3
15nH
C9
15pF
C7
2u2
MIC LP
C8
2u2
MIC LN

CON3
3
2
1
1503 06

AUDIO IN2
L6
15nH
C27
15pF
C10
2u2
MIC RP
C12
2u2
MIC RN
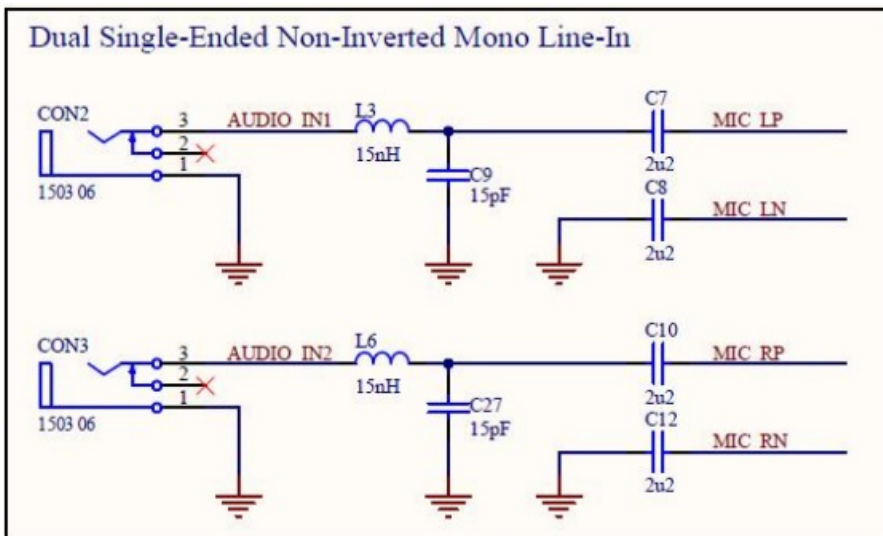
One 2-pole audio jack providing single mono audio source, unused inputs are AC grounded

Mono Single-Ended Non-Inverted Line-In

CON2
3
2
1
1503 06

AUDIO IN
L3
15nH
C9
15pF
C7
2u2
MIC LP
C8
2u2
MIC LN

C10
2u2
MIC RP
C12
2u2
MIC RN

Microphone Input
Dual Microphones

Dual Microphone Application Example

Some microphones may require a higher load capacitance, in which case a maximum 2.2uF capacitor can be added across MIC_BIAS with a 10R value resistor inserted between the MIC_BIAS_A and the microphone as below:

Dual Microphone - Maximum Load Capacitance Example
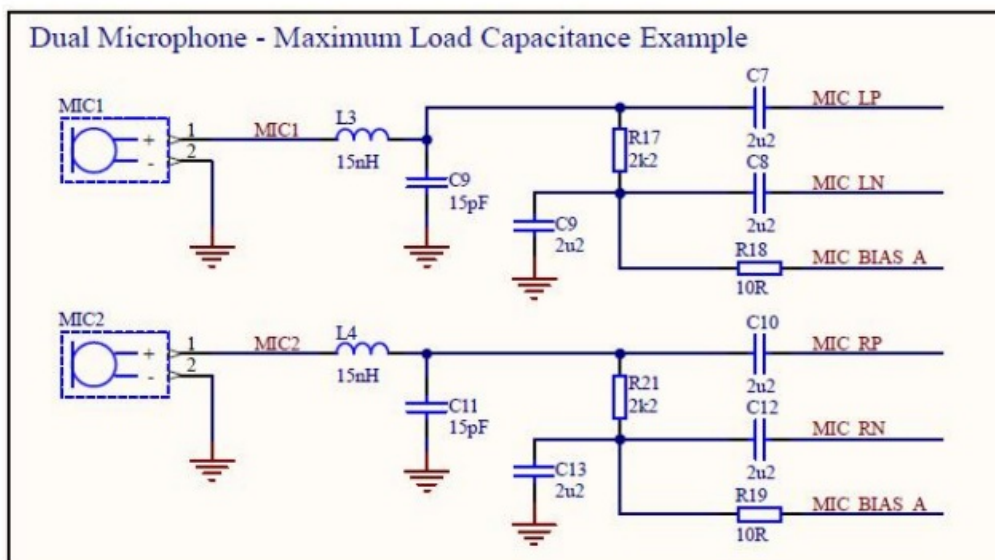
If a single microphone is used, the unused analogue inputs should be AC coupled to ground.
MEMS Microphone

Dual MEMS Microphone Application Example
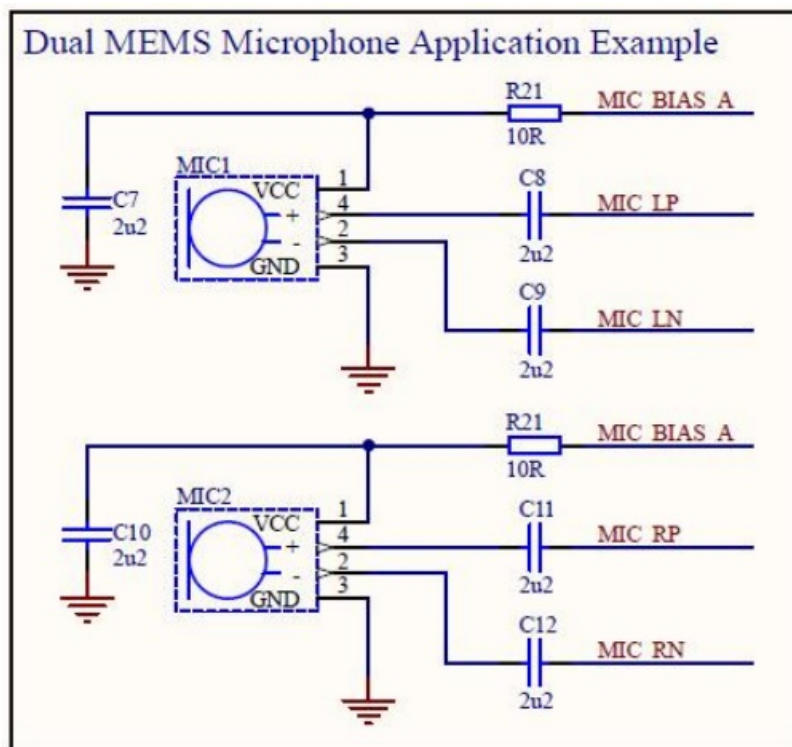
If a single microphone is used, the unused analogue inputs should be AC coupled to ground.

Analogue Audio Outputs

The IDC777's Class-D and Class-AB headset/speaker outputs are stereo differential outputs capable of directly driving 30 mWrms into 32 Ω or 16 Ω speaker loads. Class-D operation enables reduced power consumption, ideal for headset applications, its 3-state BD modulation enables a filter-free configuration, where most of the analogue driver is powered down, supports differential headphone loads of 16 Ω/32 Ω.

Direct Drive Headphone Example
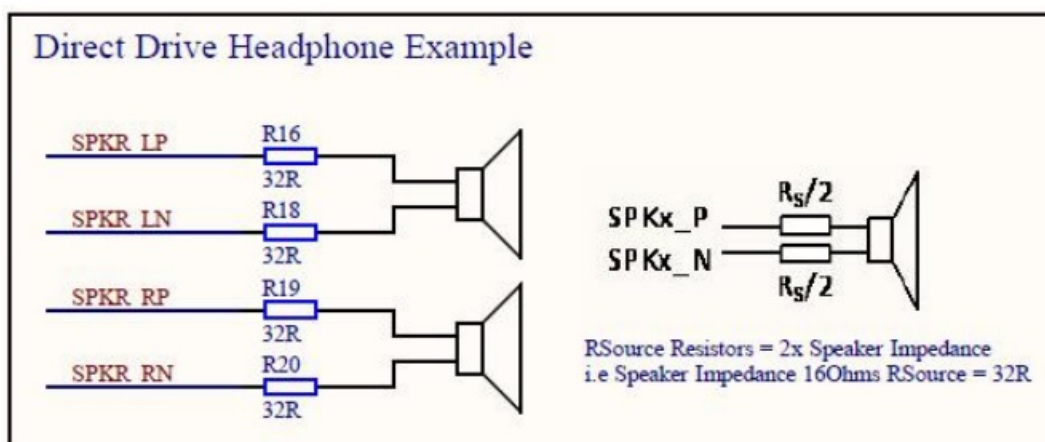
To achieve optimal audio performance in direct drive applications the DACs should operate at close the maximum output voltage of 1Vrms. This can be achieved by adding source resistors between the output terminals and the speaker driver, the value of which are double the rated speaker impedance. i.e., for 16Ω speakers use 32Ω resistors, for 32Ω speakers use 64Ω resistors.

Class-AB operation enables either headphone or speaker applications, with higher impedance loads such as differential line out or for driving an external power amplifier. For such applications requiring external power amplifiers, the output should be filtered using a 30 kHz RC low pass filters as shown in the application schematic below:

Amplified Audio Output Application Example
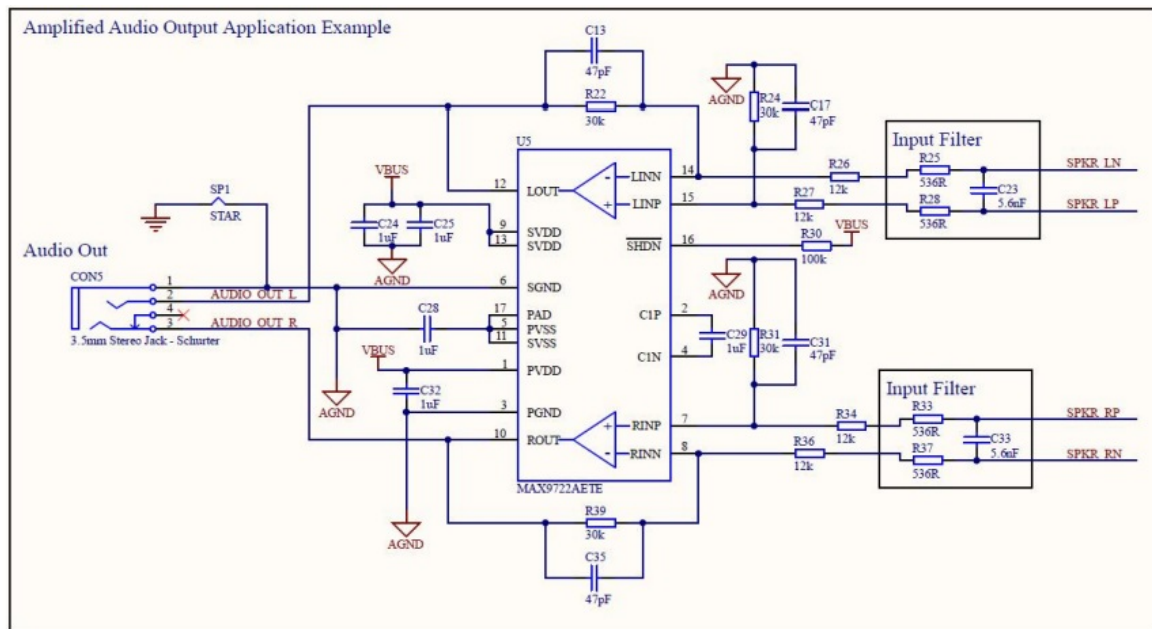
Further noise shaping can be employed by the addition of a DC blocking capacitor between the input filter and the input resistor of the audio amplifier. This forms a high pass filter which has a 3dB cut-off frequency described by the equation below.

$$f_{-3dB} = \frac{1}{2\pi R_{IN} C_{IN}}$$

The recommended layout for the analogue audio outputs is to use differential routing, keeping the two channels isolated from each other and from other sensitive circuitry.

The IDC777 DK1 board uses an external audio amplifier for audio application demonstration purposes. When using an external audio amplifier, it is important to follow the manufacturers recommended circuit and layout guidelines to achieve the best possible audio experience.

Always use a high-quality audio amplifier ideally with click and pop suppression circuits built in. These amplifiers use noise suppression and soft start techniques to filter supply noise and transients as well as minimising ground loop currents and DC offsets that can cause degraded audio effects. Some amplifiers even employ ground sensing and suppression techniques to minimise and remove noise coupling to the audio path.

In the example amplifier circuit shown above the amplifier audio ground is connected to the main ground via a single "star" point at the audio output jack. This is suitable for connection to headphones where noise from external sources are not expected.

When connecting to external devices such as laptops in a "Line In" configuration there is a possibility that the sleeve of the audio cable can carry noise derived from the laptop. Also external devices connected through the audio cable sleeve can have different ground potentials which causes currents to flow through the sleeve ground. In this case it is important to isolate the sleeve ground from the audio amplifier to avoid the noise coupling to the amplifier and degrading the signal source. In this case add a filter circuit or ferrite bead connecting the sleeve ground to the ground on the application board as shown below.

Amplified Audio Output Application Example
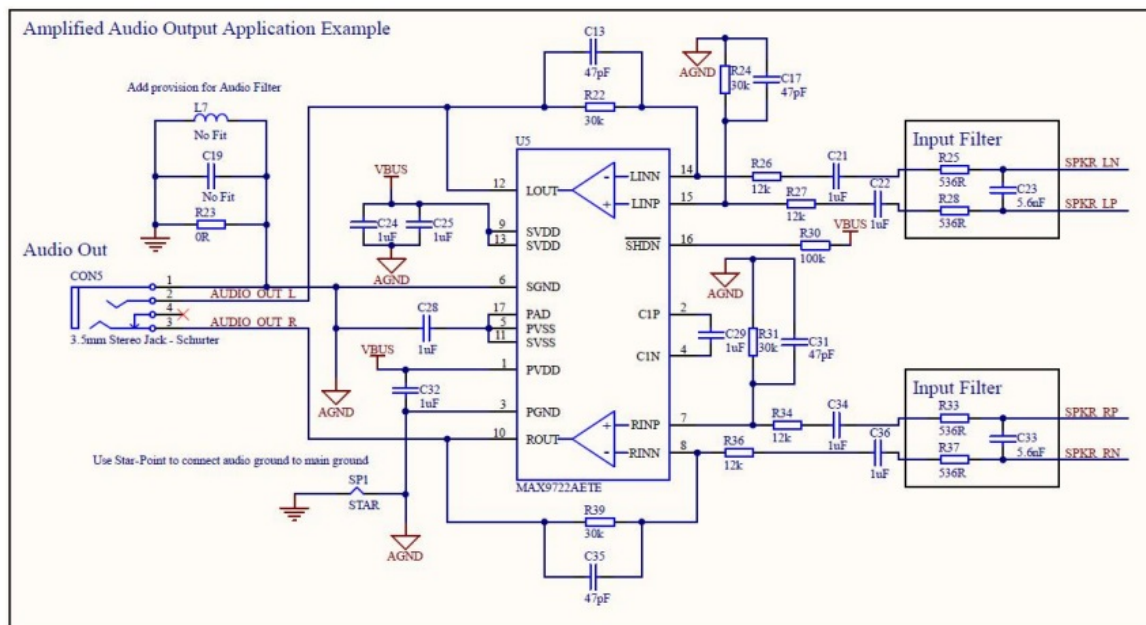
Some amplifiers do not support "capless" operation and require ac coupling on the input and output of the amplifier. Series capacitance can introduce clicks and pops during turn off and turn on as voltage transients occur across the capacitors causing audible spikes on the audio output.

Choice of capacitors used in these configurations is important, avoid using ceramic capacitors as these tend to have high voltage coefficients. Use low voltage coefficients capacitors such as tantalum or electrolytic capacitors to reduce low frequency distortion effects.

In differential mode the tolerance of the source and feedback resistors which set the gain of an amplifier is important. 1% resistors give a 40dB CMRR (Common Mode Rejection Ratio) whereas 0.1% resistors give a 60dB CMRR. Use 0.1% resistors where possible.

USB supply configuration:

In many applications supply noise can significantly degrade audio performance. This is especially true in USB powered applications or where a USB source is used to charge a battery powered application. USB sources have varying noise levels and in addition to steady state noise levels, the plugging and unplugging of USB chargers can cause large supply transients that ripple through the power supply chain to cause clicking and popping in the audio domain. It is recommended to follow good noise immunity pcb design practices, ground isolation, short residual current return paths and the use of ferrite bead and large decoupling capacitors on USB supply connections.

An example USB supply configuration is shown below.
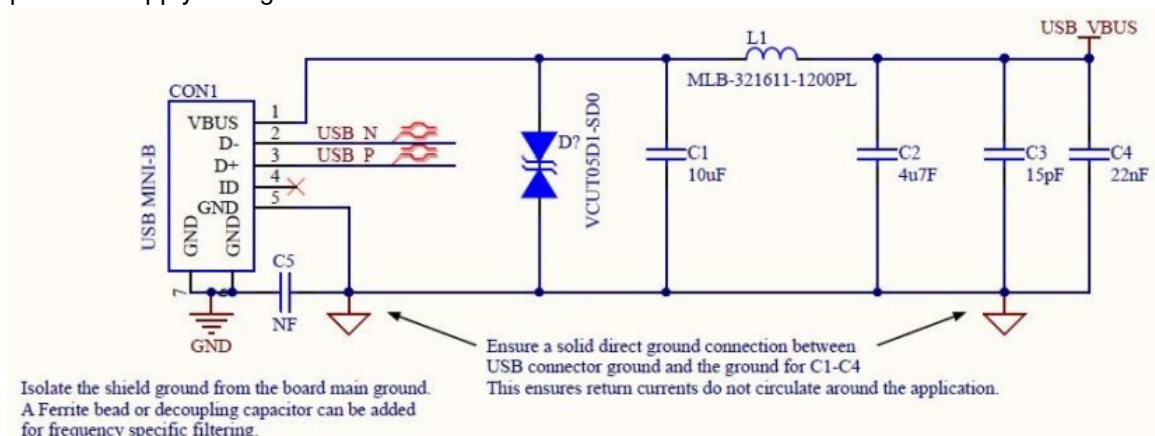
Digital Audio Interfaces

The IDC777 supports digital microphones as inputs, and interfaces to external audio devices via a standard I2S/PCM interface. Up to eight channels of digital microphone inputs are supported. These are grouped as four pairs, as most digital microphones support a L/R selection pin which allows for the clocking of two microphones from the same clock, with one being sampled on the rising clock edge and the other on the falling clock edge Eight digital microphone clock frequencies can be generated. Configurable at: 500 kHz, 571 kHz, 666 kHz, 800 kHz, 1 MHz, 1.33 MHz, 2 MHz, and 4 MHz clock frequencies.

The digital microphone, CLK and Data functions can be mapped to any PIO on the module.

I²S/PCM/SPDIF
IDC777 provides a standard I²S/PCM/SPDIF interface capable of operating at up to a 384 kHz sample rate. The I²S/PCM port is highly configurable with alternate PCM modes, and has the following options:

- SYNC edge position selectable to align with start of channel data (PCM mode), or 1 clock before start of channel
- data (I²S mode)
- Master (generate CLK and SYNC) or Slave (receive CLK and SYNC) (PCM/I²S)
- SYNC polarity (PCM)
- Long or short SYNC (PCM)
- Left or right justification (PCM/I²S)
- Sign extension / zero pad (PCM)
- Optional tri-state at end of word (PCM)
- Optional invert of clock (PCM/ I²S)
- 13/16/24-bit per sample (PCM/ I²S)
- Up to four slots per frame (PCM)

SPDIF (IEC 60958) uses biphase coding to minimize the DC content of the transmitted signal, and enables the receiver to decode clock information from the transmitted signal.
IDC777 has 2 SPDIF interfaces for input and output.These interfaces are compatible with IEC 60958-1, IEC, 60958-3, IEC 60958-4, and AES/EBU standards. Signals are input/output via PIO and typically require external line drivers (for 75 Ω cabling) or optical transceivers ('Toslink').
The I2S/PCM/SPDIF interface is available on dedicated pins see the Pin Out table on pages 5 and 6 for details.

Solder Reflow Profile

The solder profile is described below.
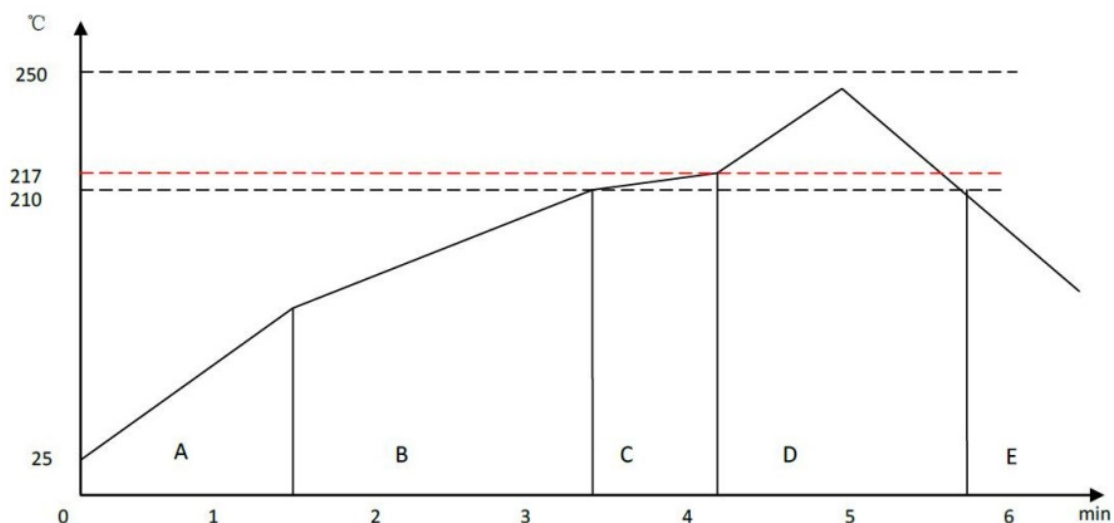
Zone A: Preheat: This raises the temperature at a controlled rate, typically 0.5 – 2C/s. This will preheat the component to 120°C to 150°C to distribute the heat uniformly to the PCB.
Zone B: Equilibrium1: In this zone, the flux becomes soft and uniformly spreads solder particles over the PCB board, preventing re-oxidisation. The recommended temperature for this zone is 150°C to 200°C for 60s to 120s.
Zone C: Equilibrium2: This is optional and in order to resolve the upright component issue.
Temperature is 210°C to 217°C for 20s to 30s.

Zone D: Reflow zone: The temperature should be high enough to avoid wetting but low enough to avoid component deterioration. The recommended peak temperature is 230°C to 250°C. The soldering time should be 30s to 90s when the temperature is above 217°C.

Zone E: Cooling: The cooling rate should be fast to keep the solder grains small which will give a longer lasting joint. A typical cooling rate is 4°C/s.
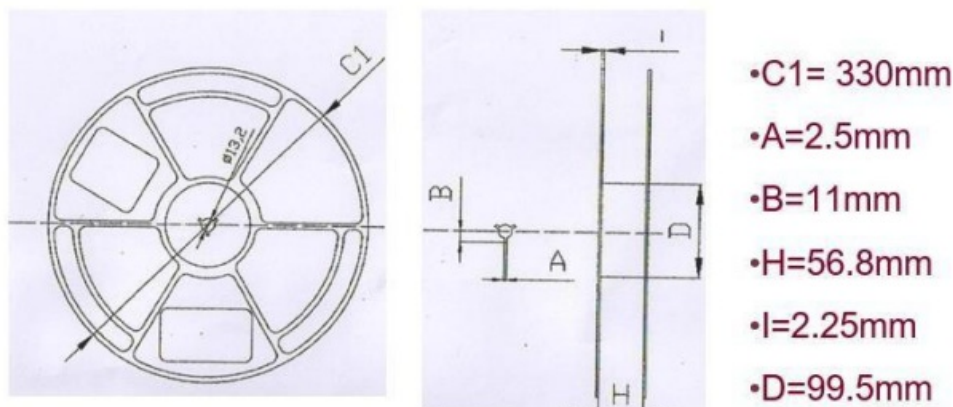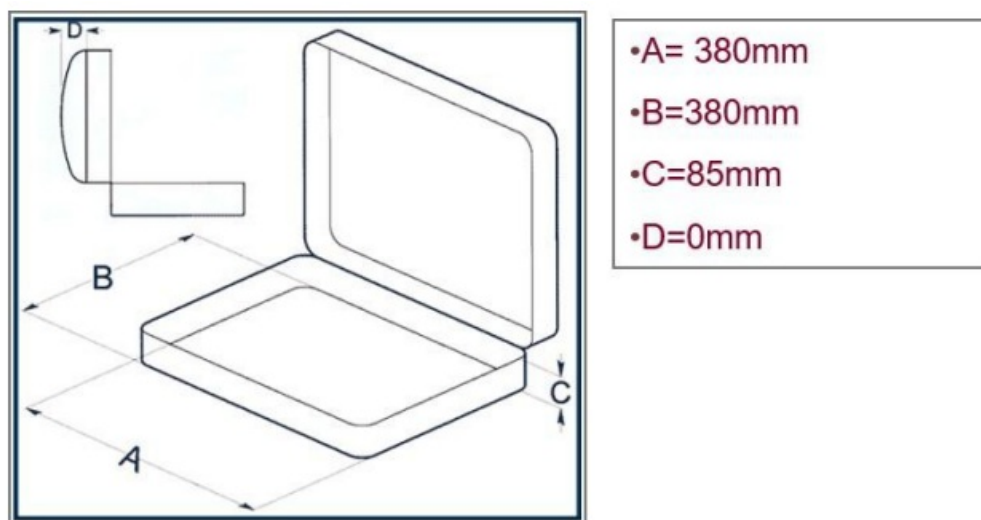
Ordering Information

Order Number	Description
IDC777-1	Bluetooth Module
IDC777-1-DK	IDC777 Development board

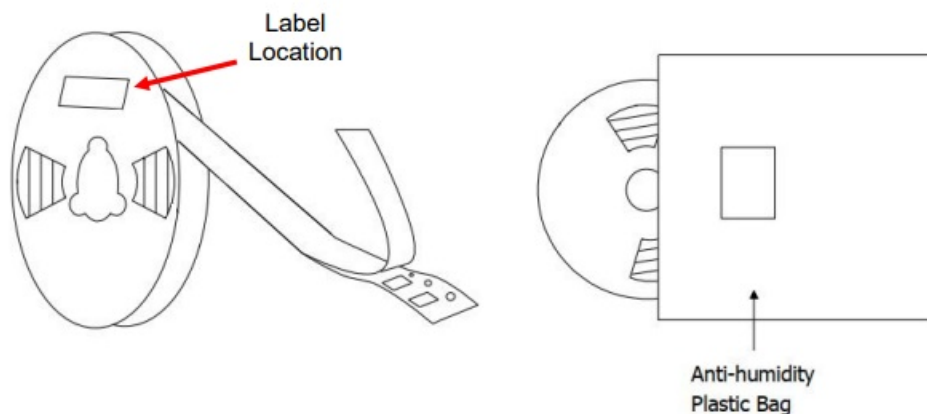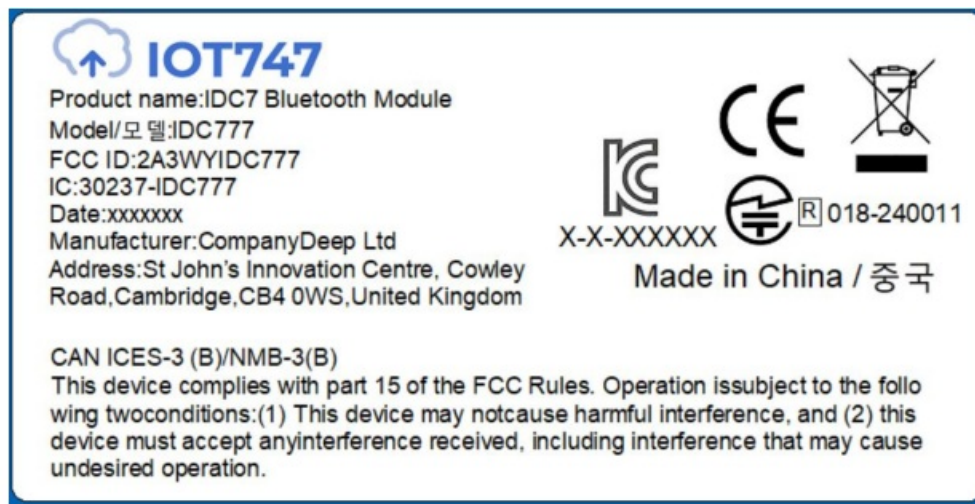Modules are shipped Flashed with the latest AudioAgent firmware production build.

Customers need to confirm at order with distributors that they will receive the firmware build they require. For volume orders (1k quantities), modules can be shipped flashed with custom firmware. Please inquire with **info@iot747.com** for more information.

Packaging

Modules are shipped in a Tape and Reel. The package and inside tape and reel dimensions are shown below:

- •A= 380mm
- •B=380mm
- •C=85mm
- •D=0mm

- •C1= 330mm
- •A=2.5mm
- •B=11mm
- •H=56.8mm
- •I=2.25mm
- •D=99.5mm

Label Location

IOT747
Product name:IDC7 Bluetooth Module
Model/모델:IDC777
FCC ID:2A3WYIDC777
IC:30237-IDC777
Date:xxxxxxx
Manufacturer:CompanyDeep Ltd
Address:St John's Innovation Centre, Cowley Road,Cambridge,CB4 0WS,United Kingdom

X-X-XXXXXX
R 018-240011
Made in China / 중국

CAN ICES-3 (B)/NMB-3(B)
This device complies with part 15 of the FCC Rules. Operation issubject to the following twoconditions:(1) This device may notcause harmful interference, and (2) this device must accept anyinterference received, including interference that may cause undesired operation.

Label Location

Anti-humidity Plastic Bag

General Notes

IOT747 products are not authorised for use in life-support or safety-critical applications. Use in such applications is done at the sole discretion of the customer. IOT747 will not warrant the use of its devices in such applications.
While every care has been taken to ensure the accuracy of the contents of this document, IOT747 cannot accept responsibility for any errors. IOT747 reserves the right to make modifications, corrections and any other changes to its products at any time. Customers should obtain the latest information before placing orders.
IOT747 other products, services and names used in this document may have been trademarked by their respective owners. The publication of this information does not imply that any license is granted under any patent or other rights owned by IOT747.
IOT747® is a trading name for Company Deep Limited.

IC Warning:

CAN ICES-3 (B)/NMB-3(B)
This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions: (1) This device may not cause interference. (2) This device must accept any interference, including interference that may cause undesired operation of the device.

FCC Warning:

This device complies with part 15 of the FCC Rules. Operation issubject to the following twoconditions:(1) This device may notcause harmful interference, and (2) this device must accept anyinterference received, including interference that may causeundesired operation. Please take attention that changes or modification not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Antenna used:

Antenna Type	Brand/ manufacturer	Model No.	Max. Antenna Gain
Chip Antenna	Johanson	2450AT42B100	0dBi

Notice to Host Product Manufacturer

Any deviation(s) from the defined parameters of the antenna trace, as described by this instruction, host product manufacturer must notify us that you wish to change the antenna trace design. In this case, a Class II permissive change application is required to be filed by us, or you (host manufacturer) can take responsibility through the change in FCC ID and IC ID (new application) procedure followed by a Class II permissive change application.

CE Statement

$C\!\!\in$ Herby,CompanyDeep Ltd declares that this IDC7 Bluetooth Module IDC777 is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU.In accordance with Article 10(2) and Article 10(10),this product allowed to be used in all EU member states.

Safe distance warning

Use the IDC7 Bluetooth Module in the environment with the temperature between -40°C and 85°C, The device complies with RF specifications when the device used at 20cm from your body.

RF Exposure compliance statement

This Module complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator and your body. This transmitter must not be co- located or operating in conjunction with any other antenna or transmitter.

Labelling Instruction for Host Product Integrator

Please notice that if the FCC and IC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. For FCC, this exterior label should follow "Contains FCC ID: 2A3WYIDC777". In accordance with FCC KDB guidance 784748 Labeling Guidelines. For IC, this exterior label can use wording "Contains IC: 30237-IDC777".

Installation Notice to Host Product Manufacturer

The OEM integrator is responsible for ensuring that the end-user has no manual instruction to remove or install module.The module is limited to installation in mobile application, a separate approval is required for all other operating configurations, including portable configurations with respect to §2.1091 and difference antenna configurations.

Antenna Change Notice to Host manufacturer

If you desire to increase antenna gain and either change antenna type or use same antenna type certified, a Class II permissive change application is required to be filed by us, or you (host manufacturer) can take responsibility through the change in FCC ID&IC ID (new application) procedure followed by a Class II permissive change application.

FCC other Parts, Part 15B Compliance Requirements for Host product manufacturer

This modular transmitter is only FCC authorized for the specific rule parts listed on our grant, host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification.

Host manufacturer in any case shall ensure host product which is installed and operating with the module is in compliant with Part 15B requirements.Please note that For a Class B or Class A digital device or peripheral, the instructions furnished the user manual of the end-user product shall include statement set out in §15.105 Information to the useror such similar statement and place it in a prominent location in the text of host product manual. Original texts as following:

For Class B

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not

installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

For Class A
Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Change Log
6/1/2021: Draft Version
9/4/2021: Minor Corrections / Typos – Added information on front page
20/7/2021: Clarified Supply configurations. Added Test Points for Fixed Supply
21/7/2021: Simplified Supply configuration – Removed detailed Power States. Deleted references to SPI as only used in IDC707.
20/1/2022: Added certification details and corrected Power Supply connection with correct Pins.

Documents / Resources

IOT747 IDC777 Bluetooth Module [pdf] User Manual
IDC777 Bluetooth Module, IDC777, Bluetooth Module, Module

References

- ⌂ **Bluetooth Technology - Bluetooth modules - IOT747**
- **User Manual**