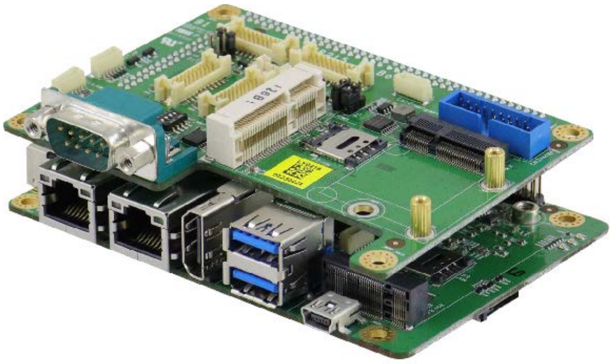

IBASE IBR215 Series Ruggedized Embedded Computer User Manual

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2 Compliance
3 Important Safety Information
4 Warranty Policy
5 Technical Support & Services
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IBASE IBR215 Series Ruggedized Embedded Computer User Manual

IBR215 Series
Ruggedized Embedded Computer
with NXP ARM@ Cortex@
A53 i.MX8M Plus Quad SOC

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Trademarks

All the trademarks, registrations and brands mentioned herein are used for identification purposes only and may be trademarks and/or registered trademarks of their respective owners.

Compliance

CE The product described in this manual complies with all applicable European Union (CE) directives if it has a CE marking. For systems to remain CE compliant, only CEcompliant parts may be used. Maintaining CE compliance also requires proper cable and cabling techniques.

FC This product has been tested and found to comply with the limits for a Class B 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 manufacturer's instructions, may cause harmful interference to radio communications.

WEEE

This product must not be disposed of as normal household waste, in accordance with the EU directive of for waste electrical and electronic equipment (WEEE – 2012/19/EU). Instead, it should be disposed of by returning it to a municipal recycling collection point. Check local regulations for disposal of electronic products.

Green IBASE

This product complies with the current RoHS directives restricting the use of the following substances in concentrations not to exceed 0.1% by weight (1000 ppm) except for cadmium, limited to 0.01% by weight (100 ppm).

- Lead (Pb)
- Mercury (Hg)
- Cadmium (Cd)
- Hexavalent chromium (Cr6+)
- Polybrominated biphenyls (PBB)
- Polybrominated diphenyl ether (PBDE)

Important Safety Information

Carefully read the following safety information before using this device.

Setting up your system:

- Put the device horizontally on a stable and solid surface.
- Do not use this product near water or any heated source.
- Leave plenty of space around the device and do not block the ventilation openings. Never drop or insert any objects of any kind into the openings.
- Use this product in environments with ambient temperatures between 0˚C and 60˚C.

Care during use:

- Do not place heavy objects on the top of the device.
- Make sure to connect the correct voltage to the device. Failure to supply the correct voltage could damage the

unit.

- Do not walk on the power cord or allow anything to rest on it.
- If you use an extension cord, make sure the total ampere rating of all devices plugged into the extension cord does not cord’s ampere rating.
- Do not spill water or any other liquids on your device.
- Always unplug the power cord from the wall outlet before cleaning the device.
- Only use neutral cleaning agents to clean the device.
- Vacuum dust and particles from the vents by using a computer vacuum cleaner.

Product Disassembly

Do not try to repair, disassemble, or make modifications to the device. Doing so will void the warranty and may result in damage to the product or personal injury.

⚠ **CAUTION**

Replace only with the same or equivalent type recommended by the manufacturer.
Dispose of used batteries by observing local regulations.

Warranty Policy

- IBASE standard products:
  24-month (2-year) warranty from the date of shipment. If the date of shipment cannot be ascertained, the product serial numbers can be used to determine the approximate shipping date.
- 3rd-party parts:
  12-month (1-year) warranty from delivery for 3rd-party parts that are not manufactured by IBASE, such as CPU, CPU cooler, memory, storage devices, power adaptor, display panel and touch screen.

PRODUCTS, HOWEVER, THAT FAIL DUE TO MISUSE, ACCIDENT, IMPROPER INSTALLATION OR UNAUTHORIZED REPAIR SHALL BE TREATED AS OUT OF WARRANTY AND CUSTOMERS SHALL BE BILLED FOR REPAIR AND SHIPPING CHARGES.

Technical Support & Services

1. Visit the IBASE website at www.ibase.com.tw to find the latest information about the product.
2. If you encounter any technical problems and require assistance from your distributor or sales representative, please prepare and send the following information:

- Product model name
- Product serial number
- Detailed description of the problem
- Error messages in text or screenshots if any
- The arrangement of the peripherals
- Software used (such as OS and application software)

3. If repair service is required, please download the RMA form at http://www.ibase.com.tw/english/Supports/RMAService/. Fill out the form and contact your distributor or sales

representative.

Chapter 1: General Information

The information provided in this chapter includes:

- Features
- Packing List
- Specifications
- Overview
- Dimensions

1.1 Introduction

IBR215 is an ARM®-based embedded system with NXP Cortex® i.MX8M Plus A53 processor. The device offers 2D, 3D graphics and multimedia accelerations while it also features numerous peripherals that are well suited for industrial applications, including RS-232/422/485, GPIO, USB, USB OTG, LAN, HDMI display, M.2 E2230 for wireless connectivity and mini-PCIe for expansion.

1.2 Features

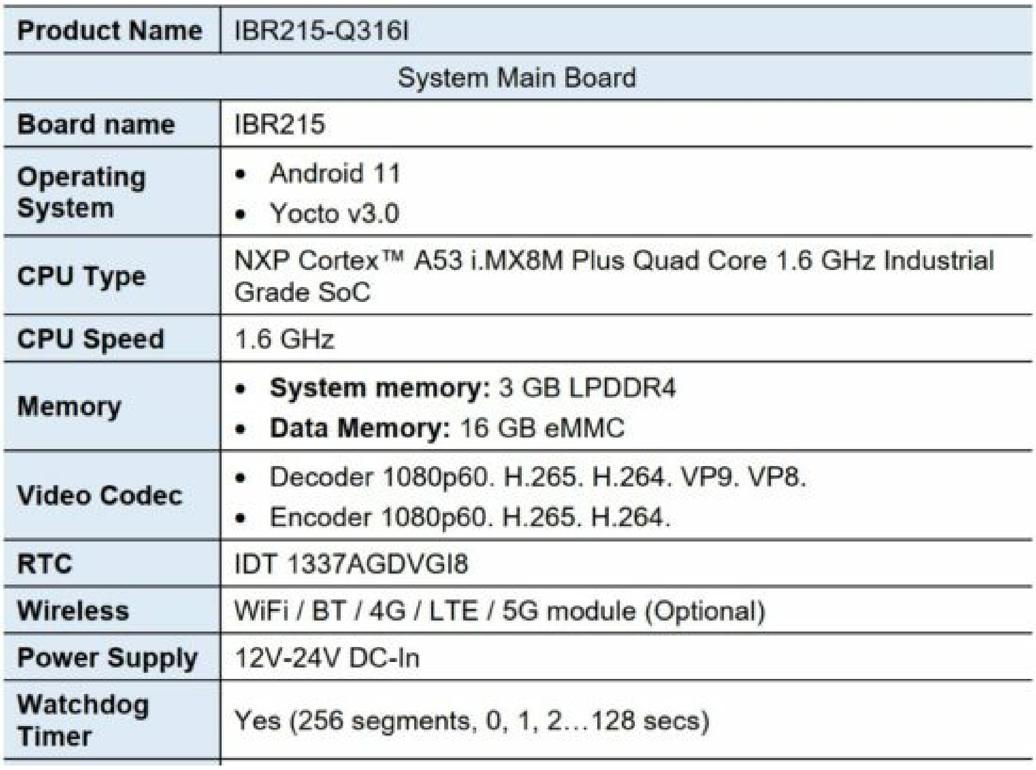
- NXP ARM® Cortex® A53 i.MX8M Plus Quad 1.6GHz Industrial Grade processor
- 3 GB LPDDR4, 16 GB eMMC and SD socket
- External connectivity including USB, HDMI, Ethernet
- Supports M.2 B-Key (3052) for 5G modules
- Rich I/O expansion signals for IO board design to support WiFi/BT, 4G/LTE, LCD, Camera, NFC, QR-code, etc.
- Ruggedized and fanless design

1.3 Packing List

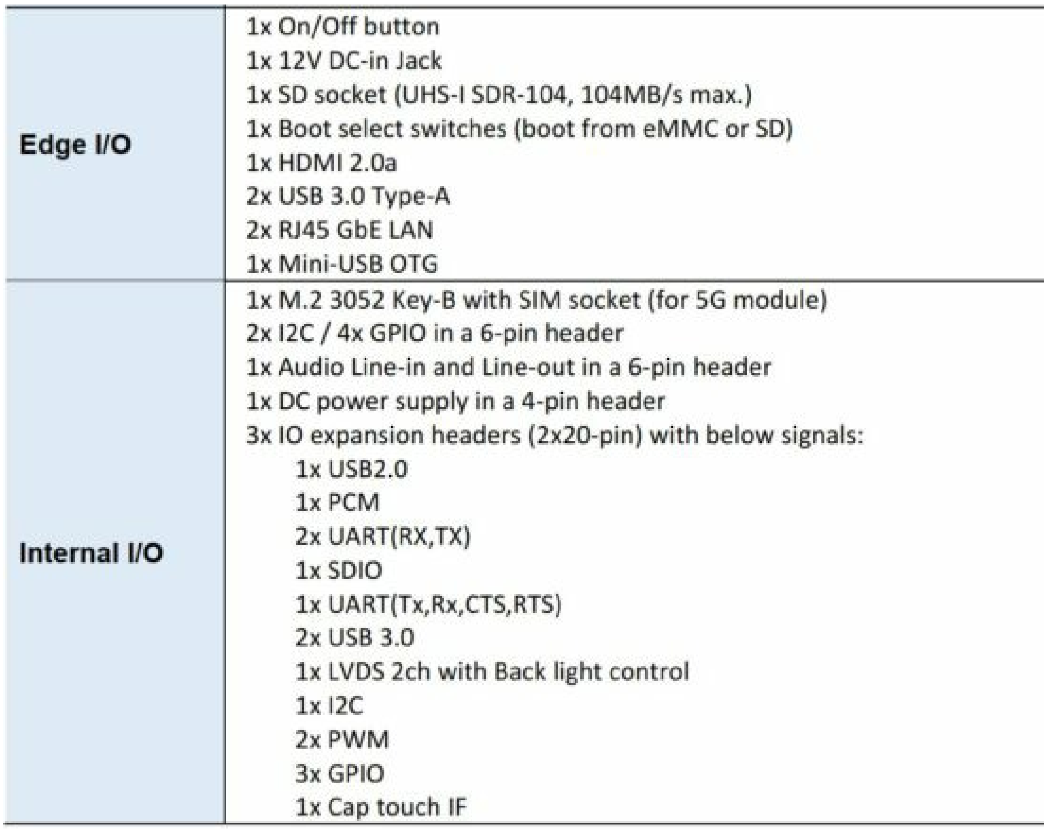
Your product package should include the items listed below. If any of the item below is missing, contact the distributor or the dealer from whom you have purchased the product. User manual are downloadable from our website.

- ISR215-Q316I

1.4 Specifications

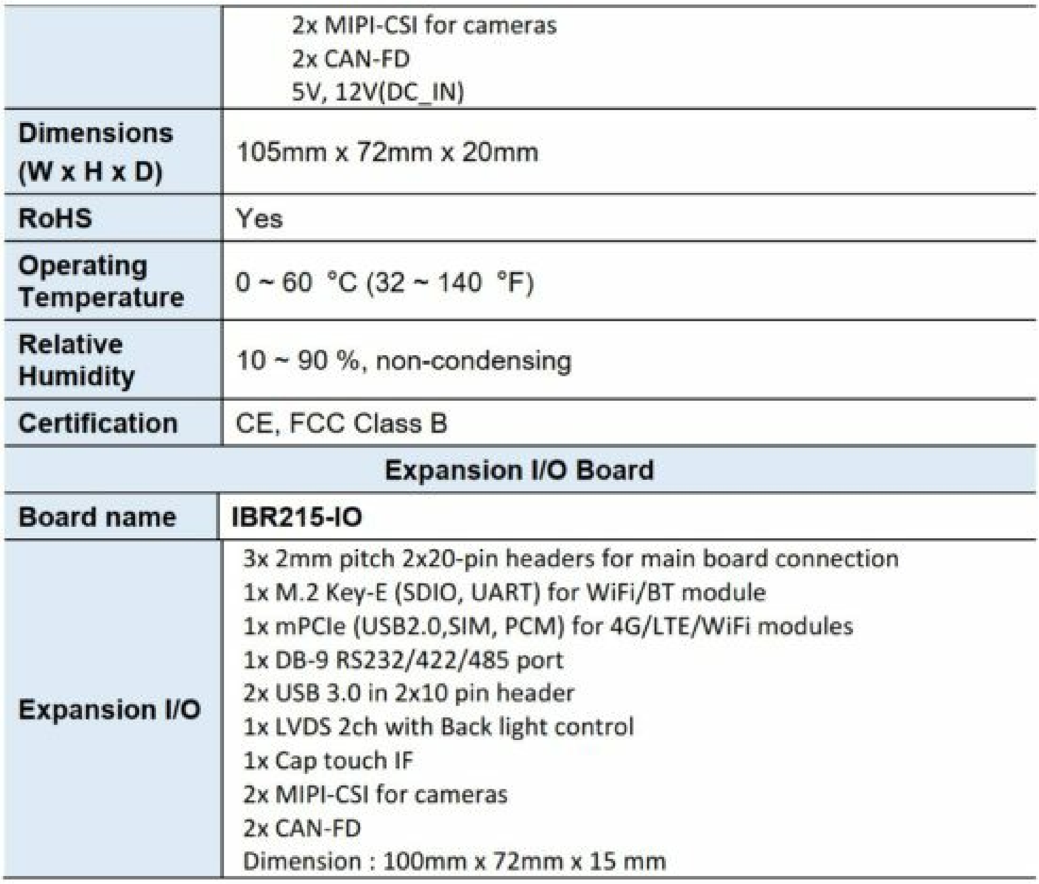


Product Name	IBR215-Q316I
System Main Board	
Board name	IBR215
Operating System	• Android 11 • Yocto v3.0
CPU Type	NXP Cortex™ A53 i.MX8M Plus Quad Core 1.6 GHz Industrial Grade SoC
CPU Speed	1.6 GHz
Memory	• **System memory:** 3 GB LPDDR4 • **Data Memory:** 16 GB eMMC
Video Codec	• Decoder 1080p60. H.265. H.264. VP9. VP8. • Encoder 1080p60. H.265. H.264.
RTC	IDT 1337AGDVGI8
Wireless	WiFi / BT / 4G / LTE / 5G module (Optional)
Power Supply	12V-24V DC-In
Watchdog Timer	Yes (256 segments, 0, 1, 2…128 secs)



Edge I/O	1x On/Off button 1x 12V DC-in Jack 1x SD socket (UHS-I SDR-104, 104MB/s max.) 1x Boot select switches (boot from eMMC or SD) 1x HDMI 2.0a 2x USB 3.0 Type-A 2x RJ45 GbE LAN 1x Mini-USB OTG

Internal I/O	1x M.2 3052 Key-B with SIM socket (for 5G module)
	2x I2C / 4x GPIO in a 6-pin header
	1x Audio Line-in and Line-out in a 6-pin header
	1x DC power supply in a 4-pin header
	3x IO expansion headers (2x20-pin) with below signals:
	    1x USB2.0
	    1x PCM
	    2x UART(RX,TX)
	    1x SDIO
	    1x UART(Tx,Rx,CTS,RTS)
	    2x USB 3.0
	    1x LVDS 2ch with Back light control
	    1x I2C
	    2x PWM
	    3x GPIO
	    1x Cap touch IF

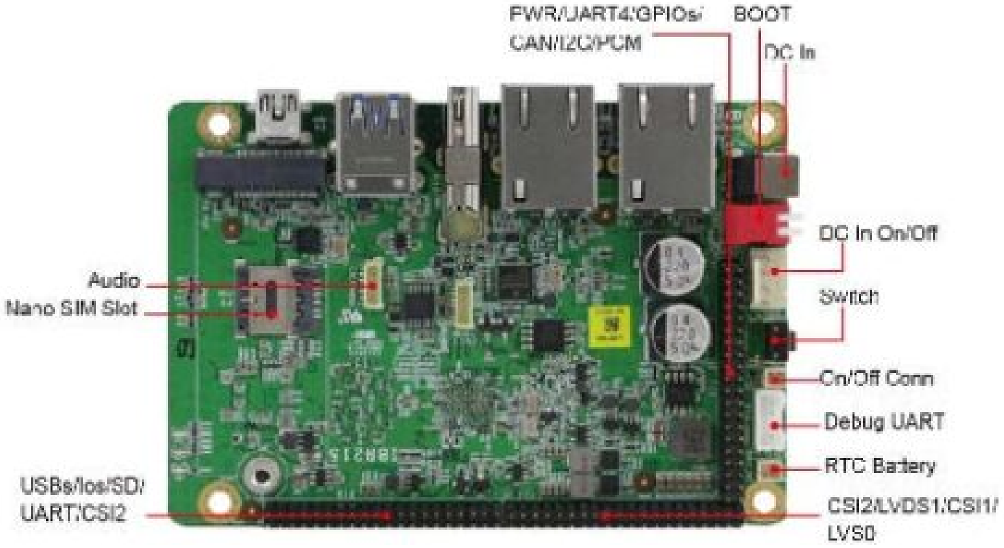


	2x MIPI-CSI for cameras 2x CAN-FD 5V, 12V(DC_IN)
Dimensions (W x H x D)	105mm x 72mm x 20mm
RoHS	Yes
Operating Temperature	0 ~ 60 °C (32 ~ 140 °F)
Relative Humidity	10 ~ 90 %, non-condensing
Certification	CE, FCC Class B
Expansion I/O Board	
Board name	**IBR215-IO**
Expansion I/O	3x 2mm pitch 2x20-pin headers for main board connection 1x M.2 Key-E (SDIO, UART) for WiFi/BT module 1x mPCIe (USB2.0,SIM, PCM) for 4G/LTE/WiFi modules 1x DB-9 RS232/422/485 port 2x USB 3.0 in 2x10 pin header 1x LVDS 2ch with Back light control 1x Cap touch IF 2x MIPI-CSI for cameras 2x CAN-FD Dimension : 100mm x 72mm x 15 mm

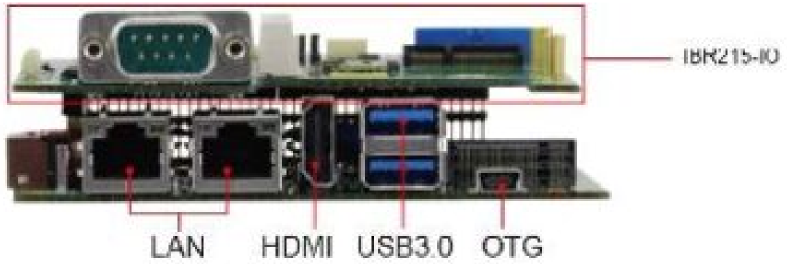
All specifications are subject to change without prior notice.

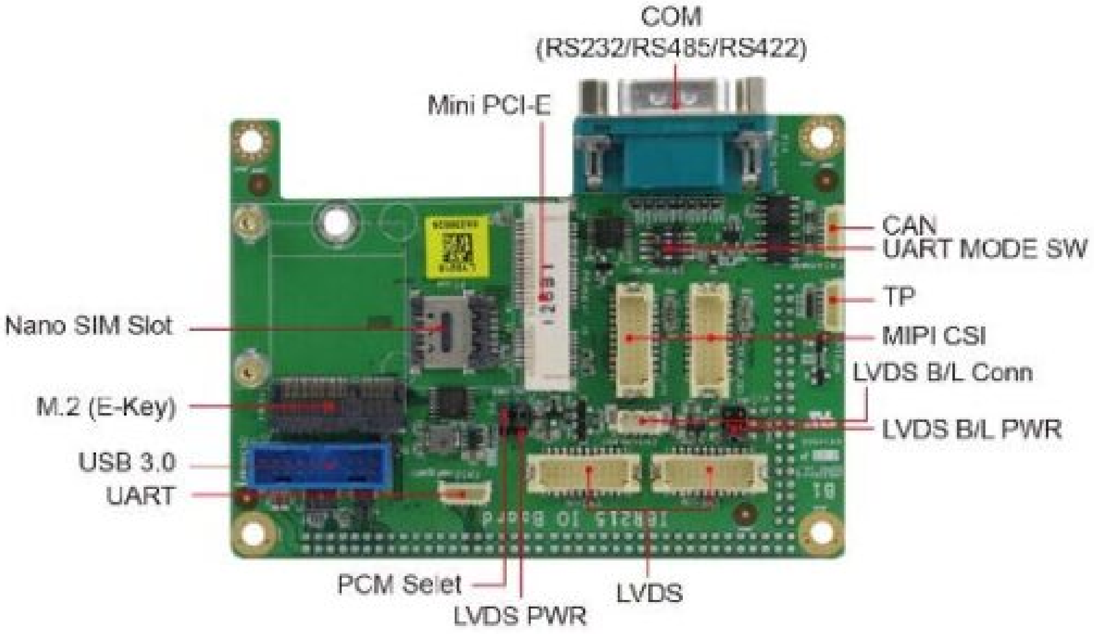
1.5 Product Overview

TOP VIEW


PWR/UART4/GPIOs/
CAN/I2C/PCM
BOOT
DC In
DC In On/Off
Audio
Nano SIM Slot
Switch
On/Off Conn
Debug UART
RTC Battery
USBs/Ios/SD/
UART/CSI2
CSI2/LVDS1/CSI1/
LVS0

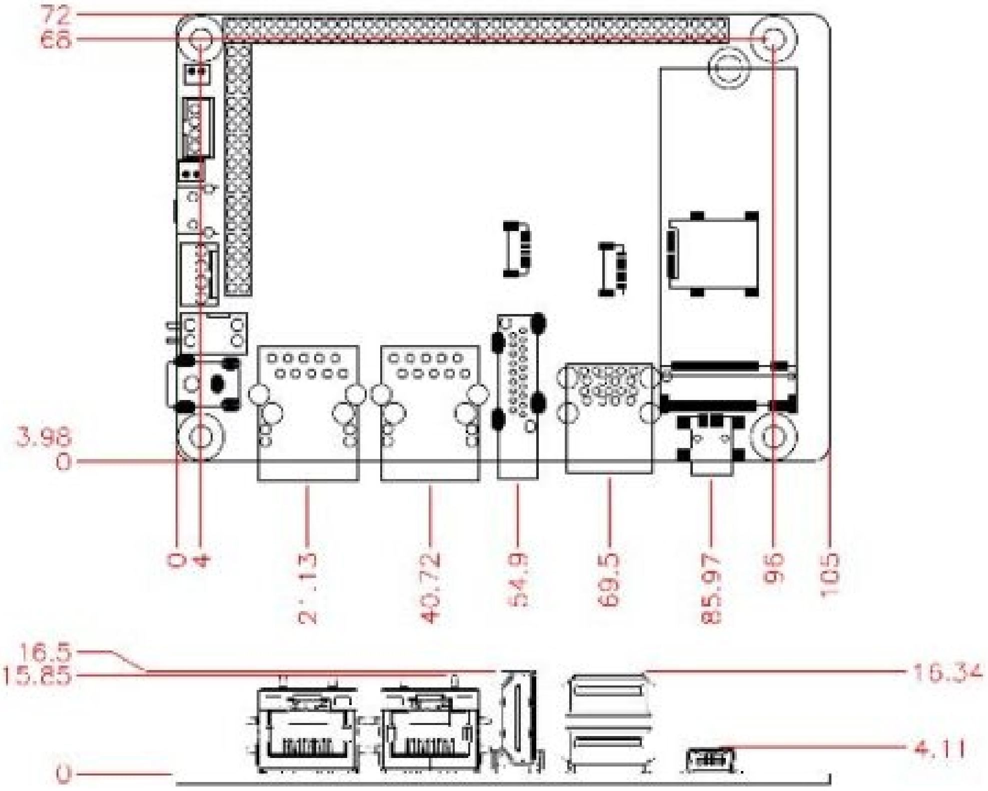
I/O VIEW

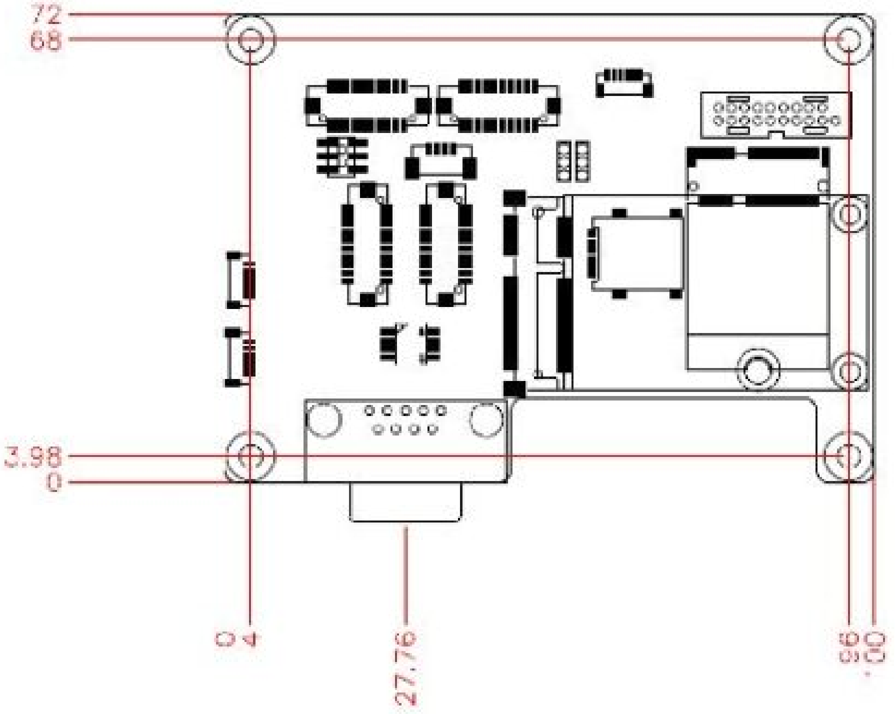

IBR215-IO
LAN
HDMI
USB3.0
OTG


COM
(RS232/RS485/RS422)
Mini PCI-E
CAN
UART MODE SW
TP
MIPI CSI
LVDS B/L Conn
LVDS B/L PWR
Nano SIM Slot
M.2 (E-Key)
USB 3.0
UART
PCM Selet
LVDS PWR
LVDS

1.6 Dimensions

Unit:mm


72
68
3.98
0
0
4
21.13
40.72
54.9
69.5
85.97
96
105
16.5
15.85
16.34
4.11
0


72
68
3.98
0
0
4
27.76
96
100

Chapter 2 Hardware Configuration

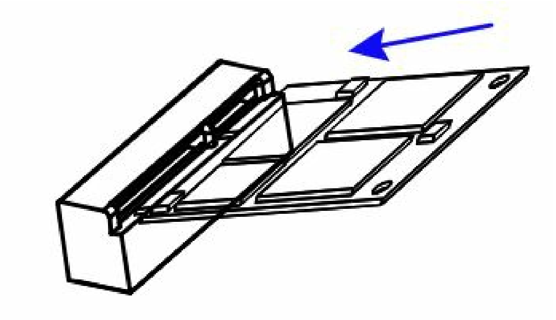
This section contains general information about:

- Installations
- Jumper and connectors

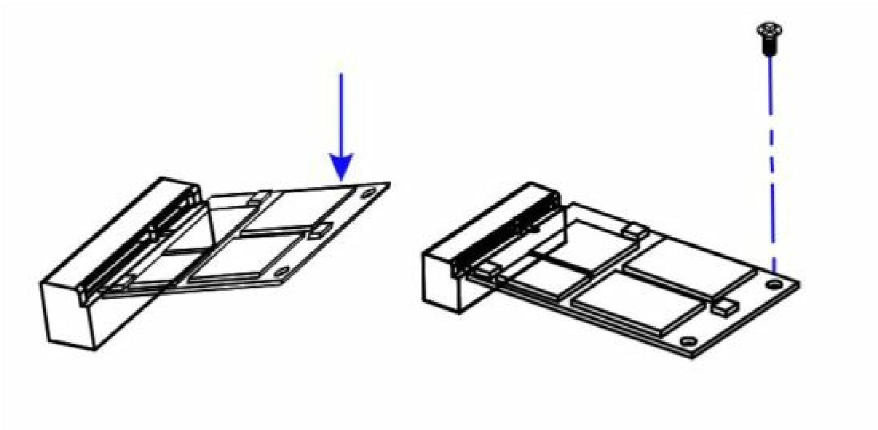
2.1.1 Mini-PCIe & M.2 Cards Installation

To install the mini-PCIe & NGFF M.2 card, remove the device cover first as mentioned above, locate the slot inside the device, and perform the following steps.

1) Align the keys of the mini-PCIe card with that of the mini-PCIe interface, and insert the card slantwise. (Insert the M.2 card in the same way.)



2) Push the mini-PCIe card downwards as shown in the picture below, and fix it onto the brass standoff with a screw.
(Fix the M.2 card also with one screw.)

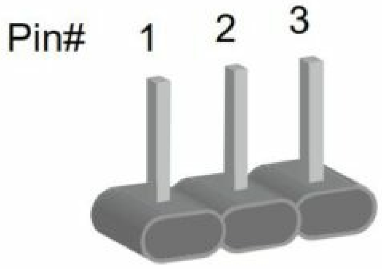


2.2.1 Setting the Jumpers

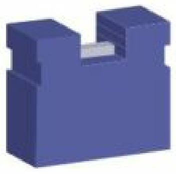
Configure your device by using jumpers to enable the features that you need based on your applications. Contact your supplier if you have doubts about the best configuration for your use.

2.2.2 How to Set Jumpers

Jumpers are short-length conductors consisting of several metal pins with a base mounted on the circuit board. Jumper caps are placed (or removed) on the pins to enable or disable functions or features. If a jumper has 3 pins, you can connect Pin 1 with Pin 2 or Pin 2 with Pin 3 by shorting the jumper.

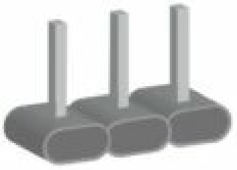
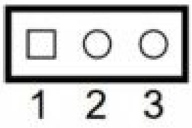
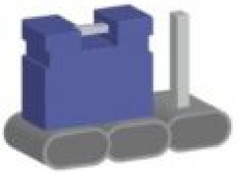
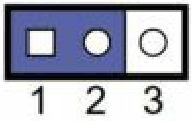
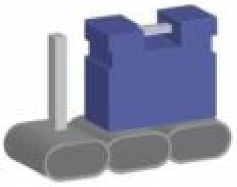
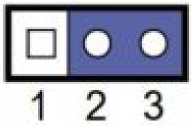


A 3-pin jumper



A jumper cap

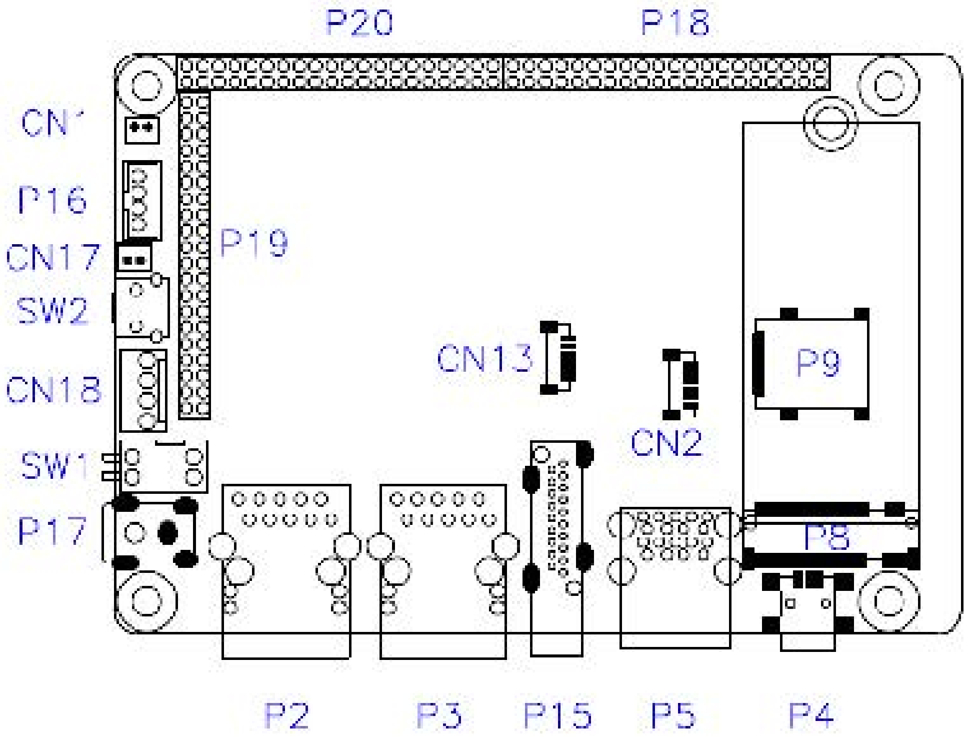
Refer to the illustration below to set jumpers.

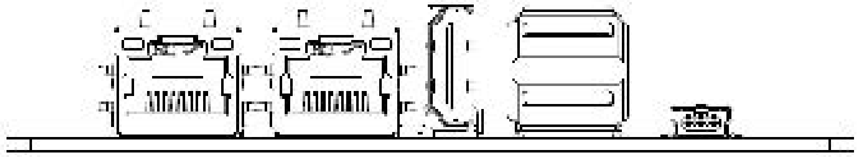
Pin closed	Oblique view	Illustration in the manual
Open		
1-2		
2-3		

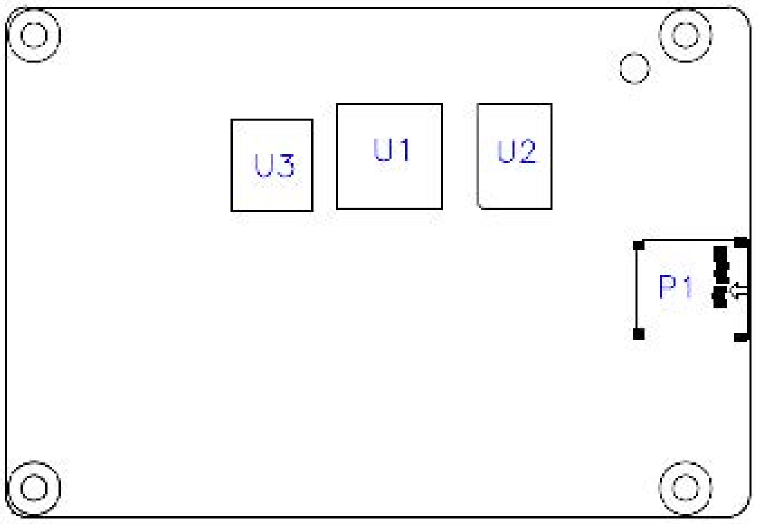
When two pins of a jumper are encased in a jumper cap, this jumper is closed, i.e. turned On.
When a jumper cap is removed from two jumper pins, this jumper is open, i.e. turned Off.

2.1 Jumper & Connector Locations on IBR215 main board Motherboard: IBR215

2.2 Jumper & Connectors Quick Reference for IBR215 main board

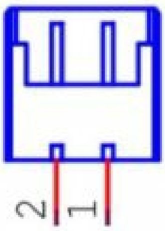

P20
P18
CN1
P16
CN17
SW2
CN18
SW1
P17
P19
CN13
CN2
P9
P8
P2
P3
P15
P5
P4




U3
U1
U2
P1

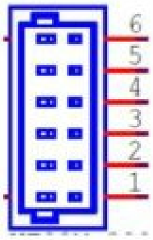
Function	Connector Name	Page
RTC Lithium Cell Connector	CN1	
Audio Line-In & Line-Out Connector	CN2	
I²C Connector	CN13	
DC Power Input	P17, CN18	- -
SD Card Slot	P1	- -
HDMI Port	P15	- -
GbE LAN Port	P2, P3	- -
Dual USB 3.0 Type-A Port	P5	- -
Mini-USB OTG Port	P4	- -
NGFF M.2 E2230 Slot	P8	- -
SIM Card Socket	P9	- -
System ON/OFF Button	SW2, CN17	- -
Factory Use Only	SW1	- -
Serial port	P16	
IO board port	P18, P19, P20	

RTC Lithium Cell Connector (CN1)



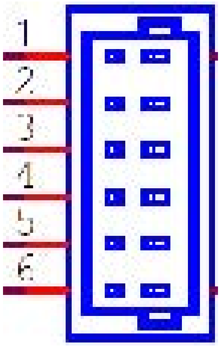
Pin	Signal Name	Pin	Signal Name
1	RTC_VCC	2	Ground

2.4.1 Audio Line-In & Line-Out Connector (CN2)



Pin	Signal Name	Pin	Signal Name
1	Ground	2	HP_R
3	HP_L	4	Ground
5	INR	6	INL

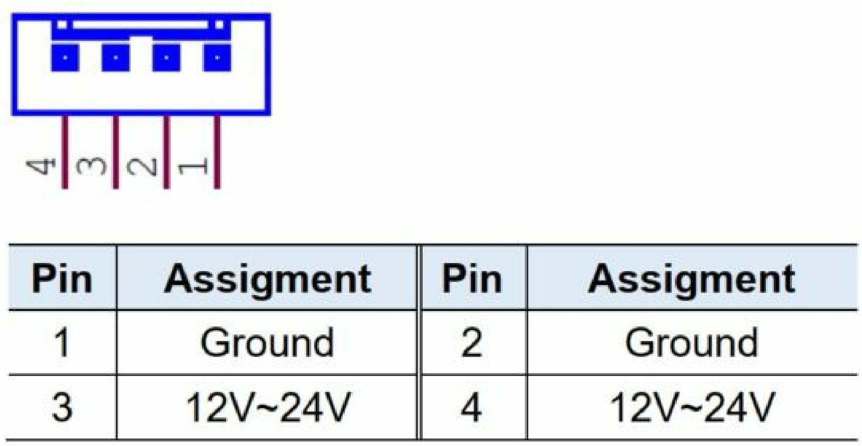
2.4.2 I2C Connector (CN13)



Pin	Signal Name	Pin	Signal Name
1	I2C3_SCL	2	I2C3_SDA
3	Ground	4	I2C4_SCL
5	I2C4_SDA	6	Ground

2.4.3 DC Power Input (P17,CN18)

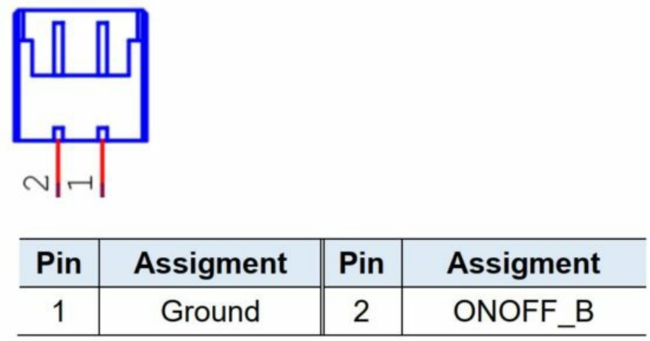
P17 12V~24V DC input
CN18 DC input/output header



Pin	Assigment	Pin	Assigment
1	Ground	2	Ground
3	12V~24V	4	12V~24V

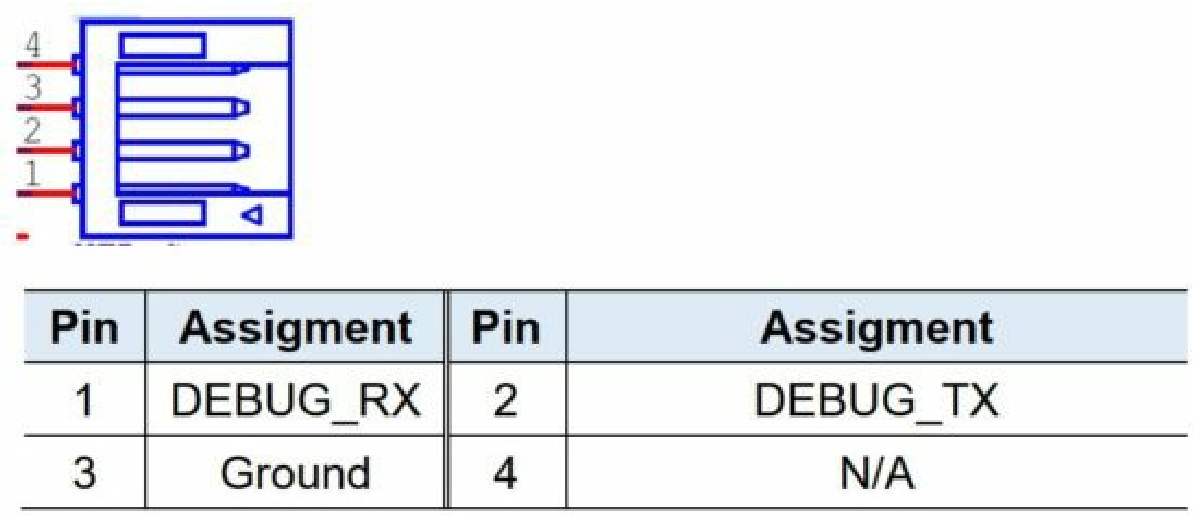
2.4.4 System ON/OFF Button (SW2, CN17)

SW2 ON/OFF switch
CN17 ON/OFF signal header



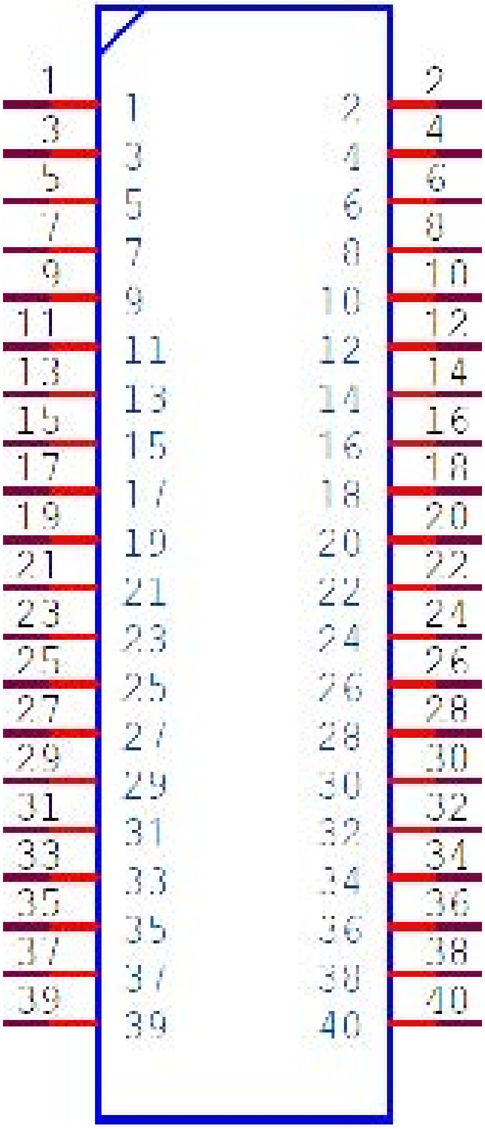
Pin	Assigment	Pin	Assigment
1	Ground	2	ONOFF_B

2.4.5 Serial port (P16)

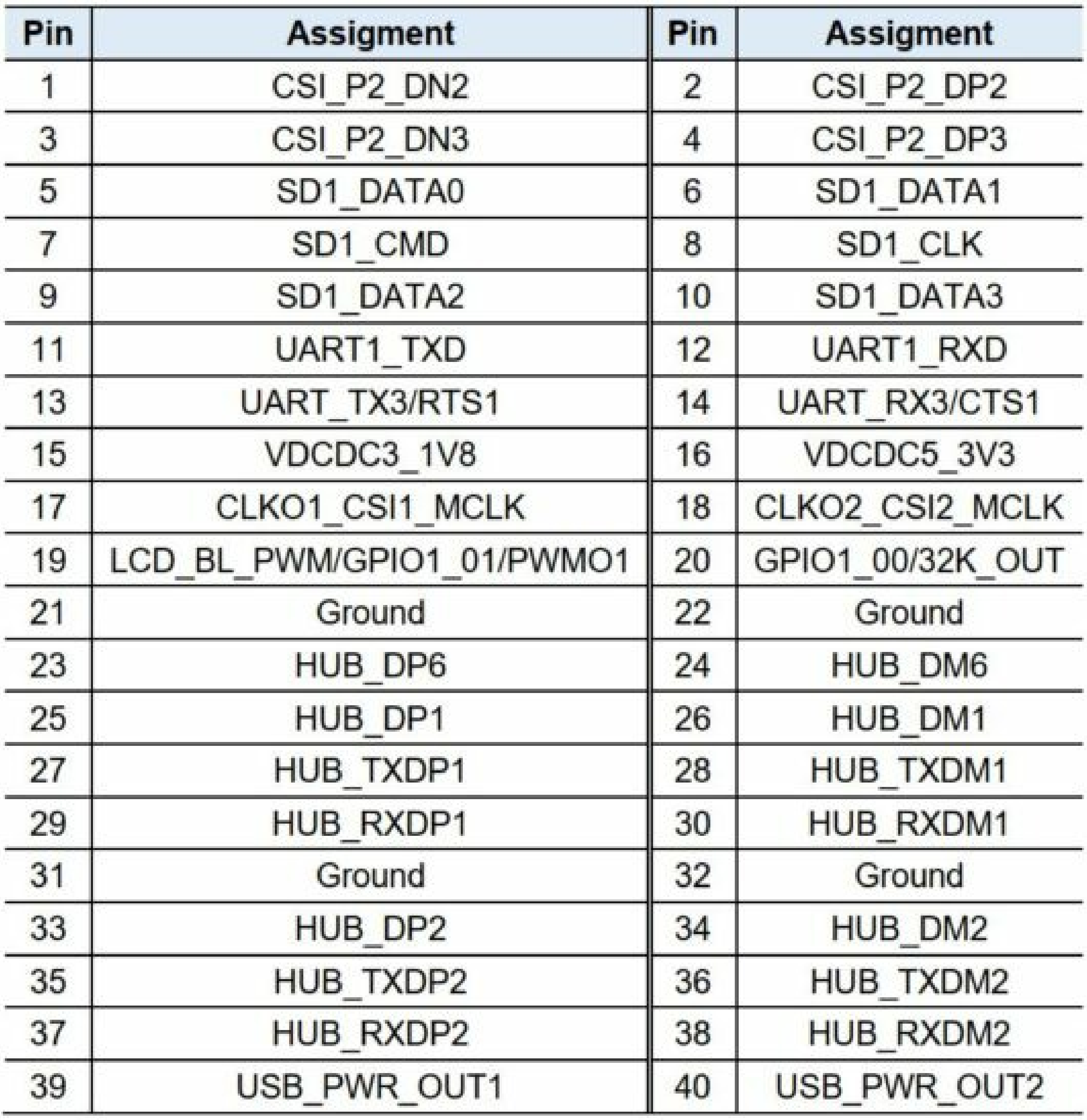


Pin	Assigment	Pin	Assigment
1	DEBUG_RX	2	DEBUG_TX
3	Ground	4	N/A

2.4.6 IO board port (P18, P19, P20)

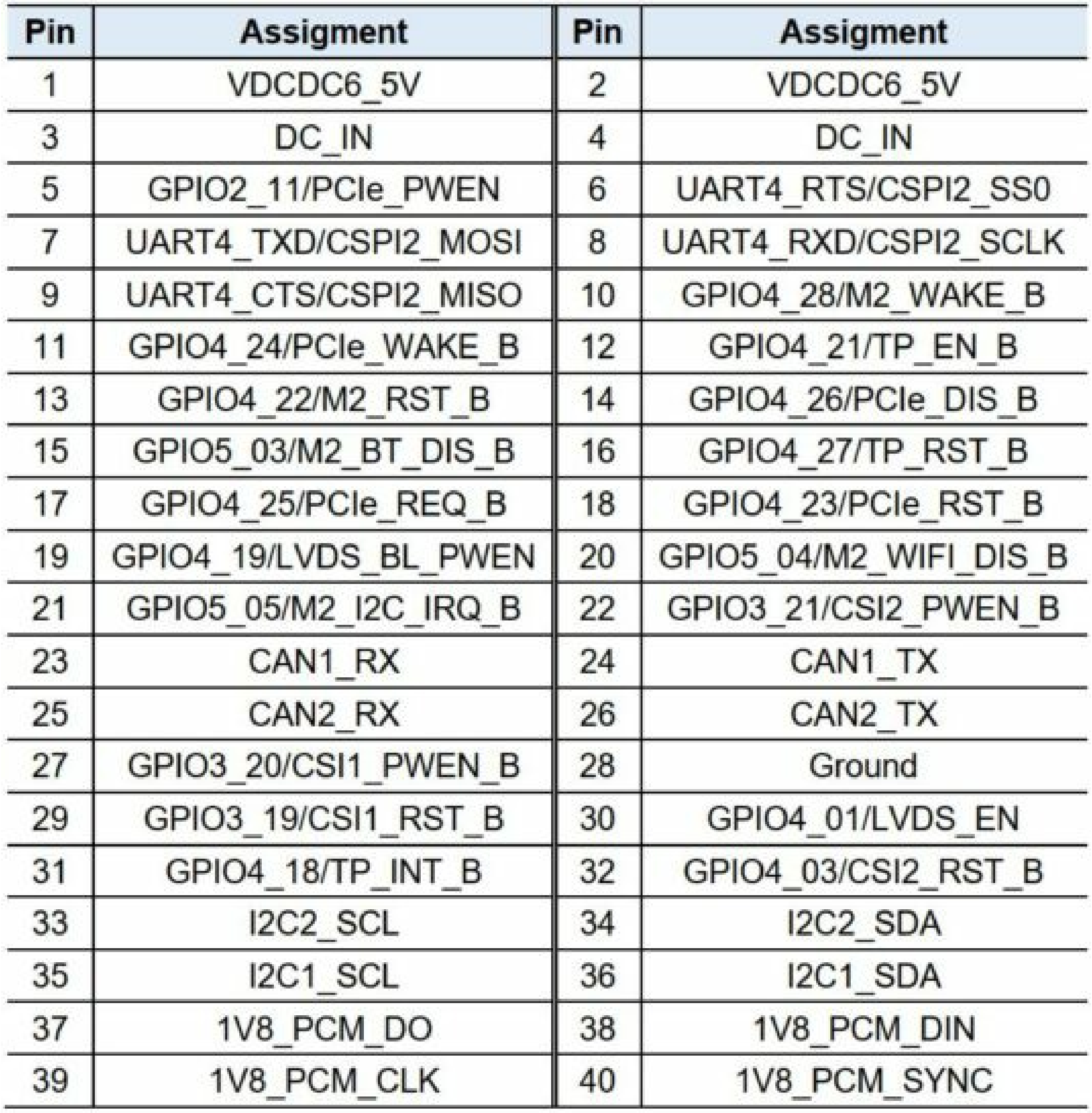


P18



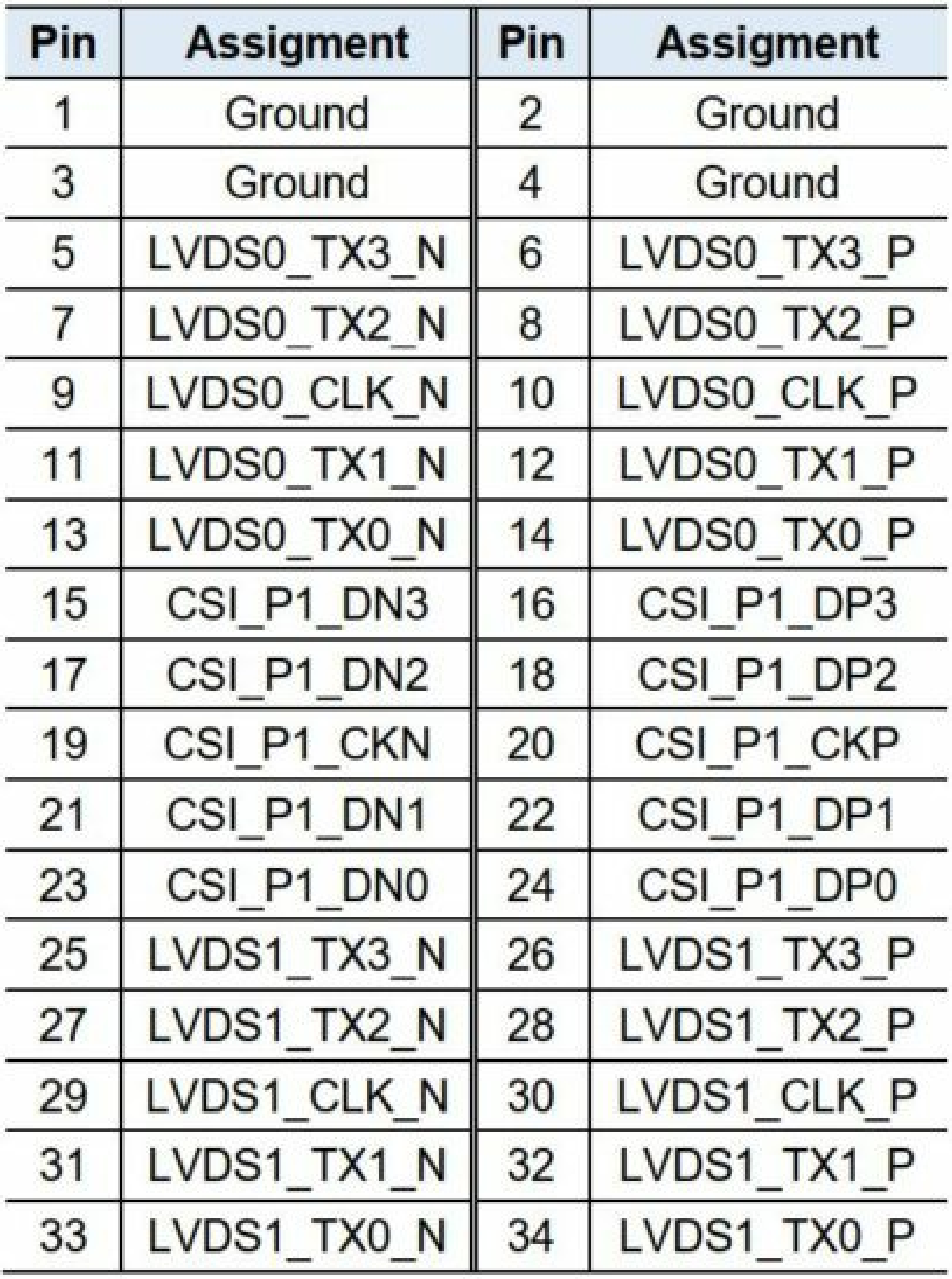
Pin	Assigment	Pin	Assigment
1	CSI_P2_DN2	2	CSI_P2_DP2
3	CSI_P2_DN3	4	CSI_P2_DP3
5	SD1_DATA0	6	SD1_DATA1
7	SD1_CMD	8	SD1_CLK
9	SD1_DATA2	10	SD1_DATA3
11	UART1_TXD	12	UART1_RXD
13	UART_TX3/RTS1	14	UART_RX3/CTS1
15	VDCDC3_1V8	16	VDCDC5_3V3
17	CLKO1_CSI1_MCLK	18	CLKO2_CSI2_MCLK
19	LCD_BL_PWM/GPIO1_01/PWMO1	20	GPIO1_00/32K_OUT
21	Ground	22	Ground
23	HUB_DP6	24	HUB_DM6
25	HUB_DP1	26	HUB_DM1
27	HUB_TXDP1	28	HUB_TXDM1
29	HUB_RXDP1	30	HUB_RXDM1
31	Ground	32	Ground
33	HUB_DP2	34	HUB_DM2
35	HUB_TXDP2	36	HUB_TXDM2
37	HUB_RXDP2	38	HUB_RXDM2
39	USB_PWR_OUT1	40	USB_PWR_OUT2

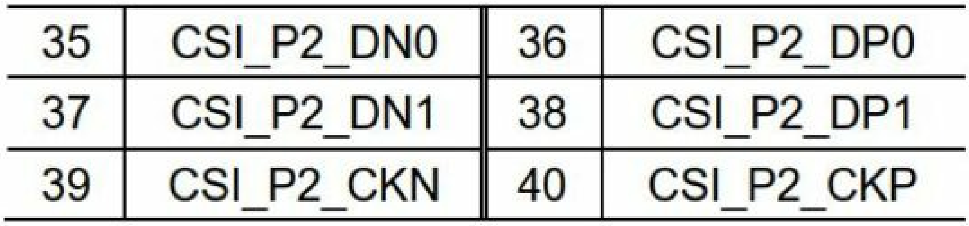
P19



Pin	Assigment	Pin	Assigment
1	VDCDC6_5V	2	VDCDC6_5V
3	DC_IN	4	DC_IN
5	GPIO2_11/PCIe_PWEN	6	UART4_RTS/CSPI2_SS0
7	UART4_TXD/CSPI2_MOSI	8	UART4_RXD/CSPI2_SCLK
9	UART4_CTS/CSPI2_MISO	10	GPIO4_28/M2_WAKE_B
11	GPIO4_24/PCIe_WAKE_B	12	GPIO4_21/TP_EN_B
13	GPIO4_22/M2_RST_B	14	GPIO4_26/PCIe_DIS_B
15	GPIO5_03/M2_BT_DIS_B	16	GPIO4_27/TP_RST_B
17	GPIO4_25/PCIe_REQ_B	18	GPIO4_23/PCIe_RST_B
19	GPIO4_19/LVDS_BL_PWEN	20	GPIO5_04/M2_WIFI_DIS_B
21	GPIO5_05/M2_I2C_IRQ_B	22	GPIO3_21/CSI2_PWEN_B
23	CAN1_RX	24	CAN1_TX
25	CAN2_RX	26	CAN2_TX
27	GPIO3_20/CSI1_PWEN_B	28	Ground
29	GPIO3_19/CSI1_RST_B	30	GPIO4_01/LVDS_EN
31	GPIO4_18/TP_INT_B	32	GPIO4_03/CSI2_RST_B
33	I2C2_SCL	34	I2C2_SDA
35	I2C1_SCL	36	I2C1_SDA
37	1V8_PCM_DO	38	1V8_PCM_DIN
39	1V8_PCM_CLK	40	1V8_PCM_SYNC

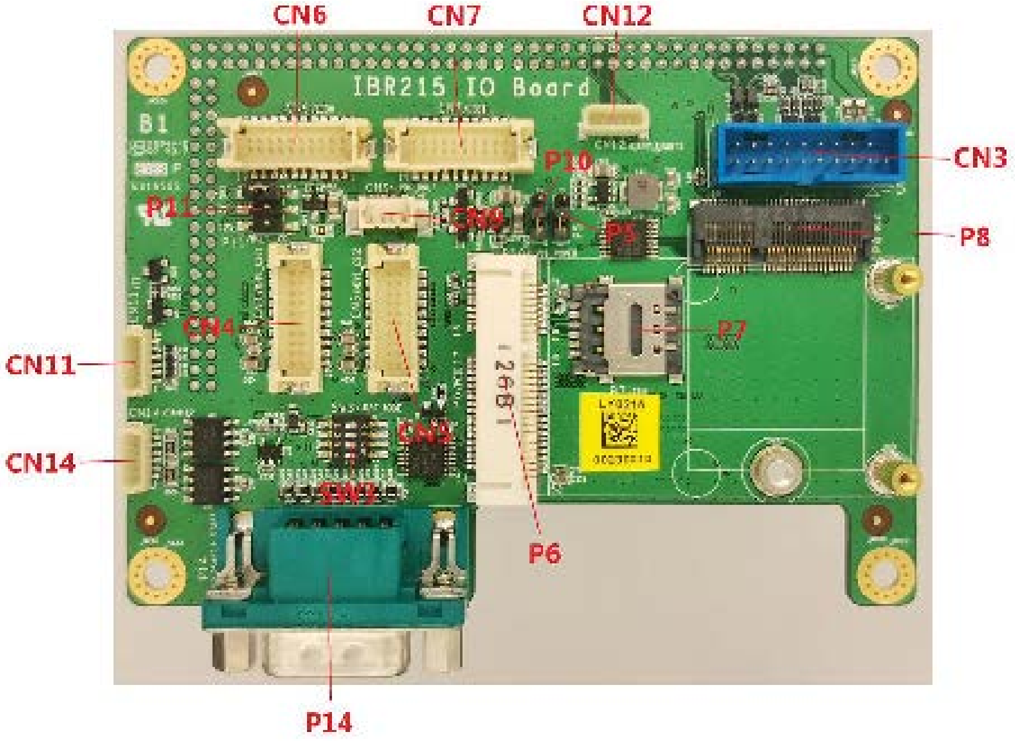
P20





Pin	Assigment	Pin	Assigment
1	Ground	2	Ground
3	Ground	4	Ground
5	LVDS0_TX3_N	6	LVDS0_TX3_P
7	LVDS0_TX2_N	8	LVDS0_TX2_P
9	LVDS0_CLK_N	10	LVDS0_CLK_P
11	LVDS0_TX1_N	12	LVDS0_TX1_P
13	LVDS0_TX0_N	14	LVDS0_TX0_P
15	CSI_P1_DN3	16	CSI_P1_DP3
17	CSI_P1_DN2	18	CSI_P1_DP2
19	CSI_P1_CKN	20	CSI_P1_CKP
21	CSI_P1_DN1	22	CSI_P1_DP1
23	CSI_P1_DN0	24	CSI_P1_DP0
25	LVDS1_TX3_N	26	LVDS1_TX3_P
27	LVDS1_TX2_N	28	LVDS1_TX2_P
29	LVDS1_CLK_N	30	LVDS1_CLK_P
31	LVDS1_TX1_N	32	LVDS1_TX1_P
33	LVDS1_TX0_N	34	LVDS1_TX0_P
35	CSI_P2_DN0	36	CSI_P2_DP0
37	CSI_P2_DN1	38	CSI_P2_DP1
39	CSI_P2_CKN	40	CSI_P2_CKP

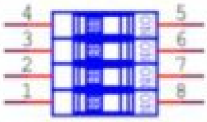
2.3 Jumper & Connector Locations on IBR215-IO board


CN6
CN7
CN12
IBR215 IO Board
CN3
P10
P11
CN9
P5
P8
CN4
P7
CN11
CN14
CN5
SW3
P6
P14

2.4 Jumper & Connectors Quick Reference for IBR215-IO Board

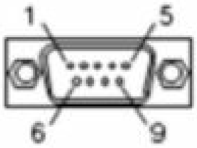
Function	**Connector Name**	**Page**
COM RS-232/422/485 Selection	SW3	
COM RS-232/422/485 Port	P14	
LVDS Display Connector	CN6, CN7	
COM RS232 Connector	CN12	
LVDS Backlight Control Connector	CN9	
MIPI-CSI Connector	CN4, CN5	
Dual USB 3.0 Type-A Port	CN3	- -
NGFF M.2 E2230 Slot	P8	- -
Mini-PCIe Slot	P6	- -
SIM Card Socket	P7	- -
BKLT_LCD Power Setup	P11	
LVDS_VCC Power Setup	P10	
PCIE/M.2 PCM select	P5	
I^{2}C Connector	CN11	
Can bus	CN14	

2.6.1 COM RS-232/422/485 Selection (SW3)



Panel Type	1-8	2-7	3-6	4-5
RS-422 Full Duplex	Off	On	On	On
RS-232 (Default)	Off	Off	On	On
RS-485 Half Duplex (TX Low-Active)	Off	On	Off	On
RS-485 Half Duplex (TX High-Active)	Off	Off	Off	On
RS-422 Full Duplex	Off	On	On	Off
RS-485 Half Duplex	Off	On	Off	Off
Shutdown	Off	Off	Off	Off

2.6.2 COM RS-232/422/485 Port (P14)

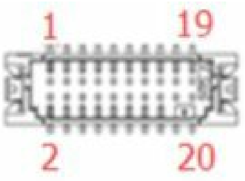


Pin	Signal Name	Pin	Signal Name
1	DCD, Data carrier detect	6	DSR, Data set ready
2	RXD, Receive data	7	RTS, Request to send
3	TXD, Transmit data	8	CTS, Clear to send
4	DTR, Data terminal ready	9	NC
5	Ground		

Refer to the SW3 setting for RS-232/422/485 mode selection.

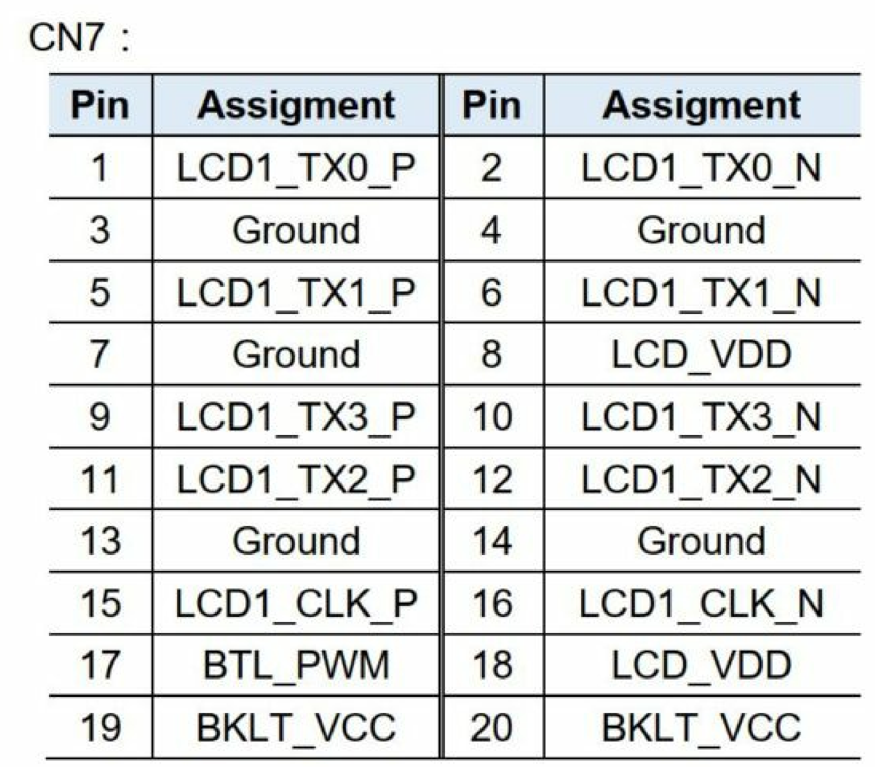
Pin	Assignment		
	RS-232	RS-422	RS-485
1	NC	TX-	DATA-
2	RX	TX+	DATA+
3	TX	RX+	NC
4	NC	RX-	NC
5	Ground	Ground	Ground
6	NC	NC	NC
7	RTS	NC	NC
8	CTS	NC	NC
9	NC	NC	NC

2.6.3 LVDS Display Connector (CN6, CN7)



CN6：

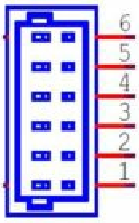
Pin	Assigment	Pin	Assigment
1	LCD0_TX0_P	2	LCD0_TX0_N
3	Ground	4	Ground
5	LCD0_TX1_P	6	LCD0_TX1_N
7	Ground	8	LCD_VDD
9	LCD0_TX3_P	10	LCD0_TX3_N
11	LCD0_TX2_P	12	LCD0_TX2_N
13	Ground	14	Ground
15	LCD0_CLK_P	16	LCD0_CLK_N
17	BTL_PWM	18	LCD_VDD
19	BKLT_VCC	20	BKLT_VCC



CN7 :

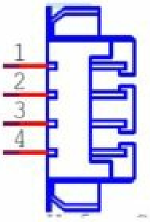
Pin	Assigment	Pin	Assigment
1	LCD1_TX0_P	2	LCD1_TX0_N
3	Ground	4	Ground
5	LCD1_TX1_P	6	LCD1_TX1_N
7	Ground	8	LCD_VDD
9	LCD1_TX3_P	10	LCD1_TX3_N
11	LCD1_TX2_P	12	LCD1_TX2_N
13	Ground	14	Ground
15	LCD1_CLK_P	16	LCD1_CLK_N
17	BTL_PWM	18	LCD_VDD
19	BKLT_VCC	20	BKLT_VCC

2.6.4 COM RS232 Connector (CN12)



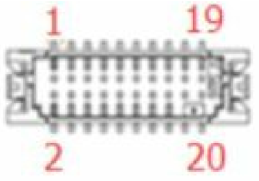
Pin	Assigment	Pin	Assigment
1	UART_TX3/RTS1	2	UART_RX3/CTS1
3	Ground	4	UART1_TXD
5	UART1_RXD	6	Ground

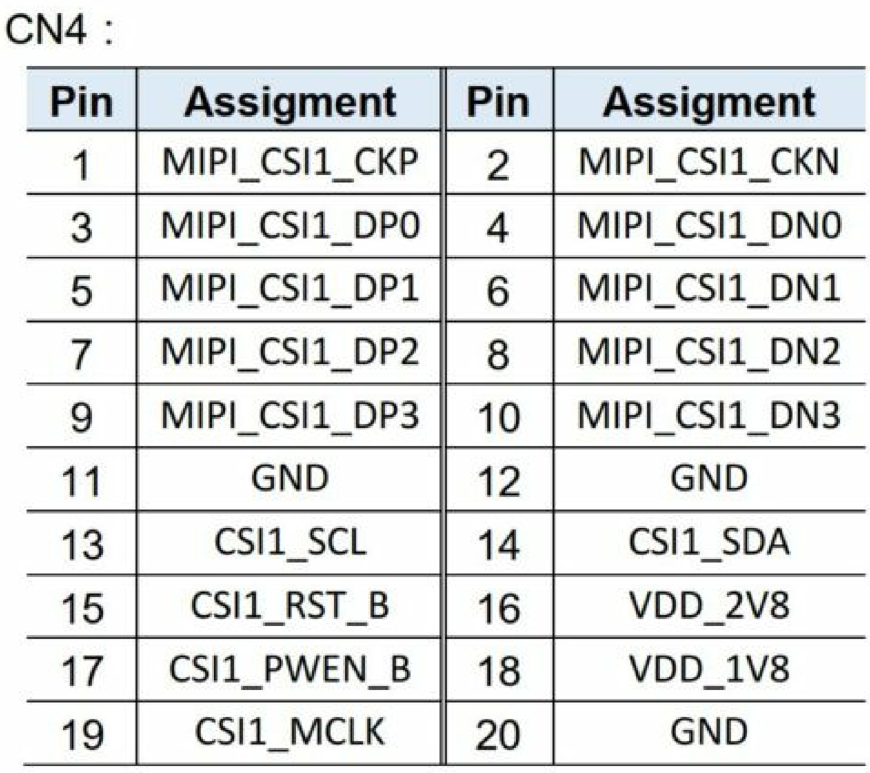
2.6.5 LVDS Backlight Control Connector (CN9)



Pin	Assigment	Pin	Assigment
1	LVDS_BKLT	2	LVDS_BKLT_EN
3	LVDS_BKLT_PWM	4	Ground

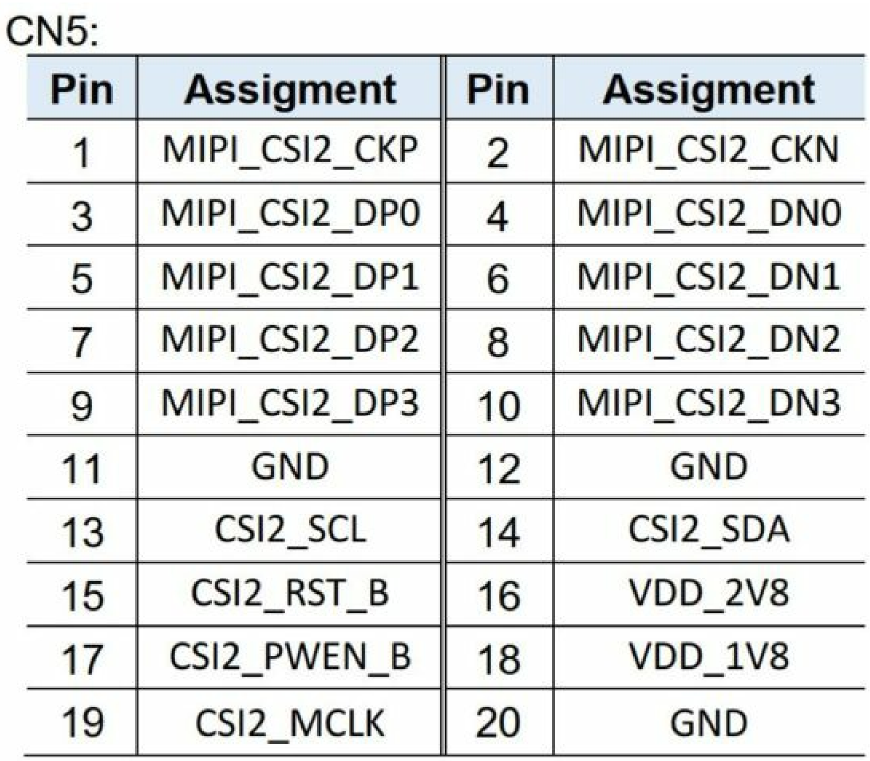
2.6.6 MIPI-CSI Connector (CN4, CN5)





CN4 :

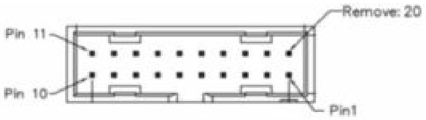
Pin	Assigment	Pin	Assigment
1	MIPI_CSI1_CKP	2	MIPI_CSI1_CKN
3	MIPI_CSI1_DP0	4	MIPI_CSI1_DN0
5	MIPI_CSI1_DP1	6	MIPI_CSI1_DN1
7	MIPI_CSI1_DP2	8	MIPI_CSI1_DN2
9	MIPI_CSI1_DP3	10	MIPI_CSI1_DN3
11	GND	12	GND
13	CSI1_SCL	14	CSI1_SDA
15	CSI1_RST_B	16	VDD_2V8
17	CSI1_PWEN_B	18	VDD_1V8
19	CSI1_MCLK	20	GND

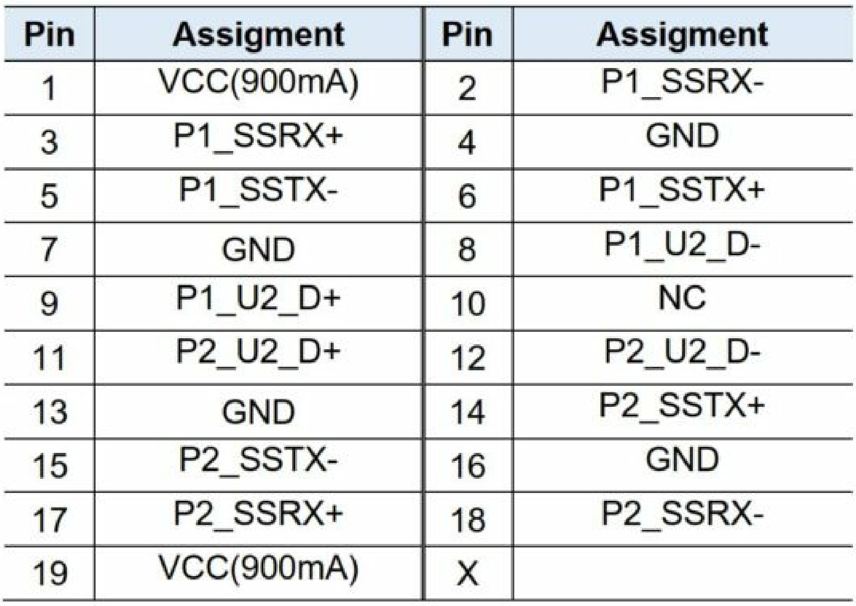


CN5:

Pin	Assigment	Pin	Assigment
1	MIPI_CSI2_CKP	2	MIPI_CSI2_CKN
3	MIPI_CSI2_DP0	4	MIPI_CSI2_DN0
5	MIPI_CSI2_DP1	6	MIPI_CSI2_DN1
7	MIPI_CSI2_DP2	8	MIPI_CSI2_DN2
9	MIPI_CSI2_DP3	10	MIPI_CSI2_DN3
11	GND	12	GND
13	CSI2_SCL	14	CSI2_SDA
15	CSI2_RST_B	16	VDD_2V8
17	CSI2_PWEN_B	18	VDD_1V8
19	CSI2_MCLK	20	GND

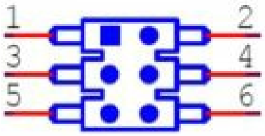
2.6.7 Dual USB 3.0 Type-A Port (CN3)

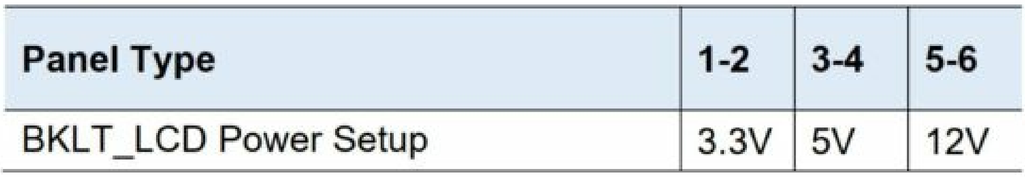




Pin	Assigment	Pin	Assigment
1	VCC(900mA)	2	P1_SSRX-
3	P1_SSRX+	4	GND
5	P1_SSTX-	6	P1_SSTX+
7	GND	8	P1_U2_D-
9	P1_U2_D+	10	NC
11	P2_U2_D+	12	P2_U2_D-
13	GND	14	P2_SSTX+
15	P2_SSTX-	16	GND
17	P2_SSRX+	18	P2_SSRX-
19	VCC(900mA)	X	

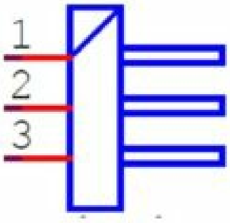
2.6.8 BKLT_LCD Power Setup (P11)

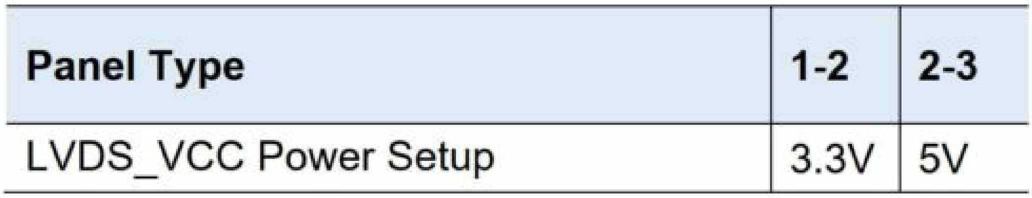




Panel Type	1-2	3-4	5-6
BKLT_LCD Power Setup	3.3V	5V	12V

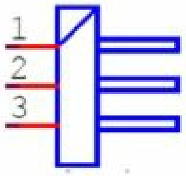
2.6.9 LVDS_VCC Power Setup (P10)





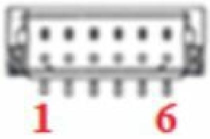
Panel Type	1-2	2-3
LVDS_VCC Power Setup	3.3V	5V

2.6.10 PCIE/M.2 audio option (P5)



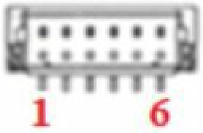
Panel Type	1-2	2-3
PCIE/M.2 PCM select	PCIE PCM	M.2 PCM

2.6.11 I2C Connector (CN11)



Pin	Assigment	Pin	Assigment
1	TP_VIO	4	TP_SCL
2	TP_INT_B	5	TP_SDA
3	TP_RST_B	6	GND

2.6.12 Can bus (CN14)



Pin	Assigment	Pin	Assigment
1	CAN1_H	4	CAN2_H
2	CAN1_L	5	CAN2_L
3	GND	6	GND

Chapter 3 Software Setup

This chapter introduces the following setup on the device: (for advanced users only)

- Make a recovery SD card
- Upgrade firmware through the recovery SD card

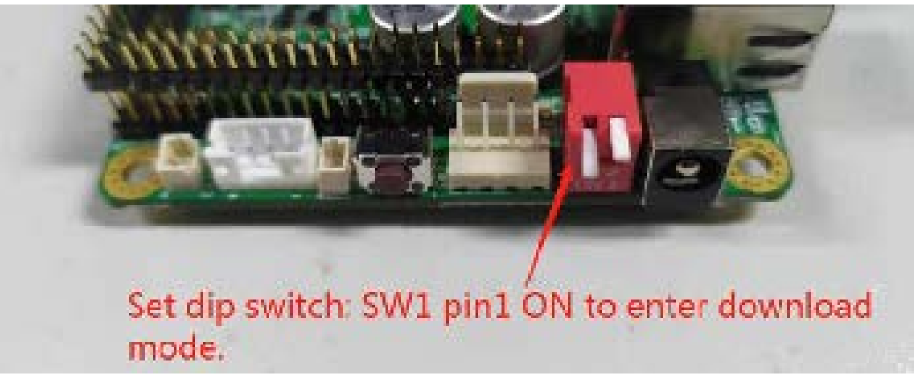
3.1 Make a Recovery SD Card

Note: This is for advanced users who has IBASE standard image file only.
Basically, IBR215 is preloaded with O.S (Android or Yocto) into eMMC by default. Connect the HDMI with IBR215, and 12V-24V power directly.
This chapter guides you to make a recovery boot-up microSD card.

3.1.1 Preparing the Recovery SD card to Install Linux / Android image into eMMC

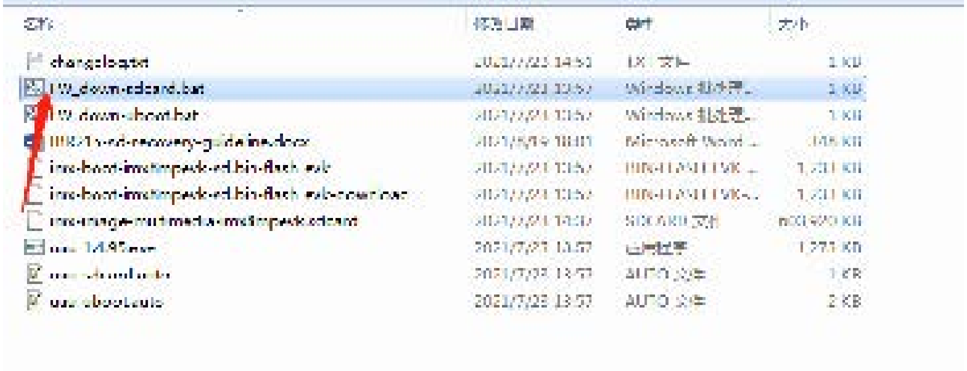
Note: All data in the eMMC will be erased.

1) System requirements:
Operating System: Windows 7 or later Tool: uuu SD card: 4GB or greater in size
2) Insert your SD card to this board (i.e. the P1 connector), connect the board to PC through the mini-USB port (i.e. the P4 connector), and change the boot mode to download mode.



Set dip switch: SW1 pin1 ON to enter download mode.

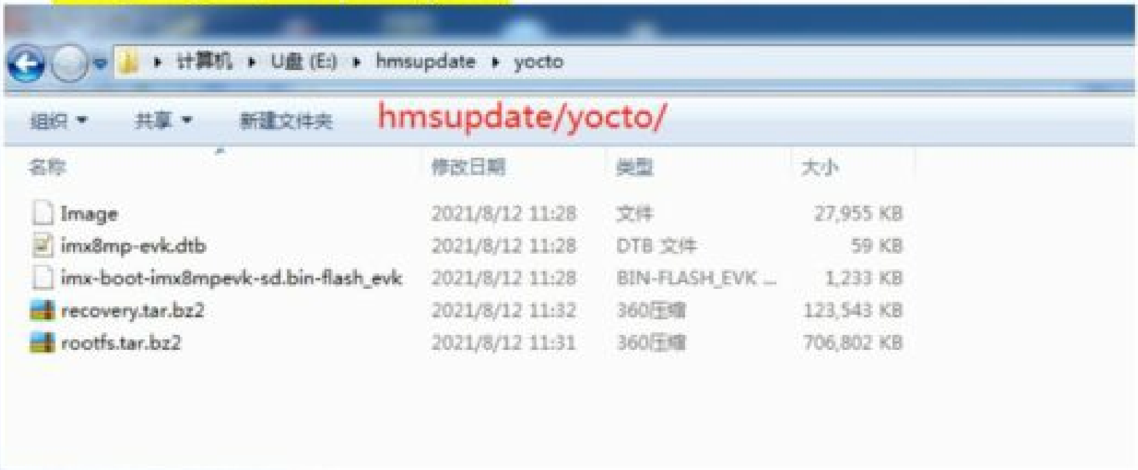
3) boot IBR215 and flash SD via CMD command “uuu.exe uuu-sdcard.auto” or double click “FW_down-sdcard.bat” (Same way as PCBA update)



3.1.2 Upgrade Firmware through the Recovery SD Card

1) Put recovery files into USB flash disk (FAT32)
A> Yocto/Ubuntu: Copy all recovery files into PATH:

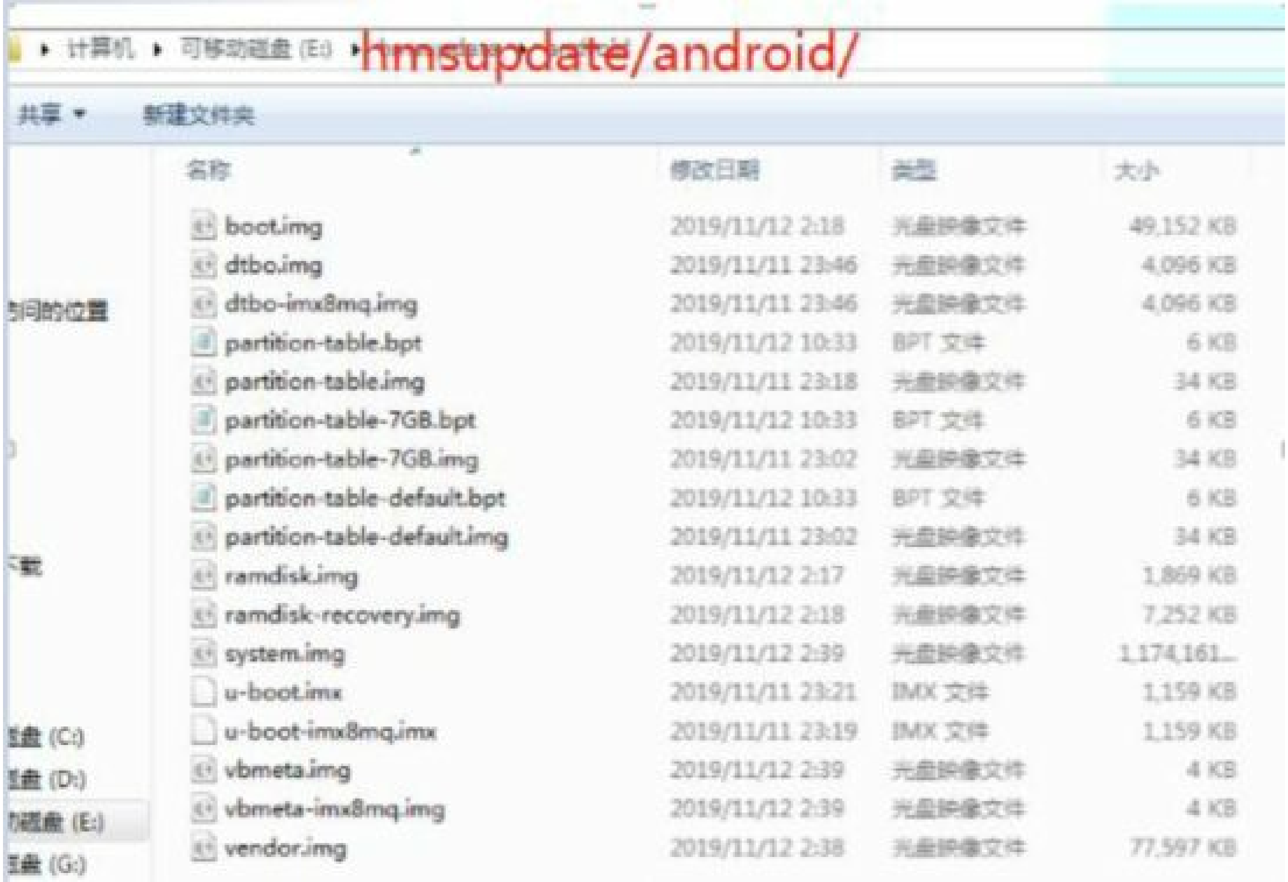
/USB_flash_disk/hmsupdate/yocto/



名称	修改日期	类型	大小
Image	2021/8/12 11:28	文件	27,955 KB
imx8mp-evk.dtb	2021/8/12 11:28	DTB 文件	59 KB
imx-boot-imx8mpevk-sd.bin-flash_evk	2021/8/12 11:28	BIN-FLASH_EVK ...	1,233 KB
recovery.tar.bz2	2021/8/12 11:32	360压缩	123,543 KB
rootfs.tar.bz2	2021/8/12 11:31	360压缩	706,802 KB

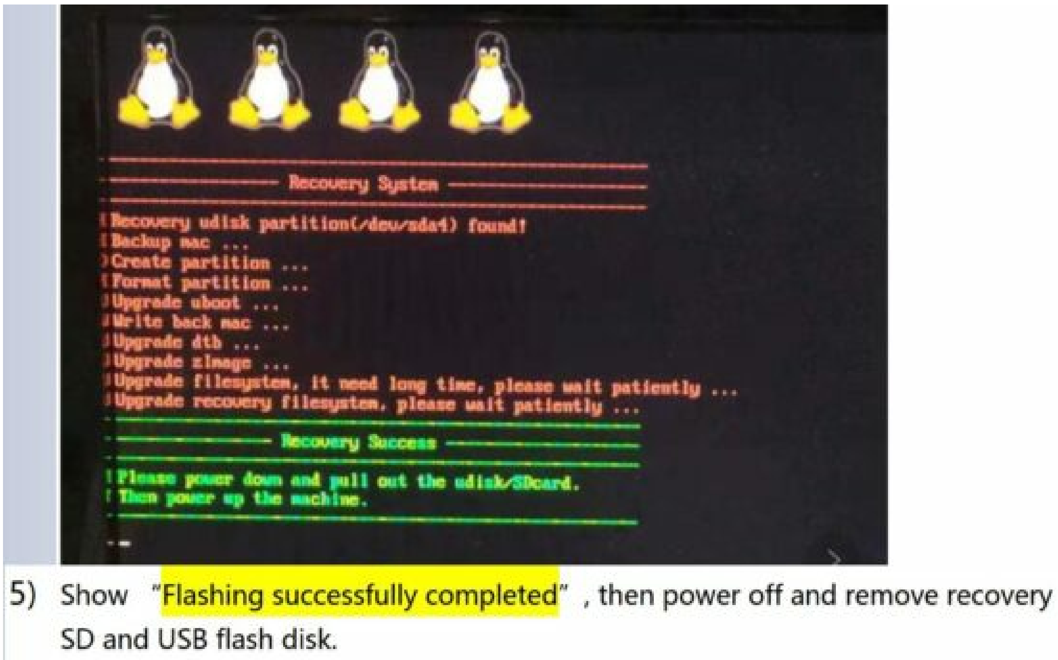
B>Android: Copy all recovery files into PATH:

/USB_flash_disk/hmsupdate/android/



名称	修改日期	类型	大小
boot.img	2019/11/12 2:18	光盘映像文件	49,152 KB
dtbo.img	2019/11/11 23:46	光盘映像文件	4,096 KB
dtbo-imx8mq.img	2019/11/11 23:46	光盘映像文件	4,096 KB
partition-table.bpt	2019/11/12 10:33	BPT 文件	6 KB
partition-table.img	2019/11/11 23:18	光盘映像文件	34 KB
partition-table-7GB.bpt	2019/11/12 10:33	BPT 文件	6 KB
partition-table-7GB.img	2019/11/11 23:02	光盘映像文件	34 KB
partition-table-default.bpt	2019/11/12 10:33	BPT 文件	6 KB
partition-table-default.img	2019/11/11 23:02	光盘映像文件	34 KB
ramdisk.img	2019/11/12 2:17	光盘映像文件	1,869 KB
ramdisk-recovery.img	2019/11/12 2:18	光盘映像文件	7,252 KB
system.img	2019/11/12 2:39	光盘映像文件	1,174,161...
u-boot.imx	2019/11/11 23:21	IMX 文件	1,159 KB
u-boot-imx8mq.imx	2019/11/11 23:19	IMX 文件	1,159 KB
vbmeta.img	2019/11/12 2:39	光盘映像文件	4 KB
vbmeta-imx8mq.img	2019/11/12 2:39	光盘映像文件	4 KB
vendor.img	2019/11/12 2:38	光盘映像文件	77,597 KB

2) Plug (step1)SD and (step2)USB flash disk into IBR215
3) Normal boot IBR215 (SW1 Pin1 OFF), start recovery eMMC automatically.
4) The update information will show on HDMI.



```
------------------------------------------------------------
------------------ Recovery System -------------------------
------------------------------------------------------------
Recovery udisk partition(/dev/sda4) found!
Backup mac ...
Create partition ...
Format partition ...
Upgrade uboot ...
Write back mac ...
Upgrade dtb ...
Upgrade zImage ...
Upgrade filesystem, it need long time, please wait patiently ...
Upgrade recovery filesystem, please wait patiently ...
------------------------------------------------------------
------------------ Recovery Success ------------------------
------------------------------------------------------------
Please power down and pull out the udisk/SDcard.
Then power up the machine.
------------------------------------------------------------
```

5) Show "Flashing successfully completed" , then power off and remove recovery SD and USB flash disk.

Chapter 4 BSP Source Guide

This chapter is dedicated for advanced software engineers only to build BSP source. The topics covered in this chapter are as follows:

- Preparation
- Building release
- Installing release to board

4.1 Building BSP Source

4.1.1 Preparation
The recommended minimum Ubuntu version is 18.04 or later.
1) Install necessary packages before building:

```
sudo apt-get install gawk wget git-core diffstat unzip texinfo gcc-multilib \
build-essential chrpath socat cpio python python3 python3-pip python3-pexpect \
xz-utils debianutils iputils-ping python3-git python3-jinja2 libegl1-mesa libsdl1.2-dev \
pylint3 xterm
```

2) Donwload toolchain

The clang used to compile Linux kernel needs to be a newer version. Perform the following steps to set the clang to be used to compile Linux kernel: sudo git clone https://android.googlesource.com/platform/prebuilts/clang/host/linux-x86 /opt/ prebuiltandroid-clang -b master cd /opt/prebuilt-android-clang
sudo git checkout 007c96f100c5322acc37b84669c032c0121e68d0 export CLANG_PATH=/opt/prebuilt-android-clang

The preceding export commands can be added to "/etc/profile". When the host boots up, "AARCH64_GCC_CROSS_COMPILE" and "CLANG_PATH" are set and can be directly used.
Prepare the build environment for U-Boot and Linux kernel.
This step is mandatory because there is no GCC cross-compile tool chain in the one in AOSP codebase.

a. Download the tool chain for the A-profile architecture on arm Developer GNU-A Downloads page. It is recommended
to use the 8.3 version for this release. You can download the “gcc-arm-8.3-2019.03-x86_64-aarch64- elf.tar.xz” or “gcc-arm-8.3-2019.03-x86_64-aarch64-linux-gnu.tar.xz”. The first one is dedicated for compiling bare-metal programs, and the second one can also be used to compile the application programs.
b. Decompress the file into a path on local disk, for example, to “/opt/”. Export a variable named “AARCH64_GCC_CROSS_COMPILE” to point to the tool as follows:

```
# if “gcc-arm-8.3-2019.03-x86_64-aarch64-elf.tar.xz” is used sudo tar -xvJf gcc-arm-8.3-2019.03-x86_64-aarch64-elf.tar.xz -C /opt
export AARCH64_GCC_CROSS_COMPILE=/opt/gcc-arm-8.3-2019.03-x86_64-aarch64-elf/bin/aarch64-elf-
# if “gcc-arm-8.3-2019.03-x86_64-aarch64-linux-gnu.tar.xz” is used sudo tar -xvJf gcc-arm-8.3-2019.03-x86_64-aarch64-linux-gnu.tar.xz -C /opt export AARCH64_GCC_CROSS_COMPILE=/opt/gcc-arm-8.3-2019.03-x86_64-aarch64-linuxgnu/bin/aarch64-linux-gnu
```

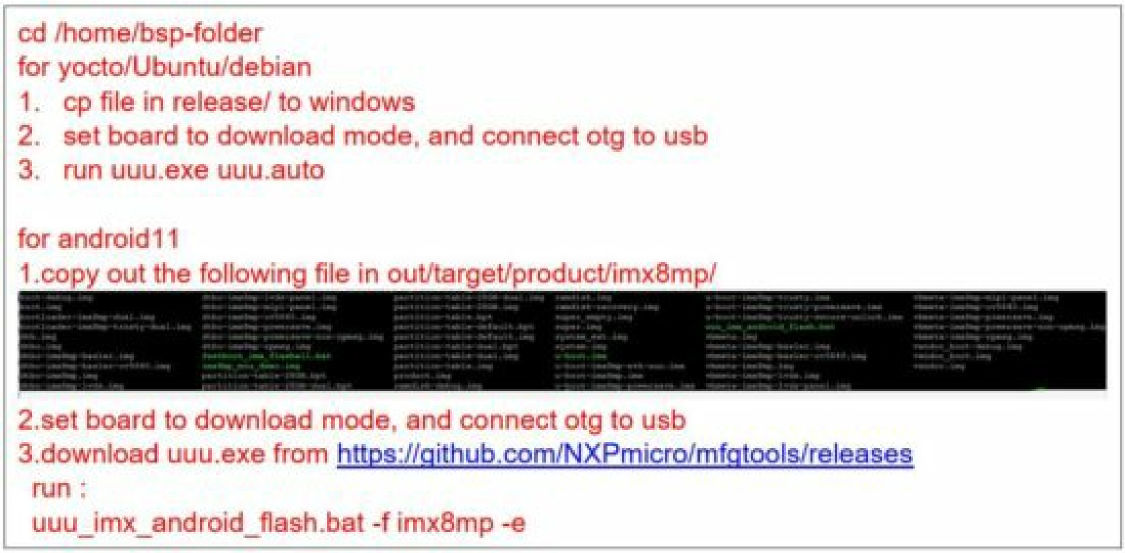
3) Decompress the IBR215 source file (example ibr215-bsp.tar.bz2) into “/home/” folder.
4.1.2 Building release
4.1.2.1 for yocto/Ubuntu/debian

```
cd /home/bsp-folder
./build-bsp-5.4.sh
```

4.1.3.2 for android

```
cd /home/bsp-folder
source build/envsetup.sh
lunch evk_8mp-userdebug
make ANDROID_COMPILE_WITH_JACK=false
./imx-make.sh –j4
Make –j4
```

4.1.3 Installing release to board


cd /home/bsp-folder
for yocto/Ubuntu/debian
1. cp file in release/ to windows
2. set board to download mode, and connect otg to usb
3. run uuu.exe uuu.auto

for android11
1.copy out the following file in out/target/product/imx8mp/
2.set board to download mode, and connect otg to usb
3.download uuu.exe from https://github.com/NXPmicro/mfqtools/releases
run :
uuu_imx_android_flash.bat -f imx8mp -e

Appendix

This section provides the information of reference code.

A. How to Use GPIO in Linux

```
# GPIO Value Rule : gpioX_N >> 32*(X-1)+N
# Take gpio5_18 as example, export value should be 32*(5-1)+18=146
# GPIO example 1: Output
echo 32 > /sys/class/gpio/export
echo out > /sys/class/gpio/gpio146/direction
echo 0 > /sys/class/gpio/gpio146/value
echo 1 > /sys/class/gpio/gpio146/value
# GPIO example 2: Input
echo 32 > /sys/class/gpio/export
echo in > /sys/class/gpio/gpio146/direction
cat /sys/class/gpio/gpio146/value
```

B. How to Use Watchdog in Linux

```
// create fd
int fd;
//open watchdog device
fd = open(“/dev/watchdog”, O_WRONLY);
//get watchdog support
ioctl(fd, WDIOC_GETSUPPORT, &ident);
//get watchdog status
ioctl(fd, WDIOC_GETSTATUS, &status);
//get watchdog timeout
ioctl(fd, WDIOC_GETTIMEOUT, &timeout_val);
//set watchdog timeout
ioctl(fd, WDIOC_SETTIMEOUT, &timeout_val);
//feed dog
ioctl(fd, WDIOC_KEEPALIVE, &dummy);
```

C. eMMC Test

Note: This operation may damage the data stored in eMMC flash. Before starting the test, make sure there is no critical data in the eMMC flash being used.

Read, write, and check

```
MOUNT_POINT_STR=”/var”
#create data file
dd if=/dev/urandom of=/tmp/data1 bs=1024k count=10
#write data to emmc
dd if=/tmp/data1 of=$MOUNT_POINT_STR/data2 bs=1024k count=10
#read data2, and compare with data1
cmp $MOUNT_POINT_STR/data2 /tmp/data1
```

eMMC speed test

```
MOUNT_POINT_STR=”/var”
#get emmc write speed”
time dd if=/dev/urandom of=$MOUNT_POINT_STR/test bs=1024k count=10
# clean caches
echo 3 > /proc/sys/vm/drop_caches
#get emmc read speed”
time dd if=$MOUNT_POINT_STR/test of=/dev/null bs=1024k count=10
```

D. USB (flash disk) Test

Insert the USB flash disk. Then make sure it is in IBR210 device list.

Note: This operation may damage the data stored in the USB flash disk. Before starting the test, make sure there is no critical data in the eMMC flash being used.

Read, write, and check

```
USB_DIR=”/run/media/mmcblk1p1″
#create data file
dd if=/dev/urandom of=/var/data1 bs=1024k count=100
#write data to usb flash disk
dd if=/var/data1 of=$USB_DIR/data2 bs=1024k count=100
#read data2, and compare with data1
cmp $USB_DIR/data2 /var/data1
```

USB speed test

```
USB_DIR=”/run/media/mmcblk1p1″
# usb write speed
dd if=/dev/zero of=$BASIC_DIR/$i/test bs=1M count=1000 oflag=nocache
# usb read speed
dd if=$BASIC_DIR/$i/test of=/dev/null bs=1M oflag=nocache
```

E. SD Card Test

When IBR210 is booted from eMMC, SD card is “/dev/mmcblk1” and able to see by “ls /dev/mmcblk1*” command:

```
/dev/mmcblk1 /dev/mmcblk1p2 /dev/mmcblk1p4 /dev/mmcblk1p5 /dev/mmcblk1p6
```

Note: This operation may damage the data stored the SD card. Before starting the test, make sure there is no critical data in the eMMC flash being used.

Read, write, and check

```
SD_DIR=”/run/media/mmcblk1″
#create data file
dd if=/dev/urandom of=/var/data1 bs=1024k count=100
#write data to SD card
dd if=/var/data1 of=$ SD_DIR/data2 bs=1024k count=100
#read data2, and compare with data1
cmp $SD_DIR/data2 /var/data1
```

SD card speed test

```
SD_DIR=”/run/media/mmcblk1″
# SD write speed
dd if=/dev/zero of=$SD_DIR/test bs=1M count=1000 oflag=nocache
# SD read speed
dd if=$SD_DIR/test of=/dev/null bs=1M oflag=nocache
```

F. RS-232 Test

```
//open ttymxc1
fd = open(/dev/ttymxc1,O_RDWR );
//set speed
tcgetattr(fd, &opt);
cfsetispeed(&opt, speed);
cfsetospeed(&opt, speed);
tcsetattr(fd, TCSANOW, &opt)
//get_speed
tcgetattr(fd, &opt);
speed = cfgetispeed(&opt);
//set_parity
// options.c_cflag
options.c_cflag &= ~CSIZE;
options.c_cflag &= ~CSIZE;
options.c_lflag &= ~(ICANON | ECHO | ECHOE | ISIG); /*Input*/
options.c_oflag &= ~OPOST; /*Output*/
```

```
//options.c_cc
options.c_cc[VTIME] = 150;
options.c_cc[VMIN] = 0;
#set parity
tcsetattr(fd, TCSANOW, &options)
//write ttymxc1
write(fd, write_buf, sizeof(write_buf));
//read ttymxc1
read(fd, read_buf, sizeof(read_buf)))
```

G. RS-485 Test

```
//open ttymxc1
fd = open(/dev/ttymxc1,O_RDWR );
//set speed
tcgetattr(fd, &opt);
cfsetispeed(&opt, speed);
cfsetospeed(&opt, speed);
tcsetattr(fd, TCSANOW, &opt
//get_speed
tcgetattr(fd, &opt);
speed = cfgetispeed(&opt);
//set_parity
// options.c_cflag
options.c_cflag &= ~CSIZE;
options.c_cflag &= ~CSIZE;
options.c_cflag &= ~CRTSCTS;
options.c_lflag &= ~(ICANON | ECHO | ECHOE | ISIG); /*Input*/
options.c_oflag &= ~OPOST; /*Output*/
//options.c_cc
options.c_cc[VTIME] = 150;
options.c_cc[VMIN] = 0;
#set parity
tcsetattr(fd, TCSANOW, &options)
//write ttymxc1
write(fd, write_buf, sizeof(write_buf));
//read ttymxc1
read(fd, read_buf, sizeof(read_buf)))
```

H. Audio Test

Yocto/debian/ubuntu

```
// play mp3 by audio (ALC5640)
gplay-1.0 /home/root/ testscript/audio/a.mp3 –audio-sink=”alsasink –device=hw:1”
// record mp3 by audio (ALC5640)
arecord -f cd $basepath/b.mp3 -D plughw:1,0
```

for android:
please record and playback apk

I. Ethernet Test

- Ethernet Ping test

```
#ping server 192.168.1.123
ping -c 20 192.168.1.123 >/tmp/ethernet_ping.txt
```

- Ethernet TCP test

```
#server 192.168.1.123 run command “iperf3 -s”
#communicate with server 192.168.1.123 in tcp mode by iperf3
iperf3 -c 192.168.1.123 -i 1 -t 20 -w 32M -P 4
```

- Ethernet UDP test

```
#server 192.168.1.123 run command “iperf3 -s”
#communicate with server 192.168.1.123 in udp mode by iperf3
```

```
iperf3 -c $SERVER_IP -u -i 1 -b 200M
```

J. LVDS Test(android not support)

```
//Open the file for reading and writing
framebuffer_fd = open(“/dev/fb0”, O_RDWR);
// Get fixed screen information
ioctl(framebuffer_fd, FBIOGET_FSCREENINFO, &finfo)
// Get variable screen information
ioctl(framebuffer_fd, FBIOGET_VSCREENINFO, &vinfo)
// Figure out the size of the screen in bytes
screensize = vinfo.xres * vinfo.yres * vinfo.bits_per_pixel / 8;
// Map the device to memory
fbp = (char *)mmap(0, screensize, PROT_READ | PROT_WRITE, MAP_SHARED, framebuffer_fd,
0);
// Figure out where in memory to put the pixel
memset(fbp, 0x00,screensize);
//draw point by fbp
long int location = 0;
location = (x+g_xoffset) * (g_bits_per_pixel/8) +
(y+g_yoffset) * g_line_length;
*(fbp + location + 0) = color_b;
*(fbp + location + 1) = color_g;
*(fbp + location + 2) = color_r;
//close framebuffer fd
close(framebuffer_fd);
```

K. HDMI Test

- HDMI display test

```
//Open the file for reading and writing
framebuffer_fd = open(“/dev/fb2”, O_RDWR);
// Get fixed screen information
ioctl(framebuffer_fd, FBIOGET_FSCREENINFO, &finfo)
// Get variable screen information
ioctl(framebuffer_fd, FBIOGET_VSCREENINFO, &vinfo)
// Figure out the size of the screen in bytes
screensize = vinfo.xres * vinfo.yres * vinfo.bits_per_pixel / 8;
// Map the device to memory
fbp = (char *)mmap(0, screensize, PROT_READ | PROT_WRITE, MAP_SHARED,
framebuffer_fd, 0);
// Figure out where in memory to put the pixel
memset(fbp, 0x00,screensize);
//draw point by fbp
long int location = 0;
location = (x+g_xoffset) * (g_bits_per_pixel/8) +
(y+g_yoffset) * g_line_length;
*(fbp + location + 0) = color_b;
*(fbp + location + 1) = color_g;
*(fbp + location + 2) = color_r;
//close framebuffer fd
close(framebuffer_fd);
```

- **HDMI audio test**

```
#enable hdmi audio
echo 0 > /sys/class/graphics/fb2/blank
#play wav file by hdmi audio
aplay /home/root/testscript/hdmi/1K.wav -D plughw:0,0
```

L. 3G Test(not for android, android have 3g config in setting)

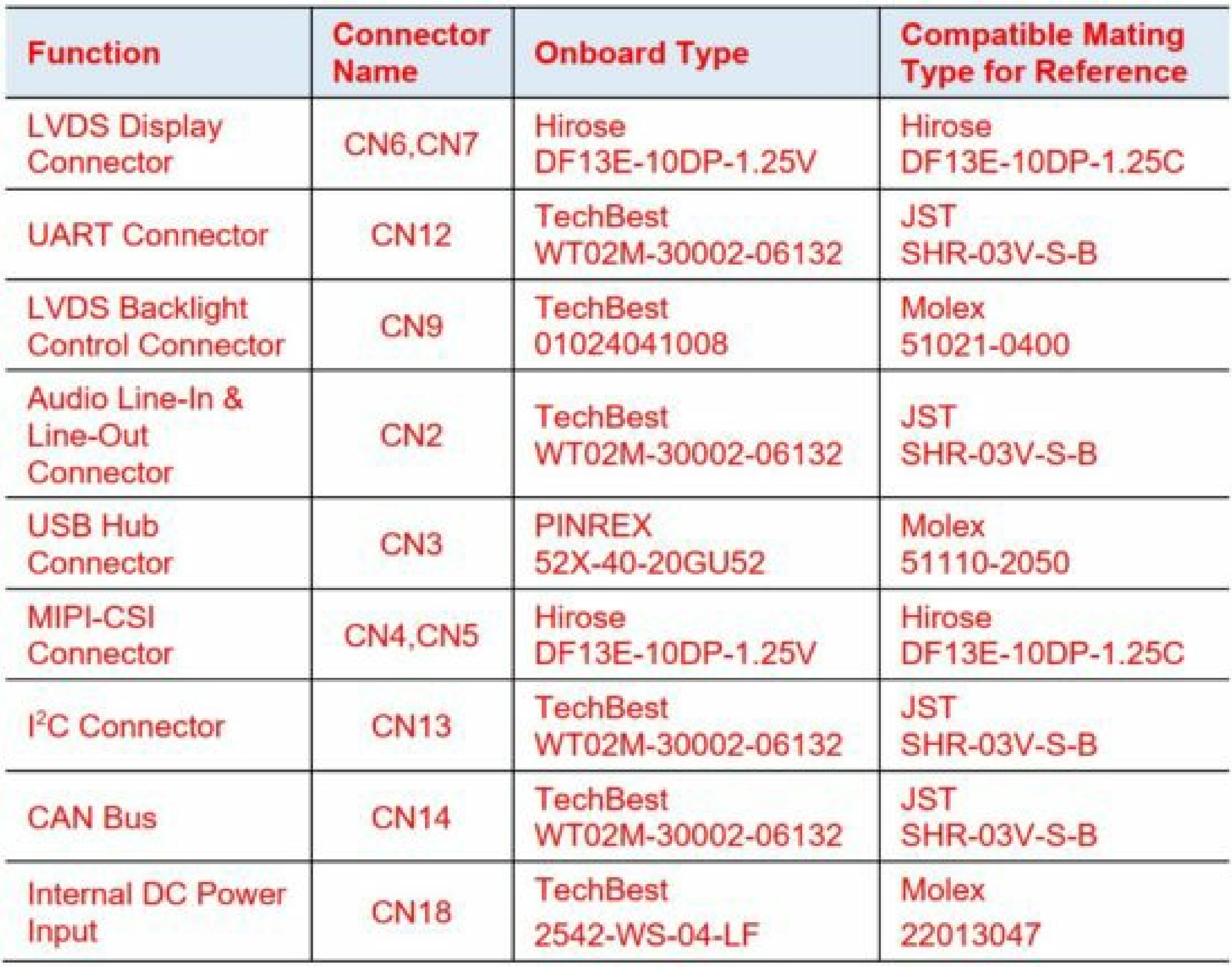
- Checking 3G state

```
#Check UC20 module state and sim state
cat /dev/ttyUSB4 &
```

- Testing 3G

```
# the command will connect 3g to network
# make sure that the simcard is inserted right, and ANT connected
pppd call quectel-ppp
echo “ping www.baidu.com to make sure the network ok”
ping www.baidu.com
```

M. Onboard Connector Types



Function	Connector Name	Onboard Type	Compatible Mating Type for Reference
LVDS Display Connector	CN6,CN7	Hirose DF13E-10DP-1.25V	Hirose DF13E-10DP-1.25C
UART Connector	CN12	TechBest WT02M-30002-06132	JST SHR-03V-S-B
LVDS Backlight Control Connector	CN9	TechBest 01024041008	Molex 51021-0400
Audio Line-In & Line-Out Connector	CN2	TechBest WT02M-30002-06132	JST SHR-03V-S-B
USB Hub Connector	CN3	PINREX 52X-40-20GU52	Molex 51110-2050
MIPI-CSI Connector	CN4,CN5	Hirose DF13E-10DP-1.25V	Hirose DF13E-10DP-1.25C
I^{2}C Connector	CN13	TechBest WT02M-30002-06132	JST SHR-03V-S-B
CAN Bus	CN14	TechBest WT02M-30002-06132	JST SHR-03V-S-B
Internal DC Power Input	CN18	TechBest 2542-WS-04-LF	Molex 22013047

Connector types may be subject to change without prior notice.

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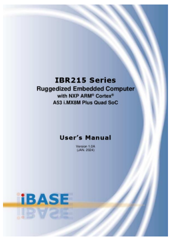

IBASE IBR215 Series Ruggedized Embedded Computer [pdf] User Manual
IBR215 Series Ruggedized Embedded Computer, IBR215 Series, Ruggedized Embedded Computer, Embedded Computer, Computer

References

- 4.sh - This is a premium name
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- IBASE - Manufacturer of Robust Embedded Computing Platforms in Taiwan
- IBASE - Manufacturer of Robust Embedded Computing Platforms in Taiwan
- platform/prebuilts/clang/host/linux-x86 - Git at Google
- Releases · nxp-imx/mfgtools · GitHub
- User Manual

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