IP416

Qseven Carrier Board

User's Manual

Version 1.0
(Oct. 2018)

iBASE

Compliance

CE

In a domestic environment, this product may cause radio interference in which case users may be required to take adequate measures.

FC

This product has been tested and found to comply with the limits for a Class A 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 is compliant with the current RoHS restrictions and prohibits use of the following substances in concentrations exceeding 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 precautions before using the board.

Environmental conditions:

- Use this product in environments with ambient temperatures between -40˚C and 85˚C.
- Do not leave this product in an environment where the storage temperature may be below -40° C or above 90° C. To prevent from damages, the product must be used in a controlled environment.

Care for your IBASE products:

- Before cleaning the PCB, unplug all cables and remove the battery.
- Clean the PCB with a circuit board cleaner, degreaser, or use cotton swabs and alcohol.
- Vacuum the dust with a computer vacuum cleaner to prevent the fan from being clogged.

WARNING

Attention during use:

- Do not use this product near water.
- Do not spill water or any other liquids on this product.
- Do not place heavy objects on the top of this product.

Anti-static precautions

- Wear an anti-static wrist strap to avoid electrostatic discharge.
- Place the PCB on an anti-static kit or mat.
- Hold the edges of PCB when handling.
- Touch the edges of non-metallic components of the product instead of the surface of the PCB.
- Ground yourself by touching a grounded conductor or a grounded bit of metal frequently to discharge any static.

CAUTION

Danger of explosion if the internal lithium-ion battery is replaced by an incorrect type. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions or recycle them at a local recycling facility or battery collection point.

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 the 3rd-party parts that are not manufactured by IBASE, such as CPU, CPU cooler, memory, storage devices, power adapter, panel and touchscreen.

* 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 need any further assistance from your distributor or sales representative, prepare the following information of your product and elaborate upon the problem.
   - Product model name
   - Product serial number
   - Detailed description of the problem
   - The error messages in text or in screenshots if there is any
   - The arrangement of the peripherals
   - Software in use (such as OS and application software, including the version numbers)
3. If repair service is required, you can download the RMA form at http://www.ibase.com.tw/english/Supports/RMAService/. Fill out the form and contact your distributor or sales representative.

Table of Contents

Chapter 1
General Information

The information provided in this chapter includes:

- Features
- Specifications
- Board Overview
- Board Dimensions

1.1 Introduction

IP416 is a Qseven carrier board coming with COM form factor. It receives major signals and interface from the Qseven module via the onboard 230-pin MXM connector. It offers expansion slots like PCIe (x1) and mini-PCIe, outputs video via DisplayPort and also has rich peripheral ports. It can be operated at the ambient operating temperature ranging from -40 ~ 85°C and even from -40 ~ 90°C for storage.

Photo of IP416

1.2 Features

- Micro-ATX form factor
- Supports 3 x PCIe (x1) and 1 x Mini-PCIe
- Rich peripheral ports: USB 3.0, USB 2.0, GbE LAN, DisplayPort, eDP or LVDS, and audio jacks
- 4 x RS-232 full function and 1 x RS-232 TX & RX only

1.3 Specifications

Product Name	IP416
Form Factor	Micro-ATX Qseven carrier board
Super I/O	Fintek F81846D-I
Watchdog	Watchdog Timer 256 segments, 0, 1, 2…255 sec/min
Dimensions	244 x 244 mm (9.6” x 9.6”)
RoHS	Yes
I/O Ports / Connectors	
Power Supply	DC-In 12V (via an onboard 2x2 pins connector)
Display	• 1 x DisplayPort • 1 x 18/24-bit dual channel LVDS or 1 x eDP (depending on the CPU module)
LAN	1 x RJ45 LAN (Derived from Qseven CPU module)
USB	• 2 x USB 2.0 • 2 x USB 3.0
Serial	**5 x COM ports:** • COM1 ~ COM4: RS-232 (full function, edge I/O connector) • COM5: UART (with RX, TX, RTS, CTS; signals from Qseven CPU module)
Serial ATA	2 x SATA 3.0
Audio Jacks	Onboard Realtek ALC662 with 5.1 channel HD audio 1 x Line-In, 1 x Line-Out, 1 x Mic-In
Battery for RTC/CMOS	1 x Lithium battery button cell for RTC
Expansion Slots	• 3 x PCIe (x1) slot • 1 x full/half-size Mini-PCIe slot

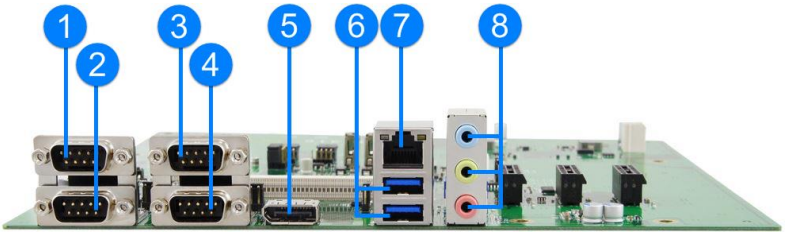
Environment	
Temperature	• Operation: -40 ~ 85°C (-40 ~ -185°F) • Storage: -40 ~ 90 °C (-40 ~ 194°F)
Relative Humidity	10 ~ 90 % (non-condensing)

All specifications are subject to change without prior notice.

1.4 Overview

Top View

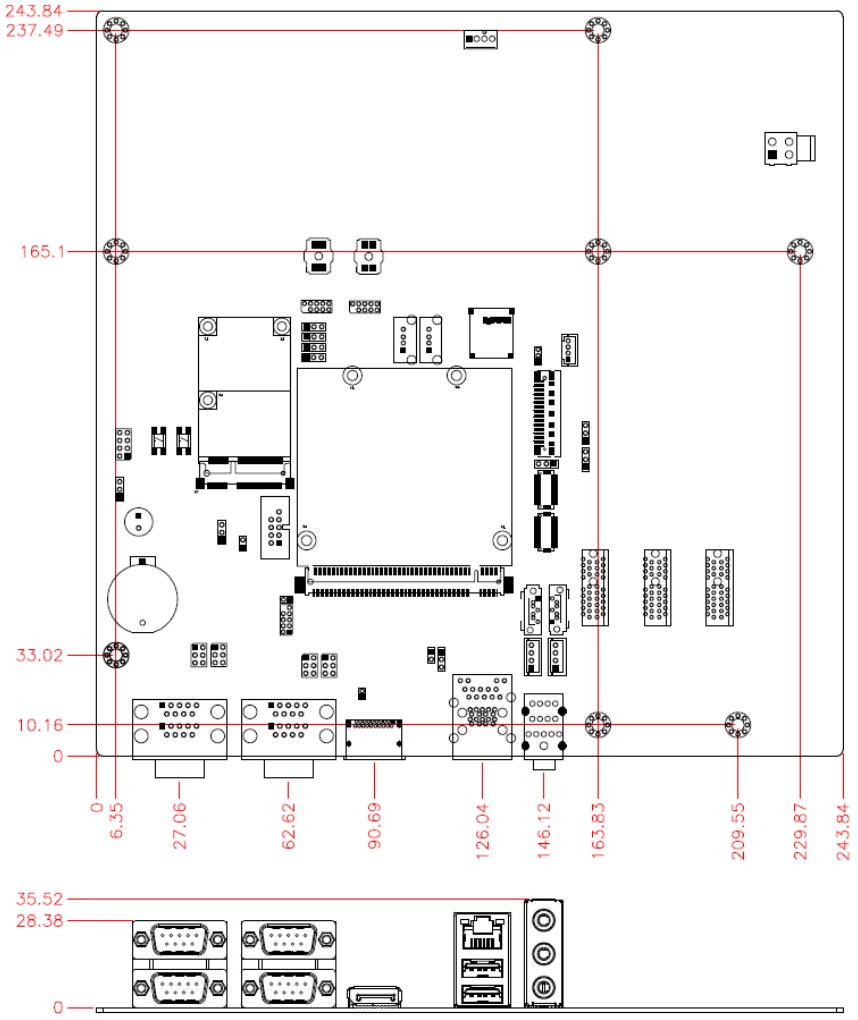
I/O View



No.	Name	No.	Name
1	COM1 RS-232 Port	5	DisplayPort
2	COM2 RS-232 Port	6	USB 3.0 Ports
3	COM3 RS-232 Port	7	GbE LAN Port
4	COM4 RS-232 Port	8	Audio Jacks (From top to bottom: Line-In, Line-Out, Mic-In)

* The photos above are for reference only. Some minor components may differ.

1.5 Dimensions



Chapter 2
Hardware Configuration

This section provides information on jumper settings and connectors on the IP416 in order to set up a workable system.

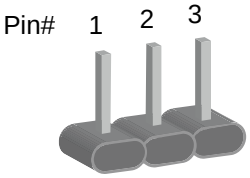
- Jumper and connector locations
- Jumper settings and information of connectors

2.1 Setting the Jumpers

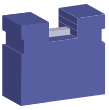
Set up and configure your board by using jumpers for various settings and features according to your needs and applications. Contact your supplier if you have doubts about the best configuration for your use.

2.1.1 How to Set Jumpers

Jumpers are short-length conductors consisting of several metal pins with a non-conductive base mounted on the circuit board. Jumper caps are used to have the functions and features enabled or disabled. If a jumper has 3 pins, you can connect either PIN1 to PIN2 or PIN2 to PIN3 by shorting.

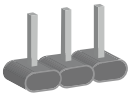
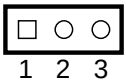
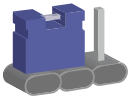
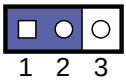
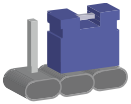
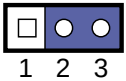


A 3-pin jumper



A jumper cap

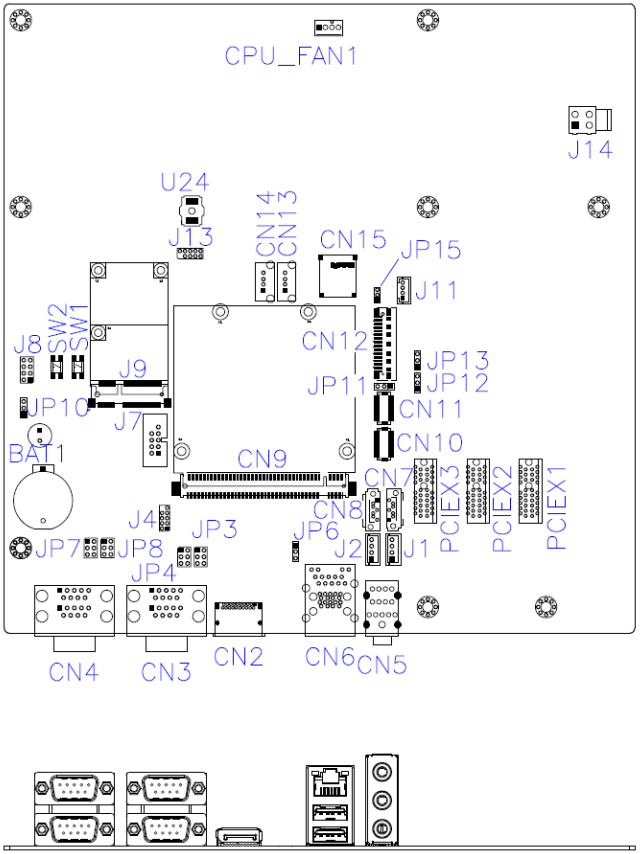
Refer to the illustration below to set jumpers.

Pin closed	Oblique view	Schematic 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**.

2.2 Connector Locations on IP416

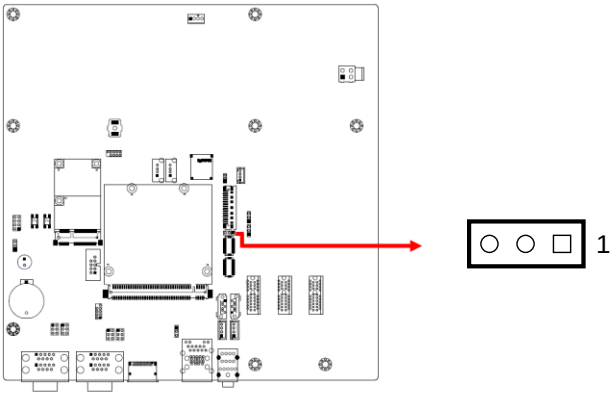


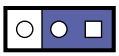
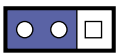
Board diagram of IP416

2.3 Jumpers Quick Reference

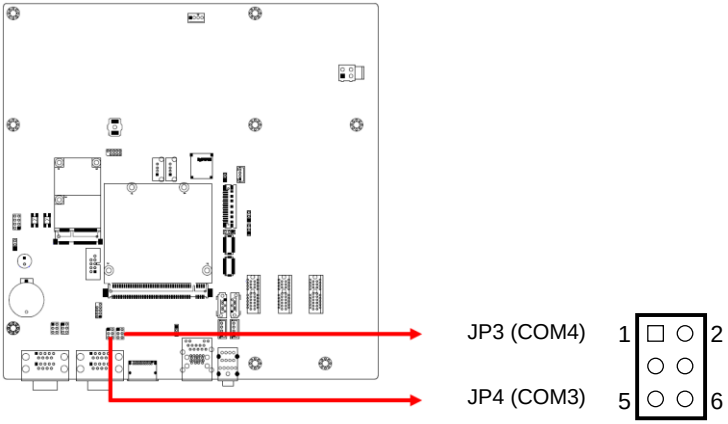
Function	Jumper Name	Page
eDP / LVDS Selection	JP11	10
COM3 & COM4 RS-232 Power Selection	JP4 (COM3), JP3 (COM4)	11
BIOS Booting Selection	JP6	12
COM1 & COM2 RS-232 Power Selection	JP7 (COM1), JP8 (COM2)	13
AT/ATX Mode Selection	JP10	14
LVDS Panel Power	JP12	15
eDP Panel Power	JP13	16
LVDS Backlight Level Selection	JP15	17

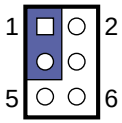
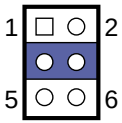
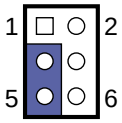
2.3.1 eDP / LVDS Selection (JP11)



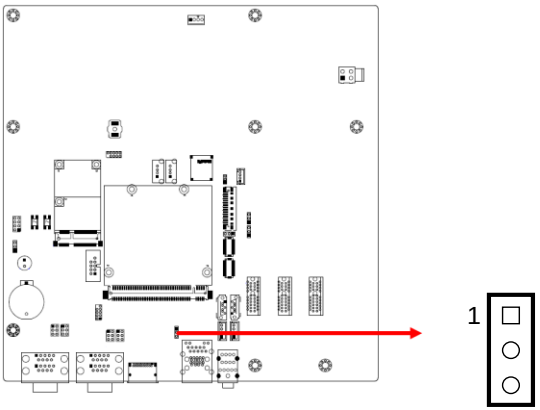
Function	Pin closed	Illustration
eDP	1-2	 1
LVDS (default)	2-3	 1

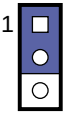
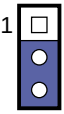
2.3.2 COM3 & COM4 RS-232 Power Selection (JP4, JP3)



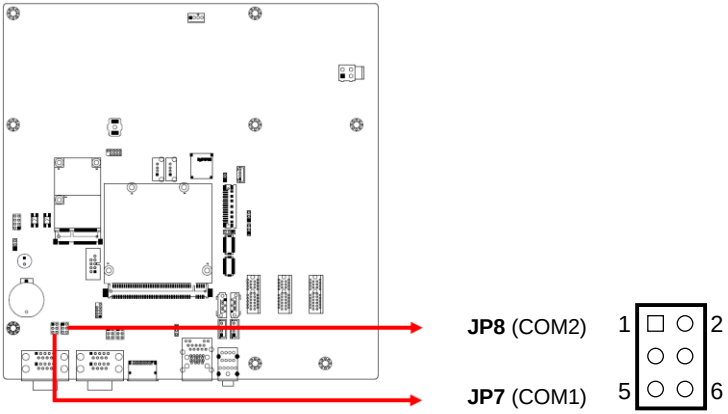
Function	Pin closed	Illustration
+12V	1-3	
RI (default)	3-4	
+5V	3-5	

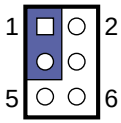
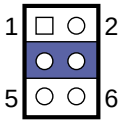
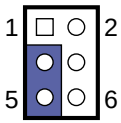
2.3.3 BIOS Booting Selection (JP6)



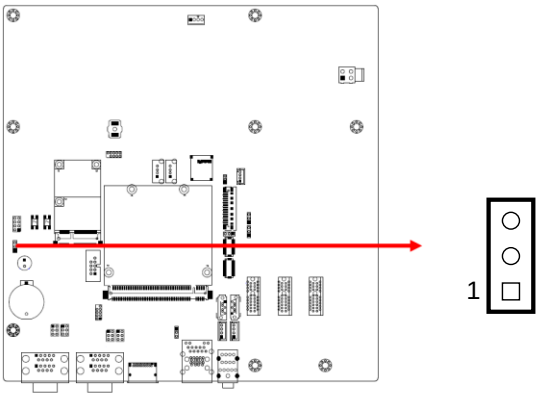
Function	Pin closed	Illustration
From CPU module (default)	1-2	
From IP416 carrier board	2-3	

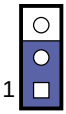
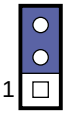
2.3.4 COM1 & COM2 RS-232 Power Selection (JP7, JP8)



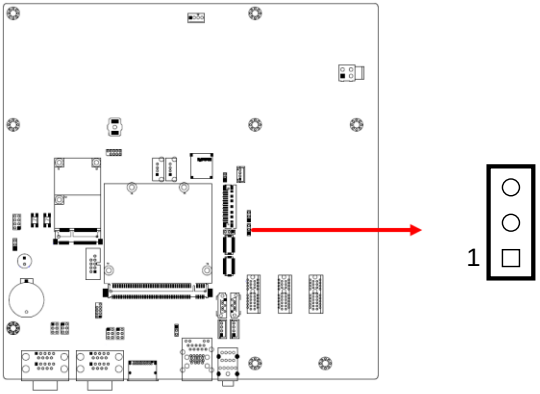
Function	Pin closed	Illustration
+12V	1-3	
RI (default)	3-4	
+5V	3-5	

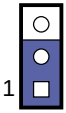
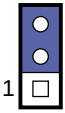
2.3.5 AT/ATX Mode Selection (JP10)



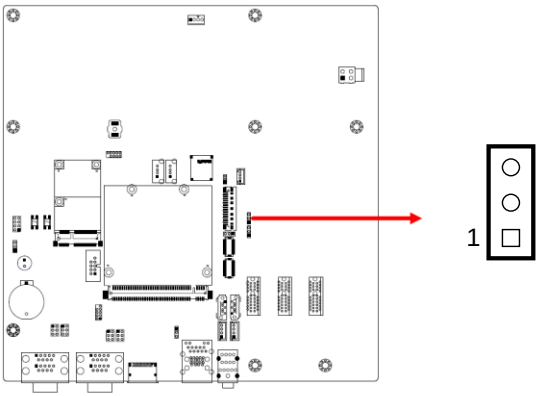
Function	Pin closed	Illustration
AT Mode (default)	1-2	
ATX Mode	2-3	

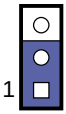
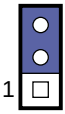
2.3.6 LVDS Panel Power (JP12)



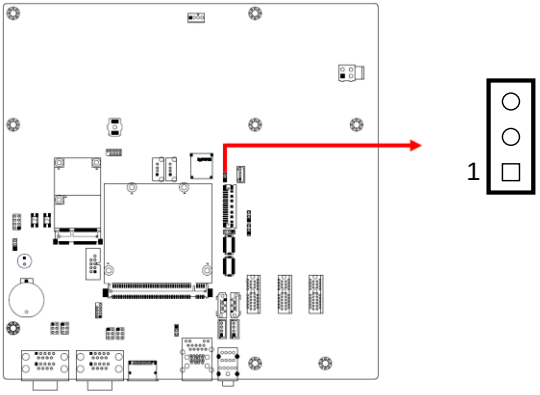
Function	Pin closed	Illustration
3.3V (default)	1-2	
5V	2-3	

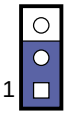
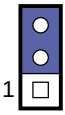
2.3.7 eDP Panel Power (JP13)



Function	Pin closed	Illustration
3.3V (default)	1-2	
5V	2-3	

2.3.8 LVDS Backlight Level Selection (JP15)



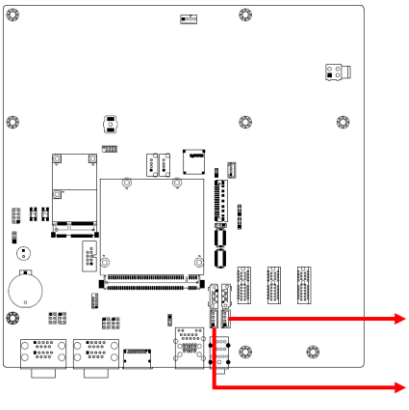
Function	Pin closed	Illustration
3.3V (default)	1-2	
5V	2-3	

2.4 Connectors Quick Reference

Function	Connector Name	Page
SATA HDD Power Connector	J1, J2	19
COM5 UART Port [1]	J7	19
System Function Connector	J8	20
LVDS Panel Inverter Power Connector	J11	21
DC-In 12V Power Connector	J14	21
COM1 & COM2 RS-232 Ports	CN4	22
COM3 & COM4 RS-232 Ports	CN3	23
Qseven MXM Connector	CN9	24
LVDS Connector	CN10 (Channel B), CN11 (Channel A)	28
eDP Connector	CN12	29
CPU Fan Power Connector	CPU_FAN1	30
USB 2.0 Connecor	CN13, CN14	--
Micro-SD Card Socket	CN15	--
DisplayPort Connector	CN2	--
Audio Jacks	CN5	--
GbE LAN & USB 3.0 Ports	CN6	--
SATA III Port	CN7, CN8	--
Mini-PCIe Slot	J9	--
PCIe (x1) Slot	PCIEX1, PCIEX2, PCIEX3	--
Reset Button	SW1	--
Power Button	SW2	--
Factory use only	J4, J13	--

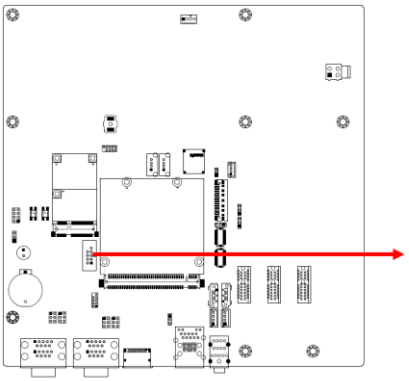
[1]: This UART port has RX, TX, RTS and CTS lines.

2.4.1 SATA HDD Power Connector (J1, J2)

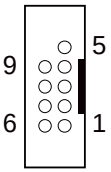


Pin	Signal Name	Pin	Signal Name
1	+5V	3	Ground
2	Ground	4	+12V

2.4.2 COM5 UART Port (J7)

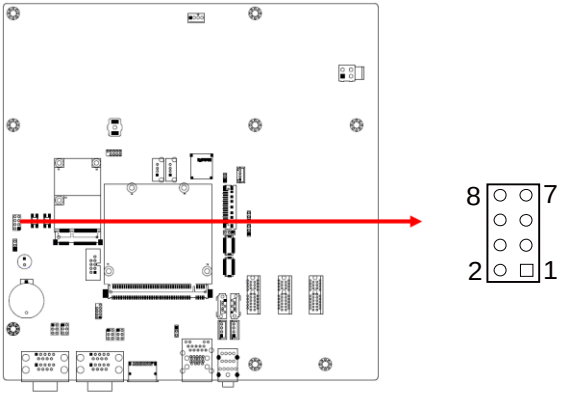


J7 has RX, TX, RTX and CTS lines.



Pin	Signal Name	Pin	Signal Name
1	NC	6	NC
2	RXD	7	RTS
3	TXD	8	CTS
4	NC	9	NC
5	Ground		

2.4.3 System Function Connector (J8)



Pin	Signal Name	Pin	Signal Name
1	Power BTN-	2	Power BTN+
3	HDD LED+	4	HDD LED-
5	Reset BTN-	6	Reset BTN+
7	Power LED+	8	Power LED-

J8 is utilized for system indicators to provide light indication of the computer activities and switches to change the computer status. It provides interfaces for the following functions.

- **ATX Power ON Switch (Pins 1 and 2)**

  The 2 pins make an “ATX Power Supply On/Off Switch” for the system that connects to the power switch on the case. When pressed, the power switch will force the system to power on. When pressed again, it will power off the system.

- **Hard Disk Drive LED Connector (Pins 3 and 4)**

  This connector connects to the hard drive activity LED on control panel. This LED will flash when the HDD is being accessed.

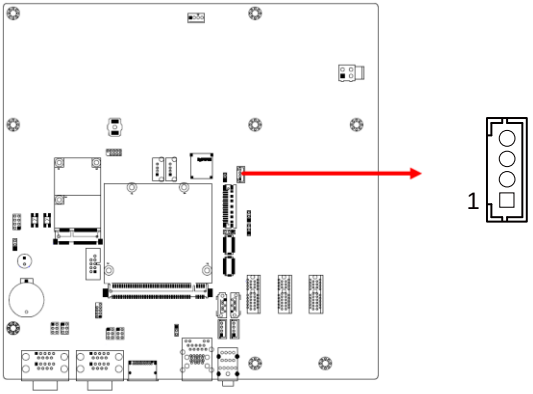
- **Reset Switch (Pins 5 and 6)**

  The reset switch allows you to reset the system without turning the main power switch off and then on again. Orientation is not required when making a connection to this header.

- **Power LED (Pins 7 and 8)**

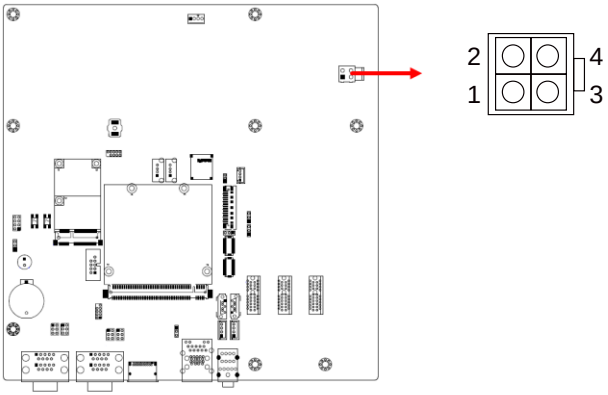
  This connector connects to the system power LED on control panel. This LED will light when the system turns on.

2.4.4 LVDS Panel Inverter Power Connector (J11)



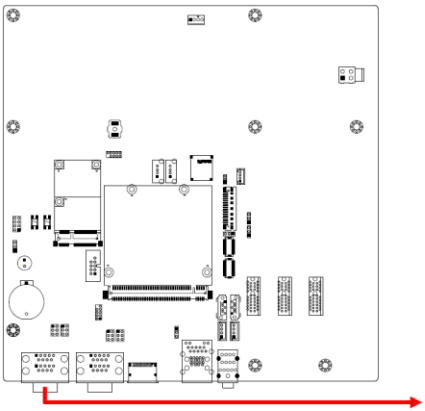
Pin	Signal Name	Pin	Signal Name
1	+12V	3	Backlight Adjustment
2	Backlight Enable	4	Ground

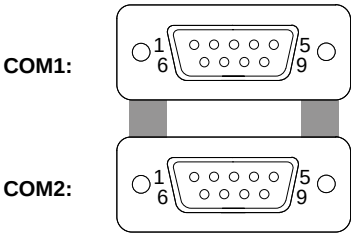
2.4.5 DC-In 12V Power Connector (J14)



Pin	Signal Name	Pin	Signal Name
1	Ground	3	+12V
2	Ground	4	+12V

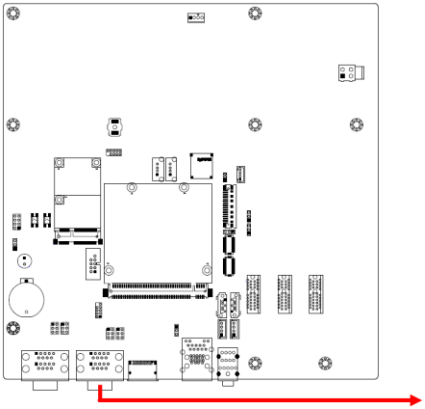
2.4.6 COM1 & COM2 RS-232 Ports (CN4)

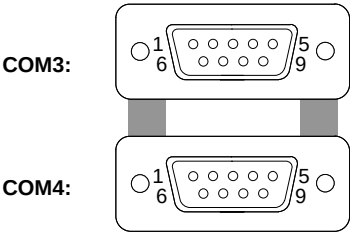




Pin	Signal Name	Pin	Signal Name
1	DCD, Data carrier detect	6	DSR, Data set ready
2	RXD, Receive data	7	RTS, Request to send
3	TXD, Transmit data	8	CTS, Clear to send
4	DTR, Data terminal ready	9	RI, Ring indicator
5	Ground		

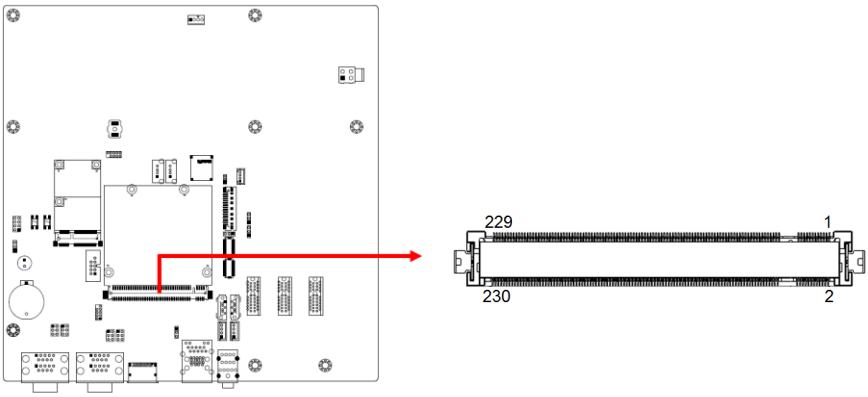
2.4.7 COM3 & COM4 RS-232 Ports (CN3)





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	RI, Ring indicator
5	Ground		

2.4.8 Qseven MXM Connector (CN9)



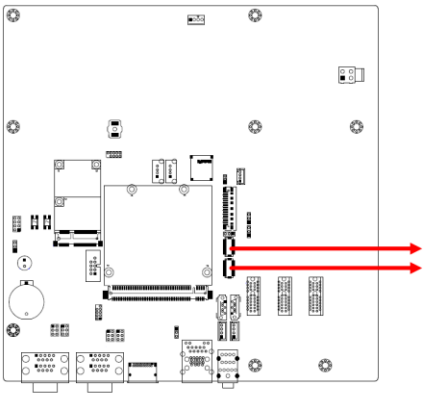
Pin	Signal Name	Pin	Signal Name
1	Ground	2	Ground
3	GBE_MDI3-	4	GBE_MDI2-
5	GBE_MDI3+	6	GBE_MDI2+
7	GBE_LINK100#	8	GBE_LINK1000#
9	GBE_MDI1-	10	GBE_MDI0-
11	GBE_MDI1+	12	GBE_MDI0+
13	Reserved	14	GBE_ACT#
15	GBE_CTREF	16	SUS_S5#
17	WAKE#	18	SUS_S3#
19	Reserved	20	PWRBTN#
21	Reserved	22	Reserved
23	Ground	24	Ground
KEY	--	KEY	--
25	Ground	26	PWGIN
27	BATLOW#	28	RSTBTN#
29	SATA0_TX+	30	SATA1_TX+
31	SATA0_TX-	32	SATA1_TX-
33	SATA_ACT#	34	Ground
35	SATA0_RX+	36	SATA1_RX+
37	SATA0_RX-	38	SATA1_RX-
39	Ground	40	Ground

Pin	Signal Name	Pin	Signal Name
41	BIOS_DISABLE#	42	SDIO_CLK#
43	SDIO_CD#	44	Reserved
45	SDIO_CMD	46	SDIO_WP
47	SDIO_PWR#	48	SDIO_DATA1
49	SDIO_DATA0	50	SDIO_DATA3
51	SDIO_DATA2	52	Reserved
53	Reserved	54	Reserved
55	Reserved	56	Reserved
57	Ground	58	Ground
59	HAD_SYNC	60	SMB_CLK
61	HAD_RST#	62	SMB_DAT
63	HAD_BITCLK	64	SMB_ALERT#
65	HAD_SDI	66	GP0_I2C_CLK
67	HAD_SDO	68	GP0_I2C_DAT
69	THRM#	70	WDTRIG#
71	THRMTRIP#	72	WDOUT
73	Ground	74	Ground
75	U3_USB0_TX_N	76	U3_USB0_RX_N
77	U3_USB0_TX_P	78	U3_USB0_RX_P
79	USB_OC1#	80	USB_OC1#
81	U3_USB2_TX_N	82	U3_USB2_RX_N
83	U3_USB2_TX_P	84	U3_USB2_RX_P
85	USB_OC1#	86	USB_OC0#
87	U2_USB3_N	88	U2_USB2_N
89	U2_USB3_P	90	U2_USB2_P
91	Reserved	92	Reserved
93	U2_USB0_N	94	U2_USB1_N
95	U2_USB0_P	96	U2_USB1_P
97	Ground	98	Ground
99	eDP0_TX0+/LVDS_A0+	100	LVDS_B0+
101	eDP0_TX0-/LVDS_A0-	102	LVDS_B0-
103	eDP0_TX1+/LVDS_A1+	104	LVDS_B1+
105	eDP0_TX1-/LVDS_A1-	106	LVDS_B1-
107	eDP0_TX2+/LVDS_A2+	108	LVDS_B2+
109	eDP0_TX2-/LVDS_A2-	110	LVDS_B2-

Pin	Signal Name	Pin	Signal Name
111	LVDS_VDD_EN	112	LVDS_BKLT_EN
113	eDP0_TX3+/LVDS_A3+	114	LVDS_B3+
115	eDP0_TX3-/LVDS_A3-	116	LVDS_B3-
117	Ground	118	Ground
119	eDP0_AUX+/LVDS_A_CLK+	120	LVDS_B_CLK+
121	eDP0_AUX-/LVDS_A_CLK-	122	LVDS_B_CLK-
123	LVDS_BKLT_CTRL	124	Reserved
125	LVDS_DDC_DAT	126	eDP0_HPD#
127	LVDS_DDC_CLK	128	Reserved
129	Reserved	130	Reserved
131	DP_LANE3+/TMDS_CLK+	132	Reserved
133	DP_LANE3-/TMDS_CLK-	134	Reserved
135	Ground	136	Ground
137	DP_LANE1+/TMDS_LANE1+	138	DP_AUX+
139	DP_LANE1-/TMDS_LANE1-	140	DP_AUX-
141	Ground	142	Ground
143	DP_LANE2+/TMDS_LANE0+	144	Reserved
145	DP_LANE2-/TMDS_LANE0-	146	Reserved
147	Ground	148	Ground
149	DP_LANE0+/TMDS_LANE2+	150	HDMI_CTRL_DAT
151	DP_LANE0-/TMDS_LANE0-	152	HDMI_CTRL_CLK
153	DP_HDMI_HPD#	154	DP_HPD#
155	PCIE_REF_CLK+	156	PCIE_WAKE#
157	PCIE_REF_CLK-	158	PCIE_RST#
159	Ground	160	Ground
161	PCIE3_TX+	162	PCIE3_RX+
163	PCIE3_TX-	164	PCIE3_RX-
165	Ground	166	Ground
167	PCIE2_TX+	168	PCIE2_RX+
169	PCIE2_TX-	170	PCIE2_RX-
171	UART0_TX	172	UART0_RTS#
173	PCIE1_TX+	174	PCIE1_RX+
175	PCIE1_TX-	176	PCIE1_RX-
177	UART0_RX	178	UART0_CTS#
179	PCIE0_TX+	180	PCIE0_RX+

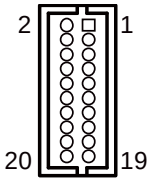
Pin	Signal Name	Pin	Signal Name
181	PCIE0_TX-	182	PCIE0_RX-
183	Ground	184	Ground
185	LPC_AD0	186	LPC_AD1
187	LPC_AD2	188	LPC_AD3
189	LPC_CLK	190	LPC_FRAME#
191	LPC_SERIRQ	192	LPC_LDRQ#
193	VCC_RTC	194	SPKR
195	FAN_TACHOIN	196	FAN_PWMOUT
197	Ground	198	Ground
199	SPI_MOSI	200	SPI_CS0#
201	SPI_MISO	202	SPI_CS1#
203	SPI_SCK	204	NC
205	VCC_5V_SB	206	VCC_5V_SB
207	NC	208	NC
209	NC	210	NC
211	VCC	212	VCC
213	VCC	214	VCC
215	VCC	216	VCC
217	VCC	218	VCC
219	VCC	220	VCC
221	VCC	222	VCC
223	VCC	224	VCC
225	VCC	226	VCC
227	VCC	228	VCC
229	VCC	230	VCC

2.4.9 LVDS Connector (CN10, CN11)



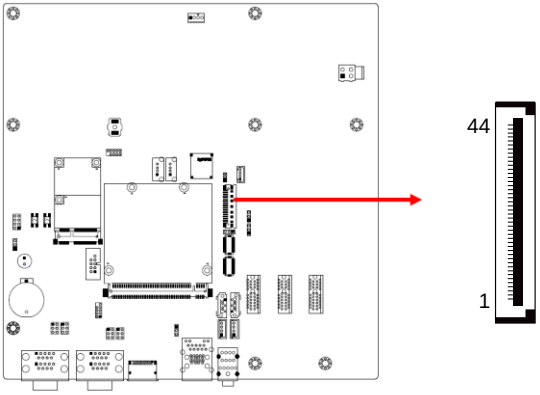
CN11 (Channel A)

CN10 (Channel B)



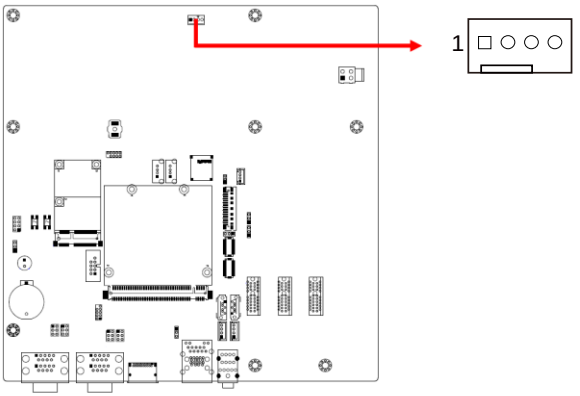
Pin	Signal Name	Pin	Signal Name
1	TX0P	2	TX0N
3	Ground	4	Ground
5	TX1P	6	TX1N
7	Ground	8	Ground
9	TX2P	10	TX2N
11	Ground	12	Ground
13	CLKP	14	CLKN
15	Ground	16	Ground
17	TX3P	18	TX3N
19	VDD	20	VDD

2.4.10 eDP Connector (CN12)



Pin	Signal Name	Pin	Signal Name
1	VDD	23	TX0N
2	VDD	24	TX0P
3	VDD	25	Ground
4	VDD	26	AUXP
5	VDD	27	AUXN
6	Ground	28	NC
7	Ground	29	+3.3V
8	Ground	30	NC
9	Ground	31	+12V
10	HPD	32	NC
11	NC	33	Ground
12	NC	34	+5V
13	Ground	35	NC
14	TX3N	36	Backlight Adjustment
15	TX3P	37	Backlight Enable
16	Ground	38	+12V
17	TX2N	39	+3.3V
18	TX2P	40	Ground
19	Ground	41	SMB_CLK
20	TX1N	42	SMB_DATA
21	TX1P	43	NC
22	Ground	44	NC

2.4.11 CPU Fan Power Connector (CPU_FAN1)



Pin	Signal Name	Pin	Signal Name
1	Ground	3	Rotation detection
2	+12V	4	Control

Appendix

This section provides the types of onboard connectors and the mating types for your reference.

A. Onboard Connector Types

Function	Connector Name	Onboard Type	Compatible Mating Type for Reference
SATA HDD Power Connector	J1, J2	JST B4B-XH-A	JST XHP-4
COM5 RS-232 Port	J7	E-call 0151-2011009	E-call 0109-042-XX0
System Function Connector	J8	E-call 0126-01-203-080	Dupont 2.54 mm-pitch (female)
LVDS Panel Inverter Power Connector	J11	JST B4B-PH-K-S	JST PHR-4
DC-In 12V Power Connector	J14	Molex 39-28-8040	JST PHR-2
COM3 & COM4 RS-232 Ports	CN3	YIMTEX C1208121009230700P	D-SUB 9P (female)
COM1 & COM2 RS-232 Ports	CN4	YIMTEX C1208121009230700P	D-SUB 9P (female)
LVDS Connector	CN10, CN11	HRS DF20F-20DP-1V	HRS DF20A-20DS-1C
eDP Connector	CN12	JAE FI-TD44SB-E-R750	JAE FI-D44C2-E
CPU Fan Power Connector	CPU_FAN1	Molex 47053-1000	Molex 47054-1000