

IB996

Intel® 14th or 13th or 12th Generation
Intel Core™ DT processors i9/i7/i5/i3
PICMG 1.3 with Intel Q670E PCH
Full-Size CPU Card

Reference
USER MANUAL

DRAFT

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Compliance



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



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 0°C and 60°C.
- Do not leave this product in an environment where the storage temperature may be below -20° C (-4° F) or above 80° C (176° F). To prevent from damages, the product must be used in a controlled environment.



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

- **Industrial 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

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)

Then contact your distributor or sales representative for assistance.

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Chapter 1

General Information

The information provided in this chapter includes:

- Features
- Packing List
- Optional Accessories
- Block Diagram
- Specifications
- Board View
- Board Dimensions

1.1 Introduction

The IB996AF PICMG1.3 SHB Express CPU Card is based on the latest 14th/13th and 12th Gen. Intel® Xeon® E / Core™ /Pentium® / Celeron® processor and features an integrated graphics core that work with LVDS, DVI-I and DVI-D display outputs.

IB996 utilizes the dramatic increase in performance provided by Intel's latest cutting-edge technology. Measuring 338mm x122mm, IB996 offers fast 6Gbps SATA support (up to 8 ports), USB3.1 (5 ports) and interfaces for two Gigabit LAN.

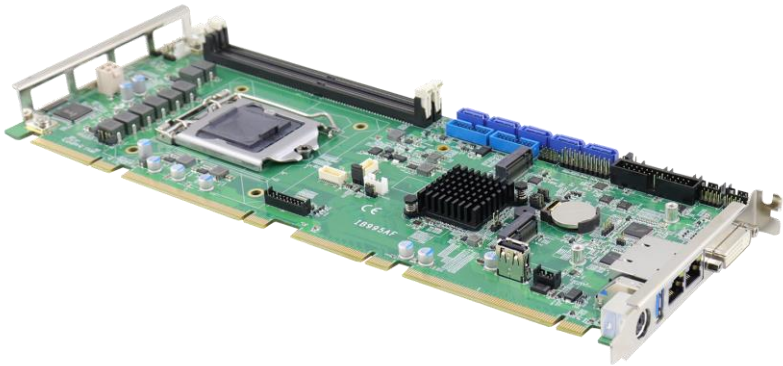


Photo of IB996

1.2 Features

- 2 x DDR4-2400/2666 UDIMM, expandable up to 64GB, ECC supported per CPU SKUS.
- Dual Gigabit LAN
- 1 x DVI-I , 1 x DVI-D, 1 x 24-bit dual channel LVDS ports
- 8 x USB 3.x, 5 x SATA III, 4 x serial ports
- PCIe (x16), M.2 M2280 (for IB996AF series only) and M.2 E2230 expansion slots
- Configurable watchdog timer, digital I/O, TPM

1.3 Packing List

Your IB996 package should include the items listed below. If any of the items is missing, please contact the distributor or dealer from whom you have purchased the product.

- IB996AF PICMG1.3 SHB x 1
- I/O shield
- SATA cable (SATA-5)
- COM port cable (PK1-150)

1.4 Optional Accessories

- Audio cable (Audio-18)
- DVI-D cable (DVIK-3)
- USB cable (USB-29)
- USB3.0 cable (USB-3K)
- Printer port cable (PK3K)

1.5 Specifications

Product Name	IB996AF Series	
Form Factor	PICMG 1.3 SHB Express full size CPU card	
System		
Operating System	<ul style="list-style-type: none"> • Microsoft Windows 10 (64-bit) • Linux Ubuntu (64-bit) 	
CPU & Chipset	14th/13th/12th Gen Intel Core i9/i7/i5/i3 processors PCH WITH Intel Q670E PCH	
Memory	2 x DDR4 UDIMM 2666 / 2400 MHz, up to 64 GB * ECC will be supported by identified CPU SKUs.	
Storage	M.2 M2280 slot (NVMe supported)	
Graphics	Intel® UHD Graphics P630	
LAN	1 st LAN: Intel® I226LM 2.5GbE 2 nd LAN: Intel® I226V 2.5 GbE	
Security	TPM 2.0	
Super I/O	Fintek F81966AB-I	
Digital I/O	4-In / 4-Out	
Audio Codec	Built HD audio with Realtek ALC888S	
Watchdog Timer	Yes (256 segments, 0, 1, 2...255 sec / min)	
BIOS	AMI BIOS	
iSmart	N/A	
RAID	RAID 0/1/5	
iAMT	16.1 (with E-Xeon® / Core i7/ i5 DT CPU SKUs)	
TPM	2.0	
Dimensions	338mm x 126mm	
RoHS	Yes	
Certification	CE, FCC	

Model	IB996AF Series	IB996EF
I/O Ports		
Display	<ul style="list-style-type: none"> • 1 x DVI-D (1920 x 1080 at 60 Hz) • 1 x DVI-I (1920 x 1080 at 60 Hz) • 1 x 24-bit dual channel LVDS (1920 x 1080 at 60 Hz) 	
LAN	<ul style="list-style-type: none"> • 2 x RJ45 GbE LAN for 2.5 GbE • 1 x M.2 (E-key@2230), Support CNVi 	
USB	<ul style="list-style-type: none"> • 1 x USB 3.2 (I/O coastline connectors) • 6 x USB 3.2 (via pin-header) • 1 x USB 2.0 ports (via M.2 E2230) • 1 x USB 3.0 (Vertical type A) • 4 x USB 2.0 to Backplane 	
Serial	<p>4 x COM ports:</p> <ul style="list-style-type: none"> • COM1: RS-232/422/485 (Support Ring-in with power at 500mA, selectable for 5V or 12V) • COM2 ~ COM4: RS-232 only (via onboard box-headers) 	
SATA	<ul style="list-style-type: none"> • support 6 ports, 5 x SATAIII (3.0) 6Gbps 	
Digital IO	4-In & 4-Out	
Expansion Slots	<ul style="list-style-type: none"> • 1 x PCIe (x16) to backplane • 1 x M.2 M2280 • 1 x M.2 E2230 	Via Backplane 4x PCI, 4x PCI-E (x1) or 1x PCI-E (x4) 1x PCI-E (x16), Mini PCIe Type Slots
Environment		
Temperature	<ul style="list-style-type: none"> • Operating: 0 ~ 60 °C (32 ~ 140 °F) • Storage: -20 ~ 80 °C (-4 ~ 176 °F) 	
Relative Humidity	0 ~ 90 %, non-condensing at 60 °C	

All specifications are subject to change without prior notice.

1.6 Block Diagram

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1.7 Board Pictures

Top View



Bottom View

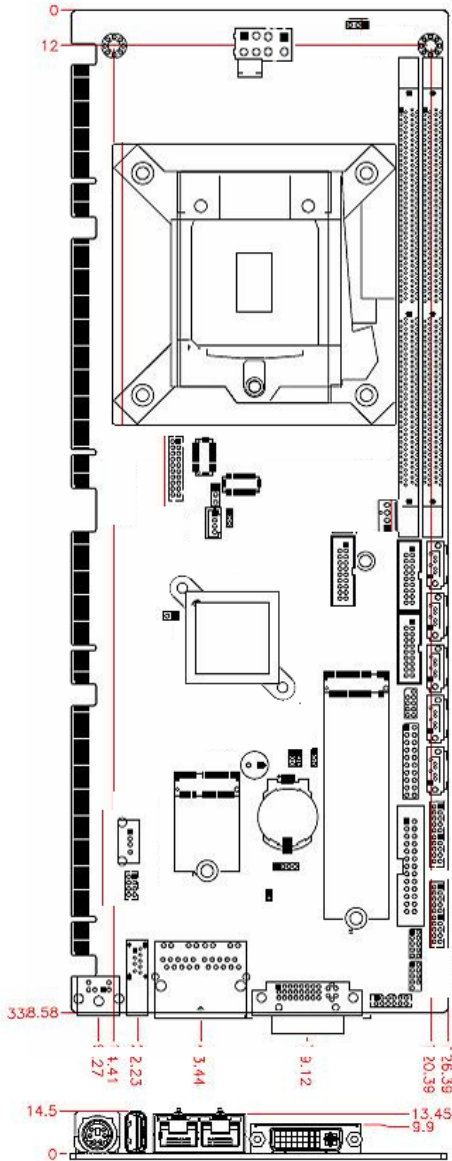


I/O View



* The photos above are for reference only.

1.8 Dimensions



Chapter 2

Hardware Configuration

This section provides information on jumper settings and connectors on the IB996 in order to set up a workable system. On top of that, you will also need to install crucial pieces such as the CPU and the memory before using the product. The topics covered are:

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

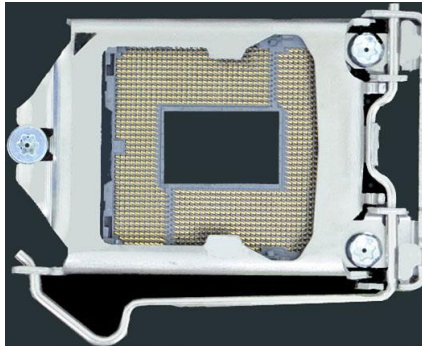
2.1 Essential Installations Before You Begin

Follow the instructions below to install the CPU and the memory.

2.1.1 Installing the CPU

The IB996 board supports an LGA1700 Socket for Intel® 14th/13th/12th Gen. Core™ i9 / i7 / i5 / i3 DT / Xeon-E processors. Follow the instructions below to install the CPU.

1. Unlock the socket by pressing the lever sideways, then lift up the lever and the metal lid.
2. Position the CPU above the socket such that the CPU corner aligns with the gold triangle matching the socket corner with a small triangle.
3. Carefully insert the CPU into the socket and push down the lever to secure the CPU.

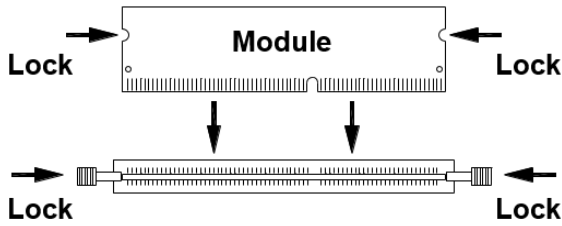


Then you can install the CPU cooler and fan.

Note: Ensure that the CPU cooler and the CPU top surface are in total contact to avoid CPU overheating problem that would cause your system to hang or be unstable.

2.1.2 Installing the Memory

The IB996 board supports two DDR4 memory socket for a maximum total memory of 64GB in DDR4 UDIMM memory type. To install the modules, locate the memory slot on the board and perform the following steps:



1. Hold the module so that the key of the module aligned with that on the memory slot.
2. Gently push the module in an upright position until the clips of the slot close to hold the module in place when the module touches the bottom of the slot.

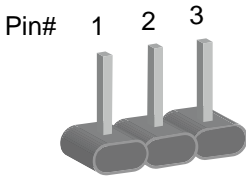
To remove the module, press the clips outwards with both hands

2.2 Setting the Jumpers

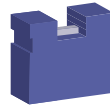
Set up and configure your IB996 by using jumpers for various settings and features according to your needs and applications. Contact your supplier if you have doubts about the best configuration for your use.

2.2.1 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.

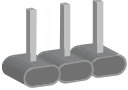

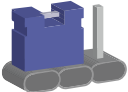

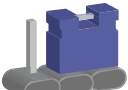



A 3-pin jumper



A jumper cap

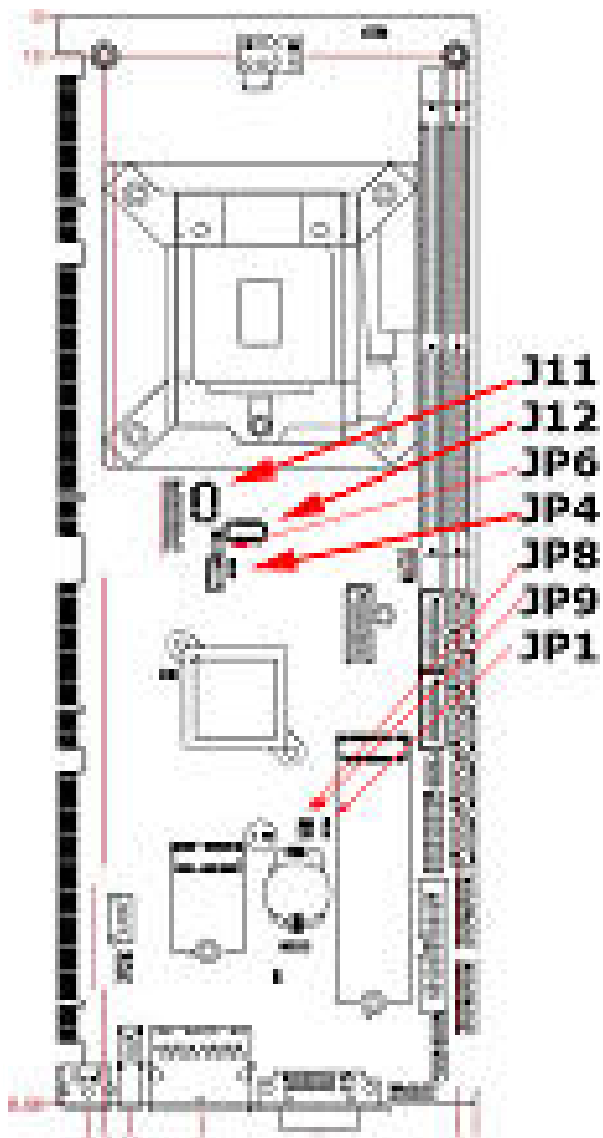
Refer to the illustration below to set jumpers.

Pin closed	Oblique view	Illustration
Open		 1 2 3
1-2		 1 2 3
2-3		 1 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**.

2.3 Jumper & Connector Locations on IB996

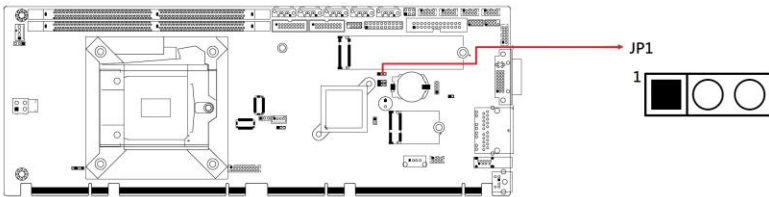


Board diagram of IB996AF (for Q170)

2.4 Jumpers Quick Reference

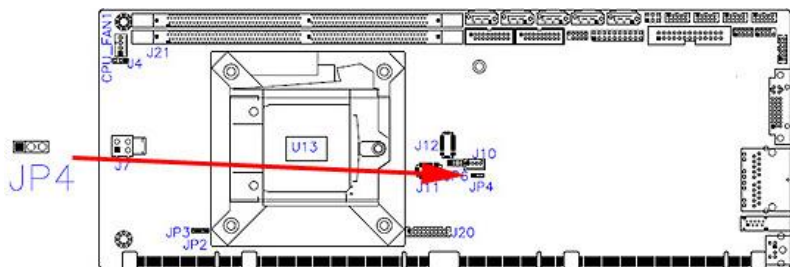
Function	Jumper	Page
LVDS Panel Brightness Selection	JP4	16
LVDS Panel Power Selection	JP6	16
Clear ME Register	JP8	17
Clear CMOS Data	JP9	17



2.4.1 ATX / AT Power Mode Selection (JP1)



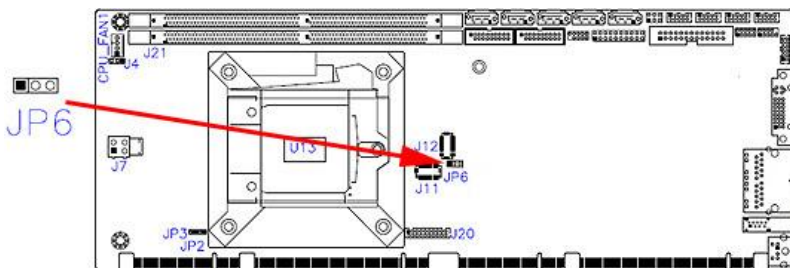
Function	Pin closed	Illustration
ATX Mode (default)	1-2	
AT Mode	2-3	

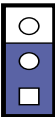

2.4.3 LVDS Power Brightness Selection (JP4)

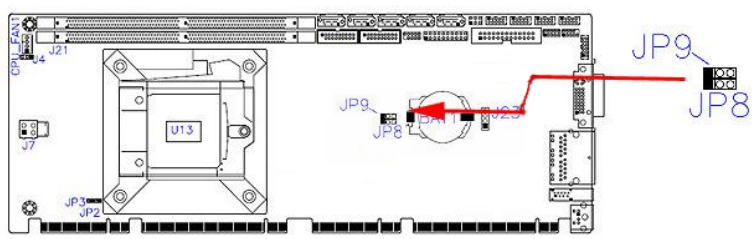


Function	Pin closed	Illustration
3.3V (default)	1-2	 1
5V	2-3	 1

2.4.4 LVDS Panel Power Selection (JP6)



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

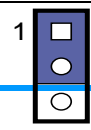


2.4.5 Clear ME Register (JP8)

Function	Pin closed	Illustration
Normal (default)	1-2	1
Clear ME	2-3	1

2.4.6 Clear CMOS Data (JP9)

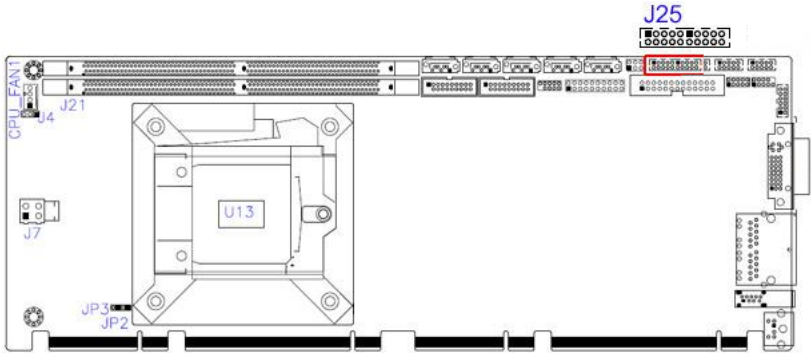
Function	Pin closed	Illustration
Normal (default)	1-2	
Clear CMOS	2-3	



2.5 Connectors Quick Reference

Function	Connector Name	Page
COM1 RS-232/422/485 Ports	J25	19
COM2~COM4 RS-232 Ports	J26 (COM2), J5 (COM3), J6 (COM4)	20
Digital I/O Connector	J2	21
LCD Backlight Connector	J10	21
ATX 12V Power Connector	J7	22
Dual USB 3.0 Pin-Header	J8,J9	23
Dual USB 2.0 Pin-Header	J16	24
Front Panel Audio Connector	J18	25
Front Panel Settings Connector	J3	25
LVDS Connector	J11, J12	26
Fan Power Connector	CPU_FAN1	27
DVI-D Connector	J20	28
Parallel Port	J24	29

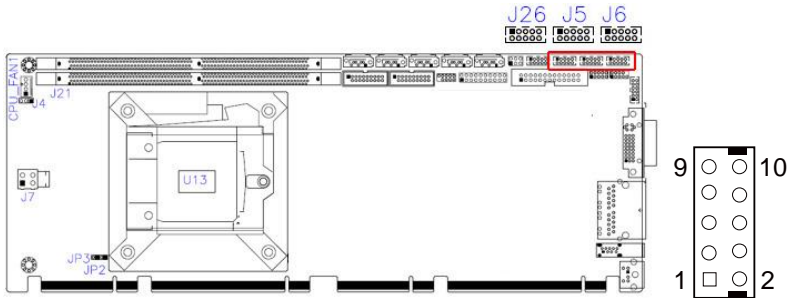
2.5.1 COM1 RS-232/422/485 & COM2 RS-232 Serial Port (J25)



Pin	Signal Name	Pin	Signal Name
1	DCD, Data carrier detect	2	RXD, Receive data
3	TXD, Transmit data	4	DTR, Data terminal ready
5	Ground	6	DSR, Data set ready
7	RTS, Request to send	8	CTS, Clear to send
9	RI, Ring indicator	10	N/A

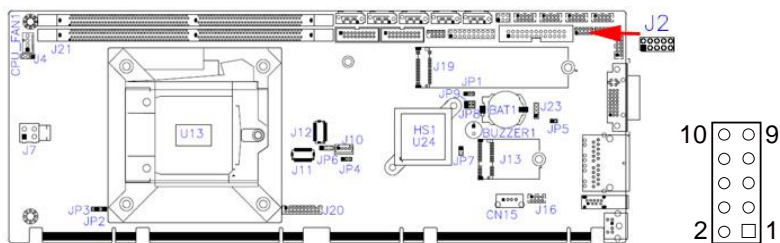
Pin	Signal Name		
	RS-232	RS-422	RS-485
1	DCD	TX-	DATA-
2	RX	TX+	DATA+
3	TX	RX+	NC
4	DTR	RX-	NC
5	Ground	Ground	Ground
6	DSR	NC	NC
7	RTS	NC	NC
8	CTS	NC	NC
9	RI	NC	NC

2.5.2 COM2~COM4 RS-232 Ports (J26, J5, J6)



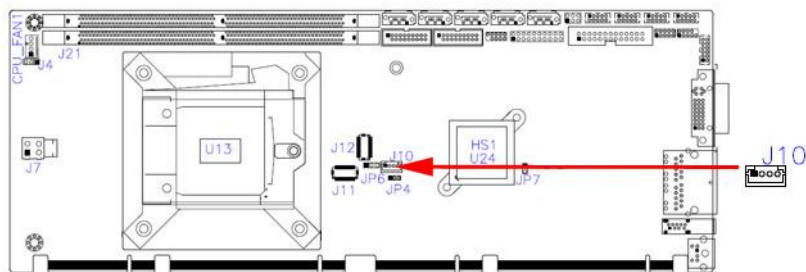
Pin	Signal Name	Pin	Signal Name
1	DCD, Data carrier detect	2	RXD, Receive data
3	TXD, Transmit data	4	DTR, Data terminal ready
5	Ground	6	DSR, Data set ready
7	RTS, Request to send	8	CTS, Clear to send
9	RI, Ring indicator	10	Key

2.5.3 Digital I/O Connector (J2)



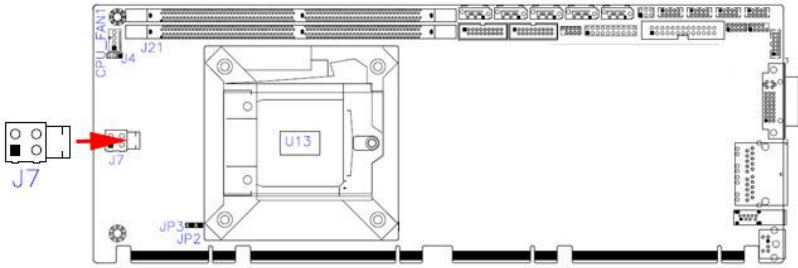
Pin	Signal Name	Pin	Signal Name
1	Ground	2	+5V
3	OUT3	4	OUT1
5	OUT2	6	OUT0
7	IN3	8	IN1
9	IN2	10	IN0

2.5.4 LCD Backlight Connector (J10)



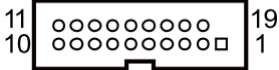
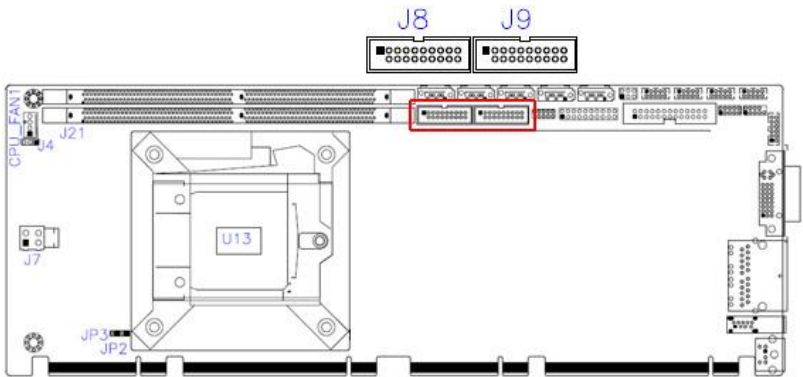
Pin	Signal Name	Pin	Signal Name
1	+12V	3	Brightness Control
2	Backlight Enable	4	Ground

2.5.5 ATX Power Connector (J7)



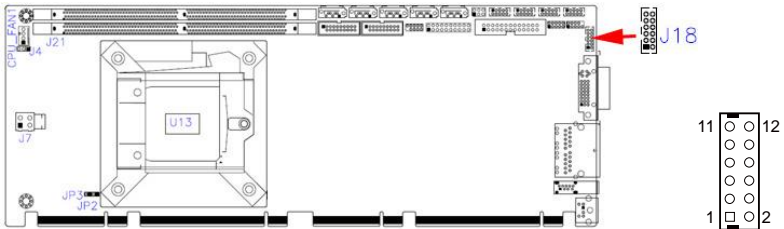
Pin	Assignment	Pin	Assignment
1	Ground	3	+12V
2	Ground	4	+12V

2.5.6 USB3.0/2.0 Connector (J8, J9)



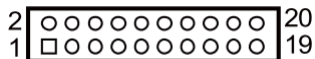
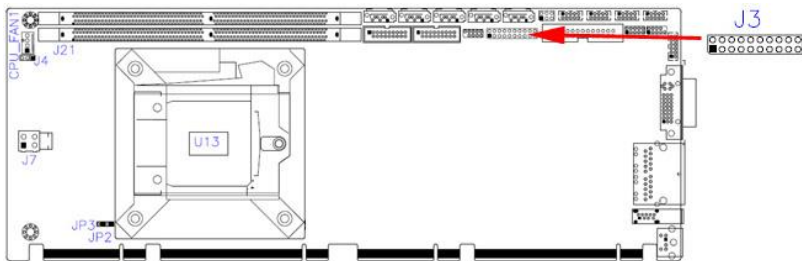
Pin #	Assignment	Pin #	Assignment
1	VCC(900mA)	11	P2_U2_D+
2	P1_SSRX-	12	P2_U2_D-
3	P1_SSRX+	13	GND
4	GND	14	P2_SSTX+
5	P1_SSTX-	15	P2_SSTX-
6	P1_SSTX+	16	GND
7	GND	17	P2_SSRX+
8	P1_U2_D-	18	P2_SSRX-
9	P1_U2_D+	19	VCC(900mA)
10	NC		

2.5.8 Front Panel Audio Connector (J18)



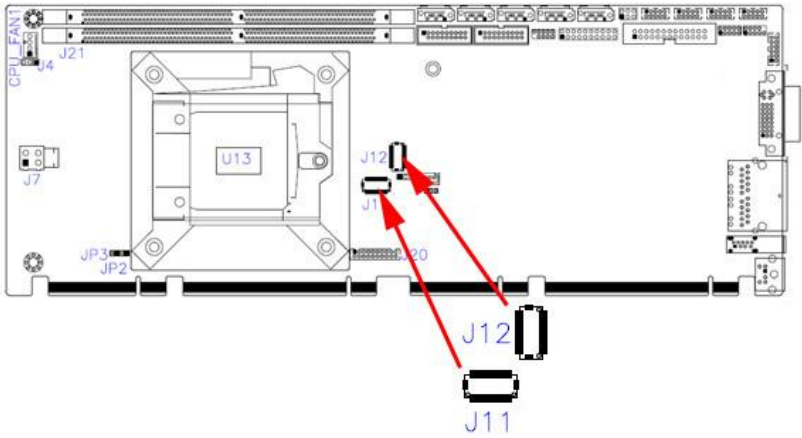
Pin	Signal Name	Pin	Signal Name
1	HPOUT_L	2	HPOUT_R
3	HPOUT_JD	4	Ground
5	LINE_L	6	LINE_R
7	LINE_JD	8	Ground
9	MIC IN_L	10	MIC IN_R
11	MIC IN_JD	12	Ground

2.5.9 Front Panel Settings Connector (J3)



Pin	Signal Name	Pin	Signal Name
1	Power LED+	2	SPK
3	NC	4	NC
5	Power LED-	6	Ground
7	NC	8	SPK(VCC5)
9	Ground	10	NC
11	Ground	12	NC
13	Power BTN-	14	Power BTN+
15	NC	16	NC
17	Reset BTN-	18	Reset BTN+
19	HDD LED+	20	HDD LED-

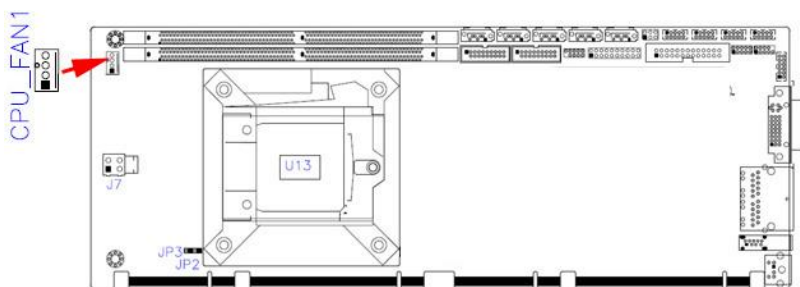
2.5.10 LVDS Connector (J11, J12)



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

Remarks: J11 is 1st LVDS; J12 is 2nd LVDS.

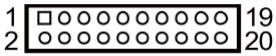
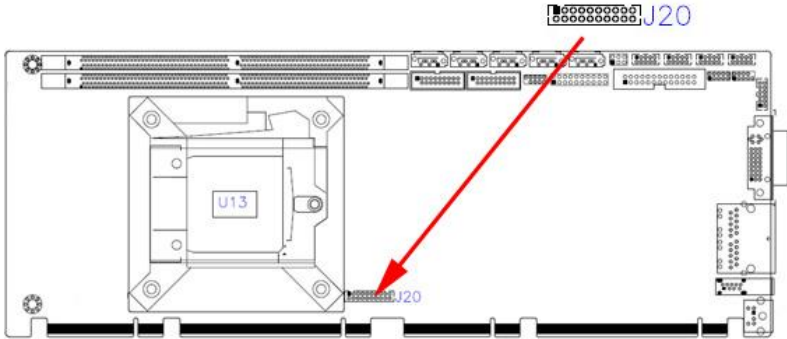
2.5.11 Fan Power Connector (CPU_FAN1)



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

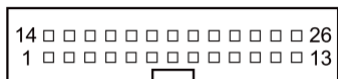
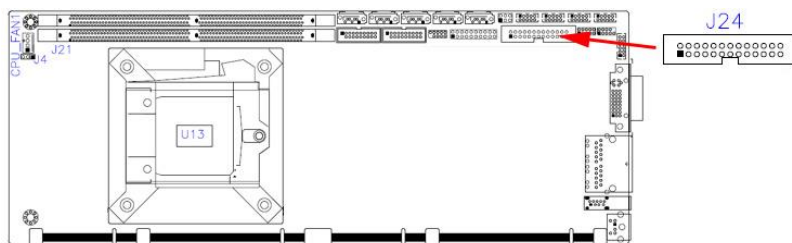
Remarks: (PWM Mode Only)

2.5.12 DVI-D Connector (J20)



Pin	Signal Name	Pin	Signal Name
1	TMDS_DATA1_P	2	TMDS_DATA1_N
3	Ground	4	Ground
5	TMDS_CLK_P	6	TMDS_CLK_N
7	Ground	8	Ground
9	Hot Plug Detect	10	NC
11	TMDS_DATA2_P	12	TMDS_DATA2_N
13	Ground	14	Ground
15	TMDS_DATA0_P	16	TMDS_DATA0_N
17	NC	18	NC
19	TMDS_SDA	20	TMDS_SCL

2.5.13 Parallel Port (J24)



Pin	Signal Name	Pin	Signal Name
1	Line printer strobe	14	Auto Feed
2	PD0, parallel data 0	15	Error
3	PD1, parallel data 1	16	Initialize
4	PD2, parallel data 2	17	Select-Printer / Select-In
5	PD3, parallel data 3	18	Ground
6	PD4, parallel data 4	19	Ground
7	PD5, parallel data 5	20	Ground
8	PD6, parallel data 6	21	Ground
9	PD7, parallel data 7	22	Ground
10	ACK,acknowledge	23	Ground
11	Busy	24	Ground
12	Paper Empty	25	Ground
13	Select	26	Ground

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