USER'S MANUAL

CEB94021

COM Express™ Type 6 Application Board

User's Manual

AXIOMTEK

www.axiomtek.com

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CAUTION

If you replace wrong batteries, it causes the danger of explosion. It is recommended by the manufacturer that you follow the manufacturer's instructions to only replace the same or equivalent type of battery, and dispose of used ones.

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ESD Precautions

Computer boards have integrated circuits sensitive to static electricity. To prevent chipsets from electrostatic discharge damage, please take care of the following jobs with precautions:

- Do not remove boards or integrated circuits from their anti-static packaging until you are ready to install them.
- Before holding the board or integrated circuit, touch an unpainted portion of the system unit chassis for a few seconds. It discharges static electricity from your body.
- Wear a wrist-grounding strap, available from most electronic component stores, when handling boards and components.

Trademarks Acknowledgments

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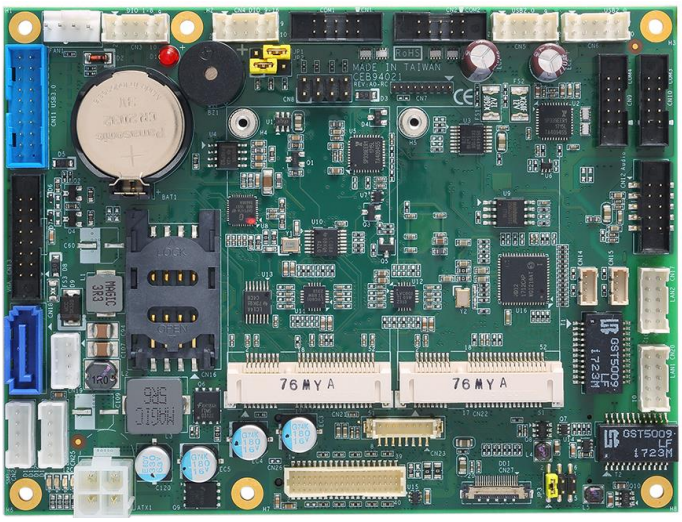
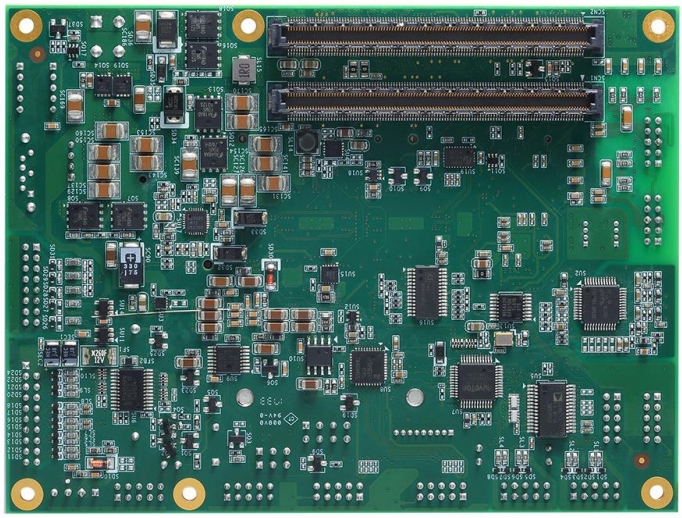
Section 1
Introduction





The CEB94021 is a new COM Express™ Type 6 Application Board for embedded COM Express™ Type 6 Mini Module and fully compliant with the PCI Industrial Computer Manufactures PICMG COM Express™ standard. The COM Express™ is an open industry standard for Computer-on-Modules, designed to be future proof and to provide a smooth transition path from legacy parallel interfaces to LVDS interfaces. In addition to the standard output signals for converting, CEB94021 provides two full-size PCI-Express Mini Card sockets and one SIM card socket for expansion purposes.

This board supports various I/O features: display interfaces (VGA and LVDS), two Gigabit/Fast Ethernet, HD audio codec, one SATA-600 interface, four USB 2.0 ports, digital I/O, four serial ports (three RS-232/422/485 and one RS-232).

With CEB94021, customers can implement it in their own applications devices and accelerate time-to-market.

1.1 Features

- 2 Gigabit LAN ports
- SATA and mSATA
- LVDS/VGA/DDI
- 2 USB 3.0 ports
- 6 USB 2.0 ports
- 4 COM ports
- 16-bit DI/O
- 2 full-size PCI-Express Mini Cards
- 125 x 95mm mini size form factor

1.2 Specifications

- **CPU**
  - COM Express™ Type 6 module.
- **System Chipset**
  - On the COM Express™ module.
- **BIOS**
  - On the COM Express™ module.
- **System Memory**
  - On the COM Express™ module.
- **Onboard Multi I/O**
  - Three RS-232/422/485 in wafer connector.
  - One RS-232 in wafer connector.
- **Serial ATA**
  - One SATA-600 connector.
  - One mSATA (mini PCIe Slot).
- **Ethernet**
  - Two wafer connectors as 1000/100/10Mbps Gigabit/Fast Ethernet interfaces.
- **Audio**
  - HD audio with line-out/line-in/MIC-in.
- **USB Interface**
  - Two USB 3.0 in 19-pin wafer connector.
  - Six USB 2.0 in 2x5-pin wafer connectors and two PCI-Express Mini Card sockets.
- **SPI**
  - Not Supported.
- **I2C**
  - Supported.
- **Digital I/O**
  - Eight inputs and eight outputs in wafer connectors.

- **Display**
  - One 2x20-pin connector for 18/24-bit single/dual channel LVDS and one 8-pin inverter connector. LVDS resolution is up to 1920x1200 in 24-bit dual channels.
  - One 16-pin wafer connector as VGA interface.
  - One 1x20-pin connector as DDI interface.

- **Expansion Interface**
  - Two full-size PCI-Express Mini Card sockets which comply with PCI-Express Mini Card Spec. V1.2.
  - One SIM card socket.

- **Battery**
  - Lithium 3V/220mAH.

- **Size**
  - 125 x 95mm.

- **Board Thickness**
  - 1.6mm.

- **Operation Temperature**
  - -40°C ~ +85°C (-104°F ~ 185°F).

- **Operation Humidity**
  - 10% ~ 95% relative humidity, non-condensing.

Note

All specifications and images are subject to change without notice.

1.3 Utilities Supported

- Audio driver
- Intel® Ethernet driver

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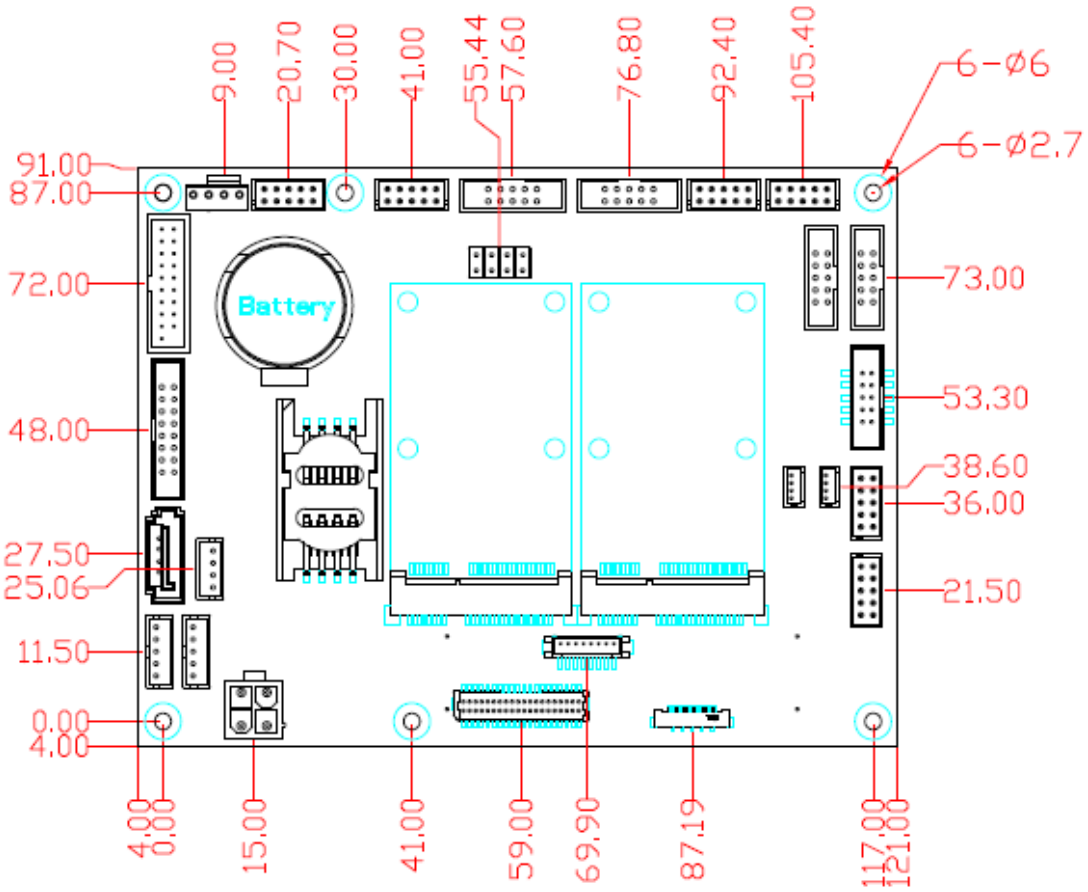
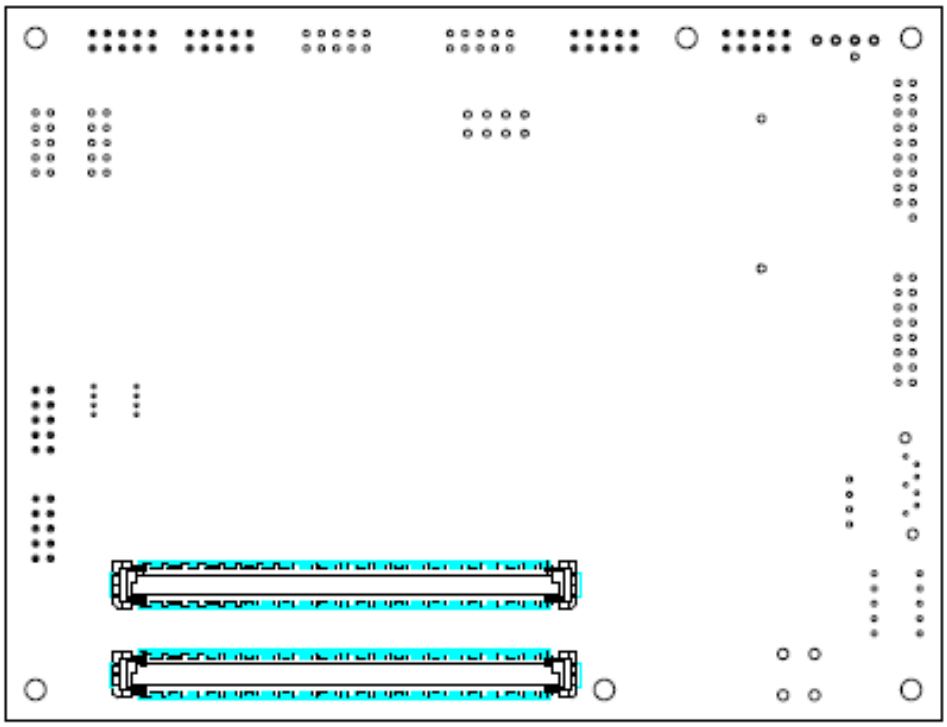
Section 2
Board and Pin Assignments

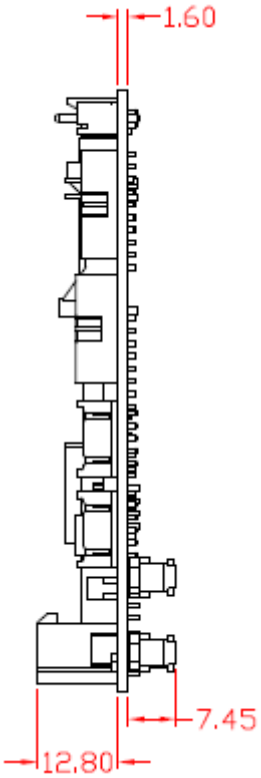
2.1 Board Dimensions and Fixing Holes



Top View

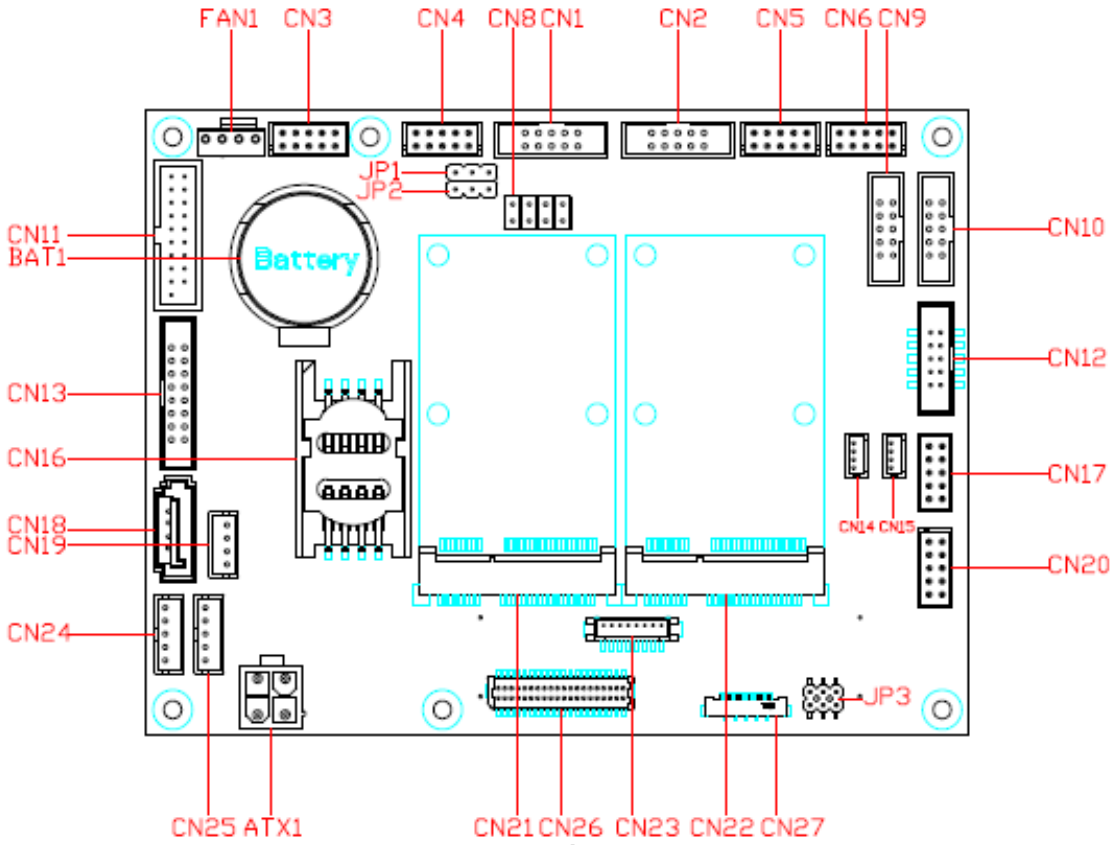


Bottom View

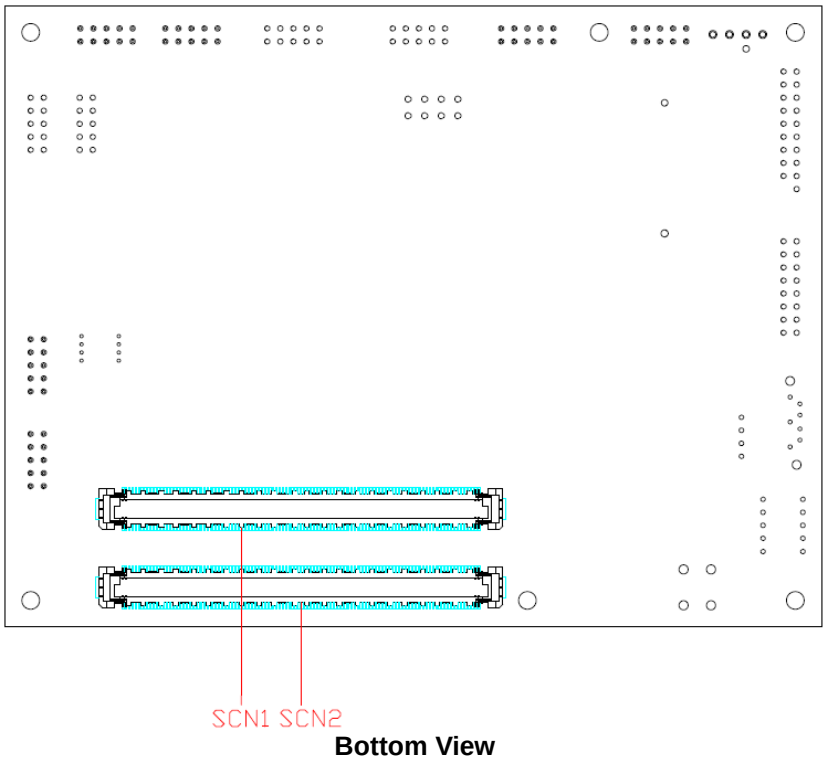


Side View

2.2 Board Layout



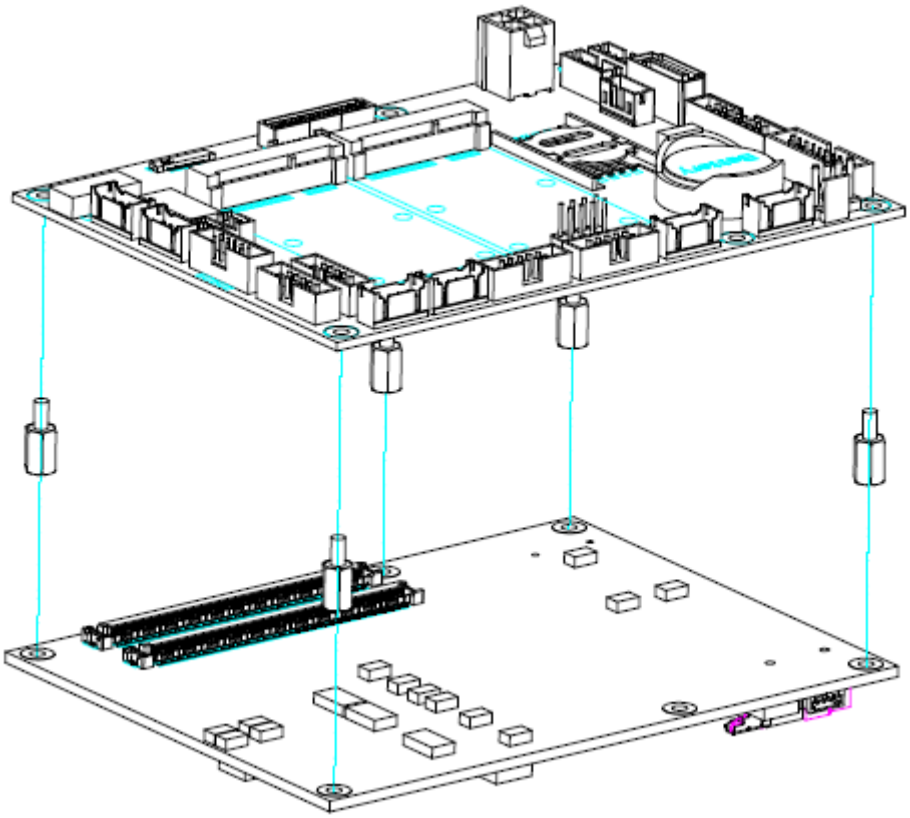
Top View



Bottom View

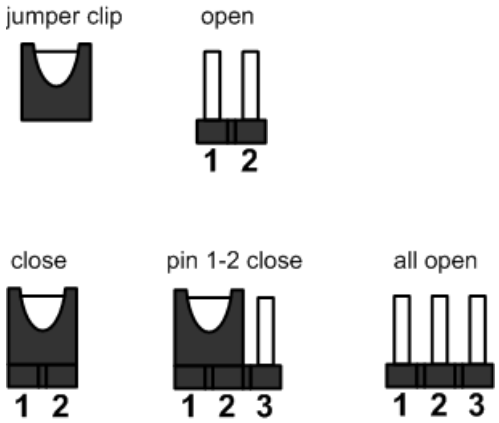
2.3 Assembly Drawing

The CEB94021 has five assembly holes for installation. Align and firmly install the compact size CEM module on CEB94021 as indicated in image below.



2.4 Jumper Settings

Jumper is a small component consisting of jumper clip and jumper pins. Install jumper clip on 2 jumper pins to close. And remove jumper clip from 2 jumper pins to open. Below illustration shows how to set up jumper.



Properly configure jumper settings on the CEB94021 to meet your application purpose. Below you can find a summary table of all jumpers and onboard default settings.

Note

Once the default jumper setting needs to be changed, please do it under power-off condition.

Jumper	Description	Setting
JP1	Auto Power On Default: Disable	2-3 Close
JP2	Restore BIOS Optimal Defaults Default: Normal Operation	1-2 Close
JP3	LVDS Voltage Selection Default: +3.3V	1-2 Close

2.4.1 Auto Power On (JP1)

If JP1 is enabled for power input, the system will be automatically power on without pressing soft power button. If JP1 is disabled for power input, it is necessary to manually press soft power button to power on the system.

Function	Setting
Enable auto power on	1-2 close
Disable auto power on (Default)	2-3 close

2.4.2 Restore BIOS Optimal Defaults (JP2)

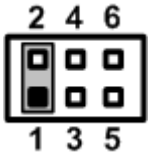
Put jumper clip to pin 2-3 for a few seconds then move it back to pin 1-2. Doing this procedure can restore BIOS optimal defaults.

Function	Setting
Normal operation (Default)	1-2 close
Restore BIOS optimal defaults	2-3 close

2.4.3 LVDS Voltage Selection (JP3)

The board supports voltage selection for flat panel displays. Use this jumper to set LVDS connector (CN26) pin 1~6 VCCM to +3.3V, +5V or +12V. To prevent hardware damage, before connecting please make sure that the input voltage of flat panel is correct.

Function	Setting
+3.3V level (Default)	1-2 close
+5V level	2-4 close
+12V level	5-6 close



2.5 Connectors

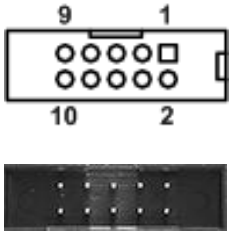
Signals go to other parts of the system through connectors. Loose or improper connection might cause problems, please make sure all connectors are properly and firmly connected. Here is a summary table which shows all connectors on the hardware.

Connector	Description
CN1~CN2, CN9~CN10	COM3~COM6 Connectors
CN3~CN4	Digital I/O Connectors
CN5~CN6	USB 2.0 Connectors
CN8	Front Panel Connector
CN11	USB 3.0 Connector
CN12	Audio Connector
CN13	VGA Connector
CN14~CN15	Ethernet LED Connector
CN16	SIM Card Socket
CN17, CN20	Ethernet Connectors
CN18	SATA Connector
CN19	SATA Power Connector
CN21~CN22	PCI-Express Mini Card Connectors
CN23	Inverter Connector
CN24	SMBus Connector
CN25	I2C Connector
CN26	LVDS Connector
CN27	DDI Connector
FAN1	Fan Connector
ATX1	ATX Power Connector
SCN1~SCN2	COM Express™ Connectors

2.5.1 COM Connectors (CN1, CN2, CN9 and CN10)

These are Molex 78046-102, 2x5-pin (pitch=2.0mm) box headers for COM3 (CN1), COM4 (CN2), COM5 (CN10) and COM6 (CN9). The COM3, COM4 and COM5 support RS-232/422/485 communication mode, while the COM6 supports RS-232 only. The related pin assignments are given in table below. You can change the communication mode in BIOS Setup utility.

Pin	RS-232	RS-422	RS-485
1	DCD	TX-	Data-
2	DSR	No use	No use
3	RXD	TX+	Data+
4	RTS	No use	No use
5	TXD	RX+	No use
6	CTS	No use	No use
7	DTR	RX-	No use
8	RI	No use	No use
9	GND	No use	No use
10	No use	No use	No use

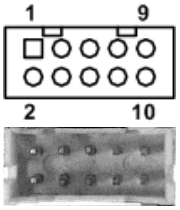


2.5.2 Digital I/O Connectors (CN3 and CN4)

These are 2x5-pin (pitch=2.0mm) connectors. The board is equipped with 16-channel (8 inputs on CN4 and 8 outputs on CN3) digital I/O that meets requirements for a system customary automation control. The digital I/O is suitable for controlling cash drawers and sense warning signals from an Uninterrupted Power System (UPS), or performing store security control. You can use software programming or BIOS Setup utility to control these digital signals.

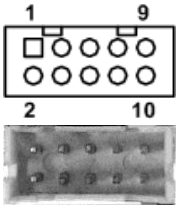
CN4:

Pin	Signal	Pin	Signal
1	Digital Input 1	2	Digital Input 8
3	Digital Input 2	4	Digital Input 7
5	Digital Input 3	6	Digital Input 6
7	Digital Input 4	8	Digital Input 5
9	GND	10	+5V level



CN3:

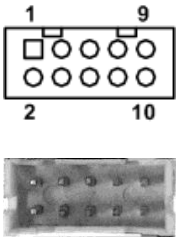
Pin	Signal	Pin	Signal
1	Digital Output 1	2	Digital Output 8
3	Digital Output 2	4	Digital Output 7
5	Digital Output 3	6	Digital Output 6
7	Digital Output 4	8	Digital Output 5
9	GND	10	+5V level



2.5.3 USB 2.0 Connectors (CN5 and CN6)

The CN5 (for USB port 2 and 3) and CN6 (for USB port 4 and 5) are 2x5-pin (pitch=2.0mm) connectors commonly used for installing USB 2.0 compliant peripherals such as keyboard, mouse, scanner, etc. Both connectors are designed with +5V level standby power which can provide power when system is in suspend mode.

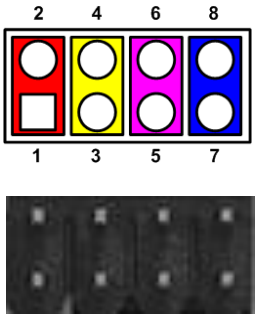
Pin	Signal	Pin	Signal
1	USB VCC (+5V level standby power)	2	USB VCC (+5V level standby power)
3	USB DX-	4	USB DY-
5	USB DX+	6	USB DY+
7	GND	8	GND
9	GND	10	GND



2.5.4 Front Panel Connector (CN8)

This is a 2x4-pin (pitch=2.54mm) connector for front panel interface.

Pin	Signal	Pin	Signal
1	PWRSW-	2	PWRSW+-
3	HW RST-	4	HW RST+
5	PWRLED-	6	PWRLED+
7	HDDLED-	8	HDDLED+



Power On/Off Button
Pin 1 and 2 connect the power button on front panel to CPU board, which allows users to turn on or off power supply.

System Reset Switch
Pin 3 and 4 connect the case-mounted reset switch that reboots your computer without turning off the power switch. It is a better way to reboot your system for a longer life of system power supply.

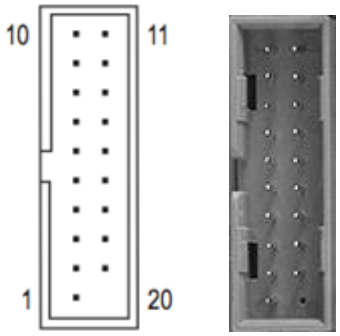
Power LED
Pin 6 connects anode (+) of LED and pin 5 connects cathode(-) of LED. The power LED lights up when the system is powered on.

HDD Activity LED
This connection is linked to hard drive activity LED on the control panel. LED flashes when HDD is being accessed. Pin 7 and 8 connect the hard disk drive to the front panel HDD LED, pin 9 is assigned as cathode(-) and pin 10 is assigned as anode(+).

2.5.5 USB 3.0 Connector (CN11)

The CN11 is a 19-pin connector for installing versatile USB 3.0 compliant peripherals.

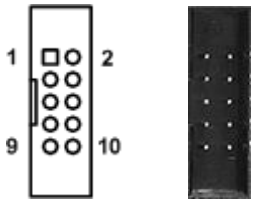
Pin	Signal	Pin	Signal
1	VBUS0		
2	SSRX1-	19	VBUS1
3	SSRX1+	18	SSRX2-
4	GND	17	SSRX2+
5	SSTX1-	16	GND
6	SSTX1+	15	SSTX2-
7	GND	14	SSTX2+
8	USB0-	13	GND
9	USB0+	12	USB1-
10	ID	11	USB1+



2.5.6 Audio Connector (CN12)

This is a 2x5-pin (pitch=2.0mm) audio connector for convenient connection and control of audio devices.

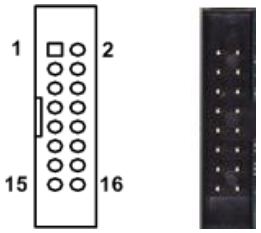
Pin	Signal	Pin	Signal
1	MIC_IN	2	GND
3	LINE_IN_L	4	GND
5	LINE_IN_R	6	GND
7	AUDIO_OUT_L	8	GND
9	AUDIO_OUT_R	10	GND



2.5.7 VGA Connector (CN13)

This is a 2x8-pin (pitch=2.0mm) connector for VGA interface.

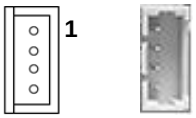
Pin	Signal	Pin	Signal
1	RED	2	GND
3	GREEN	4	N.C.
5	BLUE	6	GND
7	VCC	8	DDC DATA
9	GND	10	GND
11	GND	12	HSYNC
13	GND	14	VSYNC
15	DDC CLK	16	N.C.



2.5.8 Ethernet LED Connector (CN14 and CN15)

These are 4-pin (pitch=1.25mm) connectors for LAN LED's activity and speed indicator interfaces. The CN14 and CN15 are for LAN2 LED signals and LAN1 LED signals, respectively.

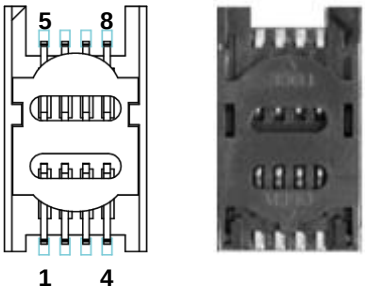
Pin	Signal
1	+V3.3_SBY
2	Active
3	LED_1000
4	LED_100



2.5.9 SIM Card Socket (CN16)

The board has CN16 socket for inserting SIM Card. In order to work properly, the SIM Card must be used together with 3G module which is inserted to CN21 or CN22. It is mainly used in 3G wireless network application.

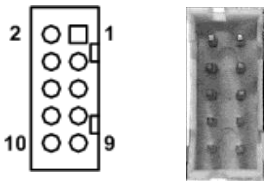
Pin	Signal
1	PWR
2	RST
3	CLK
4	NC
5	GND
6	VPP
7	I/O
8	NC



2.5.10 Ethernet Connectors (CN17 and CN20)

The board has two 2x5-pin (pitch=2.0mm) connectors for Ethernet interfaces. The CN17 (LAN2) is for Intel® I210IT LAN chip, while the CN20 (LAN1) is determined by the CEM module.

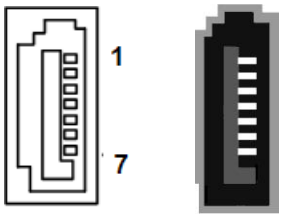
Pin	Signal	Pin	Signal
1	MDI0-	2	MDI1-
3	MDI0+	4	MDI1+
5	LAN_GND	6	LAN_GND
7	MDI2-	8	MDI3-
9	MDI2+	10	MDI3+



2.5.11 SATA Connector (CN18)

The CN18 is a connector for high-speed Serial Advanced Technology Attachment (Serial ATA or SATA) interface. It is a computer bus interface for connecting to devices such as hard disk drive.

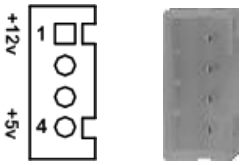
Pin	Signal
1	GND
2	SATA_TX+
3	SATA_TX-
4	GND
5	SATA_RX-
6	SATA_RX+
7	GND



2.5.12 SATA Power Connector (CN19)

This is a 4-pin (pitch=2.0mm) connector for interfacing to SATA 2.5” HDD power supply.

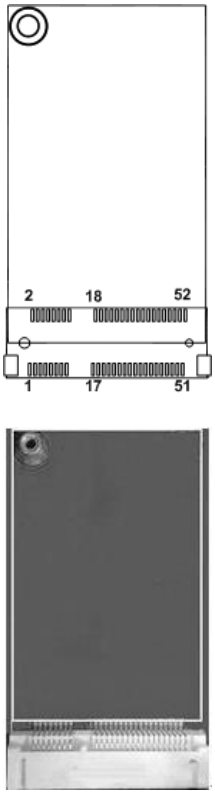
Pin	Signal
1	+12V level
2	GND
3	GND
4	+5V level



2.5.13 PCI-Express Mini Card Connectors (CN21 and CN22)

These are full-size PCI-Express Mini Card connectors complying with PCI-Express Mini Card Spec. V1.2. They support either PCI-Express, USB 2.0 or SATA (mSATA; only CN22 supports mSATA). You can choose to enable or disable mSATA support in BIOS Setup utility (please refer to chapter 3).

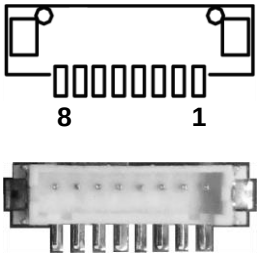
Pin	Signal	Pin	Signal
1	WAKE#	2	+3.3VSB
3	No use	4	GND
5	No use	6	+1.5V
7	CLKREQ#	8	PWR
9	GND	10	I/O
11	REFCLK-	12	CLK
13	REFCLK+	14	RST
15	GND	16	VPP
17	No use	18	GND
19	No use	20	W_DISABLE#
21	GND	22	PERST#
23	PE_RXN3/SATA_RXP	24	+3.3VSB
25	PE_RXP3/SATA_RXN	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	PE_TXN3/SATA_TXN	32	SMB_DATA
33	PE_TXP3/SATA_TXP	34	GND
35	GND	36	USB_D8-
37	GND	38	USB_D8+
39	+3.3VSB	40	GND
41	+3.3VSB	42	No use
43	GND	44	No use
45	No use	46	No use
47	No use	48	+1.5V
49	No use	50	GND
51	No use	52	+3.3VSB



2.5.14 Inverter Connector (CN23)

This is a 8-pin (pitch=1.25mm) connector for inverter. We strongly recommend you to use the matching DF13-8P-1.25C connector to avoid malfunction.

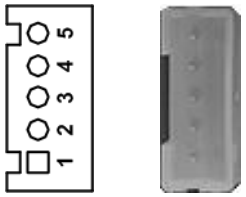
Pin	Signal
1	VBL1 (+12V level)
2	VBL1 (+12V level)
3	VBL2 (+5V level)
4	VBL_ENABLE
5	GND
6	GND
7	GND
8	VBL Brightness Control



2.5.15 SMBus Connector (CN24)

The CN24 is a 5-pin (pitch=2.0mm) connector for SMBus interface. The SMBus (System Management Bus) is a simple bus for the purpose of lightweight communication.

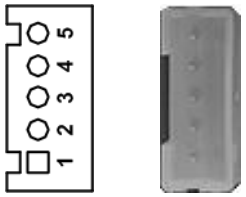
Pin	Signal
1	GND
2	SMB_ALERT
3	SMB_DATA_S
4	SMB_CLK_S
5	+3.3V



2.5.16 I2C Connector (CN25)

The CN25 is a 5-pin (pitch=2.0mm) connector for I2C interface.

Pin	Signal
1	GND
2	N.C
3	I2C_DATA
4	I2C_CLK
5	+3.3V

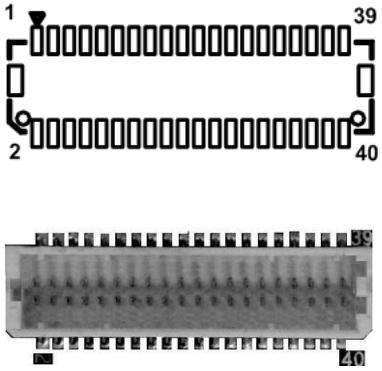


2.5.17 LVDS Connector (CN26)

The board has one 2x20-pin (pitch=1mm) connector for LVDS LCD interface. It is strongly recommended to use the matching JST SHDR-40VS-B connector for LVDS interface. Pin 1~6 VCCM can be set to +3.3V, +5V or +12V by setting JP3 (see section 2.5.3).

18-bit single channel

Pin	Signal	Pin	Signal
1	VCCM	2	VCCM
3	VCCM	4	VCCM
5	VCCM	6	VCCM
7	EDID DATA	8	EDID CLK
9	GND	10	GND
11	N.C.	12	N.C.
13	N.C.	14	N.C.
15	GND	16	GND
17	N.C.	18	N.C.
19	N.C.	20	N.C.
21	GND	22	GND
23	Channel A D0-	24	N.C.
25	Channel A D0+	26	N.C.
27	GND	28	GND
29	Channel A D1-	30	N.C.
31	Channel A D1+	32	N.C.
33	GND	34	GND
35	Channel A D2-	36	Channel A CLK-
37	Channel A D2+	38	Channel A CLK+
39	GND	40	GND



24-bit single channel

Pin	Signal	Pin	Signal
1	VCCM	2	VCCM
3	VCCM	4	VCCM
5	VCCM	6	VCCM
7	EDID DATA	8	EDID CLK
9	GND	10	GND
11	N.C.	12	N.C.
13	N.C.	14	N.C.
15	GND	16	GND
17	N.C.	18	N.C.
19	N.C.	20	N.C.
21	GND	22	GND
23	Channel A D0-	24	N.C.
25	Channel A D0+	26	N.C.
27	GND	28	GND
29	Channel A D1-	30	Channel A D3-
31	Channel A D1+	32	Channel A D3+
33	GND	34	GND
35	Channel A D2-	36	Channel A CLK-
37	Channel A D2+	38	Channel A CLK+
39	GND	40	GND

18-bit dual channel

Pin	Signal	Pin	Signal
1	VCCM	2	VCCM
3	VCCM	4	VCCM
5	VCCM	6	VCCM
7	EDID DATA	8	EDID CLK
9	GND	10	GND
11	N.C	12	Channel B D0-
13	N.C	14	Channel B D0+
15	GND	16	GND
17	Channel B CLK-	18	Channel B D1-
19	Channel B CLK+	20	Channel B D1+
21	GND	22	GND
23	Channel A D0-	24	Channel B D2-
25	Channel A D0+	26	Channel B D2+
27	GND	28	GND
29	Channel A D1-	30	N.C
31	Channel A D1+	32	N.C
33	GND	34	GND
35	Channel A D2-	36	Channel A CLK-
37	Channel A D2+	38	Channel A CLK+
39	GND	40	GND

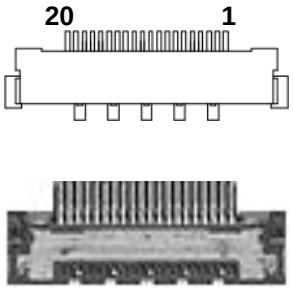
24-bit dual channel

Pin	Signal	Pin	Signal
1	VCCM	2	VCCM
3	VCCM	4	VCCM
5	VCCM	6	VCCM
7	EDID DATA	8	EDID CLK
9	GND	10	GND
11	Channel B D3-	12	Channel B D0-
13	Channel B D3+	14	Channel B D0+
15	GND	16	GND
17	Channel B CLK-	18	Channel B D1-
19	Channel B CLK+	20	Channel B D1+
21	GND	22	GND
23	Channel A D0-	24	Channel B D2-
25	Channel A D0+	26	Channel B D2+
27	GND	28	GND
29	Channel A D1-	30	Channel A D3-
31	Channel A D1+	32	Channel A D3+
33	GND	34	GND
35	Channel A D2-	36	Channel A CLK-
37	Channel A D2+	38	Channel A CLK+
39	GND	40	GND

2.5.18 DDI Connector (CN27)

The board has one 20-pin connector for DDI (Digital Display Interface).

Pin	Signal
1	GND
2	DDSP_TX_0_DP
3	DDSP_TX_0_DN
4	GND
5	DDSP_TX_1_DP
6	DDSP_TX_1_DN
7	GND
8	DDSP_TX_2_DP
9	DDSP_TX_2_DN
10	GND
11	DDSP_TX_3_DP
12	DDSP_TX_3_DN
13	GND
14	DDI_AUX_SEL
15	GND
16	DDI_CTRL_CLK_AUXP
17	DDI_CTRL_DATA_AUXN
18	+V5S
19	HPD
20	+V3.3S



2.5.19 Fan Connector (FAN1)

Fan is needed for cooling down temperature. FAN1 is a 4-pin (pitch=2.54mm) connector for fan interface. You can find fan speed option(s) at BIOS Setup Utility. For further information, see BIOS Setup Utility: Advanced\HW Monitor\PC Health Status.

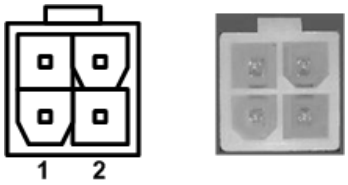
Pin	Signal
1	GND
2	+12V level
3	Rotation detection
4	Speed control

2.5.20 ATX Power Connector (ATX1)

Steady and sufficient power can be supplied to all components on the board by connecting the power connector. Please make sure all components and devices are properly installed before connecting the power connector.

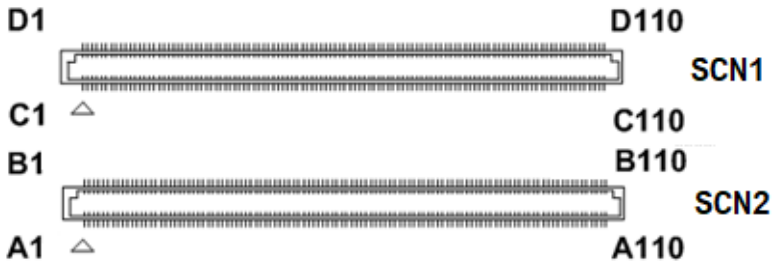
The ATX1 is a 4-pin power supply interface. External power supply plug fits into ATX1 in only one orientation. Properly press down power supply plug until it completely and firmly fits into this connector. Loose connection may cause system instability.

Pin	Signal
1	GND
2	GND
3	+12V
4	+12V



2.5.21 COM Express™ Connectors (SCN1 and SCN2)

The SCN1 and SCN2 are 220-pin connectors for connecting COM Express™ module and COM Express™ baseboard. The pin assignments are as follows.



Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A1	GND (FIXED)	B1	GND (FIXED)	C1	GND (FIXED)	D1	GND (FIXED)
A2	GBE0_MDI3-	B2	GBE0_ACT#	C2	GND (FIXED)	D2	GND (FIXED)
A3	GBE0_MDI3+	B3	LPC_FRAME#	C3	USB_SSRX0-	D3	USB_SSTX0-
A4	GBE0_LINK100#	B4	LPC_AD0	C4	USB_SSRX0+	D4	USB_SSTX0+
A5	GBE0_LINK1000#	B5	LPC_AD1	C5	GND (FIXED)	D5	GND (FIXED)
A6	GBE0_MDI2-	B6	LPC_AD2	C6	USB_SSRX1-	D6	USB_SSTX1-
A7	GBE0_MDI2+	B7	LPC_AD3	C7	USB_SSRX1+	D7	USB_SSTX1+
A8	N.C	B8	LPC_DRQ0#	C8	GND (FIXED)	D8	GND (FIXED)
A9	GBE0_MDI1-	B9	N.C	C9	N.C	D9	N.C
A10	GBE0_MDI1+	B10	LPC_CLK	C10	N.C	D10	N.C
A11	GND (FIXED)	B11	GND (FIXED)	C11	GND (FIXED)	D11	GND (FIXED)
A12	GBE0_MDI0-	B12	PWRBTN#	C12	N.C	D12	N.C
A13	GBE0_MDI0+	B13	SMB_CK	C13	N.C	D13	N.C
A14	GBE0_CTREF	B14	SMB_DAT	C14	GND (FIXED)	D14	GND (FIXED)
A15	SUS_S3#	B15	SMB_ALERT#	C15	N.C	D15	DDI1_CTRLCLK_AUX+
A16	SATA0_TX+	B16	SATA1_TX+	C16	N.C	D16	DDI1_CTRLDATA_AUX-
A17	SATA0_TX-	B17	SATA1_TX-	C17	N.C.	D17	N.C.
A18	N.C	B18	N.C	C18	N.C.	D18	N.C.
A19	SATA0_RX+	B19	SATA1_RX+	C19	N.C	D19	N.C
A20	SATA0_RX-	B20	SATA1_RX-	C20	N.C	D20	N.C
A21	GND (FIXED)	B21	GND (FIXED)	C21	GND (FIXED)	D21	GND (FIXED)
A22	N.C	B22	N.C	C22	N.C	D22	N.C
A23	N.C	B23	N.C	C23	N.C	D23	N.C
A24	N.C	B24	PWR_OK	C24	DDI1_HPD	D24	N.C.
A25	N.C	B25	N.C	C25	N.C	D25	N.C.
A26	N.C	B26	N.C	C26	N.C	D26	DDI1_PAIR0+
A27	N.C	B27	WDT	C27	N.C.	D27	DDI1_PAIR0-
A28	(S)ATA_ACT#	B28	N.C	C28	N.C.	D28	N.C.
A29	AC/HDA_SYNC	B29	N.C	C29	N.C	D29	DDI1_PAIR1+
A30	AC/HDA_RST#	B30	AC/HDA_SDIN0	C30	N.C	D30	DDI1_PAIR1-
A31	GND (FIXED)	B31	GND (FIXED)	C31	GND (FIXED)	D31	GND (FIXED)
A32	AC/HDA_BITCLK	B32	SPKR	C32	DDI2_CTRLCLK_AUX+	D32	N.C.
A33	AC/HDA_SDOUT	B33	I2C_CK	C33	DDI2_CTRLDATA_AUX-	D33	N.C.
A34	N.C	B34	I2C_DAT	C34	DDI2_DDC_AUX_SEL	D34	DDI1_DDC_AUX_SEL
A35	N.C	B35	N.C	C35	N.C.	D35	N.C.
A36	USB6-	B36	USB7-	C36	N.C	D36	N.C.
A37	USB6+	B37	USB7+	C37	N.C	D37	N.C.
A38	USB_6_7_OC#	B38	USB_4_5_OC#	C38	N.C	D38	N.C.
A39	USB4-	B39	USB5-	C39	N.C	D39	DDI2_PAIR0+
A40	USB4+	B40	USB5+	C40	N.C	D40	DDI2_PAIR0-
A41	GND (FIXED)	B41	GND (FIXED)	C41	GND (FIXED)	D41	GND (FIXED)
A42	USB2-	B42	USB3-	C42	N.C	D42	DDI2_PAIR1+
A43	USB2+	B43	USB3+	C43	N.C	D43	DDI2_PAIR1-
A44	USB_2_3_OC#	B44	USB_0_1_OC#	C44	N.C	D44	DDI2_HPD
A45	USB0-	B45	USB1-	C45	N.C.	D45	N.C.
A46	USB0+	B46	USB1+	C46	N.C	D46	DDI2_PAIR2+
A47	VCC_RTC	B47	N.C	C47	N.C	D47	DDI2_PAIR2-
A48	N.C	B48	N.C	C48	N.C.	D48	N.C.
A49	N.C	B49	SYS_RESET#	C49	N.C	D49	DDI2_PAIR3+
A50	LPC_SERIRQ	B50	CB_RESET#	C50	N.C	D50	DDI2_PAIR3-
A51	GND (FIXED)	B51	GND (FIXED)	C51	GND (FIXED)	D51	GND (FIXED)
A52	N.C	B52	N.C	C52	N.C	D52	N.C
A53	N.C	B53	N.C	C53	N.C	D53	N.C
A54	GPI0	B54	N.C	C54	N.C	D54	N.C
A55	N.C	B55	N.C	C55	N.C	D55	N.C

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A56	N.C	B56	N.C	C56	N.C	D56	N.C
A57	GND	B57	N.C	C57	N.C	D57	TYPE2#
A58	N.C	B58	N.C	C58	N.C	D58	N.C
A59	N.C	B59	N.C	C59	N.C	D59	N.C
A60	GND (FIXED)	B60	GND (FIXED)	C60	GND (FIXED)	D60	GND (FIXED)
A61	PCIE_TX2+	B61	PCIE_RX2+	C61	N.C	D61	N.C
A62	PCIE_TX2-	B62	PCIE_RX2-	C62	N.C	D62	N.C
A63	N.C	B63	N.C	C63	RSVD	D63	RSVD
A64	PCIE_TX1+	B64	PCIE_RX1+	C64	RSVD	D64	RSVD
A65	PCIE_TX1-	B65	PCIE_RX1-	C65	N.C.	D65	N.C
A66	GND	B66	WAKE0#	C66	N.C.	D66	N.C
A67	N.C	B67	WAKE1#	C67	RSVD	D67	GND
A68	PCIE_TX0+	B68	PCIE_RX0+	C68	N.C	D68	N.C
A69	PCIE_TX0-	B69	PCIE_RX0-	C69	N.C	D69	N.C
A70	GND(FIXED)	B70	GND(FIXED)	C70	GND(FIXED)	D70	GND(FIXED)
A71	LVDS_A0+	B71	LVDS_B0+	C71	N.C	D71	N.C
A72	LVDS_A0-	B72	LVDS_B0-	C72	N.C	D72	N.C
A73	LVDS_A1+	B73	LVDS_B1+	C73	GND(FIXED)	D73	GND
A74	LVDS_A1-	B74	LVDS_B1-	C74	N.C.	D74	N.C
A75	LVDS_A2+	B75	LVDS_B2+	C75	N.C.	D75	N.C
A76	LVDS_A2-	B76	LVDS_B2-	C76	GND	D76	GND
A77	LVDS_VDD_EN	B77	LVDS_B3+	C77	RSVD	D77	RSVD
A78	LVDS_A3+	B78	LVDS_B3-	C78	N.C	D78	N.C
A79	LVDS_A3-	B79	LVDS_BKLT_EN	C79	N.C	D79	N.C
A80	GND(FIXED)	B80	GND(FIXED)	C80	GND(FIXED)	D80	GND(FIXED)
A81	LVDS_A_CK+	B81	LVDS_B_CK+	C81	N.C	D81	N.C
A82	LVDS_A_CK-	B82	LVDS_B_CK-	C82	N.C	D82	N.C
A83	LVDS_I2C_CK	B83	LVDS_BKLT_CTRL	C83	RSVD	D83	RSVD
A84	LVDS_I2C_DAT	B84	VCC_5V_SBY	C84	GND	D84	GND
A85	N.C	B85	VCC_5V_SBY	C85	N.C	D85	N.C
A86	N.C	B86	VCC_5V_SBY	C86	N.C	D86	N.C
A87	N.C	B87	VCC_5V_SBY	C87	GND	D87	GND
A88	PCIE0_CK_REF+	B88	N.C	C88	N.C	D88	N.C
A89	PCIE0_CK_REF-	B89	N.C.	C89	N.C	D89	N.C
A90	GND (FIXED)	B90	GND (FIXED)	C90	GND (FIXED)	D90	GND (FIXED)
A91	N.C	B91	N.C.	C91	N.C	D91	N.C
A92	N.C	B92	N.C.	C92	N.C	D92	N.C
A93	N.C	B93	N.C.	C93	GND	D93	GND
A94	N.C	B94	N.C.	C94	N.C	D94	N.C
A95	N.C	B95	N.C.	C95	N.C	D95	N.C
A96	TPM_PP	B96	N.C.	C96	GND	D96	GND
A97	N.C	B97	N.C	C97	RSVD	D97	RSVD
A98	N.C	B98	N.C.	C98	N.C	D98	N.C
A99	N.C	B99	N.C.	C99	N.C	D99	N.C
A100	GND (FIXED)	B100	GND (FIXED)	C100	GND (FIXED)	D100	GND (FIXED)
A101	N.C	B101	FAN_PWMOUT	C101	N.C	D101	N.C
A102	N.C	B102	FAN_TACHIN	C102	N.C	D102	N.C
A103	N.C	B103	N.C	C103	GND	D103	GND
A104	VCC_12V	B104	VCC_12V	C104	VCC_12V	D104	VCC_12V
A105	VCC_12V	B105	VCC_12V	C105	VCC_12V	D105	VCC_12V
A106	VCC_12V	B106	VCC_12V	C106	VCC_12V	D106	VCC_12V
A107	VCC_12V	B107	VCC_12V	C107	VCC_12V	D107	VCC_12V
A108	VCC_12V	B108	VCC_12V	C108	VCC_12V	D108	VCC_12V
A109	VCC_12V	B109	VCC_12V	C109	VCC_12V	D109	VCC_12V
A110	GND (FIXED)	B110	GND (FIXED)	C110	GND (FIXED)	D110	GND (FIXED)

Section 3
AMI BIOS

The BIOS functions described in this chapter are available only when CEB94021 is connected to CPU module. For the other detailed description about how to set up basic system configuration through AMI BIOS setup utility, please refer to the CPU module user's manual.

3.1 Starting

To enter BIOS setup screens, follow the steps below:

1. Turn on the computer and press the <Del> key immediately.
2. After you press the <Del> key, the main BIOS setup menu displays. You can access the other setup screens from the main BIOS setup menu, such as the Advanced and Chipset menus.

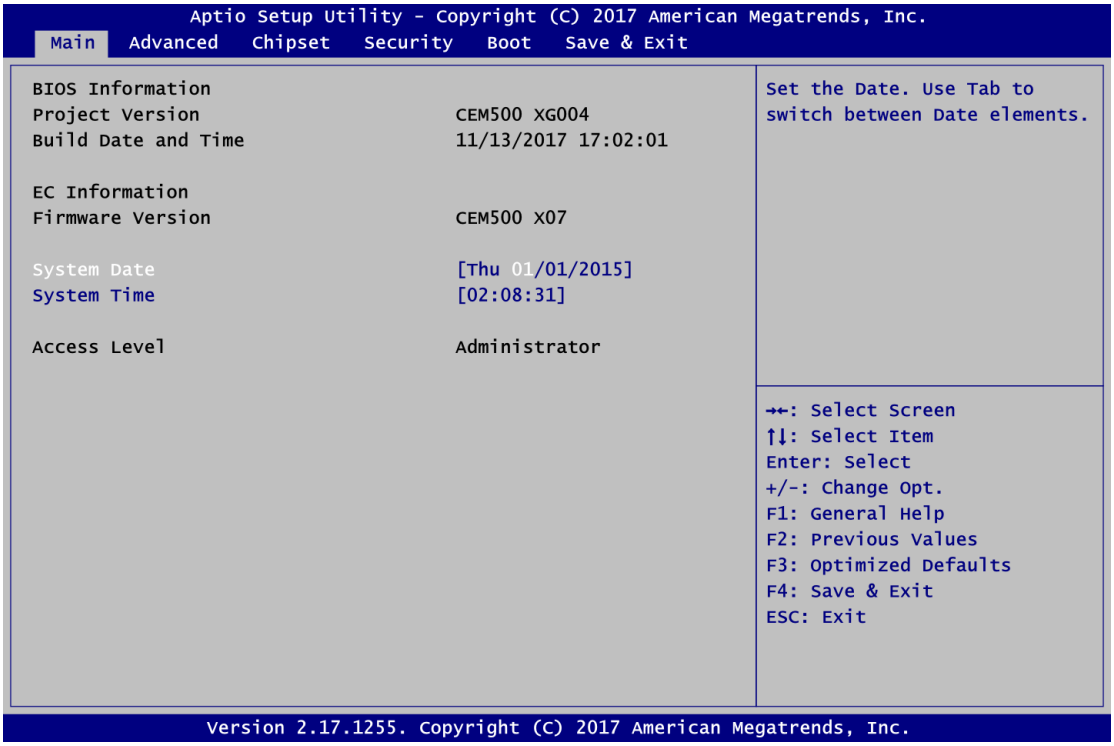
Note

If your computer cannot boot after making and saving system changes with BIOS setup, you can restore BIOS optimal defaults by setting JP2 (see section 2.5.2).

It is strongly recommended that you should avoid changing the chipset's defaults. Both AMI and your system manufacturer have carefully set up these defaults that provide the best performance and reliability.

3.2 Main Menu

When you first enter the setup utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab. System Time/Date can be set up as described below. The Main BIOS setup screen is shown below.



- **BIOS and EC Information**
  Display BIOS and EC firmware information.

- **System Date/Time**
  Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time is entered in HH:MM:SS format.

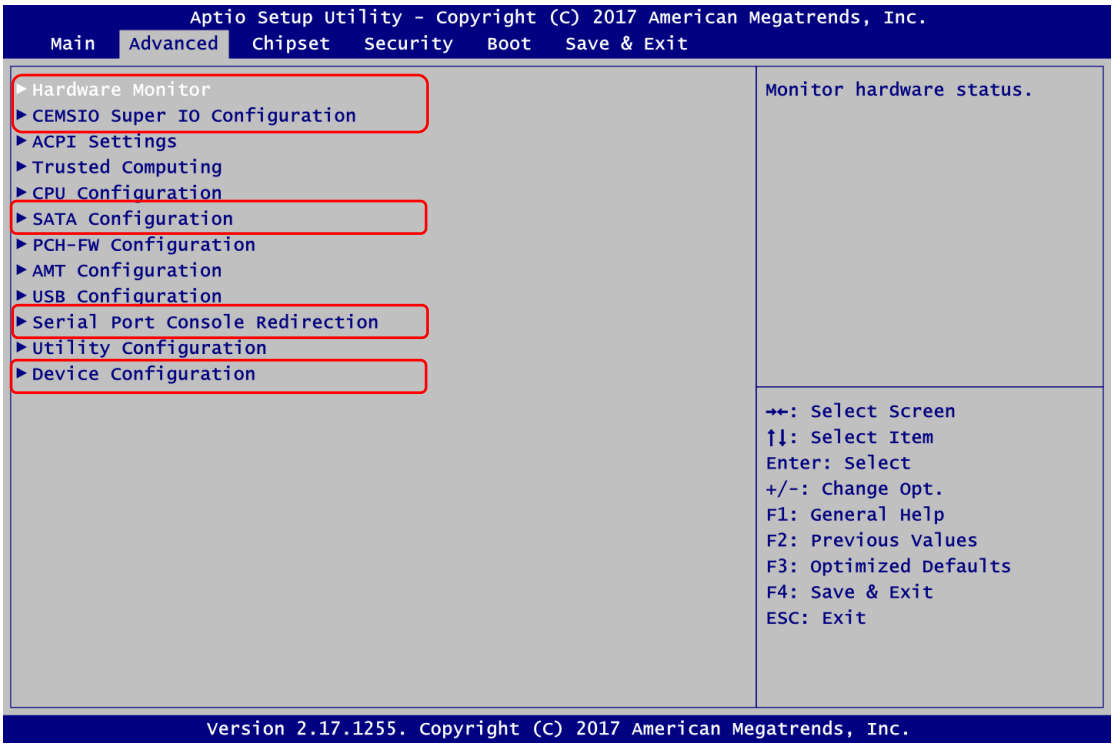
- **Access Level**
  Display the access level of current user.

3.3 Advanced Menu

The Advanced menu allows users to set configuration of the CPU and other system devices. You can select any of the items in the left frame of the screen to go to the sub menus:

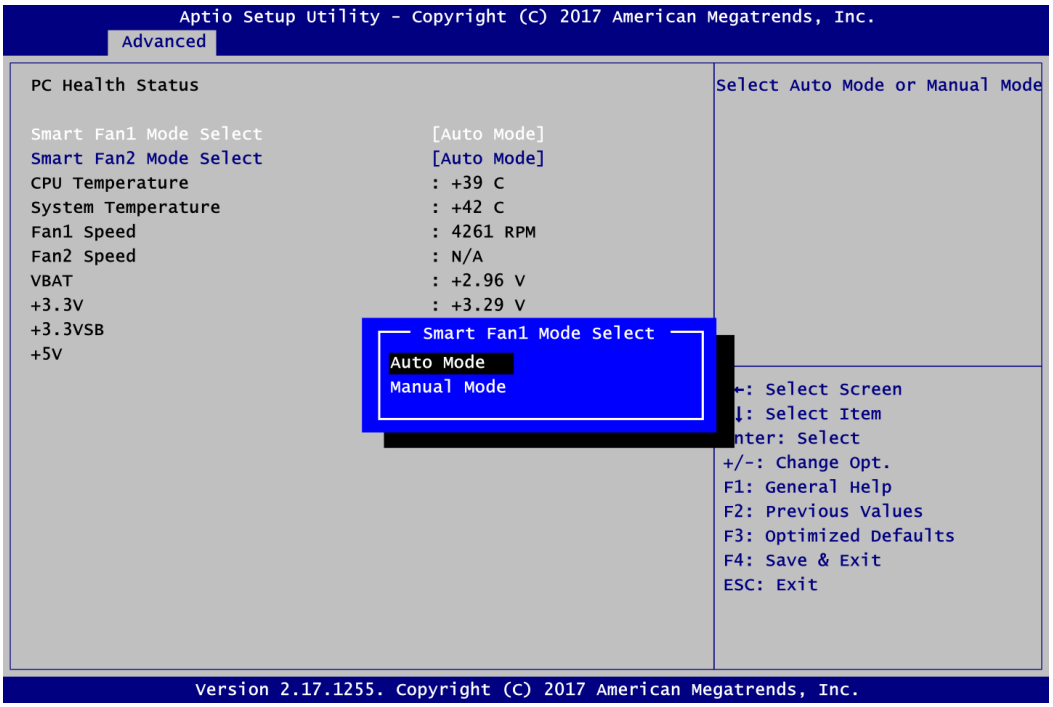
- ▶ Hardware Monitor
- ▶ CEMSIO Super IO Configuration
- ▶ ACPI Settings
- ▶ Trusted Computing
- ▶ CPU Configuration
- ▶ SATA Configuration
- ▶ PCH-FW Configuration
- ▶ AMT Configuration
- ▶ USB Configuration
- ▶ Serial Port Console Redirection
- ▶ Utility Configuration
- ▶ Device Configuration

For items marked with "▶", please press <Enter> for more options.



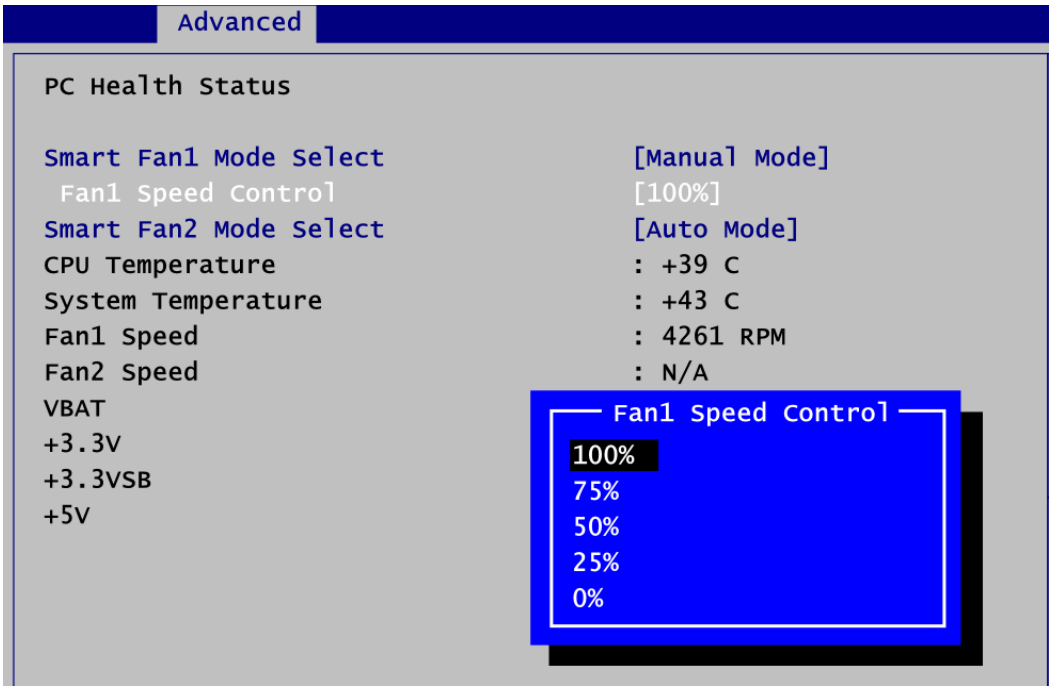
The sub menus marked with red rectangular contain functions available only if CEB94021 is connected to CPU module. The functions are COM port settings in Super IO Configuration, digital I/O settings in DIO Configuration, Serial Port Console Redirection and an extra mSATA/PCIe selection in SATA Configuration.

- **Hardware Monitor**
  This screen monitors hardware health status.

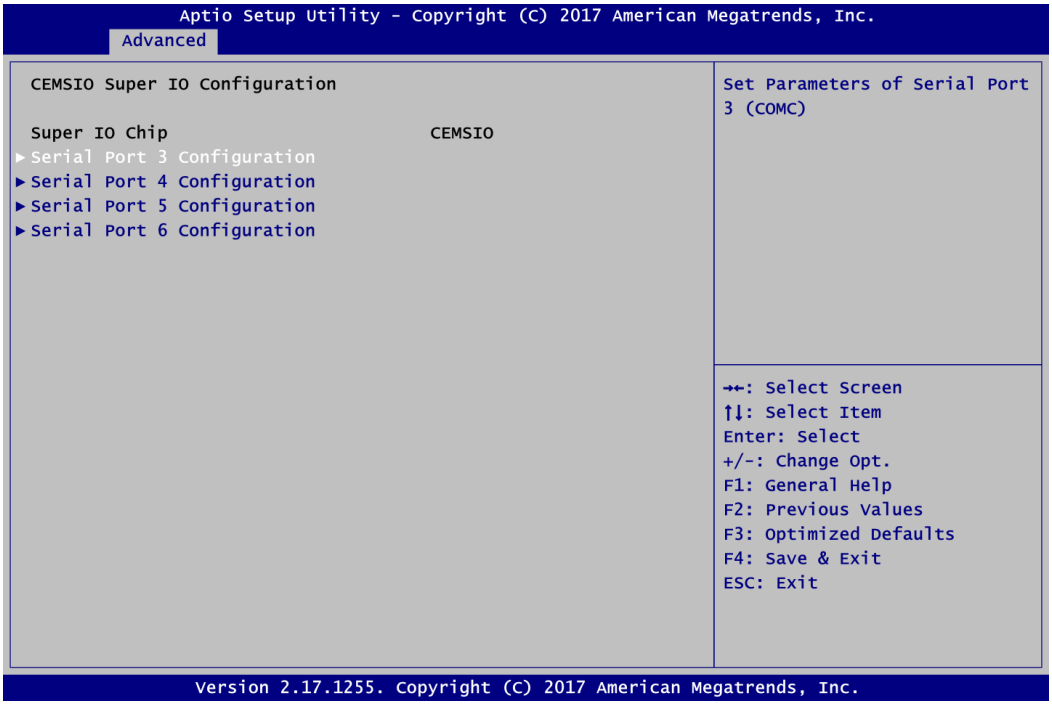


This screen displays the temperature of system and CPU, cooling fans speed in RPM and system voltages (VBAT, +3.3V, +3.3V standby and +5V).

Smart Fan1\Fan2 Mode Select
This item allows you to select smart fan1\fan2 mode: Auto Mode or Manual Mode. In Auto Mode, the fan spins at different speed depending on temperature; the higher the temperature, the faster the fan spins. In Manual Mode, user can manually change fan speed to 0%, 50%, 75% or 100% (RPM percentage), see image below.

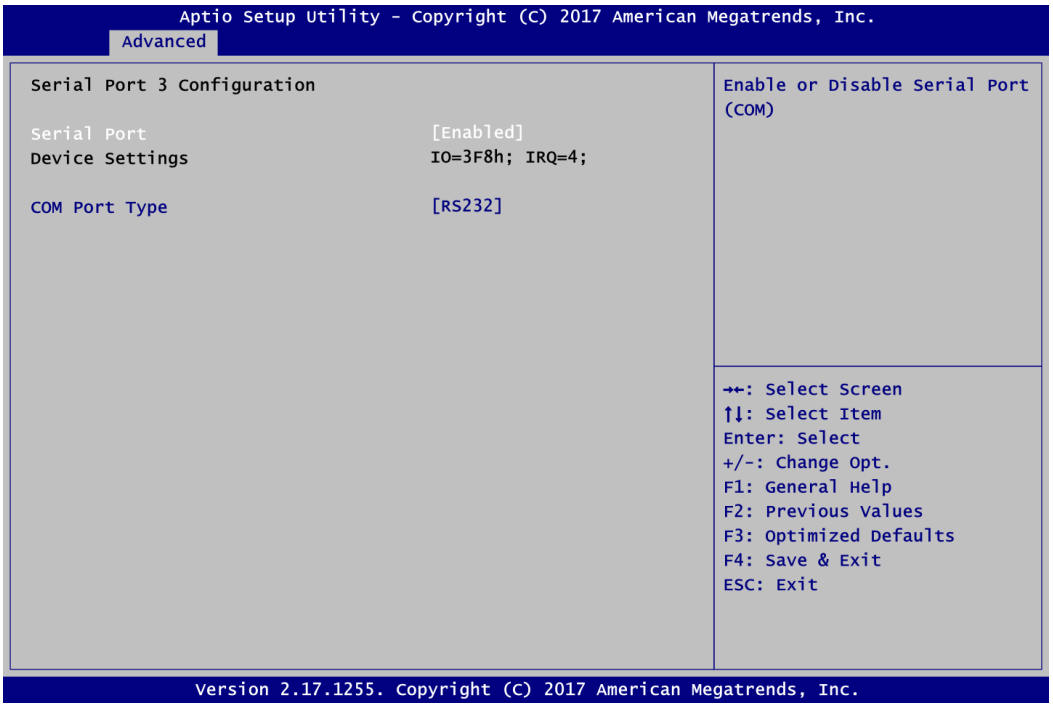


- **CEMSIO Super IO Configuration**
  You can use this screen to select options for Serial Port Configuration, and change the value of the selected option. A description of the selected item appears on the right side of the screen. For items marked with "▶", please press <Enter> for more options.



Serial Port 3~6 Configuration
Use these items to set parameters related to serial port 3~6.

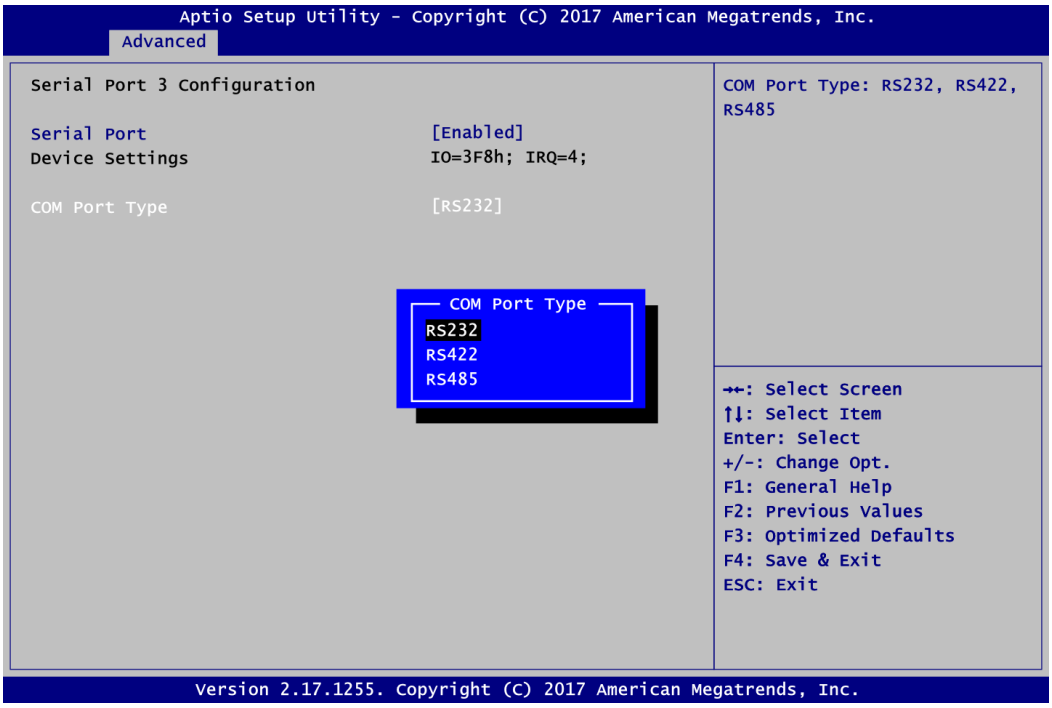
- **Serial Port 3~6 Configuration**



Serial Port

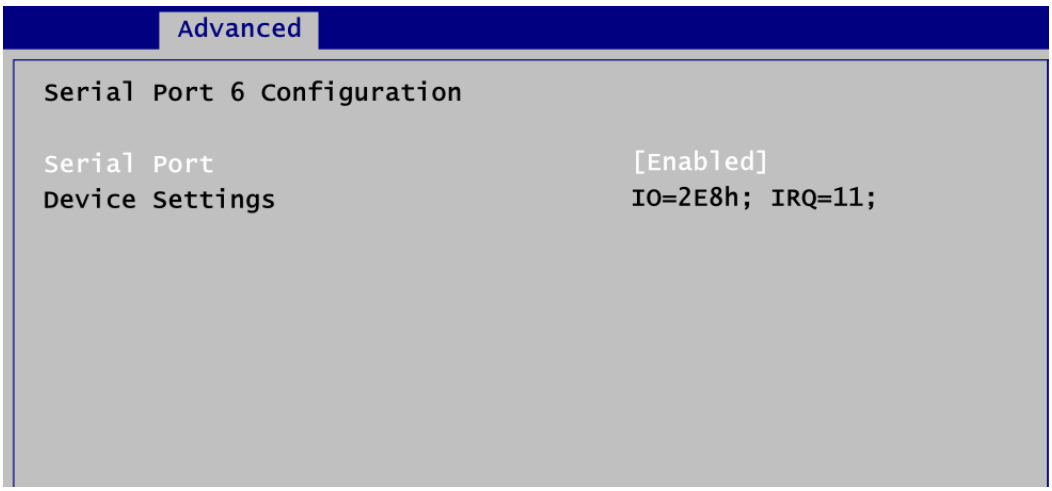
Enable or disable serial port 3~6. The optimal settings for base I/O address and for interrupt request address are:

- Serial port 3: 3F8h, IRQ4
- Serial port 4: 2F8h, IRQ3
- Serial port 5: 3E8h, IRQ10
- Serial port 6: 2E8h, IRQ11

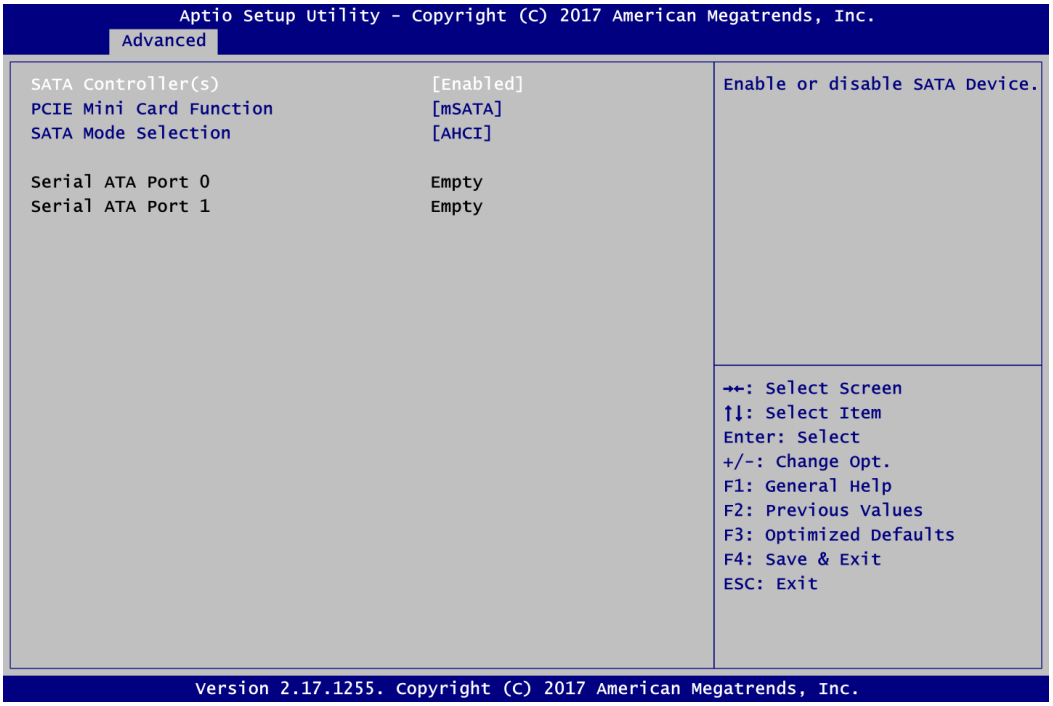


COM Port Type

Use this item to set RS-232/422/485 communication mode for serial port 3~5. The serial port 6 supports RS-232 only, see image below.

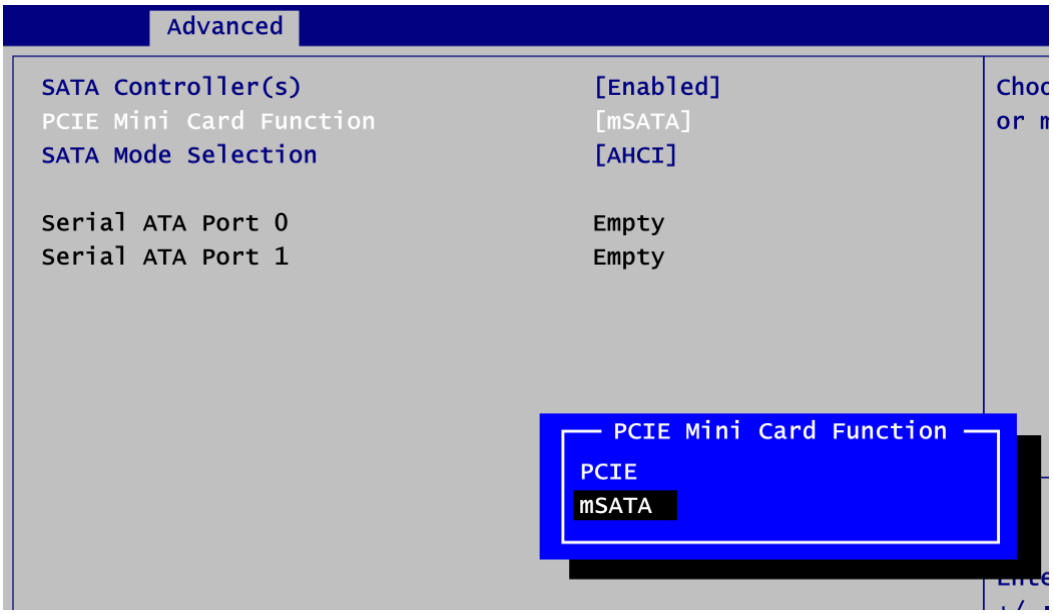


- **SATA Configuration**
  During system boot up, BIOS automatically detects the presence of SATA devices. In this Configuration menu, you can see the currently installed hardware in SATA ports.



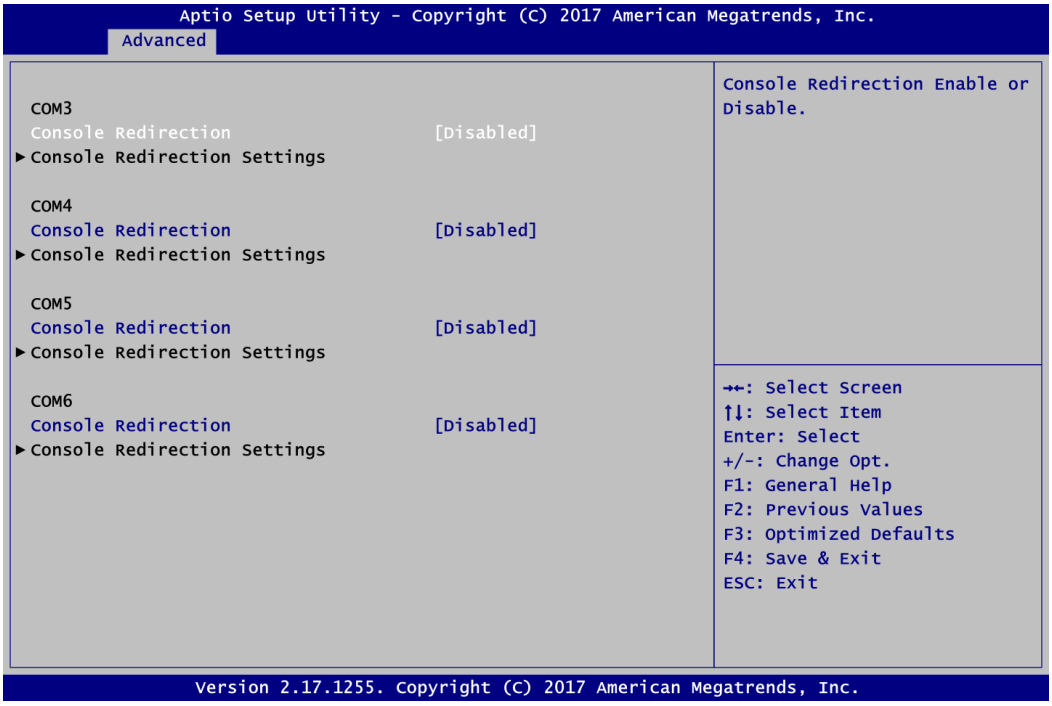
SATA Controller(s)
Enable or disable SATA device.

PCIE Mini Card Function
Choose PCIE or mSATA for PCI-Express Mini Card. The default is mSATA. If PCIE is needed to insert to CN22 (see section 2.6.13), please change setting to PCIE (see image below).

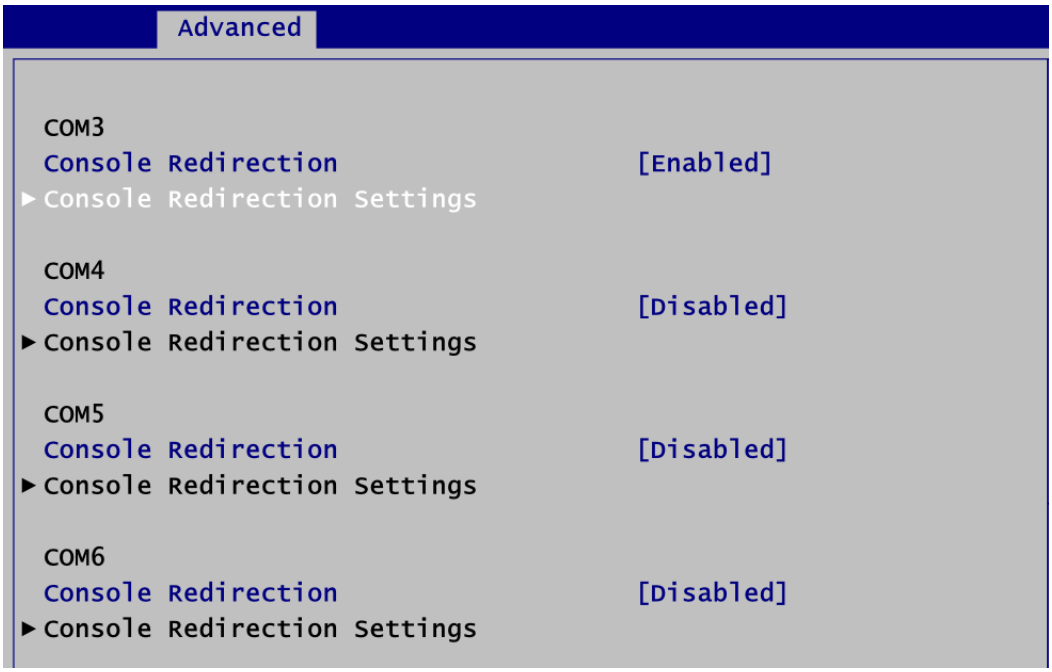


SATA Mode Selection
Determine how SATA controller(s) operate. Operation mode options are AHCI (Advanced Host Controller Interface) Mode and RAID Mode.

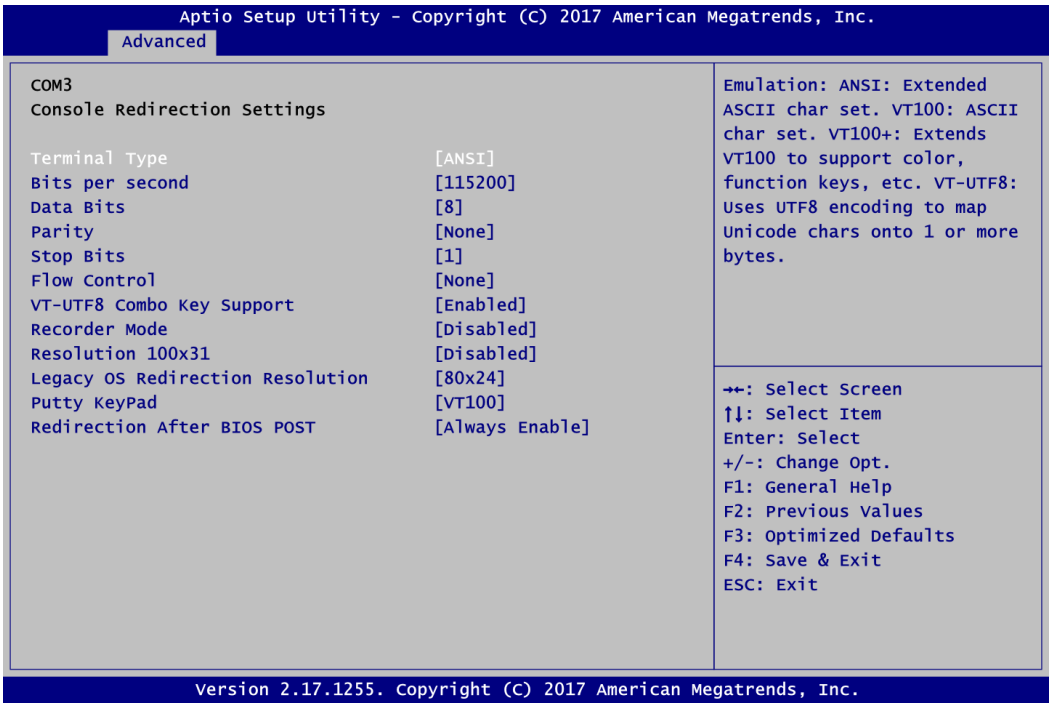
- **Serial Port Console Redirection**
  You can use this screen to select options for Serial Port Console Redirection, and change the value of the selected option. A description of the selected item appears on the right side of the screen. For items marked with "▶", please press <Enter> for more options.



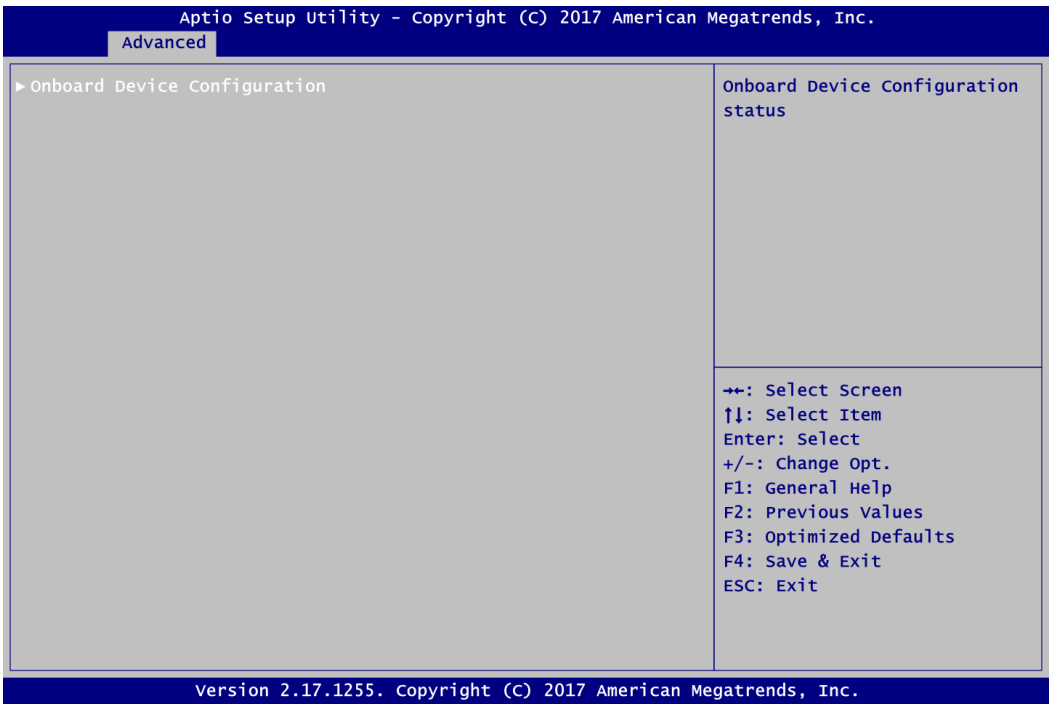
COM3~COM6 Console Redirection
Enable or disable COM3~COM6 console redirection settings, see image below. When enabled, the settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.



COM3~COM6 Console Redirection Settings

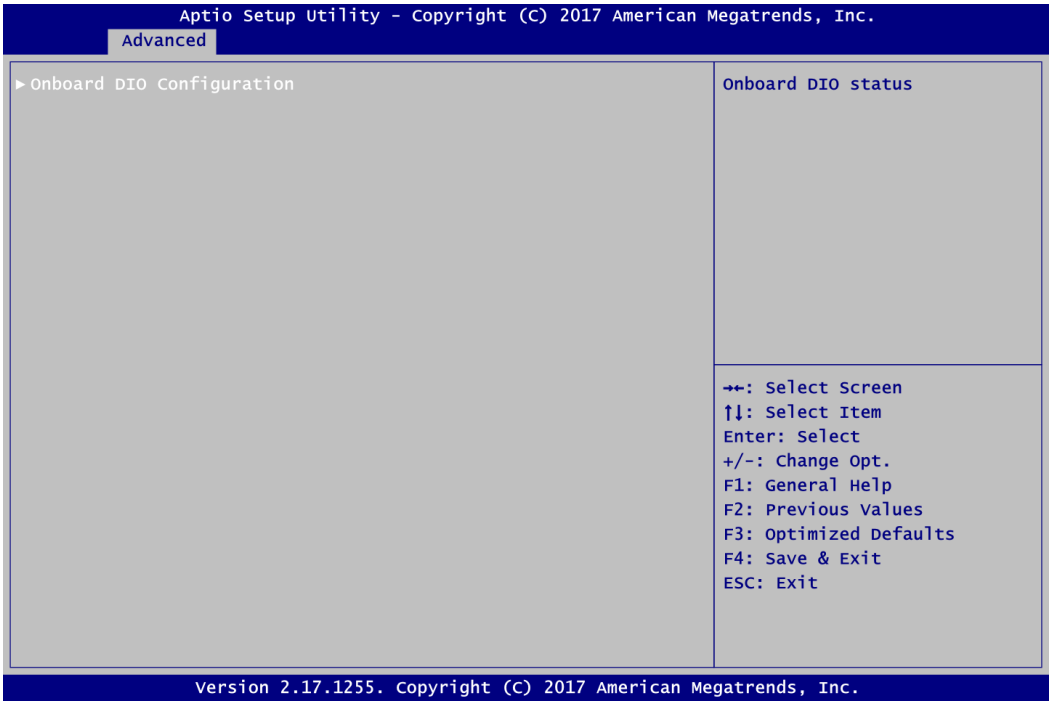


- **Device Configuration**
  A description of selected item appears on the right side of the screen. For items marked with "►", please press <Enter> for more options.

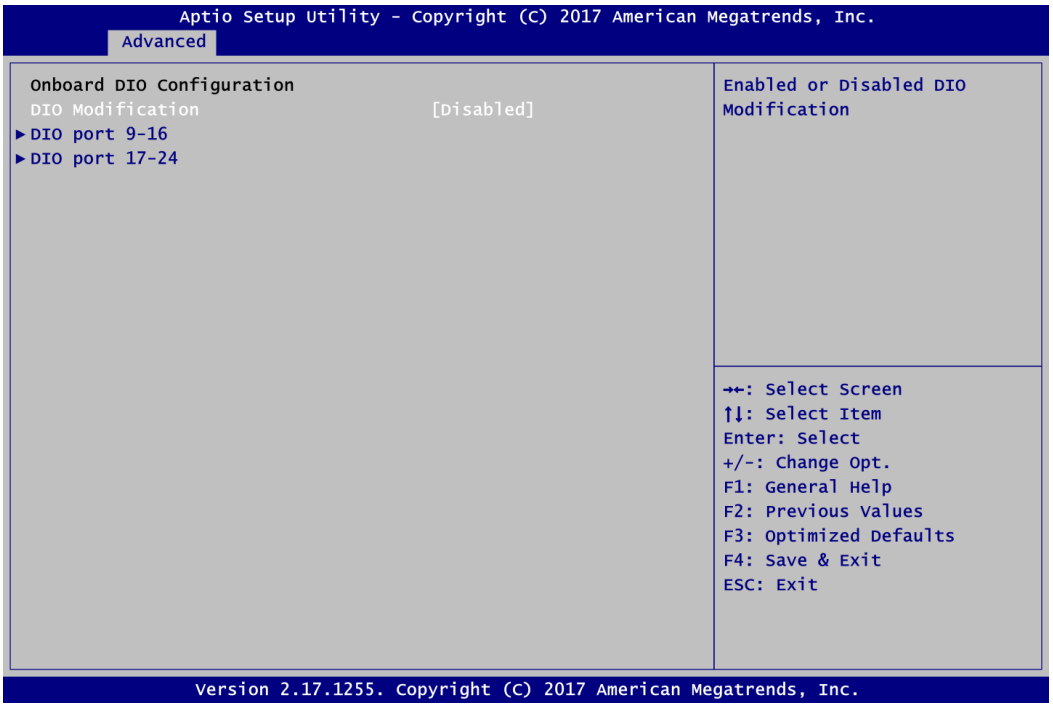


Onboard Device Configuration
Use this option to configure onboard device (e.g., DIO setting).

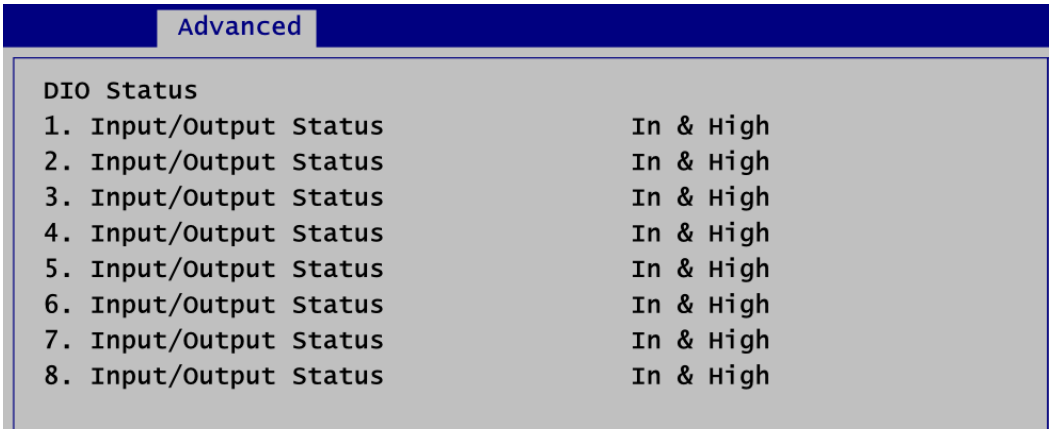
- **Onboard DIO Configuration**
  You can use this screen to select options for the 16-bit Digital I/O Configuration. A description of the selected item appears on the right side of the screen. For items marked with "▶", please press <Enter> for more options.

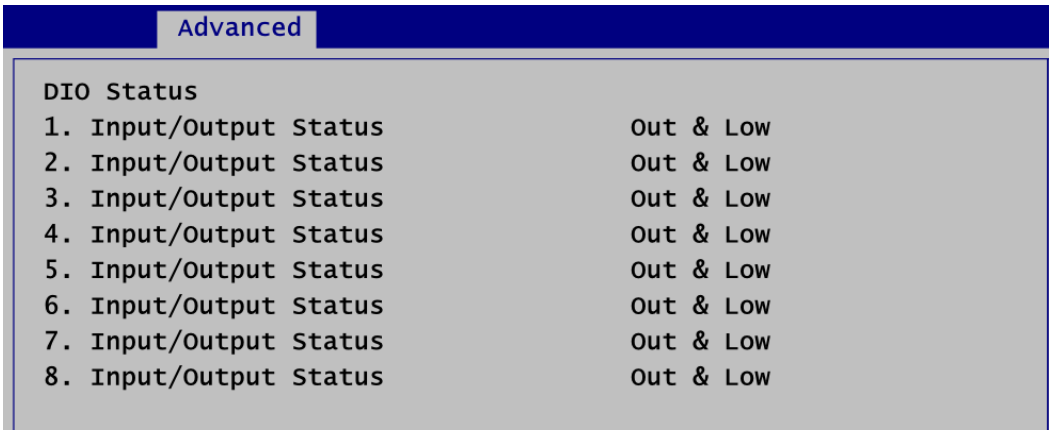


Onboard DIO Configuration
Use this screen to set parameters related to digital I/O configuration.

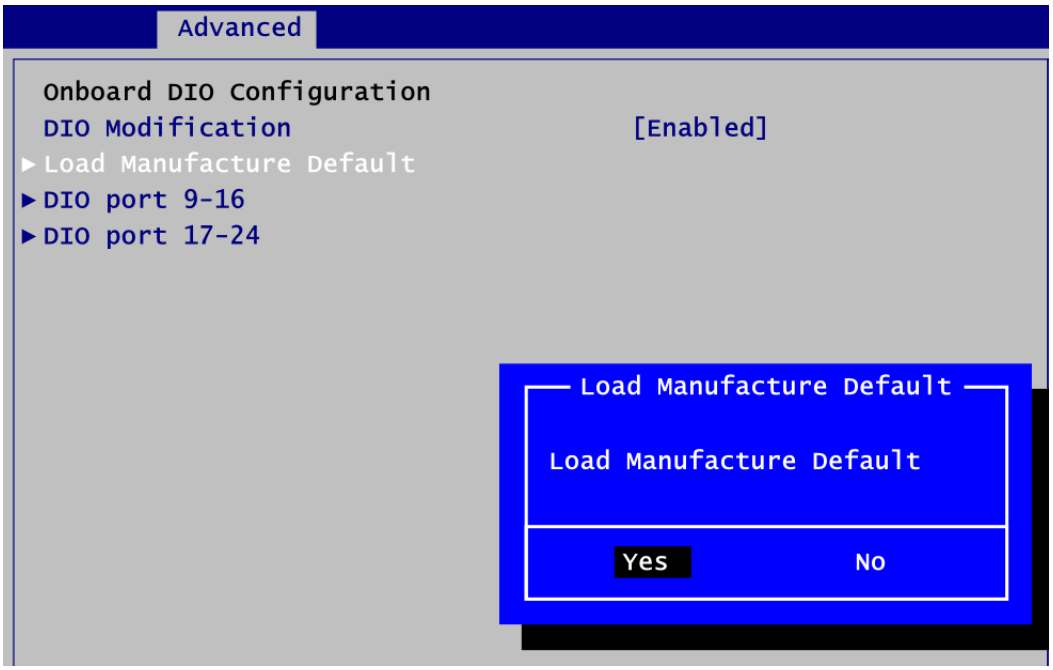


DIO Modification
Enable or disable digital I/O modification. If modification is disabled, the DIO status sub screens are as follows:





Once it is enabled, you can load manufacture default and access to the DIO status sub screen to set output or input, see image below.

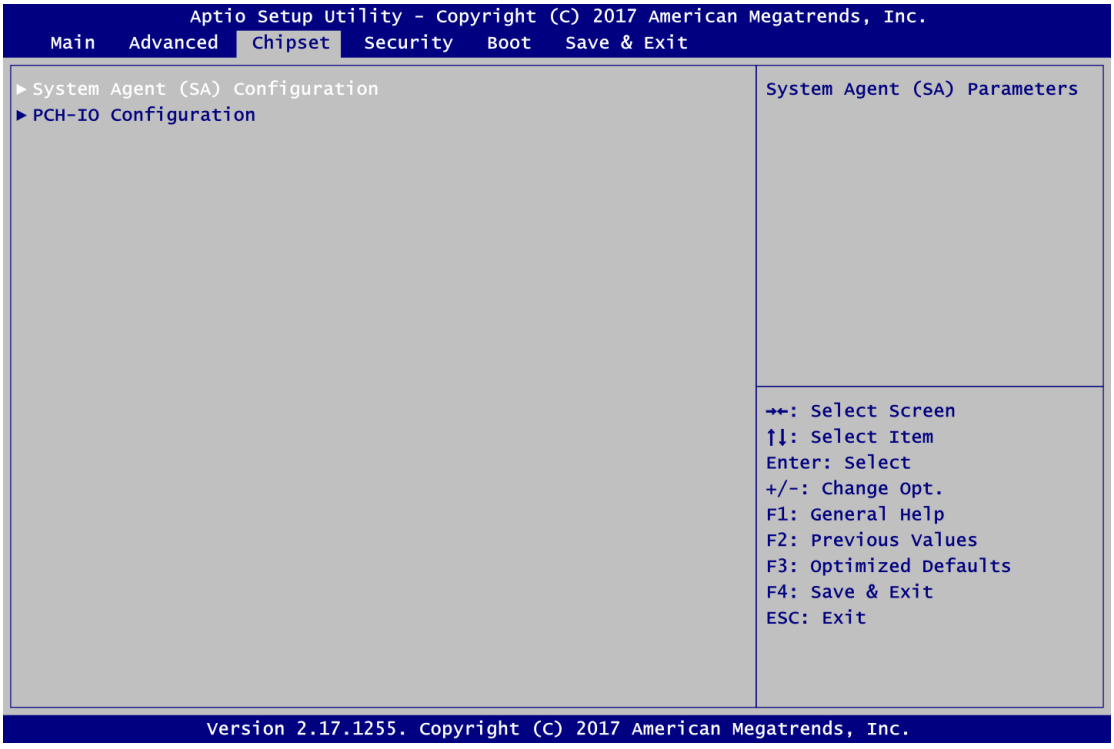


3.4 Chipset Menu

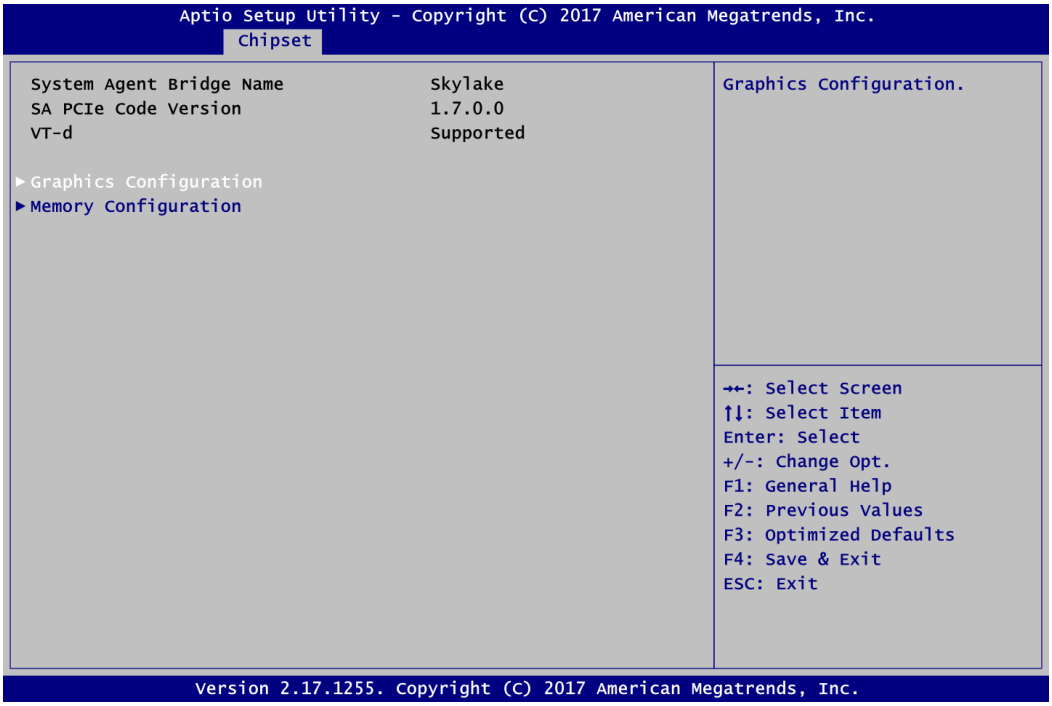
The Chipset menu allows users to change the advanced chipset settings. You can select any of the items in the left frame of the screen to go to the sub menus:

- ► System Agent (SA) Configuration
- ► PCH-IO Configuration

For items marked with "►", please press <Enter> for more options.



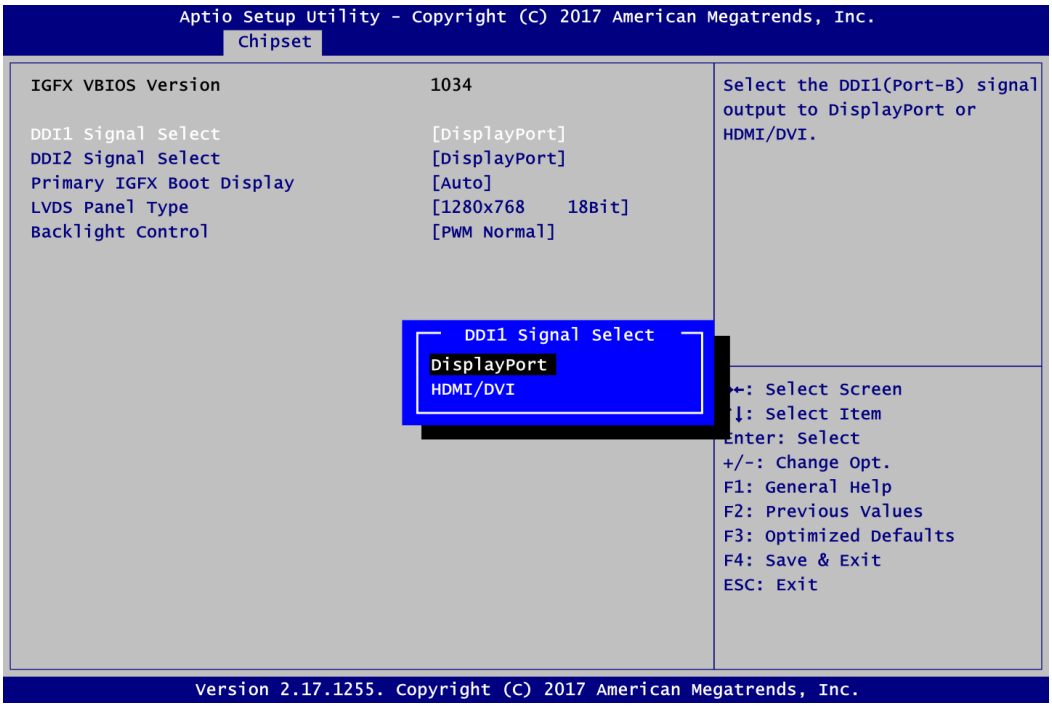
- **System Agent (SA) Configuration**
  This screen allows users to configure System Agent (SA) parameters. For items marked with "►", please press <Enter> for more options.



Graphics Configuration
Open sub menu for parameters related to graphics configuration.

Memory Configuration
Open sub menu for information related to system memory.

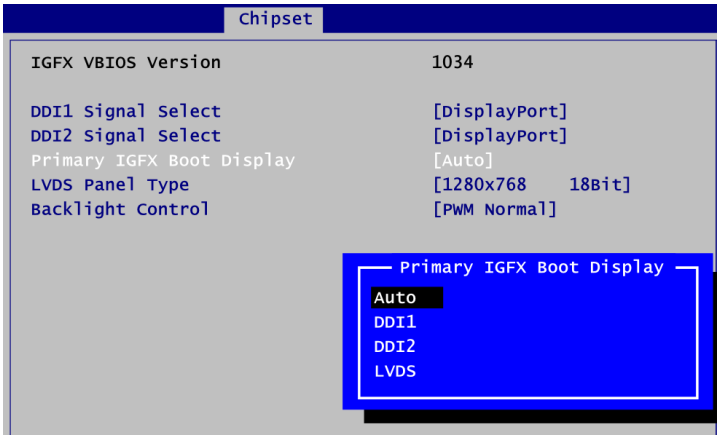
- **Graphics Configuration**

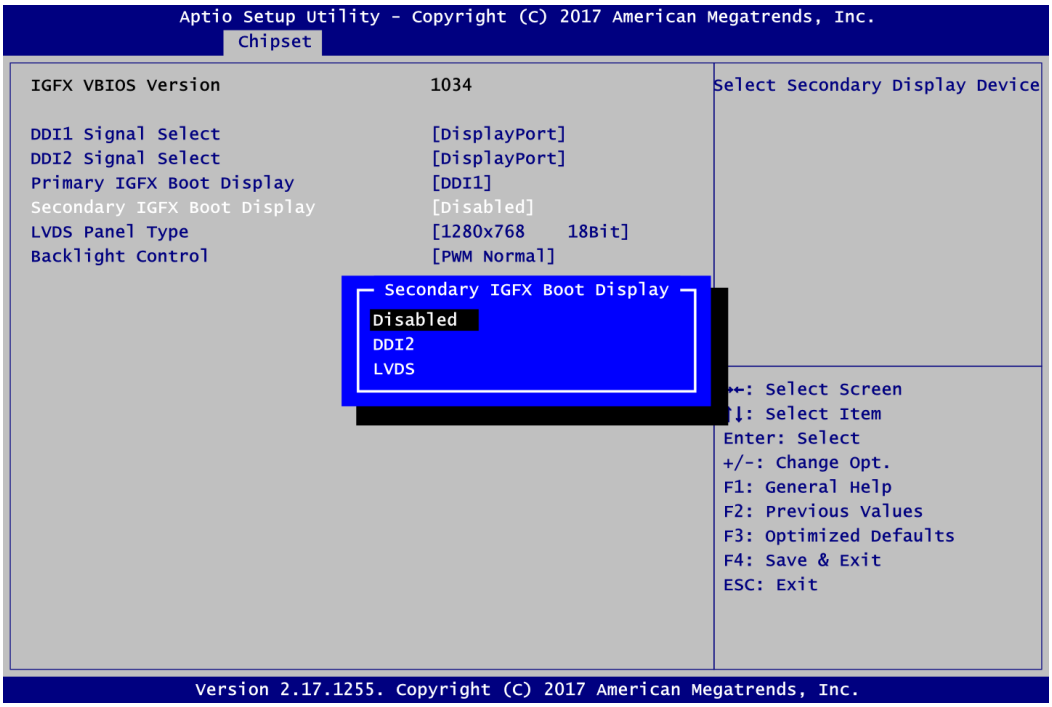


DDI1 Signal Select
Select the DDI1 (Port-B) signal output to DisplayPort or HDMI/DVI. This item must be set to DisplayPort if you want to enable VGA port on CEB94021.

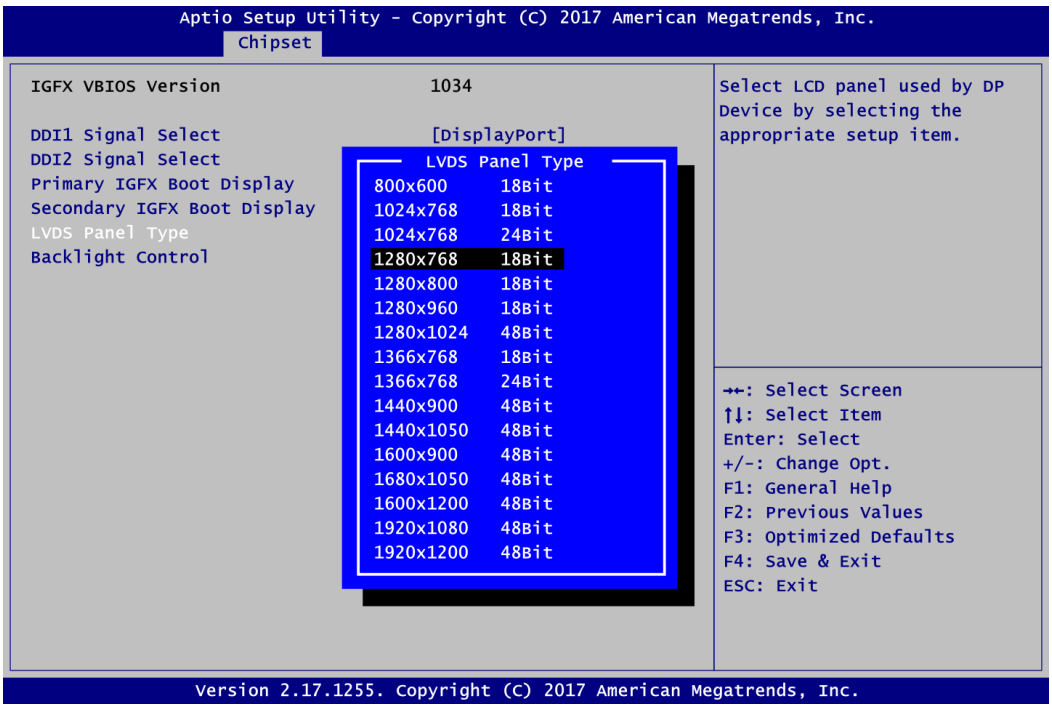
DDI2 Signal Select
Select the DDI2 signal (display output on CN27) to DisplayPort or HDMI/DVI.

Primary IGFX Boot Display
Select the video device which will be activated during POST (Power-On Self Test). The default is Auto. Image below shows option list in Primary IGFX Boot Display.

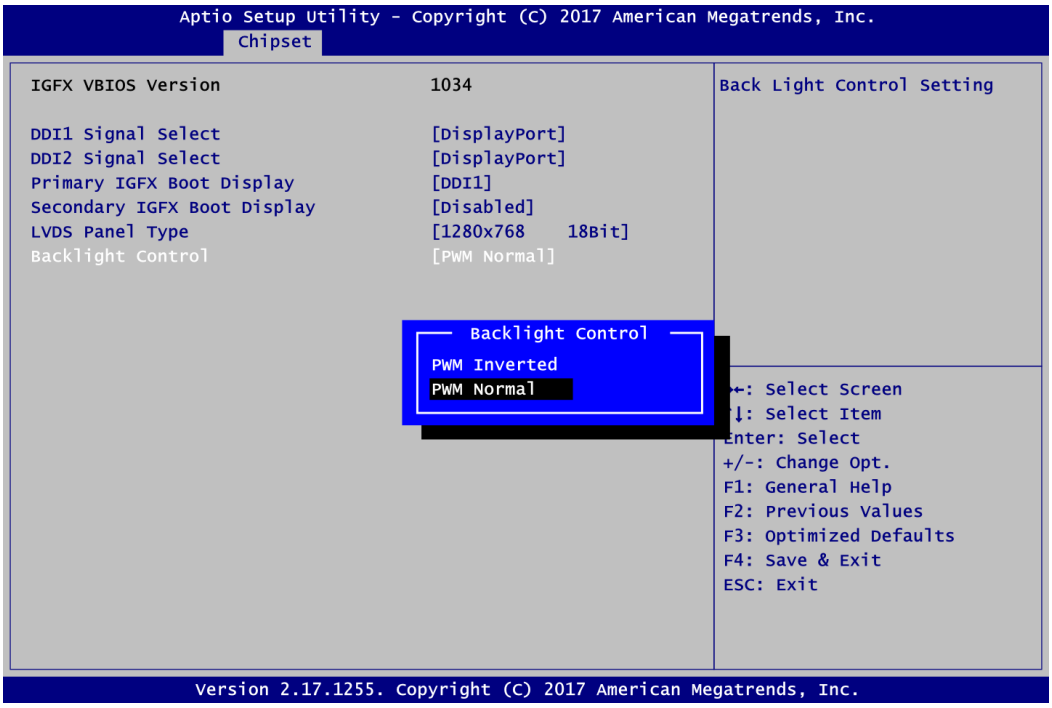




Secondary IGFX Boot Display
Select the secondary IGFX boot display. The default is Disabled. Note that this selection appears only if you set the Primary IGFX Boot Display to DDI1, DDI2 or LVDS.

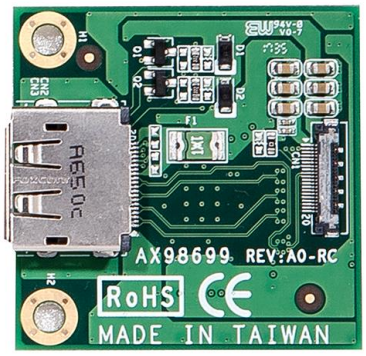


LVDS Panel Type
Select LVDS panel resolution.

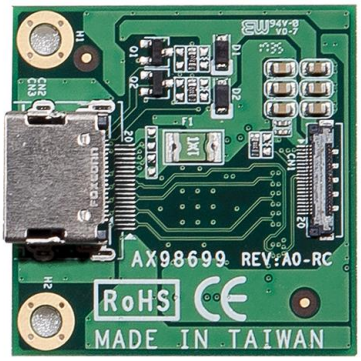


Backlight Control
Use this item to select backlight control mode.

Appendix A
AX98699 I/O Board (Optional)



AX98699 with DisplayPort



AX98699 with HDMI

The AX98699 is an I/O expansion board for CEB94021. Its specifications and detailed information are given in this appendix. Please read this appendix carefully before attaching it to your CEB94021.

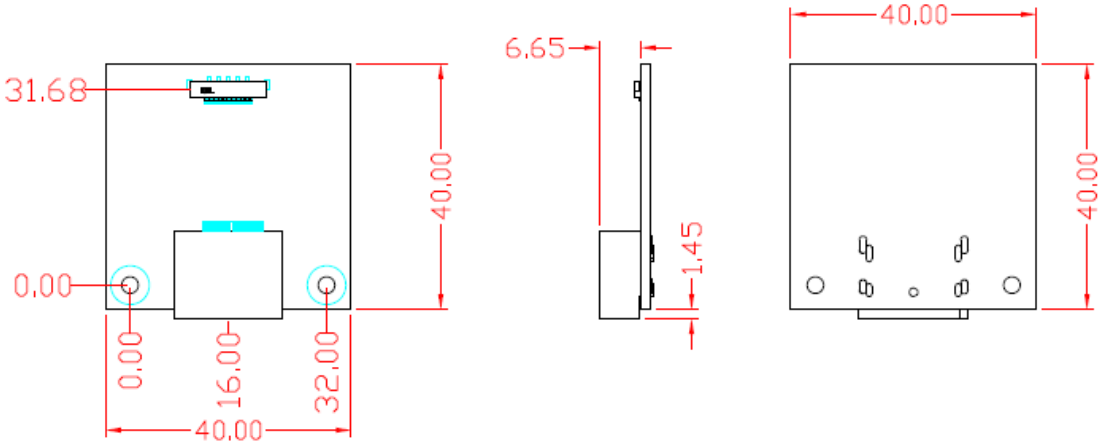
A.1 Specifications

- **Size**
  - 40mm x 40mm
- **Features**
  - One DisplayPort.
  - One HDMI.

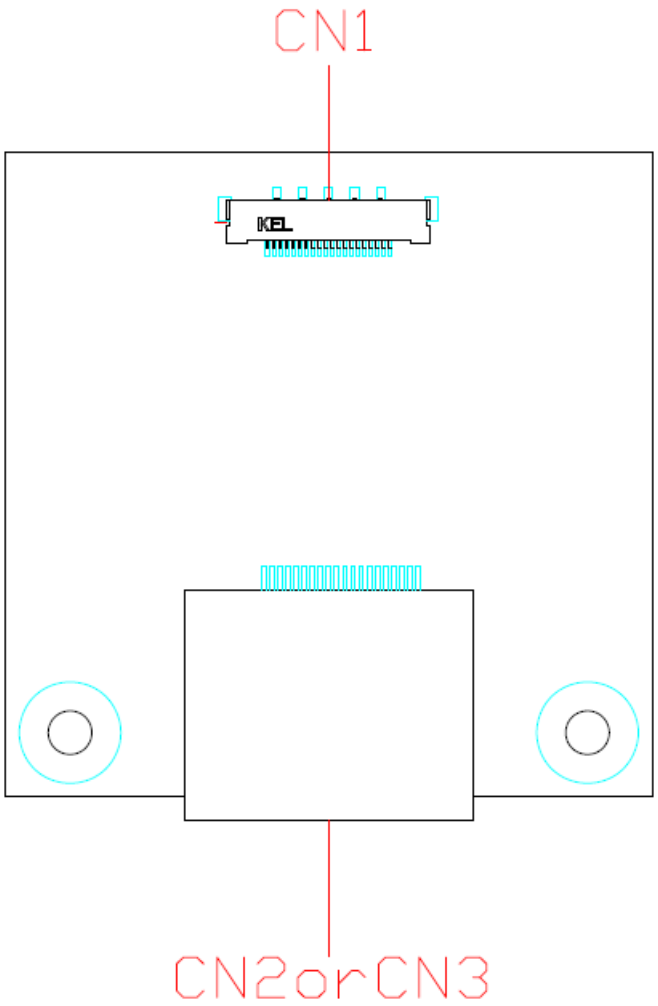
Note

All specifications and images are subject to change without notice.

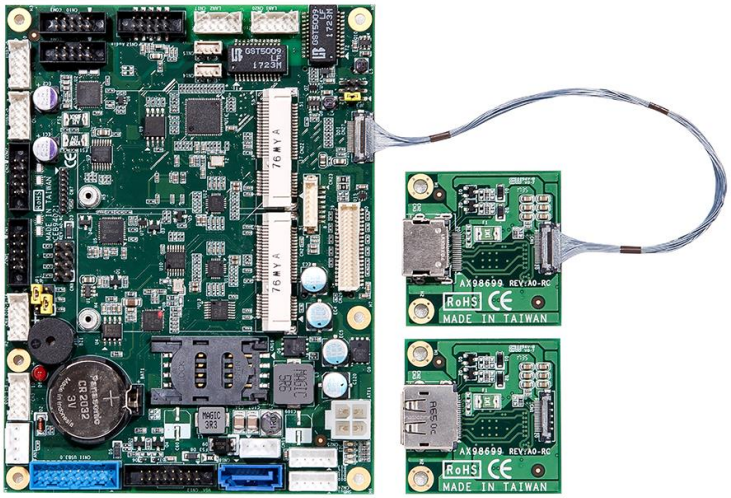
A.2 Dimensions and Fixing Holes



A.3 Board Layout



A.4 Connecting AX98699 to CEB94021



A.5 Connectors

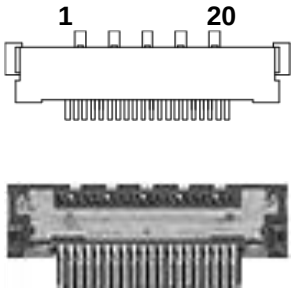
Signals go to other parts of the system through connectors. Loose or improper connection might cause problems, please make sure all connectors are properly and firmly connected. Here is a summary table which shows all connectors on the hardware.

Connector	Description
CN1	DDI Connector
CN2	DisplayPort Connector
CN3	HDMI Connector

A.5.1 DDI Connector (CN1)

The board has one 20-pin connector for DDI (Digital Display Interface).

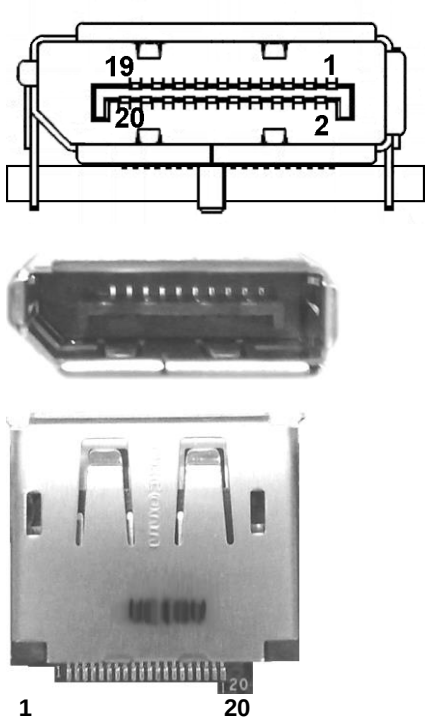
Pin	Signal
1	+V3.3S
2	HPD
3	+V5S
4	DDI_CTRL_DATA_AUXN
5	DDI_CTRL_CLK_AUXP
6	GND
7	DDI_AUX_SEL
8	GND
9	DDSP_TX_3_DN
10	DDSP_TX_3_DP
11	GND
12	DDSP_TX_2_DN
13	DDSP_TX_2_DP
14	GND
15	DDSP_TX_1_DN
16	DDSP_TX_1_DP
17	GND
18	DDSP_TX_0_DN
19	DDSP_TX_0_DP
20	GND



A.5.2 DisplayPort Connector (CN2)

The DisplayPort interface is available through CN2 which is co-layout with HDMI connector (CN3).

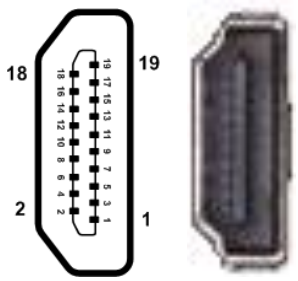
Pin	Signal
1	DP_TX0_P
2	GND
3	DP_TX0_N
4	DP_TX1_P
5	GND
6	DP_TX1_N
7	DP_TX2_P
8	GND
9	DP_TX2_N
10	DP_TX3_P
11	GND
12	DP_TX3_N
13	GND
14	GND
15	DP_AUXP
16	GND
17	DP_AUXN
18	DP_HPD
19	GND
20	+3.3V



A.5.3 HDMI Connector (CN3)

The HDMI (High-Definition Multimedia Interface) is a compact digital interface which is capable of transmitting high-definition video and high-resolution audio over a single cable.

Pin	Signal	Pin	Signal
1	HDMI OUT_DATA2+	2	GND
3	HDMI OUT_DATA2-	4	HDMI OUT_DATA1+
5	GND	6	HDMI OUT_DATA1-
7	HDMI OUT_DATA0+	8	GND
9	HDMI OUT_DATA0-	10	HDMI OUT_Clock+
11	GND	12	HDMI OUT_Clock-
13	N.C.	14	N.C.
15	HDMI OUT_SCL	16	HDMI OUT_SDA
17	GND	18	+5V
19	HDMI_HTPLG		



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Appendix B
AX93287 I/O Board (Optional)

AX93287 with LAN Port

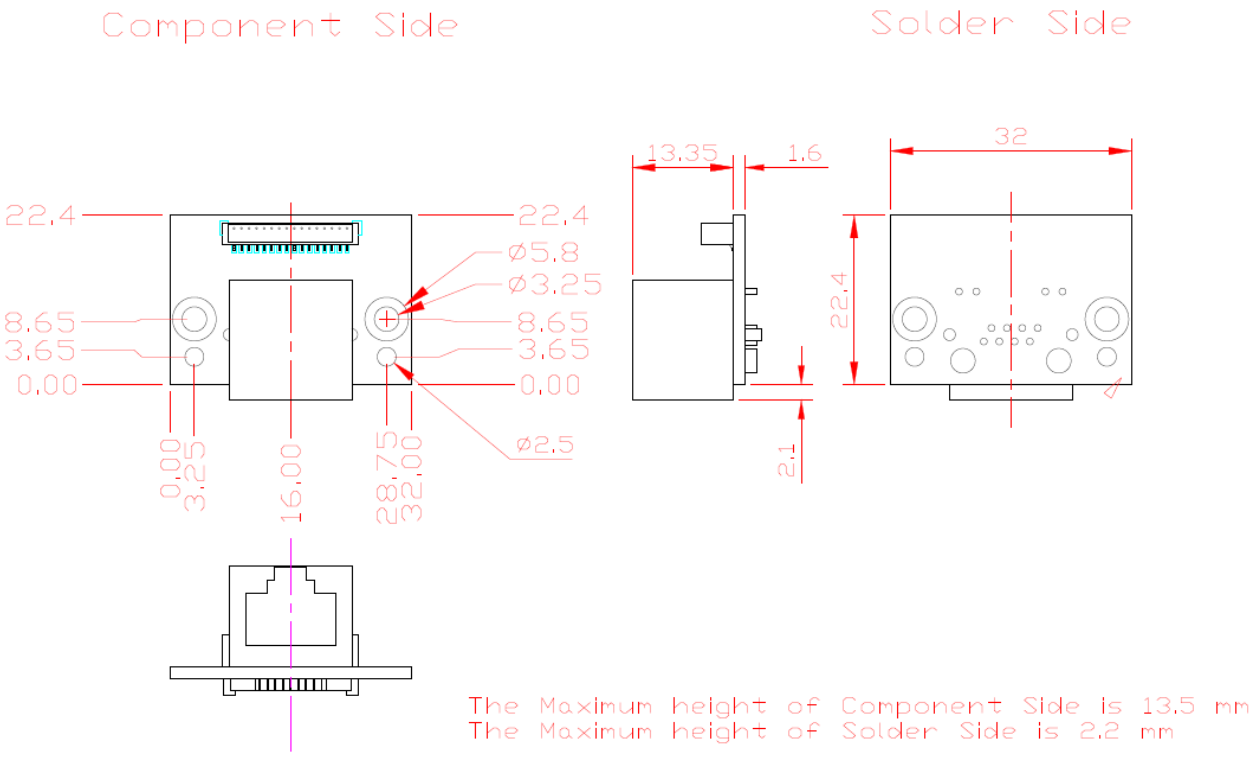
The AX93287 is an I/O expansion board for CEB94021. Its specifications and detailed information are given in this appendix. Please read this appendix carefully before attaching it to your CEB94021.

B.1 Specifications

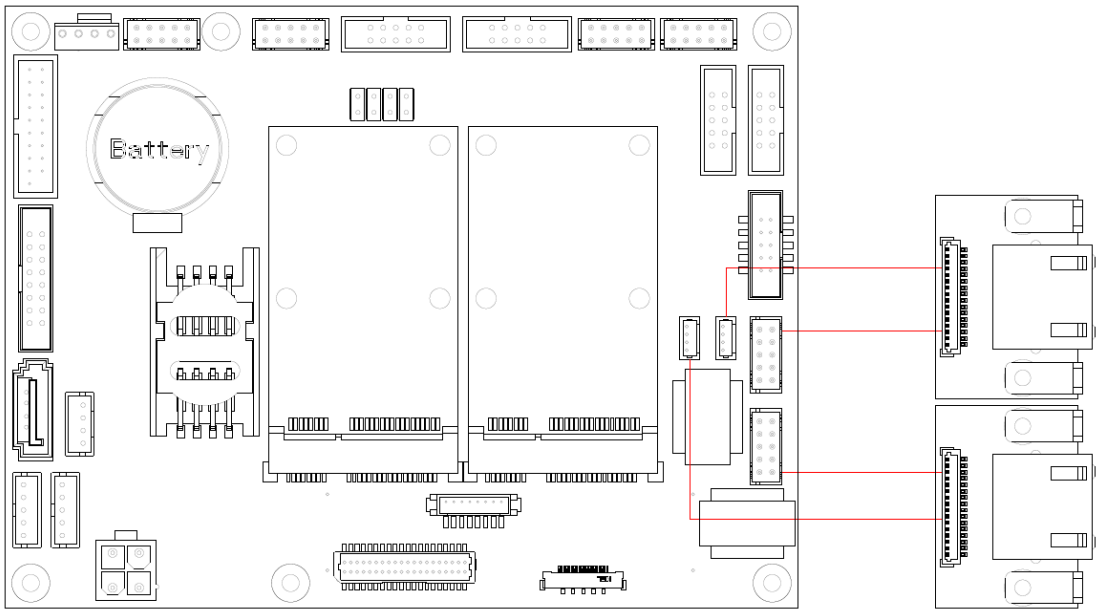
- **Size**
  - 32mm x 22.4mm
- **Features**
  - One Ethernet Port .

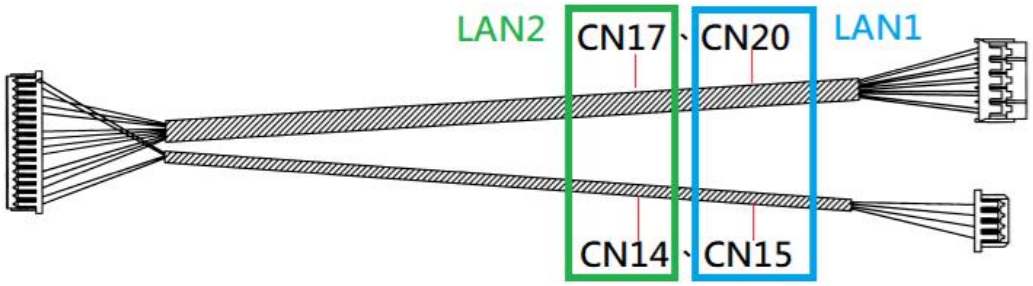
Note ***All specifications and images are subject to change without notice.***

B.2 Dimensions and Fixing Holes



B.3 Connecting AX93287 to CEB94021





*There are total 2 x GbE, LAN1 & LAN2, from CEB94021, and please make sure LAN cable (59440212700E) is assembly to corresponding box wafer that shows above.
**Please connect CN20 & CN15 if LAN1 is needed.
**Please connect CN17 & CN14 if LAN2 is needed.
**Please use 2pcs of LAN cable (59440212700E) & AX93287 if both LAN1 & LAN2 are needed and assembly to corresponding box wafer that shows above.

B.4 Connectors

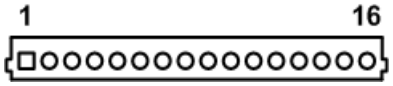
Signals go to other parts of the system through connectors. Loose or improper connection might cause problems, please make sure all connectors are properly and firmly connected. Here is a summary table which shows all connectors on the hardware.

Connector	Description
CN1	AX93287 Ethernet Connectors
CN2	AX93287 RJ45 Ethernet Connectors
CN14~CN15	CEB94021 Ethernet LED Connector
CN17 & CN20	CEB94021 Ethernet Connectors

B.4.1 AX93287 Ethernet Connectors (CN1)

This is a JST BM16B-SRSS-TB 16-pin wafer connector for Ethernet interface.

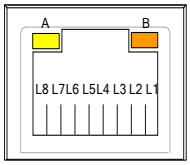
Pin	Signal
1	LAN_1000_LED-
2	LAN_100_LED-
3	GND
4	LAN_MMDI3-
5	LAN_MMDI3+
6	LAN_MMDI1-
7	LAN_MMDI2-
8	LAN_MMDI2+
9	LAN_MMDI1+
10	LAN_MMDI0-
11	LAN_MMDI0+
12	GND
13	LAN_VDD33
14	LAN_LINK/ACT-
15	GND
16	GND

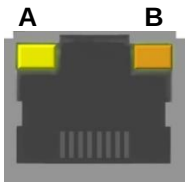


B.4.2 AX93287 RJ45 Ethernet Connectors (CN2)

The board has one RJ-45 Ethernet connectors. Connection can be established by plugging one end of the Ethernet cable into this connector and the other end (phone jack) to a 1000/100/10-Base-T hub

Pin	1000 Base-T	100/10 Base-T	Description
L1	BI_DA+	TX+	Bidirectional or Transmit Data+
L2	BI_DA-	TX-	Bidirectional or Transmit Data-
L3	BI_DB+	RX+	Bidirectional or Receive Data+
L4	BI_DC+	N.C.	Bidirectional or Not Connected
L5	BI_DC-	N.C.	Bidirectional or Not Connected
L6	BI_DB-	RX-	Bidirectional or Receive Data-
L7	BI_DD+	N.C.	Bidirectional or Not Connected
L8	BI_DD-	N.C.	Bidirectional or Not Connected
A	Active Link LED Off: No link Blinking: Data activity detected		
B	Speed LED 1000: Orange 100/10: Green/OFF		

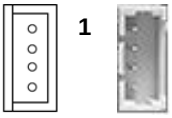




B.4.3 CEB94021 Ethernet LED Connector (CN14 and CN15)

These are 4-pin (pitch=1.25mm) connectors for LAN LED's activity and speed indicator interfaces. The CN14 and CN15 are for LAN2 LED signals and LAN1 LED signals, respectively.

Pin	Signal
1	+V3.3_SBY
2	Active
3	LED_1000
4	LED_100



B.4.4 CEB94021 Ethernet Connectors (CN17 and CN20)

The board has two 2x5-pin (pitch=2.0mm) connectors for Ethernet interfaces. The CN17 (LAN2) is for Intel® I210IT LAN chip, while the CN20 (LAN1) is determined by the CEM module.

Pin	Signal	Pin	Signal
1	MDI0-	2	MDI1-
3	MDI0+	4	MDI1+
5	LAN_GND	6	LAN_GND
7	MDI2-	8	MDI3-
9	MDI2+	10	MDI3+