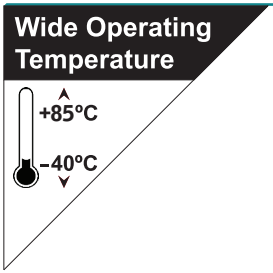

Em104-i230F R2.1

PC/104 CPU Module

User Manual

Version 2.1

2022.08

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Revision History

Version	Release Time	Description
1.0	February, 2016	Initial release
1.1	July, 2021	1. Update Ethernet and Audio Chipset in 1.3 Specifications 2.Update 2.2. Block Diagram
1.2	Dec, 2021	1. Remove driver CD in 1.4 Inside the Package 2. Update content in 2.4 Driver Installation Notes
2.1	Mar, 2023	1. Update Ethernet Chipset in 1.3 Specifications 2. Update 2.2. Block Diagram 3. Update 2.3 Jumpers and Connectors board diagram

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Copyright Notice

The information in this document is subject to change without prior notice in order to improve the reliability, design and function. It does not represent a commitment on the part of the manufacturer.

Under no circumstances will the manufacturer be liable for any direct, indirect, special, incidental, or consequential damages arising from the use or inability to use the product or documentation, even if advised of the possibility of such damages.

Declaration of Conformity

CE

The CE symbol on your product indicates that it is in compliance with the directives of the Union European (EU). A Certificate of Compliance is available by contacting Technical Support.

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This kind of cable is available from ARBOR. Please contact your local supplier for ordering information.

This product has passed the CE test for environmental specifications. Test conditions for passing included the equipment being operated within an industrial enclosure. In order to protect the product from being damaged by ESD (Electrostatic Discharge) and EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

Warning

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

FCC Class A

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1)This device may not cause harmful interference, and

(2)This device must accept any interference received, including interference that may cause undesired operation.

NOTE:

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

RoHS

ARBOR Technology Corp. certifies that all components in its products are in compliance and conform to the European Union's Restriction of Use of Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive 2002/95/EC.

The above mentioned directive was published on 2/13/2003. The main purpose of the directive is to prohibit the use of lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB), and polybrominated diphenyl ethers (PBDE) in electrical and electronic products. Member states of the EU are to enforce by 7/1/2006.

ARBOR Technology Corp. hereby states that the listed products do not contain unintentional additions of lead, mercury, hex chrome, PBB or PBDB that exceed a maximum concentration value of 0.1% by weight or for cadmium exceed 0.01% by weight, per homogenous material. Homogenous material is defined as a substance or mixture of substances with uniform composition (such as solders, resins, plating, etc.). Lead-free solder is used for all terminations (Sn(96-96.5%), Ag(3.0-3.5%) and Cu(0.5%)).

SVHC / REACH

To minimize the environmental impact and take more responsibility to the earth we live, Arbor hereby confirms all products comply with the restriction of SVHC

(Substances of Very High Concern) in (EC) 1907/2006 (REACH --Registration, Evaluation, Authorization, and Restriction of Chemicals) regulated by the European Union.

All substances listed in SVHC < 0.1 % by weight (1000 ppm)

Warning

Single Board Computers and their components contain very delicate Integrated Circuits (IC). To protect the Single Board Computer and its components against damage from static electricity, you should always follow the following precautions when handling it :

1. Disconnect your Single Board Computer from the power source when you want to work on the inside.
2. Hold the board by the edges and try not to touch the IC chips, leads or circuitry.
3. Use a grounded wrist strap when handling computer components.
4. Place components on a grounded antistatic pad or on the bag that comes with the Single Board Computer, whenever components are separated from the system.

Replacing Lithium Battery

Incorrect replacement of the lithium battery may lead to a risk of explosion.

The lithium battery must be replaced with an identical battery or a battery type recommended by the manufacturer.

Do not throw lithium batteries into the trash-can. It must be disposed of in accordance with local regulations concerning special waste.

Technical Support

If you have any technical difficulties, please do not hesitate to call or e-mail our customer service.

https://www.arbor-technology.com
E-mail:info@arbor.com.tw

Warranty

This product is warranted to be in good working order for a period of two years from the date of purchase. Should this product fail to be in good working order at any time during this period, we will, at our option, replace or repair it at no additional charge except as set forth in the following terms. This warranty does not apply to products damaged by misuse, modifications, accident or disaster.

Vendor assumes no liability for any damages, lost profits, lost savings or any other incidental or consequential damage resulting from the use, misuse of, or inability to use this product. Vendor will not be liable for any claim made by any other related party. Vendors disclaim all other warranties, either expressed or implied, including but not limited to implied warranties of merchantability and fitness for a

particular purpose, with respect to the hardware, the accompanying product's manual(s) and written materials, and any accompanying hardware. This limited warranty gives you specific legal rights.

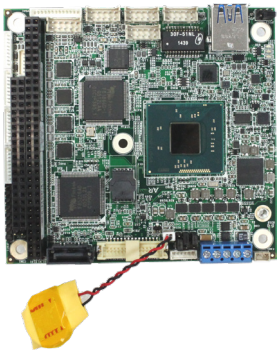
Return authorization must be obtained from the vendor before returned

merchandise will be accepted. Authorization can be obtained by calling or faxing the vendor and requesting a Return Merchandise Authorization (RMA) number. Returned goods should always be accompanied by a clear problem description.

Chapter 1

Introduction

1.1. The Product



- Fanless Design
- Support Intel® Atom™ E3800 Family
- Dual Gigabit Ethernet ports
- LVDS, Analog RGB Port
- Support Dual Independent Displays
- Wide-Range Operating Temp.: -40 ~ 85°C

1.2. About this Manual

This manual is intended for experienced users and integrators with hardware knowledge of computers. If you are not sure about the description in this manual, consult your vendor before further handling.

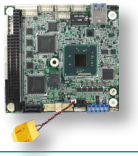
We recommend that you keep one copy of this manual for the quick reference for any necessary maintenance in the future. Thank you for choosing ARBOR products.

1.3. Specifications

System	
CPU	Soldered onboard Intel® Atom™ processor E3825 dual-core 1.33GHz / E3845 quad-core 1.91GHz
Memory	1 x DDR3L SO-DIMM socket, supporting up to 8GB 1333 MT/s SDRAM
BIOS	Insyde BIOS
Watchdog Timer	1 ~ 255 levels reset
I/O	
I/O Chipset	Fintek F81866
Serial Port	2 x RS-232
	2 x RS-232/422/485 selectable
USB Port	2 x USB 2.0 ports
	1 x USB 3.0 port
KB/MS	6-pin wafer connector for PS/2 keyboard and mouse via Y-cable
Expansion Bus	PC/104 interface & Mini-card socket
Storage	1 x Serial ATA port with 300MB/s HDD transfer rate
	1 x mSATA socket (Socket shared and BIOS selectable with Mini PCIe card)
Ethernet Chipset	2 x RTL8111H PCIe GbE controllers
Digital I/O	8-bit programmable
Audio	Realtek ALC888S HD Audio CODEC, Mic-in/ Line-in/Line-out
Display	
Graphics Chipset	Integrated Intel® HD Graphics
Graphics Interface	Analog RGB supports resolution up to 2048 x 1536
	LCD: Dual Channel 24-bit LVDS
Mechanical & Environmental	
Power Requirement	+5V (Additional +12V might be required for LCD panel)
Power Consumption	1.81A@5V with E3825 (Typical) 2.24A@5V with E3845 (Typical)
Operating Temp.	-40 ~ 85ºC (-40 ~ 185ºF)
Operating Humidity	10%~95% @ 85C (non-condensing)
Dimension (L x W)	96 x 90 mm (3.8” x 3.5”)

1.4. Inside the Package

Before starting to install the single board, make sure the following items are shipped:

	1 x Em104-i230F
	1 x Heat Sink
	1 x Quick Installation Guide

If any of the above items is damaged or missing, contact your vendor immediately.

1.5. Ordering Information

Em104-i230F-E3825	Intel® Atom™ Processor E3825 PC/104 CPU module
Em104-i230F-E3845	Intel® Atom™ Processor E3845 PC/104 CPU module

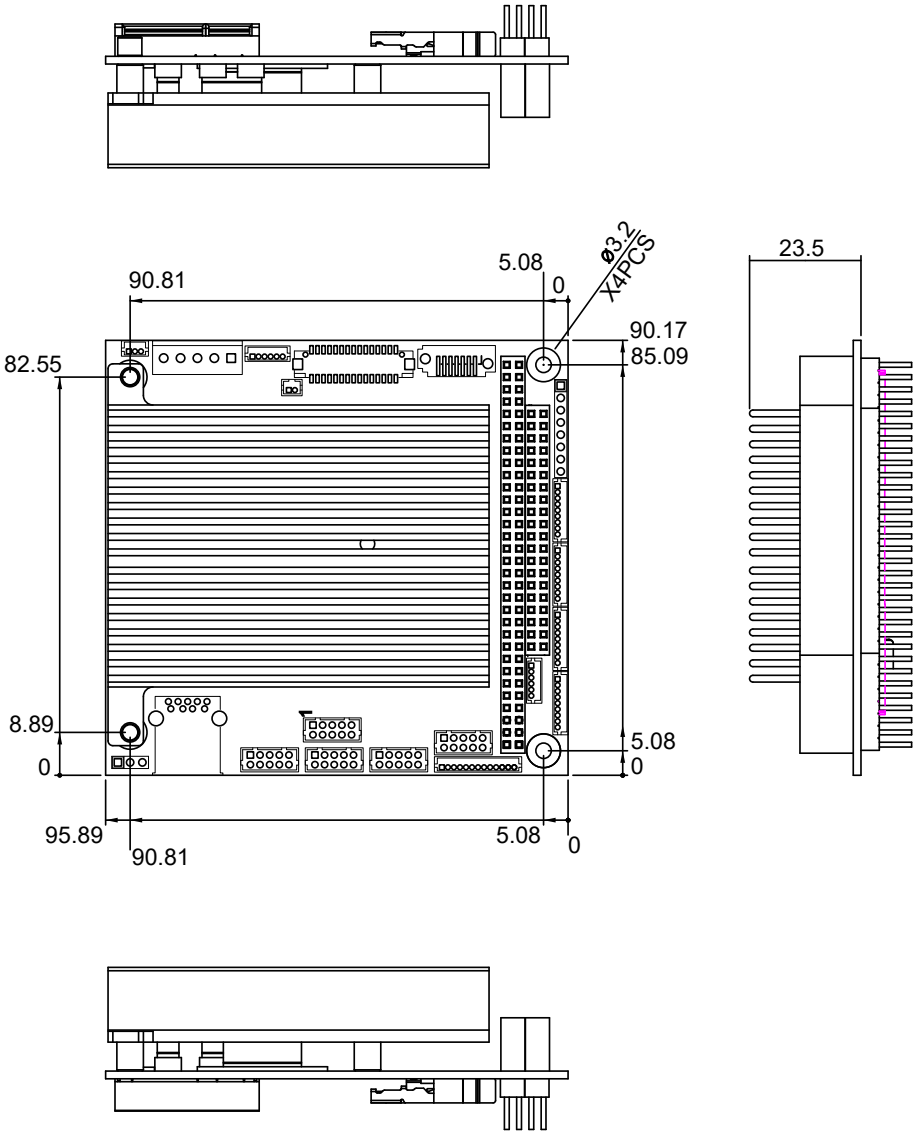
1.5.1. Optional Accessories

CBK-11-230F-00	Cable kit 1 x SATA cable 1 x Audio cable 4 x COM port cables 1 x KB & MS Y-cable 1 x USB cable 1 x VGA cable 2 x LAN cables

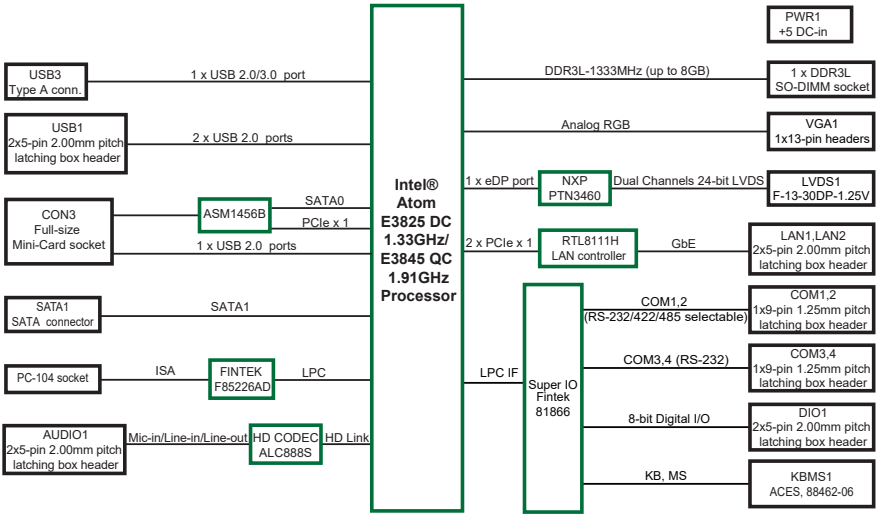
Chapter 2

Getting Started

2.1. Board Dimensions



2.2. Block Diagram



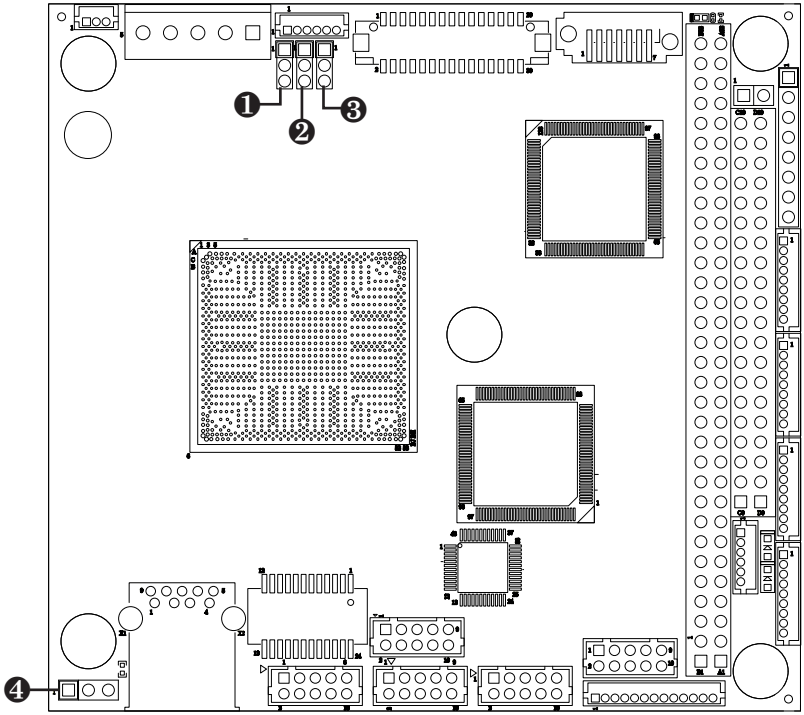
2.3. Jumpers and Connectors

The board comes with some connectors to join some devices and also some jumpers to alter the hardware configuration. The following in this chapter will explicate each of these components one-by-one.

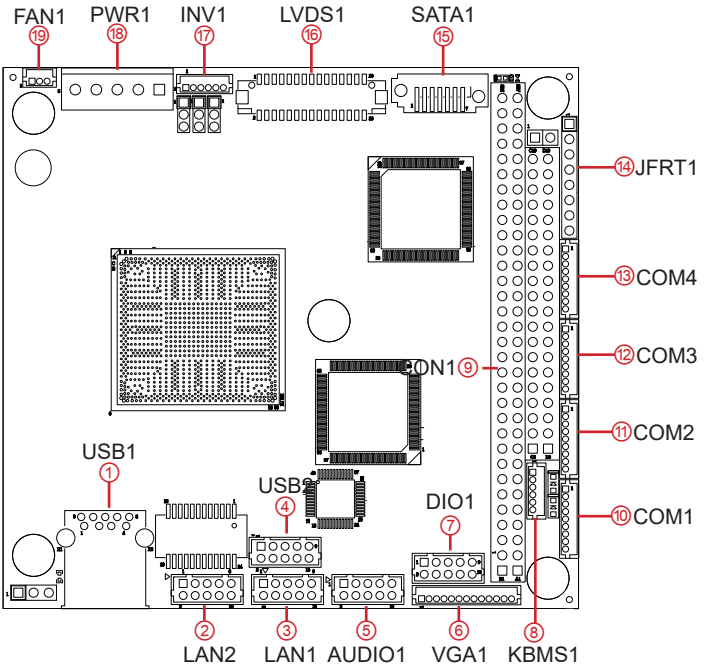
2.3.1. Layout

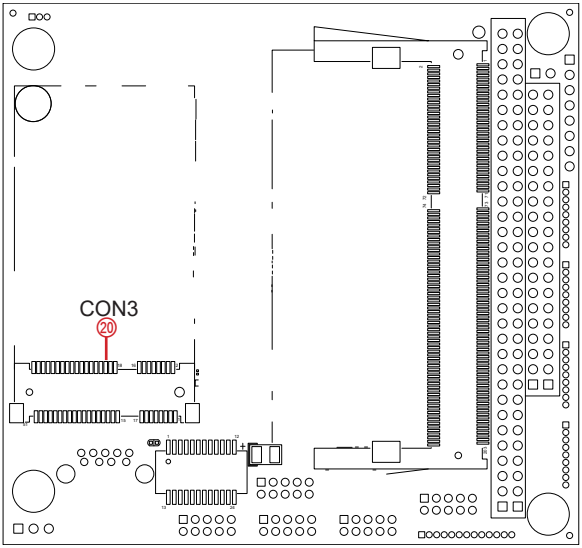
This section will provide an overview of this board, both the top and bottom sides.

Jumpers Location



Connectors Location





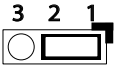
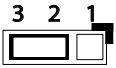
2.3.2. Jumpers

❶JINV1

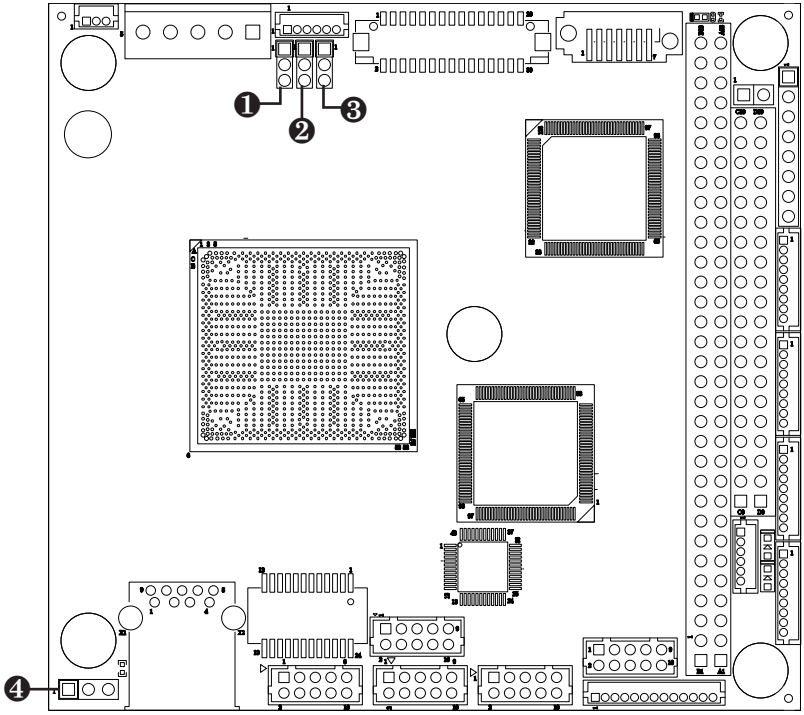
Function: Sets LCD inverter voltage. (This jumper sets the voltage of LCD connector INV1, which means this jumper decides the pin 1 of the LCD connector INV1.)

Jumper Type: 2.00mm pitch, 1x3-pin header

Setting:

Pin	Description	
1-2	+12V	
2-3	+5V (default)	

Board Top

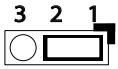
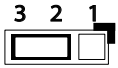


❷JLVCD1

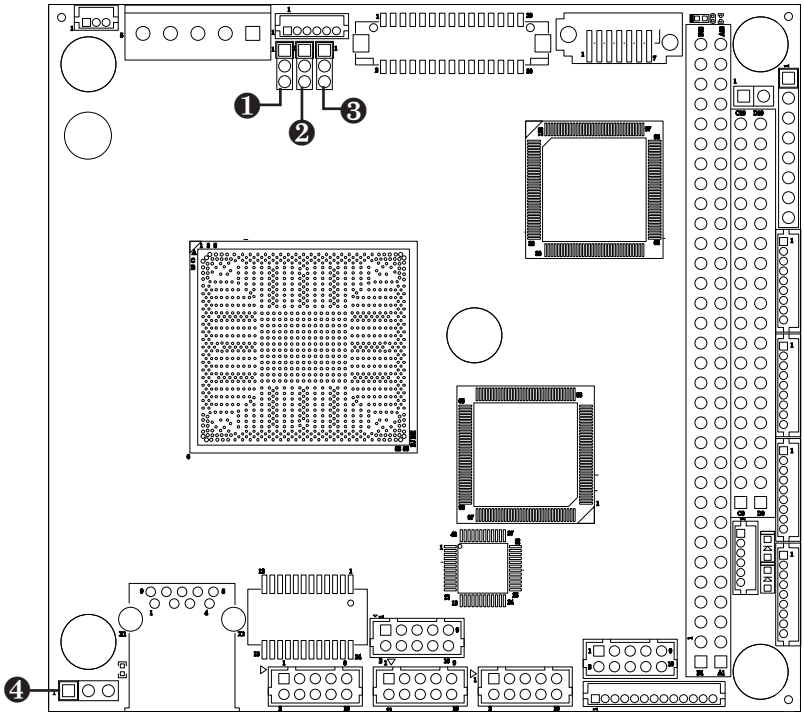
Function: Sets LCD panel voltage

Jumper Type: 2.00mm pitch, 1x3-pin header

Setting:

Pin	Description	
1-2	+5V	
2-3	+3.3V (default)	

Board Top



❸JBAT1

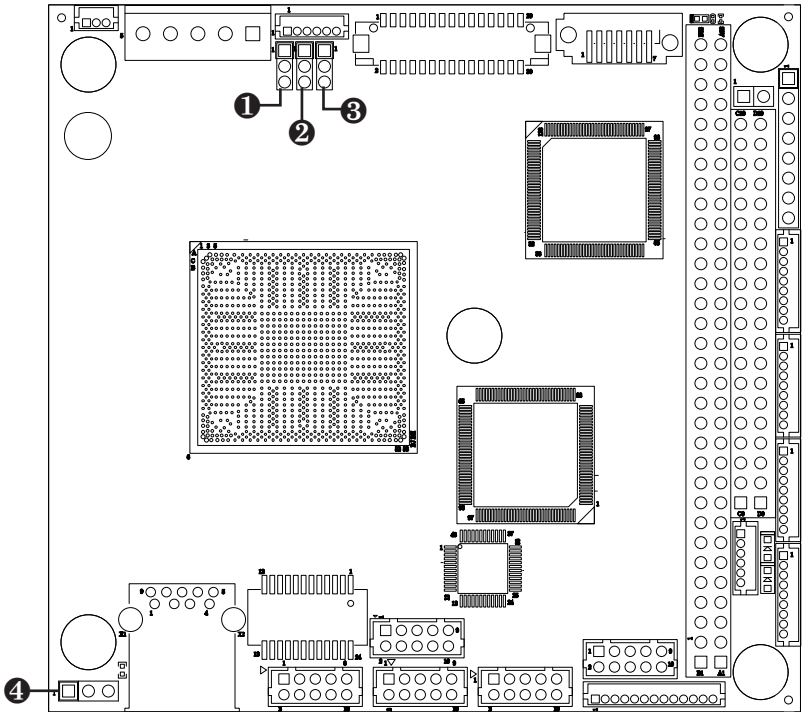
Function: The voltage selection of LCD panel

Jumper Type: 2.00mm pitch, 1x3-pin header

Setting:

Pin	Description	
1-2	Keeps CMOS (default)	
2-3	Clears CMOS	

Board Top



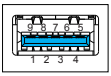
❹JPIC1

Function: This jumper is for internal testing only.

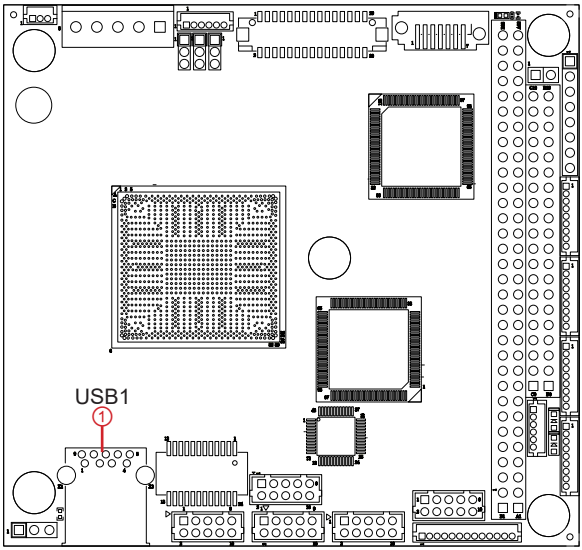
2.3.3. Connectors

USB1

Description:	USB 3.0/2.0 Connector
Connector Type:	Type A connector
Setting:	The pin assignments conform to the industry standard.



Board Top



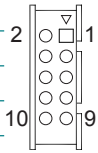
LAN1~2

Description: Ethernet Connectors

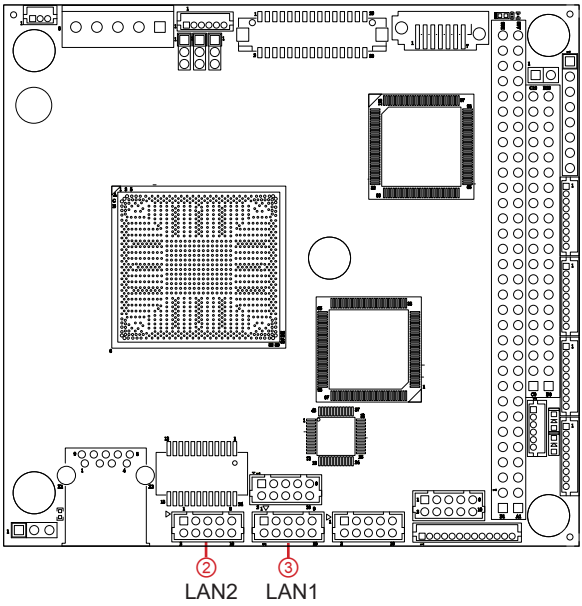
Connector Type: 2.00mm pitch 2x5-pin wafer connector

Setting:

Pin	Description	Pin	Description
2	TX_MDI0-	1	TX_MDI0+
4	MDI2+	3	RX_MDI1+
6	RX_MDI1-	5	MDI2-
8	MDI3-	7	MDI3+
10	N/C	9	N/C



Board Top



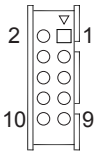
USB2

Description: USB 2.0 Connector

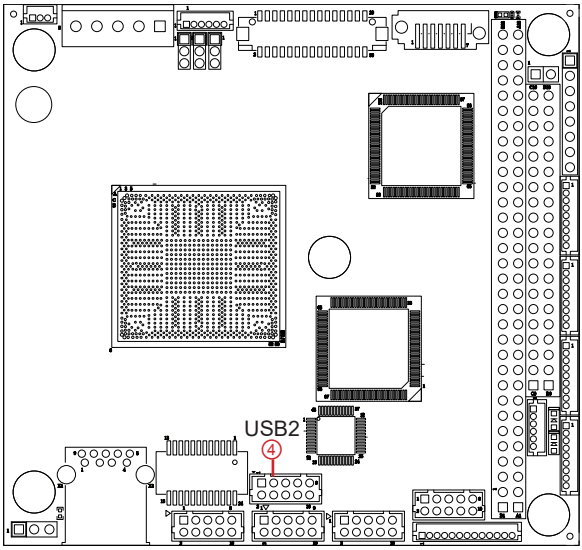
Connector Type: 2.00mm pitch 2x5-pin headers

Setting:

Pin	Description	Pin	Description
2	+5V-	1	+5V
4	USBP1-	3	USBP0-
6	USBP1+	5	USBP0+
8	GND	7	GND
10	N/C	9	GND



Board Top



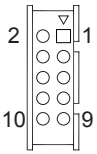
AUDIO1

Description: AUDIO connector

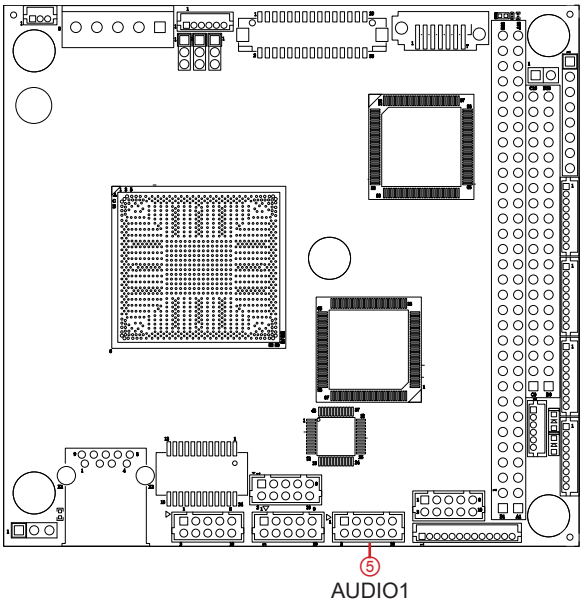
Connector Type: 2.00mm pitch 2x5-pin wafer connector

Setting:

Pin	Description	Pin	Description
2	LINE-R	1	Line_L
4	GND3	3	GND1
6	N/C	5	MIC1
8	GND4	7	GND2
10	LOUT_R	9	LOUT_L



Board Top



VGA1

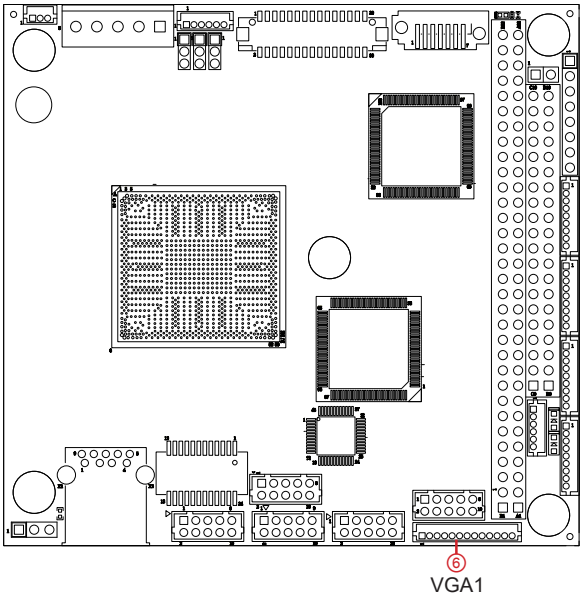
Description: Analog RGB Display Connector

Connector Type: 1x13-pin ACES 1.25mm 86801-13 4-wall connector

Setting:

Pin	Description
1	VGA_VSYNC
2	VGA_HSYNC
3	GND
4	SCL
5	SDA
6	GND
7	BLUE
8	GND
9	GREEN
10	GND
11	RED
12	GND
13	VCC

Board Top



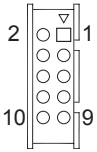
DIO1

Description: DIO Connector

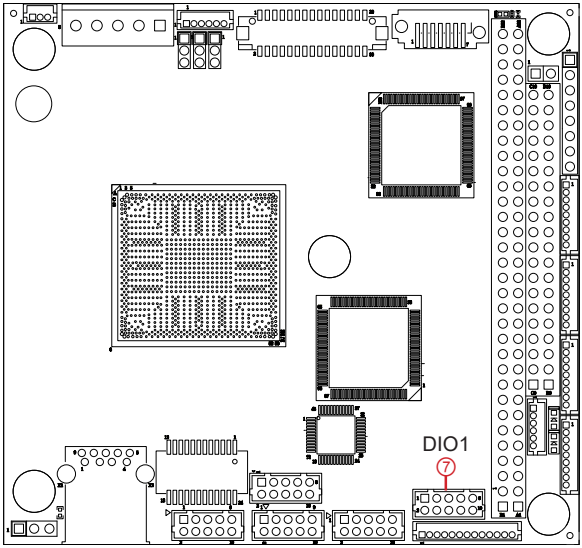
Connector Type: 2.00mm pitch 2x5-pin wafer connector

Setting:

Pin	Description	Pin	Description
2	DIO1	1	DIO0
4	DIO3	3	DIO2
6	DIO5	5	DIO4
8	DIO7	7	DIO6
10	GND	9	5V



Board Top



KBMS1

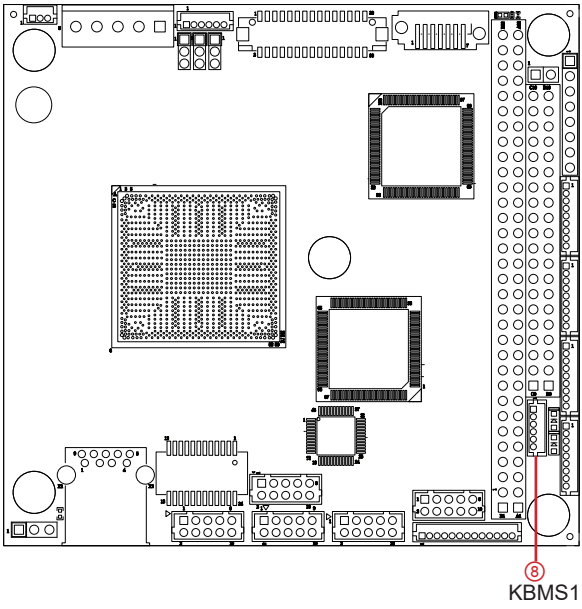
Description: Connector for keyboard and mouse.

Connector Type: 1x6-pin CVILUX 1.25mm CI4406P1V00- LF 4-wall connector

Setting:

Pin	Description
1	KB_DATA
2	KB_CLK
3	GND
4	PS2_VCC
5	MS_DATA
6	MS_CLK

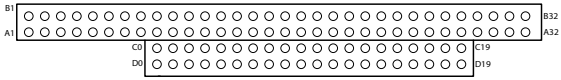
Board Top



CON1

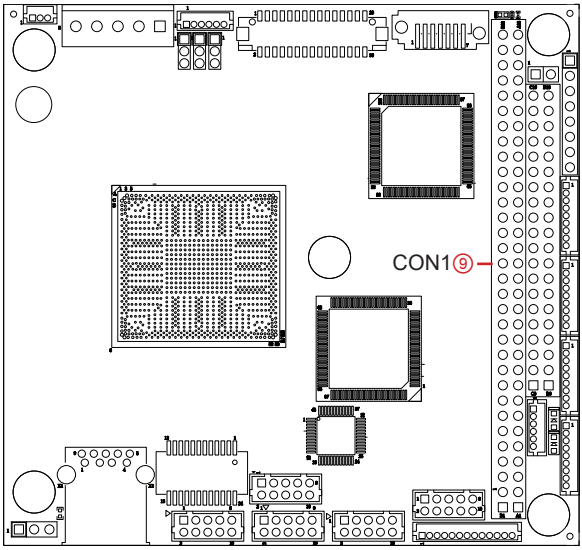
Description: PC/104 interface

Connector Type:



The pin assignments conform to the industry standard.

Board Top



COM1~2

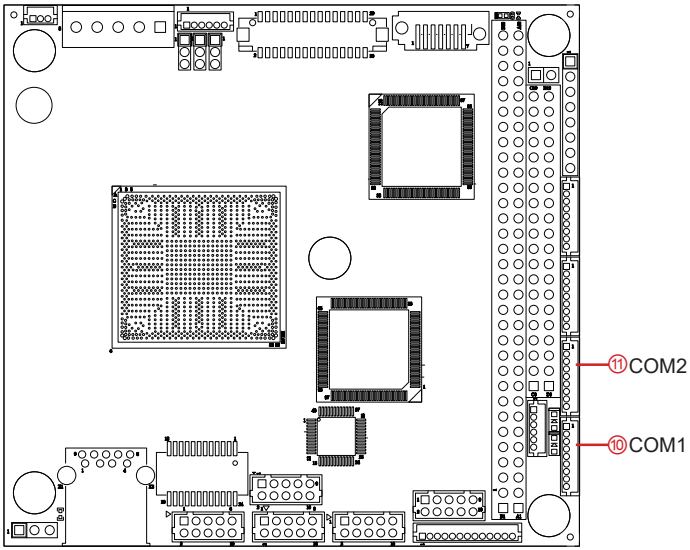
Description: RS-232/422/485 Serial Ports

Connector Type: 1x9-pin ACES 1.25mm 86801-09 4-wall connector

Setting:

	RS-232	RS-422	RS-485
Pin	**Desc.**	**Desc.**	**Desc.**
1	DCD#	TX-	D-
2	DSR#		
3	RX	TX+	D+
4	RTS#		
5	TX	RX+	
6	CTS#		
7	DTR#	RX-	
8	RI#		
9	GND		

Board Top



COM3~4

Description: RS232-interfaced serial port

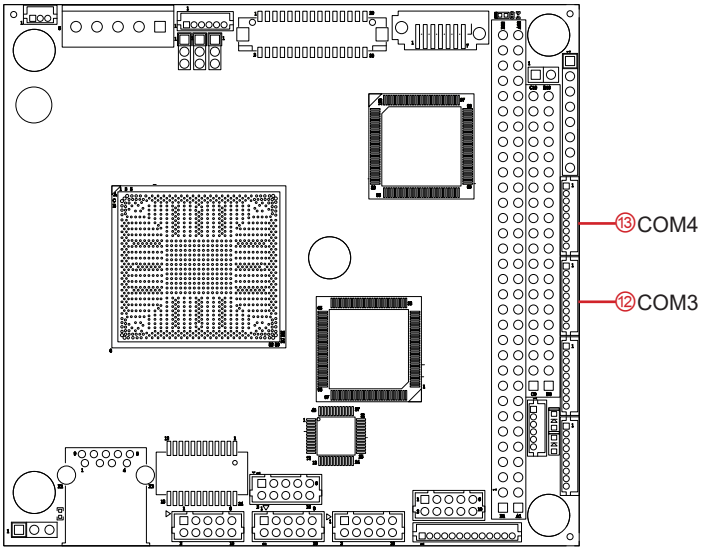
Connector Type: 2.00mm pitch 2x5-pin header

Setting:

RS-232

Pin	Desc.
1	DCD#
2	DSR#
3	RX
4	RTS#
5	TX
6	CTS#
7	DTR#
8	RI#
9	GND

Board Top



JFRT1

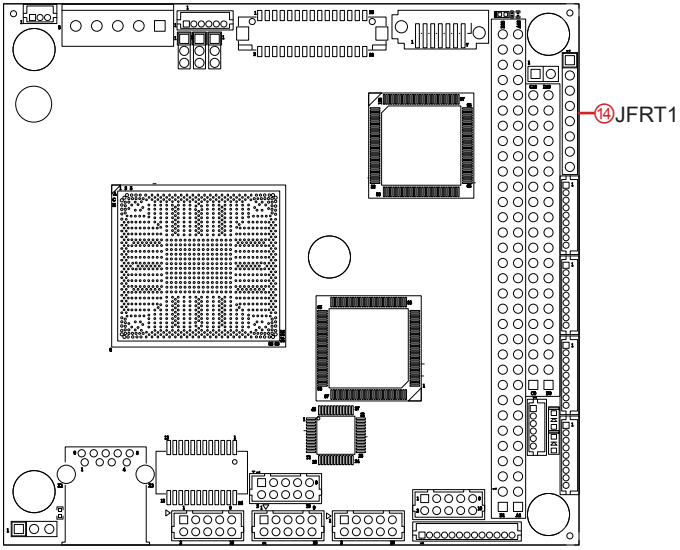
Description: Connector for reset, power LED, HDD LED and speaker

Connector Type: 2.54mm pitch 1x8-pin header

Setting:

Pin	Description
1	RESET
2	GND
3	PWR LED+
4	GND
5	HDD LED+
6	HDD LED-
7	SPKOUT+
8	SPKOUT-

Board Top



SATA1

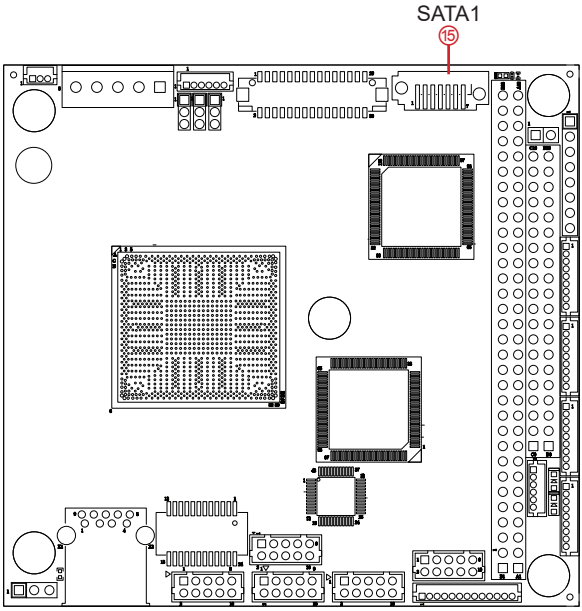
Description: Serial ATA connector

Connector Type: High speed transfer rates (300MB/s).

Setting:

Pin	Description
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND

Board Top



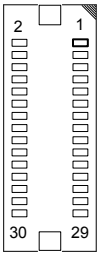
LVDS1

Description: Connector for LCD panel.

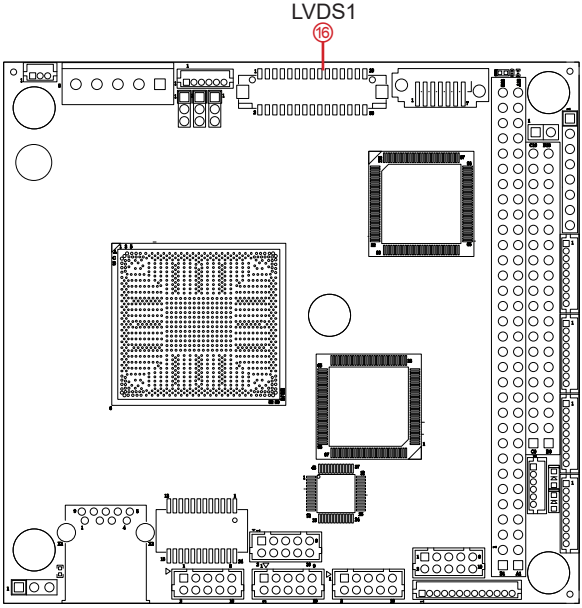
Connector Type: DF-13-30DP-1.25V connector

Setting:

Pin	Description	Pin	Description
2	VDD	1	VDD
4	TX2CLK+	3	TX1CLK+
6	TX2CLK-	5	TX1CLK-
8	GND	7	GND
10	TX2_D0+	9	TX1_D0+
12	TX2_D0-	11	TX1D0-
14	GND	13	GND
16	TX2_D1+	15	TX1D1+
18	TX2_D1-	17	TX1D1-
20	GND	19	GND
22	TX2D2+	21	TX1D2+
24	TX2D2-	23	TX1D2-
26	GND	25	GND
28	TX2D3+	27	TX1D3+
30	TX2D3-	29	TX1D3-



Board Top



INV1

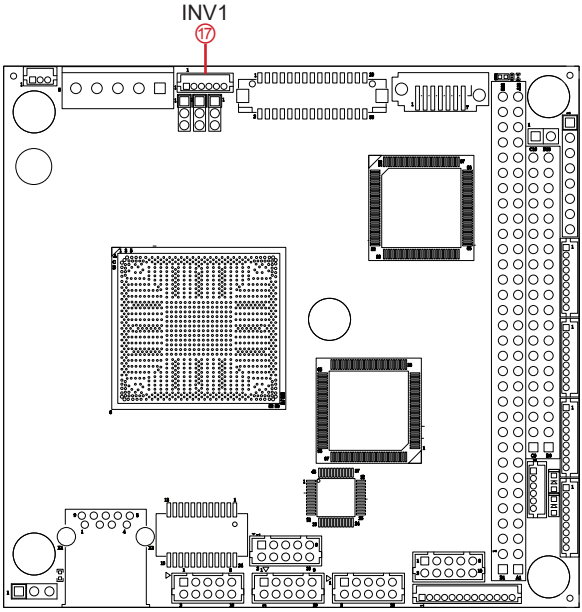
Description: LCD Inverter Connector

Connector Type: 1x6-pin CVILUX 1.25mm CI4406P1V00- LF 4-wall connector

Setting:

Pin	Description
1	INV_VCC
2	INV_VCC
3	BKLT_EN
4	BKLT_CTRL
5	GND
6	GND

Board Top



PWR1

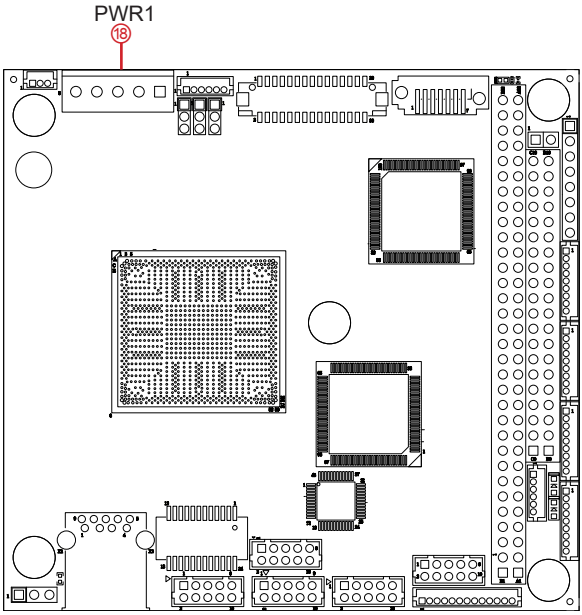
Description: 12V/5V power input

Connector Type: 1x5-pin terminal

Setting:

Pin	Description
1	VCC 12V
2	GND
3	GND
4	VCC 5V
5	VCC 5V

Board Top



FAN1

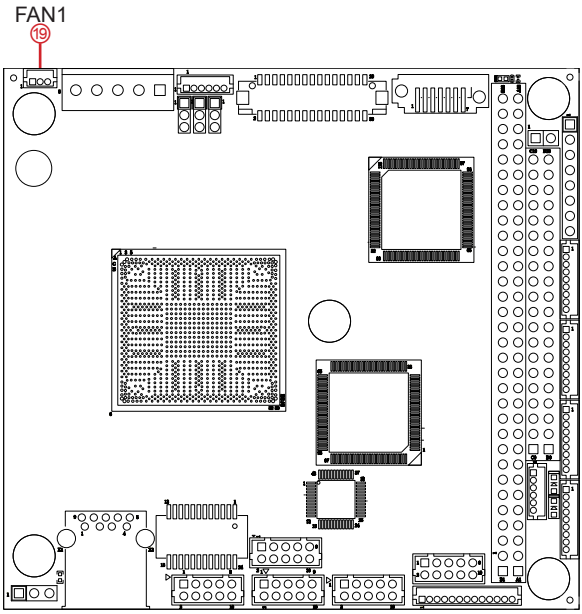
Description: FAN Connector

Connector Type: 1.25mm pitch 1x3-pin wafer connector

Setting:

Pin	Description
1	GND
2	5V
3	N/C

Board Top



CON3

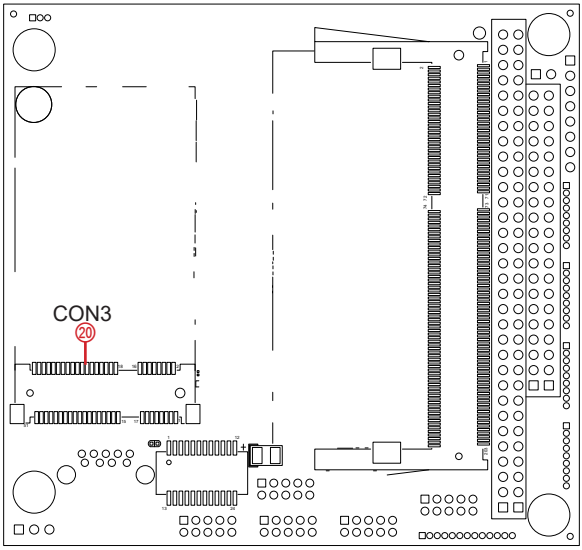
Description: mSATA Full-Size Socket

Connector Type: 52-pin mSATA Full-Size Socket

Setting:

The pin assignments conform to the industry standard.
(Socket shared and BIOS selectable with Mini-card)
As for configuration, please refer to Mini PCI Express Support in
3.2.2. On Board Device Support on page 35

Board Bottom



2.4. Driver Installation Notes

To install the drivers, please go to our website at www.arbor-technology.com and download the driver pack from the product page. Then extract the downloaded file and follow the sequence below to install the drivers:

Chipset → Graphic → Audio → Other drivers

Chapter 3

BIOS

The BIOS Setup utility is to configure the system settings stored in the system's BIOS ROM. BIOS is activated once the computer powers on.

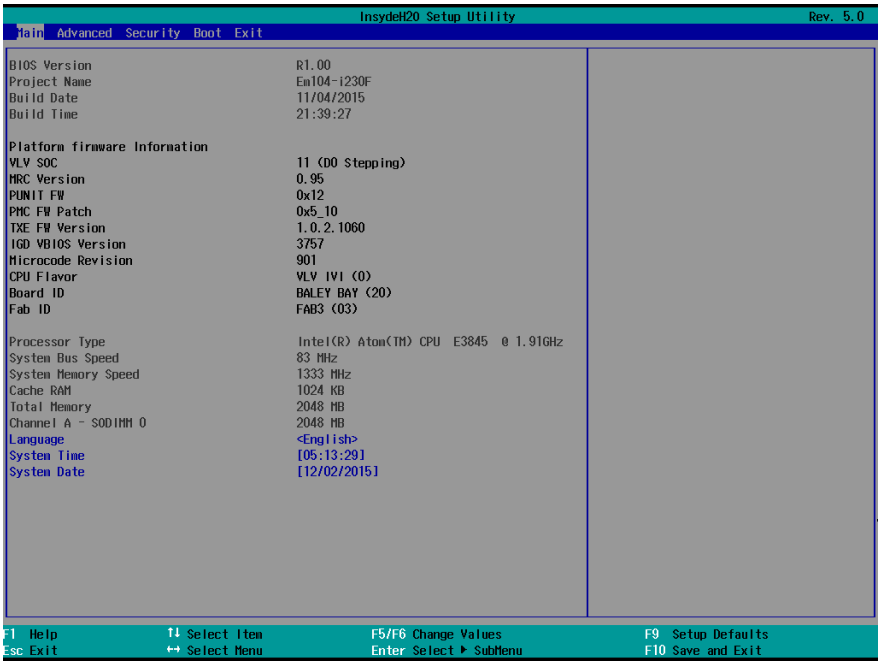
After entering the utility, use the left/right arrow keys to navigate between the top menus and use the down arrow key to access one.

Menu	Description
Main	See 3.1. Main on page 33.
Advanced	See 3.2. Advanced on page 34.
Security	See 3.3. Security on page 39.
Boot	See 3.4. Boot on page 40.
Exit	See 3.5. Exit on page 42.

NOTE: For system stability and performance, this BIOS utility is constantly improved. The screenshots demonstrated and descriptions hereinafter are for reference only and may not exactly meet what is presented onscreen.

3.1. Main

The **Main** menu displays some BIOS info and features the settings of **System Date** and **System Time**.



The BIOS info displayed is:

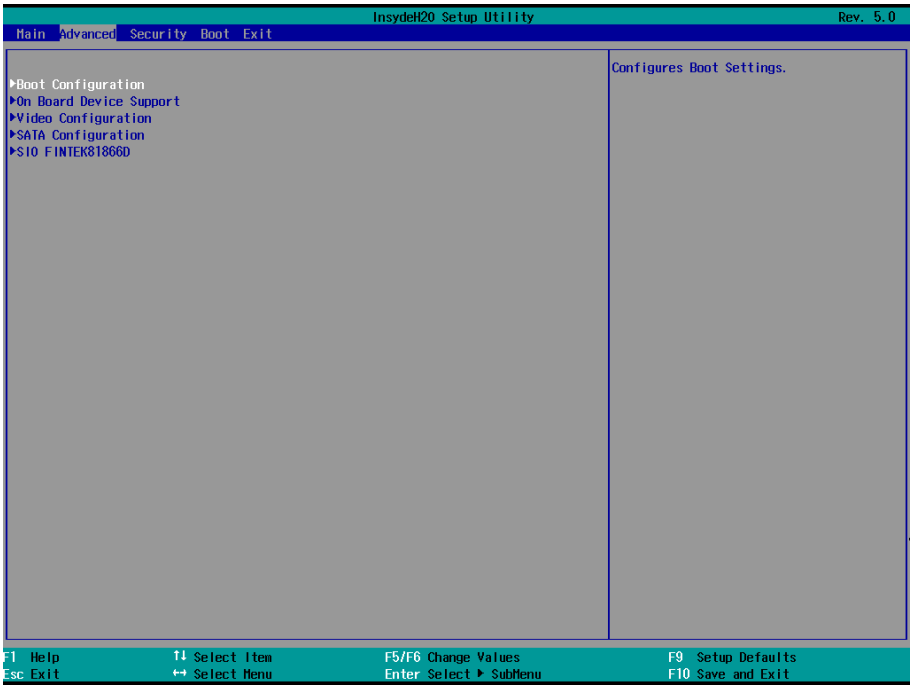
Info Item	Description
BIOS Version	Delivers the computer's BIOS version.
Project name	Delivers the name of the project
Build Date and Time	Delivers the date and time when the BIOS Setup utility was created/ updated.
Platform firmware Information	Delivers the Platform firmware Information

The featured settings are:

Setting	Description
Language	Select the current default language used by the InsydeH20
System Time	Sets system time.
System Date	Sets system date.

3.2. Advanced

The **Advanced** menu controls the system's CPU, IDE, Super IO, AHCI and USB. It also helps users monitor hardware health.



The featured submenus are:

Submenu	Description
Boot Configuration	See 3.2.1. Boot Configuration on page 35.
On Board Device Support	See 3.2.2. On Board Device Support on page 35
Video Configuration	See 3.2.3. Video Configuration on page 36.
SATA Configuration	See 3.2.4. SATA Configuration on page 37.
SIO FINTEK81866D	See 3.2.5. SIO FINTEK81866D on page 38.

3.2.1. Boot Configuration

Setting	Description
Numlock	Select Power-on state for Num lock

3.2.2. On Board Device Support

Configures On-board devices by the following settings:

Setting	Description
RTL8111E Gigabit Ethernet Controller 1/2	Enables/Disables On Board LAN Configuration
Mini PCI Express Support	▸ Mini PCI Express Support Options are: Enabled, Disabled, mSATA Enabled is the default. ▸ PCIE Port Speed Options are: Auto, Gen 1, Gen 2 Auto is the default. ▸ PCIE Port ASPM Options are: Disable : disables ASPM L0s : force all links to L0s state L1 : force all links to L1 state L0sL1 : force all links to L0s+L1 state Auto : BIOS auto configure

3.2.3. Video Configuration

Configure video settings

The featured setting is:

3.2.3.1 Video Configuration

Setting	Description
Logo & SCU Resolution	Set Logo & SCU Resolution. Options are Auto/640 x480/800 x 600/1024 x 768

3.2.3.2 VBT Hook Configuration

Setting	Description
Configure CRT as	Set the option of CRT. Options are CRT / No Device
CRT EDID Support	Enables/disables CRT EDID Support.
Configure DDI1 as	Set the option of DDI1. Options are eDP / No Device.
VBIOS eDP Panel Number as	Set the option of VBIOS eDP Panel Number. Options are 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16.
LFP EDID Support	Enables/disables LFP EDID Support.
EFP EDID Support	Enables/disables EFP EDID Support.

3.2.3.3 PTN3460 (eDP to LVDS) Configuration

Setting	Description
PTN3460 Output Format	Set the Output Format of PTN3460. Options are (01) JEIDA (24bpp) / (10) VESA and JEIDA (18bpp) / (11) reserved
PTN3460 Channel Control	Set the PTN3460 channel. Options are Single / Double.
PTN3460 EDID Table	Set the EDID Table of PTN3460.

3.2.3.4 GOP Configuration

Setting	Description
GOP Brightness Level	Set the Brightness Level of GOP. 80 is the default.
GOP Driver	Enables/Disables GOP Driver

3.2.4. SATA Configuration

Select this submenu to configure the SATA controller and HD.

Setting	Description
SATA Controller	Enables/disables the present SATA controller. ▸ **Enabled** is the default.
Configures SATA Mode	Configures how to sun the SATA drives. ▸ Options available are **AHCI** (default) and **IDE**.
SATA Port 0 Hot Plug Capability	Enables/disables hot-pluggable feature for the SATA port. ▸ **Enabled** is the default.
SATA Port 1 Hot Plug Capability	
SATA Port 0 Connect to an ODD	Enables/disables the SATA port connect to an ODD If enabled, when you connect an ODD to a SATA port. The software auto detection for media insert and tray will be enabled. ▸ **Disabled** is the default.
SATA Port 1 Connect to an ODD	
Serial ATA Port 0	Delivers the SATA port Media information and Security Mode.
Serial ATA Port 1	

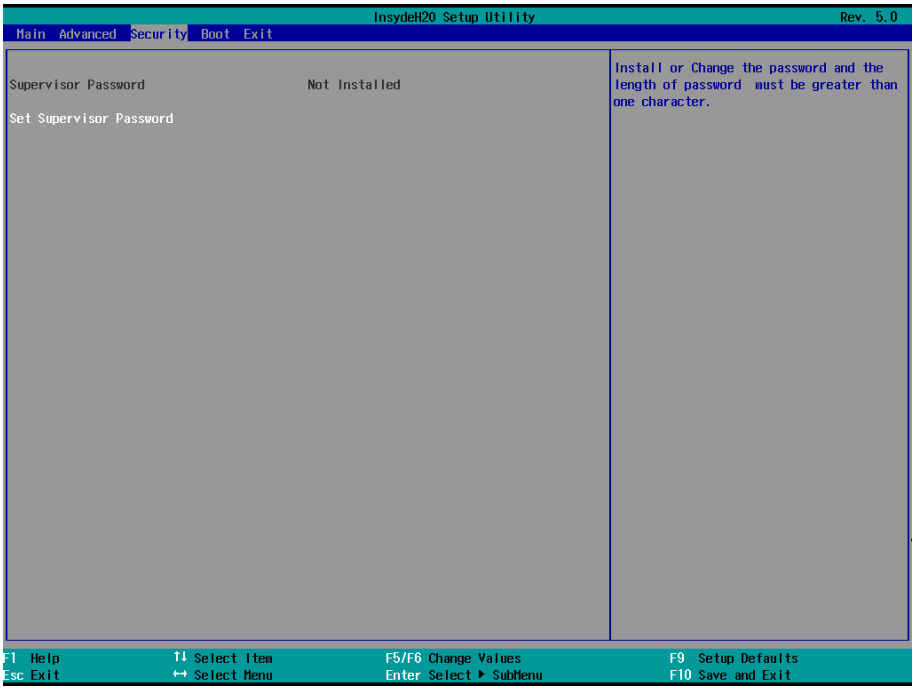
3.2.5. SIO FINTEK81866D

Configures SIO by the following settings:

Setting	Description
Voltage	Display the voltage info
Thermal	Display thermal info CPU Temperature SYSTEM Temperature
Power Loss mode	Set the state of Power Loss mode Options are Always On(default)/Always Off
Serial Port A/B	▸ Serial Port A/B Enables/disables the Serial port. ▸ Com Port Type Setup the Com Port Type of the Serial Port. Options are RS232, R422 Without Termination resistor, RS485 Without Termination resistor, R422 With Termination resistor, RS485 With Termination resistor. ▸ RS-485 AUTO Flow Control Enables/disables the Serial port RS-485 Auto Flow control. ▸ Base I/O Address Setup the Base I/O Address of the Serial Port. ▸ Interrupt Setup the Interrupt of the Serial Port
Serial Port C/D	▸ Serial Port C/D Enables/disables the Serial port. ▸ Base I/O Address Setup the Base I/O Address of the Serial Port. ▸ Interrupt Setup the Interrupt of the Serial Port

3.3. Security

The **Security** menu sets up the password for the system's administrator account. Once the administrator password is set up, this BIOS Setup utility is limited to access and will ask for the password each time any access is attempted.

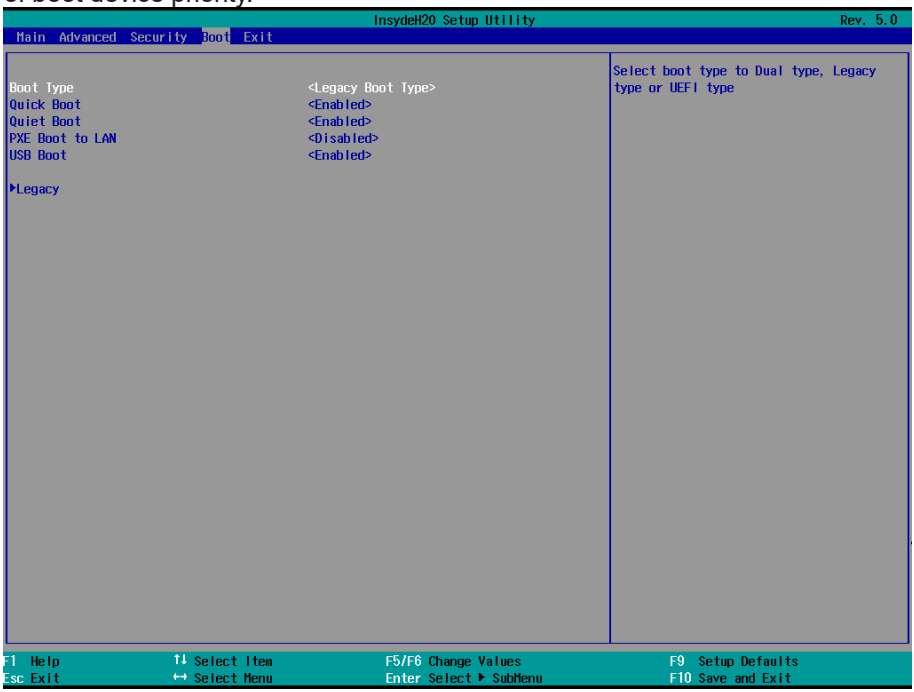


The featured setting is:

Setting	Description
Set Supervisor Password	To set up an administrator password: 1. Select **Set Supervisor Password**. An **Create New Password** dialog then pops up onscreen. 2. Enter your desired password that is no less than 3 characters and no more than 20 characters. 3. Hit [Enter] key to submit.

3.4. Boot

The **Boot** menu configures how to boot up the system such as the configuration of boot device priority.



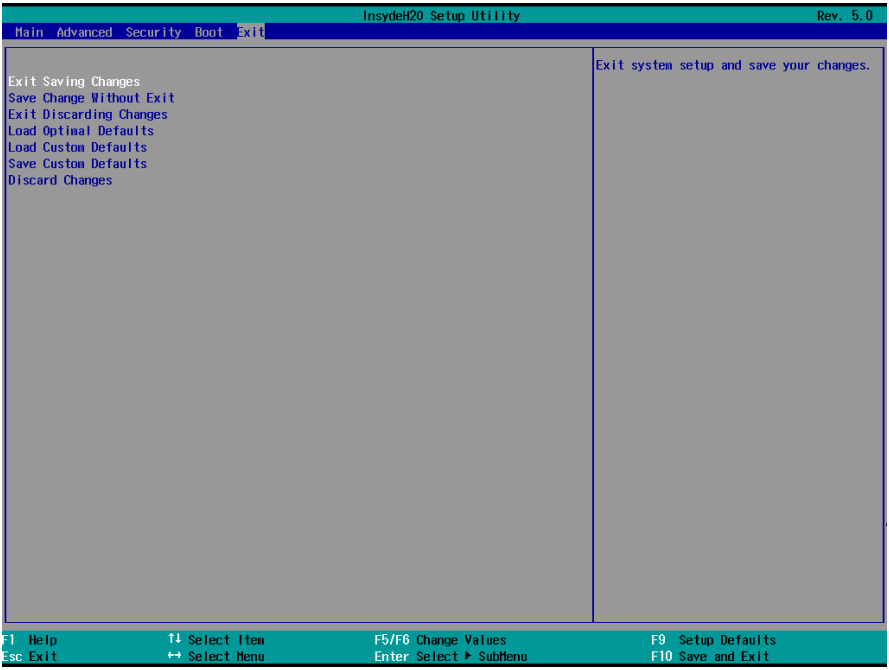
The featured settings are:

Setting	Description
Boot Type	Set the boot type. Options are Legacy Boot Type , UEFI Type.
Quick Boot	Allow InsydeH20 to Skip certain tests while booting . This will descrese the time need to boot the system.
Quiet Boot	Disables or enables booting in text mode.
PXE boot to LAN	Disables or enables PXE boot to LAN.
USB Boot	Disable or enable booting to USB boot devices.

Legacy	**Boot Device Priority** **Normal Boot Menu** Select Normal boot option priority or Advance boot option Priority. **Boot type order** Change boot type order **Hard Disk Drive** Change CD/DVD-ROM Drive Boot order

3.5. Exit

The **Save & Exit** menu features a handful of commands to launch actions from the BIOS Setup utility regarding saving changes, quitting the utility and recovering defaults.



The features settings are:

Setting	Description
Exit Saving Changes	Saves the changes and quits the BIOS Setup utility.
Save Changes Without Exit	Save Changes but does not quit the BIOS.
Exit Discard Changes	Quits the BIOS Setup utility without saving the change(s).
Load Optimal Defaults	Restores all settings to defaults. ▶ This is a command to launch an action from the BIOS Setup utility rather than a setting.
Load Custom Default	Load custome default values
Save Custom Default	Save current setting as custome default
Discard Changes	Discard all changes without Exit.

Appendices

Appendix A. I/O Port Address Map

Each peripheral device in the system is assigned a set of I/O port addresses which also becomes the identity of the device. The following table lists the I/O port addresses used.

Address	Device Description
0x000003F8-0x000003FF	Communications Port (COM1)
0x000002F8-0x000002FF	Communications Port (COM2)
0x000003E8-0x000003EF	Communications Port (COM3)
0x000002E8-0x000002EF	Communications Port (COM4)
0x00003050-0x00003057	Intel(R) Atom(TM) Processor E3800 Series/Intel(R) Celeron(R) Processor N2920/J1900
0x000003B0-0x000003BB	Intel(R) Atom(TM) Processor E3800 Series/Intel(R) Celeron(R) Processor N2920/J1900
0x000003C0-0x000003DF	Intel(R) Atom(TM) Processor E3800 Series/Intel(R) Celeron(R) Processor N2920/J1900
0x00003048-0x0000304F	Intel(R) Atom(TM)/Celeron(R)/Pentium(R) Processor AHCI - 0F23
0x0000305C-0x0000305F	Intel(R) Atom(TM)/Celeron(R)/Pentium(R) Processor AHCI - 0F23
0x00003040-0x00003047	Intel(R) Atom(TM)/Celeron(R)/Pentium(R) Processor AHCI - 0F23
0x00003058-0x0000305B	Intel(R) Atom(TM)/Celeron(R)/Pentium(R) Processor AHCI - 0F23
0x00003020-0x0000303F	Intel(R) Atom(TM)/Celeron(R)/Pentium(R) Processor AHCI - 0F23
0x00002000-0x000020FF	Intel(R) Atom(TM)/Celeron(R)/Pentium(R) Processor PCI Express - Root Port 2 - 0F4A
0x00001000-0x000010FF	Intel(R) Atom(TM)/Celeron(R)/Pentium(R) Processor PCI Express - Root Port 3 - 0F4C
0x00003000-0x0000301F	Intel(R) Atom(TM)/Celeron(R)/Pentium(R) Processor Platform Control Unit - SMBus Port - 0F12
0x00000060-0x00000060	Microsoft PS/2 Mouse
0x00000064-0x00000064	Microsoft PS/2 Mouse
0x00000070-0x00000077	Motherboard resources
0x0000002E-0x0000002F	Motherboard resources
0x0000004E-0x0000004F	Motherboard resources
0x00000061-0x00000061	Motherboard resources
0x00000063-0x00000063	Motherboard resources
0x00000065-0x00000065	Motherboard resources
0x00000067-0x00000067	Motherboard resources

Address	Device Description
0x00000080-0x0000008F	Motherboard resources
0x00000092-0x00000092	Motherboard resources
0x000000B2-0x000000B3	Motherboard resources
0x00000680-0x0000069F	Motherboard resources
0x00000000-0x0000006F	PCI bus
0x00000078-0x00000CF7	PCI bus
0x00000D00-0x0000FFFF	PCI bus
0x00000020-0x00000021	Programmable interrupt controller
0x00000024-0x00000025	Programmable interrupt controller
0x00000028-0x00000029	Programmable interrupt controller
0x0000002C-0x0000002D	Programmable interrupt controller
0x00000030-0x00000031	Programmable interrupt controller
0x00000034-0x00000035	Programmable interrupt controller
0x00000038-0x00000039	Programmable interrupt controller
0x0000003C-0x0000003D	Programmable interrupt controller
0x000000A0-0x000000A1	Programmable interrupt controller
0x000000A4-0x000000A5	Programmable interrupt controller
0x000000A8-0x000000A9	Programmable interrupt controller
0x000000AC-0x000000AD	Programmable interrupt controller
0x000000B0-0x000000B1	Programmable interrupt controller
0x000000B4-0x000000B5	Programmable interrupt controller
0x000000B8-0x000000B9	Programmable interrupt controller
0x000000BC-0x000000BD	Programmable interrupt controller
0x000004D0-0x000004D1	Programmable interrupt controller
0x00002000-0x000020FF	Realtek PCIe GBE Family Controller
0x00001000-0x000010FF	Realtek PCIe GBE Family Controller #2
0x00000060-0x00000060	Standard PS/2 Keyboard
0x00000064-0x00000064	Standard PS/2 Keyboard
0x00000070-0x00000077	System CMOS/real time clock
0x00000040-0x00000043	System timer
0x00000050-0x00000053	System timer

Appendix B. Memory Address Map

Address	Device Description
0x90810000-0x90813FFF	High Definition Audio Controller
0xFED00000-0xFED003FF	High precision event timer
0xFF000000-0xFFFFFFFF	Intel(R) 82802 Firmware Hub Device
0xA0000-0xBFFFF	Intel(R) Atom(TM) Processor E3800 Series/Intel(R) Celeron(R) Processor N2920/J1900
0x80000000-0x908FFFFE	Intel(R) Atom(TM) Processor E3800 Series/Intel(R) Celeron(R) Processor N2920/J1900
0x90000000-0x903FFFFF	Intel(R) Atom(TM) Processor E3800 Series/Intel(R) Celeron(R) Processor N2920/J1900
0x90818000-0x908187FF	Intel(R) Atom(TM)/Celeron(R)/Pentium(R) Processor AHCI - 0F23
0x90500000-0x90503FFF	Intel(R) Atom(TM)/Celeron(R)/Pentium(R) Processor PCI Express - Root Port 2 - 0F4A
0x90400000-0x90403FFF	Intel(R) Atom(TM)/Celeron(R)/Pentium(R) Processor PCI Express - Root Port 3 - 0F4C
0x90815000-0x9081501F	Intel(R) Atom(TM)/Celeron(R)/Pentium(R) Processor Platform Control Unit - SMBus Port - 0F12
0x90700000-0x907FFFFF	Intel(R) Atom(TM)/Celeron(R)/Pentium(R) Processor Trusted Execution Engine Interface - 0F18
0x90600000-0x906FFFFF	Intel(R) Atom(TM)/Celeron(R)/Pentium(R) Processor Trusted Execution Engine Interface - 0F18
0x90800000-0x9080FFFF	Intel(R) USB 3.0 eXtensible Host Controller Driver OK
0xE0000000-0xEFFFFFFF	Motherboard resources
0xFED01000-0xFED01FFF	Motherboard resources
0xFED03000-0xFED03FFF	Motherboard resources
0xFED04000-0xFED04FFF	Motherboard resources
0xFED0C000-0xFED0FFFF	Motherboard resources
0xFED08000-0xFED08FFF	Motherboard resources
0xFED1C000-0xFED1CFFF	Motherboard resources
0xFEE00000-0xFEEFFFFF	Motherboard resources
0xFEF00000-0xFEFFFFFF	Motherboard resources
0xFED40000-0xFED44FFF	Motherboard resources
0xA0000-0xBFFFF	PCI Bus
0xC0000-0xDFFFF	PCI Bus
0xE0000-0xFFFFF	PCI Bus

Address	Device Description
0x80000000-0x908FFFFE	PCI Bus
0x90504000-0x90504FFF	Realtek PCIe GBE Family Controller
0x90500000-0x90503FFF	Realtek PCIe GBE Family Controller
0x90404000-0x90404FFF	Realtek PCIe GBE Family Controller #2
0x90400000-0x90403FFF	Realtek PCIe GBE Family Controller #2
0x90817000-0x90817FFF	SDA Standard Compliant SD Host Controller
0x90816000-0x90816FFF	SDA Standard Compliant SD Host Controller

Appendix C. Interrupt Request Lines (IRQ)

Peripheral devices use interrupt request lines to notify CPU for the service required. The following table shows the IRQ used by the devices on board.

Level	Function
IRQ0	System timer
IRQ1	Standard PS/2 Keyboard
IRQ3	Communications Port (COM2)
IRQ4	Communications Port (COM1)
IRQ8	High precision event timer
IRQ10	Communications Port (COM4)
IRQ11	Communications Port (COM3)
IRQ12	Microsoft PS/2 Mouse
IRQ14	Intel(R) Atom(TM)/Celeron(R)/Pentium(R) Processor Platform Control Unit - SMBus Port - 0F12
IRQ14	Intel(R) Atom(TM)/Celeron(R)/Pentium(R) Processor Trusted Execution Engine Interface - 0F18
IRQ16	Intel(R) Atom(TM)/Celeron(R)/Pentium(R) Processor PCI Express - Root Port 1 - 0F48
IRQ17	Intel(R) Atom(TM)/Celeron(R)/Pentium(R) Processor PCI Express - Root Port 2 - 0F4A
IRQ18	Intel(R) Atom(TM)/Celeron(R)/Pentium(R) Processor PCI Express - Root Port 3 - 0F4C
IRQ19	PCI standard PCI-to-PCI bridge
IRQ19	Intel(R) Atom(TM)/Celeron(R)/Pentium(R) Processor AHCI - 0F23
IRQ22	High Definition Audio Controller
IRQ23	SDA Standard Compliant SD Host Controller
IRQ81~190	Microsoft ACPI-Compliant System
IRQ4294967291	Realtek PCIe GBE Family Controller #2
IRQ4294967292	Realtek PCIe GBE Family Controller
IRQ4294967293	Intel(R) USB 3.0 eXtensible Host Controller Driver OK
IRQ4294967294	Intel(R) Atom(TM) Processor E3800 Series/Intel(R) Celeron(R) Processor N2920/J1900

Appendix D: Watchdog Timer (WDT) Setting

WDT is widely used for industrial application to monitor CPU activities. The application software depends on its requirement to trigger WDT with adequate timer setting. Before WDT timeout, the functional normal system will reload the WDT. The WDT never time-out for a normal system. The WDT will not be reloaded by an abnormal system, then WDT will time-out and auto-reset the system to avoid abnormal operation.

This computer supports 255 levels watchdog timer by software programming I/O ports.

Below is an assembly program example to disable and load WDT.

Sample Codes:

```
/*----- Include Header Area -----*/
#include "math.h"
#include "stdio.h"
#include "dos.h"

#define SIO_INDEX       0x2E                /* or index = 0x4E */
#define SIO_DATA        0x2F                /* or data  = 0x4F */

/*----- routing, sub-routing -----*/
void main()
{
        outportb(SIO_INDEX, 0x87);          /* SIO - Enable */
        outportb(SIO_INDEX, 0x87);

        outportb(SIO_INDEX, 0x07);          /* LDN - WDT */
        outportb(SIO_DATA,  0x07);

        outportb(SIO_INDEX, 0x30);          /* WDT - Enable */
        outportb(SIO_DATA,  0x01);

        outportb(SIO_INDEX, 0xF6);          /* WDT - Timeout Value : 5sec */
        outportb(SIO_DATA,  0x05);

        outportb(SIO_INDEX, 0xFA);          /* WDOUT - Enable */
        outportb(SIO_DATA,  0x01);

        outportb(SIO_INDEX, 0xF5);          /* WDT - Configuration */
        outportb(SIO_DATA,  0x31);

        outportb(SIO_INDEX, 0xAA);          /* SIO - Disable */

}
```