EMBC-1000 USER Manual

Intel® Core™ i7/i5/i3 U-series SoC (Kaby Lake/Skylake) 3.5" Single Board Computer, 2 GigE LAN, 4 USB 3.0, 5 COM, SUMIT, -40°C to 85°C Operation

Vecow

2.6.0 Edition 20240816

Record of Revision

Version	Date	Page	Description	Remark
0.1	04/12/2016	All	Preliminary Release	
1.0	05/05/2016	All	Official Release	
1.1	05/20/2016	69-71	Update	
1.2	07/11/2016	All	Update	
1.3	07/26/2016	All	Update	
1.4	07/28/2016	10-12	Update	
1.5	05/09/2017	60	Update	
1.6	07/19/2017	36-37	Update	
1.7	09/15/2017	32	Update	
1.8	10/02/2017	30-31	Update	
1.9	01/18/2018	13	Update	
2.0	12/20/2018	iv, 1-12	Update	
2.1	02/14/2019	28	Update	
2.2	03/21/2019	All	Update	
2.3	03/22/2021	2, 4, 5, 7, 8, 10, 18	Update	
2.4	05/25/2022	75-77	Update	
2.5	05/30/2023	15, 36, 68	Update	
2.6	08/16/2024	15, 40	Update	

Disclaimer

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Declaration of Conformity

FCC

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 it is not installed and used in accordance with the instruction manual, it 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.

CE

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

Copyright and Trademarks

Order Information

Part Number	Description
EMBC-1000-7600U	EMBC-1000 Embedded Single Board Computer, onboard Intel® Core™ i7-7600U Processor (Kaby Lake-U), 2 GbE LAN, 5 COM, 4 USB 3.0, 4 USB 2.0, 2 Mini PCIe, 16 GPIO
EMBC-1000-600U	EMBC-1000 Embedded Single Board Computer, onboard Intel® Core™ i7-6600U Processor (Skylake-U), 2 GbE LAN, 5 COM, 4 USB 3.0, 4 USB 2.0, 2 Mini PCIe, 16 GPIO
EMBC-1000-300U	EMBC-1000 Embedded Single Board Computer, onboard Intel® Core™ i5-6300U Processor (Skylake-U), 2 GbE LAN, 5 COM, 4 USB 3.0, 4 USB 2.0, 2 Mini PCIe, 16 GPIO
EMBC-1000-100U	EMBC-1000 Embedded Single Board Computer, onboard Intel® Core™ i3-6100U Processor (Skylake-U), 2 GbE LAN, 5 COM, 4 USB 3.0, 4 USB 2.0, 2 Mini PCIe, 16 GPIO
EMBC-1000-955U	EMBC-1000 Embedded Single Board Computer, onboard Intel® Celeron® 3955U Processor (Skylake-U), 2 GbE LAN, 5 COM, 4 USB 3.0, 2 USB 2.0, 2 Mini PCIe, 16 GPIO
EMBC-1000E-600U	EMBC-1000 Embedded Single Board Computer, onboard Intel® Core™ i7-6600U Processor (Skylake-U), 2 GbE LAN, 5 COM, 4 USB 3.0, SUMIT, 2 Mini PCIe, 16 GPIO

Optional Accessories

Part Number	Description
61-1301009-0DA	COM Port Cable
61-13B0707-386	SATA Data Cable
61-13P0430-08A	SATA Power Cable
61-193102U-156	USB 2.0 Cable
61-13T10LM-3CG	Audio Cable
61-13S33KM-3CG	KB/MS Cable
62-A110100-011	Heat Sink
62-A210100-011	Heat Spreader

Table of Contents

1

GENERAL INTRODUCTION

1.1 Overview

EMBC-1000 Series 3.5” Embedded Single Board Computer is an all-in-one, compact, versatile and high performance embedded engine in the market. With Intel® Core™ i7/i5/i3 U-series processor (Kaby Lake-U/Skylake-U), dual channel DDR4 2400/2133 MHz up to 32GB memory, EMBC-1000 serves up to 10% CPU performance enhanced than the former generation Intel® SoC solution with lower CPU power consumption; Advanced Intel® HD Graphics 620/520 graphics engine supports DirectX 12, OpenGL 4.4 and OpenCL 2.0 API, onboard DVI-D, DisplayPort and dual channel 24-bit LVDS display interface support up to ultra HD 4K resolution, EMBC-1000 offers up to 34% improved graphics performance than the former generation.

Multiple Gen 3 PCIe (8GT/s), SATA III (6Gbps), USB 3.0 (5Gbps), PoE (1Gbps) LAN and flexible 3G/4G/WiFi/LTE/GPS/GPRS/UMTS wireless connections make high-speed data conveying possible. Vecow EMBC-1000 Series Embedded Single Board Computer delivers you outstanding Power-Efficient Performance for demanding workloads.

Featured with 2 independent Gigabit LANs support iAMT 11.0, 5 COM RS-232/422/485, 4 external USB 3.0, 4 USB 2.0, 2 Mini PCIe sockets, 1 SIM card socket for 3G/4G/LTE/WiFi/GPRS/UMTS, 2 SATA III, 16 GPIO, onboard SUMIT A, B connection, 9V to 36V wide range power input, fanless -40°C to 85°C operating temperature, smart manageability features, all-in-one and cable-less designs, Vecow EMBC-1000 Series Embedded Single Board Computer integrates outstanding performance, remarkable power productivity, smart manageability, mobile availability, industrial-grade reliability and all-in-one compact solution for low-profile high-performance embedded applications.

Vecow EMBC-1000 Series Embedded Single Board Computer delivers outstanding performance, compact integrated functions, smart manageability, mobile availability, trusted reliability and flexible expansion features for your Healthcare Service, Smart Automation, Point-Of-Information (POI), Self-Services, In-vehicle Infotainment, Industry 4.0 and any compact high-performance Internet of Thing (IoT) applications.

1.2 Features

- Intel® Core™ i7/i5/i3 U-series SoC (Kaby Lake-U/Skylake-U), up to 3 independent Full HD displays
- DDR4 2400/2133 MHz memory, up to 32GB
- Onboard DisplayPort, DVI and dual channel 24-bit LVDS display interface
- Dual Independent Gigabit LAN supports iAMT 11.0
- 2 Mini PCIe Socket for 3G/4G/LTE/WiFi/GPRS/UMTS
- 4 USB 3.0, 5 COM, 16 GPIO
- Supports full function SUMIT A, B expansion
- 9V to 36V DC Power Input
- Easy to customize for low-profile system applications
- One-stop SUMIT Expansion Design and Manufacturing Services

1.3 Product Specification

1.3.1 Specifications of EMBC-1000-7600U

System	
Processor	Intel® Core™ i7-7600U Processor (Kaby Lake-U, up to 4M Cache, 3.9GHz)
Chipset	Intel® SoC (Kaby Lake)
BIOS	AMI
SIO	IT8786E
Memory	1 DDR4 2400/2133 MHz SO-DIMM, up to 32GB
Graphics	
Graphics Processor	Intel® HD Graphics 620
Interface	• DVI-D : Up to 1920 x 1080 • DisplayPort : Up to 3840 x 2160 • LVDS : Dual Channel 24-bit, up to 1920 x 1200
Ethernet	
LAN 1	Intel® I219LM Gigabit LAN supports iAMT 11.0
LAN 2	Intel® I210 Gigabit LAN
Audio	
Audio Codec	Realtek ALC888S-VD, 7.1 Channel HD Audio
Audio Interface	1 Line-in, 1 Line-out, 1 Mic-in

I/O Interface	
Front I/O	• 1 DVI-D Connector • 1 DisplayPort Connector • 4 USB 3.0 Connector • 2 RJ45 Connector • 1 COM RS-232/422/485 DB9 Connector
Internal I/O	• 1 ATX 4-pin Power Connector • 4 COM RS-232/422/485 Connector • 2 Mini PCIe Connector • 1 SIM Card Socket • 1 DDR4 SO-DIMM Socket • 1 LVDS Backlight Connector • 2 SATA Connector • 1 SATA Power Connector • 2 USB 2.0 Connector for 4 USB Port • 1 GPIO Connector • 1 Fan Connector
Storage	
SATA	2 SATA III (6Gbps)
mSATA	1 SATA III (Mini PCIe Type, 6Gbps)
Expansion	
Mini PCIe	2 Mini PCIe Socket : • 1 Mini PCIe for PCIe/USB/SIM Card • 1 Mini PCIe for PCIe/USB/Optional mSATA
SUMIT (Optional)	• 1 SUMIT Connector A (Internal) • 1 SUMIT Connector B (Internal)
Power	
Power Input	9V to 36V, DC-in
Power Interface	ATX Power Connector
Others	
Watchdog Timer	Reset : 1 to 255 sec./min. per step
Smart Management	Wake on LAN, PXE supported
HW Monitor	Monitoring temperature, voltages. Auto throttling control when CPU overheats.
Software Support	
Microsoft	Windows 10, Windows 8.1, Windows 7
Linux	Fedora 19, Ubuntu 10.04 LTS, or Linux Kernel 3.0 above
Mechanical	
Dimension (W x H)	146mm x 102mm (5.75” x 4.02”)
Environment	
Operating Temperature	-40°C to 85°C (-40°F to 185°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% Humidity, non-condensing
Relative Humidity	95% at 85°C
EMC	CE, FCC

1.3.2 Specifications of EMBC-1000-600U

System	
Processor	Intel® Core™ i7-6600U Processor (Skylake-U, up to 4M Cache, 3.4GHz)
Chipset	Intel® SoC (Skylake)
BIOS	AMI
SIO	IT8786E
Memory	1 DDR4 2400/2133 MHz SO-DIMM, up to 32GB
Graphics	
Graphics Processor	Intel® HD Graphics 520
Interface	• DVI-D : Up to 1920 x 1080 • DisplayPort : Up to 3840 x 2160 • LVDS : Dual Channel 24-bit, up to 1920 x 1200
Ethernet	
LAN 1	Intel® I219LM Gigabit LAN supports iAMT 11.0
LAN 2	Intel® I210 Gigabit LAN
Audio	
Audio Codec	Realtek ALC888S-VD, 7.1 Channel HD Audio
Audio Interface	1 Line-in, 1 Line-out, 1 Mic-in
I/O Interface	
Front I/O	• 1 DVI-D Connector • 1 DisplayPort Connector • 4 USB 3.0 Connector • 2 RJ45 Connector • 1 COM RS-232/422/485 DB9 Connector
Internal I/O	• 1 ATX 4-pin Power Connector • 4 COM RS-232/422/485 Connector • 2 Mini PCIe Connector • 1 SIM Card Socket • 1 DDR4 SO-DIMM Socket • 1 LVDS Backlight Connector • 2 SATA Connector • 1 SATA Power Connector • 2 USB 2.0 Connector for 4 USB Port • 1 GPIO Connector • 1 Fan Connector
Storage	
SATA	2 SATA III (6Gbps)
mSATA	1 SATA III (Mini PCIe Type, 6Gbps)
Expansion	
Mini PCIe	2 Mini PCIe Socket : • 1 Mini PCIe for PCIe/USB/SIM Card • 1 Mini PCIe for PCIe/USB/Optional mSATA
SUMIT (Optional)	• 1 SUMIT Connector A (Internal) • 1 SUMIT Connector B (Internal)

Power	
Power Input	9V to 36V, DC-in
Power Interface	ATX Power Connector
Others	
Watchdog Timer	Reset : 1 to 255 sec./min. per step
Smart Management	Wake on LAN, PXE supported
HW Monitor	Monitoring temperature, voltages. Auto throttling control when CPU overheats.
Software Support	
Microsoft	Windows 10, Windows 8.1, Windows 7
Linux	Fedora 19, Ubuntu 10.04 LTS, or Linux Kernel 3.0 above
Mechanical	
Dimension (W x H)	146mm x 102mm (5.75” x 4.02”)
Environment	
Operating Temperature	-40°C to 85°C (-40°F to 185°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% Humidity, non-condensing
Relative Humidity	95% at 85°C
EMC	CE, FCC

1.3.3 Specifications of EMBC-1000-300U

System	
Processor	Intel® Core™ i5-6300U Processor (Skylake-U, up to 3M Cache, 3.0GHz)
Chipset	Intel® SoC (Skylake)
BIOS	AMI
SIO	IT8786E
Memory	1 DDR4 2400/2133 MHz SO-DIMM, up to 32GB
Graphics	
Graphics Processor	Intel® HD Graphics 520
Interface	• DVI-D : Up to 1920 x 1080 • DisplayPort : Up to 3840 x 2160 • LVDS : Dual Channel 24-bit, up to 1920 x 1200
Ethernet	
LAN 1	Intel® I219LM Gigabit LAN supports iAMT 11.0
LAN 2	Intel® I210 Gigabit LAN
Audio	
Audio Codec	Realtek ALC888S-VD, 7.1 Channel HD Audio
Audio Interface	1 Line-in, 1 Line-out, 1 Mic-in

I/O Interface	
Front I/O	• 1 DVI-D Connector • 1 DisplayPort Connector • 4 USB 3.0 Connector • 2 RJ45 Connector • 1 COM RS-232/422/485 DB9 Connector
Internal I/O	• 1 ATX 4-pin Power Connector • 4 COM RS-232/422/485 Connector • 2 Mini PCIe Connector • 1 SIM Card Socket • 1 DDR4 SO-DIMM Socket • 1 LVDS Connector • 1 LVDS Backlight Connector • 2 SATA Connector • 1 SATA Power Connector • 2 USB 2.0 Connector for 4 USB Port • 1 GPIO Connector • 1 Fan Connector
Storage	
SATA	2 SATA III (6Gbps)
mSATA	1 SATA III (Mini PCIe Type, 6Gbps)
Expansion	
Mini PCIe	2 Mini PCIe Socket : • 1 Mini PCIe for PCIe/USB/SIM Card • 1 Mini PCIe for PCIe/USB/Optional mSATA
SUMIT (Optional)	• 1 SUMIT Connector A (Internal) • 1 SUMIT Connector B (Internal)
Power	
Power Input	9V to 36V, DC-in
Power Interface	ATX Power Connector
Others	
Watchdog Timer	Reset : 1 to 255 sec./min. per step
Smart Management	Wake on LAN, PXE supported
HW Monitor	Monitoring temperature, voltages. Auto throttling control when CPU overheats.
Software Support	
Microsoft	Windows 10, Windows 8.1, Windows 7
Linux	Fedora 19, Ubuntu 10.04 LTS, or Linux Kernel 3.0 above
Mechanical	
Dimension (W x H)	146mm x 102mm (5.75” x 4.02”)
Environment	
Operating Temperature	-40°C to 85°C (-40°F to 185°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% Humidity, non-condensing
Relative Humidity	95% at 85°C
EMC	CE, FCC

1.3.4 Specifications of EMBC-1000-100U

System	
Processor	Intel® Core™ i3-6100U Processor (Skylake-U, up to 3M Cache, 2.3GHz)
Chipset	Intel® SoC (Skylake)
BIOS	AMI
SIO	IT8786E
Memory	1 DDR4 2400/2133 MHz SO-DIMM, up to 32GB
Graphics	
Graphics Processor	Intel® HD Graphics 520
Interface	• DVI-D : Up to 1920 x 1080 • DisplayPort : Up to 3840 x 2160 • LVDS : Dual Channel 24-bit, up to 1920 x 1200
Ethernet	
LAN 1	Intel® I219LM Gigabit LAN supports iAMT 11.0
LAN 2	Intel® I210 Gigabit LAN
Audio	
Audio Codec	Realtek ALC888S-VD, 7.1 Channel HD Audio
I/O Interface	
Front I/O	• 1 DVI-D Connector • 1 DisplayPort Connector • 4 USB 3.0 Connector • 2 RJ45 Connector • 1 COM RS-232/422/485 DB9 Connector
Internal I/O	• 1 ATX 4-pin Power Connector • 4 COM RS-232/422/485 Connector • 2 Mini PCIe Connector • 1 SIM Card Socket • 1 DDR4 SO-DIMM Socket • 1 LVDS Connector • 1 LVDS Backlight Connector • 2 SATA Connector • 1 SATA Power Connector • 2 USB 2.0 Connector for 4 USB Port • 1 GPIO Connector • 1 Fan Connector
Storage	
SATA	2 SATA III (6Gbps)
mSATA	1 SATA III (Mini PCIe Type, 6Gbps)
Expansion	
Mini PCIe	2 Mini PCIe Socket : • 1 Mini PCIe for PCIe/USB/SIM Card • 1 Mini PCIe for PCIe/USB/Optional mSATA
SUMIT (Optional)	• 1 SUMIT Connector A (Internal) • 1 SUMIT Connector B (Internal)

Power	
Power Input	9V to 36V, DC-in
Power Interface	ATX Power Connector
Others	
Watchdog Timer	Reset : 1 to 255 sec./min. per step
Smart Management	Wake on LAN, PXE supported
HW Monitor	Monitoring temperature, voltages. Auto throttling control when CPU overheats.
Software Support	
Microsoft	Windows 10, Windows 8.1, Windows 7
Linux	Fedora 19, Ubuntu 10.04 LTS, or Linux Kernel 3.0 above
Mechanical	
Dimension (W x H)	146mm x 102mm (5.75” x 4.02”)
Environment	
Operating Temperature	-40°C to 85°C (-40°F to 185°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% Humidity, non-condensing
Relative Humidity	95% at 85°C
EMC	CE, FCC

1.3.5 Specifications of EMBC-1000-955U

System	
Processor	Intel® Celeron® 3955U Processor (Skylake-U, up to 2M Cache, 2.0GHz)
Chipset	Intel® SoC (Skylake)
BIOS	AMI
SIO	IT8786E
Memory	1 DDR4 2400/2133 MHz SO-DIMM, up to 32GB
Graphics	
Graphics Processor	Intel® HD Graphics 520
Interface	• DVI-D : Up to 1920 x 1080 • DisplayPort : Up to 3840 x 2160 • LVDS : Dual Channel 24-bit, up to 1920 x 1200
Ethernet	
LAN 1	Intel® I219LM Gigabit LAN supports iAMT 11.0
LAN 2	Intel® I210 Gigabit LAN
Audio	
Audio Codec	Realtek ALC888S-VD, 7.1 Channel HD Audio
Audio Interface	1 Line-in, 1 Line-out, 1 Mic-in

I/O Interface	
Front I/O	• 1 DVI-D Connector • 1 DisplayPort Connector • 4 USB 3.0 Connector • 2 RJ45 Connector • 1 COM RS-232/422/485 DB9 Connector
Internal I/O	• 1 ATX 4-pin Power Connector • 4 COM RS-232/422/485 Connector • 2 Mini PCIe Connector • 1 SIM Card Socket • 1 DDR4 SO-DIMM Socket • 1 LVDS Connector • 1 LVDS Backlight Connector • 2 SATA Connector • 1 SATA Power Connector • 1 USB 2.0 Connector for 2 USB Port • 1 GPIO Connector • 1 Fan Connector
Storage	
SATA	2 SATA III (6Gbps)
mSATA	1 SATA III (Mini PCIe Type, 6Gbps)
Expansion	
Mini PCIe	2 Mini PCIe Socket : • 1 Mini PCIe for PCIe/USB/SIM Card • 1 Mini PCIe for PCIe/USB/Optional mSATA
SUMIT (Optional)	• 1 SUMIT Connector A (Internal) • 1 SUMIT Connector B (Internal)
Power	
Power Input	9V to 36V, DC-in
Power Interface	ATX Power Connector
Others	
Watchdog Timer	Reset : 1 to 255 sec./min. per step
Smart Management	Wake on LAN, PXE supported
HW Monitor	Monitoring temperature, voltages. Auto throttling control when CPU overheats.
Software Support	
Microsoft	Windows 10, Windows 8.1, Windows 7
Linux	Fedora 19, Ubuntu 10.04 LTS, or Linux Kernel 3.0 above
Mechanical	
Dimension (W x H)	146mm x 102mm (5.75” x 4.02”)
Environment	
Operating Temperature	-40°C to 85°C (-40°F to 185°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% Humidity, non-condensing
Relative Humidity	95% at 85°C
EMC	CE, FCC

1.3.6 Specifications of EMBC-1000E-600U

System	
Processor	Intel® Core™ i7-6600U Processor (Skylake-U, up to 4M Cache, 3.4GHz)
Chipset	Intel® SoC (Skylake)
BIOS	AMI
SIO	IT8786E
Memory	1 DDR4 2400/2133 MHz SO-DIMM, up to 32GB
Graphics	
Graphics Processor	Intel® HD Graphics 520
Interface	• DVI-D : Up to 1920 x 1080 • DisplayPort : Up to 3840 x 2160 • LVDS : Dual Channel 24-bit, up to 1920 x 1200
Ethernet	
LAN 1	Intel® I219LM Gigabit LAN supports iAMT 11.0
LAN 2	Intel® I210 Gigabit LAN
Audio	
Audio Codec	Realtek ALC888S-VD, 7.1 Channel HD Audio
Audio Interface	1 Line-in, 1 Line-out, 1 Mic-in
I/O Interface	
Front I/O	• 1 DVI-D Connector • 1 DisplayPort Connector • 4 USB 3.0 Connector • 2 RJ45 Connector • 1 COM RS-232/422/485 DB9 Connector
Internal I/O	• 1 ATX 4-pin Power Connector • 4 COM RS-232/422/485 Connector • 2 Mini PCIe Connector • 1 SIM Card Socket • 1 DDR4 SO-DIMM Socket • 1 LVDS Connector • 1 LVDS Backlight Connector • 2 SATA Connector • 1 SATA Power Connector • 1 GPIO Connector • 1 Fan Connector
Storage	
SATA	2 SATA III (6Gbps)
mSATA	1 SATA III (Mini PCIe Type, 6Gbps)
Expansion	
Mini PCIe	2 Mini PCIe Socket : • 1 Mini PCIe for PCIe/USB/SIM Card • 1 Mini PCIe for PCIe/USB/Optional mSATA
SUMIT (Optional)	• 1 SUMIT Connector A (Internal) • 1 SUMIT Connector B (Internal)

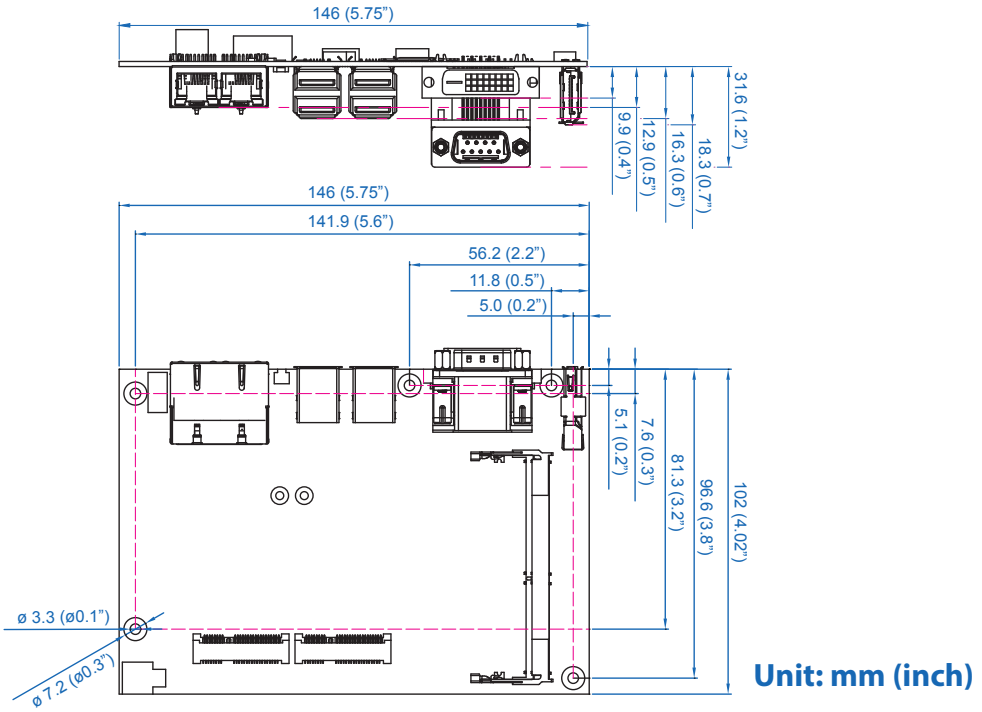
Power	
Power Input	9V to 36V, DC-in
Power Interface	ATX Power Connector
Others	
Watchdog Timer	Reset : 1 to 255 sec./min. per step
Smart Management	Wake on LAN, PXE supported
HW Monitor	Monitoring temperature, voltages. Auto throttling control when CPU overheats.
Software Support	
Microsoft	Windows 10, Windows 8.1, Windows 7
Linux	Fedora 19, Ubuntu 10.04 LTS, or Linux Kernel 3.0 above
Mechanical	
Dimension (W x H)	146mm x 102mm (5.75” x 4.02”)
Environment	
Operating Temperature	-40°C to 85°C (-40°F to 185°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% Humidity, non-condensing
Relative Humidity	95% at 85°C
EMC	CE, FCC

1.4 Supported CPU List

CPU Name	TDP	Cache	Max. Frequency	Embedded
i7-7600U	15W	4MB	Up to 3.90GHz	Yes
i7-6600U	15W	4MB	Up to 3.40GHz	Yes
i5-6300U	15W	4MB	Up to 3.00GHz	Yes
i3-6100U	15W	4MB	Up to 2.30GHz	Yes
Celeron 3955U	15W	2MB	Up to 2.00GHz	Yes

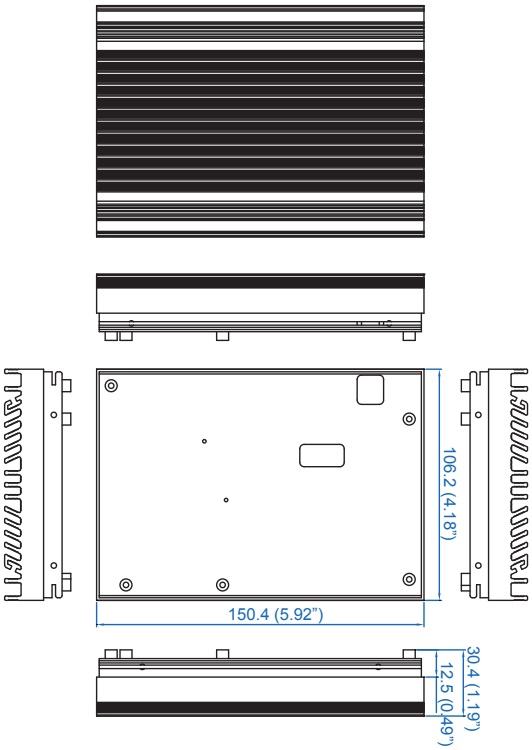
1.5 Mechanical Dimensions

1.5.1 EMBC-1000 Mechanical Drawing (Main Board)



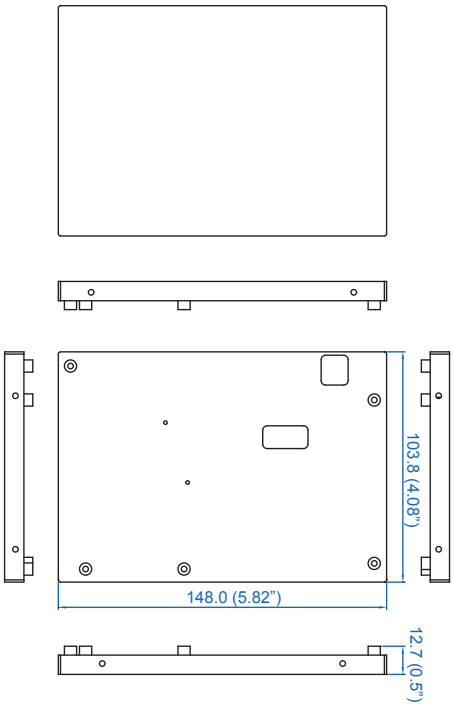
Unit: mm (inch)

1.5.2 EMBC-1000 Heat Sink Mechanical Drawing



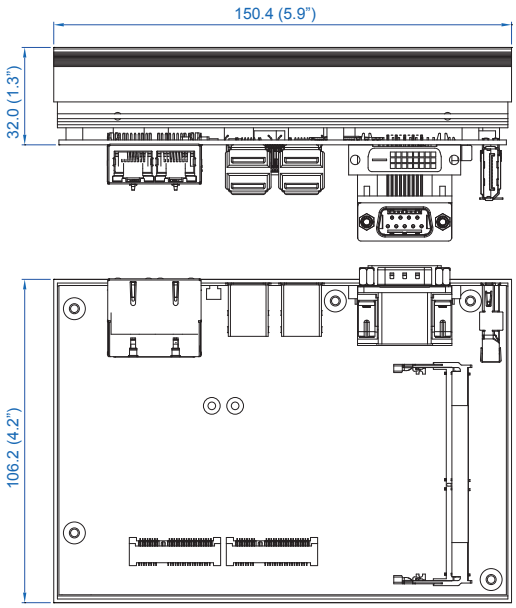
Unit: mm (inch)

1.5.3 EMBC-1000 Heat Spreader Mechanical Drawing



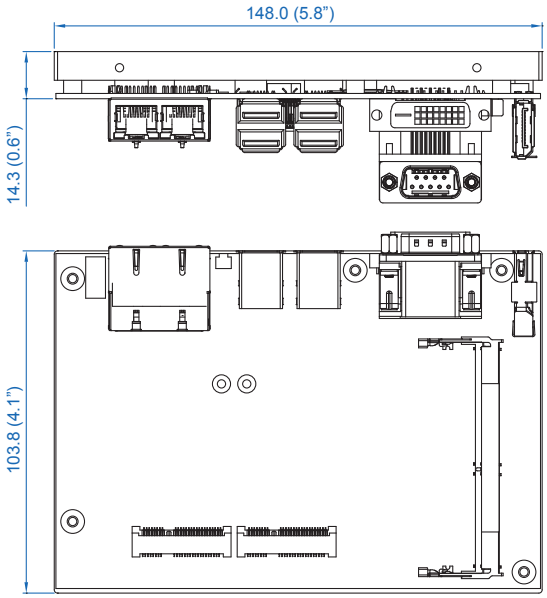
Unit: mm (inch)

1.5.4 EMBC-1000 Mechanical Drawing (Main Board + Heat Sink)



Unit: mm (inch)

1.5.5 EMBC-1000 Mechanical Drawing (Board + Heat Spreader)



Unit: mm (inch)

2

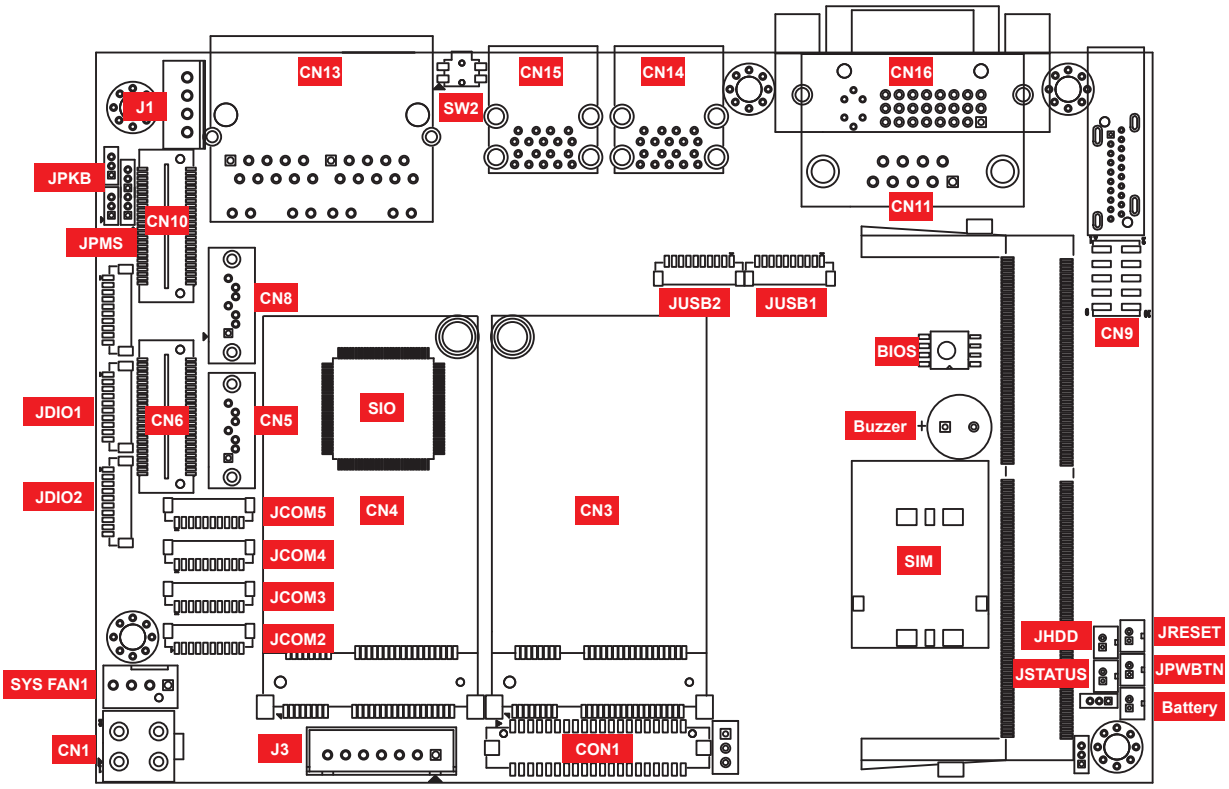
GETTING TO KNOW YOUR EMBC-1000

2.1 Packing List

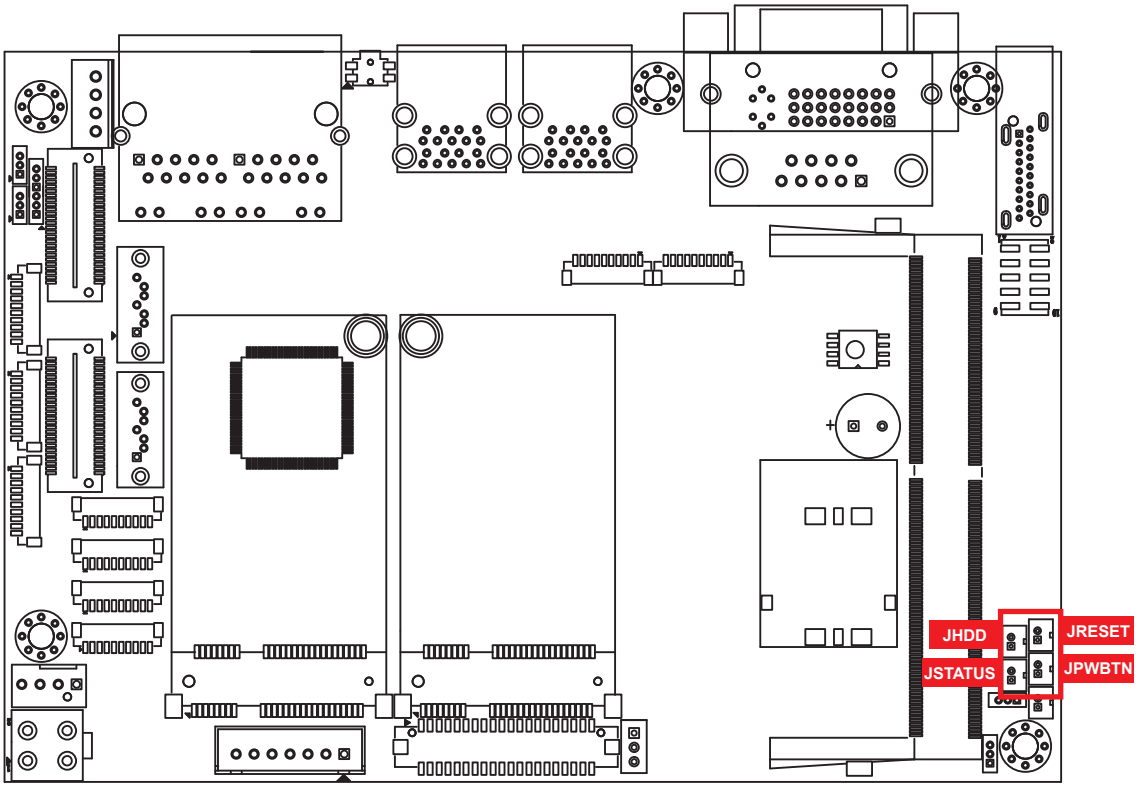
Item	Description	Qty
1	EMBC-1000 SBC	1
2	Cable Kit • COM Port Cable • COM Screw#4-40, L=5mm • SATA Data Cable • SATA Power Cable • USB 2.0 Cable • USB Screw PH-M3,L=6mm • Audio Cable • Audio Ring	 2 8 1 1 1 4 1 2

2.2 Connector/Jumper Locations

2.2.1 Top Side



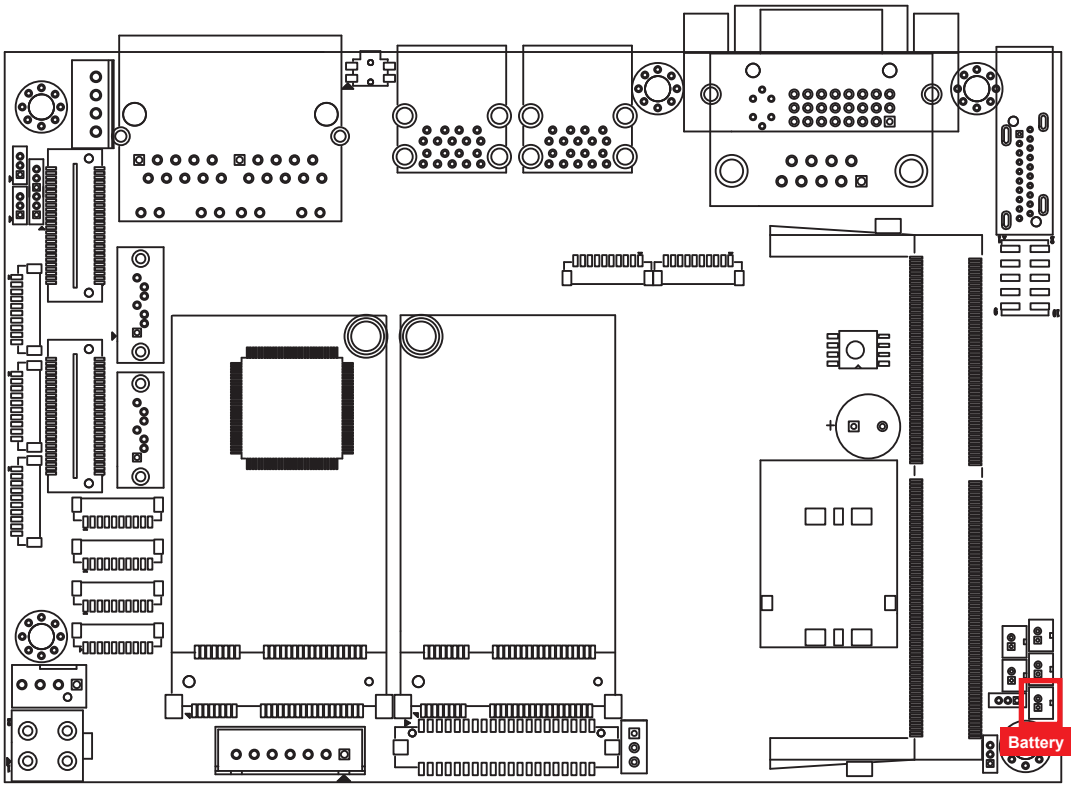
2.2.2 JPWBTN, JRESET, JSTATUS, JHDD : Miscellaneous Pin Header



These pin headers can be used as a backup for the following functions: hard drive, LED indicator, reset button, power LED indicator, and power on/off buttons, which already can be accessed by front panel and top panel. The pinouts of Miscellaneous port are listed in following table:

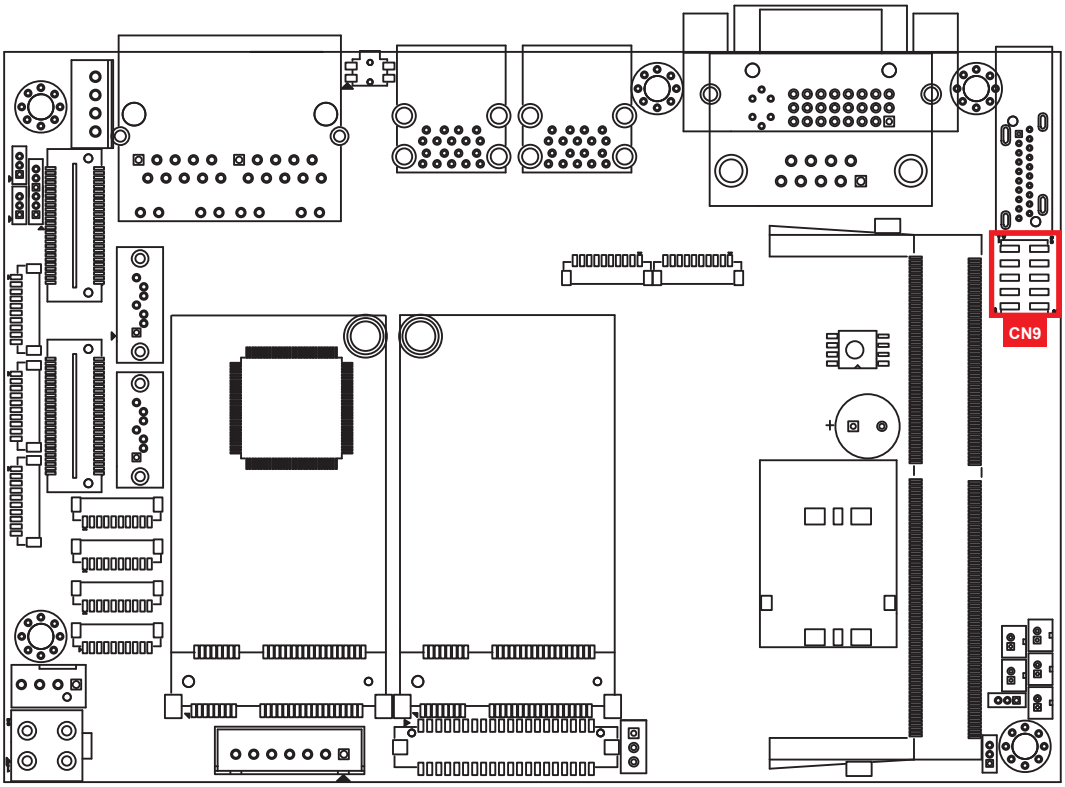
Group	Pin No.	Description
JPWBTN	1	GND
	2	FP_PWR_BTN_IN
JRESET	1	GND
	2	FP_RST_BTN_N
JSTATUS	1	PWR_LED_N
	2	PWR_LED_P
JHDD	1	HDD_LED_N
	2	HDD_LED_P

2.2.3 Battery



The EMBC-1000's real-time clock is powered by a lithium battery. It is equipped with Panasonic BR2032 190mAh lithium battery. It is recommended that you not replace the lithium battery on your own, but if the battery needs to be changed, please contact the Vecow RMA service team.

2.2.4 CN9 : Audio Connector



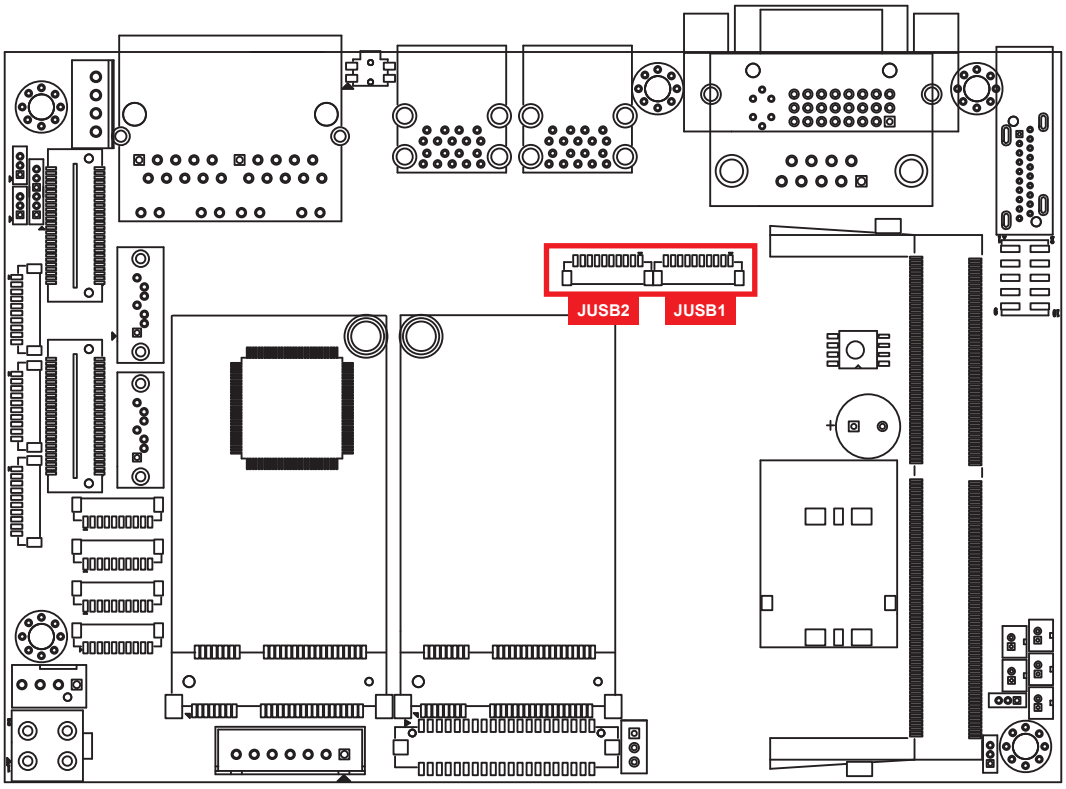
There are three audio connectors, mic-in, line-in, and line-out, in the top side of EMBC-1000. Onboard Realtek ALC888S-VD audio codec supports 7.1 channel HD audio and fully complies with Intel® High Definition Audio (Azalia) specifications.

To utilize the audio function in Windows platform, you need to install corresponding drivers for both Intel Broadwell-U chipset and Realtek ALC888S-VD codec. Please refer to Chapter 4 for more details of driver installation.

The pinouts of Audio port are listed in the following table:

Pin No.	Definition	Pin No.	Definition
1	A_z_MIC1-L	2	GND_A
3	A_z_MIC1-R	4	GND_EARTH
5	A_z_LINEO-R	6	A_z_LINEI-R
7	F_IO_SENSE	8	GND_EARTH
9	A_z_LINEO-L	10	A_z_LINEI-L

2.2.5 JUSB1, JUSB2 : Internal USB2.0 Connector



The EMBC-1000 main board provides maxima eight expansion USB ports. The USB interface supports 480 Mbps transfer rate which comply with high speed USB specification Rev. 2.0.

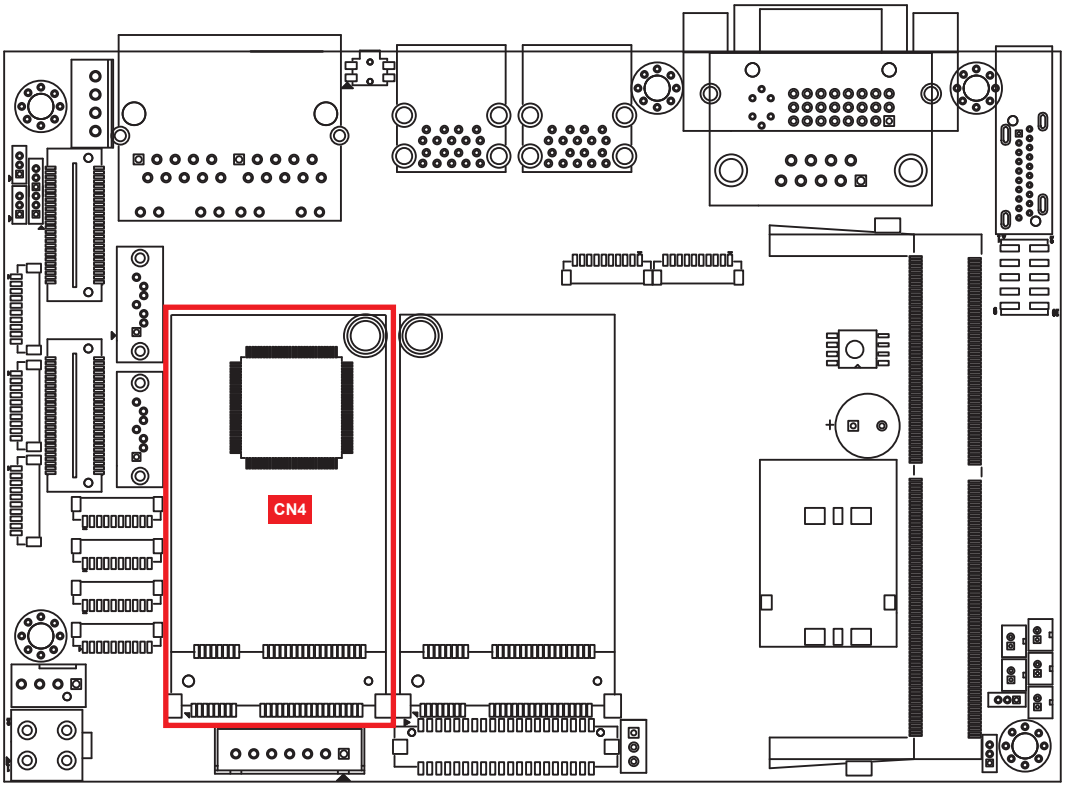
The USB interface is accessed through one 10-pin JST 1.0mm connector. You will need an adapter cable if you use a standard USB connector. The adapter cable has a 10-pin connector on one end and a USB connector on the other.

The pin assignments of JUSB1 and JUSB2 are listed in the following table:

Connector	Pin No.	Description	Pin No.	Description
JUSB1	1	USB_VCC	6	USB_D_5N
	2	USB_VCC	7	USB_D_5P
	3	USB_VCC	8	GND
	4	USB_D_4N	9	GND
	5	USB_D_4P	10	GND

Connector	Pin No.	Description	Pin No.	Description
JUSB2	1	USB_VCC	6	USB_D_7N
	2	USB_VCC	7	USB_D_7P
	3	USB_VCC	8	GND
	4	USB_D_6N	9	GND
	5	USB_D_6P	10	GND

2.2.6 CN4 : Mini PCIe, mSATA



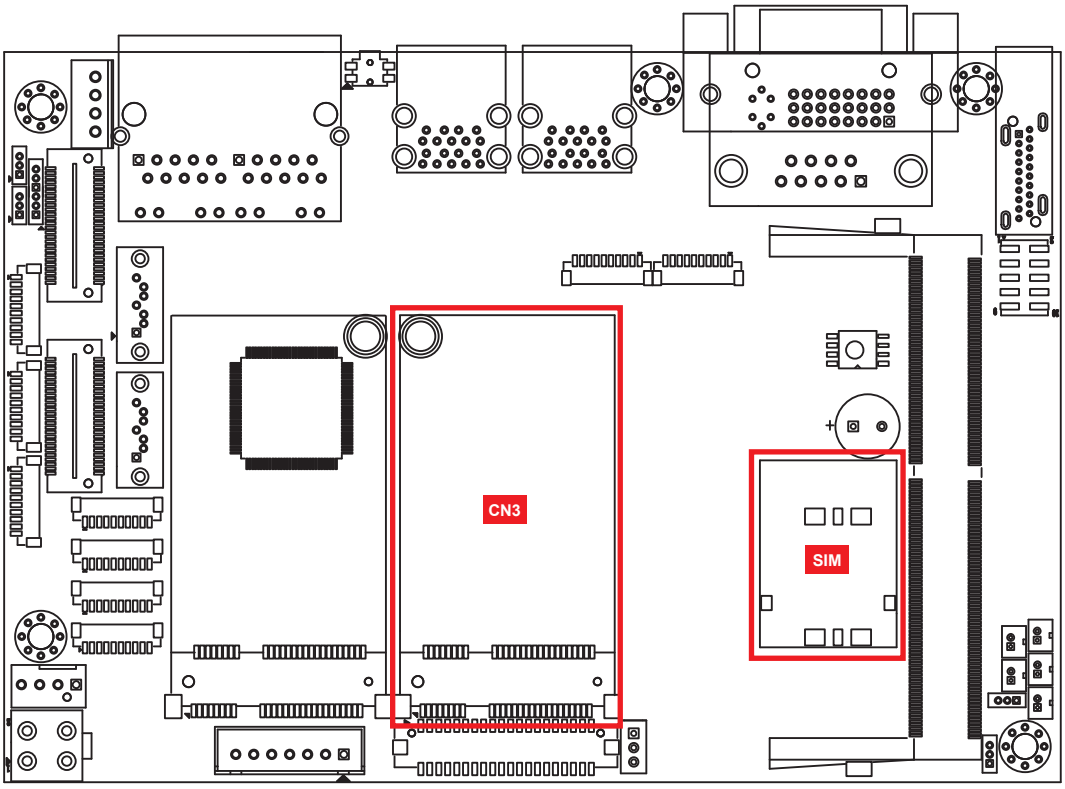
Both mSATA and Mini PCIe share the same form factor and similar electrical pinout assignments on their connectors. There was no clear mechanism to distinguish if a mSATA drive or a Mini PCIe device is plugged into the socket until recently that SATA I/O issued an ECN change (ECN #045) to redefine pin-43 on mSATA connector as “no connect” instead of “return current path” (or GND).

When an mSATA drive is inserted, its pin-43 is “no connect”, and the respective pin on the socket is being pulled-up to logic 1. When a Mini PCIe device is inserted, its pin-43 forces the respective pin on the socket to ground, or logic 0.

The pin assignments of CN4 are listed in the following table:

Pin No.	Signal Name	Pin No.	Signal Name
51	Reserved	52	+3.3Vaux
49	Reserved	50	GND
47	Reserved	48	+1.5V
45	Reserved	46	Reserved
43	Status	44	Reserved
41	+3.3Vaux	42	Reserved
39	+3.3Vaux	40	GND
37	GND	38	USB_D+
35	GND	36	USB_D-
33	PETp0	34	GND
31	PETn0	32	SMB_DATA
29	GND	30	SMB_CLK
27	GND	28	+1.5V
25	PERp0	26	GND
23	PERn0	24	+3.3Vaux
21	GND	22	PERST#
19	Reserved	20	reserved
17	Reserved	18	GND
Mechanical Key			
15	GND	16	UIM_VPP
13	REFCLK+	14	UIM_RESET
11	REFCLK-	12	UIM_CLK
9	GND	10	UIM_DATA
7	CLKREQ#	8	UIM_PWR
5	Reserved	6	1.5V
3	Reserved	4	GND
1	WAKE#	2	3.3Vaux

2.2.7 CN3, SIM : Mini PCIe



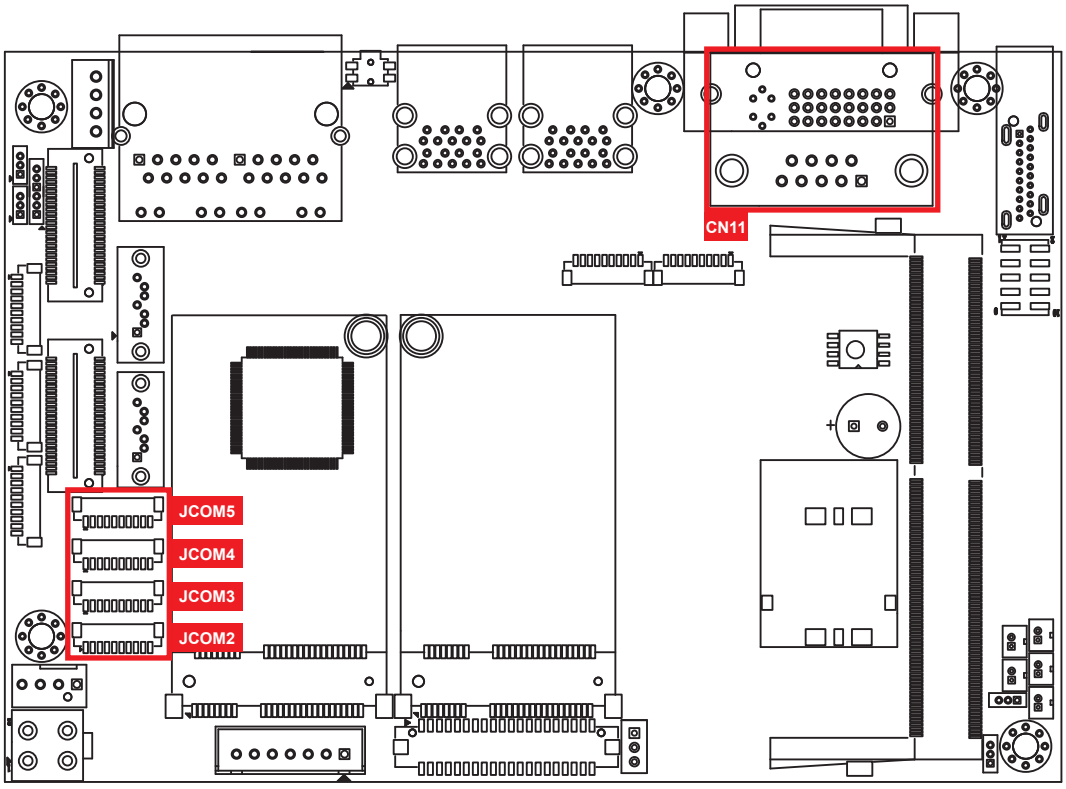
Note:
The SIM card sockets do not support hot-plug. Please make sure to unplug the system power before inserting the SIM card(s).

The pin assignments of CN3 are listed in the following table:

Pin No.	Signal Name	Pin No.	Signal Name
51	Reserved	52	+3.3Vaux
49	Reserved	50	GND
47	Reserved	48	+1.5V
45	Reserved	46	Reserved
43	GND	44	Reserved
41	+3.3Vaux	42	Reserved
39	+3.3Vaux	40	GND
37	GND	38	USB_D+
35	GND	36	USB_D-
33	PETp0	34	GND
31	PETn0	32	SMB_DATA

29	GND	30	SMB_CLK
27	GND	28	+1.5V
25	PERp0	26	GND
23	PERn0	24	+3.3Vaux
21	GND	22	PERST#
19	Reserved	20	reserved
17	Reserved	18	GND
Mechanical Key			
15	GND	16	UIM_VPP
13	REFCLK+	14	UIM_RESET
11	REFCLK-	12	UIM_CLK
9	GND	10	UIM_DATA
7	CLKREQ#	8	UIM_PWR
5	Reserved	6	1.5V
3	Reserved	4	GND
1	WAKE#	2	3.3Vaux

2.2.8 COM1 (CN11) , COM2~COM5 (JCOM2~JCOM5) : Serial Port



Serial port 1 ~ serial port 5 can be configured for RS-232, RS-422, or RS-485 with auto flow control communication.

The default definition of COM 1 and COM 2 is RS-232, if you want to change to RS-422 or RS-485, you can find the setting in BIOS.

Group	Description
COM1 (CN11)/COM2 (JCOM2)/ COM3 (JCOM3)/COM4 (JCOM4)/ COM5 (JCOM5)	RS-232
	RS-422 (5-wire)
	RS-422 (9-wire)
	RS-485
	RS-485 w/z auto-flow control

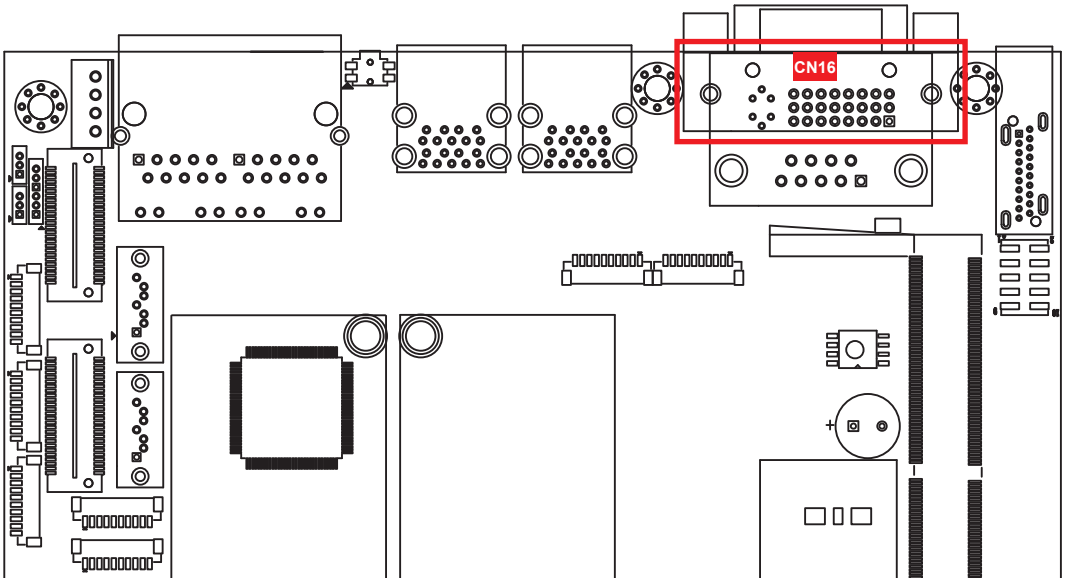
COM1 pin assignments are listed in the following table:

Serial Port	Pin No.	RS-232	RS-422 (5-wire)	RS-422 (9-wire)	RS-485 (3-wire)
1	1	DCD	TXD-	TXD-	DATA-
	2	RXD	TXD+	TXD+	DATA+
	3	TXD	RXD+	RXD+	----------
	4	DTR	RXD-	RXD-	----------
	5	GND	GND	GND	GND
	6	DSR	----------	RTS-	----------
	7	RTS	----------	RTS+	----------
	8	CTS	----------	CTS+	----------
	9	RI	----------	CTS-	----------

COM2~COM5 pin assignments are listed in the following table:

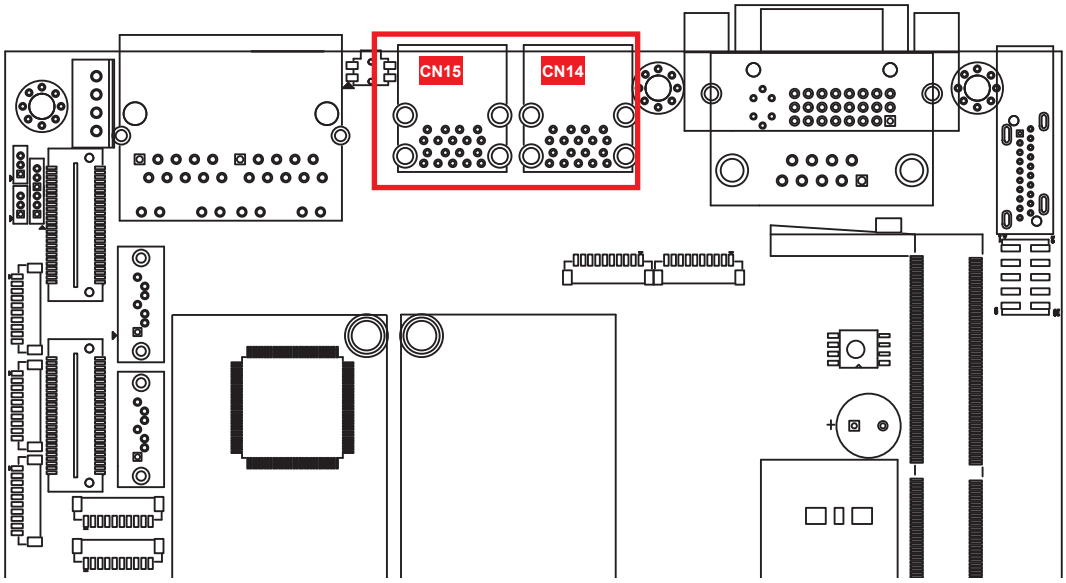
Serial Port	Pin No.	RS-232	RS-422 (5-wire)	RS-422 (9-wire)	RS-485 (3-wire)
2, 3 4, 5	1	GND_ EARTH	GND_ EARTH	GND_ EARTH	GND_ EARTH
	2	GND	GND	GND	GND
	3	RI	----------	CTS-	RI
	4	DTR	RXD-	RXD-	----------
	5	CTS	----------	CTS+	----------
	6	TXD	RXD+	RXD+	----------
	7	RTS	----------	RTS+	----------
	8	RXD	TXD+	TXD+	DATA+
	9	DSR	----------	RTS-	----------
	10	DCD	TXD-	TXD-	DATA-

2.2.9 CN16 : DVI-D Connector



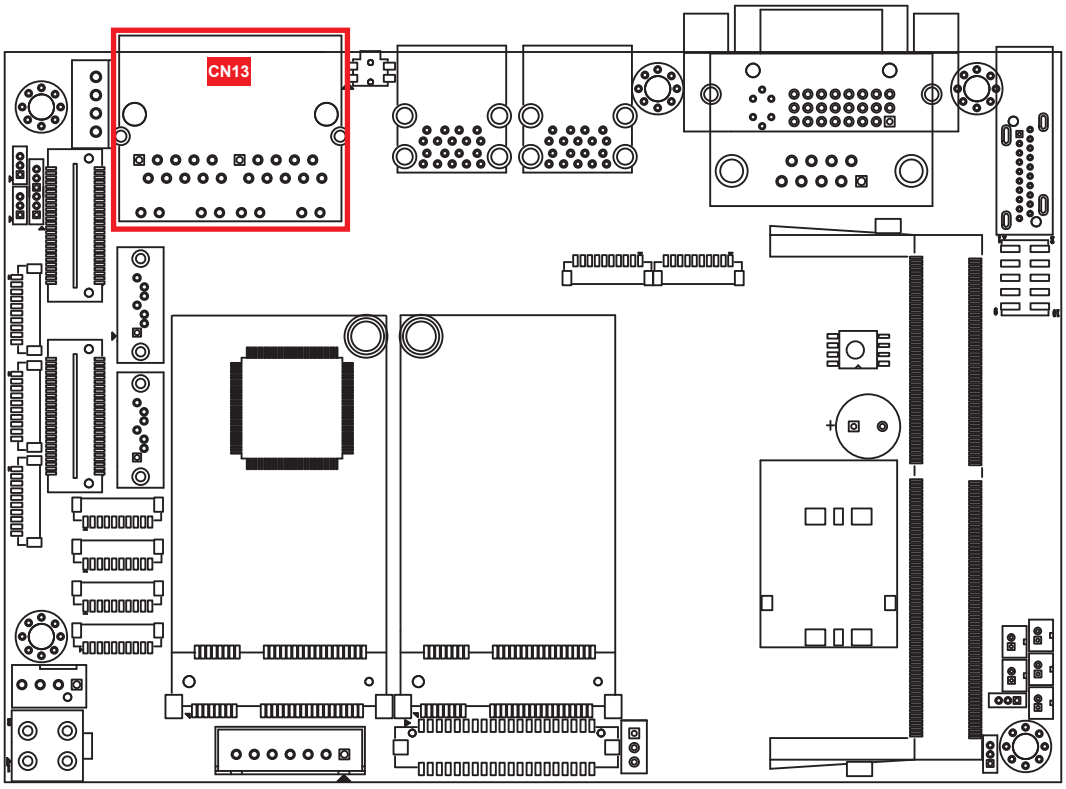
The DVI-D connector on the front panel supports DVI display modes. The DVI output mode supports up to 1920 x 1080 resolutions.

2.2.10 CN14, CN15 : External USB



There are 4 USB 3.0 connections available supporting up to 5GB per second data rate in the top side of EMBC-1000. They are also compliant with the requirements of SuperSpeed (SS), high speed (HS), full speed (FS) and low speed (LS).

2.2.11 CN13 : LAN



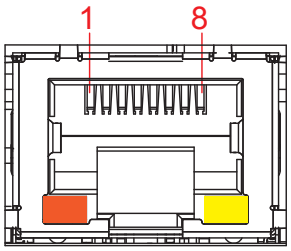
There are two 8-pin RJ-45 jacks supporting 10/100/1000 Mbps Ethernet connections in the front side of MTC-4015. LAN 1 is powered by Intel® 218LM Ethernet engine; LAN 2 is powered by Intel I210 Ethernet engine. When both LAN 1 and LAN 2 work in normal status, basic iAMT function is enabled.

Using suitable RJ-45 cable, you can connect MTC-4015 system to a computer or to any other devices with Ethernet connection, for example, a hub or a switch. Moreover, both LAN 1 and LAN 2 supports Wake on LAN and Pre-boot functions. The pinouts of LAN 1 and LAN 2 are listed as follows:

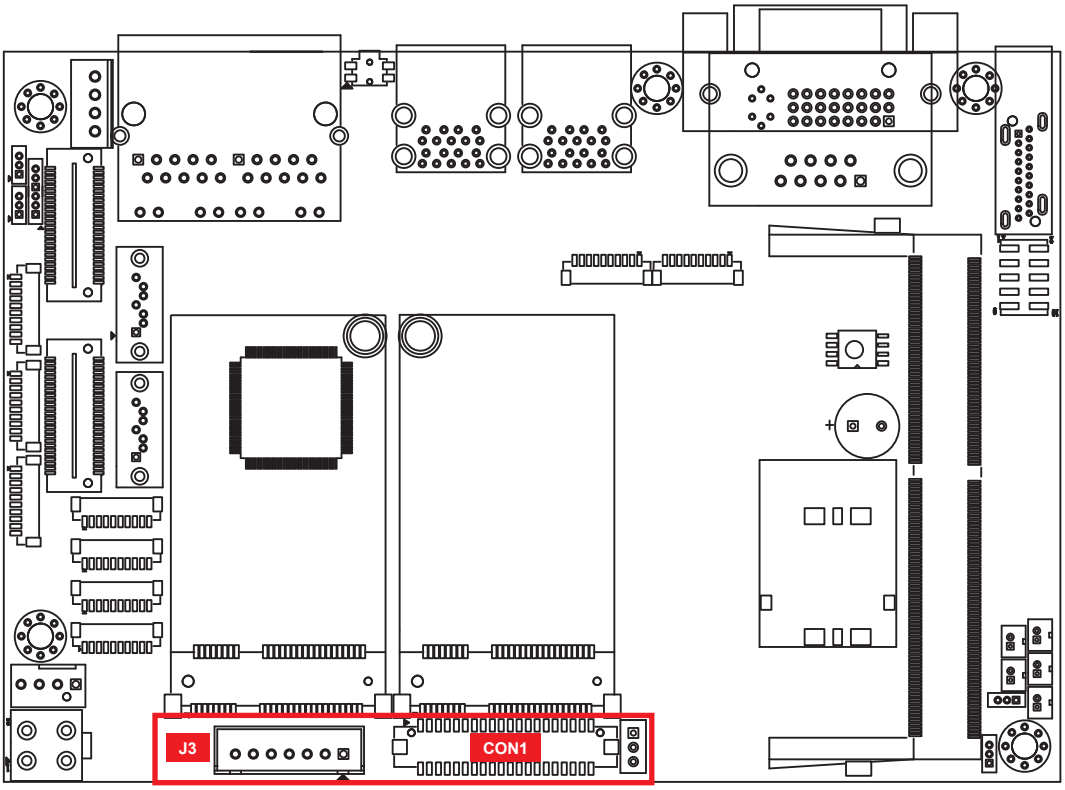
Pin No.	10/100Mbps	1000Mbps
1	E_TX+	MDI0_P
2	E_TX-	MDI0_N
3	E_RX+	MDI1_P
4	----	MDI2_P
5	-----	MDI2_N
6	E_RX-	MDI1_N
7	-----	MDI3_P
8	------	MDI3_N

Each LAN port is supported by standard RJ-45 connector with LED indicators to present Active/Link/Speed status of the connection.
The LED indicator on the right bottom corner lightens solid green when the cable is properly connected to a 100Mbps Ethernet network and solid orange when the cable is properly connected to a 1000Mbps Ethernet network. The left LED will keep blinking off when Ethernet data packets are being transmitted/ received.

LED	10Mbps	100Mbps	1000Mbps
Right Bottom Led	Off	Solid Green	Solid Orange
Left Bottom Led	Blinking Yellow	Blinking Yellow	Blinking Yellow



2.2.12 CON1, J3 : LVDS



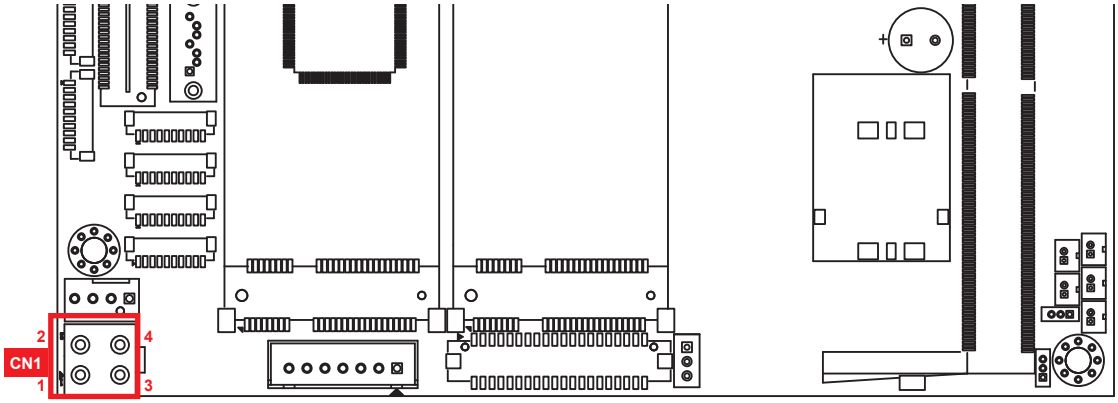
EMBC-1000 supports dual-channel 24-bit LVDS display, up to 1920 x 1200 pixels resolution. The pin assignments of CON1 are listed in the following table:

Pin No.	function	Pin No.	function
1	PANEL_VDD	21	GND
2	TXO0-	22	TXE0-
3	PANEL_VDD	23	GND
4	TXO0+	24	TXE0+
5	PANEL_VDD	25	GND
6	TXO1-	26	TXE1-
7	GND	27	GND
8	TXO1+	28	TXE1+
9	GND	29	GND
10	TXO2-	30	TXE2-
11	GND	31	GND
12	TXO2+	32	TXE2+
13	GND	33	GND
14	TXOC-	34	TXEC-
15	GND	35	GND
16	TXOC+	36	TXEC+
17	GND	37	GND
18	TXO3-	38	TXE3-
19	GND	39	LVDS_DET#
20	TXO3+	40	TXE3+

The LCD inverter is connected to J3 via a JST 7-pin, a 2.5mm connector providing +5V/+12V power to LCD display. The pin assignments are listed in the following table:

Pin No.	Definition	Pin No.	Definition
1	+5V	5	GND
2	+12V	6	GND
3	+12V	7	LBKLT_EN
4	LBKLT_CTL		

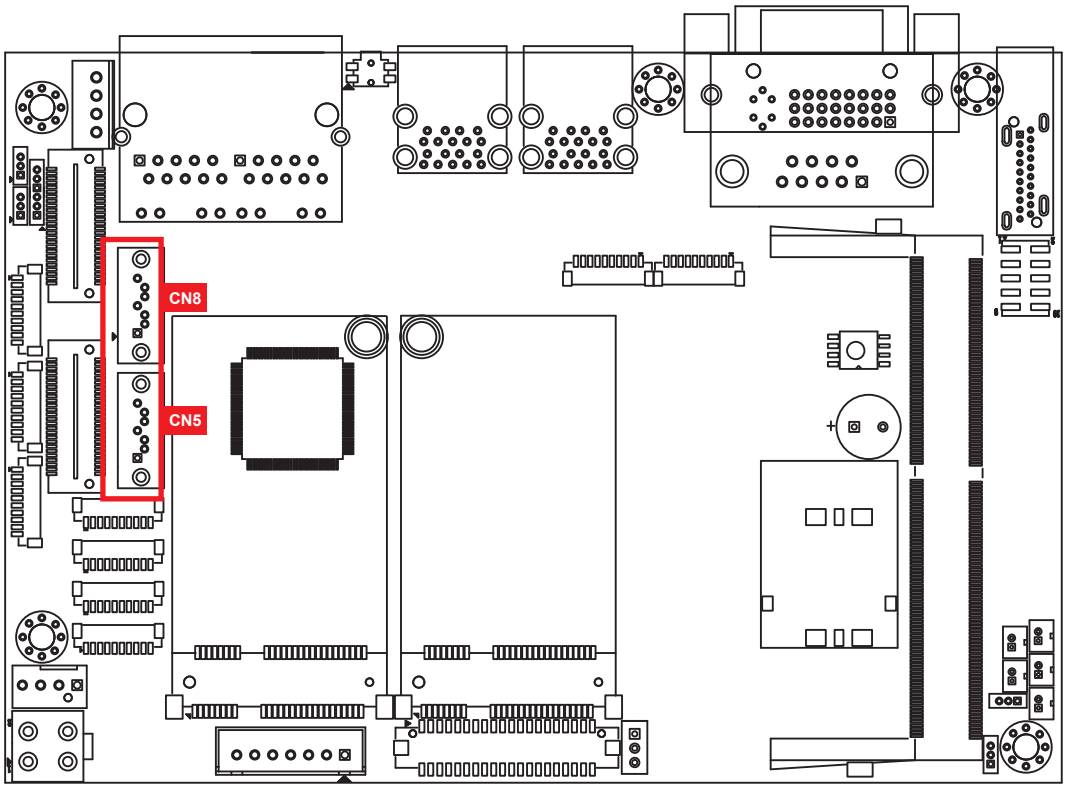
2.2.13 CN1 : Power Input



EMBC-1000 supports 9V to 36V DC power input by wire-to-board connector in the top side.

Pin No.	Definition	Pin No.	Definition
1	V-	3	V+
2	V-	4	V+

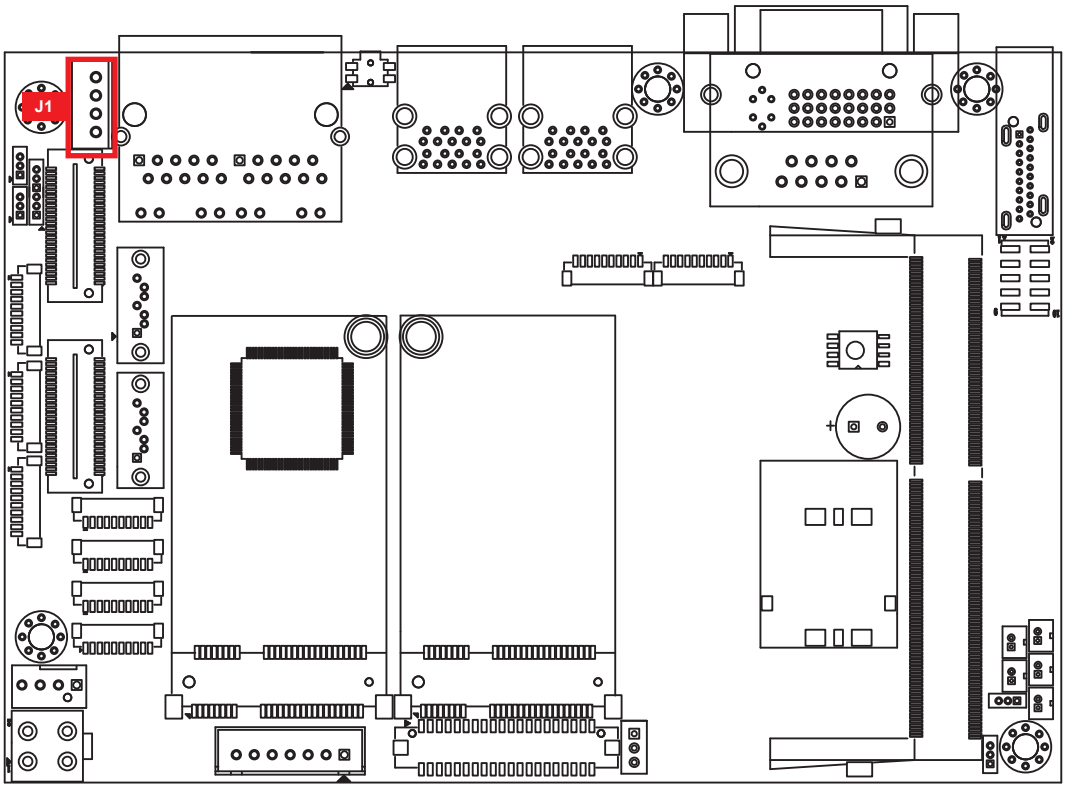
2.2.14 CN5, CN8 : SATA III Connector



There are two high performance Serial ATA III (SATA III) on the EMBC-1000. They support higher storage capacity with less cabling effort and smaller required space. The pin assignments of CN5 and CN8 are listed in the following table:

Pin No.	Definition	Pin No.	Definition
1	GND	5	RXN
2	TXP	6	RXP
3	TXN	7	GND
4	GND		

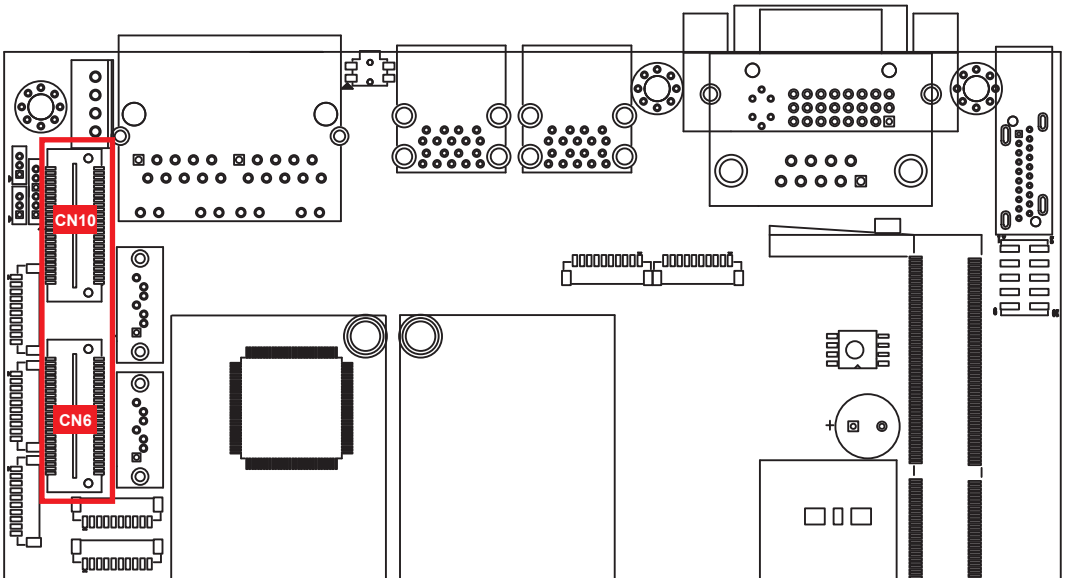
2.2.15 J1: SATA Power Connector



The EMBC-1000 is also equipped with one SATA power connector. It supports 5V (Up to 2A) and 12V (Up to 1A) currents to the hard drive or SSD. The pin assignments of J1 is listed in the following table:

Pin No.	Definition	Pin No.	Definition
1	+12V	3	GND
2	GND	4	+5V

2.2.16 CN6, CN10 : SUMIT



CN10 Pin Out

Pin No.	Function	Pin No.	Function
1	+5V_AUX	2	+12V
3	+3.3V	4	SMB_DATA
5	+3.3V	6	SMB_CLK
7	Reserved	8	Reserved
9	Reserved	10	Reserved
11	USB_OC#	12	Reserved
13	Reserved	14	Reserved
15	+5V	16	Reserved
17	USB_3+	18	Reserved
19	USB_3-	20	Reserved
21	+5V	22	Test Point
23	USB_2+	24	LPC_AD0
25	USB_2-	26	LPC_AD1
27	+5V	28	LPC_AD2
29	USB_1+	30	LPC_AD3
31	USB_1-	32	LPC_FRAME#
33	+5V	34	SERIRQ#

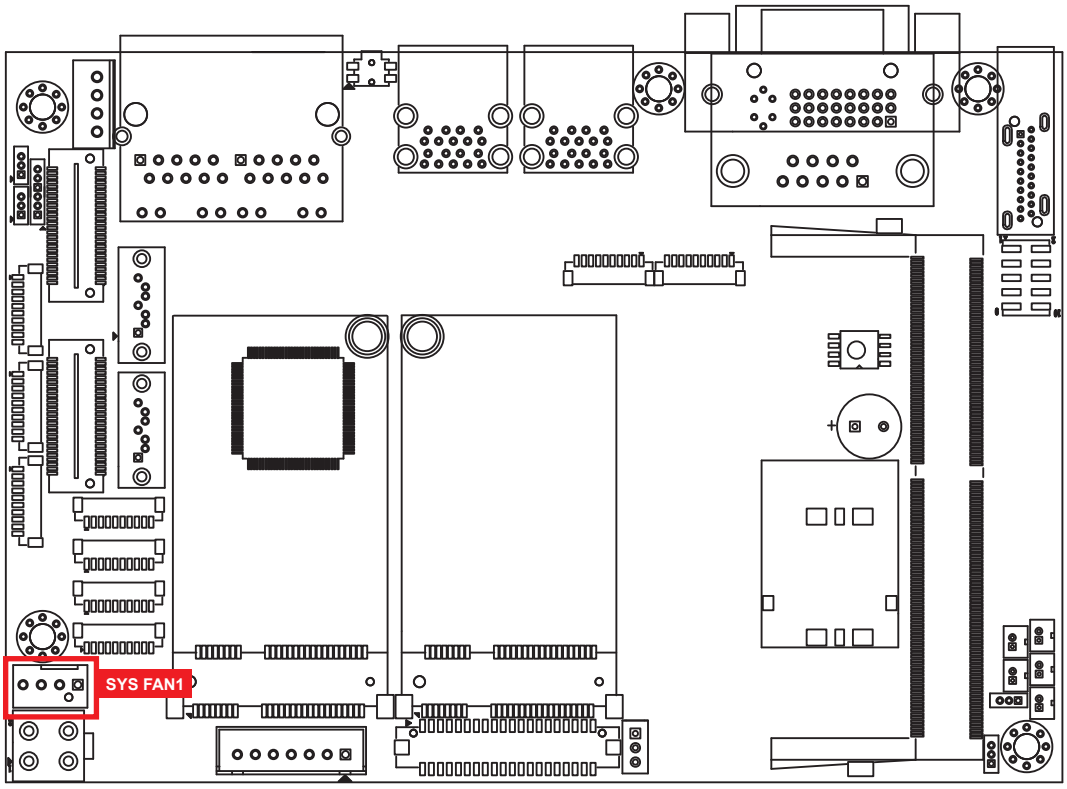
35	USB_0+	36	Reserved
37	USB_0-	38	CLK_33MHz
39	GND	40	GND
41	A_PET_P0	42	A_PER_P0
43	A_PET_N0	44	A_PER_N0
45	GND	46	GND
47	PERST#	48	A_CLKP
49	WAKE#	50	A_CLKN
51	+5V	52	GND

CN6 Pin Out

Pin No.	Function	Pin No.	Function
1	GND	2	GND
3	B_PET_P0	4	B_PER_P0
5	B_PET_N0	6	B_PER_N0
7	GND	8	GND
9	C_CLKP	10	B_CLKP
11	C_CLKN	12	B_CLKN
13	CPRSNT#/C_PE_CLKREQ#	14	GND
15	C_PET_P0	16	C_PER_P0
17	C_PET_N0	18	C_PER_N0
19	GND	20	GND
21	C_PET_P1	22	C_PER_P1
23	C_PET_N1	24	C_PER_N1
25	GND	26	GND
27	C_PET_P2	28	C_PER_P2
29	C_PET_N2	30	C_PER_N2
31	GND	32	GND
33	C_PET_P3	34	C_PER_P3
35	C_PET_N3	36	C_PER_N3

37	GND	38	GND
39	PERST#	40	WAKE#
41	Reserved	42	Reserved
43	+5V	44	Reserved
45	+5V	46	+3.3V
47	+5V	48	+3.3V
49	+5V	50	+3.3V
51	+5V	52	+5V_AUX

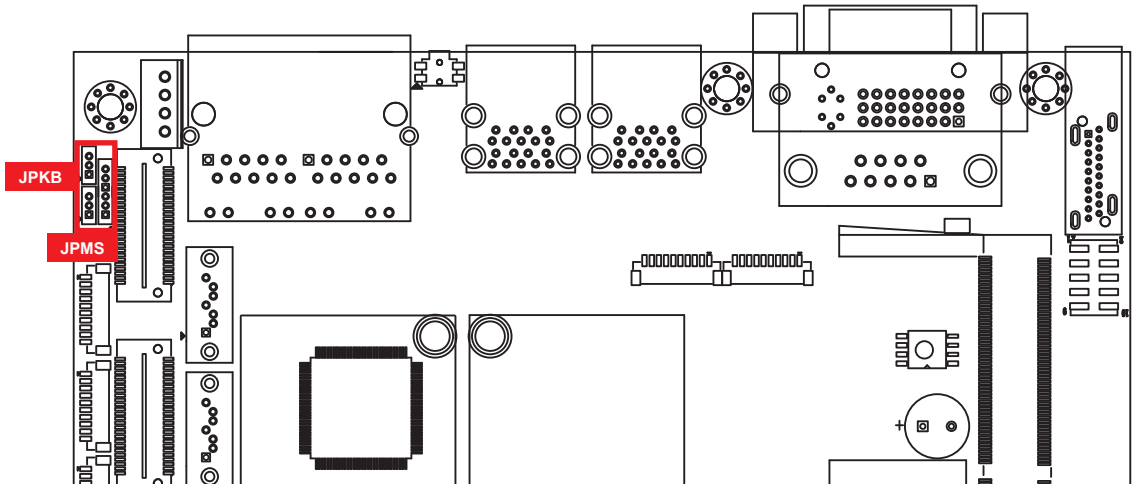
2.2.17 SYS FAN1 : Connector



Fan power connector supports higher thermal requirements.

Pin No.	Definition	Pin No.	Definition
1	GND	3	Fan speed sensor
2	+12V(1.5A max)	4	Fan PWM

2.2.18 JPMS, JPKB : PS/2 Mouse Keyboard Pin Head



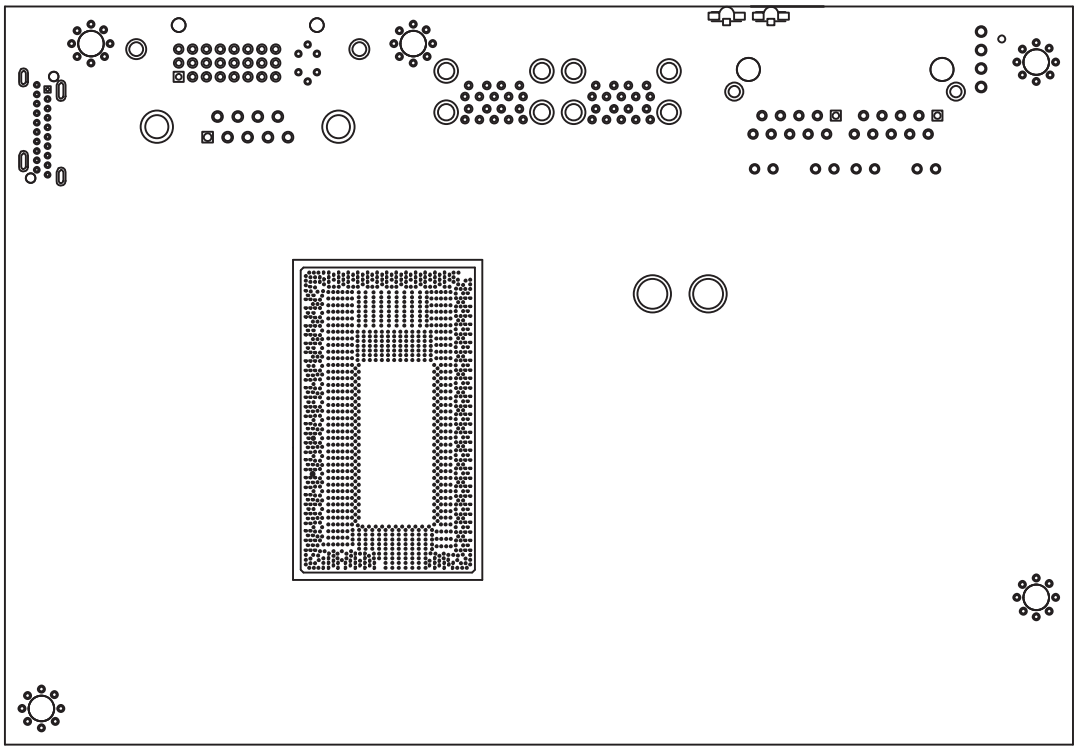
JPMS Mouse Pin assingment as the following table:

Pin No.	Definition
1	SIO_MCLK
2	SIO_MDAT
3	GND

JPMS Keyboard Pin assingment as the following table:

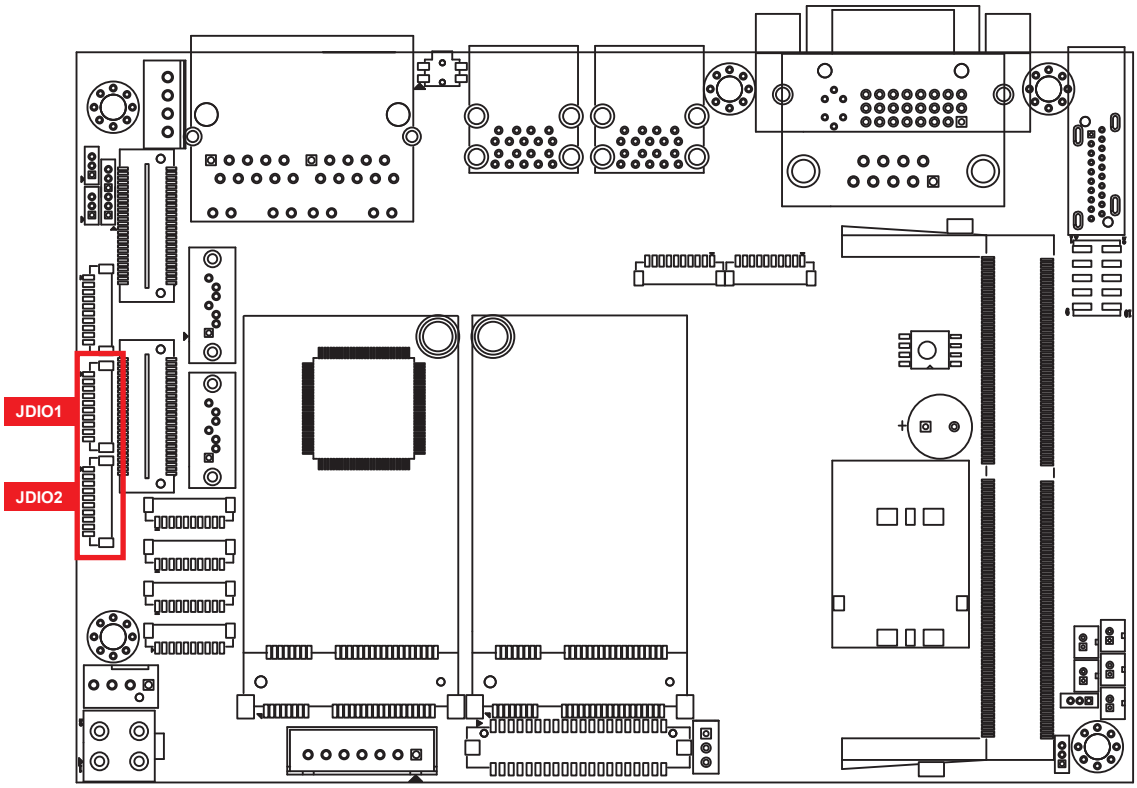
Pin No.	Definition
1	SIO_KCLK
2	SIO_KDAT
3	VCC5_KBMS

2.2.19 Bottom Side



Green-Power LED: If the LED is solid green, it indicates that the system is powered on. Green-HDD LED: A hard disk LED. If the LED is on, it indicates that the system's storage is functional. If it is off, it indicates that the system's storage is not functional. If it is flashing, it indicates data access activities.

2.2.20 JDIO1,JDIO2 : GPIO



There is a 16-bit GPIO connector in the Top side. Each GPIO channel can be configuration GPI or GPO. Detail setting see **APPENDIX A**
JDIO1 and JDIO2 pins are defined in the following table:

Pin No.	JDIO1 Definition	JDIO2 Definition
1	SIO_GPI80	SIO_GPI84
2	SIO_GPI81	SIO_GPI85
3	SIO_GPI82	SIO_GPI86
4	SIO_GPI83	SIO_GPI87
5	SIO_GPO70	SIO_GPO74
6	SIO_GPO71	SIO_GPO75
7	SIO_GPO72	SIO_GPO76
8	SIO_GPO73	SIO_GPO77
9	+5V	+5V
10	GND	GND

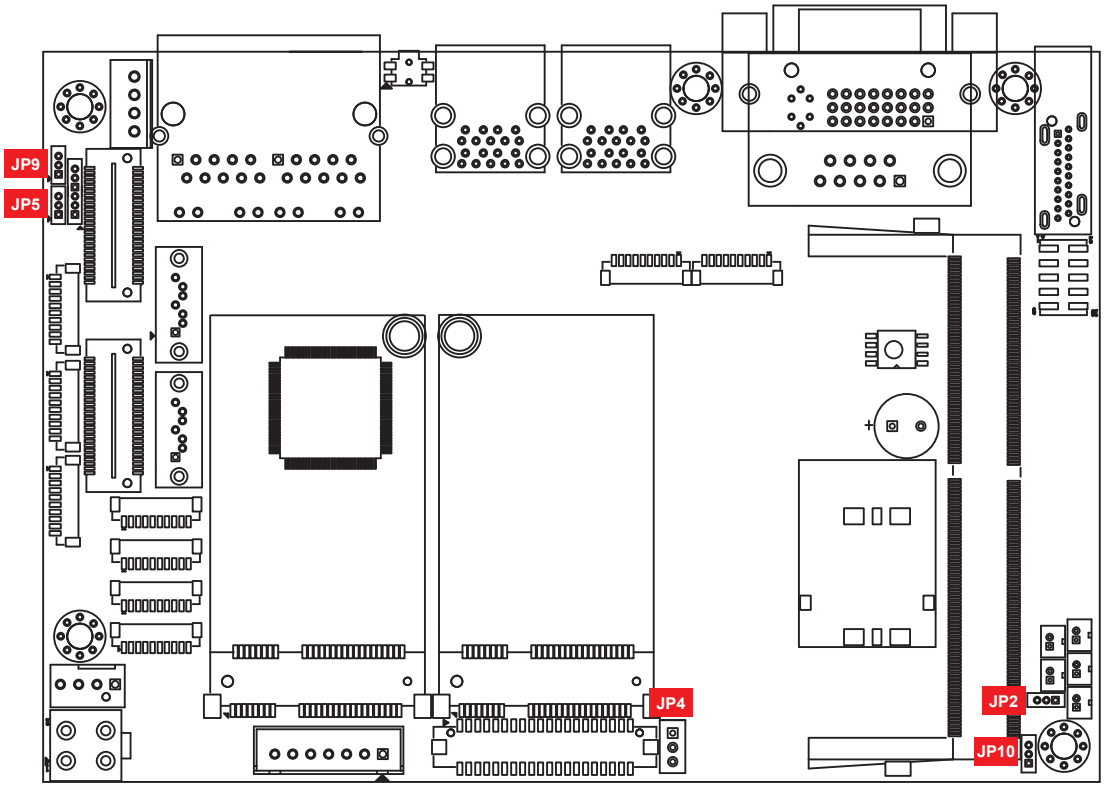
GIOP DC Electrical Characteristics:

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
V_{OL}	Low Output Voltage	I_{OL} = 8 mA			0.4	V
V_{IL}	Low Input Voltage				0.8	V
V_{IH}	High Input Voltage		2.2			V
I_{IL}	Low Input Leakage	V_{IN} = 0			10	µA
I_{IH}	High Input Leakage	V_{IN} = VCC3			-10	µA
I_{OZ}	3-state Leakage				20	µA

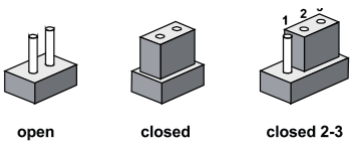
2.3 Jumper Settings

2.3.1 Front View of EMBC-1000 Main Board With Jumper Location

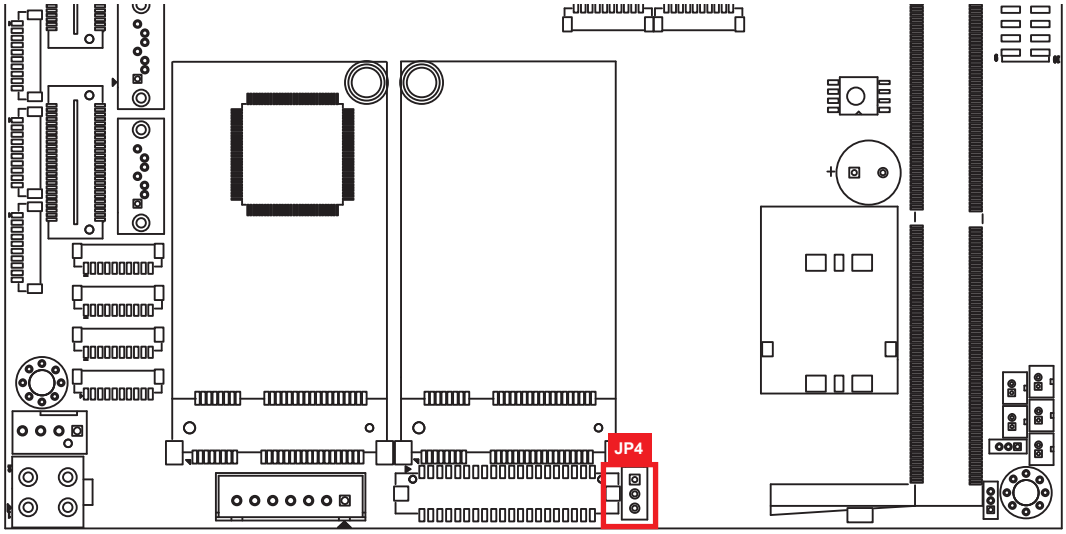
The figure below is the top view of the EMBC-1000 main board. It shows the location of the jumpers.



You may configure your card to match the needs of your application by setting jumpers. A jumper is a metal bridge used to close an electric circuit. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To “close” a jumper, you connect the pins with the clip. To “open” a jumper, you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2, and 3. In this case you would connect either pins 1 and 2, or 2 and 3.



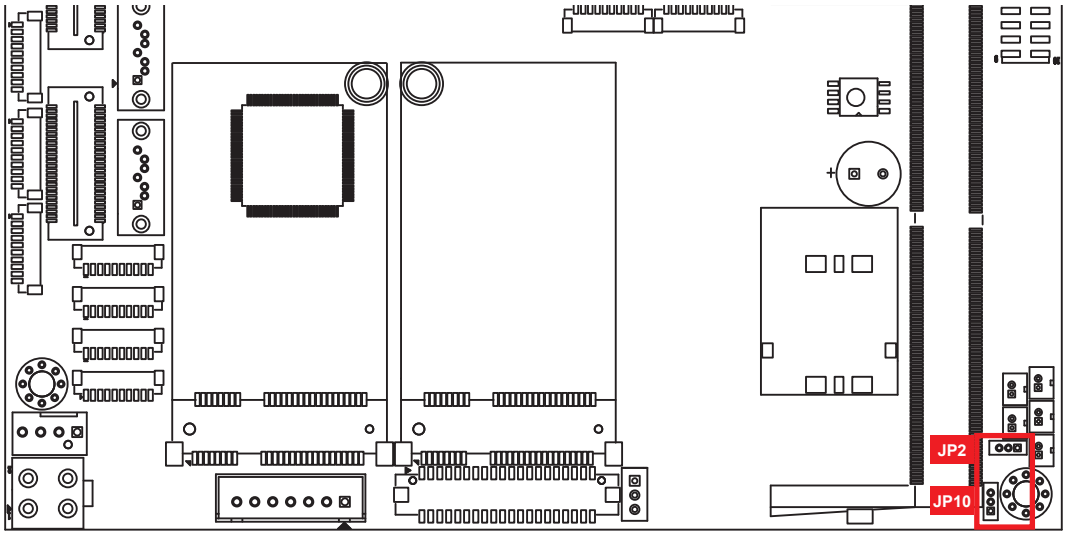
2.3.2 JP4 : LVDS Module, Power Selection



JP4 provides LVDS voltage selection function, Closing Pin 1 and Pin 2 is for 3.3V LVDS power input; closing Pin 2 and Pin 3 is for 5V LVDS power input.

Pin No.	Definition	Pin No.	Definition
1-2	+3.3V (Default)	2-3	+5V

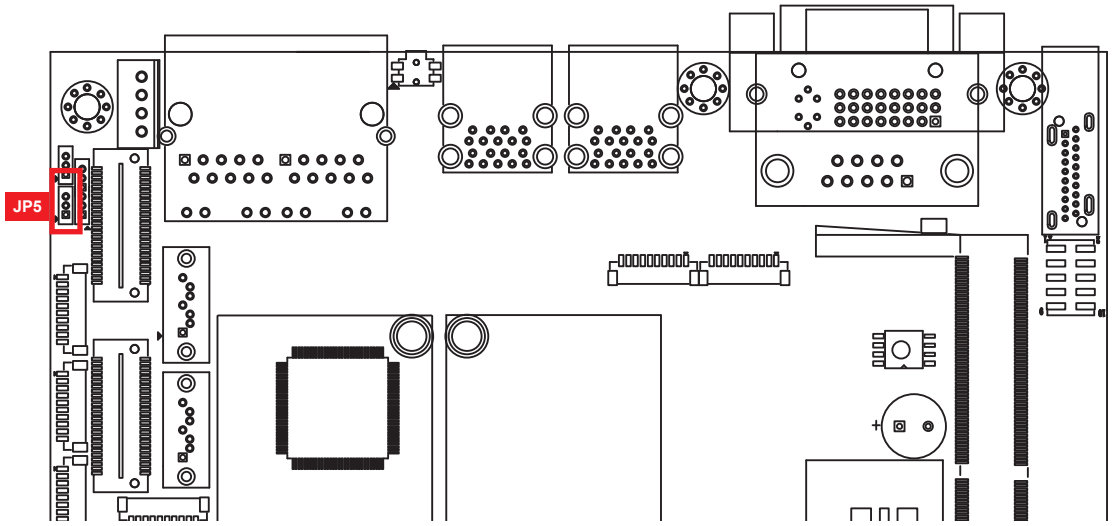
2.3.3 JP2(CMOS), JP10(ME)



CMOS	Header
1-2	Normal
2-3	Clear CMOS

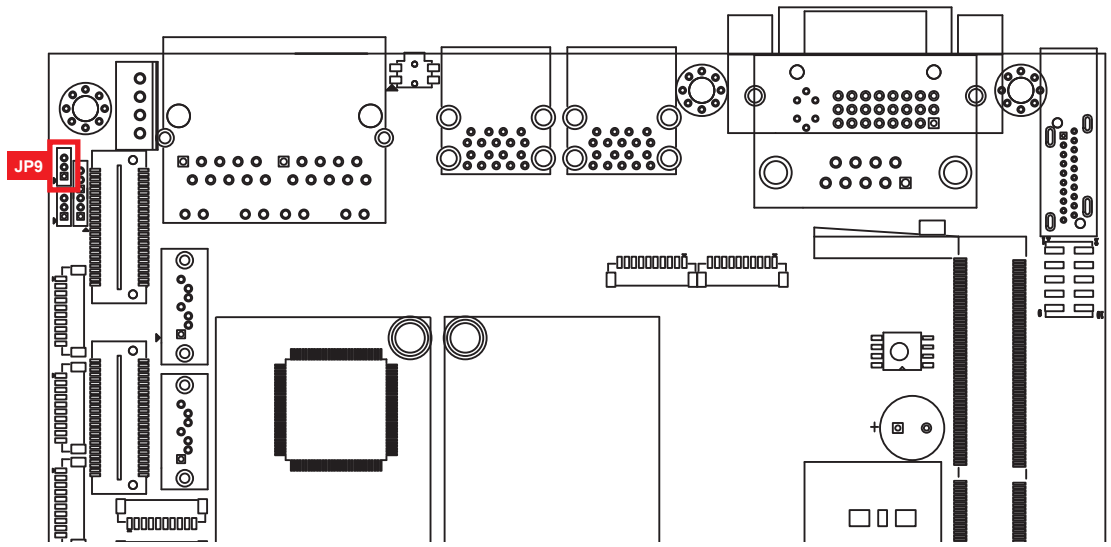
ME	Header
1-2	Normal
2-3	Clear ME

2.3.4 JP5 : External USB 3.0/2.0 Power Select



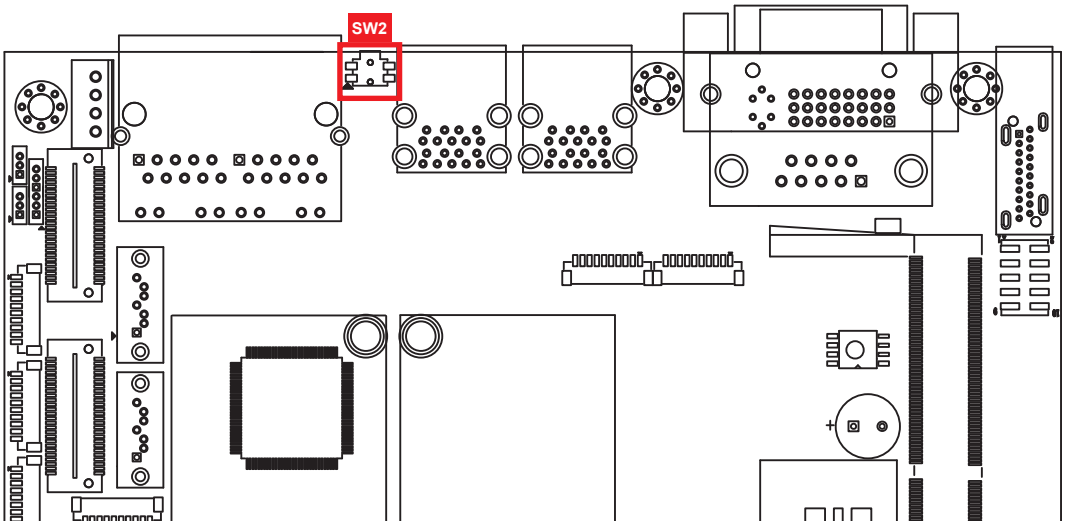
Header	Power	Header	Power
1-2	+5V Standby Power	2-3	+5V System Power

2.3.5 JP9 : Backlight Control Level Select

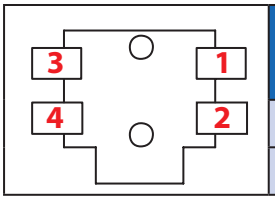


Pin No.	Definition	Pin No.	Definition
1-2	3.3V	2-3	5V

2.3.6 SW2 : RESET Button



Pin assignment as the following table :



Pin No.	Definition	Pin No.	Definition
1	FP_RST_BTN_N	2	GND
3	FP_RST_BTN_N	4	GND

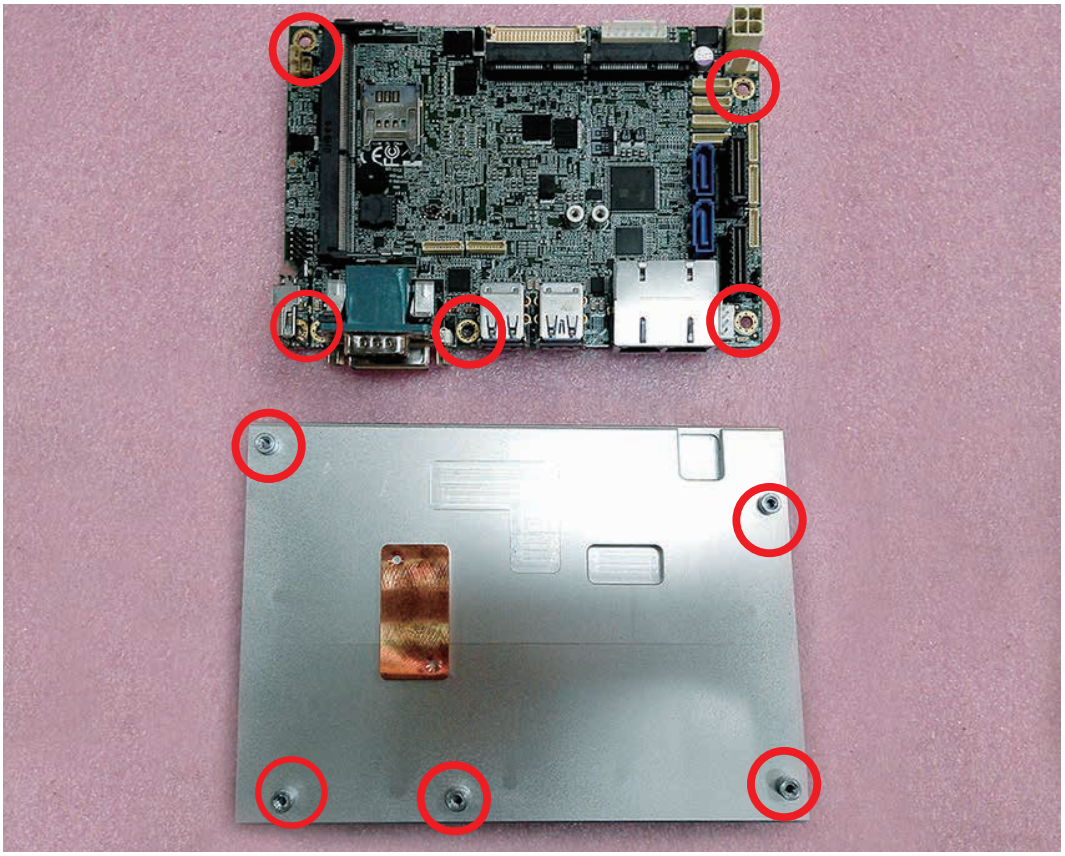
It is a hardware reset switch. Use this switch to reset the system without power off the system. Press the Reset Switch for a few seconds, and then the reset function will be enabled.

3

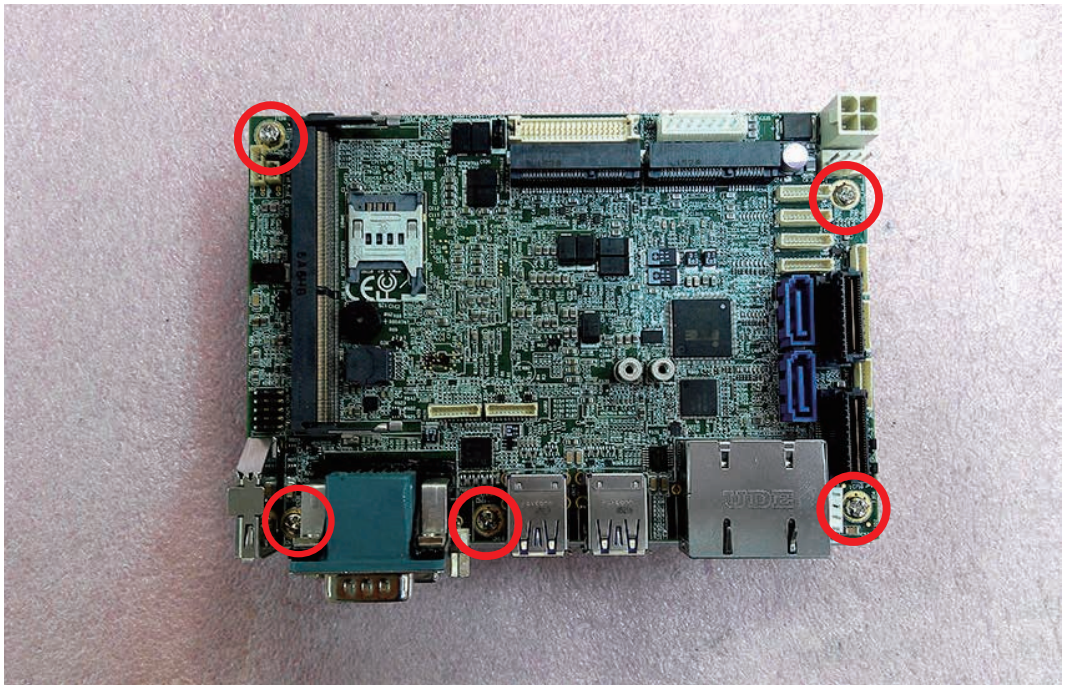
INSTALLATION

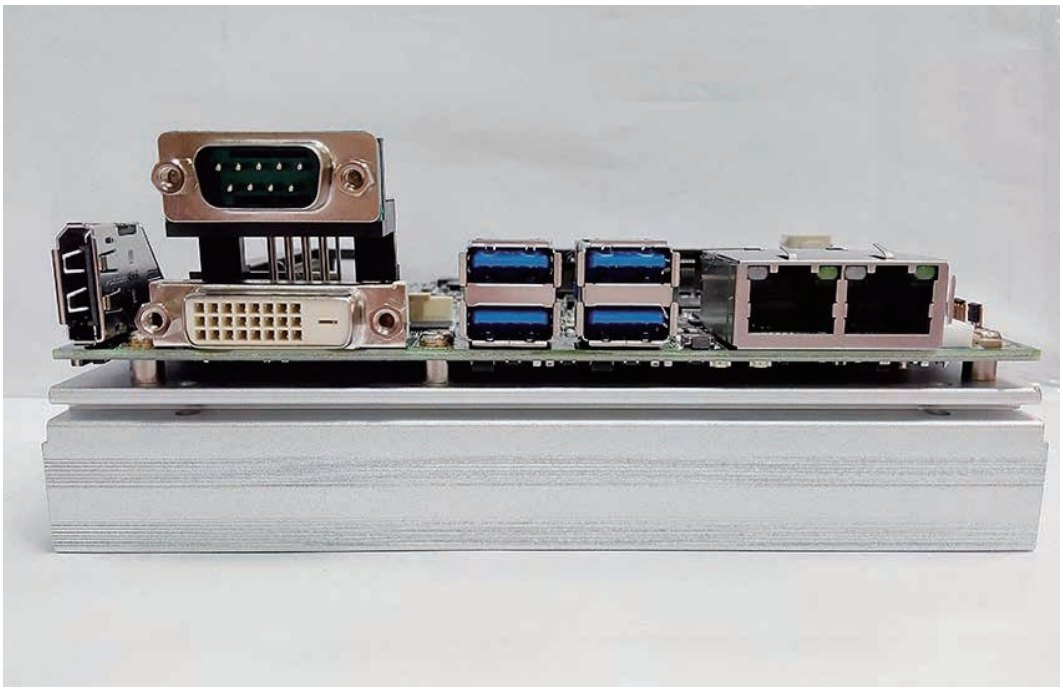
3.1 Installing Heat Sink

Step 1 Ensure the screw locations on EMBC-1000 fit the ones on the heat sink.



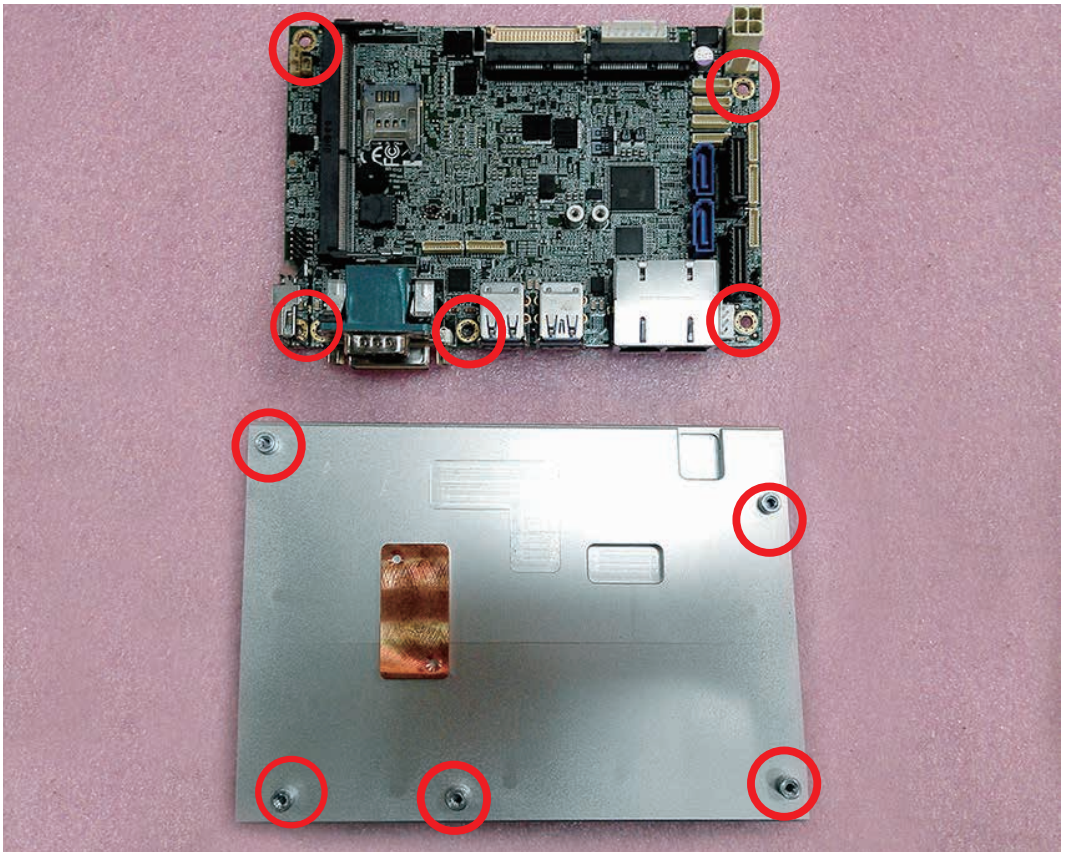
Step 2 Fasten five PH-M3x6 screws (circled in red).



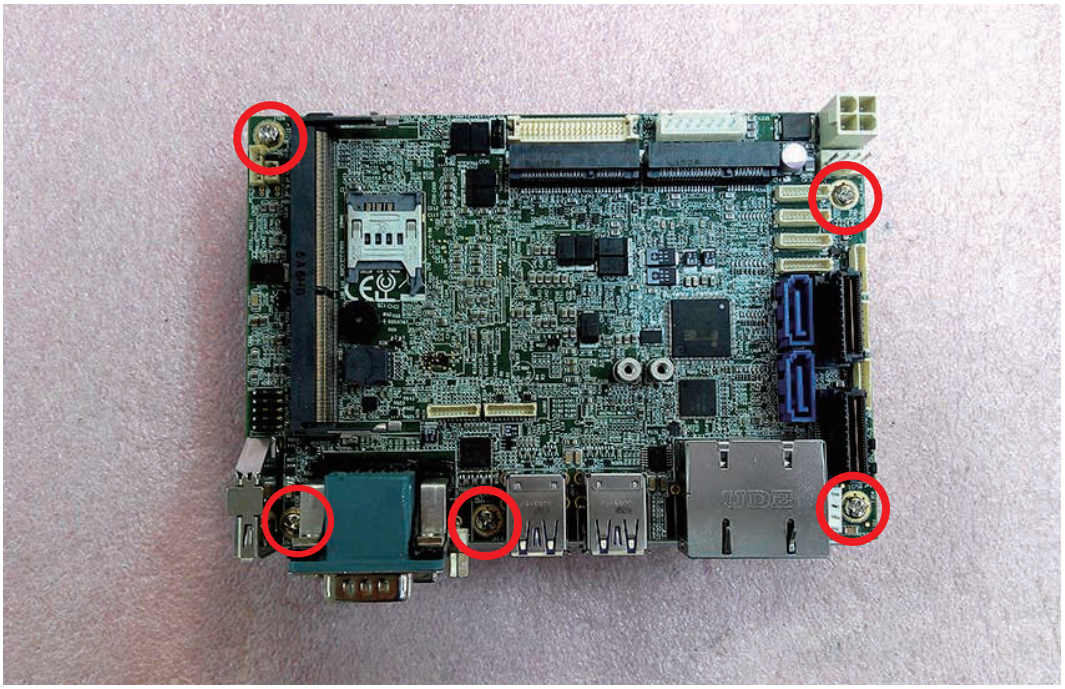


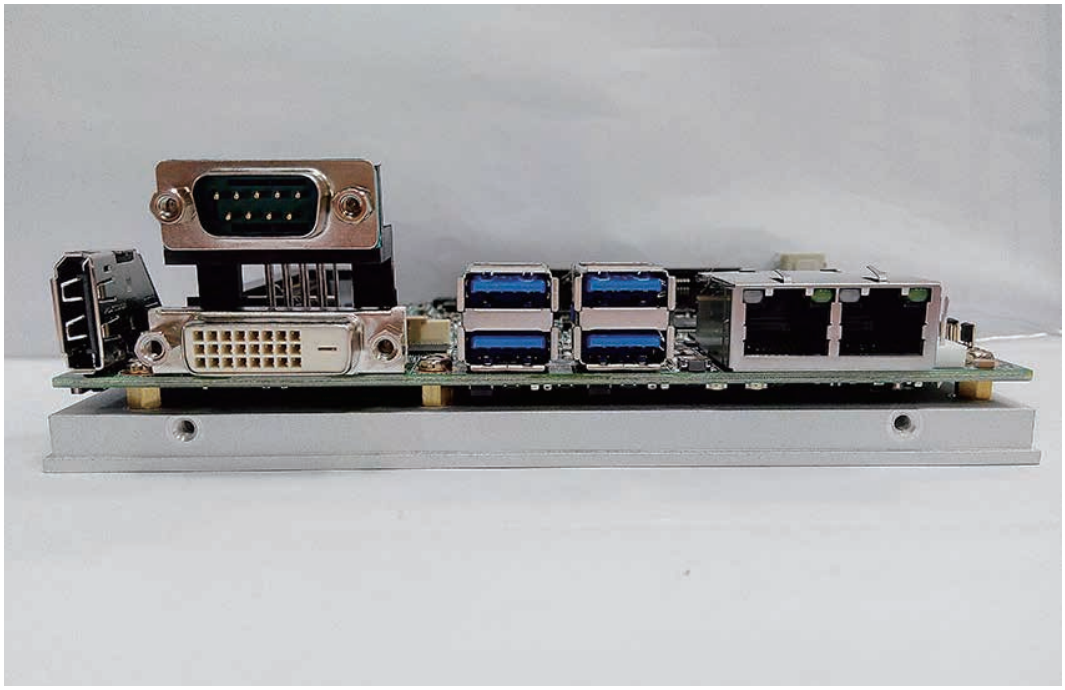
3.2 Installing Heat Spreader

Step 1 Place the motherboard and heat sink in position.



Step 2 Fasten six PH-M3x6 screws (circled in red).

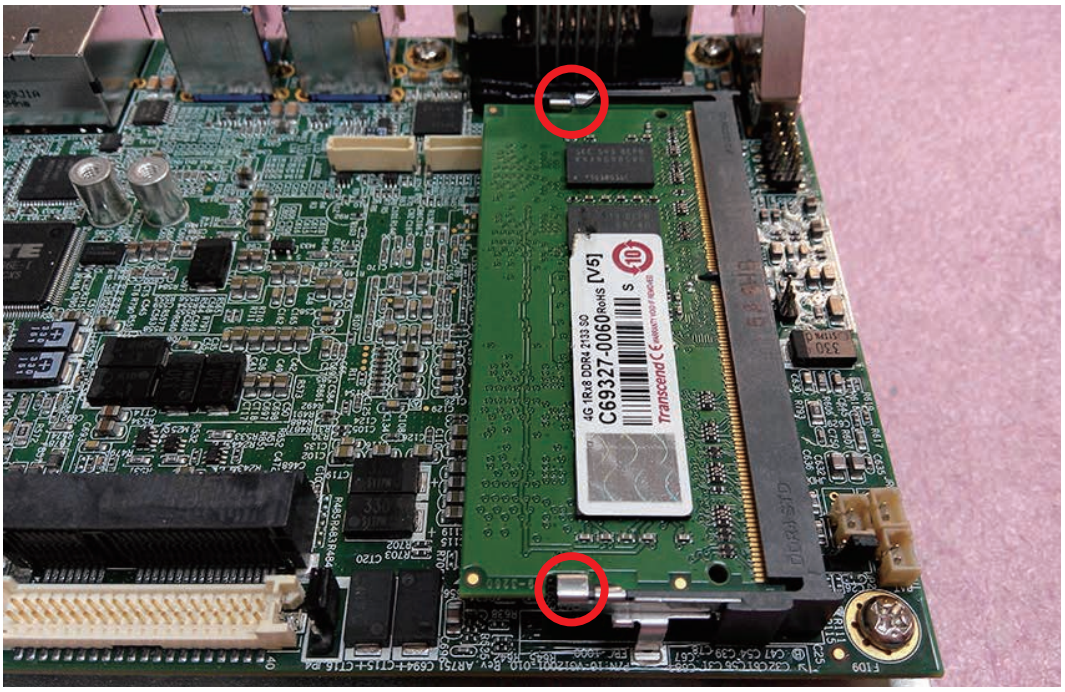




3.3 Installing DDR4 SO-DIMM Module

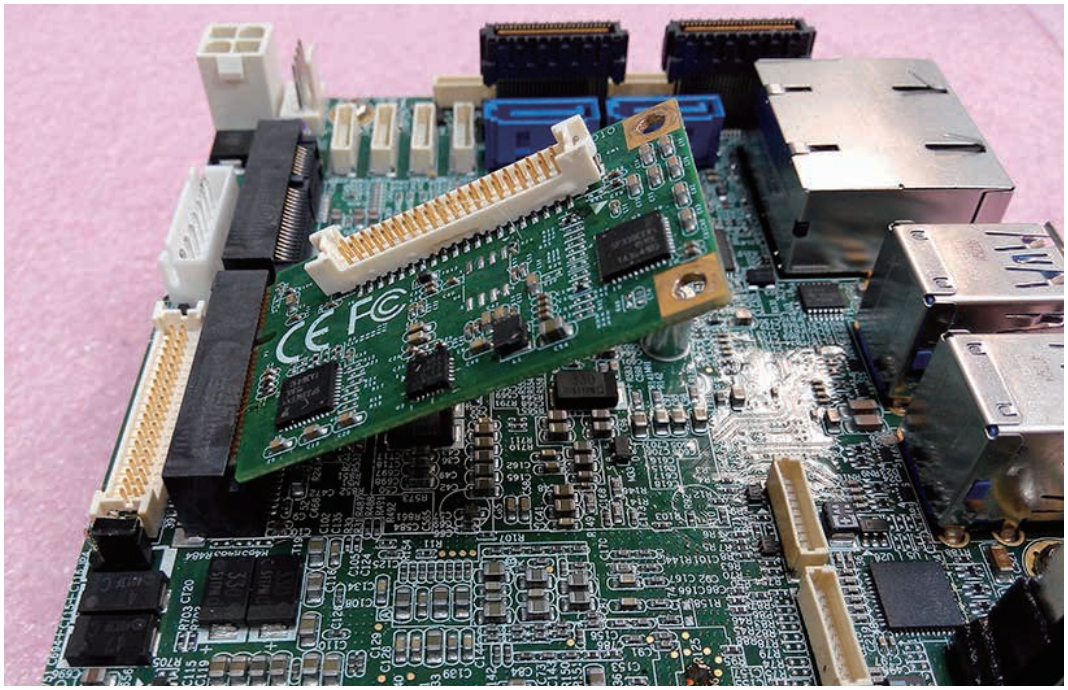
Step 1 Install DDR4 RAM module into SO-DIMM slot.

Step 2 Make sure the RAM module is locked by the memory slot.

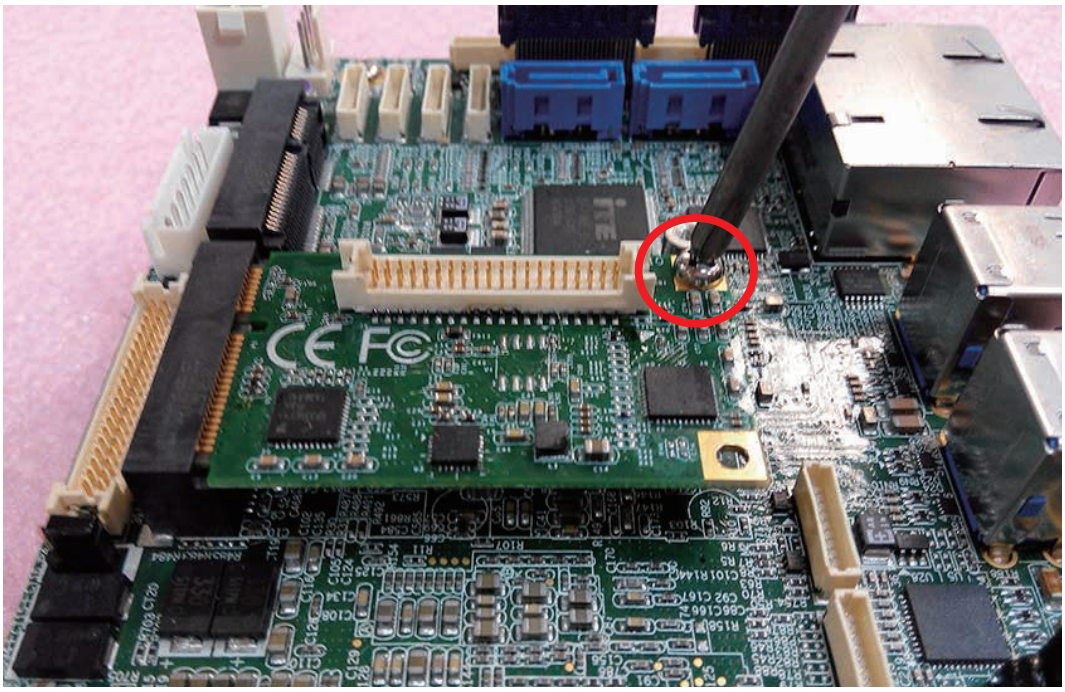


3.4 Installing Mini PCIe Card

Step 1 Install Mini PCIe card into the Mini PCIe slot.

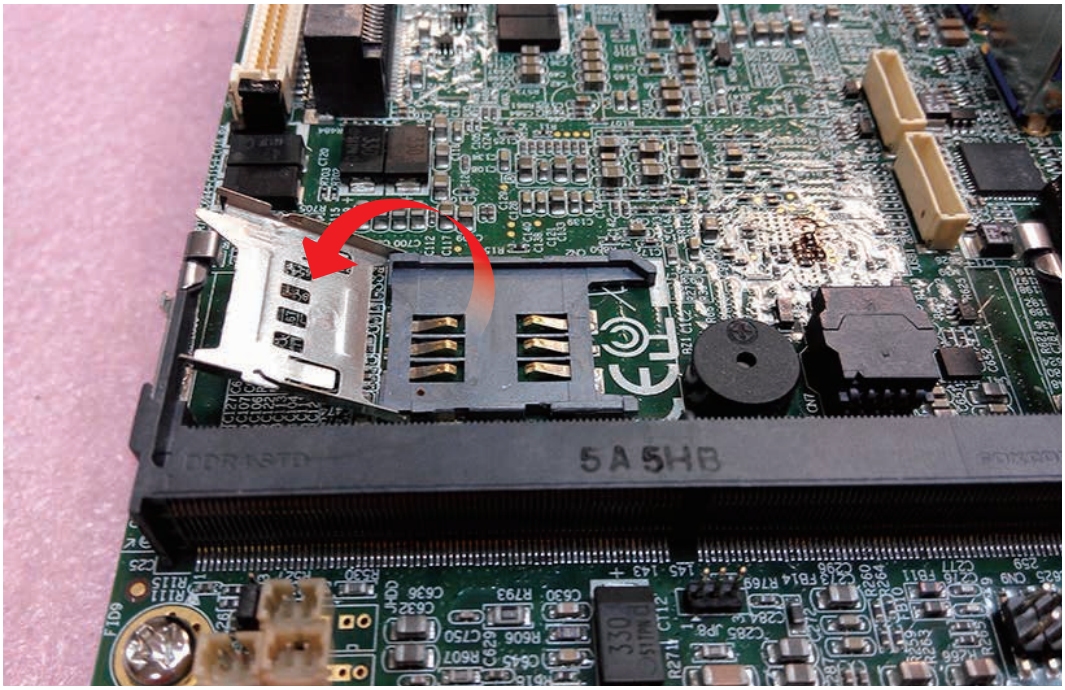


Step 2 Fasten one M2.5 screw.

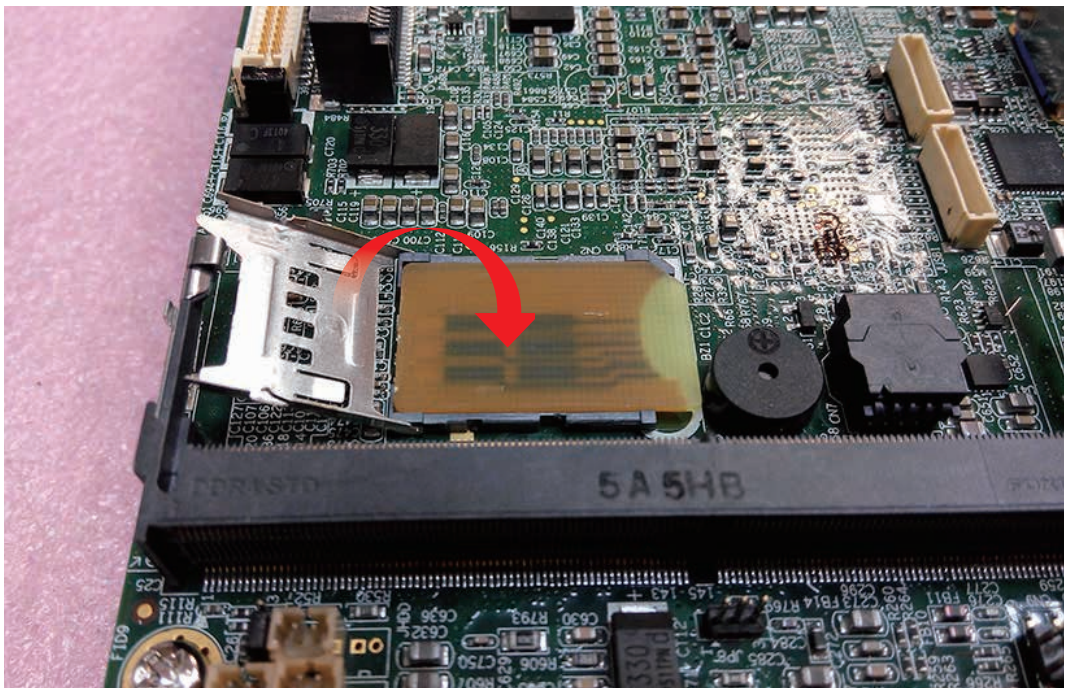


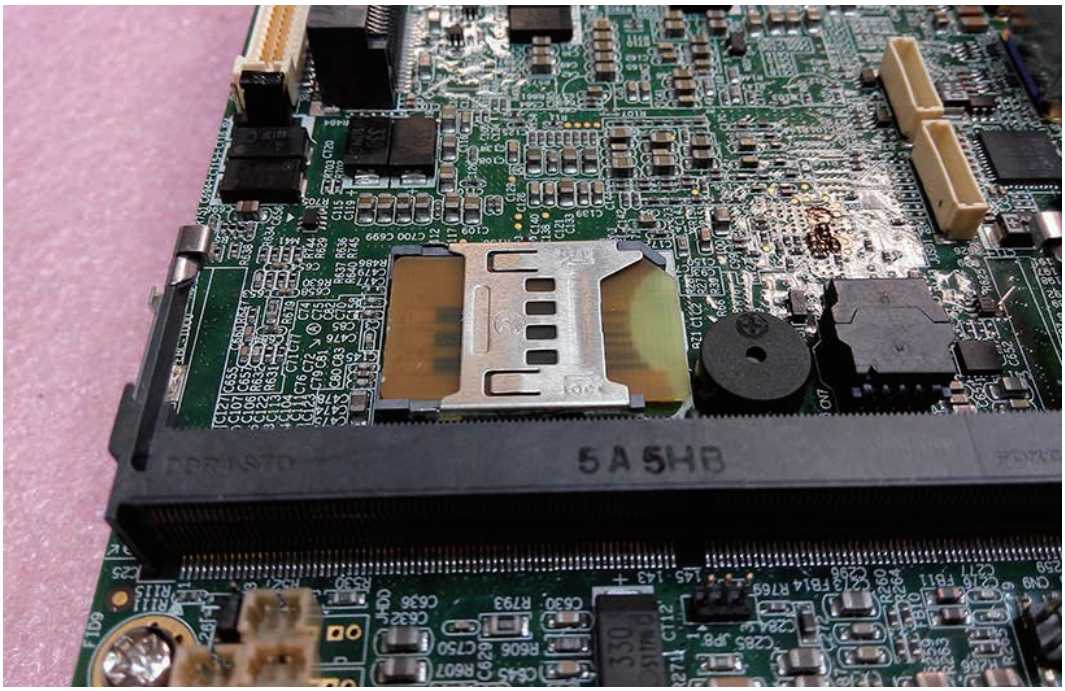
3.5 Installing SIM Card

Step 1 Open the SIM card cover.



Step 2 Install SIM card into the SIM card slot and then close and lock the SIM card cover.





4

BIOS SETUP

4.1 Entering Setup

BIOS provides an interface for users to check and change system configuration. The BIOS setup program is accessed by pressing the <Del> key when POST display output is shown.

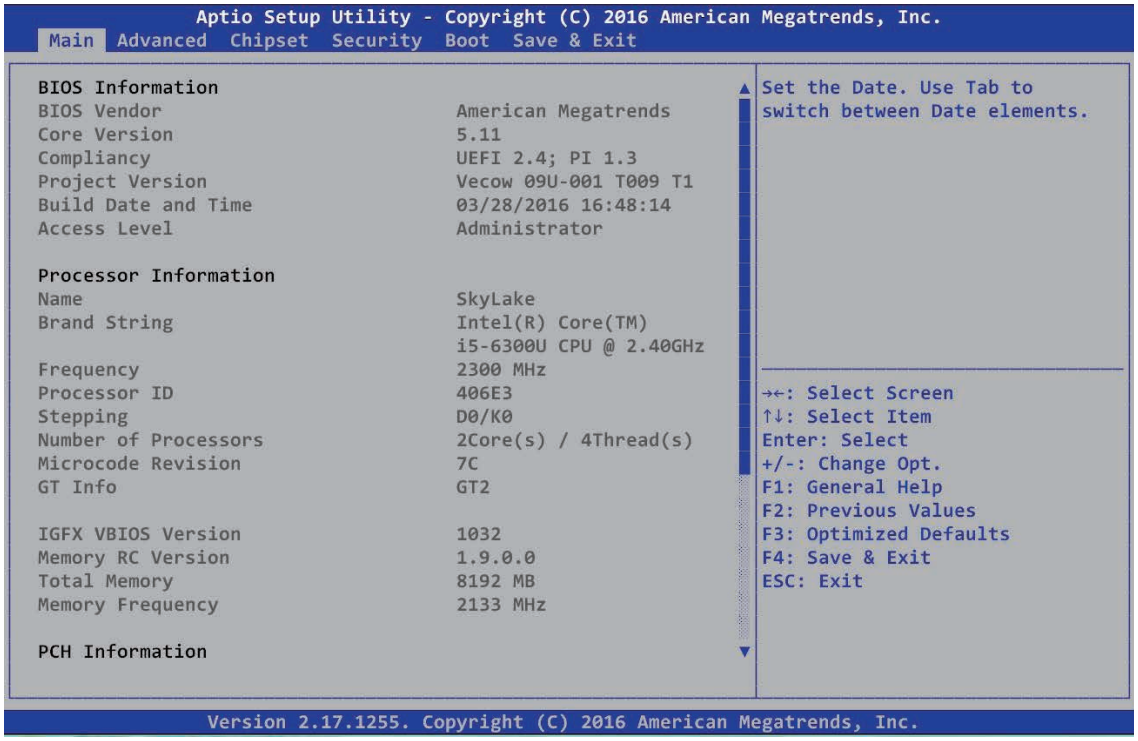


Figure 4-1 : Entering Setup Screen

4.2 Main Menu

The main menu displays BIOS version and system information. There are two options on Main menu.

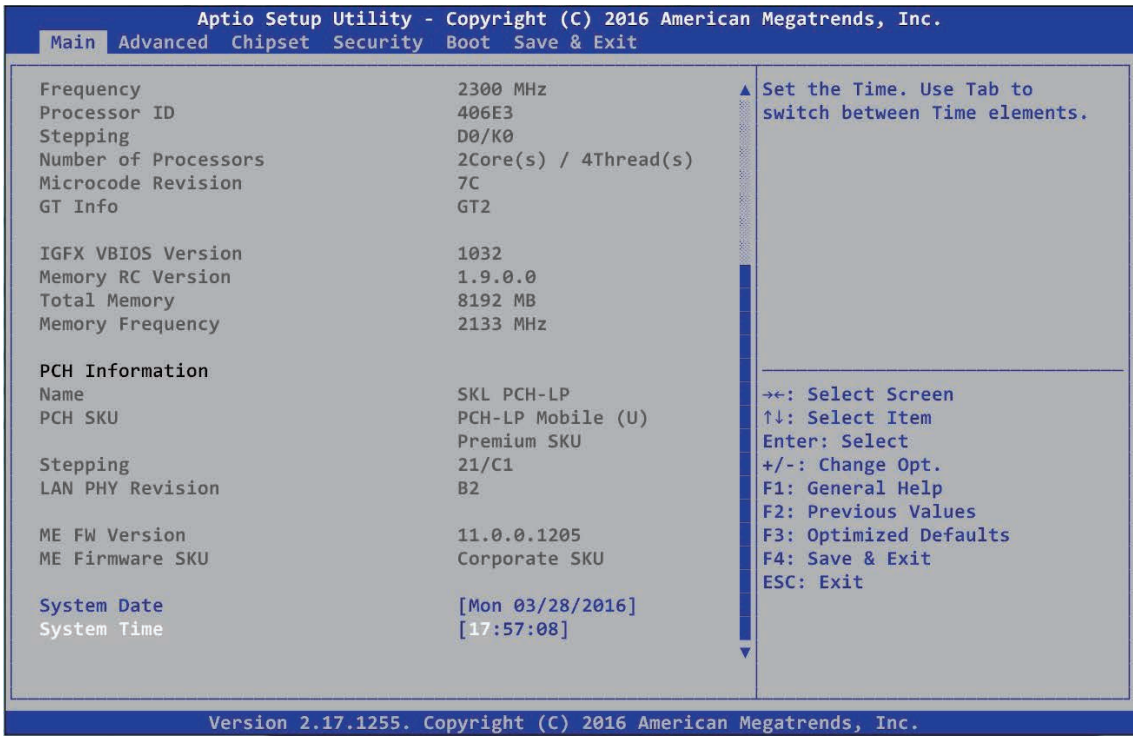


Figure 4-2 : BIOS Main Menu

System Date

Set the Date. Use Tab to switch between Date elements.

System Time

Set the Time. Use Tab to switch between Time elements.

4.3 Advanced Function

Select Advanced tab to enter advanced BIOS Setup options such as CPU configuration SATA configuration, and USB configuration.

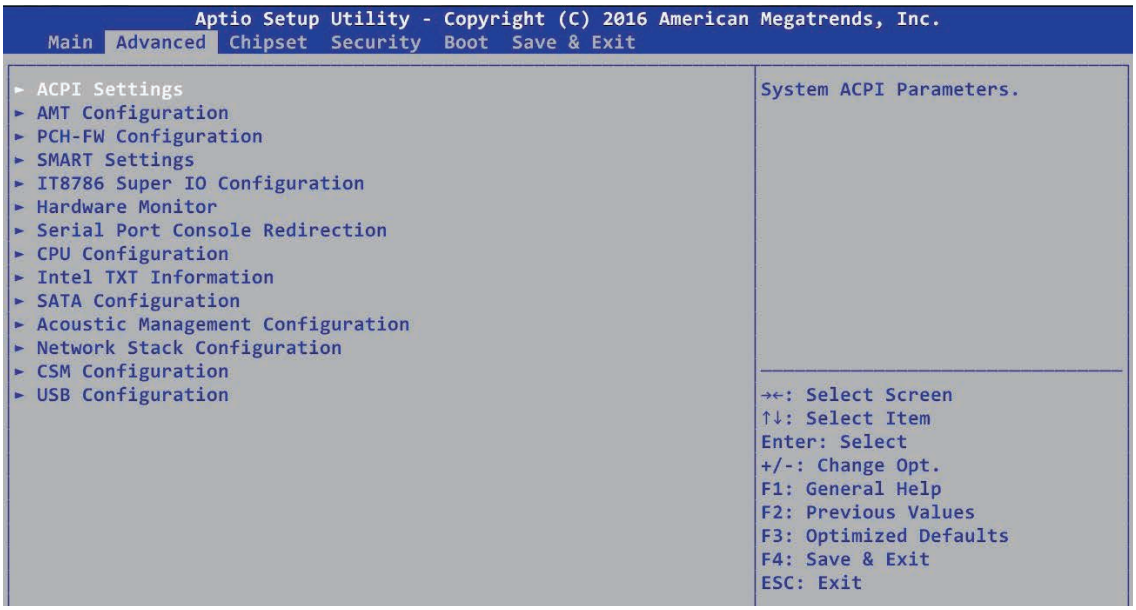


Figure 4-3 : BIOS Advanced Menu

4.3.1 ACPI Setting

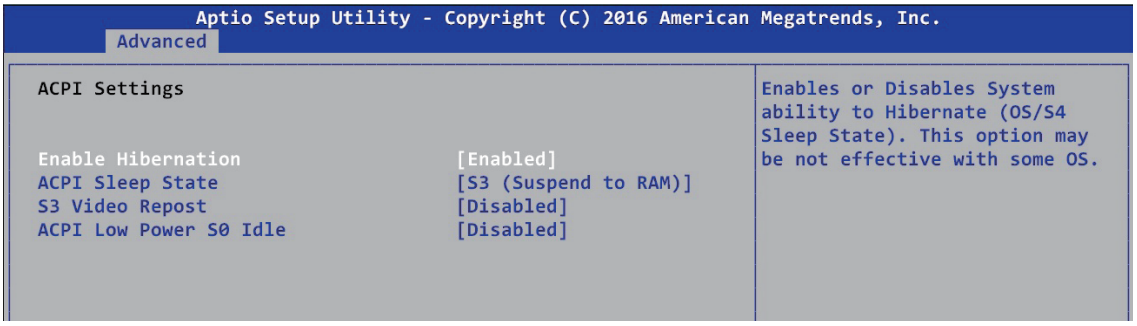


Figure 4-3-1 : ACPI Settings

Enable Hibernation
Enables or disables system's ability to hibernate (OS/S4 Sleep State). This option may be not effective with some OS.

ACPI Sleep State
Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.

S3 Video Repost
Enable or disable S3 Video Repost.

ACPI Low Power S0 Idle
Enable or disable ACPI Low Power S0 Idle Support.

4.3.2 AMT Configuration

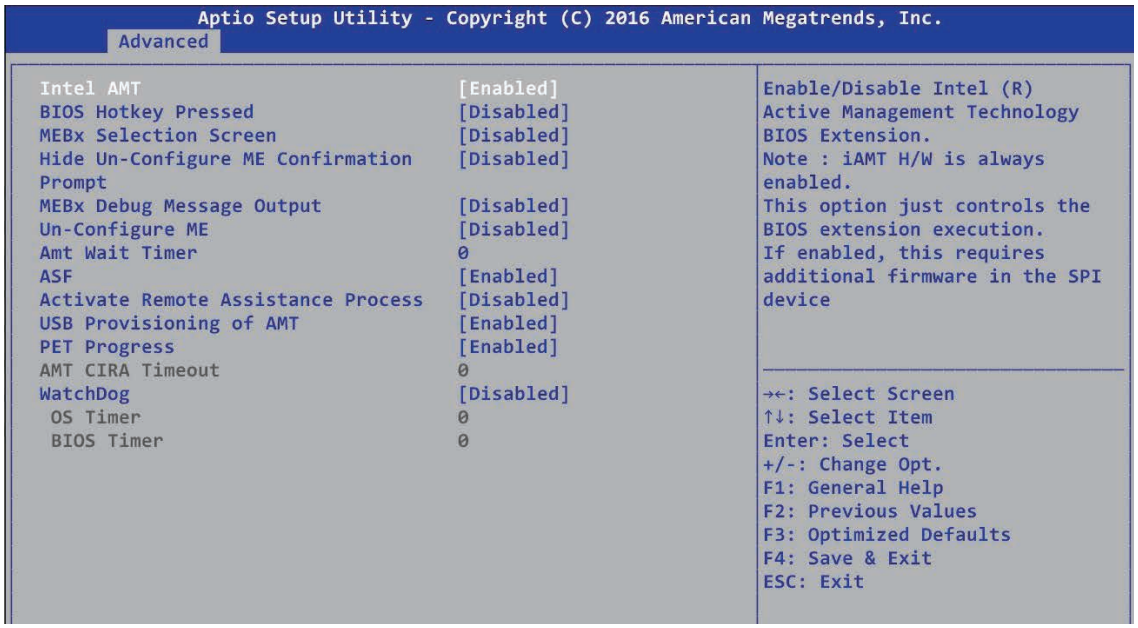


Figure 4-3-2 : Intel AMT Settings

Intel AMT

Enable/disable Intel Active Management Technology BIOS Extension.
Note: iAMT H/W is always enabled. This option just controls the BIOS extension execution. If enabled, this requires additional firmware in the SPI device.

4.3.3 PCH-FW Configuration

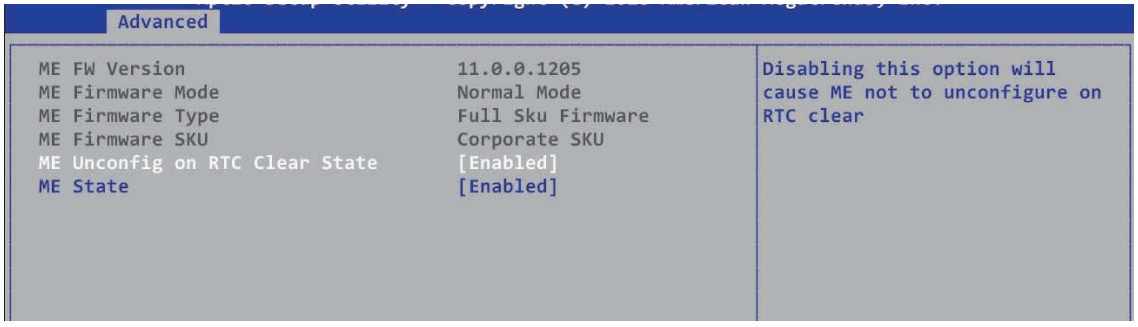


Figure 4-3-3 : PCH-FW Settings

ME Unconfig on RTC Clear State

Disabling this option will cause ME not to unconfigure on RTC clear.

ME State

Set ME to soft temporarily disabled.

4.3.4 SMART Settings

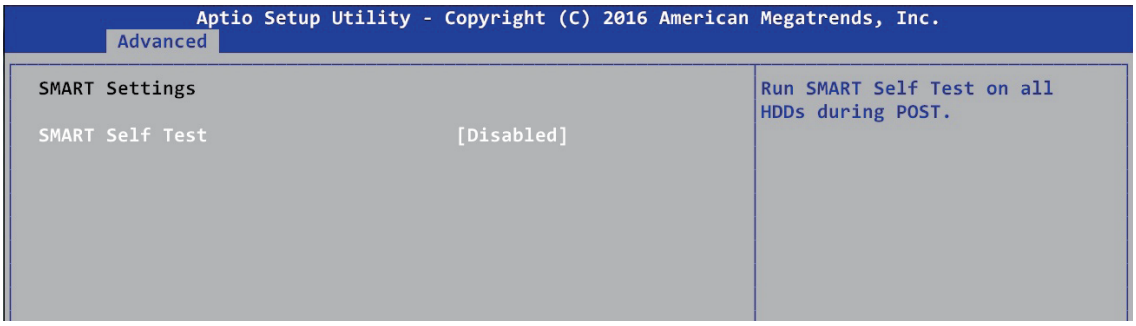


Figure 4-3-4 : SMART Settings

SMART Self Test
Run SMART Self Test on all HDDs during POST.

4.3.5 IT8786 Super IO Configuration

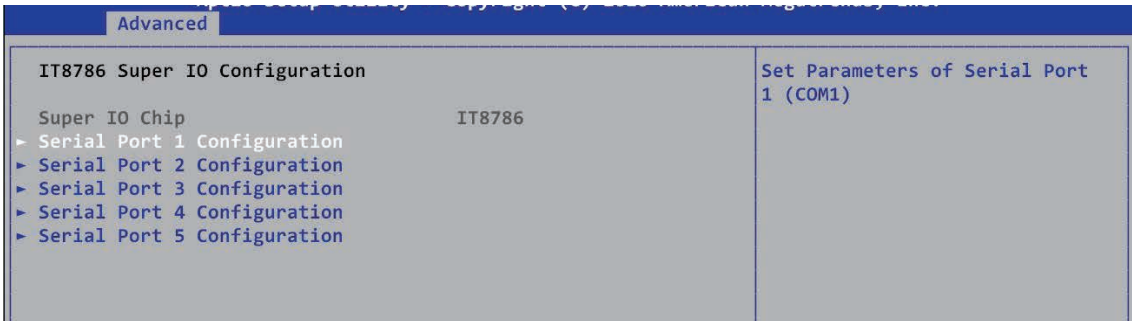


Figure 4-3-5 : Super IO Settings

Serial Port 1 Configuration
Set parameters of serial port 1 (COM 1).

Serial Port 2 Configuration
Set parameters of serial port 2 (COM 2).

Serial Port 3 Configuration
Set parameters of serial port 3 (COM 3).

Serial Port 4 Configuration
Set parameters of serial port 4 (COM 4).

Serial Port 5 Configuration
Set parameters of serial port 5 (COM 5).

4.3.6 Hardware Monitor

The IT8786 SIO features an enhanced hardware monitor providing thermal, fan speed, and system voltages' status monitoring.

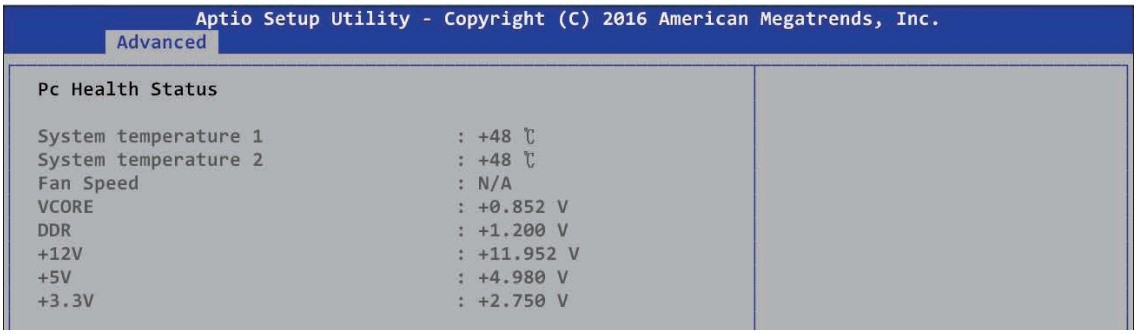


Figure 4-3-6 : Hardware Monitor Settings

4.3.7 Serial Port Console Redirection

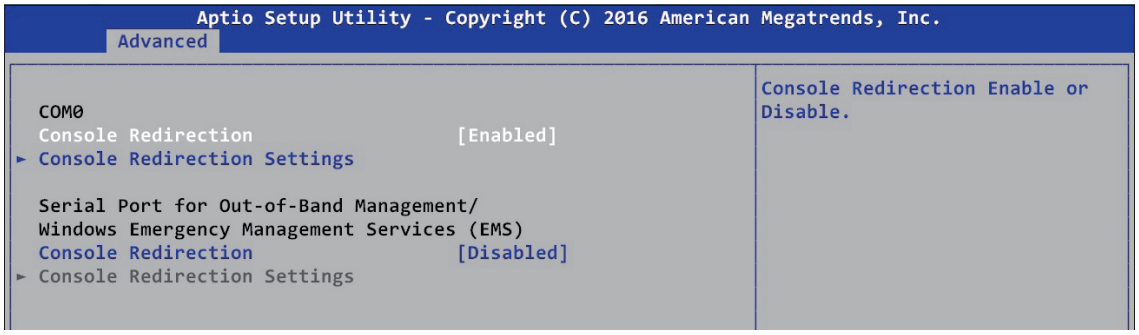


Figure 4-3-7 : Serial Port Console Redirection Settings

Console Redirection

Console redirection enable or disable.

Console Redirection Settings

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.

4.3.8 CPU Configuration

Display CPU-related related information and features supported.

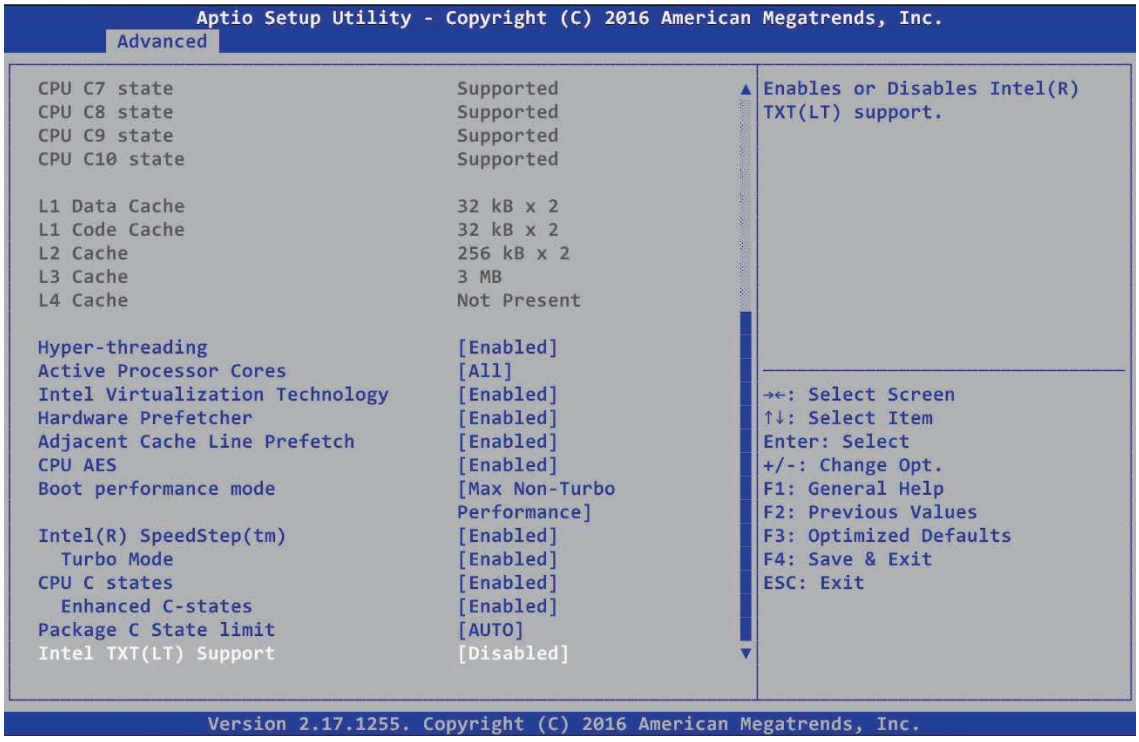


Figure 4-3-8 : CPU Function Settings

Hyper-threading

Enabled for Windows XP and Linux (OS optimized for Hyper-Threading Technology) and disabled for other OS (OS not optimized for Hyper-Threading Technology). When disabled only one thread per enabled core is enabled.

Active Processor Cores

Number of cores to enable in each processor package.

Intel Virtualization Technology

When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.

Hardware Prefetcher

To turn on/off the MLC streamer prefetcher.

Adjacent Cache Line Prefetch

To turn on/off prefetching of adjacent cache lines.

CPU AES

Enable/disabled CPU Advanced Encryption Standard instructions.

Boot performance mode
Select the performance state that the BIOS will set before OS handoff.

Intel SpeedStep
Allows more than two frequency ranges to be supported.

Turbo Mode
Turbo Mode.

CPU C state
Enable or disable CPU C states.

Enhanced C-states
Enable/disabled C1E. When enabled, CPU will switch to minimum speed when all cores enter C-State.

Package C State limit
Package C State limit.

Intel TXT(LT) Suppor
Enables or disabled Intel TXT(LT) support.

4.3.9 Intel TXT Information

Display Intel TXT information.

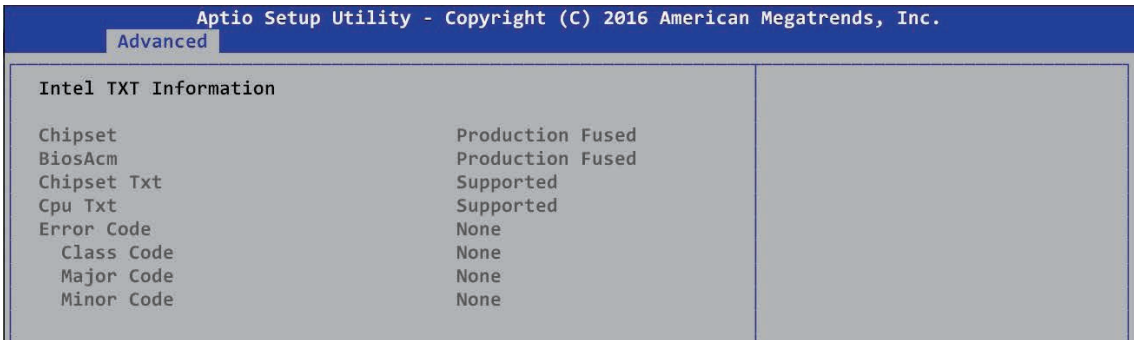


Figure 4-3-9 : Intel TXT Information

4.3.10 SATA Configuration

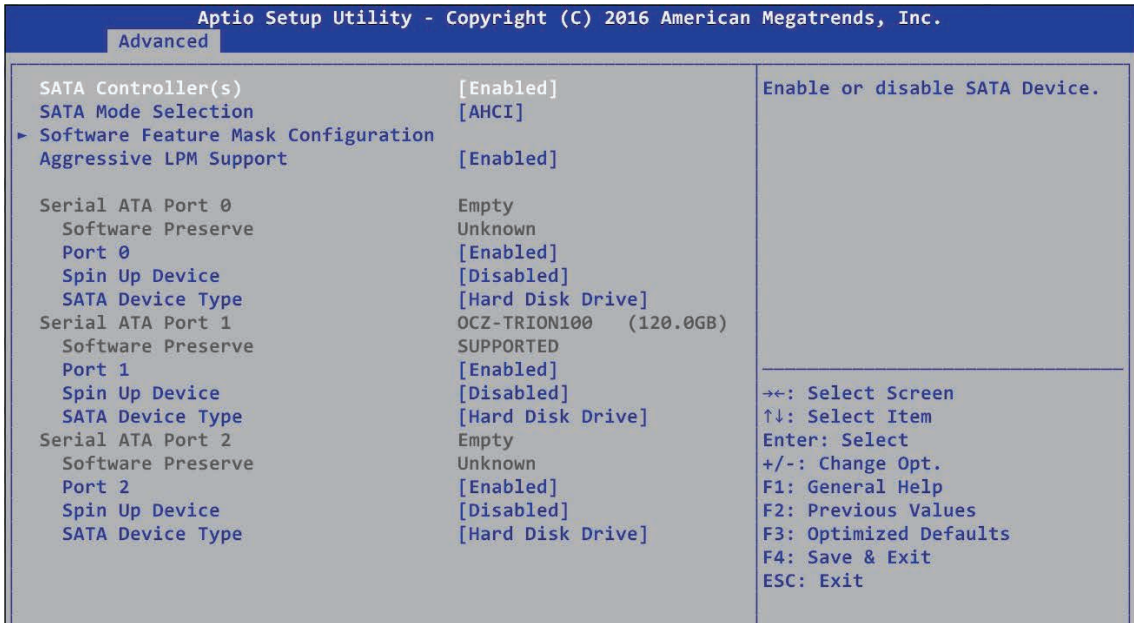


Figure 4-3-10 : SATA Devices Settings

Hyper-threading
Enabled for Windows XP and Linux (OS optimized for Hyper-Threading Technology) and disabled for other OS (OS not optimized for Hyper-Threading Technology). When disabled only one thread per enabled core is enabled.

SATA Controller(s)
Enable or disable SATA Device.

SATA Mode Selection
Determines how SATA controller(s) operate.

Software Feature Mask Configuration
RAID OROM/RST driver will refer to the SWFM configuration to enable or disable the storage features.

Aggressive LPM Support
Enable PCH to aggressively enter link power state.

Options for each SATA port :

Port 0
Enable or disabled SATA Port.

Spin Up Device
On an edge detect from 0 to 1, the PCH starts a COMRESET initialization sequence to the device.

SATA Device Type
Identify the SATA port is connected to Solid State Drive or Hard Disk Drive.

4.3.11 Acoustic Management Configuration

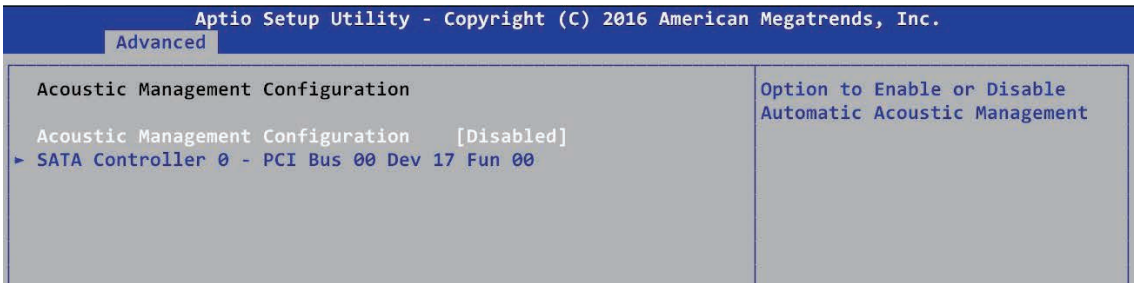


Figure 4-3-11 : Acoustic Management Settings

Acoustic Management Configuration

Option to enable or disable Automatic Acoustic Management.

4.3.12 Network Stack Configuration

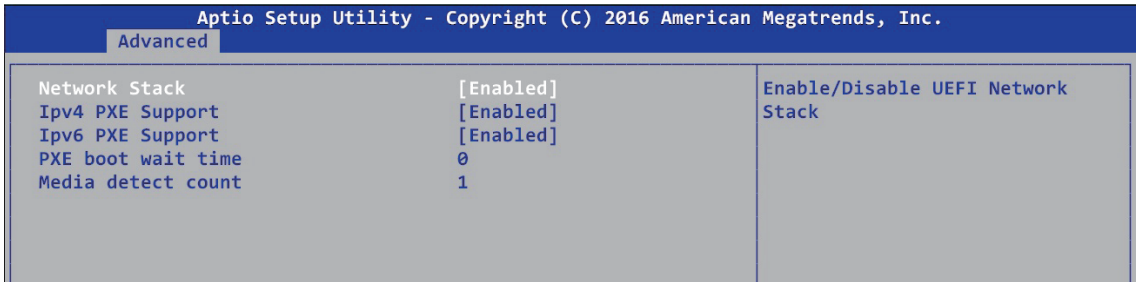


Figure 4-3-12 : Network Stack Settings

Network Stack

Enable/disable UEFI Network Stack.

Ipv4 PXE Support

Enable Ipv4 PXE Boot Support. If disabled IPV4 PXE boot option will not be created.

Ipv6 PXE Support

Enable Ipv6 PXE Boot Support. If disabled IPV6 PXE boot option will not be created.

PXE boot wait time

Wait time to press ESC key to abort the PXE boot.

Media detect count

Number of times presence of media will be checked.

4.3.13 CSM Configuration

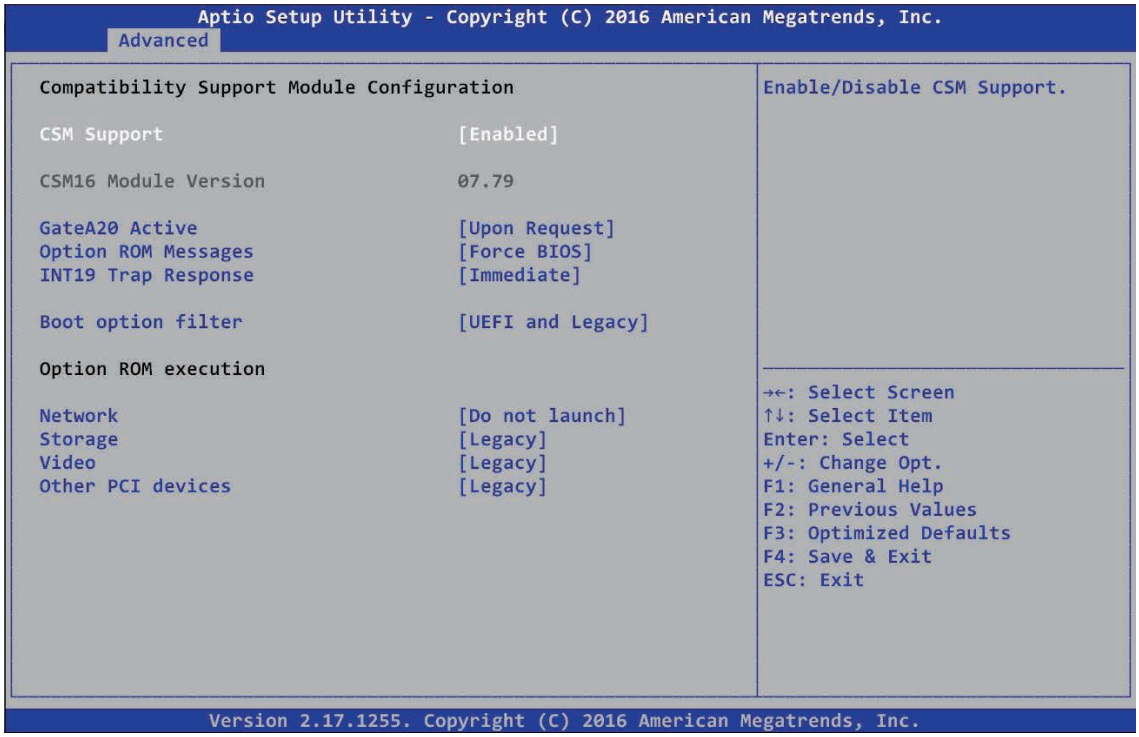


Figure 4-3-13 : CSM Settings

Network Stack
Enable/disable UEFI Network Stack.

CSM Support
Enable/disable CSM Support.

GateA20 Active
UPON REQUEST - GA20 can be disabled using BIOS services.
ALWAYS - do not allow disabling GA20; this option is useful when any RT code is executed above 1MB.

Option ROM Messages
Set display mode for Option ROM.

INT19 Trap Response
BIOS reaction on INT19 trapping by Option ROM:
IMMEDIATE - execute the trap right away;
POSTPONED - execute the trap during legacy boot.

Boot option filter
This option controls Legacy/UEFI ROMs priority.

Network
Controls the execution of UEFI and Legacy PXE OpROM.

Storage
Controls the execution of UEFI and Legacy Storage OpROM.

Video
Controls the execution of UEFI and Legacy Video OpROM.

Other PCI devices
Determines OpROM execution policy for devices other than network, storage, or video.

4.3.14 USB Configuration

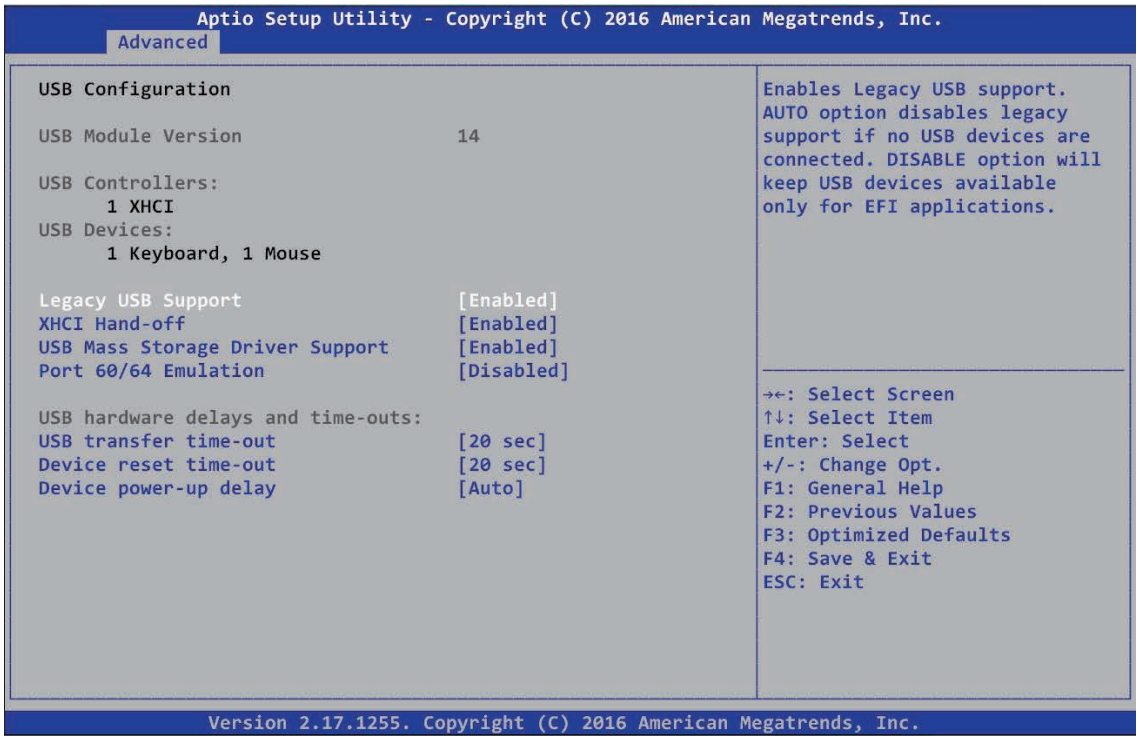


Figure 4-3-14 : USB Settings

Network Stack
Enable/disable UEFI Network Stack.

Legacy USB Support
Enables Legacy USB support.
AUTO option disables legacy support if no USB devices are connected.
DISABLE option will keep USB devices available only for EFI applications.

XHCI Hand-off
This is a workaround for OS-es without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.

USB Mass Storage Driver Support
Enable/disable USB Mass Storage Driver Support.

Port 60/64 Emulation
Enables I/O port 60h/64h emulation support. This should be enabled for the complete USB keyboard legacy support for non-USB aware OSes.

USB transfer time-out
The time-out value for control, bulk, and interrupt transfers.

Device reset time-out
USB mass storage device Start Unit command time-out.

Device power-up delay
Maximum time the device will take before it properly reports itself to the host controller. 'Auto' uses default value: for a root port it is 100 ms, for a hub port the delay is taken from hub descriptor.

4.4 Chipset

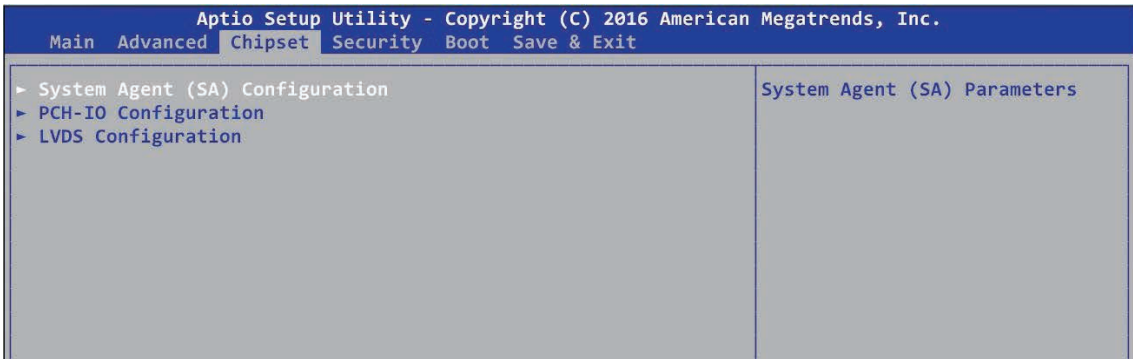


Figure 4-4 : BIOS Chipset Menu

System Agent (SA) Configuration
System Agent (SA) Parameters.

PCH-IO Configuration
PCH Parameters.

LVDS Configuration
LVDS Configuration.

4.4.1 System Agent (SA) Configuration

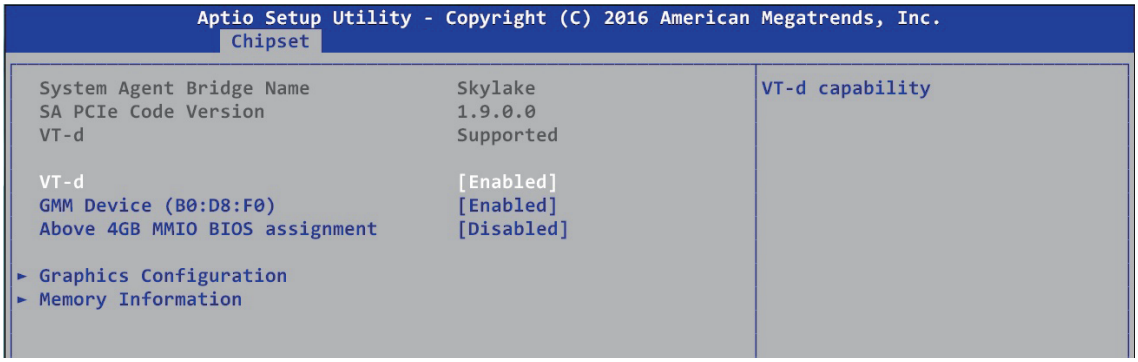


Figure 4-4-1 : USB Settings

VT-d
VT-d capability.

GMM Device (B0:D8:F0)
Enable/disable SA GMM Device.

Above 4GB MMIO BIOS assignment
Enable/disable above 4GB Memory MappedIO BIOS assignment. This is disabled automatically when Aperture Size is set to 2048MB.

4.4.2 Graphics Configuration of System Agent (SA)

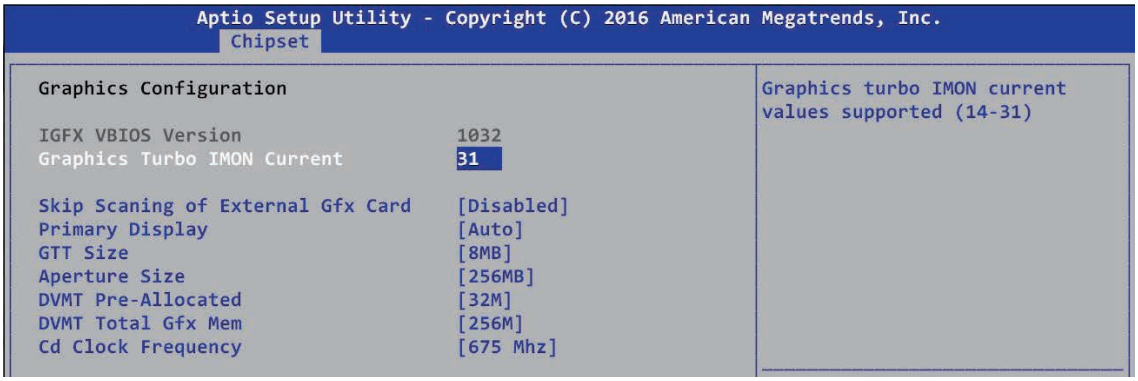


Figure 4-4-1 : USB Settings

Graphics Turbo IMON Current
Graphics turbo IMON current values supported (14-31).

Skip Scaning of External Gfx Card
If enable, it will not scan for External Gfx Card on PEG and PCH PCIE Ports.

Primary Display
Select which of IGFX/PEG/PCI graphics device should be primary display or select SG for Switchable Gfx.

GTT Size
Select the GTT Size.

Aperture Size
Select the Aperture Size.
Note: Above 4GB MMIO BIOS assignment is automatically enabled when selecting 2048MB aperture. To use this feature, please disable CSM Support.

DVMT Pre-Allocated
Select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device.

DVMT Total Gfx Mem
Select DVMT5.0 Total Graphic Memory size used by the Internal Graphics Device.

Cd Clock Frequency
Select the highest Cd Clock frequency supported by the platform.

4.4.3 Memory Information of System Agent (SA)

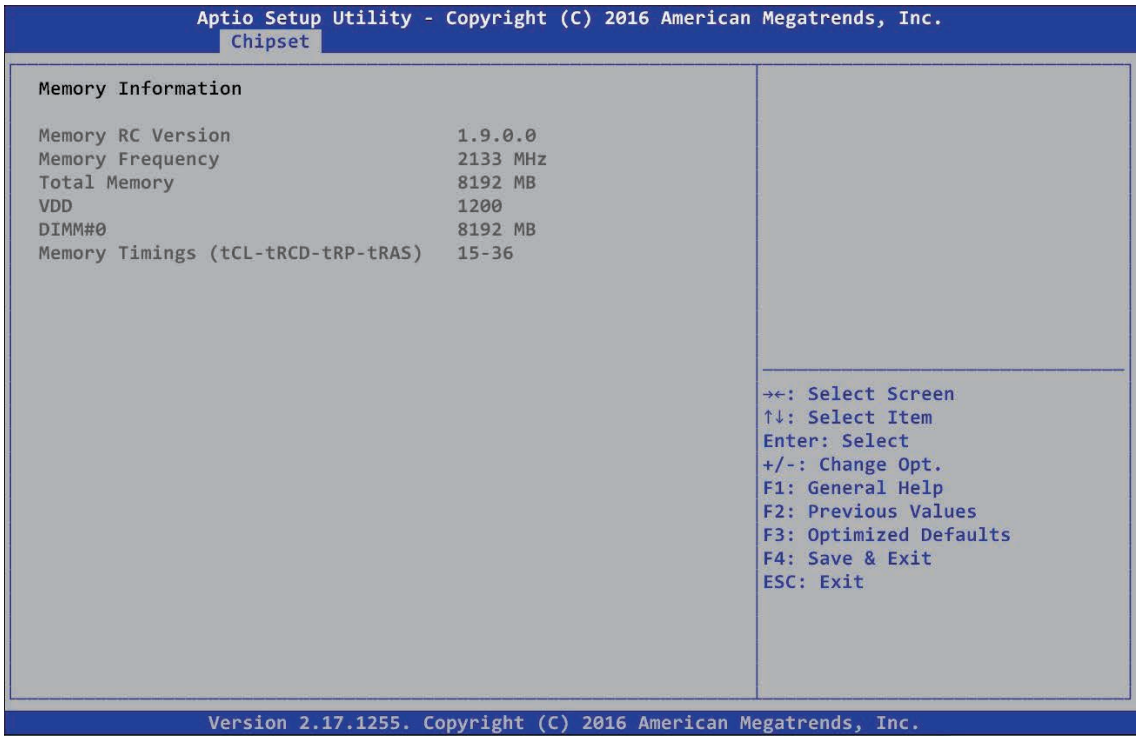


Figure 4-4-3 : Memory Information

Display memory information.

4.4.4 PCH-IO Configuration

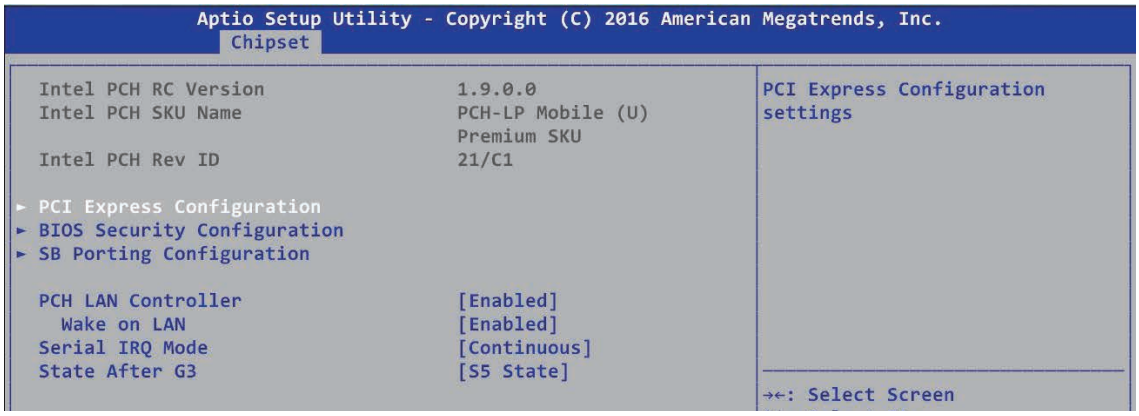


Figure 4-4-4 : USB Settings

PCH LAN Controller
Enable or disable onboard NIC.

Wake on LAN
Enable or disable integrated LAN to wake the system. (The Wake On LAN cannot be disabled if ME is on at Sx state).

Serial IRQ Mode
Configure Serial IRQ Mode.

State After G3
Specify what state to go to when power is re-applied after a power failure (G3 state).
S0 State: Always turn-on the system when power source plugged-in.
S5 State: Always turn-off the system when power source plugged-in

DMI Link ASPM Control
Enable/disable the control of Active State Power Management on SA side of the DMI Link.

Intel Ethernet Controller I210
Intel Ethernet Controller I210 Settings.

Mini PCIe Slot with SIM
Mini PCIe Slot with SIM Settings.

Mini PCIe\ mSATA Slot
Mini PCIe\ mSATA Slot Settings.

4.4.6 BIOS Security Configuration of PCH-IO

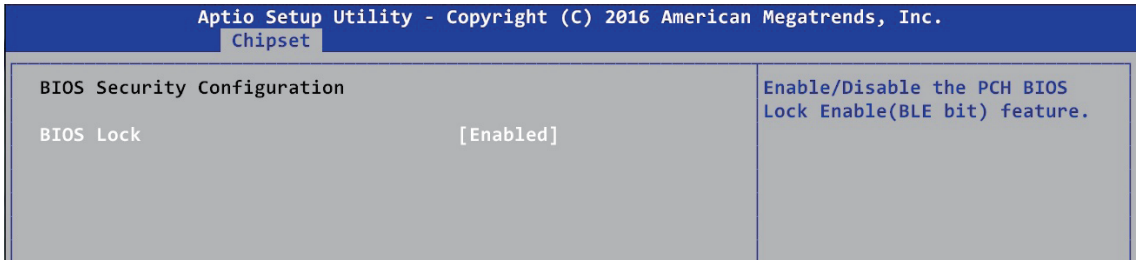


Figure 4-4-6 : BIOS Security Settings

BIOS Lock
Enable/disable the PCH BIOS lock enable (BLE bit) feature.

4.4.7 SB Porting Configuration of PCH-IO

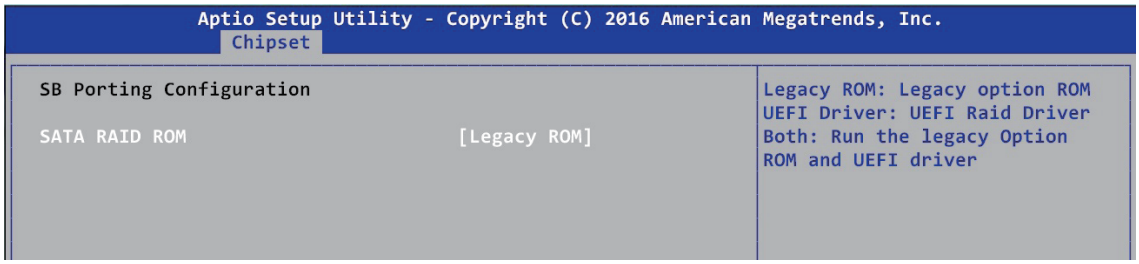


Figure 4-4-7 : RAID ROM Settings

SATA RAID ROM
Legacy ROM: Legacy option ROM
UEFI Driver: UEFI Raid Driver
Both: Run the legacy Option ROM and UEFI driver.

4.4.8 LVDS Configuration

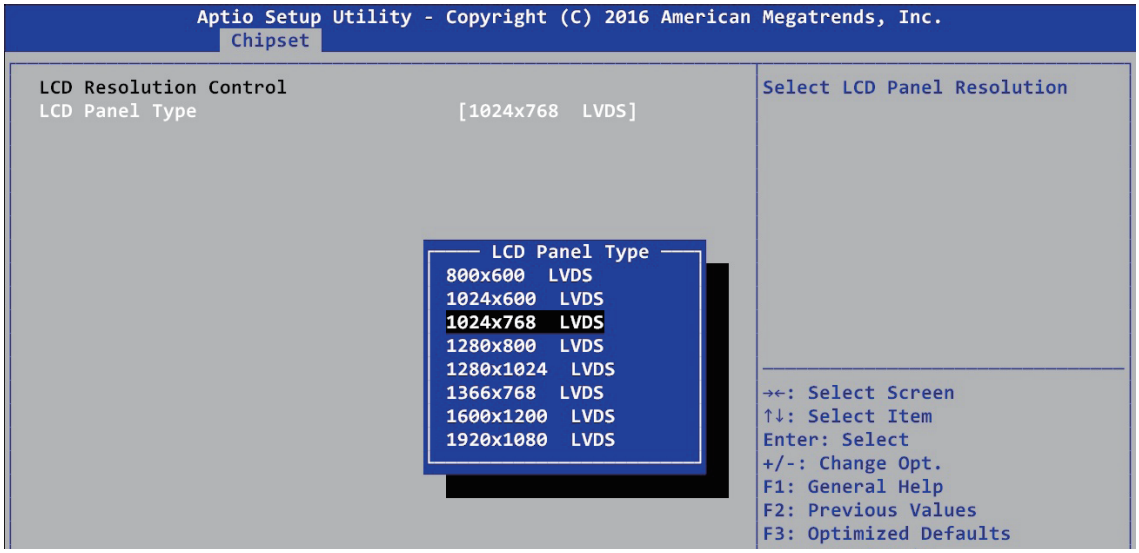


Figure 4-4-8 : LVDS Panel Settings

LCD Panel Type

Select LCD Panel Resolution.

4.5 Security

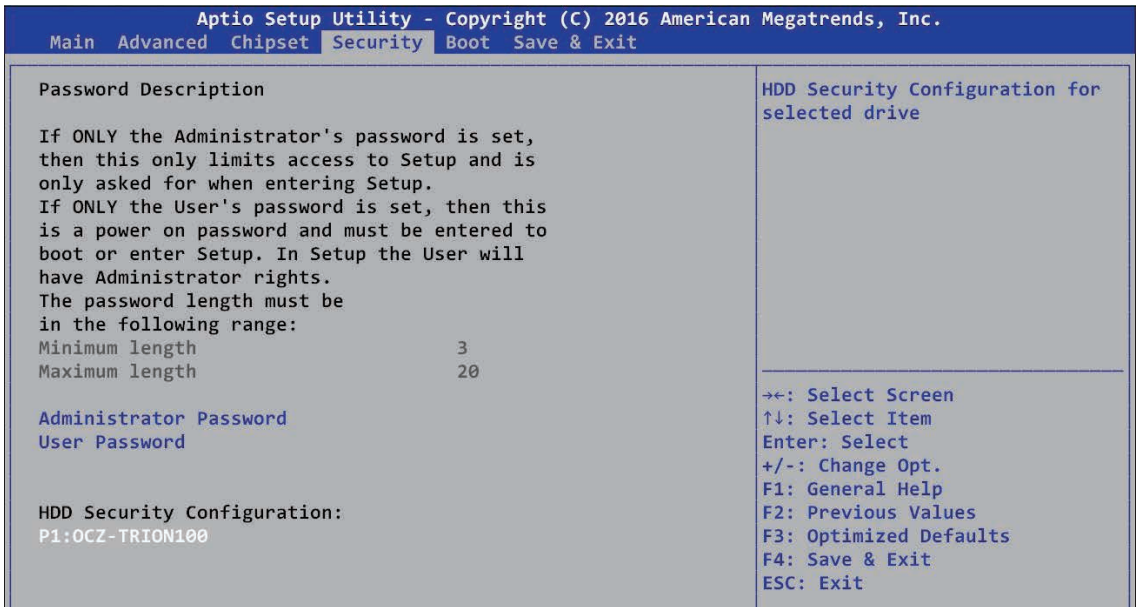


Figure 4-5 : BIOS Security Menu

Administrator Password

Set Administrator Password.

User Password

Set User Password.

4.5.1 HDD Security Configuration

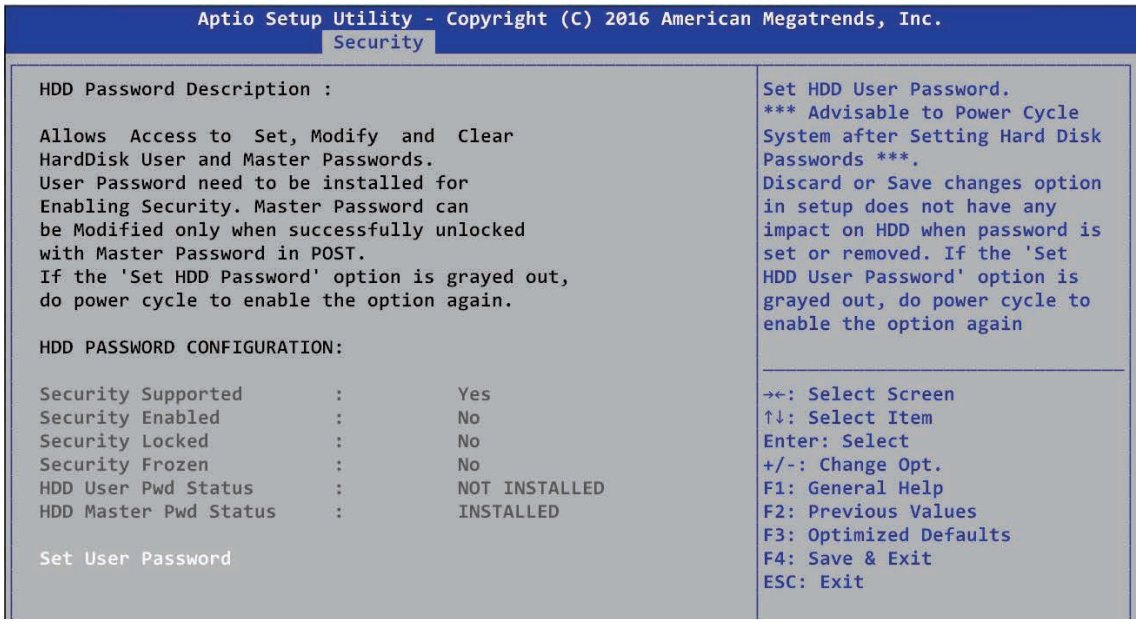


Figure 4-5-1 : HDD Security Settings

Set User Password
Set HDD user password.

Advisable to Power Cycle System after Setting Hard Disk Passwords.
Discard or save changes option in setup does not have any impact on HDD when password is set or removed. If the 'Set HDD User Password' option is grayed out, do power cycle to enable the option again.

4.6 Boot

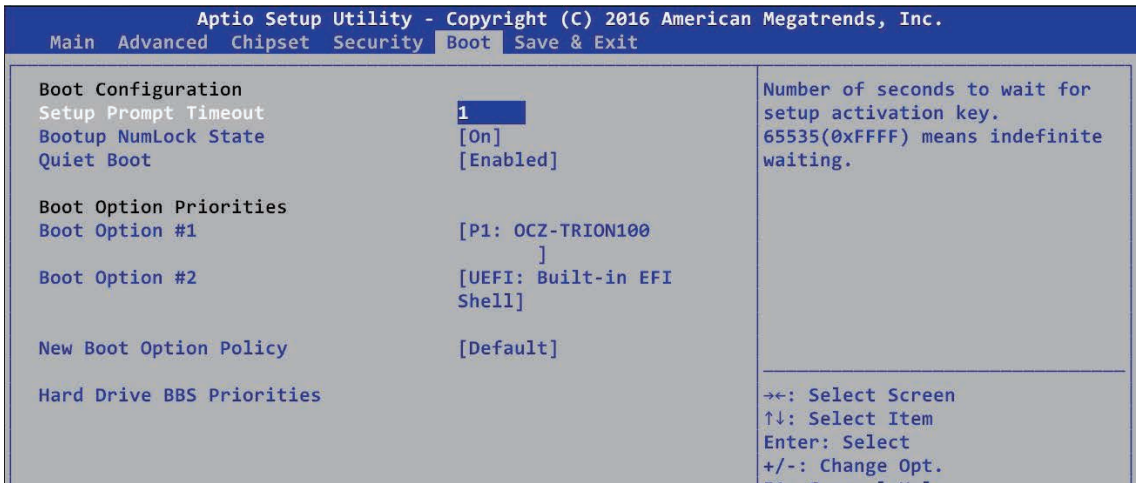


Figure 4-6 : BIOS Boot Menu

Setup Prompt Timeout
Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.

Bootup NumLock State
Select the keyboard NumLock state.

Quiet Boot
Enables or disables Quiet Boot option.

Boot Option #x
Sets the system boot order.

New Boot Option Policy
Controls the placement of newly detected UEFI boot options.

Hard Drive BBS Priorities
Set the order of the legacy devices in this group.

4.7 Save & Exit

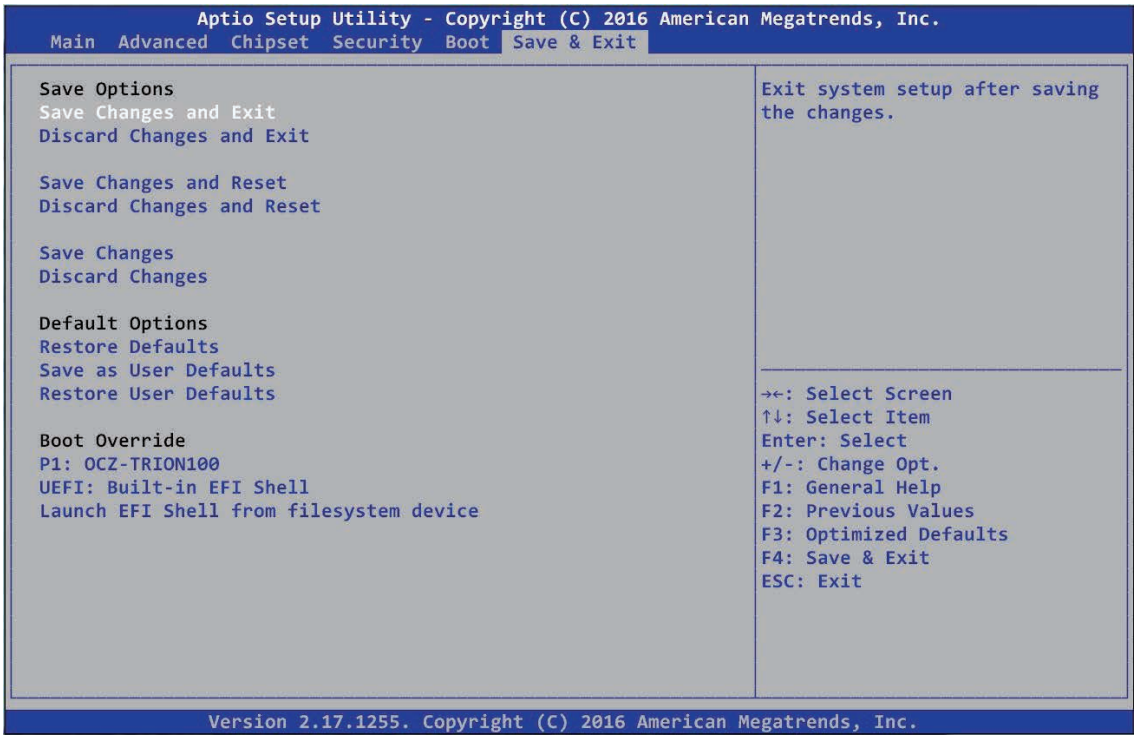


Figure 4-7 : Bios Save and Exit Menu

Save Changes and Exit
Exit system setup after saving the changes.

Discard Changes and Exit
Exit system setup without saving any changes.

Save Changes and Reset
Reset the system after saving the changes.

Discard Changes and Reset
Reset system setup without saving any changes.

Save Changes
Save changes done so far to any of the setup options.

Discard Changes
Discard changes done so far to any of the setup options.

Default Options :

Restore Defaults
Restore/load default values for all the setup options.

Save as User Defaults
Save the changes done so far as User Defaults.

Restore User Defaults
Restore the User Defaults to all the setup options.

A

APPENDIX A : ISOLATED DIO GUIDE

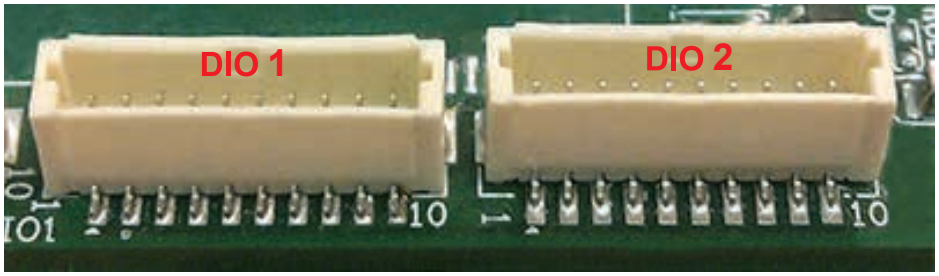
A.1 I/O Pin Definition

I/O Pin	GPIO 77~74	GPIO 87~84
Base Adr.	0xA06 [7:4]	0xA07 [7:4]
Usage	DIO 2 Output	DIO 2 Input

GPIO 73~70	GPIO 83~80
0xA06 [3:0]	0xA07 [3:0]
DIO 1 Output	DIO 1 Input

A.2 Function Description

The EMBC-1000 offers a 16-bit DIO (8-DI/8-DO) on two wafer connector. There is a 16-bit GPIO connector in the top side. Each GPIO channel can be configuration GPI or GPO. Please refer to below table to see the pin definition in details.



Pin No.	JDIO1 Definition	JDIO2 Definition
1	SIO_GPI80	SIO_GPI84
2	SIO_GPI81	SIO_GPI85
3	SIO_GPI82	SIO_GPI86
4	SIO_GPI83	SIO_GPI87
5	SIO_GPO70	SIO_GPO74
6	SIO_GPO71	SIO_GPO75
7	SIO_GPO72	SIO_GPO76
8	SIO_GPO73	SIO_GPO77
9	+5V	+5V
10	GND	GND

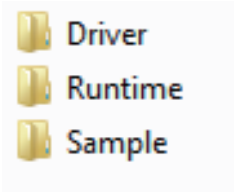
GIOP DC Electrical Characteristics:

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
V_{OL}	Low Output Voltage	I_{OL} = 8 mA			0.4	V
V_{IL}	Low Input Voltage				0.8	V
V_{IH}	High Input Voltage		2.2			V
I_{IL}	Low Input Leakage	V_{IN} = 0			10	µA
I_{IH}	High Input Leakage	V_{IN} = VCC3			-10	µA
I_{OZ}	3-state Leakage				20	µA

A.3 Software Package contain

There are three folders as follows:

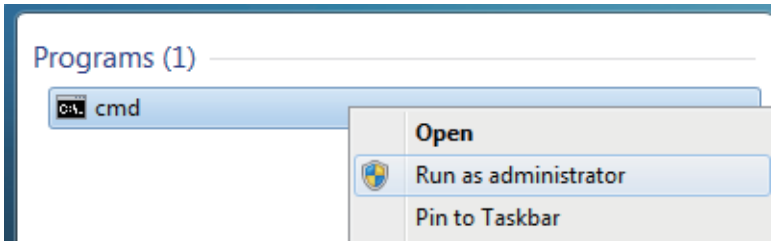
1. Driver folder includes x86 and x64 version.
2. DLL and head file for software developer or System Integration.
3. C# and C++ sample program.

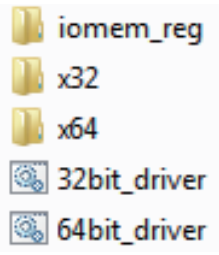


A.4 Driver Install

This driver only supports 32-bit version that are WinXP and Win7 32-bit version. Please make sure your OS before you install it.

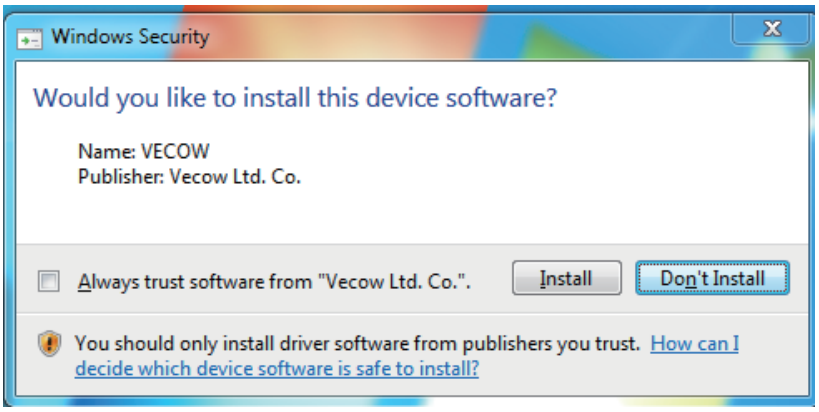
Open Console Window as Administrator



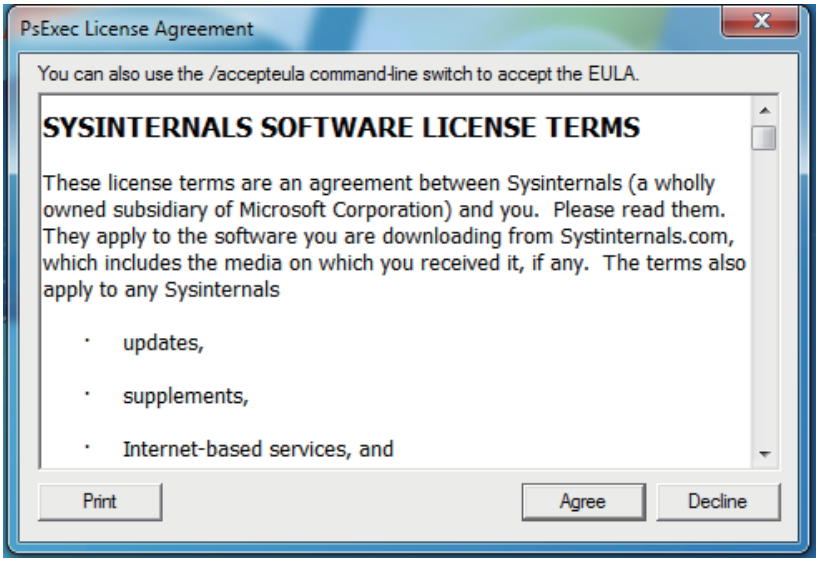


WinXP :
Please execute “32bit_driver.bat” on console window as administrator.
Windows 7 32-bit :
Please execute “32bit_driver.bat” on console window as administrator.
Windows 7 64-bit :
Please execute “64bit_driver.bat” on console window as administrator.

While executing the driver install process, a security window will pop-up. Please check "Always trust software from: 'Vecow Ltd. Co.'" and click install button to go to the next step.



In the 64-bit version, there will be a window for driver certification. Please agree to this license to finish the install process.



After driver installation process is complete, you **must restart the system** to get DIO driver activated.

B

APPENDIX B : WDT Functions

B.1 Function Description

The WDT are using internal Super I/O function. However, you must entry super I/O configuration mode to set it.

Super I/O special address port = 0x2E
Super I/O special data port = 0x2F
GPIO Logical device is 0x07

B.2 Entry Functions

1. Entry MB PnP Mode.

//write twice 0x87 value.
outportb(Super I/O special address port, 0x87);
outportb(Super I/O special address port, 0x01);
outportb(Super I/O special address port, 0x55);
outportb(Super I/O special address port, 0x55);

2. Located on Logical Device 7(LOGIC_DEVICE_WDT)

//write 0x07 on Reg [0x07] , this setup must follow Step A. that can be workable.
outportb(Super I/O special address port, 0x07);
outportb(Super I/O special data port, 0x07);

3. Config the WDT Register

outb(WDT_Config,SPECIAL_ADDRESS_PORT);
outb(WDT_As_Second|WDT_Pin_PWRGD,SPECIAL_DATA_PORT);

4. Start WDT TimeOut Value

Here have 2 Byte for WDT timing count, MSB and LSB should be write the value separate.

WDT_TimeOut_MSB,SPECIAL	***WDT_TimeOut_LSB,SPECIAL***

outb(WDT_TimeOut_LSB,SPECIAL_ADDRESS_PORT);
outb(WDT_TimeOutValue,SPECIAL_DATA_PORT);

APPENDIX C : Power Consumption

Testing Board	EMBC-1000
RAM	Transcend 8GB
SATA 0	TOSHIBA SSD THNS064GE4BBDC 64GB
SATA 1	HITACHI HTS542580K9SA00 80G
USB3.0 -1	USB Flash Transcend 3.0 8GB
USB3.0 -2	USB Flash Transcend 3.0 8GB
USB3.0 -3	USB Flash Transcend 3.0 8GB
USB3.0 -4	USB Flash Transcend 3.0 8GB
USB2.0-1	USB Flash ADATA 8GB
USB2.0-2	Logitech M105 Mouse
LAN1(I219)	1.0 Gbps
LAN2(I210)	1.0 Gbps
Graphics Output	DVI
Power plan	Balance(Windows8.1 Power Plan)
Power Source	Chroma 62006P-100-25

C.1 CPU : Intel® Core™ i7-6600U@2.6GHz (4M Cache, up to 3.40 GHz)

Standby Mode

CPU	Input Power	Max Current	Max Consumption
i7-6600U	12V	0.327A	03.92W
i7-6600U	24V	0.279A	06.70W
i7-6600U	28V	0.274A	07.67W
i7-6600U	36V	0.258A	09.29W

Power-on and boot to Win 8.1 64-bit

CPU	Input Power	Idle Status : CPU usage less 3%		Run 100% CPU usage	
		Max Current	Max Consumption	Max Current	Max Consumption
i7-6600U	12V	0.874A	10.49W	1.993A	23.92W
i7-6600U	24V	0.571A	13.70W	1.121A	26.90W
i7-6600U	28V	0.504A	14.11W	1.002A	28.06W
i7-6600U	36V	0.443A	15.95W	0.796A	28.66W

C.2 CPU : Intel® Core™ i5-6300U@2.4GHz (3M Cache, up to 3.00 GHz)

Standby Mode

CPU	Input Power	Max Current	Max Consumption
i5-6300U	12V	0.335A	04.02W
i5-6300U	24V	0.284A	06.82W
i5-6300U	28V	0.276A	07.73W
i5-6300U	36V	0.259A	09.32W

Power-on and boot to Win 8.1 64-bit

CPU	Input Power	Idle Status : CPU usage less 3%		Run 100% CPU usage	
		Max Current	Max Consumption	Max Current	Max Consumption
i5-6300U	12V	0.854A	10.25W	2.091A	25.09W
i5-6300U	24V	0.580A	13.92W	1.151A	27.62W
i5-6300U	28V	0.514A	14.39W	1.050A	29.40W
i5-6300U	36V	0.445A	16.03W	0.839A	30.20W

C.3 CPU : Intel® Celeron® Processor 3955U (2M Cache, 2.00 GHz)

Standby Mode

CPU	Input Power	Max Current	Max Consumption
Celeron 3955U	12V	0.338A	04.06W
Celeron 3955U	24V	0.296A	07.10W
Celeron 3955U	28V	0.291A	08.15W
Celeron 3955U	36V	0.274A	09.86W

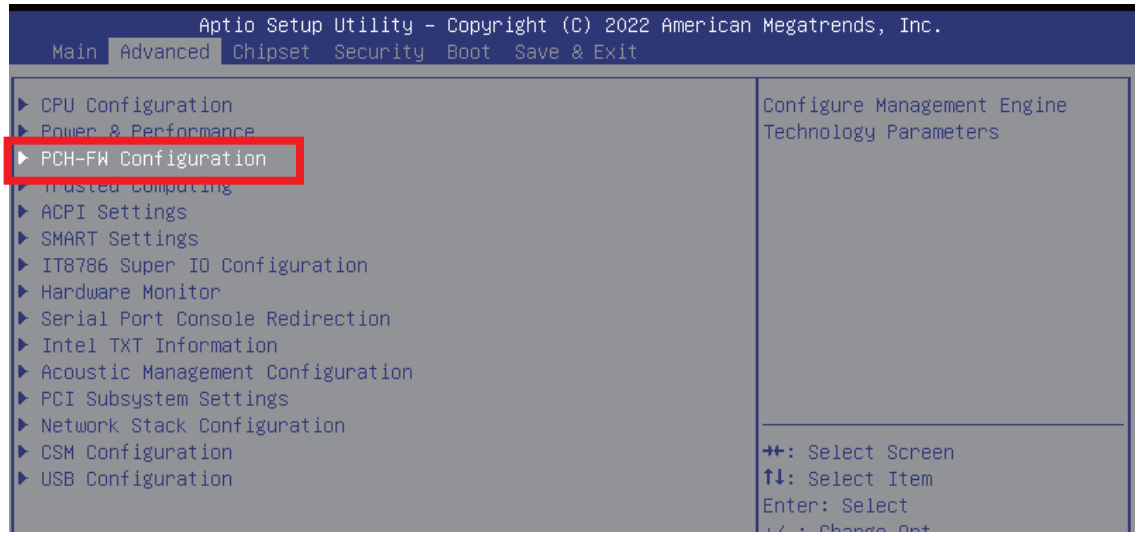
Power-on and boot to Win 8.1 64-bit

CPU	Input Power	Idle Status : CPU usage less 3%		Run 100% CPU usage	
		Max Current	Max Consumption	Max Current	Max Consumption
Celeron 3955U	12V	0.894A	10.73W	1.712A	20.54W
Celeron 3955U	24V	0.570A	13.68W	0.976A	23.42W
Celeron 3955U	28V	0.532A	14.90W	0.843A	23.60W
Celeron 3955U	36V	0.456A	16.42W	0.734A	26.42W

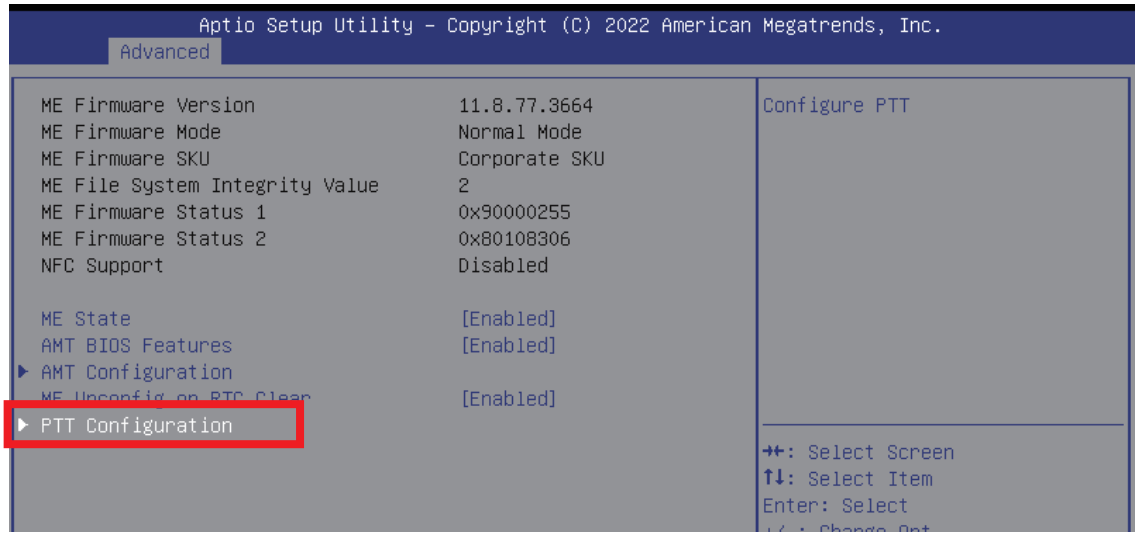
D

APPENDIX D : Install Win11 (BIOS TPM Setting)

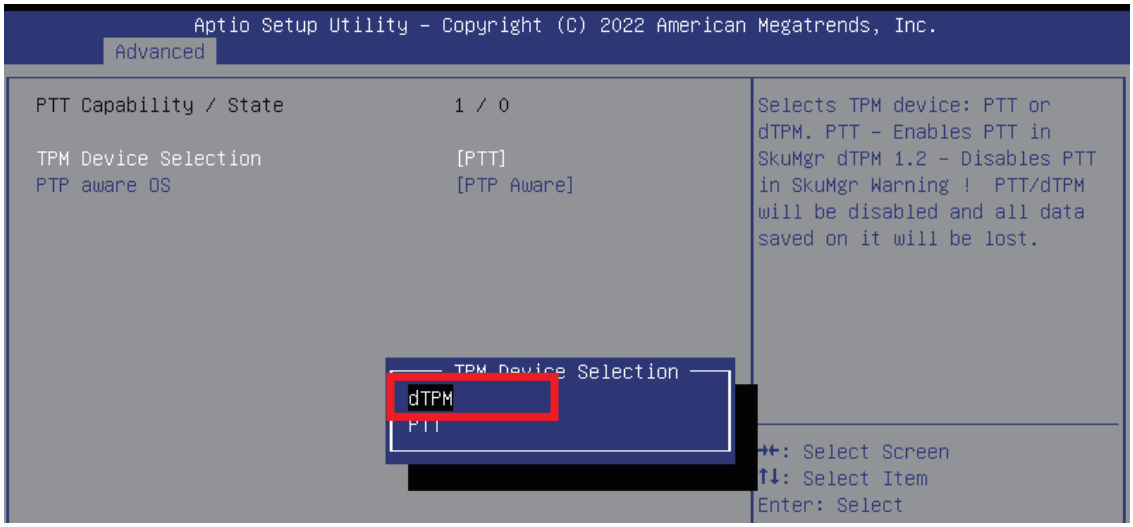
Step 1 Click on “Advanced”, then click on “PCH-FW Configuration”

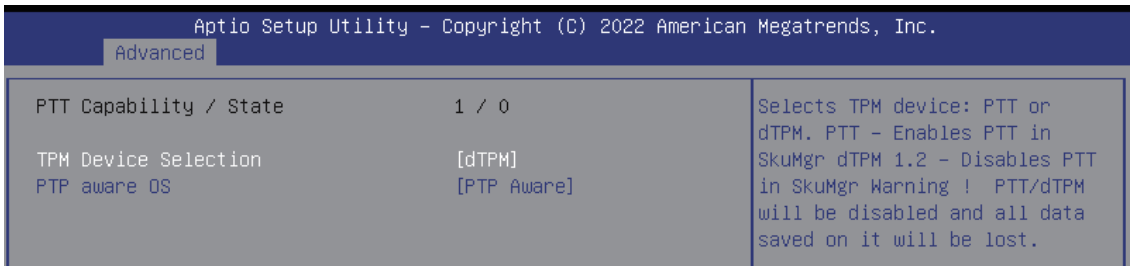


Step 2 Click on “PTT Configuration”

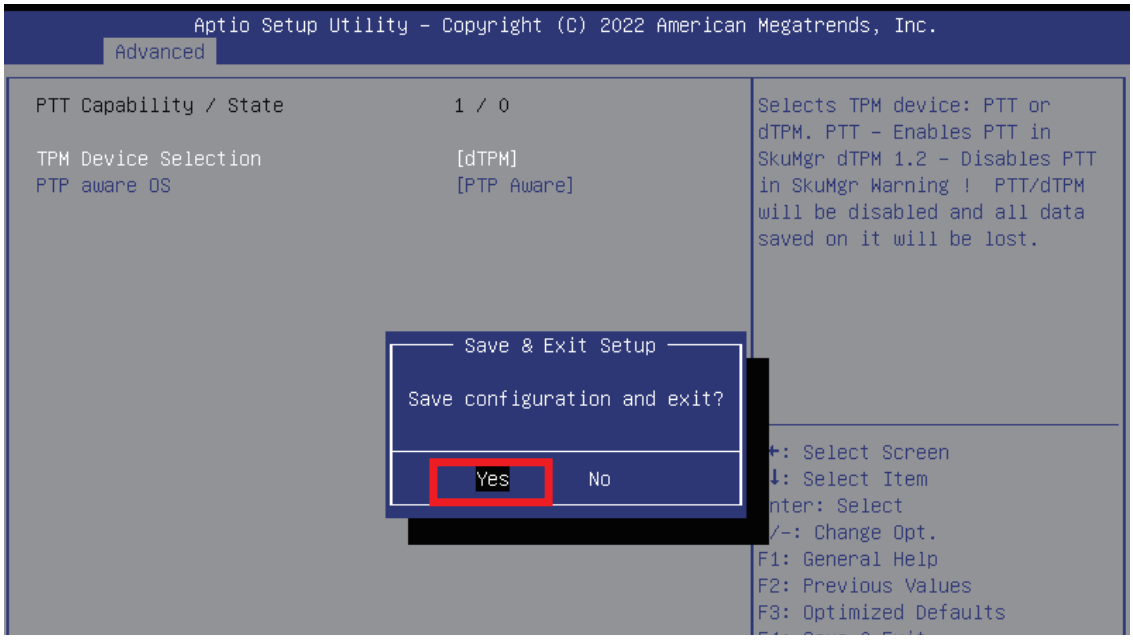


Step 3 Click on “dTPM” (TPM Device Selection)

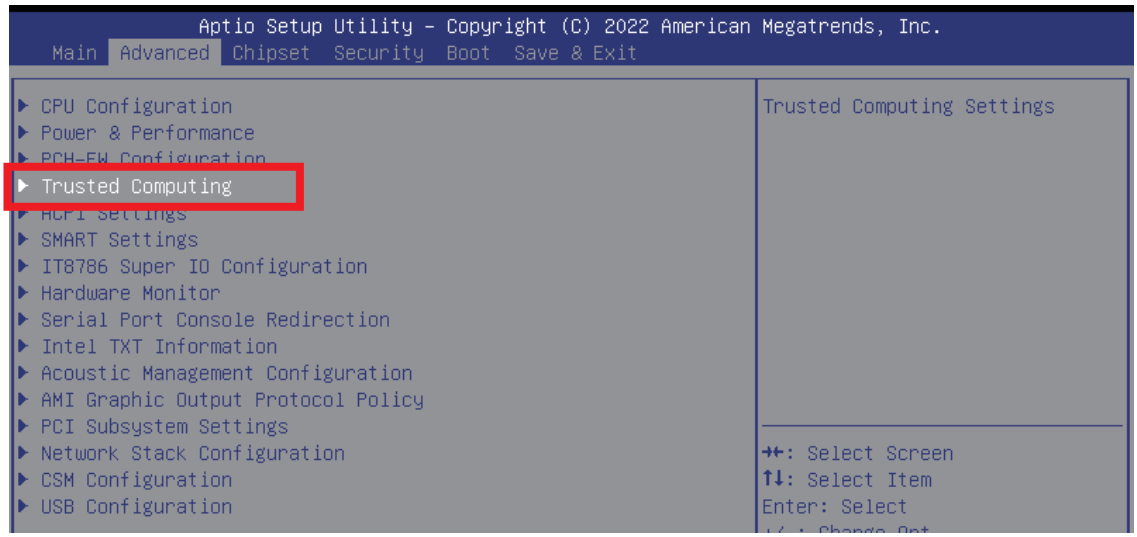




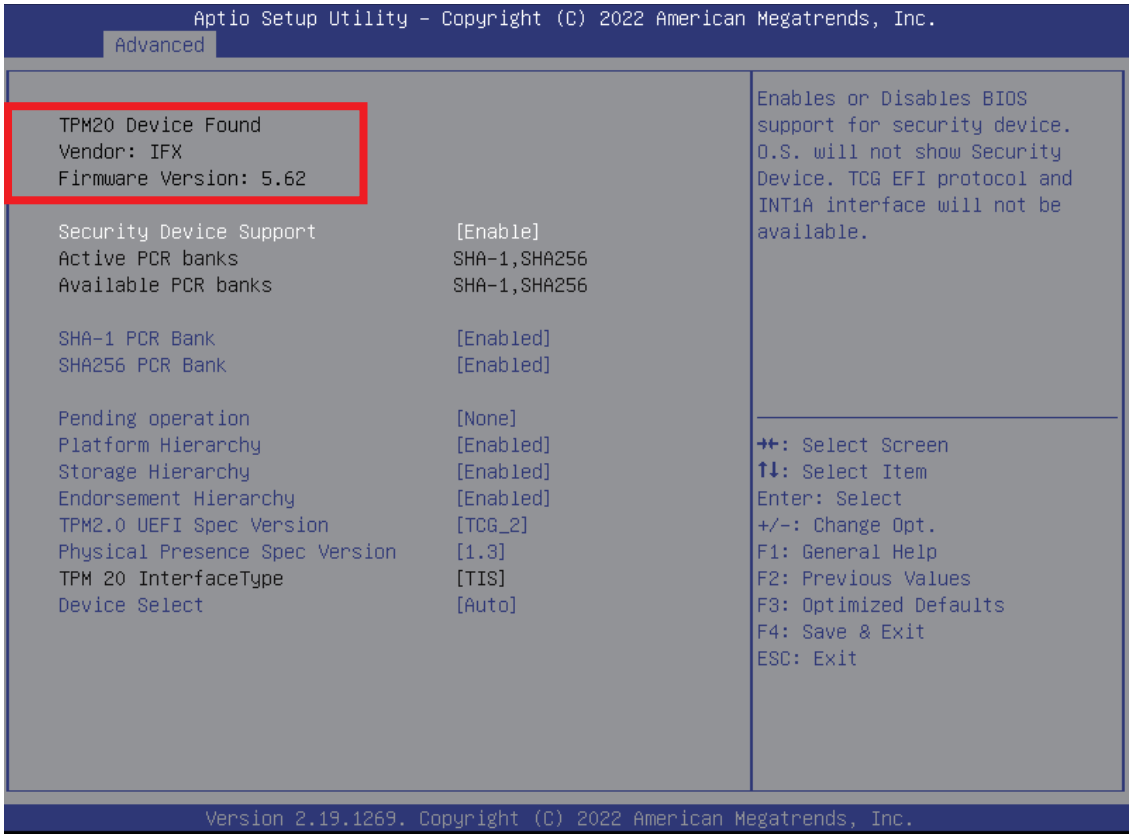
Step 4 Please save the BIOS settings by pressing F4. Please press Enter when the pop-up window which asks “Save configuration and exit?” appears. The computer will then restart.



Step 5 Click on “Trusted Computing”



Step 6 If the window shows “TPM2.0 Device Found Firmware Version:5.62”, then the setting is completed.



** If more help is needed, please contact Vecow technical support **

Vecow

For further support information, please visit www.vecow.com