MB-i89Q0

Micro-ATX Industrial Motherboard

User's Manual
Version 1.0

C E

RoHS VERIFIED

2018.04

Revision History

Version	Release Time	Description
1.0	2018.04	Initial release

Contents

Preface

Copyright Notice

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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.

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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)

About This User's Manual

This user's manual provides general information and installation instructions about the product. This User's Manual is intended for experienced users and integrators with hardware knowledge of personal computers. If you are not sure about any description in this booklet. Please consult your vendor before further handling.

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 the 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.

> http://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. Packing List

Before starting with the installation, make sure the following items are shipped. If any item appears damaged or is missing, contact your vendor immediately:

1 x MB-i89Q0 Industrial Motherboard

1 x Driver CD
1 x Quick Installation Guide
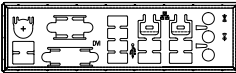
1 x I/O Bracket

1.2. Ordering Information

MB-i89Q0	Socket LGA1151/ PCH Q170 for Intel® 6th Gen. processor micro-ATX motherboard
CPF-67Q0-C1	CPU COOLING FAN FOR LGA1151

Optional Accessories

SCDB-3291	TPM 1.2 Daughter board with Infineon OPTIGA TPM SLB9660
SCDB-3292	TPM 2.0 Daughter board with Infineon OPTIGA TPM SLB9665
CBK-11-89Q0-00	Cable kit 2 x USB 2.0 cable w/ bracket (2 ports / cable) 1 x COM port cable 6 x SATA cables 2 x DP cables

1.3. The Installation Paths of CD Driver

The CPU board supports Windows 10 64-bit. Find the necessary drivers by the following paths on the CD that comes with your purchase.

Windows 10 64-bit

Chipset	\i89X\Chipset\Chipset_10.1.1.13_Public
Audio	\i89X\Audio\7687_PG436_Win10_Win8.1_Win8_Win7_WHQLx64
LAN	\i89X\Ethernet
Graphic	\i89X\Graphic\IntelR Graphics Driver Production Version 15.40.16.64.4364
ME	\i89X\ME\Intel(R)_ME_11.0_Corporate_11.0.0.1202
RAID	\i89X\RAID\Intel Rapid Storage Technology Driver 14.8.0.1042

1.4. Specifications

Form Factor	Micro-ATX Industrial Motherboard
CPU	Support 6th Generation Intel® Core™ i7/i5/i3 processors in LGA1151 socket
Memory	4 x 288-pin DDR4 Long-DIMM sockets, supporting 2133/1866MHz SDRAM up to 64GB
Chipset	Intel® PCH Q170
BIOS	AMI UEFI ROM
TPM	Support TPM 1.2 & 2.0 daughterboard via LPC connector (optional)
Watchdog Timer	1~255 levels reset
Super IO Chipset	FINTEK F81768 FINTEK F81216AD (OEM request)
Serial Port	2 x RS-232 ports, up to 4 x RS-232 ports (OEM request)
USB Port	10 x USB 2.0 ports, 4 x USB 3.0/2.0 ports
Keyboard & Mouse	6-pin wafer connector for PS/2 keyboard/ mouse via Y-cable
Expansion Bus	1 x PCI slot 1 x PCIex16 Gen 3.0 slot 1 x PCIex4 in x8 slot 1 x PCIex1 slot
Storage	Six Serial ATA ports with 600MB/s HDD transfer rate
	RAID 0, 1, 5, 10 supported
Ethernet Chipset	1 x Intel® i210AT PCIe GbE controller 1 x Intel® i219LM PCIe GbE PHY
Audio Interface	Realtek® ALC269 5.1 Channel HD Audio CODEC,Mic-in/ Line-in/ Line-out with Amplifier
Graphic Chipset	Integrated Intel® HD Graphics 5x0
Graphic Interface	1 x DVI-I port, 2 x DisplayPort ports
Power Requirement	24-pin + 4-pin ATX power connector

Power Consumption	2.34A @+12V with i3-6100 (Typical) 3.83A @+12V with i7-6700 (Typical)
Operating Temp.	0 ~ 60ºC (32 ~ 140ºF)
Operating Humidity	10 ~ 95% @ 60ºC (non-condensing)
Dimension (L x W)	244 x 244 mm (9.6" x 9.6")

Recommended CPU List:
Intel® Core™ i7-6700 quad-core 3.4 GHz processor
Intel® Core™ i5-6500 quad-core 3.6 GHz processor
Intel® Core™ i3-6100 dual-core 3.7 GHz processor

1.6. Board Dimensions
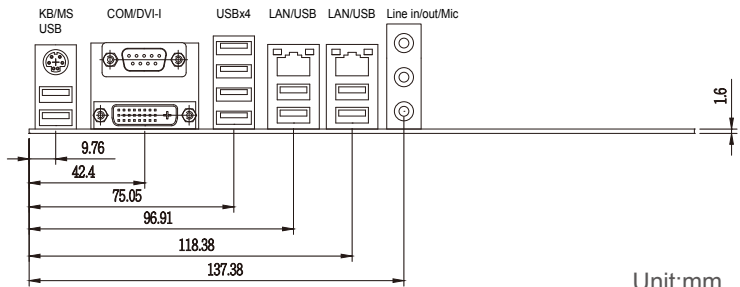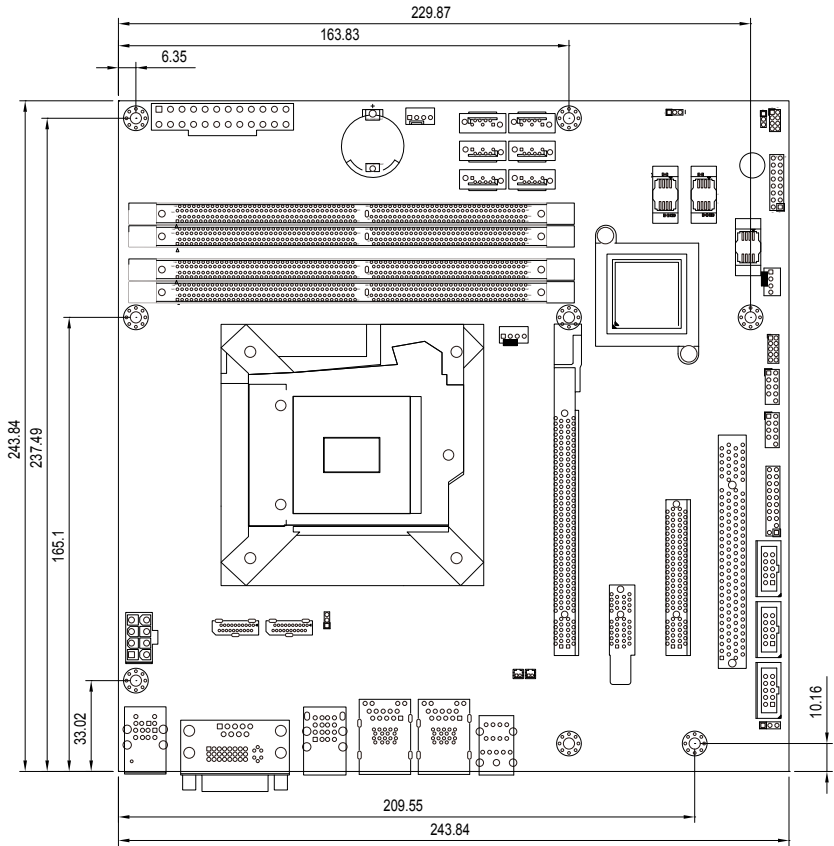
Unit:mm

1.7. Installing the CPU

The LGA1151 processor socket comes with a lever to secure the processor. Please refer to the pictures step by step as below.

1. Push the lever down to unclip it and lift it.
2. Open the load plate.
3. Remove the protective cover from the load plate. Do not discard the protective cover. Always replace the socket cover if the processor is removed from the socket.
4. Hold processor with your thumb and index fingers, oriented as shown. Ensure your fingers align to the socket cutouts. Align the notches with the socket. Lower the processor straight down without tilting or sliding the processor in the socket.
5. Close the load plate. Pressing down on the load plate, close and engage the socket lever.
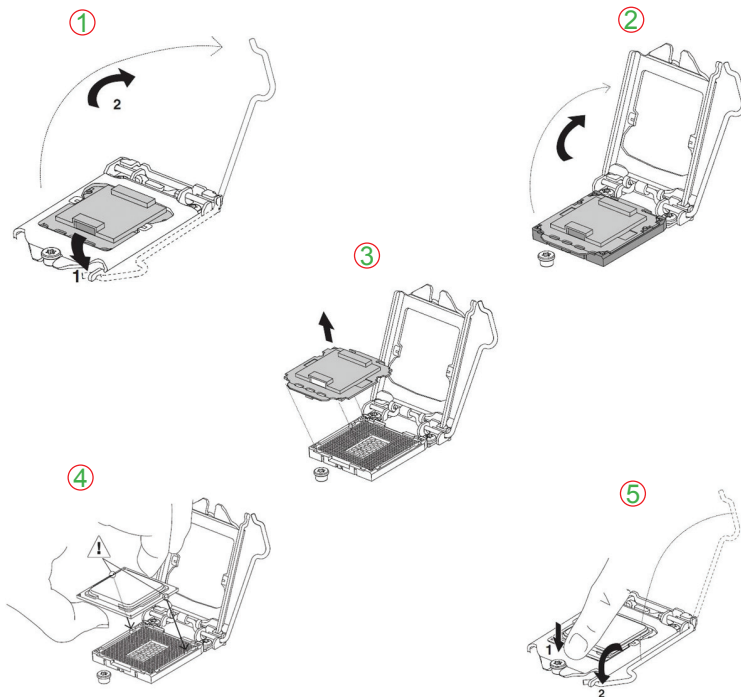
1.8. Installing the Memory

To install the Memory module, locate the Memory DIMM slot on the board and perform as below:

1. Hold the Memory module so that the key of the Memory module align with those on the Memory DIMM slot.
2. Gently push the Memory module in an upright position and a right way until the clips of the DIMM slot close to lock the Memory module in place, when the Memory module touches the bottom of the DIMM slot.
3. To remove the Memory module, just pressing the clips of DIMM slot with both hands.

Lock   Lock
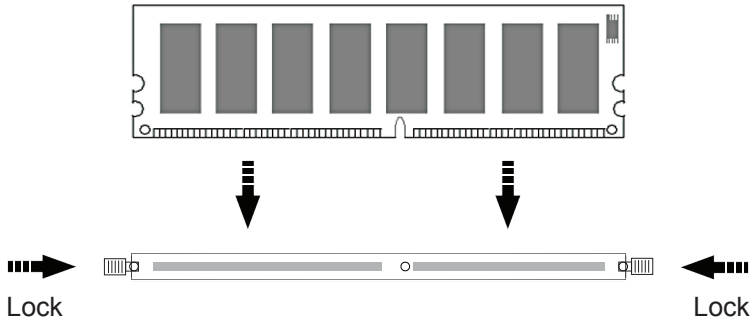
Chapter 2

Installation

2.1. Block Diagram
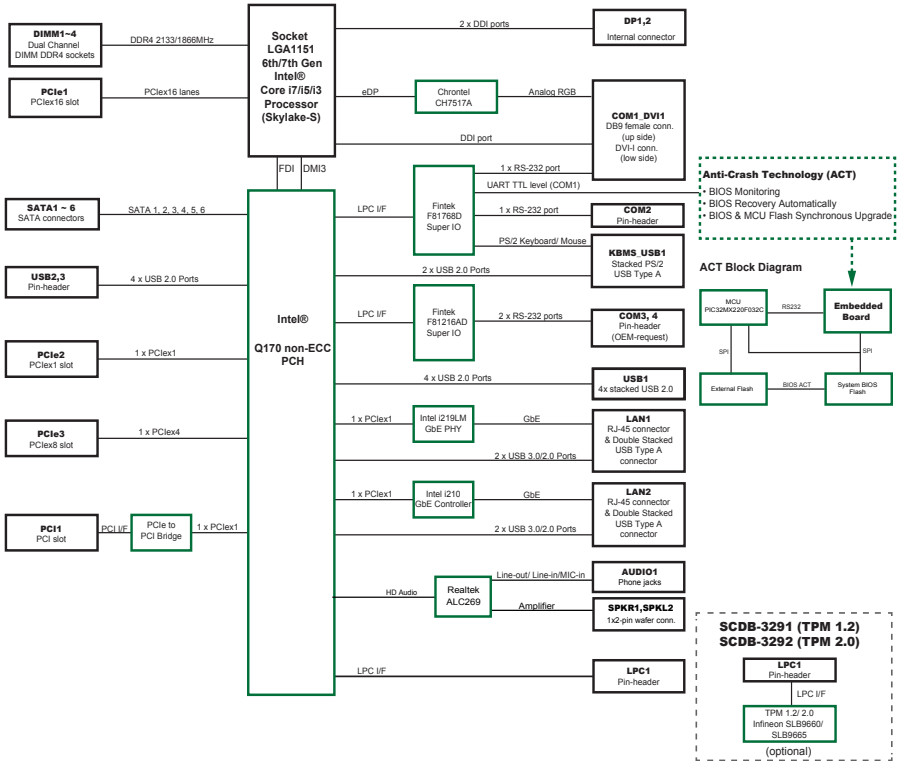
2.2. Jumpers & Connectors Quick Reference

Jumpers

Jumper	Description
❶JBAT1	CMOS Setting
❷JPIC1	ACT Function Setting
❸JPATATX1	AT/ATX Mode Selection

Connectors

Connector	Description
①ATX1	ATX Power Connector
②⑪SYSFAN1, 2	Fan Power Connectors
③~⑧SATA1~6	Serial ATA Connectors
⑨JICSP1	For Internal Use Only
⑩JFRT1	Connectors for front-panel switches and LED status lamps
⑫LPC1	Low Pin Count Connector
⑬⑭USB3, 2	USB 2.0 Connectors
⑮TPM1	TPM Connector
⑯⑰⑱COM2, 3, 4	RS-232 Connectors
⑲⑳SPKR1, SPKL1	Speaker Connectors
㉑AUDIO1	Audio Interface Port
㉒㉓LAN1, 2	RJ-45+USB 3.0 Stacked Connectors
㉔USB1	USB 2.0 Stacked Connectors
㉕DVI1	Stacked COM1 & DVI-I Connectors
㉖KBUSB1	PS/2 Keyboard & USB 2.0 Stacked Connectors
㉗JATX1	ATX 12V Connector
㉘㉙DP1, 2	DisplayPort Connectors
㉚CPUFAN1	CPU Fan Power Connector
㉛PCIE1	PCI Express x16 Gen 3.0 Slot
㉜PCIE2	PCI Express x1 Slot
㉝PCIE4	PCI Express x8 Slot with x4 Single
㉞PCI1	PCI Slot
㉟~㊳DIMM1~4	288-pin DDR4 Memory Slots

2.2.2. Jumpers & Connectors Location
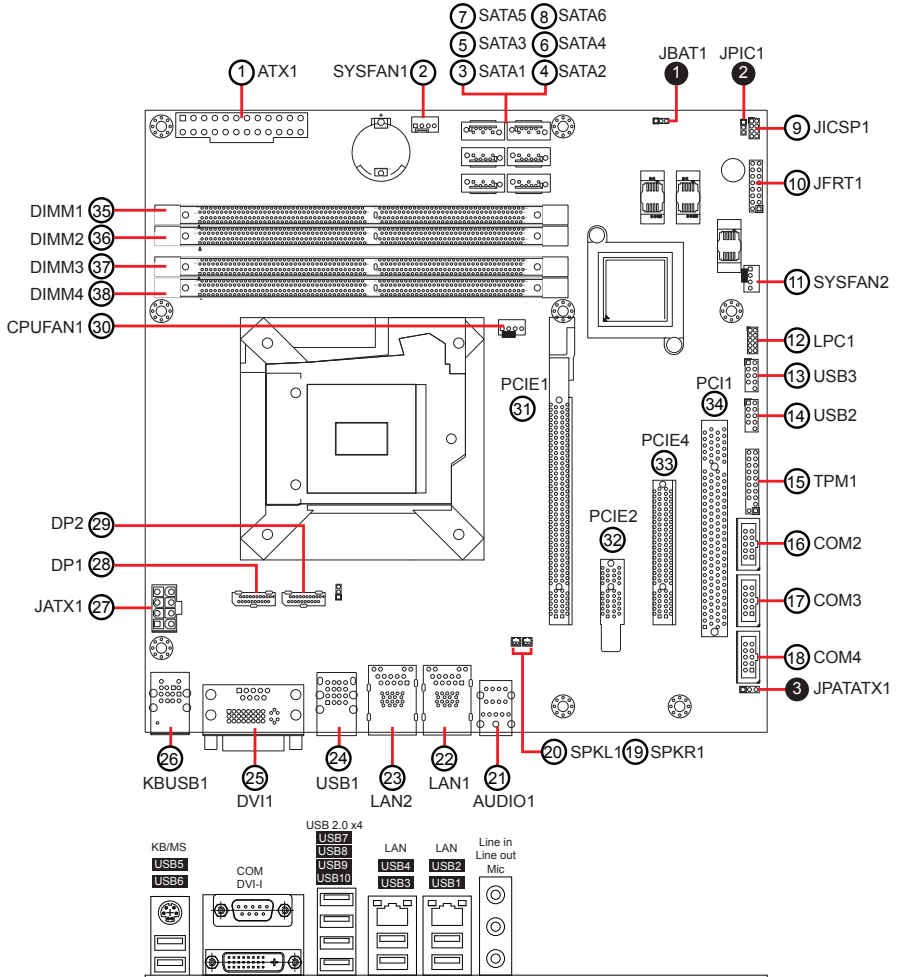
2.2.3. Jumpers

❶JBAT1

Function: COMS Setting
Connector type:2.54mm pitch 1x3-pin header

Pin	Description	
1-2	Keep CMOS (default)	
2-3	Clear CMOS	

JBAT1
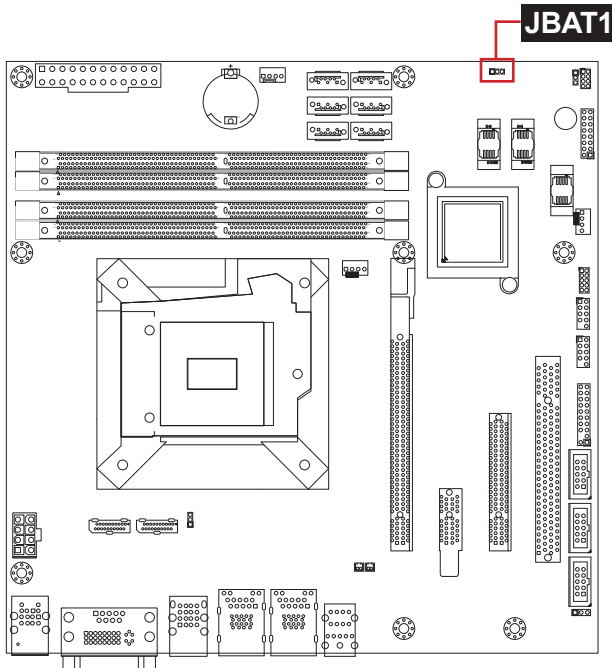
❷JPIC1

Function: ACT Function Setting
Connector type: 2.00mm pitch 1x3-pin header

Pin Description

1-2	ACT Enabled (default)	
2-3	ACT Disabled	

JPIC1
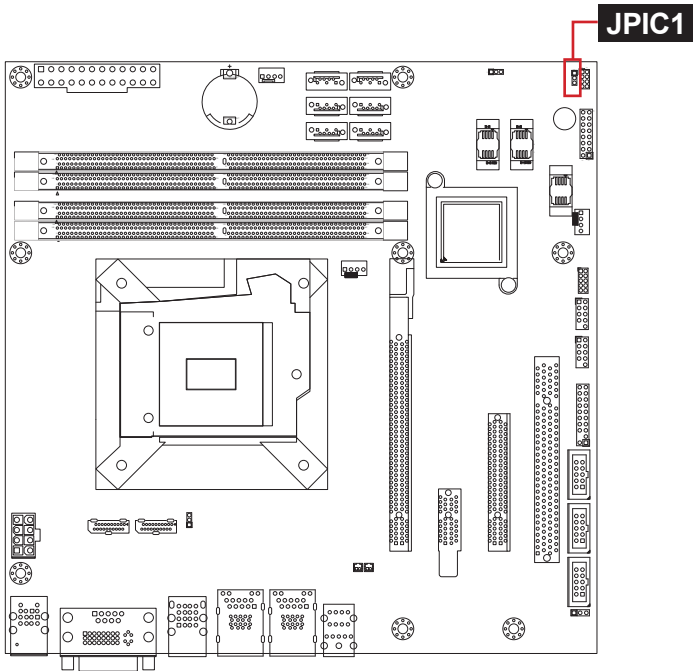
❸JPATAX1

Function: AT/ATX Mode Selection
Connector type: 2.54mm pitch 1x3-pin header

Pin Description

1-2 AT Mode

2-3 ATX Mode (Default)

JPATAX1
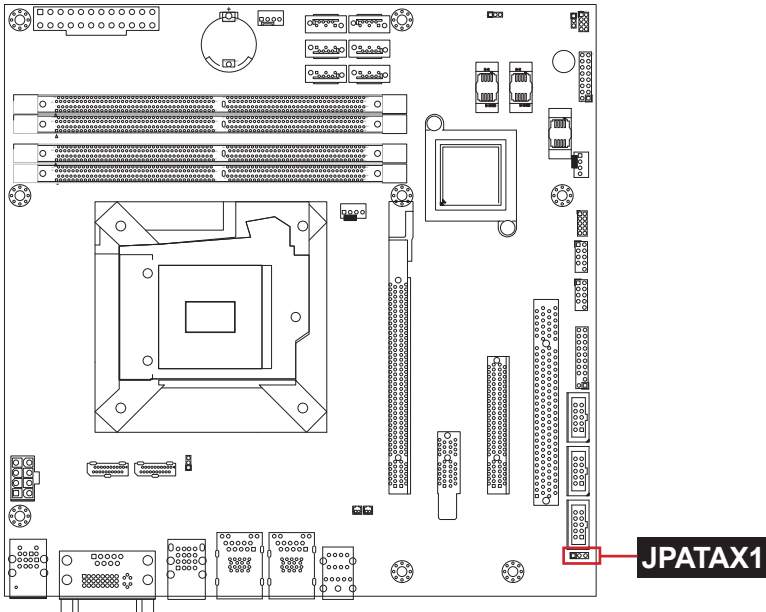
2.2.4. Connectors

①ATX1

Function: ATX Power Connector
Connector type: 24-pin ATX power supply connector

Pin	Desc.	Pin	Desc.
1	+3.3V	13	+3.3V
2	+3.3V	14	-12V
3	COM	15	COM
4	+5V	16	PS-ON
5	COM	17	COM
6	+5V	18	COM
7	COM	19	COM
8	PW-OK	20	NC
9	+5VSB	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	+3.3V	24	COM
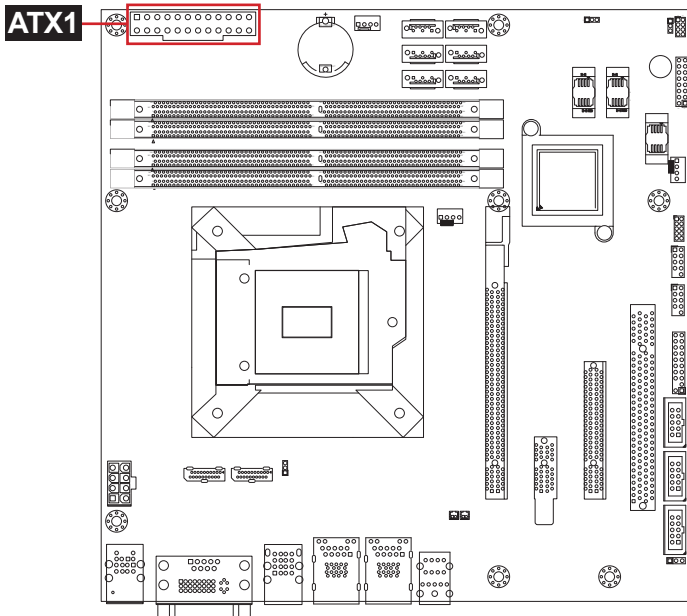
②⑪**SYSFAN1, 2**

Function: FAN Power Connectors
Connector type: 2.54mm pitch 1x4-pin wafer one wall connector

Pin	Description
1	GND
2	+12V
3	RPM
4	CTRL

SYSFAN1

SYSFAN2
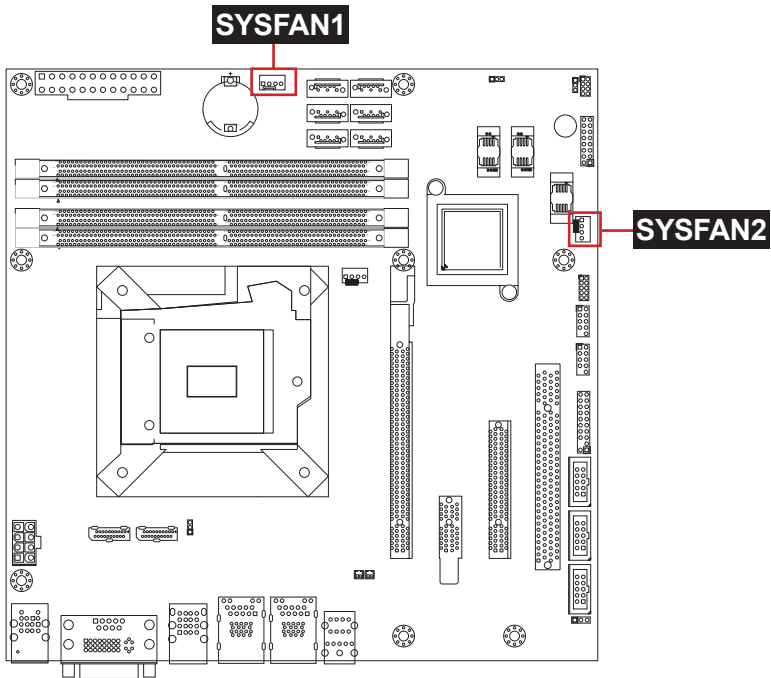
③~⑧ **SATA1~6**

Function: Serial ATA Connectors
Connector type: Lockable SATA connectors with housing

The pin assignments conform to the industry
standard.
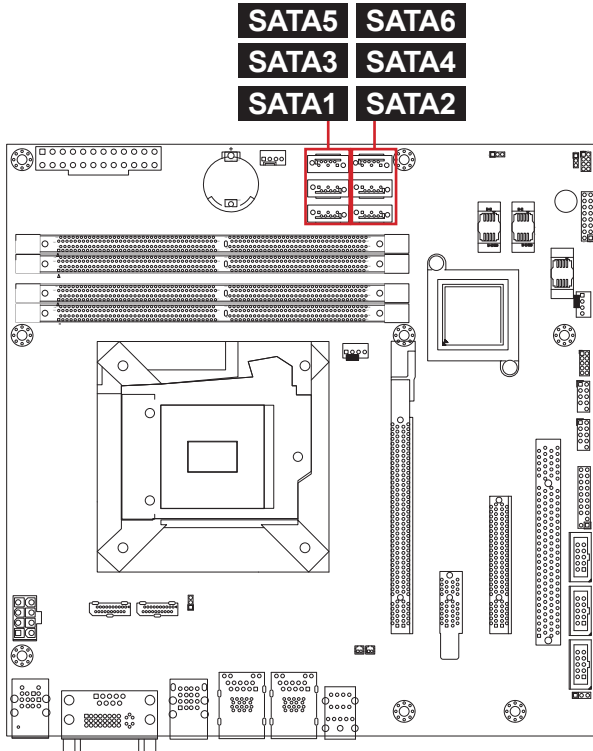
⑨ **JICSP1**

Function: For Internal Use Only
Connector type: 2.00mm pitch 2x4-pin header
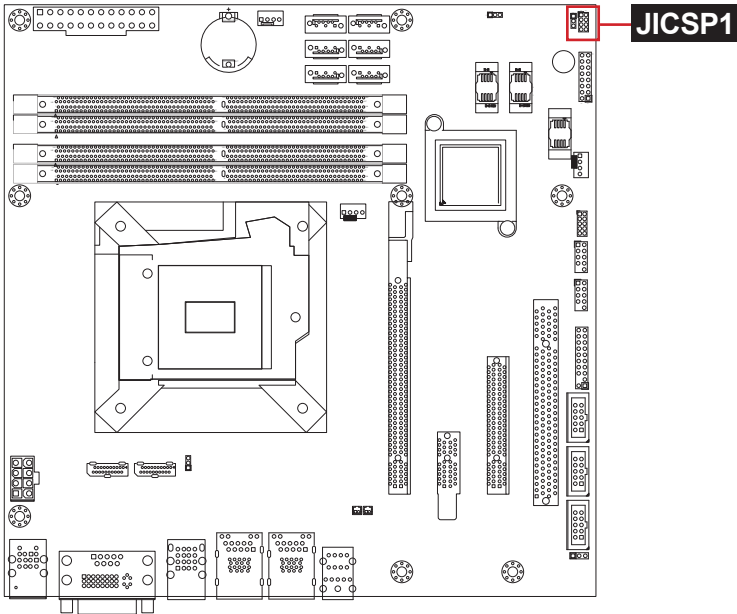
⑩ **JFRT1**

Function: Connectors for front-panel switches and LED status lamps
Connector type: 2.54mm pitch 2x8-pin header

Pin	Description	Pin	Description
1	LED-	2	LED+
3	PWRBTN-	4	PWRBTN+
5	RESET-	6	RESET+
7	HDD LED+	8	GND
9	HDD LED-	10	SPEAKER+
11	SMB_CLK	12	SPEAKER+
13	SMB_DATA	14	SPEAKER-
15	GND	16	SPEAKER-

⑫LPC1
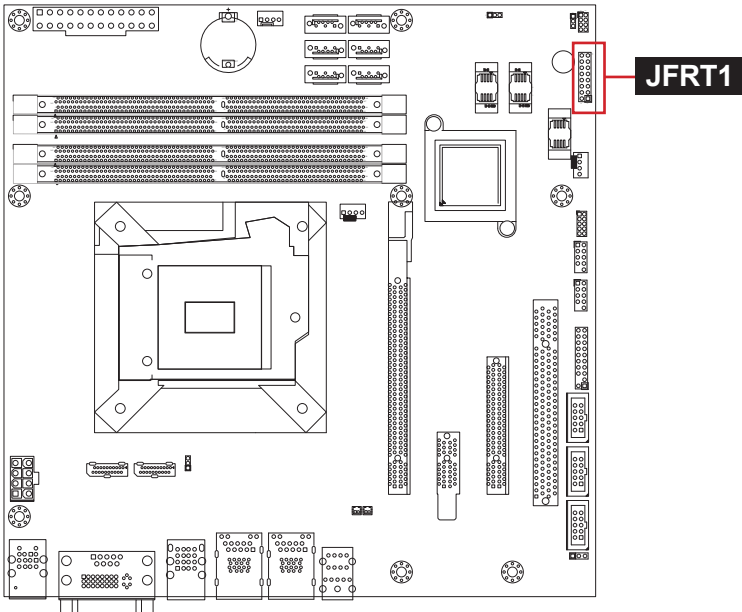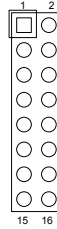
Function: Low Pin Count Connector
Connector Type: 2.00mm pitch 2x5-pin header

Pin	Desc.	Pin	Desc.
1	CLK_PC_24M	2	GND
3	L_FRAME#	4	L_ADØ
5	PLTRST#	6	SERIRØ
7	L_AD3	8	L_AD2
9	+V3.3S	10	L_AD1
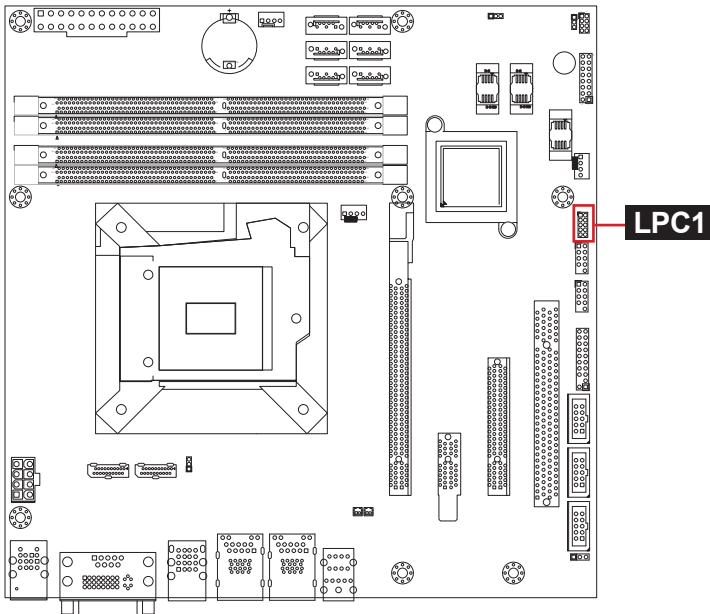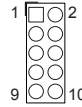
⑬USB3

Function: USB 2.0 Connectors
Connector Type: 2.54mm pitch 2x5-pin header

Pin	Desc.	Pin	Desc.
1	+5VS	2	+5VS
3	USBP11N	4	USBP12N
5	USBP11P	6	USBP12P
7	GND	8	GND
9	N/C	10	GND
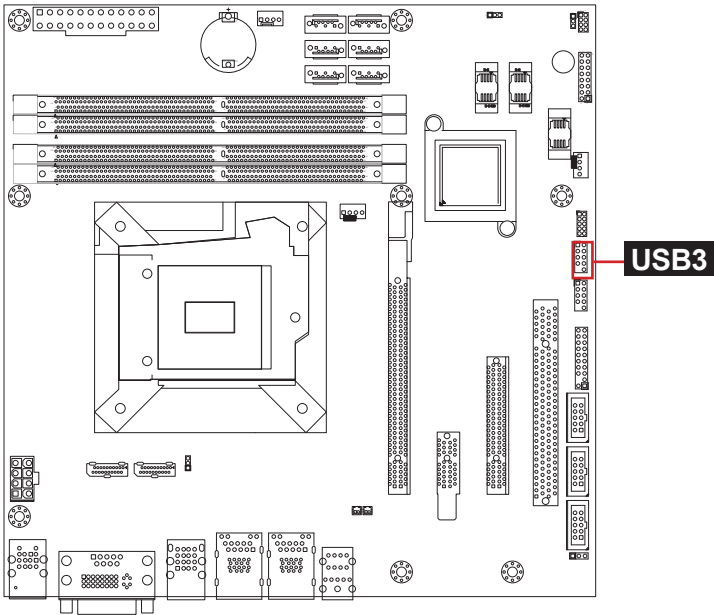
⑭**USB2**

Function: USB 2.0 Connectors
Connector Type: 2.54mm pitch 2x5-pin header

Pin	Desc.	Pin	Desc.
1	+5VS	2	+5VS
3	USBP13N	4	USBP14N
5	USBP13P	6	USBP14P
7	GND	8	GND
9	N/C	10	GND

USB2
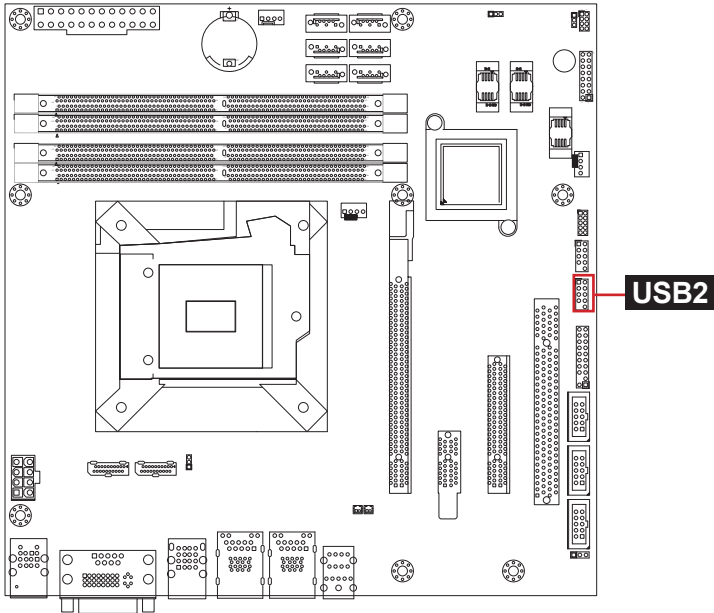
⑮TPM1

Function: TPM Connector (Optional)
Connector type: 2.54mm pitch 2x10-pin header

Pin	Desc.	Pin	Desc.
1	CLK_LPC1_24M	2	GND
3	L_FRAME#	4	N/C
5	PLT_RST	6	N/C
7	L_AD3	8	L_AD2
9	+V3.3S	10	L_AD1
11	L_AD0	12	GND
13	N/C	14	N/C
15	+V3.3A	16	SER_IRQ
17	GND	18	CLKR#
19	LPCPD#_LPC	20	N/C
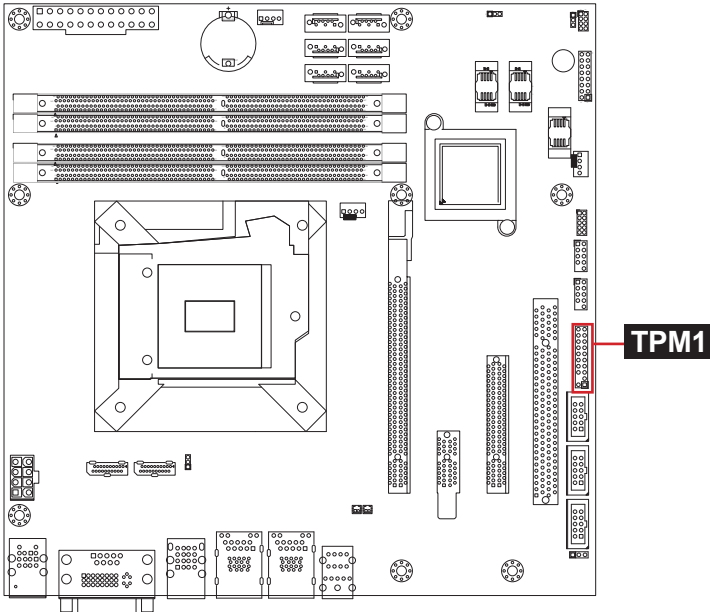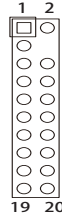
⑯⑰⑱**COM2, 3, 4**
Function: RS-232 Connectors (COM 3 & 4 optional)
Connector type: 2.54mm pitch 2x5-pin header

Pin	Desc.	Pin	Desc.
1	DCD#	2	RXD
3	TXD	4	DTR#
5	GND	6	DSR#
7	RTS#	8	CTS#
9	RI#	10	N/C

COM2

COM3

COM4
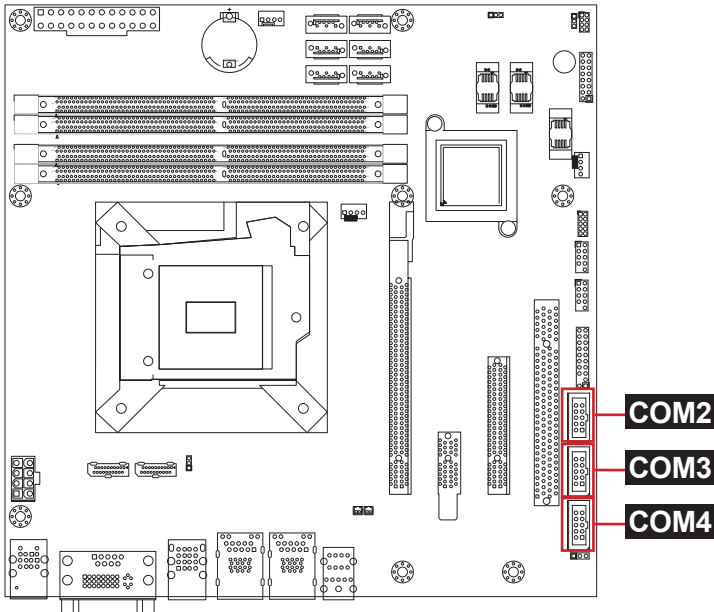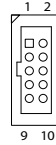
⑲ ⑳ **SPKR1, SPKL1**

Function: Speaker Connectors
Connector Type: 1.25mm pitch 1x2-pin wafer connector

Pin	Description
1	INSPL/R+
2	INSPL/R-

1 ▢◯ 2

SPKL1 SPKR1
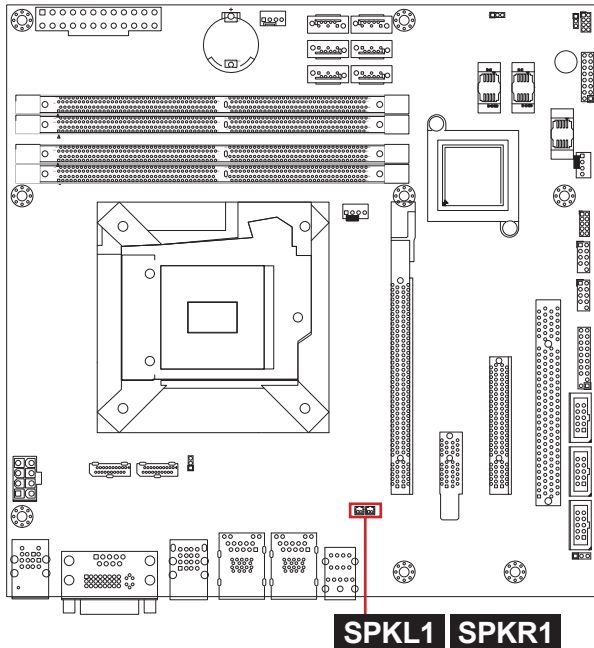
㉑ **AUDIO1**

Function: Audio Interface Port
Connector type: 3 x 3.5mm stacked phone jack

Audio Jack	Description
Blue	Line-in
Green	Line-out
Pink	Mic-in

Line in
Line out
Mic

AUDIO1
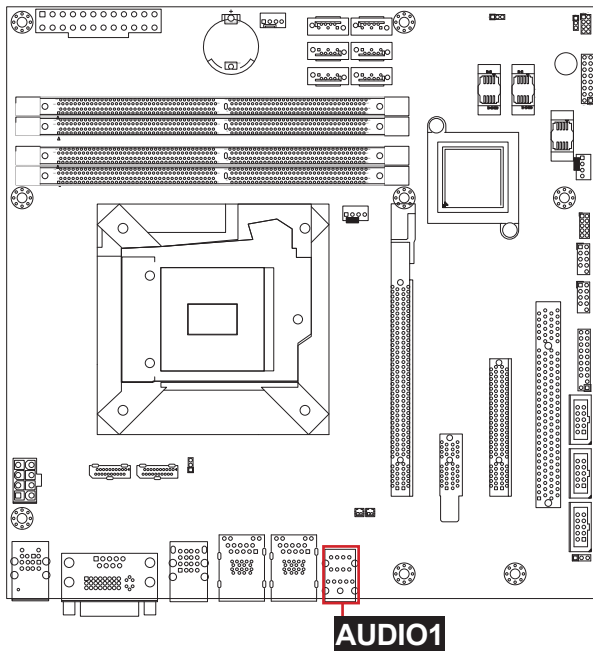
㉒㉓ **LAN1, 2**

Function: RJ-45+USB Stacked Connectors
Connector type: RJ-45 connector with LED + double-stacked USB 3.02/2.0 type A connectors

LAN:

LED	Definition
Speed	Amber:1000M Green: 10/100M
Link/Act	On: Linked Blink: Network Activity Off: No Link

LAN1 LAN2
Speed Link/Act Speed Link/Act

USB2 USB4
USB1 USB3

USB:
The pin assignments conform to the industry standard.

LAN2 LAN1
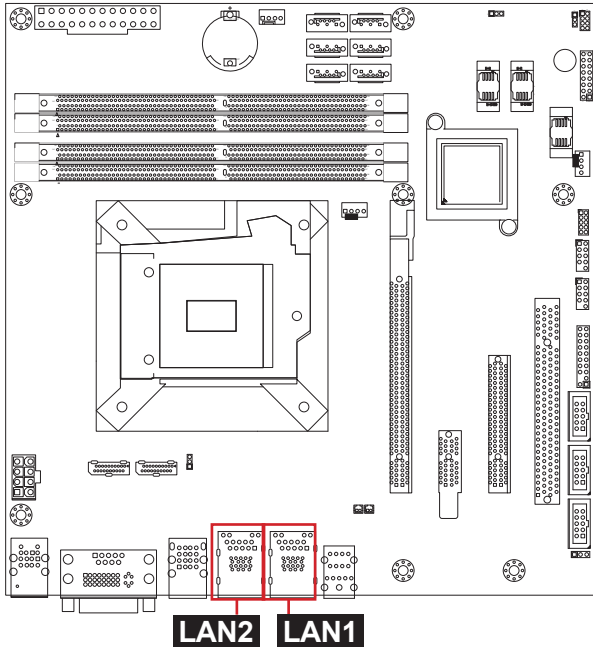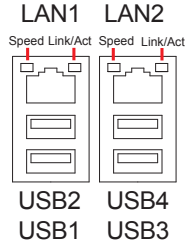
㉔ **USB1**

Function: USB 2.0 Stacked Connectors
Connector type: Quad-stacked USB 2.0 type A connectors

The pin assignments conform to the industry standard.

USB7
USB8
USB9
USB10
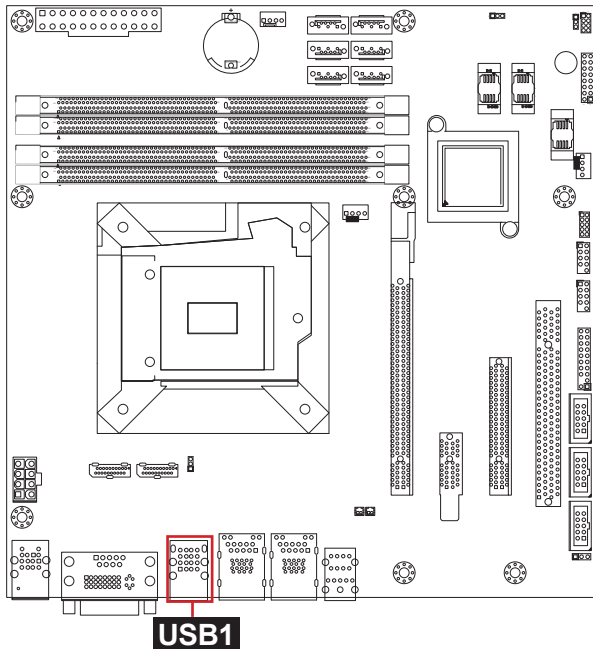
㉕ **DVI1**

Function: Stacked COM1 & DVI-I Connectors
Connector type: Male type 9-pin D-SUB connector+female type DVI-I connector

COM1:

Pin	Desc.	Pin	Desc.
1	DCD#	2	RXD
3	TXD	4	DTR#
5	GND	6	DSR#
7	RTS#	8	CTS#
9	RI#		
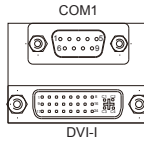
DVI-I: The pin assignments conform to the industry standard.

DVI1
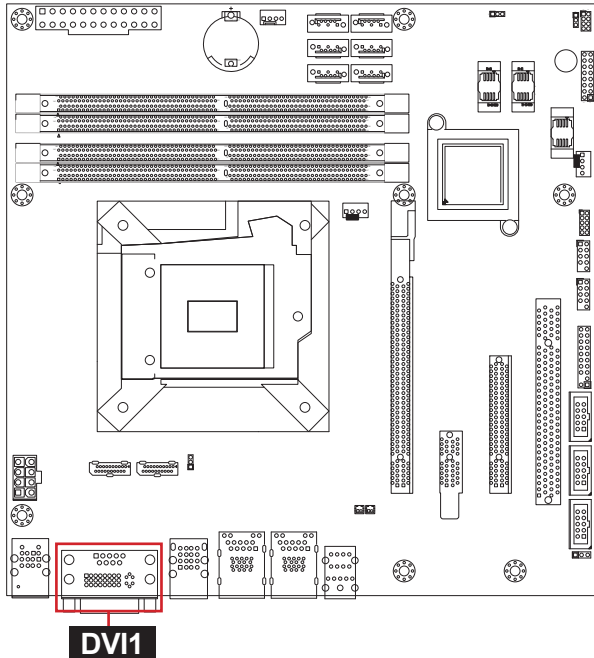
㉖ **KBUSB1**

Function: PS/2 Keyboard & USB 2.0 Stacked Connectors
Connector type: 6-pin Mini-DIN & Double-stacked USB 2.0 type A connectors
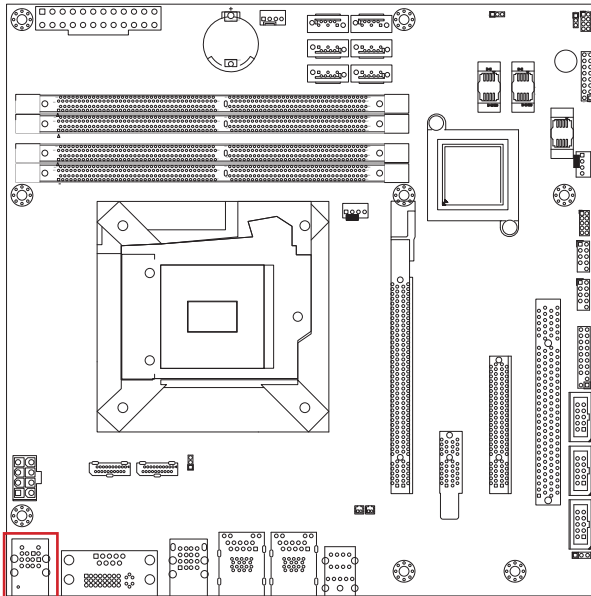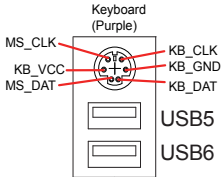
KBUSB1

㉗ **JATX1**

Function: ATX 12V Connector
Connector type: 8-pin power connector

Pin	Desc.	Pin	Desc.
1	GND	5	+12V
2	GND	6	+12V
3	GND	7	+12V
4	GND	8	+12V
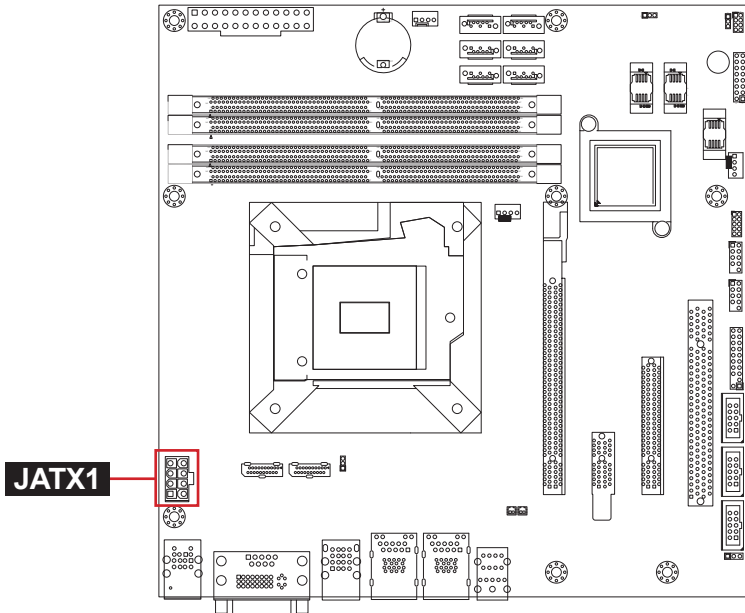
㉘㉙ **DP1, 2**

Function: DisplayPort Connectors
Connect the display device to the DisplayPort connector

The pin assignments conform to the
industry standard.

DP2

DP1
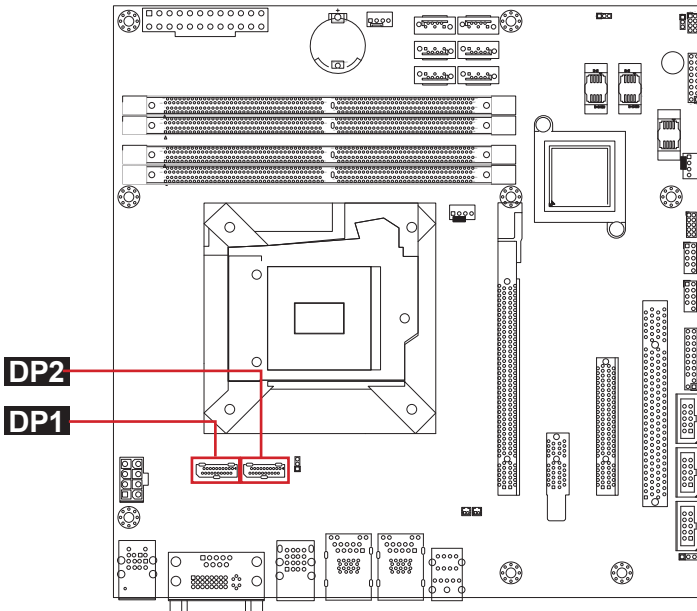
㉚ **CPUFAN1**

Function: CPU Fan Power Connector
Connector type: 2.54mm pitch 1x4 wafer one wall connector

Pin	Description
1	GND
2	+12V
3	RPM
4	CTRL

CPUFAN1
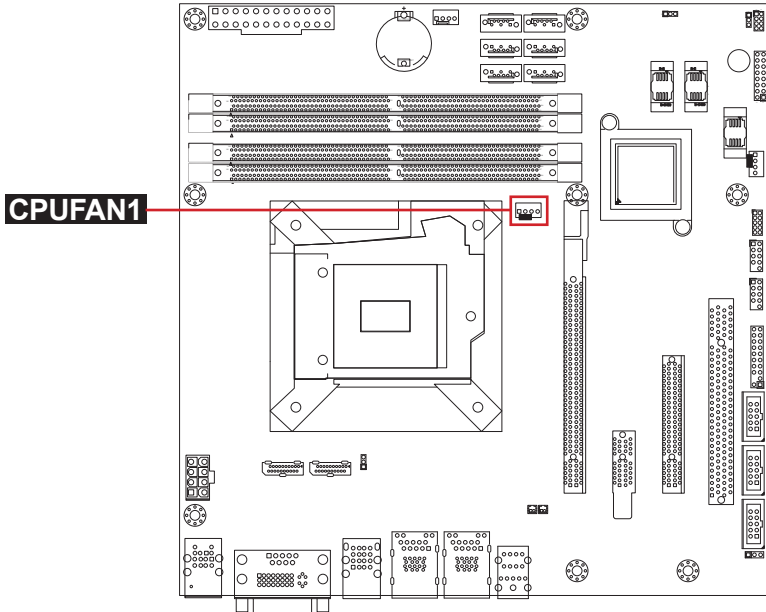
㉛ **PCIE1**

Function: PCIe x16 Gen3.0 Slot
Connector type: PCI Express x16 Gen 3.0 slot

The pin assignments conform to the industry standard.

PCIE1
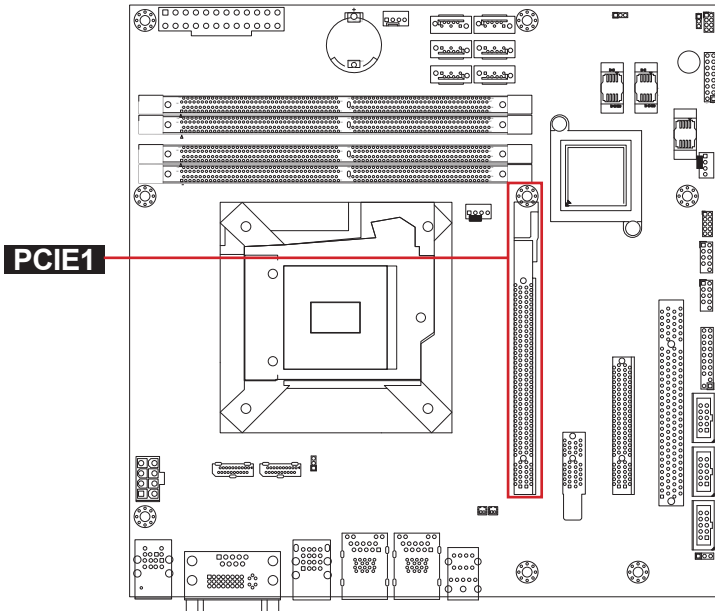
㉜ **PCIE2**

Function: PCIe x1 Slot
Connector type: PCI Express x1 slot

The pin assignments conform to the industry standard.

PCIE2
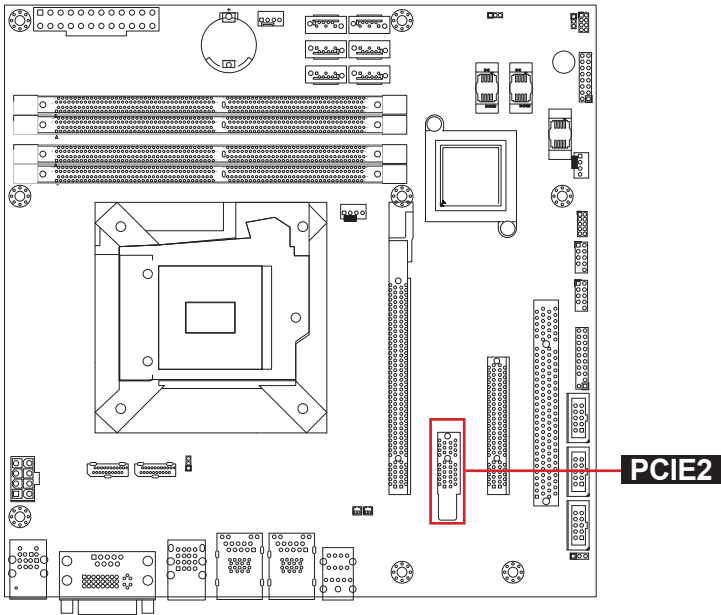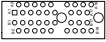
㉝ **PCIE4**

Function: PCIe x8 Slot w/ x4 single
Connector type: PCI Express x8 slot with x4 single

The pin assignments conform to the industry standard.

PCIE4
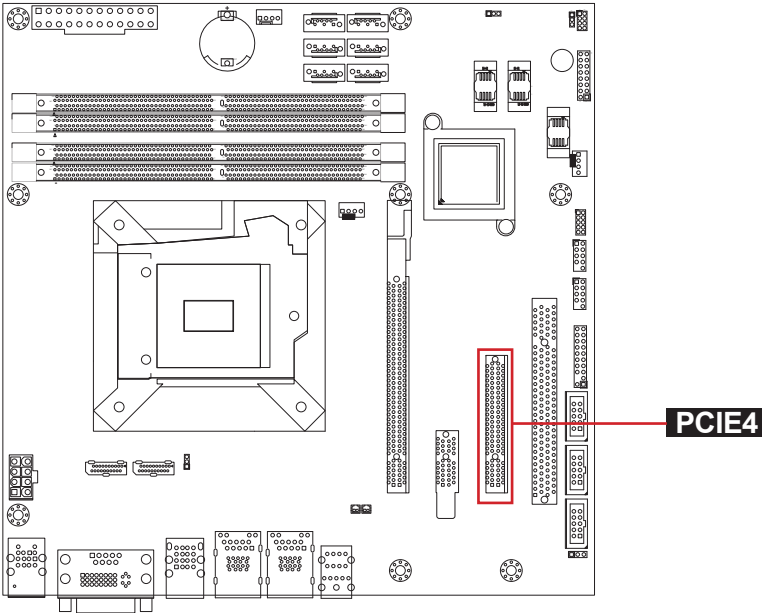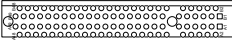
㉞ **PCI1**

Function: PCI Slot
Connector type: 32-bit PCI slot

The pin assignments conform to the industry standard.

PCI1
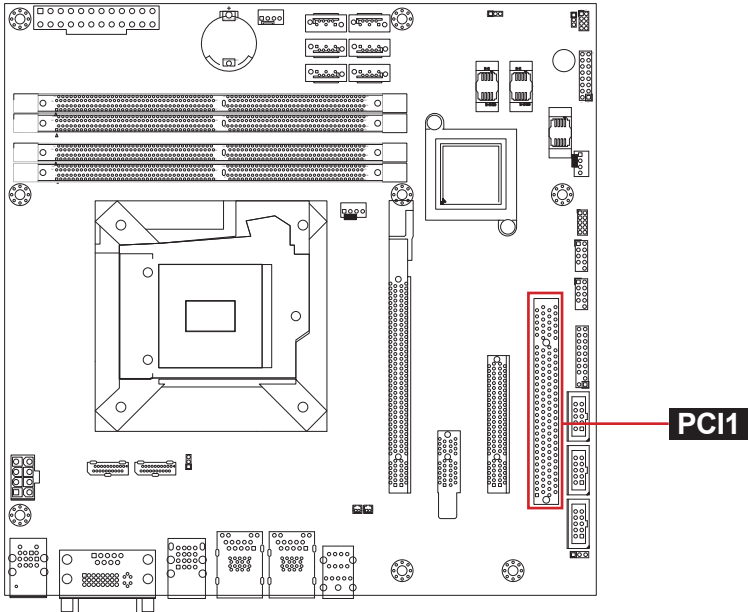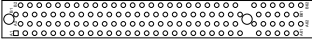
㉟㊱㊲㊳ **DIMM1~4**

Function: 288-pin DDR4 Memory Slots
Connector type: 284-pin DDR4 DIMM slots

The pin assignments conform to the industry standard.
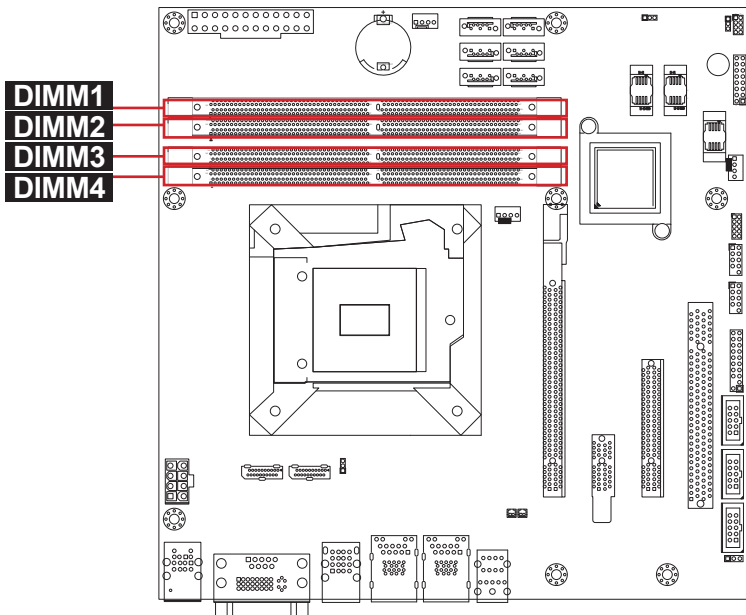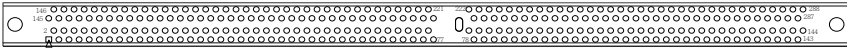
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Chapter 3

BIOS

3.1 Main

The AMI BIOS provides a Setup utility program for specifying the system configurations and settings. The BIOS RAM of the system stores the Setup utility and configurations. When you turn on the computer, the AMI BIOS is immediately activated. To enter the BIOS SETUP UTILITY, press **"Delete"** once the power is turned on.

The **Main Setup** screen lists the following information:

```
       Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.
   Main  Advanced  Chipset  Security  Boot  Save & Exit

   BIOS Name              MB-i89Q0                Set the Date. Use Tab
   BIOS Version           1.09                    to Switch between Date
   Build Date and Time    03/12/2018 14:32:33     elements.
   Access Level           Administrator

   System Date            [Wed 03/21/2018]
   System Time            [09:18:21]



                                                  →←: Select Screen
                                                  ↓↑: Select Item
                                                  Enter: Select
                                                  +/-: Change Opt.
                                                  F1: General Help
                                                  F2: Previous Values
                                                  F9: Optimized Defaults
                                                  F10: Save and Exit
                                                  ESC: Exit

        Version 2.17.1255. Copyright (C) 2018 American Megatrendes, Inc.
```

Setting	Description

System Date	Set the system date. Use Tab to switch between Data elements. Note that the 'Day' automatically changes when you set the date.
	► The date format is: **Day:** Sun to Sat
	                                       Month: 1 to 12
	                                       Date: 1 to 31
	                                       Year: 1998 to 2099

System Time	Set the system time. Use Tab to switch between Time elements.
	► The time format is: **Hour:** 00 to 23
	                                Minute: 00 to 59
	                                Second: 00 to 59

Key Commands

BIOS Setup Utility is mainly a key-based navigation interface. Please refer to the following key command instructions for navigation process.

Keystroke	Function
◄ ►	Move to highlight a particular configuration screen from the top menu bar / Move to highlight items on the screen
▼ ▲	Move to highlight previous/next item
Enter	Select and access a setup item/field
Esc	On the Main Menu – Quit the setup and not save changes into CMOS (a message screen will display and ask you to select "OK" or "Cancel" for exiting and discarding changes. Use "←" and "→" to select and press "Enter" to confirm) On the Sub Menu – Exit current page and return to main menu
Page Up / +	Increase the numeric value on a selected setup item / make change
Page Down / -	Decrease the numeric value on a selected setup item / make change
F1	Activate "General Help" screen
F2	Previous values
F9	Optimal defaults
F10	Save the changes that have been made in the setup and exit. (a message screen will display and ask you to select "OK" or "Cancel" for exiting and saving changes. Use "←" and "→" to select and press "Enter" to confirm)

3.2 Advanced

```
         Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.
  Main  Advanced  Chipset  Security  Boot  Save & Exit

  ▶ CPU Configuration                              CPU Configuration
  ▶ Trusted Computing                              Parameters
  ▶ PCI Subsystem Settings
  ▶ SATA Configuration
  ▶ ACPI Settings
  ▶ Super IO Configuration
  ▶ Hardware Monitor
  ▶ S5 RTC Wake Settings
  ▶ CSM Configuration
  ▶ NVMe Configuration
  ▶ USB Configuration
                                                   ─────────────────────────
                                                   →←: Select Screen
                                                   ↓↑: Select Item
                                                   Enter: Select
                                                   +/-: Change Opt.
                                                   F1: General Help
                                                   F2: Previous Values
                                                   F9: Optimized Defaults
                                                   F10: Save and Exit
                                                   ESC: Exit

         Version 2.17.1255. Copyright (C) 2018 American Megatrendes, Inc.
```

Setting	Description
CPU Configuration	See section 3.2.1 CPU Configuration on page 45
Trusted Computing	See section 3.2.2 Trusted Configuration on page 47
PCI Subsystem Settings	See section 3.2.3 PCI Subsystem Settings on page 48
SATA Configuration	See section 3.2.4 SATA Configuration on page 49
ACPI Settings	See section 3.2.5 ACPI Settings on page 50
Super IO Configuration	See section 3.2.6 Super IO Configuration on page 51
Hardware Monitor	See section 3.2.7 Hardware Monitor on page 53
S5 RTC Wake Settings	See section 3.2.8 S5 RTC Wake Settings on page 54
CSM Configuration	See section 3.2.9 CSM Configuration on page 55
NVMe Configuration	See section 3.2.10 NVMe Configuration on page 56

3.2.1 CPU Configuration

```
           Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.
          Advanced

  CPU Configuration                                    Number of cores to enable
                                                       in each processor package.
  Intel(R) Core(TM) i7-6700 CPU @ 3.40GHz
  CPU Signature                      506E3
  Microcode Patch                    7C
  Max CPU Speed                      3400 MHz
  Min CPU Speed                      800 MHz
  CPU Speed                          3400 MHz
  Processor Cores                    4

  L1 Data Cache                      32 KB x 4
  L1 Code Cache                      32 KB x 4
  L2 Cache                           256 KB x 2
  L3 Cache                           8 MB
  L4 Cache                           Not Present      →←: Select Screen
                                                      ↓↑: Select Item
  Hyper-threading                    [Disabled]       Enter: Select
  Active Processor Cores             [All]            +/-: Change Opt.
  Intel Virtualization Technology    [Enabled]        F1: General Help
  Boot performance Mode              [Max Non-Turbo   F2: Previous Values
                                     Performance]     F9: Optimized Defaults
  Intel (R) SpeedStep (tm)           [Enabled]        F10: Save and Exit
    Turbo Mode                       [Enabled]        ESC: Exit
  CPU C states                       [Disabled]

           Version 2.17.1255. Copyright (C) 2018 American Megatrendes, Inc.
```

Setting	Description
Hyper-threading	Enabled for Windows XP and Linux (OS optimized for Hyper-threading technology) Disabled for other OS (OS not optimized for Hyper-threading technology. When disabled, only one thread per enabled core is enabled. ► Options: **Enabled** or **Disabled** (default)
Active Processor Cores	Number of cores to enable in each processor package. ► Options: **All** (default), **1**, **2** and **3.**
Intel Virtualization Technology	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology ► Options: **Enabled** (default) or **Disabled**

Boot performance Mode	Set the performance state that the BIOS will set before the OS handoff. ► Options: **Max Battery, Max Non-Turbo Performance** (default) and **Turbo Performance**.
Intel (R) Speed Step (tm)	**Enable** (default)/**Disable** Intel SpeedStep
Turbo Mode	Only available when Intel Speed Step is **Enabled**. **Enable** (default)/**Disable** Turbo Mode
CPU C States	**Enable** /**Disable** (default) CPU C States

3.2.2 Trusted Configuration

```
          Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.
     Advanced

Configuration                                            Enable or disabless BIOS
  Security Device Support          [Enabled]             support for security
  No Security Device Found                               device. O.S will show
                                                         Security Device. TCG
                                                         EFI protocol and INT1A
                                                         interface will not be
                                                         available.



                                                         →←: Select Screen
                                                         ↓↑: Select Item
                                                         Enter: Select
                                                         +/-: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F9: Optimized Defaults
                                                         F10: Save and Exit
                                                         ESC: Exit


          Version 2.17.1255. Copyright (C) 2018 American Megatrendes, Inc.
```

Setting	Description
Security Device Support	**Enable** (default) or **Disable** BIOS support for security device. O.S will show Security Device. TCG EFI protocol and INT1A interface will not be available.

3.2.3 PCI Subsystem Settings

```
         Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.
           Advanced

  PCI Bus Driver Version        A5.01.08              Enables or Disables
                                                      64bit capable Devices
  PCI Device Common Setttings:                        to be Decoded in Above
  PCI Latency Timer             [32 PCI Bus Clocks]   4G Address Space (Only
  PCI-X Latency Timer           [64 PCI Bus Clocks]   if System Supports 64
  Above 4G Decoding             [Disabled]            bit PCI Decoding).




                                                      →←: Select Screen
                                                      ↓↑: Select Item
                                                      Enter: Select
                                                      +/-: Change Opt.
                                                      F1: General Help
                                                      F2: Previous Values
                                                      F9: Optimized Defaults
                                                      F10: Save and Exit
                                                      ESC: Exit

         Version 2.17.1255. Copyright (C) 2018 American Megatrendes, Inc.
```

Setting	Description
PCI Latency Timer	Value to be programmed into PCI Latency Timer Register. ► **32** (default), **64**, **96**, **128**, **160**, **192**, **224** and **248 PCI Bus Clocks**.
PCI-X Latency Timer	Value to be programmed into PCI-X Latency Timer Register. ► **32**, **64** (default), **96**, **128**, **160**, **192**, **224** and **248 PCI Bus Clocks**.
Above 4G Decoding	**Enable**/**Disable** (default) 64bit capable Devices to be Decoded in Above 4G Address Space (Only if System Supports 64 bit PCI Decoding).

3.2.4 SATA Configuration

```
         Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.
            Advanced

     SATA Controller(s)            [Enabled]              Enable or disable SATA
     SATA Mode Selection           [AHCI]                 Device.

     Serial ATA Port 0             Empty
       Port 0                      [Enabled]

     Serial ATA Port 1             Empty
       Port 1                      [Enabled]

     Serial ATA Port 2             Empty
       Port 2                      [Enabled]

     Serial ATA Port 3             Empty
       Port 3                      [Enabled]
                                                          →←: Select Screen
     Serial ATA Port 4             Empty                  ↓↑: Select Item
       Port 4                      [Enabled]              Enter: Select
                                                          +/-: Change Opt.
     Serial ATA Port 5             Empty                  F1: General Help
       Port 5                      [Enabled]              F2: Previous Values
                                                          F9: Optimized Defaults
                                                          F10: Save and Exit
                                                          ESC: Exit

            Version 2.17.1255. Copyright (C) 2018 American Megatrendes, Inc.
```

Setting	Description
SATA Controller(s)	**Enable** (default) or **disable** SATA Device.
SATA Mode Selection	Determines how SATA controller(s) operate. ► Options: **AHCI** (default) and **RAID**
Port 0/1/2/3/4/5	**Enable** (default) or **disable** SATA Port.

3.2.5 ACPI Settings

```
          Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.
              Advanced

   ACPI Settings                                              Enables or Disables
                                                              System ability to
   Enable Hibernation      [Enabled]                          Hibernate (OS/S4 Sleep
   ACPI Sleep State        [S3 (Suspend to RAM)]              State). This option
                                                              may be not effective
                                                              with some OS.



                                                              →←: Select Screen
                                                              ↓↑: Select Item
                                                              Enter: Select
                                                              +/-: Change Opt.
                                                              F1: General Help
                                                              F2: Previous Values
                                                              F9: Optimized Defaults
                                                              F10: Save and Exit
                                                              ESC: Exit

          Version 2.17.1255. Copyright (C) 2018 American Megatrendes, Inc.
```

Setting	Description
Enable Hibernation	**Enable** (default) or **Disable** System 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. ► Options: **Suspend Disabled** and **S3 (Suspend to RAM)** (default).

3.2.6 Super IO Configuration

```
          Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.
            Advanced

    Super IO Configuration                         Set Parameters of
                                                   Serial Port 1 (CONA)
    Super IO Chip                  F81768
    ▶ Serial Port 1 Configuration
    ▶ Serial Port 2 Configuration

    Restore AC Power Loss        [Power Off]



                                                   →←: Select Screen
                                                   ↓↑: Select Item
                                                   Enter: Select
                                                   +/-: Change Opt.
                                                   F1: General Help
                                                   F2: Previous Values
                                                   F9: Optimized Defaults
                                                   F10: Save and Exit
                                                   ESC: Exit

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```

Setting	Description
Serial Port 1/2 & Parallel Port Configuration	See next page.
Restore AC Power Loss	Specify what state to go to when power is re-applied after a power failure. ► Options: **Last State**, **Power On** and **Power Off** (default)

Serial Port 1/2 Configuration

Setting	Description
Serial Port	**Enable** (default) or **Disable** Serial Port (COM).
Change Settings	Select an optimal setting for Super IO device. ► Options for Serial Port 1: **Auto**; **IO=3F8h; IRQ=4** (default) ; **IO=3F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12**; **IO=2F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12**; **IO=3E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12**; **IO=2E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12**; ► Options for Serial Port 2: **Auto** **IO=2F8h; IRQ=3** (default) **IO=3F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12**; **IO=2F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12**; **IO=3E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12**; **IO=2E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12**;

3.2.7 Hardware Monitor

```
         Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.
          Advanced

        Pc Health Status                                    Enabled or Disable
                                                            Smart Fan
        Smart Fan Function        [Enabled]

        CPU tempreture            : +31ºC
        System temperature1       : +35ºC
        System temperature2       : +37ºC
        Fan1 Speed                : 2742 RPM
        Fan2 Speed                : N/A
        +VCCCORE                  : +1.072 V
        +VCCIO                    : +0.952 V       →←: Select Screen
        +VPP                      : +2.512 V       ↓↑: Select Item
        +VDDQ                     : +1.232 V       Enter: Select
        +V5S                      : +5.024 V       +/-: Change Opt.
        +12V                      : +12.064 V      F1: General Help
                                                   F2: Previous Values
                                                   F9: Optimized Defaults
                                                   F10: Save and Exit
                                                   ESC: Exit

              Version 2.17.1255. Copyright (C) 2018 American Megatrendes, Inc.
```

Access this submenu to monitor the hardware status and to configure smart fan settings.

Setting	Description
Smart Fan Function	**Enable** (default) or **Disable** Smart Fan..

3.2.8 S5 RTC Wake Settings

```
Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.
  Advanced

Wake system from S5                              Enable or disable System
                                                 wake on alarm event.
                                                 Select FixedTime, system
                                                 will wake on the
                                                 hr::min::sec specified.
                                                 Select DynamicTime,
                                                 system will wake on the
                                                 current time + Increase
                                                 minute(s).


                                                 →←: Select Screen
                                                 ↓↑: Select Item
                                                 Enter: Select
                                                 +/-: Change Opt.
                                                 F1: General Help
                                                 F2: Previous Values
                                                 F9: Optimized Defaults
                                                 F10: Save and Exit
                                                 ESC: Exit

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```

Setting	Description
Wake System from S5	**Enable** or **Disable** (default) system wake on alarm event. ► Options available are: **Disabled** (default): **Fixed Time:** System will wake on the hr::min::sec specifiedc. **DynamicTime:** If selected, you need to set **Wake up minute increase** from 1 - 5. System will wake on the current time + increase minute(s).

3.2.9 CSM Configuration

```
         Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.
           Advanced

  Compatibility Support Module Configuration          Enable/Disable CSM
                                                      Support.
  CSM Support              [Enabled]

  CSM16 Module Version     07.79


  Boot option filter       [UEFI and Legacy]

  Option ROM execution

  Network                  [Do not launch]          →←: Select Screen
  Storage                  [Legacy]                  ↓↑: Select Item
  Video                    [Legacy]                  Enter: Select
                                                     +/-: Change Opt.
                                                     F1: General Help
                                                     F2: Previous Values
                                                     F9: Optimized Defaults
                                                     F10: Save and Exit
                                                     ESC: Exit

         Version 2.17.1255. Copyright (C) 2018 American Megatrendes, Inc.
```

Setting	Description
CSM Support	**Enable** (default) or **Disable** CSM Support.
Boot option filter	Control the Legacy/UEFI ROMs priority. ► Options: **UEFI and Legacy** (default), **Legacy only** and **UEFI only**
Network	Control the execution of UEFI and Legacy PXE OpROM ► Options: **Do not launch** (default) and **Legacy**
Storage	Control the execution of UEFI and Legacy Storage OpROM ► Options: **Do not launch** and **Legacy** (default)
Video	Control the execution of UEFI and Legacy Video OpROM ► Options: **UEFI** and **Legacy** (default)

3.2.10 NVMe Configuration

```
         Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.
          Advanced

        NVMe controller and Drive information

        No NVME Device Found

                                                         →←: Select Screen
                                                         ↓↑: Select Item
                                                         Enter: Select
                                                         +/-: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F9: Optimized Defaults
                                                         F10: Save and Exit
                                                         ESC: Exit

             Version 2.17.1255. Copyright (C) 2018 American Megatrendes, Inc.
```
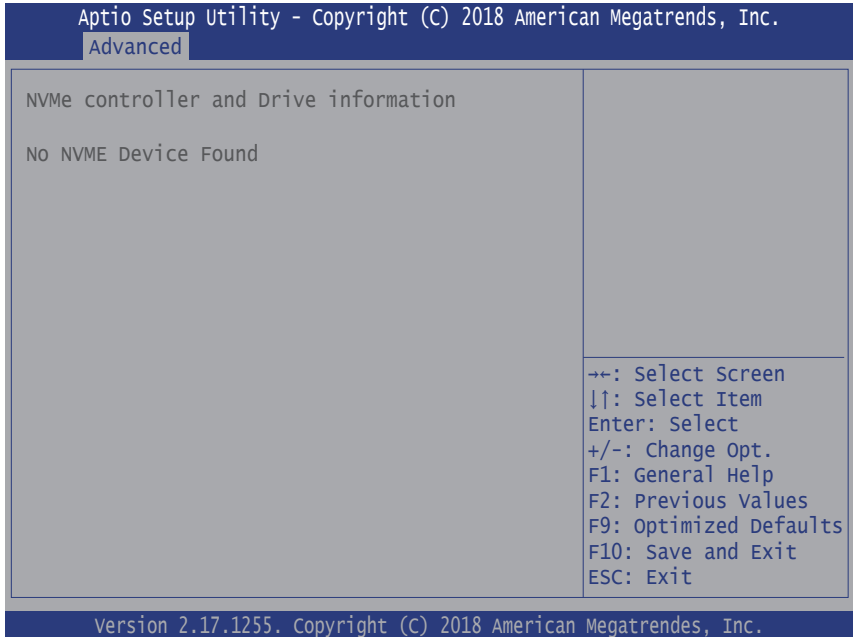
Access this submenu to view the NVME device information.

3.2.11 USB Configuration

```
        Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.
        Advanced

  USB Configuration                                  Enables Legacy USB
                                                     support. AUTO option
  USB Module Version           13                    disables legacy
                                                     support if no USB
  USB Devices:                                       devices are connected.
      1 XHCI                                         DISABLE option will
  USB Devices:                                       keep USB devices
      1 Keyboard                                     available only for EFI
                                                     applications.
  Legacy USB Support           [Enabled]
  XHCI Hand-off                [Enabled]
  USB Mass Storage Driver Support  [Enabled]         →←: Select Screen
  Port 60/64 Emulation         [Disabled]            ↓↑: Select Item
                                                     Enter: Select
  USB hardware delays and time-outs:                 +/-: Change Opt.
  USB Transfer time-out        [20 sec]              F1: General Help
  Device reset time-out        [20 sec]              F2: Previous Values
  Device power-up delay        [Auto]                F9: Optimized Defaults
                                                     F10: Save and Exit
                                                     ESC: Exit

        Version 2.17.1255. Copyright (C) 2018 American Megatrendes, Inc.
```

Setting	Description
Legacy USB Support	Sets legacy USB support. ► Options: **Enabled** (default), **Disabled** and **Auto**. **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	**Enable** (default) or **Disable** XHCI Hand-off This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
USB Mass Storage Driver Support	**Enable** (default) or **Disable** USB Mass Storage Driver Support.
Port 60/64 Emulation	**Enable** or **Disable** (default) port 60h/64h emulation support. This should be enabled for the complete USB keyboard legacy support for non-USB aware OSes.

USB hardware delay and time-out	
USB Transfer time-out	Use this item to set the time-out value for control, bulk, and interrupt transfers. ▶ Options available are: **1 sec, 5 sec, 10 sec, 20 sec** (default)
Device reset time-out	Use this item to set USB mass storage device start unit command time-out. ▶ Options available are: **10 sec, 20 sec** (default)**, 30 sec, 40 sec**
Device power-up delay	Use this item to set maximum time the device will take before it properly reports itself to the host controller. ▶ Options available are: 　**Auto** (Default): 'Auto' uses default value: for a root port it is 100 ms, for a hub port the delay is taken from hub descriptor. 　**Manual**: Select **Manual** you can set value for the following sub-item: '**Device Power-up delay in seconds**', the delay range in from 1 to 40 seconds, in one second increments.

3.3 Chipset

```
        Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.
     Main  Advanced  Chipset  Boot  Security  Save & Exit

     VT-d                           [Enabled]       VT-d capability
     Above 4GB MMIO BIOS assignment [Disabled]

     System Agent Configuration
   ▶ Graphics Configuration
   ▶ Memory Configuration

     PCH-IO Configuration
   ▶ PCI Express Configuration
   ▶ USB Configuration
   ▶ HD Audio Configuration
   ▶ PCH LAN Configuration
                                                  →←: Select Screen
                                                  ↓↑: Select Item
                                                  Enter: Select
                                                  +/-: Change Opt.
                                                  F1: General Help
                                                  F2: Previous Values
                                                  F9: Optimized Defaults
                                                  F10: Save and Exit
                                                  ESC: Exit

          Version 2.17.1255. Copyright (C) 2018 American Megatrendes, Inc.
```

Setting	Description
VT-d	**Enable** (default) or **Disable** VT-d function
Above 4GB MMIO BIOS assignment	**Enable** or **Disable** (default) Above 4GB MMIO BIOS assignment
System Agent (SA) Configuration	
Graphics Configuration	See section 3.3.1 Graphics Configuration on page 61
PEG Port Configuration	
Memory Configuration	See section 3.3.2 Memory Configuration on page 64
PCH-IO Configuration	
PCI Express Configuration	See section 3.3.4 PCI Express Configuration on page 65
USB Configuration	See section 3.3.5 USB Configuration on page 66

HD Audio Configuration	Control Detection of the HD-Audio device. ► Options available are: **Disabled**: HDA will be unconditionally disabled **Enabled** (default) : HDA will be unconditionally Enabled **Auto** = HDA will be enabled if present, disabled otherwise.
PCH LAN Controller	Enables/Disables onboard NIC. ► Options: **Enabled** (default) and **Disabled** If enabled, "Wake on LAN" option will be available to **Enable** (default) / **Disable** integrated LAN to wake the system. (the Wake On LAN cannot be disabled if ME is on at Sx state.)

3.3.1 Graphics Configuration

```
            Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.
                     Chipset

  Graphics Configuratino                          Graphics turbo IMON
                                                  current values
  IGFX VBIOS Version          1046                supported (14-31)
  Graphics Turbo IMON Current  31

  Primary Display             [PEG]
   Primary PEG                [Auto]
  Internal Graphics           [Auto]
  GTT Size                    [8MB]
  Aperture Size               [128MB]
  DVMT Pre-Allocated          [32M]
  DVMT Total Gfx mem          [256M]
                                                  →←: Select Screen
                                                  ↓↑: Select Item
                                                  Enter: Select
                                                  +/-: Change Opt.
                                                  F1: General Help
                                                  F2: Previous Values
                                                  F9: Optimized Defaults
                                                  F10: Save and Exit
                                                  ESC: Exit

            Version 2.17.1255. Copyright (C) 2018 American Megatrendes, Inc.
```

Setting	Description
Graphics Turbo IMON Current	Sets the graphics turbo IMON current values. ► Options available are **14** to **31** (default).
Primary Display	Select which of IGFX/PEG/PCI Graphics device should be Primary Display or select SG for Switchabel Gfx. ► Options available are **Auto**, **IGFX** and **PEG** (default).
Primary PEG	Set the Primary PEG device. ► Options: **Auto** (default), **PEG11,** and **PEG12**.
Internal Graphics	Keep IGD enabled based on the setup options. ► Options: **Auto** (default), **Disabled** and **Enabled**.
GTT Size	Select the GTT Size. ► Options: **4MB, 2MB** and **8MB** (default)**.**

Apeture Size	Select the Apeture Size. Note that above 4GB MMIO BIOS assignment is automatically enabled when selecting 2048MB aperture. To use this feature, please disable CSM support. ► Options: **128MB** (default), **256MB, 512MB**, **1024MB**, **2048MB** and **4096MB**.
DVMT Pre-Allocated	Select the DVMT 5.0 Pre-allocated (Fixed) Graphic Memory size used by the Internal Graphic Device. ► Options: **32M** is the default.
DVMT total Gfx Mem	Select the DVMT 5.0 Total Graphic Memory size used by the Internal Graphic Device. ► Options: **128MB, 256MB** (default) and **Max.**

3.3.2 PEG Port Configuration

```
        Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.
               Chipset

  PEG Port Configuration                                Graphics turbo IMON
  PEG 0:1:0                        Not Present          current values
    Enable Poot Port               [Enabled]            supported (14-31)
    Max Link Speed                 [Auto]
    PEG0 Slot Power Limit Value    75
    PEG0 Slot Power Limit Scale    [1.0x]
    PEG0 Physical Slot Number      1
  PEG0 Hotplug                     [Disabled]
  PEG 0:1:0                        Not Present
    Enable Poot Port               [Enabled]
    Max Link Speed                 [Auto]
    PEG0 Slot Power Limit Value    75
    PEG0 Slot Power Limit Scale    [1.0x]
    PEG0 Physical Slot Number      2
                                                        →←: Select Screen
  PEG 0:1:0                        Not Present          ↓↑: Select Item
    Enable Poot Port               [Enabled]            Enter: Select
    Max Link Speed                 [Auto]               +/-: Change Opt.
    PEG0 Slot Power Limit Value    75                   F1: General Help
    PEG0 Slot Power Limit Scale    [1.0x]               F2: Previous Values
    PEG0 Physical Slot Number      3                    F9: Optimized Defaults
  Detect Non-Compliance Device     [Disabled]           F10: Save and Exit
  Program PCIe ASPM after OpROM    [Disabled]           ESC: Exit

        Version 2.17.1255. Copyright (C) 2018 American Megatrendes, Inc.
```

Enable Root Port	**Enable** or **Disable** (default) the Root Port. ► Options: **Auto**, **Disabled** and **Enabled** Default for PEG0: Enabled Default for PEG1 & 2: Auto
Max Link Speed	Configures PEG 0:1: X Max Speed. ► Options: **Auto** (default), **Gen 1**, **Gen 2** and **Gen 3**.
PEGx Slot Power Limit Value	Set the upper limit on power supplied by slot. Power limit (in Watts) is calculated by multiplying this value bythe Slot Power Limit Scale. Values 0-255. ► Default: **75**
PEGx Slot Power Limit Scale	Select the scale used for the Slot Power Limit Value. ► Options: **1.0x** (default), **0.1x**, **0.01x** and **0.001x**.
PEGx Physical Slot Number	Set the physical slot number attached to this port. The number has to be globally unique within the chassis Value: 0~8191 ► Default: **1** (for PEG0), **2** (for PEG1), **3** (for PEG2)
Detect Non-Compliance Device	Detect Non-Compliance PCI Express Device in PEG. ► Options: **Enabled** and **Disabled** (default)
Program PCIe ASPM after OpROM	**Enabled**: PCIe ASPM will be programmed after OpROM. **Disable** (default): PCIe ASPM will be programmed before OpROM.

3.3.3 Memory Configuration

```
        Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.
                 Chipset

  Memory Information

  Memory RC Version              1.9.0.0
  Memory Frequency               2133 Mhz
  Total Memory                   8192 MB
  VDD                            1200
  DIMM#0                         Not Present
  DIMM#1                         4096 MB
  DIMM#2                         Not Present
  DIMM#3                         4096 MB
  Memory Timings (tCL-tRCD-tRP-tRAS)  15-36
                                              →←: Select Screen
                                              ↓↑: Select Item
                                              Enter: Select
                                              +/-: Change Opt.
                                              F1: General Help
                                              F2: Previous Values
                                              F9: Optimized Defaults
                                              F10: Save and Exit
                                              ESC: Exit

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```

Access this submenu to view the memory configuration.

3.3.4 PCI Express Configuration

```
            Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.
                    Chipset

    PCI Express Configuration                      i210 LAN Settings.

  ▶ i210 LAN
  ▶ PCIe x4 Lanes (w/ PCIe x8 slot)
  ▶ PCIe x1 Lanes slot
  ▶ PCIe to PCI Bridge




                                                  →←: Select Screen
                                                  ↓↑: Select Item
                                                  Enter: Select
                                                  +/-: Change Opt.
                                                  F1: General Help
                                                  F2: Previous Values
                                                  F9: Optimized Defaults
                                                  F10: Save and Exit
                                                  ESC: Exit

            Version 2.17.1255. Copyright (C) 2018 American Megatrendes, Inc.
```

	Description
Port PCIe X4 Lanes PCIe x1 Lanes Slot, PCIe to PCI Bridge	**Enable** (default) or **Disable** the PCIe Express Root Port.
ASPM Support	Disable or set the ASPM level. Force L0s will force all inks to L0s state. "Auto" will allow BIOS to auto configure."Disable" will disable ASPM. ► Options: **Disabled** (default), **L0s**, **L1**, **L0sL1** and **Auto**.
PCIe Speed	Select PCI Express port speed. ► Options: **Auto** (default), **Gen1**, **Gen2** and **Gen3**

3.3.5 USB Configuration

```
            Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.
                Chipset

    USB Configuration                              Precondition work on
                                                   USB host controller and
    USB Preconditon              [Disabled]        root ports for faster
                                                   enumeration.
    XHCI Disable Compliance Mode [FALSE]

    XDCI Support                 [Disabled]

    USB Port Disable Override    [Disabled]

                                                   →←: Select Screen
                                                   ↓↑: Select Item
                                                   Enter: Select
                                                   +/-: Change Opt.
                                                   F1: General Help
                                                   F2: Previous Values
                                                   F9: Optimized Defaults
                                                   F10: Save and Exit
                                                   ESC: Exit

            Version 2.17.1255. Copyright (C) 2018 American Megatrendes, Inc.
```

Setting	Description
USB Precondition	Precondition work on USB host controller and root ports for faster enumeration. ► Options: **Enable**/**Disable** (default).
XHCI Disable Compliance Mode	Options to disable Compliance Mode. Default is FALSE to not disable Compliance Mode. Set TRUE to disable Compliance Mode. ► Options: **False** (default) /**True**.
xDCI Support	**Enable** or **Disable** (default) xDCI (USB OTG Device.
USB Port Disable Override	Selectively enable/disable the corresponding USB port from reporting a Device Connection to the controller. ► Options: **Disabled** (default) / **Select Per-Pin**.

3.4 Security

The **Security** menu sets up the administrator password.

```
         Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.
      Main  Advanced  Chipset  Security  Boot  Save & Exit

      Password Description                           Set Administrator
                                                     Password
      Minimum length                   3
      Maximum length                   20


      Administrator Password


                                                     ┌──────────────────────
                                                     →←: Select Screen
                                                     ↓↑: Select Item
                                                     Enter: Select
                                                     +/-: Change Opt.
                                                     F1: General Help
                                                     F2: Previous Values
                                                     F9: Optimized Defaults
                                                     F10: Save and Exit
                                                     ESC: Exit

            Version 2.17.1255. Copyright (C) 2018 American Megatrendes, Inc.
```

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

3.5 Boot

```
            Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.
      Main  Advanced  Chipset  Boot  Security  Save & Exit

      Boot Configuration                              Select the keyboard
      Setup Prompt Timeout         1                  NumLock state
      Bootup NumLock State         [On]
      Fast Boot                    [Disabled]
      Quiet Boot                   [Disabled]

      Boot Option Priorities



                                                      →←: Select Screen
                                                      ↓↑: Select Item
                                                      Enter: Select
                                                      +/-: Change Opt.
                                                      F1: General Help
                                                      F2: Previous Values
                                                      F9: Optimized Defaults
                                                      F10: Save and Exit
                                                      ESC: Exit

            Version 2.17.1277. Copyright (C) 2018 American Megatrendes, Inc.
```
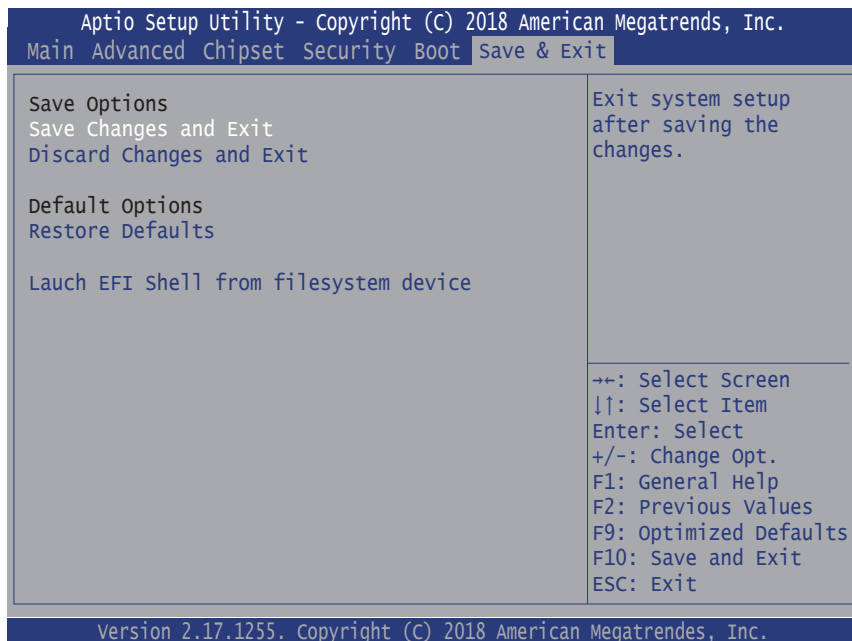
Setting	Description
Setup Prompt Timeout	Number of seconds to wati for setup activation key. 65535 (0XFFFF) means indefinite waiting.
Boot NumLock State	Select the keyboard NumLock state. ► Options: **On** (default) and **Off**.
Fast Boot	**Enable** or **Disable** (default) boot with initialization of a minimal set of devices required to launch active boot option.
Quiet Boot	**Enable** or **Disable** (default) Quiet Boot option.

3.6 Save & Exit

```
       Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.
  Main  Advanced  Chipset  Security  Boot  Save & Exit

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

  Default Options
  Restore Defaults

  Lauch EFI Shell from filesystem device

                                                  →←: Select Screen
                                                  ↓↑: Select Item
                                                  Enter: Select
                                                  +/-: Change Opt.
                                                  F1: General Help
                                                  F2: Previous Values
                                                  F9: Optimized Defaults
                                                  F10: Save and Exit
                                                  ESC: Exit

          Version 2.17.1255. Copyright (C) 2018 American Megatrendes, Inc.
```

| Setting	Description
Save Changes and Exit	Exit system setup after saving the changes. ► Enter the item and then a dialog box pops up: **Save configuration and exit? (Yes/ No)**
Discard Changes and Exit	Exit system setup without saving the changes. ► Enter the item and then a dialog box pops up: **Quit without saving? (Yes/ No)**
Restore Defaults	Restore/Load Default values for all the setup options. ► Enter the item and then a dialog box pops up: **Load Optimized Defaults? (Yes/ No)**
Launch EFI Shell from filesystem device	Attempts to launch EFI shell application (Shell.efi) from one of the available filesystem devices.

Appendix

Appendix A. Anti-Crash Technology for BIOS Recovering

The motherboard supports Anti-Crash Technology (ACT) for automatical system BIOS recovering. This section describes the recovery and update process.

Caution: DO NOT disconnect the AC power supply during the Auto Recovery and BIOS update process.

A.1 Auto Recovery
The motherboard comes with two BIOS ROMs mounted onto the board as shown below.
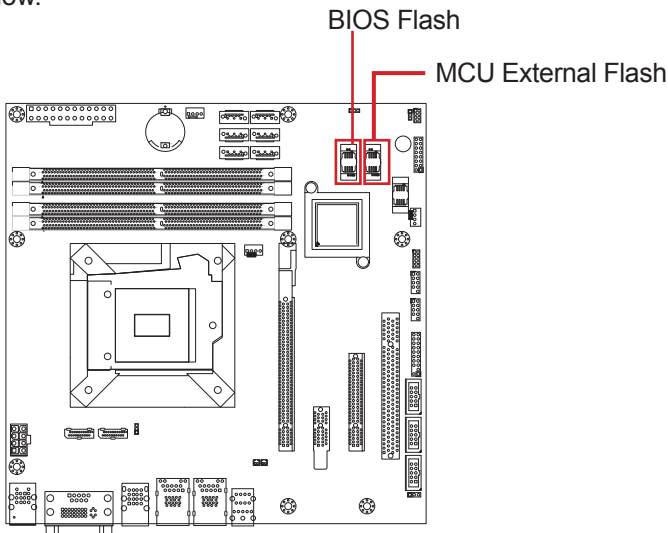

- BIOS Flash: Primary ROM for BIOS
- MCU External Flash: Secondary ROM for backup BIOS

In case the motherboard fails to boot, it will run BIOS self diagnostics to verify the BIOS status on the primary ROM. If problem is detected on the BIOS, then the recovery process will automatically start to load the backup BIOS from the secondary ROM. The whole process will take about 2~3 minutes where a BIOS recovery status LED will show the recovery status as described below:

- The LED blinks fast to indicate erasing data from the primary ROM.

- The LED blinks slowly to indicate the MCU is writing system backup BIOS from the secondary ROM to the primary one.

- The LED turns off to indicate the process is finished and the motherboard will automatically boot to your system.

If you cannot see the LED status, just **wait for about 3 minutes** for the motherboard to complete the recovery and then reboot to your system.

BIOS / recovery status LED
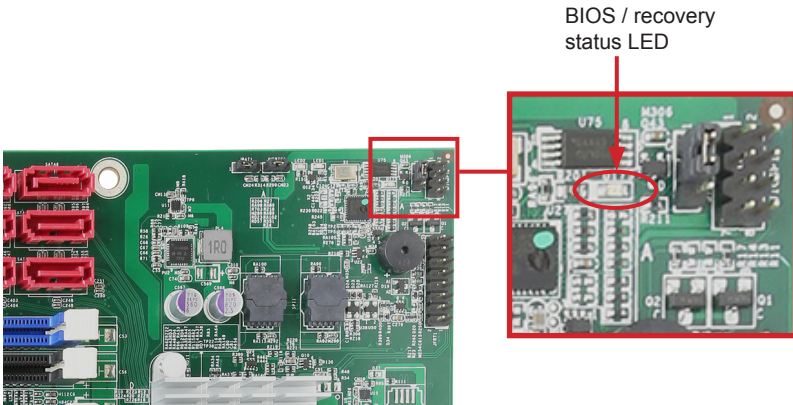
A.2 BIOS Update using ACT Utility

When a new version of BIOS is available and you want to update the BIOS, you need to update the BIOS in the primary ROM as well as the secondary ROM to the same version; otherwise the primary BIOS will load a different version upon BIOS recovery.

ARBOR's proprietary ACT Utility is designed to update the BIOS in the primary ROM as well as the secondary ROM at the same time. The ACT Utility is a DOS-based program:

```
C:\I89Q0>dir /w
Volume in drive C is DOS USB
Volume Serial Number is DOA5-AA5A
Directory of C:\I89Q0

[.]           [..] 89Q0.BAT      BACKUP.EXE      ERROR.LOG
FPARTS.TXT    FPT11.EXE          I89Q0.023       UPDATE.EXE
      7 file(s)    18,475,016 bytes
      2 dir(s)     2,590.02 MB free

C:\89Q0>89q0
```

After running the program on command prompt, the utility performs these tasks:

1. Provides a specific protection to the BIOS. This ensures the BIOS will not become corrupted if power failure occurs while the BIOS update is in progress.

2. Update the BIOS in primary ROM to the new version.

```
[.]           [..] 89Q0.BAT      BACKUP.EXE      ERROR.LOG
FPARTS.TXT    FPT11.EXE          I89Q0.023       UPDATE.EXE
      7 file(s)    18,475,016 bytes
      2 dir(s)     2,590.02 MB free

C:\89Q0>89q0
C:\89Q0>update.exe
C:\89Q0>fpt11.exe - SAVEMAC  -F i89Q0.023

Intel (R) Flash Programming Tool. Version:   11.0.0.1202
Copyright (c) 2007 - 2015, Intel Corporation. All rights reservation

Reading HSFSTS register...Flash Descriptor: Valid

o--- Flash Devices Found ---
ow25Q128BVoID:0xEF4048oSize: 16384KB (131072Kb)

PDR Region does not exists.
```
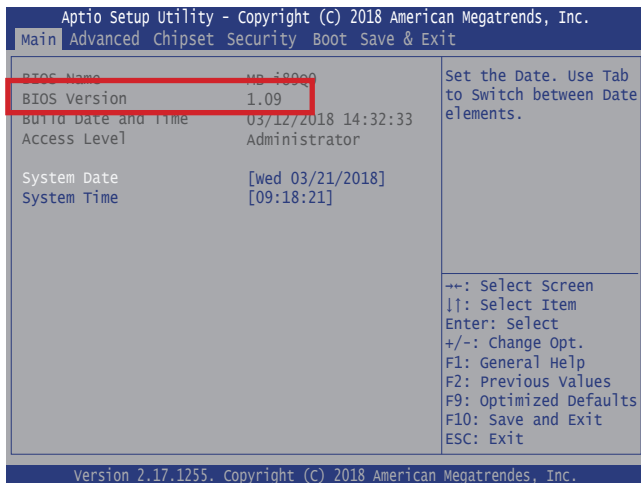
```
PDR Region does not exists.
- Reading Flash [0x016B000]    - 100 percent complete.
- Programming Flash [0x016B000]   88KB of  88KB - 100 percent complete.
- Erasing Flash Block [0x274000] - 100 percent complete.
- Programming Flash [0x274000]    - 12KB of 12KB - 100 percent complete.
- Erasing Flash Block [0xA0A000] - 100 percent complete.
- Programming Flash [0xA0A000]    - 40KB of 40KB - 100 percent complete.
- Erasing Flash Block [0x0A2000] - 100 percent complete.
- Programming Flash [0x0A2000]    - 4KB of  4KB  - 100 percent complete.
- Erasing Flash Block [0xA51000] - 100 percent complete.
- Programming Flash [0xA51000]    - 4KB of 4KB  - 100 percent complete.
- Erasing Flash Block [0xA59000] - 100 percent complete.
- Programming Flash [0xA59000]    - 8KB of 8KB  - 100 percent complete.
- Erasing Flash Block [0x882000] - 62 percent complete.
```

3. Backup the new version of BIOS to the secondary ROM. During this stage:

    - The system will shut down and the screen goes black.

    - The BIOS recovery status LED blinks fast to indicate erasing data from the secondary ROM.

    - The BIOS recovery status LED blinks slowly to indicate the MCU is writing system BIOS from the mater ROM to the secondary one.

4. Once the programming procedure is done, the computer soon reboots to verify if both the primary/secondary BIOS functions properly. If yes, then the computer will boot to your system.

After using the ACT Utility to perform the BIOS update, user can verify the BIOS version by accessing the BIOS:

```
         Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.
  Main  Advanced  Chipset  Security  Boot  Save & Exit

  BIOS Name                MB-i8900               Set the Date. Use Tab
  BIOS Version             1.09                   to Switch between Date
  Build Date and Time      03/12/2018 14:32:33    elements.
  Access Level             Administrator

  System Date              [Wed 03/21/2018]
  System Time              [09:18:21]




                                                  →←: Select Screen
                                                  ↓↑: Select Item
                                                  Enter: Select
                                                  +/-: Change Opt.
                                                  F1: General Help
                                                  F2: Previous Values
                                                  F9: Optimized Defaults
                                                  F10: Save and Exit
                                                  ESC: Exit

         Version 2.17.1255. Copyright (C) 2018 American Megatrendes, Inc.
```

A.3 How to Get ACT Utility

ARBOR's ACT Utility is provided upon request. Please contact your local
ARBOR sales office or sales representativ for more information.

Appendix B. 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 program example to disable and load WDT.

Sample Codes:

```
/*------------------------------------------------------------------------*/
#include <math.h>
#include <stdio.h>
#include <dos.h>

int sioIndex  = 0x2E;                  /* or index = 0x4E */
int sioData   = 0x2F;                  /* or data  = 0x4F */

int main(void)
{
    int i;

    SioWDTStart(5);

    while(1)
    {
                                       i = SioWDTCount();
                                       printf("\r Counts : %d ",i);
                                       sleep(1);
    }

    return 0;
}

void SioWDTStart(int iCount)
{
    int iData;

    outportb(sioIndex, 0x87);          /* Enable Super I/O */
    outportb(sioIndex, 0x87);

    outportb(sioIndex, 0x07);          /* Select logic device - WDT */
    outportb(sioData,  0x07);

    outportb(sioIndex, 0x29);          /* Enable WDTRST# Pin */
    iData = inportb(sioData);
    iData = iData & 0xEF;
    outportb(sioData,  iData);         /* The pin function is WDTRST# */

    outportb(sioIndex, 0x30);          /* Enable WDT */
    outportb(sioData,  0x01);

    outportb(sioIndex, 0xF0);          /* Enable WDTRST# Output */
    outportb(sioData,  0x80);
```

```
    outportb(sioIndex, 0xF6);          /* Set WDT Timeout value */
    outportb(sioData,  iCount);

    outportb(sioIndex, 0xF5);          /* Set Configure and Enable WDT timer, Start countdown */
    outportb(sioData,  0x32);

    outportb(sioIndex, 0xAA);          /* Disable Super I/O */
}

void SioWDTStop(void)
{
    outportb(sioIndex, 0x87);          /* Enable Super I/O */
    outportb(sioIndex, 0x87);

    outportb(sioIndex, 0x07);          /* Select logic device – WDT */
    outportb(sioData,  0x07);

    outportb(sioIndex, 0xF5);          /* Disable WDT timer, stop countdown */
    outportb(sioData,  0x12);

    outportb(sioIndex, 0xAA);          /* Disable Super I/O */
}

void SioWDTClear(int iCount)
{
    outportb(sioIndex, 0x87);          /* Enable Super I/O */
    outportb(sioIndex, 0x87);

    outportb(sioIndex, 0x07);          /* Select logic device – WDT */
    outportb(sioData,  0x07);

    outportb(sioIndex, 0xF6);          /* Reset WDT Timeout Value */
    outportb(sioData,  iCount);

    outportb(sioIndex, 0xAA);          /* Disable Super I/O */
}

int SioWDTCount(void)
{
    int oData;

    outportb(sioIndex, 0x87);          /* Enable Super I/O  */
    outportb(sioIndex, 0x87);

    outportb(sioIndex, 0x07);          /* Select logic device – WDT */
    outportb(sioData,  0x07);

    outportb(sioIndex, 0xF6);          /* Get count of timer */
    oData = inportb(sioData);

    outportb(sioIndex, 0xAA);          /* Disable Super I/O */

    return oData;
}
```