

# **SHB150R Series**

Intel<sup>®</sup> Socket 1151 Core<sup>™</sup> i7/ i5/ i3 Processors PICMG<sup>®</sup> v1.3 Full-size CPU Card

**User's Manual** 



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## CAUTION

Wrong type of batteries may cause explosion. It is recommended that users only replace with the same or equivalent type of batteries as suggested by the manufacturer once properly disposing of any used ones.

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

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

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# Chapter 1 Introduction



The SHB150R PICMG<sup>®</sup> v1.3 full-size Single Board Computer supports an LGA1151 socket for Intel<sup>®</sup> Core<sup>TM</sup> i7/ i5/ i3 desktop processors with 14nm technology and transfer rate 2400/ 2666 MHz. The board integrates an Intel<sup>®</sup> Q370/H310/C246 chipset that delivers outstanding system performance through high-bandwidth interfaces, multiple I/O functions for interactive applications and various embedded computing solutions. There are two 288-pin DDR4 DIMM sockets for dual channel DDR4 2400/ 2666MHz with maximum memory capacity up to 64GB. The board also features dual Gigabit Ethernet, SATA 6Gbps with SATA RAID 0/1/5/10(Q370/C246) by PCH, USB 2.0, and USB 3.1 (Gen1/Gen2) high speed compliant ports and built-in Intel<sup>®</sup> HD Audio Digital Header to achieve the best stability and reliability for industrial applications.

# 1.1 Features

- LGA1151 socket 9<sup>th</sup>/8<sup>th</sup> Generation Intel<sup>®</sup> Core<sup>TM</sup> processors up to 95W
- Intel<sup>®</sup> Q370/H310/C246 PCH
- 2 DDR4 unbuffered DIMM max. up to 64GB memory capacity
- Intel<sup>®</sup> iAMT (Q370/C246 PCH) and TPM2.0 module supported (optional)
- PCIe Gen. 3 at 8GT/s supported
- USB 3.1 (Gen2) supported (Q370/C246 PCH)

# 1.2 Specifications

#### • CPU

- LGA1151 socket 9th/8th Generation Intel® Core™ i7/i5/i3, Pentium® and Celeron® processors (Coffee Lake Refresh) up to 95W
- System Chipset
  - Intel<sup>®</sup> Q370
  - Intel<sup>®</sup> H310
  - Intel<sup>®</sup> C246

#### CPU Socket

LGA1151 socket

#### • DRAM Transfer Rate

2400/ 2666 MHz

#### • BIOS

AMI BIOS via SPI interface with socket

#### • System Memory

- Two 288-pin DDR4 2400/ 2666MHz DIMM sockets
- Maximum up to 64GB DDR4 memory
- Supports the memory with ECC function (C246 PCH)

#### • L1, L2, L3 Cache: Integrated in CPU

#### • Onboard Multi I/O

- Serial ports: two RS-232/422/485 port in 2x5-pin (pitch=2.54mm) box-header (COM 1/2) and two RS-232 ports in 2x5-pin (pitch=2.54mm) box-header (COM 3/4)
- Parallel Port: one 26-pin 2.54-pitch box-header; SPP/EPP/ECP supported

#### USB Interface

#### Q370

- Two USB3.1 (Gen2) ports on internal box header
- Two USB3.1 (Gen1) ports on rear I/O
- Two USB3.1 (Gen1) ports on internal box header
- Two USB2.0 ports on internal pin header

■ Four USB2.0 ports on SHB connector-C golden fingers

- H310
- Two USB3.1 (Gen1) ports on rear I/O
- Two USB3.1 (Gen1) ports on internal box header
- Two USB2.0 ports on internal pin header
- Four USB2.0 ports on SHB connector-C golden fingers
   C246
- Two USB3.1 (Gen2) ports on internal box header
- Two USB3.1 (Gen1) ports on rear I/O
- Two USB3.1 (Gen1) ports on internal box header
- Two USB2.0 ports on internal pin header
- Four USB2.0 ports on SHB connector-C golden fingers
- Onboard Graphics
  - Integrated Intel<sup>®</sup> HD graphics supporting DVI-I
  - DVI/VGA: Max. resolution is 1920x1200.
  - Internal DP1.4 Connector: Max resolution is 4096 x 2304. Must use with Axiomtek DP kit.

- Ethernet
  - LAN1/LAN2: Intel<sup>®</sup> i219LM with iAMT / Intel<sup>®</sup> i211AT Ethernet controller
  - Support 1000/100/10Mbps Gigabit/Fast Ethernet
- Storage
  - Serial ATA:
    - Six SATA 3.0 ports (6Gbps performance) with SATA RAID 0/1/5/10 (Q370/C246) Four SATA 3.0 ports (6Gbps performance) (H310)
  - One M.2 2280 Key M (Only for Q370, C246 version)
- Audio
  - Supports HD audio interface as a 2x8 pin header
  - Supports audio kit AX93242 with MIC-in/Line-in/speaker-out (option kit)
- Watchdog Timer
  - 1~255 seconds or minutes; up to 255 levels
- Hardware Monitoring
  - Monitoring temperatures, voltages and cooling fan status
- Dimensions
  - 338mm x 126mm
- Expansion Interface
  - One PCI-Express x16 (Gen.3)
  - One PCI-Express x4 (or four PCI-Express x1) (Gen.3)
  - Four PCI



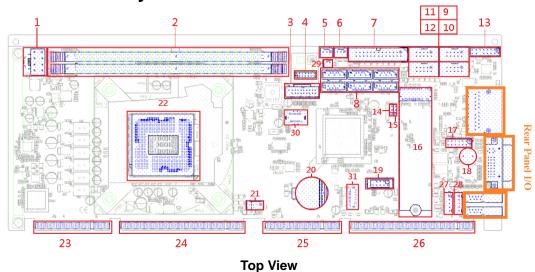
All specifications and images are subject to change without notice.

# 1.3 Packing list

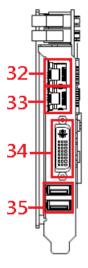
- 1 x slot CPU card
- 1 x Driver DVD
- 1 x SATA cable
- 1 x COM cable

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# Chapter 2 Board and Pin Assignments

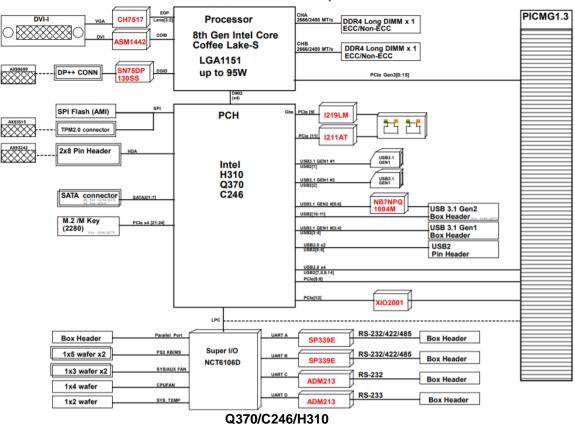


# 2.1 Board Layout



Rear Panel I/O

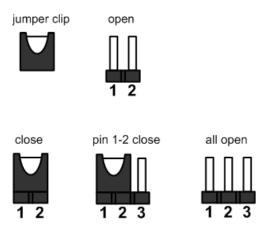
# 2.2 Block Diagram



9th Gen Intel Core coffee lake refresh suported in A3

# 2.3 Jumper Settings

A jumper is a small component consisting of a jumper clip and jumper pins. Install a jumper clip on two jumper pins to close a jumper. Remove the jumper clip from two jumper pins to open a jumper. The following illustration shows how to set up a jumper.



Before applying power to the SHB150R series, please make sure all of the jumpers are in factory default position. Below you can find a summary table and onboard default settings.



Turn off power before changing any default jumper settings.

Jumper	Description	Setting
JP3	Auto Power On Default: Enable	1-2 Close
JP2	Restore BIOS Optimal Defaults Default: Normal Operation	1-2 Close

### 2.3.1 Auto Power On (JP3)

If JP3 is enabled for power input, the system will be automatically power on without pressing soft power button. If JP3 is disabled for power input, it is necessary to manually press soft power button to power on the system.

Function	Setting	3 🔳
Enable auto power on (Default)	1-2 close	2 🗖
Disable auto power on	2-3 close	1 0

## 2.3.2 Restore BIOS Optimal Defaults (JP2)

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

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

# 2.4 Connectors

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

	Jumpers/Headers/Connectors					
1	ATX Power Connector (ATX1)	17	Front Panel Connector (CN8)			
2	DDR4 Socket (DIMM1.DIMM2)	18	Buzzer (BZ1)			
3	Internal USB 3.1 Gen1 Connector (CN3)	19	Internal USB2.0 Headers (CN10)			
4	TPM Pin Header (CN2)	20	RTC Battery Socket (BAT1)			
5	FAN Connectors (FAN1)	21	FAN Connectors (FAN3)			
6	FAN Connectors (FAN2)	22	9th/8th Intel® Coffee Lake LGA 1151 socket			
7	Parallel Port Connector (PRINT1)	23	PICMG_1.3 Gold Finger			
8	SATA 3.0 Connectors (SATA1~SATA6)	24	PICMG_1.3 Gold Finger			
9	COM Connectors (COM1)	25	PICMG_1.3 Gold Finger			
10	COM Connectors (COM2)	26	PICMG_1.3 Gold Finger			
11	COM Connectors (COM3)	27	Internal PS/2 Mouse Connectors (CN13)			
12	COM Connectors (COM4)	28	Internal PS/2 Keyboard Connectors (CN14)			
13	Intel <sup>®</sup> HD Audio Digital Header (HDA1)	29	Temperature Sensor Connector (CN1)			
14	Restore BIOS Optimal Defaults (JP2)	30	Internal USB 3.1 Gen2 Connector (CN7)			
15	Auto Power On (JP3)	31	Display Port 1.4 Connector (CN11)			
16	M.2 2280 Key M NVMe SSD (CN4)					

	Rear I/O Jumpers/Headers/Connectors				
32	Ethernet Ports (CN5)	34	DVI-I Connector (CN9)		
32	32 Ethernet Ports (CN5)		Rear I/O I USB 3.1 Gen1 Connectors (CN12 and CN15)		

### 2.4.1 Temperature Sensor Connector (CN1) (Optional)

This is a 2-pin connector for temperature sensor (NTC thermistor) interface. The thermistor value should be 10K and its B value is 3435K.

Pin	Signal	
1	Sensor Input	
2	GND	1 2

#### 2.4.2 Ethernet Ports (CN5)

The board has two RJ-45 connectors: LAN1 (i219LM) and LAN2 (i211AT). Ethernet connection can be established by plugging one end of the Ethernet cable into this RJ-45 connector and the other end (phone jack) to a 1000/100/10 Base-T hub.

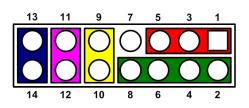
Pin	1000 Base-T	100/10 Base-T	Description	
L1	BI_DA+	TX+	Bidirectional or Transmit Data+	
L2	BI_DA-	TX-	Bidirectional or Transmit Data-	
L3	BI_DB+	RX+	Bidirectional or Receive Data+	
L4	BI_DC+	N.C.	Bidirectional or Not Connected	
L5	BI_DC-	N.C.	Bidirectional or Not Connected	
L6	BI_DB-	RX-	Bidirectional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

LAN1	LAN2

## 2.4.3 Front Panel Connector (CN8)

This is a front panel header (7x2-pin p=2.54mm).

Pin	Signal	
1	PWRLED+	
2	EXT SPK-	
3	GND	
4	Buzzer	
5	PWRLED-	
6	N.C.	
7	N.C.	
8	EXT SPK+	
9	PWRSW-	
10	PWRSW+	
11	HW RST-	
12	HW RST+	
13	HDDLED-	
14	HDDLED+	



#### Power LED

Pin 1 connects anode(+) of LED and pin 5 connects cathode(-) of LED. The power LED lights up when the system is powered on. Pin 3 is defined as GND.

#### **External Speaker and Internal Buzzer**

Pin 2, 4, 6 and 8 connect the case-mounted speaker unit or internal buzzer. While connecting the CPU board to an internal buzzer, please set pin 2 and 4 closed; while connecting to an external speaker, you need to set pins 2 and 4 opened and connect the speaker cable to pin 8(+) and pin 2(-).

#### **Power On/Off Button**

Pin 9 and 10 connect the power button on a front panel to the CPU board, which allows users to turn on or off power supply.

#### System Reset Switch

Pin 11 and 12 connect the case-mounted reset switch that reboots your computer without turning off the power switch. It is a better way to reboot your system for a longer life of system power supply.

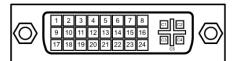
#### HDD Activity LED

This connection is linked to hard drive activity LED on the control panel. LED flashes when HDD is being accessed. Pin 13 and 14 connect the hard disk drive to the front panel HDD LED; pin 13 is assigned as cathode(-) and pin 14 is assigned as anode(+).

## 2.4.4 DVI-I Connector (CN8)

DVI-I (integrated, combining digital and analog in the same connector; digital may be single or dual link) provides transmission of fast and high quality digital video between a source device (graphics card) and a display device.

Pin	Signal	Pin	Signal
1	DVI_DATA2-	2	DVI_DATA2+
3	GND	4	N.C.
5	N.C.	6	DVI_SPC
7	DVI_SPD	8	N.C.
9	DVI_DATA1-	10	DVI_DATA1+
11	GND	12	N.C.
13	N.C.	14	+5V
15	GND	16	DVI_HTPLG
17	DVI_DATA0-	18	DVI_DATA0+
19	GND	20	N.C.
21	N.C.	22	GND
23	DVI_CLK+	24	DVI_CLK-
C1	Analog red	C2	Analog green
C3	Analog blue	C4	Analog
C5	Analog ground	04	horizontal sync



## 2.4.5 Internal USB 2.0 Connectors (CN10)

These are 5x2-pin p=2.54mm headers for USB 2.0 interface.

Pin	Signal	Pin	Signal		
1	USB_PWR	2	USB_PWR		
3	USB -	4	USB -	3	
5	USB +	6	USB +	5	00
7	GND	8	GND	7	00
		10	GND		0

### 2.4.6 Rear I/O USB 3.1 (Gen1) Connectors (CN12 and CN15)

These are standard USB (Universal Serial Bus) 3.0 connectors on the rear I/O for installing USB peripherals such as a keyboard, mouse, scanner, etc.

Pin	Signal
1	VCC
2	D-
3	D+
4	GND
5	StdA_SSRX-
6	StdA_SSRX+
7	GND_DRAIN
8	StdA_SSTX-
9	StdA_SSTX+

CN12: USB 3.0 port 0 CN15: USB 3.0 port 1



# 2.4.7 Internal PS/2 Keyboard and Mouse Connectors (CN13 and CN14)

The board has two 5-pin connectors for PS/2 keyboard (CN14) and mouse (CN13) interfaces.

Pin	Signal
1	Clock
2	DATA
3	No connector
4	GND
5	5VSBY

1	
2	20
3	0
4	0
5	зΟЦ
-	

### 2.4.8 COM Connectors (COM1~COM4)

The board supports RS-232/RS-422/RS-485 mode operation for COM1 and COM2. See the table below for the pin assignments. You can change the transmission mode from BIOS setting. COM3 and COM4 support RS-232 only.

Pin	RS-232	RS-422	RS-485
1	Data Carrier Detect (DCD)	тх-	DATA-
2	Data Set Ready (DSR)	No connector	No connector
3	Receive Data (RXD)	TX+	DATA+
4	Request to Send (RTS)	No connector	No connector
5	Transmit Data (TXD)	RX+	No connector
6	Clear to Send (CTS)	No connector	No connector
7	Data Terminal Ready (DTR)	RX-	No connector
8	Ring Indicator (RI)	No connector	No connector
9	Ground (GND)	GND	GND
10	Disconnect (NI)	NI	NI

9 10	00000	1
10	00000	2

### 2.4.9 FAN Connectors (FAN1, FAN2 and FAN3)

Fans are needed for cooling down CPU and system temperature. The board has three fan connectors. You can find fan speed option(s) at BIOS Setup Utility if either fan is installed. For further information, see BIOS Setup Utility: Advanced\HW Monitor\PC Health Status.

Auxiliary and system fan interfaces are available through FAN1 and FAN2. See the table below.

Pin	Signal	3 1
1	GND	000
2	+12V level	_
3	Rotation detection	

CPU fan interface is available through FAN3. See the table below.

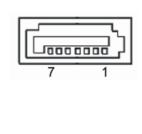
Pin	Signal	
1	Ground	4
2	+12V	000
3	Rotation Detection	
4	Speed Control	

### 2.4.10 SATA 3.0 Connectors (SATA1~SATA6)

These Serial Advanced Technology Attachment (Serial ATA or SATA) connectors are for high-speed SATA 3.0 interfaces. They are computer bus interfaces for connecting to devices such as hard disk drives.

This board has six SATA 3.0 ports with 6Gb/s performance.

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



# 2.4.11 Intel<sup>®</sup> HD Audio Digital Header (HDA1)

This is a 2x8-pin header for connecting an external HD Audio board (AX93242).

Pin	Signal	Pin	Signal
1	BCLK	2	GND
3	RST#	4	N.C
5	SYNC	6	GND
7	SDO	8	+3.3S
9	SDIO	10	+12VS
11	N.C	12	
13	N.C	14	N.C
15	N.C	16	GND

15							1
0	0	0	0	0	0	0	0 0
0	0		0	0	0	0	0
16							2

## 2.4.12 ATX Power Connector (ATX1)

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

The external power supply plug fits into this connector in only one orientation. Properly press down the power supply plug until it completely and firmly fits into this connector. Loose connection may cause system instability.

The ATX2 is an 8-pin ATX power connector. Its pin assignments are given in table below.

Pin	Signal	Pin	Signal
1	GND	5	+12V
2	GND	6	+12V
3	GND	7	+12V
4	GND	8	+12V

5	6	•	1
Ч	•	D	
Ч	•	D	
8		•	4
			•

### 2.4.13 Internal USB 3.1 Gen1 Connector (CN3)

The CN3 is a 19-pin internal connector for installing versatile USB 3.1 compliant peripherals.

Pin	Signal	Pin	Signal	
1	USB3_PWR56			
2	SSRX5-	19	VBUS1	
3	SSRX5+	18	SSRX6-	
4	GND	17	SSRX6+	
5	SSTX5-	16	GND	
6	SSTX5+	15	SSTX6-	
7	GND	14	SSTX6+	
8	USB10-	13	GND	
9	USB10+	12	USB11-	
10	ID	11	USB11+	

# 2.4.14 TPM Pin Header (CN2)

These are 7x2-pin p=2.0mm headers for SPI interface with an AX93515 TPM module.

Pin	Signal	Pin	Signal
1	VCC3P3	2	GND
3	MOSI	4	MISO
5	CLK	6	CS2
7	RST	8	PIRQ
9	PP	10	NC
11	NC	12	NC
13	NC	14	MC

		9				
0	0	0	0	0	0	
0	0	0	0	0	0	<b>0</b>
		10				2

20



The screw type is M2\*0.4.

## 2.4.15 Parallel Port Connector (PRINT1)

This board has a multi-mode parallel port to support:

#### • Standard Mode:

IBM PC/XT, PC/AT and PS/2<sup>™</sup> are compatible with a bi-directional parallel port.

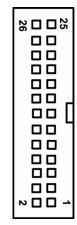
• Enhanced Mode:

Enhance Parallel Port (EPP) is compatible with EPP 1.7 and EPP 1.9 (IEEE 1284 compliant).

• High Speed Mode:

Microsoft and Hewlett Packard Extended Capabilities Port (ECP) is IEEE 1284 compliant.

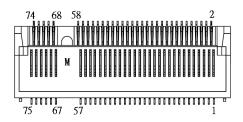
Pin	Signal	Pin	Signal
1	Strobe#	2	Auto Form Feed#
3	Data 0	4	Error#
5	Data 1	6	Initialize#
7	Data 2	8	Printer Select In#
9	Data 3	10	GND
11	Data 4	12	GND
13	Data 5	14	GND
15	Data 6	16	GND
17	Data 7	18	GND
19	Acknowledge#	20	GND
21	Busy	22	GND
23	Paper Empty#	24	GND
25	Printer Select	26	N.C



## 2.4.16 M.2 2280 Key M NVMe SSD (CN4)

The M.2 2280 Key M NVM Express SSD for storage.

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	GND	2	+3.3V	3	GND	4	+3.3V
5	PERn3	6	NC	7	PERp3	8	NC
9	GND	10	LED_1#	11	PETn3	12	+3.3V
13	PETp3	14	+3.3V	15	GND	16	+3.3V
17	PERn2	18	+3.3V	19	PERp2	20	NC
21	GND	22	NC	23	PETn2	24	NC
25	PETp2	26	NC	27	GND	28	NC
29	PERn1	30	NC	31	PERp1	32	NC
33	GND	34	NC	35	PETn1	36	NC
37	PETp1	38	NC	39	GND	40	NC
41	PERn0	42	NC	43	PERp0	44	NC
45	GND	46	NC	47	PETn0	48	NC
49	PETp0	50	PERST#	51	GND	52	CLKREQ#
53	REFCLKn	54	PEWAKE#	55	REFCLKp	56	NC
57	GND	58	NC	59	CONNECTOR Key M	60	CONNECTOR Key M
61	CONNECTOR Key M	62	CONNECTOR Key M	63	CONNECTOR Key M	64	CONNECTOR Key M
65	CONNECTOR Key M	66	CONNECTOR Key M	67	NC	68	NC
69	NC	70	+3.3V	71	GND	72	+3.3V
73	GND	74	+3.3V	75	GND		



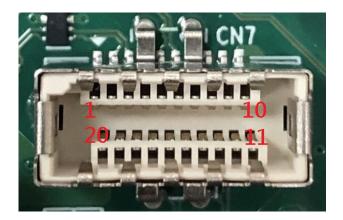
Note

M.2 2280 Key M (Only for Q370, C246 version)

# 2.4.17 Internal USB 3.1 Gen2 Connector (CN7)

The CN7 is an internal box connector for installing versatile USB 3.1 Gen2 compliant peripherals.

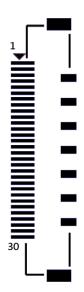
Pin	Signal	Pin	Signal
1	GND	11	GND
2	SSTX2+	12	SSTX3-
3	SSTX2-	13	SSTX3+
4	GND	14	GND
5	SSRX2+	15	SSRX3-
6	SSRX2-	16	SSRX3+
7	GND	17	GND
8	USBP3P_C	18	USBP4P_C
9	USBP3N_C	19	USBP4N_C
10	GND	20	+3.3VS



## 2.4.18 Display Port 1.4 Connector (CN11)

The CN11 is an internal box connector which is defined by Axiomtek for installing Display Port 1.4 Connector peripherals. The Display Port 1.4 Connector peripherals are available as an optional kit.

Pin	Signal	Pin	Signal
1	GND	16	DPC_AUX_D+
2	DDSP_TX_0_D+	17	DPC_AUX_D-
3	DDSP_TX_0_D-	18	+5VS
4	GND	19	DDPD_HPD_C
5	DDSP_TX_1_D+	20	+3.3VS
6	DDSP_TX_1_D-	21	+3.3VS
7	GND	22	+3.3VS
8	DDSP_TX_2_D+	23	+3.3VS
9	DDSP_TX_2_D-	24	GND
10	GND	25	GND
11	DDSP_TX_3_D+	26	GND
12	DDSP_TX_3_D-	27	GND
13	GND	28	+5VS
14	HDMI_C_DNG_DETECT	29	+5VS
15	GND	30	+5VS



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# Chapter 3 Hardware Installation

# 3.1 Installing the Processor

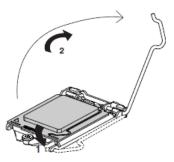
The LGA1151 processor socket comes with a cover to protect the processor. Please install the processor into the CPU socket step by step as illustrated below:



Make sure that you install the correct CPU designed for the LGA1151 socket only. DO NOT install a CPU designed for LGA1156, LGA1155 or LGA1150 CPU on the LGA1151 socket.

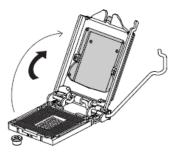
#### Step 1 Opening the socket:

- Disengage the load lever by pressing the lever down and pulling it slightly away by the hook. This will release the load lever from the retention tab.
- Rotate the load lever to open position at approximately 135°.
- Rotate the load plate to open position at approximately 150°.



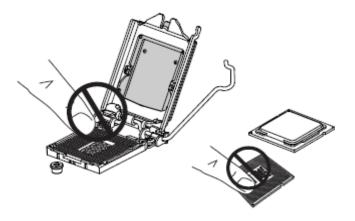
#### Step 2 Removing the socket protective cover:

- Place the thumb against the front edge of the protective cover and rest the index finger on the rear grip to maintain control of the cover.
- Lift the front edge of the protective cover to disengage from the socket. Keep control of the cover by holding the rear grip with the index finger.
- Lift the protective cover away from the socket, being careful not to touch the electrical contacts.



#### Step 3 Processor installation:

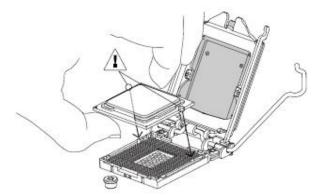
- Lift the processor package from shipping media by grasping the substrate edges.
- Scan the processor package gold pads for any presence of foreign material. If necessary, the gold pads can be wiped clean with a soft lint-free cloth and isopropyl alcohol.
- Locate connection 1 indicator on the processor which aligns with connection 1 indicator chamfer on the socket, and notice processor keying features that line up with posts along socket walls.



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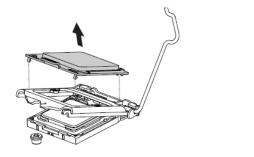
Never touch fragile socket contacts to avoid damage and do not touch processor sensitive contacts at any time during Installation.

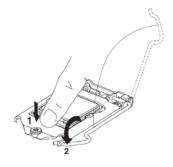
• Carefully place the processor into the socket body vertically (see image below).



#### Step 4 Close the socket (see image below):

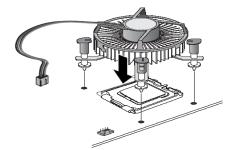
- Gently lower the load plate.
- Make sure the load plate's front edge slides under the shoulder screw cap as the lever is lowered.
- Latch the lever under the top plate's corner tab, being cautious not to damage the motherboard with the tip of the lever.



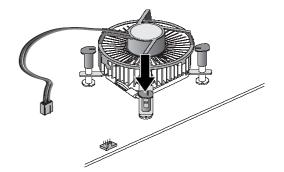


#### Step 5 Fan heatsink handling:

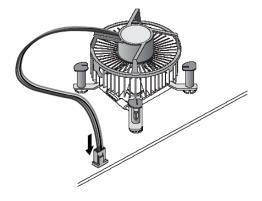
1. Orientate the CPU cooling fan to fixing holes on the board.



2. Screw the CPU cooling fan onto the board.



3. Make sure the CPU fan is plugged to the CPU fan connector.



# 3.2 Installing the Memory

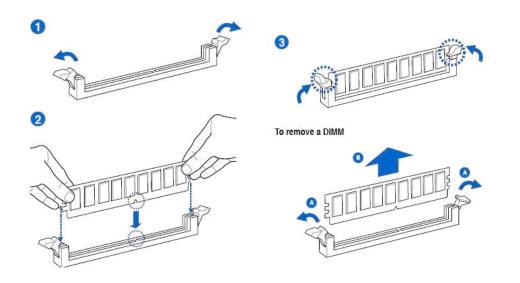
The board supports two 288-pin DDR4 DIMM memory sockets with maximum memory capacity up to 64GB.

Please follow steps below to install the memory modules:

- Push down latches on each side of the DIMM socket.
- Align the memory module with the socket to ensure that notches of the memory module match the socket keys for a correct installation.
- Install the memory module into the socket and push it firmly down until it is fully seated. The socket latches are levered upwards and clipped on to the edges of the DIMM.
- Install any remaining DIMM modules.



To remove a DIMM, push down the latches on each side of the DIMM socket to loosen the DIMM, and then lift the DIMM carefully.



# Chapter 4 Hardware Description

## 4.1 Microprocessors

The SHB150R Series supports Intel<sup>®</sup> 9th/8th Core<sup>™</sup> i7/ i5/ i3 processors, which enable your system to operate under Windows<sup>®</sup> 10 and Linux environments. The system performance depends on the microprocessor. Make sure all correct settings are arranged for your installed microprocessor to prevent the CPU from damage.

# 4.2 BIOS

The SHB150R Series uses AMI Plug and Play BIOS with a single 256Mbit SPI Flash.

## 4.3 System Memory

The SHB150R Series supports two 288-pin DDR4 DIMM sockets for maximum memory capacity up to 64GB DDR4 SDRAMs. The memory module comes in sizes of 2GB, 4GB, 8GB, 16GB and 32GB.

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# Chapter 5 AMI BIOS Setup Utility

The AMI UEFI BIOS provides users with a built-in setup program to modify basic system configuration. All configured parameters are stored in a flash chip to save the setup information whenever the power is turned off. This chapter provides users with detailed description about how to set up basic system configuration through the AMI BIOS setup utility.

# 5.1 Starting

To enter the setup screens, follow the steps below:

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

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*If your computer cannot boot after making and saving system changes with BIOS setup, you can restore BIOS optimal defaults by setting JP2 (see section 2.3.2)*.

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

# 5.2 Navigation Keys

The BIOS setup/utility uses a key-based navigation system called hot keys. Most of the BIOS setup utility hot keys can be used at any time during the setup navigation process. These keys include <F1>, <F2>, <Enter>, <ESC>, <Arrow> keys, and so on.



Some of the navigation keys differ from one screen to another.

Hot Keys	Description
→← Left/Right	The Left and Right <arrow> keys allow you to select a setup screen.</arrow>
∕↑↓ Up/Down	The Up and Down <arrow> keys allow you to select a setup screen or sub-screen.</arrow>
+– Plus/Minus	The Plus and Minus <arrow> keys allow you to change the field value of a particular setup item.</arrow>
Tab	The <tab> key allows you to select setup fields.</tab>
F1	The <f1> key allows you to display the General Help screen.</f1>
F2	The <f2> key allows you to Load Previous Values.</f2>
F3	The <f3> key allows you to Load Optimized Defaults.</f3>
F4	The <f4> key allows you to save any changes you have made and exit Setup. Press the <f4> key to save your changes.</f4></f4>
Esc	The <esc> key allows you to discard any changes you have made and exit the Setup. Press the <esc> key to exit the setup without saving your changes.</esc></esc>
Enter	The <enter> key allows you to display or change the setup option listed for a particular setup item. The <enter> key can also allow you to display the setup sub- screens.</enter></enter>

# 5.3 Main Menu

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



#### **BIOS Information**

Display the auto-detected BIOS information.

#### System Date/Time

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

#### Access Level

Display the access level of the current user.

### 5.4 Advanced Menu

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

- ACPI Settings
- Trusted Computing
- Platform Misc Configuration
- CPU Configuration
- SATA and RST Configuration
- ► NCT6106D Super IO Configuration
- NCT6106D HW Monitor
- PCH-FW Configuration
- AMT Configuration
- USB Configuration
- PCI Subsystem Settings
- CSM Configuration
- Serial Port Console Redirection

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

Aptio Setup Utility – Copyright (C) 2019 American Main Advanced Chipset Security Boot Save & Exit	Megatrends, Inc.
ACPI Settings Trusted Computing Platform Misc Configuration CPU Configuration SATA And RST Configuration NCT6106D Super IO Configuration NCT6106D HW Monitor PCH-FW Configuration AMT Configuration USB Configuration PCI Subsystem Settings CSM Configuration Serial Port Console Redirection	System ACPI Parameters. ++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Version 2.20.1271. Copyright (C) 2019 American M	egatrends, Inc.

#### • NCT6106D Super IO Configuration

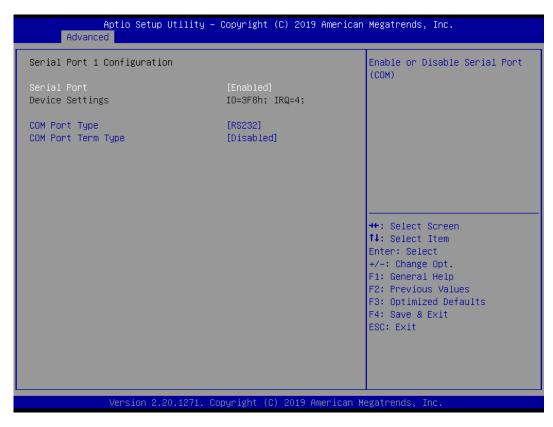
You can use this screen to select options for the Super IO Configuration, and change the value of the selected option. A description of the selected item appears on the right side of the screen. For items marked with "▶", please press <Enter> for more options.

Aptio Setup Utility - Advanced	- Copyright (C) 2019 America	n Megatrends, Inc.
NCT6106D Super IO Configuration		Set Parameters of Serial Port 1 (COMA)
Super IO Chip > Serial Port 1 Configuration > Serial Port 2 Configuration > Serial Port 3 Configuration > Serial Port 4 Configuration > Parallel Port Configuration	NCT6106D	
		<pre>++: Select Screen f1: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit ESC: Exit</pre>
Version 2.20.1271. C	Copyright (C) 2019American	Megatrends, Inc.

### Serial Port 1~4 Configuration

Use this item to set parameters of serial port 1 to 4.

• Serial Port 1 Configuration



#### Serial Port

Enable or disable serial port 1. The optimal setting for base I/O address is 3F8h and for interrupt request address is IRQ4.

#### **Change Settings**

Use this item to change base I/O address and IRQ settings.

#### **COM Port Type**

Select RS-232/422/485 communication mode for serial port 1.

#### **COM Port Term Type**

Enable or disable serial port termination.

#### • NCT6106D HW Monitor

Use this screen for Smart Fan configuration and hardware health status monitoring.

Aptio Setup Ut Advanced	ility – Copyright (C) 2019 Ar	merican Megatrends, Inc.
Pc Health Status Smart Fan Function	[Disabled]	Enable or Disable Smart Fan
System temperature CPU temperature CPU FAN Speed SYS Speed AUX Speed VCORE +5V_SBY VBAT +5V	: +26.0 % : +52 % : 2039 RPM : N/A : N/A : +0.944 V : +5.056 V : +2.896 V : +5.056 V	
+3.3V	: +3.312 V	<pre>++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit ESC: Exit</pre>
Version 2.20.	1271. Copyright (C) 2019 Amer	rican Megatrends, Inc.

This screen displays the temperature of system, cooling fans speed in RPM and system voltages (VCORE, VIN0, VIN1, VIN2 and VBAT).

#### **Smart Fan Function**

Enable or disable Smart Fan function.



CPU FAN = FAN1; SYS FA = FAN2; AUX FAN = FAN3.

#### • ACPI Settings

You can use this screen to select options for the ACPI configuration, and change the value of the selected option. A description of the selected item appears on the right side of the screen.

Aptio Setu Advanced	o Utility – Copyright (C) 2019 American	Megatrends, Inc.
ACPI Settings		Select the highest ACPI sleep
ACPI Sleep State	[S3 (Suspend to RAM)]	<pre>state the system will enter when the SUSPEND button is pressed.  ++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit ESC: Exit</pre>
Version 2.	.20.1271. Copyright (C) 2019 American M	egatrends, Inc.

### ACPI Sleep State

Select the ACPI (Advanced Configuration and Power Interface) sleep state. Configuration options are Suspend Disabled and S3 (Suspend to RAM). The default is S3 (Suspend to RAM); this option selects ACPI sleep state the system will enter when the suspend button is pressed.

#### • Trusted Computing

This screen provides function for specifying the Trusted Computing.

TPM20 Device Found		Enables or Disables BIOS
Firmware Version: Vendor:	71.4 STM	support for security device. 0.S. will not show Security Device. TCG EFI protocol and
Security Device Support	[Enable]	INTIA interface will not be
Active PCR banks	SHA-1,SHA256	available.
Available PCR banks	SHA-1,SHA256	
SHA-1 PCR Bank	[Enabled]	
SHA256 PCR Bank	[Enabled]	
Pending operation	[None]	
Platform Hierarchy	[Enabled]	
Storage Hierarchy	[Enabled]	↔ Select Screen
Endorsement Hierarchy	[Enabled]	î↓: Select Item
TPM2.0 UEFI Spec Version	[TCG_2]	Enter: Select
Physical Presence Spec Version	[1.3]	+/-: Change Opt.
TPM 20 InterfaceType	[TIS]	F1: General Help
Device Select	[Auto]	F2: Previous Values
		F3: Optimized Defaults F4: Save & Exit
		FSC: Exit
		LOC. EXIC

#### Security Device Support

Enable or disable BIOS support for the security device. The default setting is Disabled.

#### **TPM State**

Once the Security Device Support is enabled, TPM (Trusted Platform Module) can be used by the operating system.

#### **Current Status Information**

Display current TPM status information.

#### **Pending Operation**

Schedule a TPM operation which will take effect at the next bootup process.

#### • CPU Configuration

This screen shows the CPU information, and you can change the value of the selected option.

Aptio Setup Utility Advanced	y – Copyright (C) 2019 Ameri	ican Megatrends, Inc.
CPU Configuration		▲ To turn on/off the MLC streamer prefetcher.
Туре	Intel(R) Pentium(R) Gold G5400T CPU @ 3.10GHz	
ID	0×906EB	
Speed	3100 MHz	
L1 Data Cache	32 KB × 2	
L1 Instruction Cache	32 KB x 2	
L2 Cache	256 KB x 2	
L3 Cache	4 MB	
L4 Cache	NZA	
VMX	Supported	
SMX/TXT	Not Supported	++: Select Screen
		↑↓: Select Item
Hardware Prefetcher	[Enabled]	Enter: Select
Adjacent Cache Line Prefetch	[Enabled]	+/-: Change Opt.
Hyper-Threading	[Enabled]	F1: General Help
Intel (VMX) Virtualization	[Enabled]	F2: Previous Values
Technology Active Pressen Cares	[011]	F3: Optimized Defaults F4: Save & Exit
Active Processor Cores AES	[A11] [Enabled]	ESC: Exit
Boot performance mode	[Max Non-Turbo	ESC: EXIL
boot performance mode	Performance]	
Intel(R) SpeedStep(tm)	[Enabled]	
Inter(N) specus(ep((III)	[Lilabied]	
Version 2 20 1271	. Copyright (C) 2019 America	an Megatrends. Inc.

#### Hyper-threading

Enable or disable Hyper-Threading Technology. When enabled, it allows a single physical processor to multitask as multiple logical processors. When disabled, only one thread per enabled core is enabled.

#### Intel Virtualization Technology

Enable or disable Intel Virtualization Technology. When enabled, a VMM (Virtual Machine Mode) can utilize the additional hardware capabilities. It allows a platform to run multiple operating systems and applications independently, hence enabling a single computer system to work as several virtual systems.

#### **Active Processor Cores**

Number of cores to enable in each processor package.

#### AES

Enable / Disable AES (Advanced Encryption Standard)

#### Boot performance mode

Select the performance state that the BIOS will set starting from reset vector.

#### Intel (R) SpeedStep(tm)

Allows more than two frequency ranges to be supported.

#### • SATA Configuration

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

Aptio Setup Util: Advanced	ity – Copyright (C) 2019 Amer	rican Megatrends, Inc.
SATA And RST Configuration		Enable/Disable SATA Device.
SATA Controller(s) SATA Mode Selection	[Enabled] [AHCI]	
Serial ATA Port 1 Port 1 Hot Plug Spin Up Device SATA Device Type	Empty [Enabled] [Disabled] [Disabled] [Hard Disk Drive]	
Serial ATA Port 2 Port 2 Hot Plug	Empty [Enabled] [Disabled]	
Spin Up Device SATA Device Type Serial ATA Port 3 Port 3	[Disabled] [Hard Disk Drive] Empty [Enabled]	++: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt.
Hot Plug Spin Up Device SATA Device Type	[Disabled] [Disabled] [Hard Disk Drive]	F1: General Help F2: Previous Values F3: Optimized Defaults
Serial ATA Port 4 Port 4 Hot Plug Spin Up Device	Empty [Enabled] [Disabled] [Disabled]	F4: Save & Exit ESC: Exit
SATA Device Type	[Hard Disk Drive]	
Version 2.20.12	71. Copyright (C) 2019 Americ	can Megatrends, Inc.

#### SATA Controller(s)

Enable or disable SATA controller feature.

#### SATA Mode Selection

Determine how SATA controller(s) operate. Operation options are AHCI and RAID modes.

• **PCH-FW Configuration** This screen displays ME (Management Engine) Firmware information.

Advand		Copyright (C) 2019 American	Megatrends, Inc.
ME Firmware V ME Firmware M ME Firmware S	1ode	12.0.2.1087 Normal Mode Corporate SKU	++: Select Screen 11: Select Item
			Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit

#### • AMT Configuration

Use this screen to configure AMT parameters.

Aptio Setup Advanced	Utility – Copyright (C) 2019 Ameria	can Megatrends, Inc.
AMT BIOS Features	[Enabled]	When disabled AMT BIOS Features are no longer supported and user is no longer able to access MEBx Setup. Note: This option does not disable Manageability Features in FW.
		++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Version 2.2	20.1271. Copyright (C) 2019 America	n Megatrends, Inc.

#### Intel AMT

Enable or disable Intel<sup>®</sup> Active Management Technology BIOS Extension. The default is Enabled. After enabling, please refer to Appendix D for iAMT settings.

• **Compatibility Support Module (CSM) Configuration** This screen displays CSM information.

Aptio Setup Utility - ( Advanced	Copyright (C) 2019 American	Megatrends, Inc.
Compatibility Support Module Configur	ration	Enable/Disable CSM Support.
CSM Support	[Enabled]	
CSM16 Module Version	07.82	
GateA20 Active Option ROM Messages INT19 Trap Response HDD Connection Order	[Upon Request] [Force BIOS] [Immediate] [Adjust]	
Boot option filter	[UEFI and Legacy]	
Option ROM execution		++: Select Screen
Launch PXE OpROM policy Storage Video Other PCI devices	[Do not launch] [Legacy] [Legacy] [Legacy]	<pre>t4: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit ESC: Exit</pre>
Version 2.20.1271. Cop	oyright (C) 2019 American Mu	egatrends, Inc.

#### **CSM Support**

Enabled / 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.

#### Storage

Controls the execution of UEFI and Legacy Storage OpROM.

#### Video

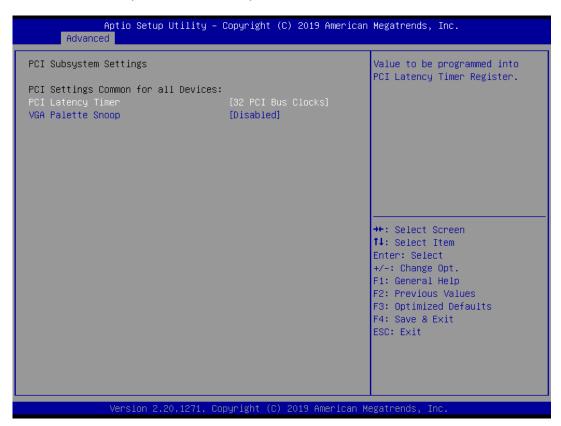
Controls the execution of UEFI and Legacy Video OpROM.

#### **Other PCI devices**

Determines OpROM execution policy for devices other than Network, Storage, or Video.

#### • PCI Subsystem Settings

This screen allows you to set PCI Subsystem mode.



#### **PCI Latency Timer**

Set the value to be programmed into PCI Latency Timer Register.

#### VGA Palette Snoop

Enables or Disables VGA Palette Registers Snooping.

#### • Platform Misc Configuration

This screen allows you to set Platform Misc Configuration.



#### Native PCIE Enable

Bit - PCIe Native \* control\n 0 - ~ Hot Plug\n 1 - SHPC Native Hot Plug control\n 2 - ~ Power Management Events\n 3 - PCIe Advanced Error Reporting control\n 4 - PCIe Capability Structure control\n 5 - Latency Tolerance Reporting control.

#### Native ASPM

Enabled - OS Controlled ASPM, Disabled - BIOS Controlled ASPM.

• Serial Port Console Redirection This screen allows you to set serial port console redirection.

		Console Redirection Enable or
СОМО		Disable.
Console Redirection	[Disabled]	
Console Redirection Settings		
Legacy Console Redirection		
Legacy Console Redirection Settings		
Serial Port for Out-of-Band Manageme	nt/	
Windows Emergency Management Service		
Console Redirection	[Disabled]	
Console Redirection Settings		
		++: Select Screen
		↑↓: Select Item
		Enter: Select
		+/−: Change Opt. F1: General Help
		F2: Previous Values
		F3: Optimized Defaults
		F4: Save & Exit
		ESC: Exit

#### • USB Configuration

This screen shows USB configuration.

Aptio Setup Utility – ( Advanced	Copyright (C) 2018 American	Megatrends, Inc.
USB Configuration		Enables Legacy USB support. AUTO option disables legacy
USB Module Version	20	support if no USB devices are connected.
USB Controllers: 1 XHCI		
USB Devices: 1 Drive, 1 Keyboard		
Legacy USB Support XHCI Hand-off USB Mass Storage Driver Support	[Enabled] [Enabled] [Enabled]	
	[Eugoreo]	
USB hardware delays and time-outs: USB transfer time-out Device reset time-out	[20 sec] [20 sec]	↔: Select Screen t↓: Select Item Enter: Select
Device power-up delay	[20 SEC] [Auto]	+/−: Change Opt. F1: General Help
Mass Storage Devices:		F2: Previous Values
Generic Flash Disk 8.07	(Auto)	F3: Optimized Defaults F4: Save & Exit ESC: Exit
Version 2.20.1271. Cop	oyright (C) 2018 American Mo	egatrends, Inc.

#### **USB** Devices

Displays all detected USB devices.

#### Legacy USB Support

Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected.

#### **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/Disable USB Mass Storage Driver Support.

#### 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.

## 5.5 Chipset Menu

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

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

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

Aptio Setup Utility – Copyright (C) 2019 American Main Advanced <mark>Chipset</mark> Security Boot Save & Exit	Megatrends, Inc.
<ul> <li>▶ System Agent (SA) Configuration</li> <li>▶ PCH-IO Configuration</li> </ul>	System Agent (SA) Parameters
	<pre>++: Select Screen 1↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit ESC: Exit</pre>
Version 2.20.1271. Copyright (C) 2019 American Me	egatrends, Inc.

#### • System Agent (SA) Configuration

This screen shows System Agent information.

Aptio Setup Utility - Chipset	Copyright (C) 2019 American	Megatrends, Inc.
System Agent (SA) Configuration		VT-d capability
SA PCIe Code Version VT-d	7.0.72.64 Supported	
VT-d Above 4GB MMIO BIOS assignment	[Enabled] [Disabled]	
<ul> <li>Graphics Configuration</li> <li>Memory Configuration</li> <li>PEG Port Configuration</li> </ul>		
		<pre>++: Select Screen f↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit ESC: Exit</pre>
Version 2.20.1271. Cc	ppyright (C) 2019 American M	egatrends, Inc.

#### **Graphics Configuration**

Open the sub menu for parameters related to graphics configuration.

#### Memory Configuration

Open the sub menu for information related to system memory.

#### PEG Port Configuration

This screen shows PEG Port/POE Port feature information.

#### VT-d

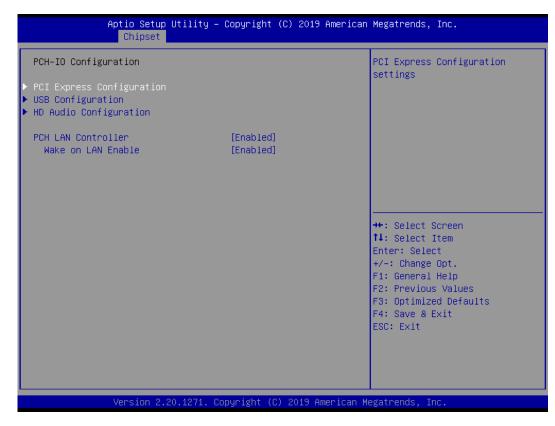
VT-d capability.

#### Above 4GB MMIO BIOS assignment

Enable/Disable above 4GB Memory MappedIO BIOS assignment. This is enabled automatically when Aperture Size is set to 2048MB.

#### • PCH-IO Configuration

This screen shows system memory information.



#### PCH LAN Controller

Enable or disable onboard PCH LAN controller.

#### Wake on LAN Enable

Enable or disable integrated LAN to wake the system.

## 5.6 Security Menu

The Security menu allows users to change the security settings for the system.

	<mark>Jtility – Copyright (C) 2019 American</mark> Security Boot Save & Exit	Megatrends, Inc.
Password Description If ONLY the Administrator' then this only limits acce only asked for when enteri	ss to Setup and is ng Setup.	Set Administrator Password
If ONLY the User's passwor is a power on password and boot or enter Setup. In Se have Administrator rights. The password length must b in the following range: Minimum length	must be entered to tup the User will e 3	
Maximum length Administrator Password User Password	20	<pre>++: Select Screen t1: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit</pre>
Version 2.2	).1271. Copyright (C) 2019 American M	ESC: Exit

#### Administrator Password

This item indicates whether an administrator password has been set (installed or uninstalled).

### User Password

This item indicates whether a user password has been set (installed or uninstalled).

## 5.7 Boot Menu

The Boot menu allows users to change boot options of the system.

Aptio Setup Utility – Main Advanced Chipset Security	Copyright (C) 2019 American Boot Save & Exit	Megatrends, Inc.
Boot Configuration		Number of seconds to wait for
Setup Prompt Timeout Bootup NumLock State	1 [0n]	setup activation key. 65535(0xFFFF) means indefinite waiting.
Quiet Boot	[Disabled]	
Launch PXE OpROM policy	[Do not launch]	
Boot Option Priorities		
Boot Option #1	[Generic Flash Disk 8.07]	
Boot Option #2	[UEFI: Generic Flash Disk 8.07, Partition 1]	
USB Device BBS Priorities		→+: Select Screen
		↑↓: Select Item
		Enter: Select +/-: Change Opt.
		F1: General Help
		F2: Previous Values
		F3: Optimized Defaults F4: Save & Exit
		ESC: Exit
Version 2 20 1271 Po	pyright (C) 2019 American Mu	edatrends Inc
VCI S1011 2.20.1271. CO	pariation (0) 2010 Miler Idan Mi	Space chao, the.

• Setup Prompt Timeout

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

- **Bootup NumLock State** Use this item to select the power-on state for the keyboard NumLock.
- Quiet Boot Select to display either POST output messages or a splash screen during boot-up.
- Launch PXE OpROM policy Use this item to enable or disable the boot ROM function of the onboard LAN chip when the system boots up.
- Boot Option Priorities

These are settings for boot priority. Specify the boot device priority sequence from the available devices.

## 5.8 Save & Exit Menu

The Save & Exit menu allows users to load your system configuration with optimal or fail-safe default values.



#### • Save Changes and Exit

When you have completed the system configuration changes, select this option to leave Setup and return to Main Menu. Select Save Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to save changes and exit.

#### • Discard Changes and Exit

Select this option to quit Setup without making any permanent changes to the system configuration and return to Main Menu. Select Discard Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to discard changes and exit.

#### • Save Changes and Reset

When you have completed the system configuration changes, select this option to leave Setup and reboot the computer so the new system configuration parameters can take effect. Select Save Changes and Reset from the Save & Exit menu and press <Enter>. Select Yes to save changes and reset.

#### • Discard Changes and Reset

Select this option to quit Setup without making any permanent changes to the system configuration and reboot the computer. Select Discard Changes and Reset from the Save & Exit menu and press <Enter>. Select Yes to discard changes and reset.

#### • Save Changes

When you have completed the system configuration changes, select this option to save changes. Select Save Changes from the Save & Exit menu and press <Enter>. Select Yes to save changes.

#### • Discard Changes

Select this option to quit Setup without making any permanent changes to the system configuration. Select Discard Changes from the Save & Exit menu and press <Enter>. Select Yes to discard changes.

#### • Restore Defaults

It automatically sets all Setup options to a complete set of default settings when you select this option. Select Restore Defaults from the Save & Exit menu and press <Enter>.

#### • Save as User Defaults

Select this option to save system configuration changes done so far as User Defaults. Select Save as User Defaults from the Save & Exit menu and press <Enter>.

#### • Restore User Defaults

It automatically sets all Setup options to a complete set of User Defaults when you select this option. Select Restore User Defaults from the Save & Exit menu and press <Enter>.

#### Boot Override

Select a drive to immediately boot that device regardless of the current boot order.

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## Appendix A Watchdog Timer

## A.1 About Watchdog Timer

Software stability is a major issue in most applications. Some embedded systems are not watched by humans for 24 hours. It is usually too slow to wait for someone to reboot when computer hangs. The systems need to be able to reset automatically when things go wrong. The watchdog timer gives us that solution.

The watchdog timer is a counter that triggers a system reset when it counts down to zero from a preset value. The software starts the counter with an initial value and must reset it periodically. If the counter ever reaches zero which means the software has crashed, the system will reboot.

### A.2 How to Use Watchdog Timer

Start		
≁ Un-Lock WDT:		
	O 2E 87	; Un-lock super I/O
		; Un-lock super I/O
$\downarrow$		
Select Logic device:	0.25.07	
	O 2E 07 O 2F 08	
$\downarrow$	0 21 00	
Set Second or Minute:		
	O 2E F0	_
	O 2F N	; N=00 or 08 (See <b>[</b> ] <u>Note</u> below)
$\downarrow$		
Set base timer:		
	O 2E F1	
1	O 2F M	; M=00,01,02,…FF(Hex) ,Value=0 to 255
✓WDT counting re-set timer:		
g	O 2E F1	
	O 2F M	; M=00,01,02,…FF (See 🚺 <u>Note</u> below)
$\downarrow$		, , , , , , <u> </u>
IF No re-set timer:		
	; WDT tin	ne-out, generate RESET
;IF to disable WDT:		
, i to disable whit.	O 2E 30	
	O 2F 00	; Can be disabled at any time
Time sout ) (shua Dan na		
Timeout Value Range     1 to 255		
■ 1 to 255		

Minute / Second

## Note:

If N=00h, the time base is set to second. M = time value00h: Time-out Disable

01h: Time-out occurs after 1 second 02h: Time-out occurs after 2 seconds 03h: Time-out occurs after 3 seconds .

FFh: Time-out occurs after 255 seconds

If N=08h, the time base is set to minute. M = time value

00h: Time-out Disable

01h: Time-out occurs after 1 minute

02h: Time-out occurs after 2 minutes 03h: Time-out occurs after 3 minutes

·

FFh: Time-out occurs after 255 minutes

# Appendix B PCI IRQ Routing

## B.1 PICMG<sup>®</sup> PCI IRQ Routing

Device	ID	Slot	Int
PCI Slot 0	31	0	BCDA
PCI Slot 1	30	1	CDAB
PCI Slot 2	29	2	DABC
PCI Slot 3	28	3	ABCD

This page is intentionally left blank.

# Appendix C Configuring SATA for RAID

# C.1 Configuring SATA Hard Drive(s) for RAID (Controller: Intel<sup>®</sup> Q370/C246)

Before you begin the SATA configuration, please prepare:

Two SATA hard drives (to ensure optimal performance, it is recommended that you use two hard drives with identical model and capacity). If you do not want to create RAID with the SATA controller, you may prepare only one hard drive.

#### Please follow up the steps below to configure SATA hard drive(s):

- 1. Install SATA hard drive(s) in your system.
- 2. Enter the BIOS Setup to configure SATA controller mode and boot sequence.
- 3. Configure RAID by the RAID BIOS.

#### 1. Installing SATA hard drive(s) in your system.

Connect one end of the SATA signal cable to the rear of the SATA hard drive, and the other end to available SATA port(s) on the board. Then, connect the power connector of power supply to the hard drive.

#### 2. Configuring SATA controller mode and boot sequence by the BIOS Setup.

You have to make sure whether the SATA controller is configured correctly by system BIOS Setup and set up BIOS boot sequence for the SATA hard drive(s).

2.1. Turn on your system, and then press the <Del> button to enter BIOS Setup during running POST (Power-On Self Test). If you want to create RAID, just go to the Advanced Settings menu\SATA Configuration, select the "SATA Mode Selection", and press <Enter> for more options.

Aptio Setup Ut Advanced	ility - Copyright (C) 2016 A:	merican Megatrends, Inc.
SATA Controller(s)	[Enabled]	Determines how SATA
		controller(s) operate.
Serial ATA Port O	Empty	
Serial ATA Port 1	Empty	
Serial ATA Port 2	Empty	
Serial ATA Port 3	Empty	
Serial ATA Port 4	Empty	
Serial ATA Port 5	Empty	
		Select Item Herer: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Version 2.17	7.1254 Copyright (C) 2016 Ame	rican Megatrends, Inc.

A list of options appears, please select "RAID".

Aptio Setup Ut Advanced	ility - Copyright (C) 2016 Am	nerican Megatrends, Inc.
SATA Controller(s) SATA Mode Selection Serial ATA Port 0 Serial ATA Port 1	[Enabled] [RAID] Empty Empty	Determines how SATA controller(s) operate.
Serial ATA Port 2 Serial ATA Port 3 Serial ATA Port 4 Serial ATA Port 5	Empty Empty Empty Empty	
		<pre>→+: Select Screen  ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit ESC: Exit</pre>
Version 2.17	7.1254 Copyright (C) 2016 Amer	rican Megatrends, Inc.

2.2. Save and exit the BIOS Setup.

#### 3. Configuring RAID by the RAID BIOS.

Enter the RAID BIOS setup utility to configure a RAID array. Skip this step and proceed if you do not want to create a RAID.

3.1. After the POST memory testing and before the operating system booting, a message "Press <Ctrl-I> to enter Configuration Utility" shows up, accordingly. Press <Ctrl + I> to enter the RAID BIOS setup utility.

Intel(R) Rapid Storage Technology - Option ROM - 12.5.0.1815 Copyright(C) 2003-13 Intel Corporation. All Rights Reserved.						
RAID VO	lumes:					
ID	Name	Level	Strip	Size	Status	Bootable
0	Volume1	RAIDO(Stripe)	128KB	149.1GB	Normal	Yes
Physica	l Devices:					
ID	Device Model	Serial #		Size	Type/Stat	tus(Vol ID)
4	ST320LT012-9WS14	WOV20YPA		298.0GB		isk(0)
5	ST380817AS	5MR1BSS7		74.5GB		isk(0)
	RL-I> to enter Confi					

3.2. After you press <Ctrl + I>, the Create RAID Volume screen will appear. If you want to create a RAID array, select the Create RAID Volume option in the Main Menu and press <Enter>.

Intel(R) Rapid Storage Technology - Option ROM - 12.5.0.1815 Copyright(C) 2003-13 Intel Corporation. All Rights Reserved.				
1. Create RAI2. Delete RAI3. Reset DiskRAID Volumes:None Defined.Physical Devices:ID Device Model4 ST320LT012-9WS145 ST380817AS	D Volume s to Non-RAID [ DISK/VOLUME INFO Serial #	4. Recovery Volume Options 5. Acceleration Options 6. Exit	D)	
[†]]-Select	[ESC]-Exit	[Enter]-Select Menu		

3.3. After entering the Create Volume Menu screen, you can type the disk array name with 1~16 letters (letters cannot be special characters) in the item "Name".

Intel(R) Rapid Storage Technology - Option ROM - 12.5.0.1815 Copyright(C) 2003-13 Intel Corporation. All Rights Reserved.				
[ CREATE VOLUME MENU ] Name: Volume1 RAID Level: RAIDO(Stripe) Disks: Select Disks Strip Size: 16KB Capacity: 149.1 GB Sync: N/A Create Volume				
[ HELP ] Enter a unique volume name that has no special characters and is 16 characters or less.				
[  ]Change [TAB]-Next [ESC]-Previous Menu [ENTER]-Select				

3.4. When finished, press <Enter> to select a RAID level. There are four RAID levels: RAID0, RAID1 and RAID5 and RAID10. Select a RAID level and press <Enter>.

Intel(R) Rapid Storage Technology - Option ROM - 12.5.0.1815 Copyright(C) 2003-13 Intel Corporation. All Rights Reserved.					
[ CREATE VOLUME MENU ] Name: Volume1 RAID Level: RAIDO(Stripe) Disks: Select Disks Strip Size: 16KB Capacity: 149.1 GB Sync: N/A Create Volume					
[ HELP ] RAID 0: Stripes data (performance).					
[ †]Change	[TAB]-Next [E	SC]-Previous Menu	[ENTER]-Select		

3.5. Set the strip block size. The KB is the standard unit of strip block size. The strip block size can be 4KB to 128KB. After the setting, press <Enter> for the array capacity.

Intel(R) Rapid Storage Technology - Option ROM - 12.5.0.1815 Copyright(C) 2003-13 Intel Corporation. All Rights Reserved.							
[ CREATE VOLUME MENU ]         Name:       Volume1         RAID Level:       RAID0(Stripe)         Disks:       Select Disks         Strip Size:       128KB         Capacity:       149.1         Sync:       N/A         Create Volume							
[ HELP ] The following are typical values: RAIDO - 128KB RAID10 - 64KB RAID5 - 64KB							
[ †]Change	[TAB]-Next [E	SC]-Previous Menu	[ENTER]-Select				

3.6. After setting all the items on the menu, select Create Volume and press <Enter> to start creating the RAID array.

Intel(R) Rapid Storage Technology - Option ROM - 12.5.0.1815 Copyright(C) 2003-13 Intel Corporation. All Rights Reserved.					
[ CREATE VOLUME MENU ]         Name:       Volume1         RAID Level:       RAID0(Stripe)         Disks:       Select Disks         Strip Size:       128KB         Capacity:       149.1         Sync:       N/A         Create Volume					
[ HELP ]					
[1]Change [TAB]-Next [ESC]-Previous Menu [ENTER]-Select					

3.7. When prompting the confirmation, press <Y> to create this volume, or <N> to cancel the creation.

Intel(R) Rapid Storage Technology - Option ROM - 12.5.0.1815 Copyright(C) 2003-13 Intel Corporation. All Rights Reserved.							
	[ CREATE VOLUME MENU ] Name: Volume1 RAID Level: RAIDO(Stripe) Disks: Select Disks Strip Size: 128KB Capacity: 149.1 GB Sync: N/A						
	WARNING: ALL DATA ON SELECTED DISKS WILL BE LOST. Are you sure you want to create this volume? (Y/N):						
Press ENTER to create the specified volume.							
	[  ]Change [TAB]-Next [ESC]-Previous Menu [ENTER]-Select						

After the creation is completed, you can see detailed information about the RAID Array in the Disk/Volume Information section, including RAID mode, disk block size, disk name, and disk capacity, etc.

Intel(R) Rapid Storage Technology - Option ROM - 12.5.0.1815 Copyright(C) 2003-13 Intel Corporation. All Rights Reserved.						
[ MAIN MENU ]         1. Create RAID Volume       4. Recovery Volume Options         2. Delete RAID Volume       5. Acceleration Options         3. Reset Disks to Non-RAID       6. Exit         [ DISK/VOLUME INFORMATION ]						
RAID Volumes: ID Name O Volume1 Physical Devices: ID Device Model 4 ST320LT012-9WS14 5 ST380817AS	Level RAIDO(Stripe) Serial # WOV2OYPA 5MR1BSS7	Strip Size Status Bootable 128KB 149.1GB Normal Yes Size Type/Status(Vol ID) 298.0GB Member Disk(O) 74.5GB Member Disk(O)				
[†↓]-Select	[ESC]-	Exit [Enter]-Select Menu				

#### **Delete RAID volume**

If you want to delete a RAID volume, select the Delete RAID Volume option in the Main Menu. Press <Enter> and follow on-screen instructions.

Intel(R) Rapid Storage Technology - Option ROM - 12.5.0.1815 Copyright(C) 2003-13 Intel Corporation. All Rights Reserved. [ MAIN MENU ]						
1. Create RAID Volume       4. Recovery Volume Options         2. Delete RAID Volume       5. Acceleration Options         3. Reset Disks to Non-RAID       6. Exit         [DISK/VOLUME INFORMATION ]						
RAID Volumes: ID Name O Volume1 Physical Devices: ID Device Model 4 ST320LT012-9wS14 5 ST380817AS	Level RAIDO(Stripe) Serial #	Strip 128KB	Size Status 149.1GB Normal Size Type/Sta 298.0GB Member D 74.5GB Member D	isk(0)		
[†]-Select	[ESC]-	-Exit	[Enter]-Select	Menu		

Please press <Esc> to exit the RAID BIOS utility. Now, you can proceed to install a SATA driver controller and the operating system.

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## Appendix D iAMT Settings

Utilizing built-in platform capabilities and popular third-party management and security applications, the Intel<sup>®</sup> Active Management Technology (Intel<sup>®</sup> iAMT) has significantly lowered a major barrier to IT management efficiency, helping IT professionals discover, repair and better protect their networked computing assets.

In order to utilize Intel<sup>®</sup> iAMT you must enter the ME BIOS (<Ctrl + P> during system startup), change the ME BIOS password, and then select "Intel<sup>®</sup> iAMT" as the manageability feature.

### D.1 Entering MEBx

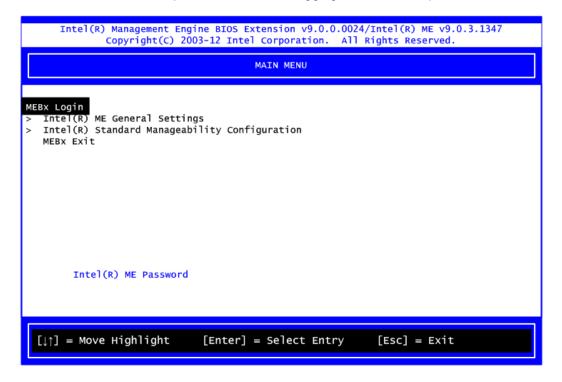
- 1. You must go to BIOS to enable the iAMT function.
- 2. Exit from BIOS after starting iAMT, and press <Ctrl + P> to enter MEBx Setting.



It is advised to press <Ctrl + P> before the screen pops out.

## D.2 Set and Change Password

1. You will be asked to set a password when first logging in. The default password is "admin".



2. You will be asked to change the password before setting ME.

Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.3.1347 Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.					
MAIN MENU					
<pre>MEBx Login &gt; Intel(R) ME General Settings &gt; Intel(R) Standard Manageability Configuration MEBx Exit Intel(R) ME Password</pre>					
Intel(R) ME Password					
$[\downarrow\uparrow]$ = Move Highlight [Enter] = Select Entry [Esc] = Exit					

- 3. You must confirm your new password while revising. The new password must consist of eight characters, including at least:
  - One upper case letter
  - One lower case letter
  - One number
  - One special symbol, such as !  $\sim$  \$ or ;  $\rightarrow$  (  $\sim$  " , excepted)

The default value demonstrates an example of a valid password: **!!11qqQQ** Underline ( \_ ) and space are valid characters for making a password, but they won't make higher complexity.

## D.3 iAMT Settings

Select  $Intel^{\ensuremath{\mathbb{R}}}$  iAMT configuration and press <Enter>.

Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.3.1347 Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.				
MAIN MENU				
> Intel(R) ME General Settings > Intel(R) Standard Manageability Configuration MEBX Exit				
[↓↑] = Move Highlight [Enter] = Select Entry [Esc] = Exit				

1. Select Network Setup to configure iAMT.

	Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.3.1347 Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.					
	INTEL (R) STANDARD MANAGEABILITY CONFIGURATION					
-	Manageability Feature Selection Enabled> SOL/IDER User Consent Password Policy <anytime> Network Setup Activate Network Access Unconfigure Network Access <full unprovision=""> Remote Setup And Configuration Power Control</full></anytime>					
	$[\downarrow\uparrow]$ = Move Highlight [Enter] = Select Entry [Esc] = Exit					

2. Select TCP/IP to get into Network interface and set it to Enabled. Get into DHCP Mode and set it to Disabled.

Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.3.1347 Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.					
INTEL (R) ME NETWORK SETUP					
Intel(R) ME Network Name Settings > TCP/IP Settings					
$[\downarrow\uparrow]$ = Move Highlight [Enter] = Select Entry [Esc] = Exit					

Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.3.1347 Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.					
WIRED LAN IPV4 CONFIGURATION					
DHCP Mode	<enabled></enabled>				
Enable/Disable IP	V4 DHCP Mode				
[↓↑] = Move Highlight	[Enter] = Select Entry	[Esc] = Exit			

- 3. If DHCP Mode is disabled, complete the following settings:
  - IP address
  - Subnet mask

Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.3.1347 Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.						
WIRED LAN IPV4 CONFIGURATION						
DHCP Mode IPV4 Address Subnet Mask Address Default Gateway Address Preferred DNS Address Alternate DNS Address	10.1	0.0				
<ente< td=""><td>er&gt; = Complete Entry</td><td>[Esc] = Discard Changes</td></ente<>	er> = Complete Entry	[Esc] = Discard Changes				

4. Go back to Intel<sup>®</sup> iAMT Configuration, then select Activate Network Access and press <Enter>.

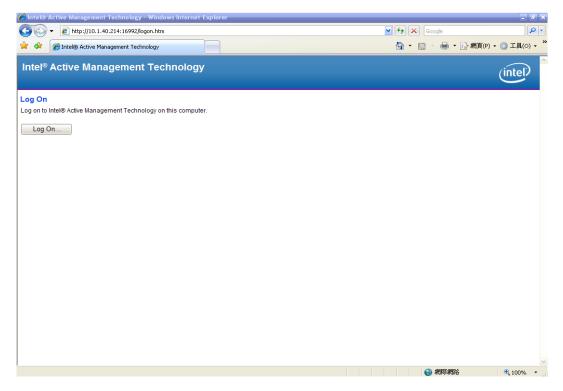
Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.3.1347 Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.					
INTEL (R) STANDARD MANAGEABILITY CONFIGURATION					
Manageability Feature Selection <enabled> &gt; SOL/IDER</enabled>					
<ul> <li>&gt; User Consent         Password Policy <anytime> </anytime></li> <li>&gt; Network Setup         Activate Network Access     </li> </ul>					
Unconfigure Network Access > Remote Setup And Configurati > Power Control Activates the current network settings and opens the ME network interface Continue: (Y/N)					
$[\downarrow\uparrow]$ = Move Highlight [Enter] = Select Entry [Esc] = Exit	:				

5. Exit from MEBx after completing the iAMT settings.

## D.4 iAMT Web Console

1. On a web browser, type http://(IP ADDRESS):16992, which connects to iAMT Web.

Example: http://10.1.40.214:16992



2. To log on, you will be required to type in your username and password for access to the Web.

USER: admin (default value) PASS: (MEBx password) 3. Enter the iAMT Web.

<u> </u>	40.214:16992/index.htm			_ 8
			💌 💀 🍫 🗙 🞯 Yahool	2
ED 編輯ED 檢視(Y)		用田		
1 . Q. Yahoola	6座搜尋 搜	💶 🗄 💰 • 🖄 😂 🔤 • 🚍 • 🥬 • 🚛 • 😢	• 🖗 • 🌐 • 🚘 • 🞬 🛅 • 🌒 🗠 🕮 • 🕸 •	+ 3
版的最爱 🛛 😒 💽 IN TH			• 離動程 🤌 黄進仁歌迎使用 WebFlow 👐 Intel Embedded Atom Proces 🐲	Intel Login
Intel® Standard Manageabi	1	1		
	Manageability			(intel)
mputer:				
tem Status dware Information	System Status			
System	Power	On		
Processor Memory	IP address	10.1.40.214		
Disk nt Log	IPv6 address	Disabled		
note Control	System ID	03000200-0400-0500-0006-000700080009 7/17/2013		
ver Policies work Settings	Date Time	9:59 am		
5 Network Settings		0.00 011		
tem Name Settings r Accounts	Refresh			

4. Click Remote Control, and select commands on the right side.

🖉 Intel® Standard Manageabilit	y - Windows Internet Explorer 是由下列提供: Yahoo!奇摩		_ 6 ×
🕒 🕞 🗢 🔊 http://10.1.4	10.214:16992/remote.htm	🗾 🗟 🍫 🗙 🞯! Yahoo!	<b>₽</b> •
	我的最愛(L) 工具(I) 説明(E)		
× 🛐 - 🔍 Yahoo'ii			+ 🌣
ஜ 我的最爱 🛛 😫 😸 INTI	EL SOFTWARE LICEN 🥪 Intel Login (2) 😰 PICO622 Project 🙎 TXC 台湾晶技 😁 Intel 嵌入式軟體、驅		
🏉 Intel® Standard Manageabil	ity	🟠 • 🔂 · 🖃 🚔 • 網頁(1) • 安全性(2	·• 工具②• ⑧• <sup>※</sup>
Intel <sup>®</sup> Standard I Computer:	Manageability		(intel)
System Status Hardware Information	Remote Control		
System Processor	Power state: On		
Marnory Disk: Event Log Remote Control Power Policies Devent States Power Policies User Accounts User Accounts	Send a command to this computer.		
			ير .
•			▶ ★ 105% • Ø

5. When you have finished using the iAMT Web console, close the Web browser.

## Appendix E PICMG<sup>®</sup> v1.3 Interface Definition

x16 PCIe Connector A			x16 PCIe Connector C		
No.	Side B	Side A	No.	Side B	Side A
1	N.C	N.C	1	USB0P	GND
2	GND	GND	2	USBON	GND
3	N.C	N.C	3	GND	USB1P
4	N.C	N.C	4	GND	USB1N
5	N.C	WAKE#	5	USB2P	GND
6	PWRBT#	PME#	6	USB2N	GND
7	PWRGD	PSON#	7	GND	USB3P
8	SHB_RST#	PERST#	8	GND	USB3N
9	CFG0	CFG1	9	USBOC0#	GND
10	CFG2	CFG3	10	GND	USBOC1#
11	RSVD	GND	11	USBOC2#	GND
		Mech	anical	Кеу	
12	GND	N.C	12	GND	USBOC3#
13	b_PETp0	GND	13	N.C	GND
14	b_PETn0	GND	14	N.C	GND
15	GND	b_PERp0	15	GND	N.C
16	GND	b_PERn0	16	GND	N.C
17	b_PETp1	GND	17	N.C	GND
18	b_PETn1	GND	18	N.C	GND
19	GND	b_PERp1	19	GND	N.C
20	GND	b_PERn1	20	GND	N.C
21	b_PETp2	GND	21	N.C	GND
22	b_PETn2	GND	22	N.C	GND
23	GND	b_PERp2	23	GND	N.C
24	GND	b_PERn2	24	GND	N.C
25	b_PETp3	GND	25	N.C	GND
26	b_PETn3	GND	26	N.C	GND

Mechanical Key						
27	GND	b_PERp3	27	GND	N.C	
28	GND	b_PERn3	28	GND	N.C	
29	REFCLK0+	GND	29	N.C	GND	
30	REFCLK0-	GND	30	N.C	GND	
31	GND	REFCLK1+	31	N.C	N.C	
32	RSVD	REFCLK1-	32	N.C	N.C	
33	REFCLK2+	GND	33	N.C	N.C	
34	REFCLK2-	GND	34	N.C	GND	
35	GND	REFCLK3+	35	N.C	GND	
36	RSVD	REFCLK3-	36	GND	N.C	
37	REFCLK4+	GND	37	GND	N.C	
38	REFCLK4-	GND	38	N.C	GND	
39	GND	N.C	39	N.C	GND	
40	RSVD	N.C	40	GND	N.C	
41	N.C	GND	41	GND	N.C	
42	N.C	GND	42	+3.3V	+3.3V	
43	GND	N.C	43	+3.3V	+3.3V	
44	GND	N.C	44	+3.3V	+3.3V	
45	a_PETp0	GND	45	+3.3V	+3.3V	
46	a_PETn0	GND	46	+3.3V	+3.3V	
47	GND	a_PERp0	47	+3.3V	+3.3V	
48	GND	a_PERn0	48	+3.3V	+3.3V	
49	a_PETp1	GND	49	+3.3V	+3.3V	
50	a_PETn1	GND	50	+3.3V	+3.3V	
51	GND	a_PERp1	51	GND	GND	
52	GND	a_PERn1	52	GND	GND	
53	a_PETp2	GND	53	GND	GND	
54	a_PETn2	GND	54	GND	GND	
55	GND	a_PERp2	55	GND	GND	
56	GND	a_PERn2	56	GND	GND	
57	a_PETp3	GND	57	GND	GND	

Mechanical Key						
58	a_PETn3	GND	58	GND	GND	
59	GND	a_PERp3	59	+5V	+5V	
60	GND	a_PERn3	60	+5V	+5V	
61	a_PETp4	GND	61	+5V	+5V	
62	a_PETn4	GND	62	+5V	+5V	
63	GND	a_PERp4	63	GND	GND	
64	GND	a_PERn4	64	GND	GND	
65	a_PETp5	GND	65	GND	GND	
66	a_PETn5	GND	66	GND	GND	
67	GND	a_PERp5	67	GND	GND	
68	GND	a_PERn5	68	GND	GND	
69	a_PETp6	GND	69	GND	GND	
70	a_PETn6	GND	70	GND	GND	
71	GND	a_PERp6	71	GND	GND	
72	GND	a_PERn6	72	GND	GND	
73	a_PETp7	GND	73	+12V	+12V	
74	a_PETn7	GND	74	+12V	+12V	
75	GND	a_PERp7	75	+12V	+12V	
76	GND	a_PERn7	76	+12V	+12V	
77	N.C	GND	77	+12V	+12V	
78	+3.3V	+3.3V	78	+12V	+12V	
79	+3.3V	+3.3V	79	+12V	+12V	
80	+3.3V	+3.3V	80	+12V	+12V	
81	+3.3V	+3.3V	81	+12V	+12V	
82	RSVD	RSVD	82	+12V	+12V	

x8 PCIe Connector B			x8 PCIe Connector D		
No.	Side B	Side A	No.	Side B	Side A
1	+5Vaux	+5Vaux	1	INTB#	INTA#
2	GND	N.C	2	INTD#	INTC#
3	a_PETp8	GND	3	GND	N.C
4	a_PETn8	GND	4	REQ3#	GNT3#
5	GND	a_PERp8	5	REQ2#	GNT2#
6	GND	a_PERn8	6	PCI_RST#	GNT1#
7	a_PETp9	GND	7	REQ1#	GNT0#
8	a_PETn9	GND	8	REQ0#	SERR#
9	GND	a_PERp9	9	N.C	+3.3V
10	GND	a_PERn9	10	GND	N.C
11	N.C	GND	11	N.C	GND
		Mecha	anical	Кеу	
12	GND	N.C	12	CLKC	CLKD
13	a_PETp10	GND	13	GND	+3.3V
14	a_PETn10	GND	14	CLKA	CLKB
15	GND	a_PERp10	15	+3.3V	GND
16	GND	a_PERn10	16	AD31	GND
17	a_PETp11	GND	17	AD29	+3.3V
18	a_PETn11	GND	18	N.C	AD30
19	GND	a_PERp11	19	AD27	AD28
20	GND	a_PERn11	20	AD25	GND
21	a_PETp12	GND	21	GND	AD26
22	a_PETn12	GND	22	C/BE3#	AD24
23	GND	a_PERp12	23	AD23	+3.3V
24	GND	a_PERn12	24	GND	AD22
25	a_PETp13	GND	25	AD21	AD20
26	a_PETn13	GND	26	AD19	N.C
27	GND	a_PERp13	27	+5V	AD18
28	GND	a_PERn13	28	AD17	AD16

Mechanical Key						
29	a_PETp14	GND	29	C/BE2#	GND	
30	a_PETn14	GND	30	PCI_PRST#	FRAME#	
31	GND	a_PERp14	31	IRDY#	TRDY#	
32	GND	a_PERn14	32	DEVSEL#	+5V	
33	a_PETp15	GND	33	LOCK#	STOP#	
34	a_PETn15	GND	34	PERR#	GND	
35	GND	a_PERp15	35	GND	C/BE1#	
36	GND	a_PERn15	36	PAR	AD14	
37	N.C	GND	37	N.C	GND	
38	N.C	N.C	38	GND	AD12	
39	GND	GND	39	AD15	AD10	
40	GND	GND	40	AD13	GND	
41	GND	GND	41	GND	AD09	
42	GND	GND	42	AD11	C/BE0#	
43	GND	GND	43	AD08	GND	
44	+12V	+12V	44	GND	AD06	
45	+12V	+12V	45	AD07	AD05	
46	+12V	+12V	46	AD04	GND	
47	+12V	+12V	47	GND	AD02	
48	+12V	+12V	48	AD03	AD01	
49	+12V	+12V	49	AD00	GND	



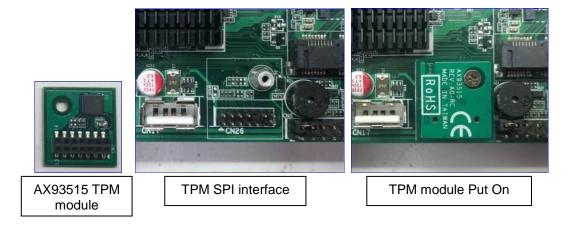
Please contact your vendor to get the backplane design guide if it's required. The backplane design guide is NDA required.

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## Appendix F TPM Module Installation

The TPM 2.0 (Trusted Platform Module 2.0) module is a modularized design applying to the SHB150R and provides enhanced hardware security for the computer. In this appendix you will learn how to install the TPM 2.0 module into the SHB150R. Please read and follow the instructions below carefully.

1. Insert TPM module into the SPI interface of motherboard, as illustrated below.



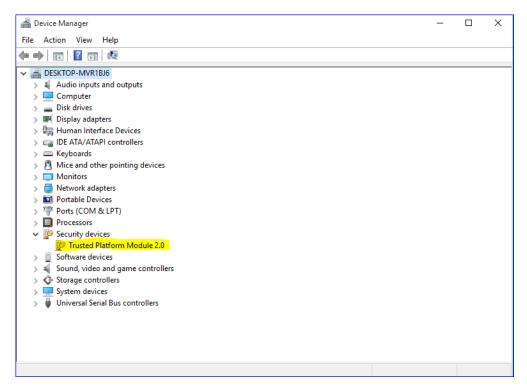
- 2. There are two ways to confirm whether the TPM Module is installed successfully or not:
  - a. Enter the BIOS setup menu and go to Trusted Computing. On the first line will show "TPM2.0 Device Found".

Aptio Setup Utility – Copyright (C) 20 Main Advanced Chipset Security Boot Save & Exi				
<ul> <li>ACPI Settings</li> <li>Trusted Computing</li> <li>Platform Misc Configuration</li> <li>CPU Configuration</li> <li>SATA And RST Configuration</li> <li>NCT6106D Super IO Configuration</li> <li>NCT6106D HW Monitor</li> <li>PCH-FW Configuration</li> <li>AMT Configuration</li> <li>USB Configuration</li> <li>PCI Subsystem Settings</li> <li>CSM Configuration</li> <li>Serial Port Console Redirection</li> </ul>	System ACPI Parameters. ++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit			
Version 2.20.1271. Copyright (C) 2018 American Megatrends, Inc. (In the Advance menu, go to Trusted Computing)				

Aptio Setup Utility - Advanced	Copyright (C) 2018 American	Megatrends, Inc.
TPM20 Device Found Firmware Version: Vendor: Security Device Support Active PCR banks Available PCR banks SHA-1 PCR Bank	73.4 STM [Enable] SHA-1,SHA256 SHA-1,SHA256 [Enabled]	Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
SHA256 PCR Bank Pending operation Platform Hierarchy Storage Hierarchy Endorsement Hierarchy TPM2.0 UEFI Spec Version Physical Presence Spec Version TPM 20 InterfaceType	[Enabled] [Enabled] [Enabled] [TCG_2] [1.3] [TIS]	++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Version 2.20.1271. 0	opyright (C) 2018 American M	

(In the Trusted Computing section, on the first of line will show "TPM2.0 Device Found", if installation is successful.)

b. In the Windows 10 OS environment, enter Device Manager, and select the item of Security devices. The screen will show "Trusted Platform Module 2.0" if installation is successful.



c. In the Windows 10 OS environment, enter Control Panel, select the item of BitLocker Drive Encryption, and enter TPM Administration. The screen will show the information below if installation is successful.

1 Trusted Platform Module (TPM)	anagement on Local Computer	- 🗆 X
1 File Action View Window	Help	_ 8 ×
🗢 🔿 🔲 🚺		
🐅 TPM Management on Local Comp	TPM Management on Local Computer	Actions
		TPM Management on Loca 🔺
	TPM Management on Local Computer Configures the TPM and its support by the Windows platform	Prepare the TPM
		Change Owner Passwo
	Overview	Clear TPM
	Windows computers containing the Trusted Platform Module (TPM) security hardware provide enhanced security features for applications. This snap-in displays information about the computer's TPM and allows administrators to configure the	Reset TPM Lockout
	device. It also allows administrators to view and manage commands understood by the device.	View 🕨
	Status	New Window from Here
		Refresh
	The TPM is ready for use, with reduced functionality.	🛛 🛛 Help
	TPM Management •	
	Change TPM owner password. and the second	
	Clear the TPM to remove ownership and reset the TPM to factory defaults.	
	WARNING: Clearing the TPM causes you to lose all TPM keys and data protected by those keys.	
	TPM Manufacturer Information	
	Manufacturer Name: STM Manufacturer Version: 71.4 Specification Version: 2.0	
< >		