

GENE-EHL7

3.5" Subcompact Board

User's Manual 1st Ed

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Packing List

Before setting up your product, please make sure the following items have been shipped:

Item	Quantity
GENE-EHL7	1

If any of these items are missing or damaged, please contact your distributor or sales representative immediately.

About this Document

This User's Manual contains all the essential information, such as detailed descriptions and explanations on the product's hardware and software features (if any), its specifications, dimensions, jumper/connector settings/definitions, and driver installation instructions (if any), to facilitate users in setting up their product.

Users may refer to the product page at AAEON.com for the latest version of this document.

Safety Precautions

Please read the following safety instructions carefully. It is advised that you keep this manual for future references

1. All cautions and warnings on the device should be noted.
2. Make sure the power source matches the power rating of the device.
3. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
4. Always completely disconnect the power before working on the system's hardware.
5. No connections should be made when the system is powered as a sudden rush of power may damage sensitive electronic components.
6. If the device is not to be used for a long time, disconnect it from the power supply to avoid damage by transient over-voltage.
7. Always disconnect this device from any AC supply before cleaning.
8. While cleaning, use a damp cloth instead of liquid or spray detergents.
9. Make sure the device is installed near a power outlet and is easily accessible.
10. Keep this device away from humidity.
11. Place the device on a solid surface during installation to prevent falls
12. Do not cover the openings on the device to ensure optimal heat dissipation.
13. Watch out for high temperatures when the system is running.
14. Do not touch the heat sink or heat spreader when the system is running
15. Never pour any liquid into the openings. This could cause fire or electric shock.
16. As most electronic components are sensitive to static electrical charge, be sure to ground yourself to prevent static charge when installing the internal components. Use a grounding wrist strap and contain all electronic components in any static-shielded containers.

17. If any of the following situations arises, please the contact our service personnel:
 - i. Damaged power cord or plug
 - ii. Liquid intrusion to the device
 - iii. Exposure to moisture
 - iv. Device is not working as expected or in a manner as described in this manual
 - v. The device is dropped or damaged
 - vi. Any obvious signs of damage displayed on the device
18. **DO NOT LEAVE THIS DEVICE IN AN UNCONTROLLED ENVIRONMENT WITH TEMPERATURES BEYOND THE DEVICE'S PERMITTED STORAGE TEMPERATURES (SEE CHAPTER 1) TO PREVENT DAMAGE.**

Warning!



This device complies with Part 15 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.

Caution:

There is a danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions and your local government's recycling or disposal directives.

Attention:

Il y a un risque d'explosion si la batterie est remplacée de façon incorrecte. Ne la remplacer qu'avec le même modèle ou équivalent recommandé par le constructeur. Recycler les batteries usées en accord avec les instructions du fabricant et les directives gouvernementales de recyclage.

China RoHS Requirements (CN)

产品中有毒有害物质或元素名称及含量

AAEON Main Board/ Daughter Board/ Backplane

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷电路板 及其电子组件	X	X	○	○	○	○
外部信号 连接器及线材	X	X	○	○	○	○
<p>O: 表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T 11363-2006 标准规定的限量要求以下。</p> <p>X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T 11363-2006 标准规定的限量要求。</p> <p>备注: 此产品所标示之环保使用期限, 系指在一般正常使用状况下。</p>						

China RoHS Requirement (EN)

Poisonous or Hazardous Substances or Elements in Products

AAEON Main Board/ Daughter Board/ Backplane

Component	Poisonous or Hazardous Substances or Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
PCB & Other Components	X	X	○	○	○	○
Wires & Connectors for External Connections	X	X	○	○	○	○
<p>O: The quantity of poisonous or hazardous substances or elements found in each of the component's parts is below the SJ/T 11363-2006-stipulated requirement.</p> <p>X: The quantity of poisonous or hazardous substances or elements found in at least one of the component's parts is beyond the SJ/T 11363-2006-stipulated requirement.</p> <p>Note: The Environment Friendly Use Period as labeled on this product is applicable under normal usage only</p>						

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Chapter 1

Product Specifications

1.1 Specifications

System

Form Factor	3.5" SubCompact Board
CPU	Intel Atom® x6000E series, Pentium®, and Celeron® N and J Series Processors: Intel Atom® x6413E (4C/4T, 1.50 GHz, 9W) Intel® Celeron® Processor J6412 (4C/4T, 2.00 GHz, 10W) Intel® Celeron® Processor N6210 (2C/2T, 1.20 GHz, 6.5W)
Chipset	Integrated with Intel® SoC
Memory Type	DDR4 up to 3200, Single Channel SODIMM x 1, Max. 32GB, Non-ECC *IBECC supported by selected CPU SKU
BIOS	UEFI
Wake on LAN	Yes
Watchdog Timer	255 Levels
Security	TPM 2.0 (Optional)
RTC Battery	Lithium Battery 3V/240mAh
Dimension	5.75" x 4" (146mm x 101.6mm)
Weight	0.83 lb. (0.38Kg)
OS Support	Windows® 10 (64-bit) Linux Ubuntu 20.04.5/5.15.0-46-generic

Power

Power Requirement	+12V
Power Supply Type	AT/ATX
Connector	2-pin Phoenix Connector
Power Consumption	Intel Atom® x6413E, DDR4 32GB, 2.17A @+12V (Typical) Intel Atom® x6413E, DDR4 32GB, 2.72A @+12V (Max)

Display

Controller	Intel® UHD Graphics for 10th Gen Intel® Processors
LVDS/eDP	LVDS x 1, Dual Channel 18/24-bit, up to 1920 x 1080
Display Interface	HDMI 1.4 x 1, up to 3840 x 2160 @30Hz DP 1.4 x 1, up to 3840 x 2160 @120Hz
Multiple Display	Up to 3 Simultaneous Displays

Audio

Codec	Realtek ALC897
Audio Interface	Line-In/Line-Out/Mic
Speaker	—

External I/O

Ethernet	Realtek RTL8111H-CG 1GbE, RJ-45 x 2
USB	USB 3.2 Gen 2 x 2
Serial Port	—
Video	HDMI 1.4 x 1 DP 1.4 x 1

Internal I/O

USB	USB 2.0 x 4
Serial Port	COM 1 (RS-232/422/485, supports 5V/12V/RI) COM 2 (RS-232)
Video	LVDS/eDP x 1 (Default: LVDS) Inverter x 1 (12V/2A)
SATA	SATA 6Gb/s x 1 +5V SATA Power Connector x 1
Audio	Audio Header x 1
DIO/GPIO	GPIO 8-bits
SMBus/I2C	SMBus/I2C x 1 (Default: SMBus)
Touch	—
Fan	4-pin Smart Fan x 1
SIM	—
Front Panel	HDD LED, PWR LED, Power Button, Buzzer, Reset

Expansion

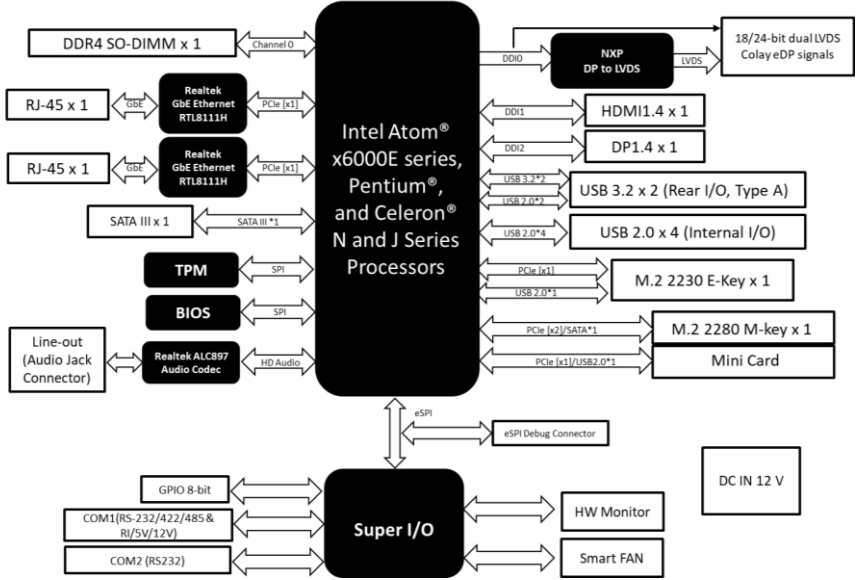
Mini PCIe/mSATA	Full-size mPCIe x 1
M.2	M.2 2230 E-Key x 1 (PCIe 3.0 [x1], USB 2.0) M.2 2280 M-Key x 1 (PCIe 3.0 [x2]/SATA), SATA select by BOM

Environment

Operating Temperature	32°F ~ 140°F (0°C ~ 60°C)
Storage Temperature	-40°F ~ 185°F (-40°C ~ 85°C)
Operating Humidity	0% ~ 90% relative humidity, non-condensing
MTBF (Hours)	484,355
EMC	CE/FCC Class A

1.2 Block Diagram

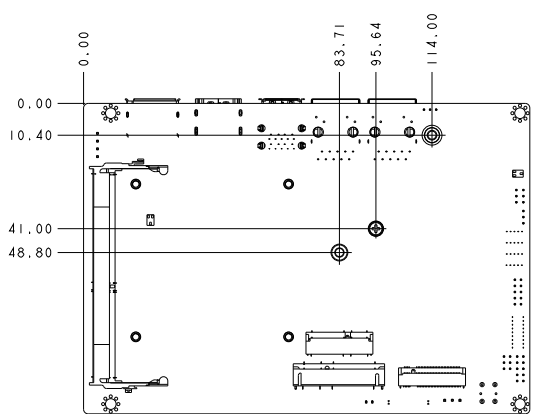
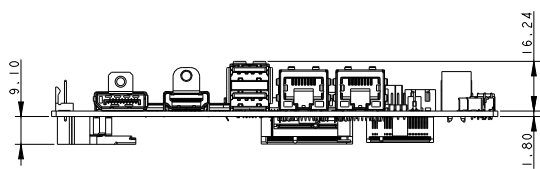
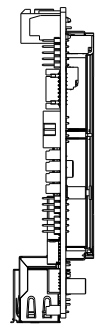
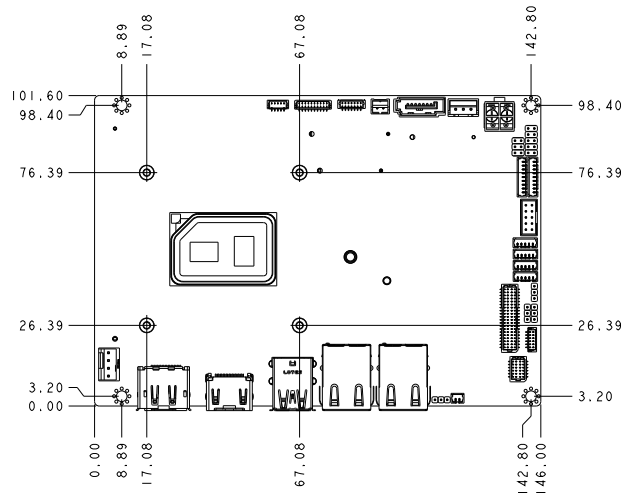
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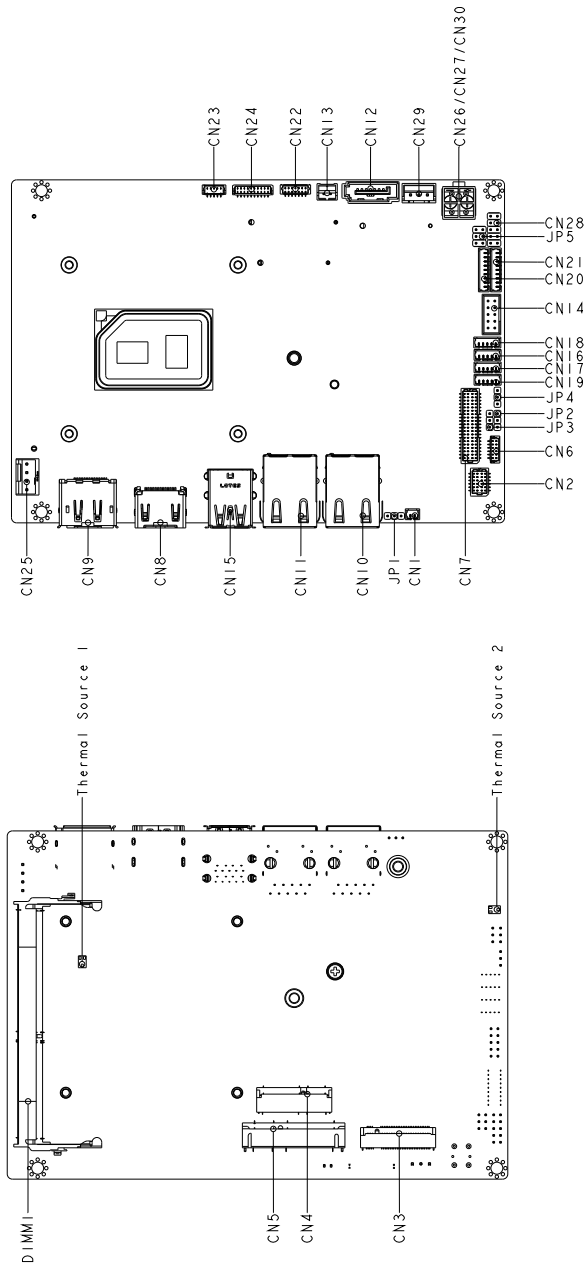
Chapter 2

Hardware Information

2.1 Dimensions



2.2 Jumpers and Connectors



2.3 List of Jumpers

Please refer to the table below for all of the board's jumpers that you can configure for your application

Label	Function
JP1	Clear CMOS Jumper
JP2	LVDS/eDP BKLT Power Selection
JP3	LVDS/eDP Power Selection
JP4	Auto Power Button Enable/Disable
JP5	COM 1 Pin 8 Function Selection

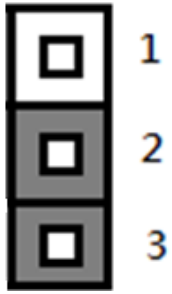
2.3.1 Clear CMOS Jumper (JP1)



Clear CMOS Jumper

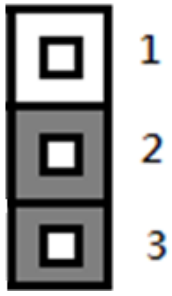
1-2	Save CMOS (Default)
2-3	Clear CMOS

2.3.2 LVDS/eDP BKLT Power Selection (JP2)



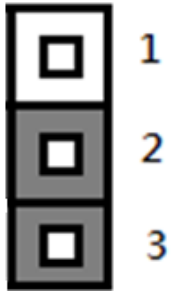
LVDS/eDP BKLT Power Selection	
1-2	12V
2-3	5V (Default)

2.3.3 LVDS/eDP Power Selection (JP3)



LVDS/eDP Power Selection	
1-2	5V
2-3	3.3V (Default)

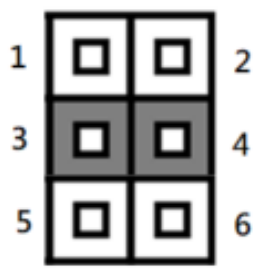
2.3.4 Auto Power Button Enable/Disable (JP4)



Auto Power Button Enable/Disable

1-2	Disable
2-3	Enable (Default)

2.3.5 COM 1 Pin 8 Function Selection (JP5)



COM 1 Pin 8 Function Selection

1-2	+12V
3-4	Ring (Default)
5-6	+5V

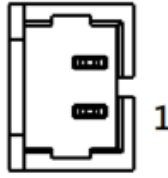
2.4 List of Connectors

Please refer to the table below for all of the board's connectors that you can configure for your application

Label	Function
CN1	RTC Battery Connector
CN2	Audio Connector
CN3	M.2 2280 M-Key
CN4	M.2 2230 E-Key
CN5	Mini Card
CN6	LVDS/eDP Backlight
CN7	LVDS/eDP Connector
CN8	HDMI
CN9	Display Port
CN10	RJ-45
CN11	RJ-45
CN12	SATA
CN13	SATA power
CN14	GPIO Connector
CN15	Dual USB 3.0 Type-A Connector
CN16~19	Internal USB 2.0 Connector
CN20	COM Port (RS-232/422/485)
CN21	COM Port (RS-232)
CN22	SPI (For BIOS)
CN23	I2C/SMBus
CN24	Debug Port (ESPI)
CN25	Fan Connector
CN26	12V Input

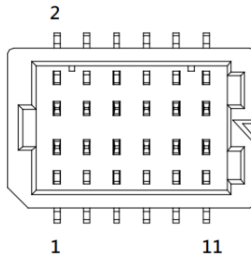
Label	Function
CN27	12V Input (4P Colay)
CN28	Front Panel
CN29	5VB Standby Input
CN30	12V Input (New Colay)

2.4.1 RTC Battery Connector (CN1)



Pin	Pin Name	Signal Type	Signal Level
1	+3.3V	PWR	+3.3V
2	GND	GND	

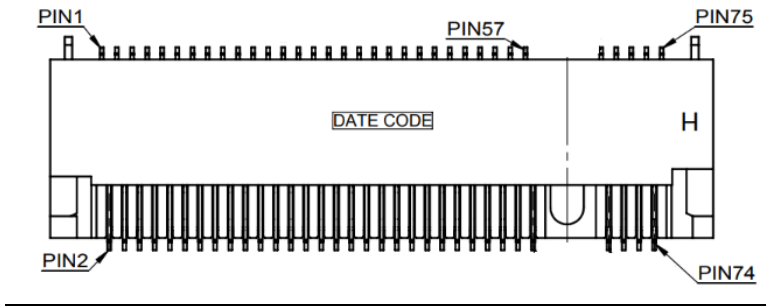
2.4.2 Audio Connector (CN2)



Pin	Pin Name	Signal Type	Signal Level
1	LOUT_R	Signal	
2	MIC_R	Signal	
3	LOUT_L	Signal	
4	MIC_L	Signal	
5	JD_LOUT	Signal	
6	JD_MIC	Signal	
7	AUD_GND	GND	
8	AUD_GND	GND	

Pin	Pin Name	Signal Type	Signal Level
9	JD_LIN	Signal	
10	LIN_R	Signal	
11	+V5A_AUD	PWR	+5V
12	LIN_L	Signal	
13	AUD_GND	GND	
14	AUD_GND	GND	

2.4.3 M.2 2280 M-Key (CN3)



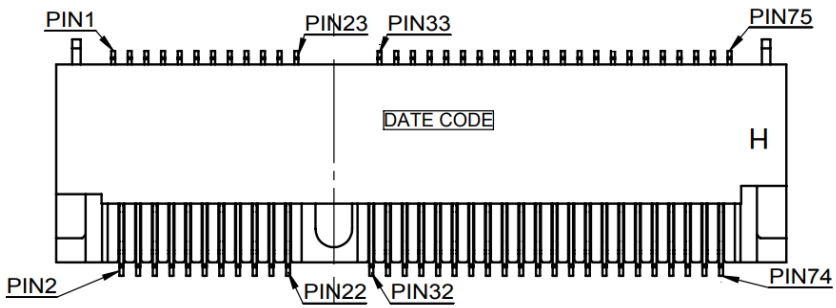
Pin	Pin Name	Signal Type	Signal Level
1	GND	GND	
2	+V3P3A	PWR	+3.3V
3	GND	GND	
4	+V3P3A	PWR	+3.3V
5	PCIE_3_RXN	DIFF	
6	CARD_PWR_OFF		
7	PCIE_3_RXP	DIFF	
8	NC		
9	GND	GND	

Pin	Pin Name	Signal Type	Signal Level
10	SSD_LED#		
11	PCIE_3_TXN	DIFF	
12	+V3P3A	PWR	+3.3V
13	PCIE_3_TXP	DIFF	
14	+V3P3A	PWR	+3.3V
15	GND	GND	
16	+V3P3A	PWR	+3.3V
17	PCIE_2_RXN	DIFF	
18	+V3P3A	PWR	+3.3V
19	PCIE_2_RXP	DIFF	
20	NC		
21	GND	GND	
22	NC		
23	PCIE_2_TXN	DIFF	
24	NC		
25	PCIE_2_TXP	DIFF	
26	NC		
27	GND	GND	
28	NC		
29	PCIE_1_RXN	DIFF	
30	NC		
31	GND	GND	
32	NC		
33	GND	GND	
34	NC		
35	PCIE_1_TXN	DIFF	

Pin	Pin Name	Signal Type	Signal Level
36	NC		
37	PCIE_1_TXP	DIFF	
38	DEVSLP		
39	GND	GND	
40	SMCLK		
41	PCIE_0_RXN	DIFF	
42	SMDAT		
43	PCIE_0_RXP	DIFF	
44	NC		
45	GND	GND	
46	NC		
47	PCIE_0_TXN	DIFF	
48	NC		
49	PCIE_0_TXP	DIFF	
50	PERST#		
51	GND	GND	
52	CLKREQ#		
53	NC		
54	PEWARK#		
55	PCIE_0_CLK_DN	DIFF	
56	NC		
57	PCIE_0_CLK_DP	DIFF	
58	NC		
67	NC		
68	SSCLK		
69	PEDET		

Pin	Pin Name	Signal Type	Signal Level
70	+V3P3A	PWR	+3.3V
71	GND	GND	
72	+V3P3A	PWR	+3.3V
73	GND	GND	
74	+V3P3A	PWR	+3.3V
75	GND	GND	

2.4.4 M.2 2230 E-Key (CN4)



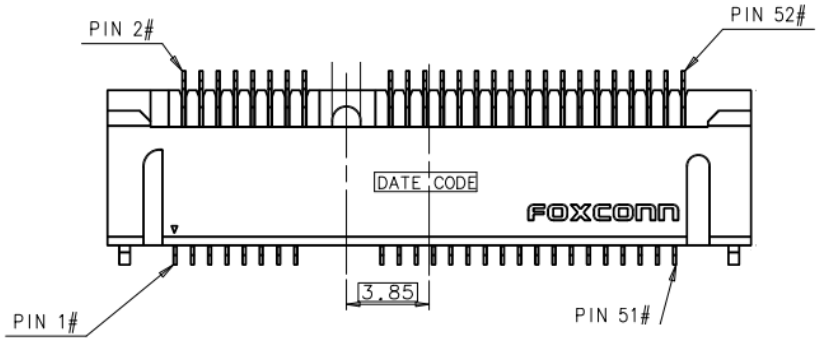
Pin	Pin Name	Signal Type	Signal Level
1	GND	GND	
2	+V3P3A	PWR	+3.3V
3	USB_D+	DIFF	
4	+V3P3A	PWR	+3.3V
5	USB_D-	DIFF	
6	LED1		
7	GND	GND	
8	NC		
9	NC		

Pin	Pin Name	Signal Type	Signal Level
10	NC		
11	NC		
12	NC		
13	GND	GND	
14	NC		
15	NC		
16	NC		
17	NC		
18	GND	GND	
19	NC		
20	NC		
21	NC		
22	NC		
23	NC		
32	NC		
33	GND	GND	
34	NC		
35	PCIE_5_TXP	DIFF	
36	NC		
37	PCIE_5_TXN	DIFF	
38	NC		
39	GND	GND	
40	NC		
41	PCIE_4_RXP	DIFF	
42	NC		
43	PCIE_4_RXN	DIFF	

Pin	Pin Name	Signal Type	Signal Level
44	NC		
45	GND	GND	
46	NC		
47	PCIE_1_CLK_DP	DIFF	
48	NC		
49	PCIE_1_CLK_DN	DIFF	
50	SUSCLK		
51	GND	GND	
52	PERST0#		
53	PCIE_CLKREQ#		
54	W_DISABLE2#		
55	PCIE_WAKE#		
56	W_DISABLE1#		
57	GND	GND	
58	NC		
59	I2C_DATA		
60	I2C_CLK		
61	NC		
62	NC		
63	NC		
64	NC		
65	NC		
66	NC		
67	NC		
68	NC		
69	GND	GND	

Pin	Pin Name	Signal Type	Signal Level
70	+V3P3A_2242	PWR	+3.3V
71	NC		
72	+V3P3A_2242	PWR	+3.3V
73	NC		
74	+V3P3A_2242	PWR	+3.3V
75	GND	GND	

2.4.5 Mini Card (CN5)

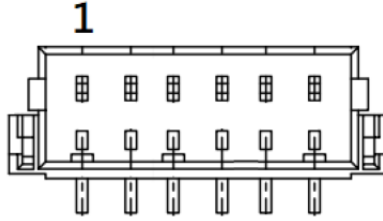


Pin	Pin Name	Signal Type	Signal Level
1	PCIE_WAKE#	IN	
2	+3.3VSB	PWR	+3.3V
3	NC		
4	GND	GND	
5	NC		
6	+1.5V	PWR	+1.5V
7	PCIE_CLK_REQ#	IN	
8	UIM_PWR	PWR	

Pin	Pin Name	Signal Type	Signal Level
9	GND	GND	
10	UIM_DATA	I/O	
11	PCIE_REF_CLK-	DIFF	
12	UIM_CLK	IN	
13	PCIE_REF_CLK+	DIFF	
14	UIM_RST	IN	
15	GND	GND	
16	UIM_VPP	PWR	
17	NC		
18	GND	GND	
19	NC		
20	W_DISABLE#	OUT	+3.3V
21	GND	GND	
22	BUF_PLT_RST#	OUT	+3.3V
23	PCIE_RX-	DIFF	
24	+3.3VSB	PWR	+3.3V
25	PCIE_RX+	DIFF	
26	GND	GND	
27	GND	GND	
28	+1.5V	PWR	+1.5V
29	GND	GND	
30	SMB_CLK	I/O	+3.3V
31	PCIE_TX-	DIFF	
32	SMB_DATA	I/O	+3.3V
33	PCIE_TX+	DIFF	
34	GND	GND	

Pin	Pin Name	Signal Type	Signal Level
35	GND	GND	
36	USB_D-	DIFF	
37	GND	GND	
38	USB_D+	DIFF	
39	+3.3VSB	PWR	+3.3V
40	GND	GND	
41	+3.3VSB	PWR	+3.3V
42	NC		
43	GND	GND	
44	NC		
45	NC		
46	NC		
47	NC		
48	+1.5V	PWR	+1.5V
49	NC		
50	GND	GND	
51	NC		
52	+3.3VSB	PWR	+3.3V

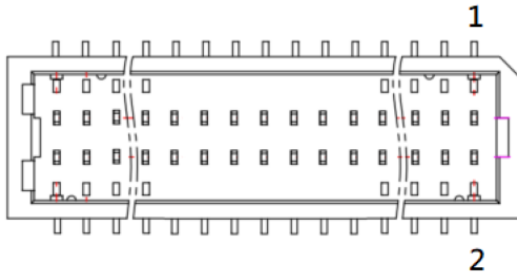
2.4.6 LVDS/eDP Backlight (CN6)



Pin	Pin Name	Signal Type	Signal Level
1	BKL_PWR	PWR	+5V / +12V
2	BKL_PWR	PWR	+5V / +12V
3	BKL_CONTROL	OUT	
4	GND	GND	
5	GND	GND	
6	BKL_ENABLE	OUT	+5V

Note: LVDS BKL_PWR can be set to +5V or +12V by JP2.

2.4.7 LVDS/eDP Connector (CN7)



LVDS Function			
Pin	Pin Name	Signal Type	Signal Level
1	BKL_ENABLE	OUT	
2	BKL_CONTROL	OUT	

LVDS Function			
Pin	Pin Name	Signal Type	Signal Level
3	GND	GND	
4	GND	GND	
5	LVDSA_CLK#	DIFF	
6	PWR	PWR	+3.3V/+5V
7	LVDSA_CLK	DIFF	
8	PWR	PWR	+3.3V/+5V
9	GND	GND	
10	GND	GND	
11	LVDSA_DATA0#	DIFF	
12	LVDSA_DATA2#	DIFF	
13	LVDSA_DATA0	DIFF	
14	LVDSA_DATA2	DIFF	
15	GND	GND	
16	GND	GND	
17	LVDSA_DATA1#	DIFF	
18	LVDSA_DATA3#	DIFF	
19	LVDSA_DATA1	DIFF	
20	LVDSA_DATA3	DIFF	
21	GND	GND	
22	GND	GND	
23	LVDSB_D0#	DIFF	
24	LVDS_DDC_DATA		
25	LVDSB_D0	DIFF	
26	LVDS_DDC_CLK		
27	GND	GND	

LVDS Function			
Pin	Pin Name	Signal Type	Signal Level
28	GND	GND	
29	LVDSB_DATA1#	DIFF	
30	LVDSB_DATA2#	DIFF	
31	LVDSB_DATA1	DIFF	
32	LVDSB_DATA2	DIFF	
33	GND	GND	
34	GND	GND	
35	LVDSB_CLK#	DIFF	
36	LVDSB_DATA3#	DIFF	
37	LVDSB_CLK	DIFF	
38	LVDSB_DATA3	DIFF	
39	EDP_LVDS_HPD		
40	NC		

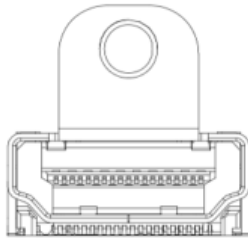
eDP Function			
Pin	Pin Name	Signal Type	Signal Level
1	BKL_ENABLE	OUT	
2	BKL_CONTROL	OUT	
3	GND	GND	
4	GND	GND	
5	DDIO_LANE3_DN	DIFF	
6	PWR	PWR	+3.3V/+5V
7	DDIO_LANE3_DP	DIFF	
8	PWR	PWR	+3.3V/+5V
9	GND	GND	

eDP Function			
Pin	Pin Name	Signal Type	Signal Level
10	GND	GND	
11	DDIO_LANE2_DN	DIFF	
12	DDIO_LANE0_DN	DIFF	
13	DDIO_LANE2_DP	DIFF	
14	DDIO_LANE0_DP	DIFF	
15	GND	GND	
16	GND	GND	
17	DDIO_LANE1_DN	DIFF	
18	NC		
19	DDIO_LANE1_DP	DIFF	
20	NC		
21	GND	GND	
22	GND	GND	
23	NC		
24	NC		
25	NC		
26	NC		
27	GND	GND	
28	GND	GND	
29	NC		
30	NC		
31	NC		
32	NC		
33	GND	GND	
34	GND	GND	

eDP Function			
Pin	Pin Name	Signal Type	Signal Level
35	NC		
36	NC		
37	NC		
38	NC		
39	EDP_LVDS_HPDP		
40	NC		

Note: LVDS/eDP LCD_PWR can be set to +3.3V or +5V by JP3.

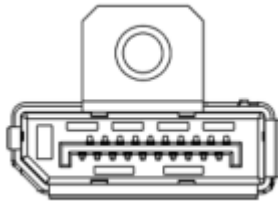
2.4.8 HDMI (CN8)



Pin	Pin Name	Signal Type	Signal Level
1	HDMI_TX2+	DIFF	
2	GND	GND	
3	HDMI_TX2-	DIFF	
4	HDMI_TX1+	DIFF	
5	GND	GND	
6	HDMI_TX1-	DIFF	
7	HDMI_TX0+	DIFF	
8	GND	GND	
9	HDMI_TX0-	DIFF	

Pin	Pin Name	Signal Type	Signal Level
10	HDMI_CLK+	DIFF	
11	GND	GND	
12	HDMI_CLK-	DIFF	
13	NC		
14	NC		
15	DDC_CLK	Signal	+5V
16	DDC_DATA	Signal	+5V
17	GND	GND	
18	+5V	PWR	+5V
19	HDMI_HPD		

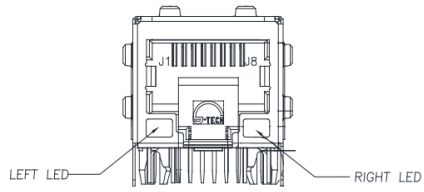
2.4.9 Display Port (CN9)



Pin	Pin Name	Signal Type	Signal Level
1	DP_D0_P	DIFF	
2	GND	GND	
3	DP_D0_N	DIFF	
4	DP_D1_P	DIFF	
5	GND	GND	
6	DP_D1_N	DIFF	
7	DP_D2_P	DIFF	

Pin	Pin Name	Signal Type	Signal Level
8	GND	GND	
9	DP_D2_N	DIFF	
10	DP_D3_P	DIFF	
11	GND	GND	
12	DP_D3_N	DIFF	
13	GND	GND	
14	GND	GND	
15	DP_AUX_P	Signal	
16	GND	GND	
17	DP_AUX_N	Signal	
18	HPD	Signal	
19	RTN_PWR	GND	
20	PWR	PWR	3.3V

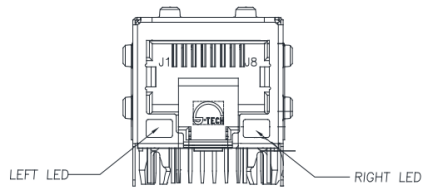
2.4.10 RJ-45 (CN10)



Pin	Pin Name	Signal Type	Signal Level
P1	LAN1_MDIO+	DIFF	
P2	LAN1_MDIO-	DIFF	
P3	LAN1_MDI1+	DIFF	
P4	LAN1_MDI1-	DIFF	
P5	LAN1_CT		

Pin	Pin Name	Signal Type	Signal Level
P6	LAN1_CT		
P7	LAN1_MDI2+	DIFF	
P8	LAN1_MDI2-	DIFF	
P9	LAN1_MDI3+	DIFF	
P10	LAN1_MDI3-	DIFF	
11	LAN1_LED_LNK#_ACT	Signal	
12	+V3P3A	VDD	+3.3V
13	LAN1_LED_100#	Signal	
14	LAN1_LED_1000#	Signal	

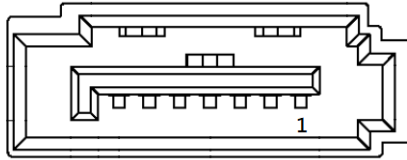
2.4.11 RJ-45 (CN11)



Pin	Pin Name	Signal Type	Signal Level
P1	LAN2_MDI0+	DIFF	
P2	LAN2_MDI0-	DIFF	
P3	LAN2_MDI1+	DIFF	
P4	LAN2_MDI1-	DIFF	
P5	LAN2_CT		
P6	LAN2_CT		
P7	LAN2_MDI2+	DIFF	
P8	LAN2_MDI2-	DIFF	
P9	LAN2_MDI3+	DIFF	

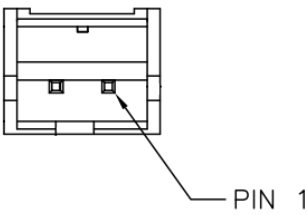
Pin	Pin Name	Signal Type	Signal Level
P10	LAN2_MDI3-	DIFF	
P11	LAN2_LED_LNK#_ACT	Signal	
P12	+V3P3A	VDD	+3.3V
P13	LAN2_LED_100#	Signal	
P14	LAN2_LED_1000#	Signal	

2.4.12 SATA (CN12)



Pin	Pin Name	Signal Type	Signal Level
1	GND	GND	
2	SATA_1_TXP	DIFF	
3	SATA_1_TXN	DIFF	
4	GND	GND	
5	SATA_1_RXN	DIFF	
6	SATA_1_RXP	DIFF	
7	GND	GND	

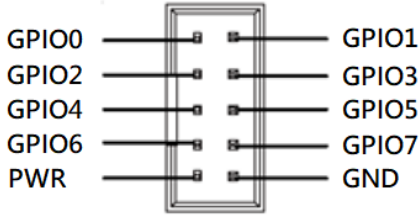
2.4.13 SATA Power (CN13)



Pin	Pin Name	Signal Type	Signal Level
1	+V5S	VDD	+5V
2	GND	GND	

Note: SATA power current max: 1.5A.

2.4.14 GPIO Connector (CN14)

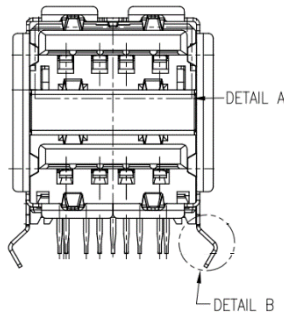


Pin	Pin Name	Signal Type	Signal Level
1	GPIO_0	Signal	
2	GPIO_1	Signal	
3	GPIO_2	Signal	
4	GPIO_3	Signal	
5	GPIO_4	Signal	

Pin	Pin Name	Signal Type	Signal Level
6	GPIO_5	Signal	
7	GPIO_6	Signal	
8	GPIO_7	Signal	
9	+V5S	VDD	+5V
10	GND	GND	

Note: GPIO power current max: 0.5A.

2.4.15 Dual USB 3.0 Type-A Connector (CN15)

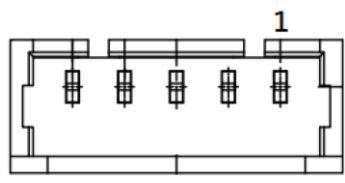


Pin	Pin Name	Signal Type	Signal Level
1	+V5A_USB12	PWR	+5V
2	USB2_0_DN	DIFF	
3	USB2_0_DP	DIFF	
4	GND	GND	
5	USB3_0_RXN	DIFF	
6	USB3_0_RXP	DIFF	
7	GND	GND	
8	USB3_0_TXN	DIFF	
9	USB3_0_TXP	DIFF	

Pin	Pin Name	Signal Type	Signal Level
10	+V5A_USB12	PWR	+5V
11	USB2_1_DN	DIFF	
12	USB2_1_DP	DIFF	
13	GND		
14	USB3_1_RXN	DIFF	
15	USB3_1_RXP	DIFF	
16	GND		
17	USB3_1_TXN	DIFF	
18	USB3_1_TXP	DIFF	

Note: USB 3.0 power current max: 0.9A.

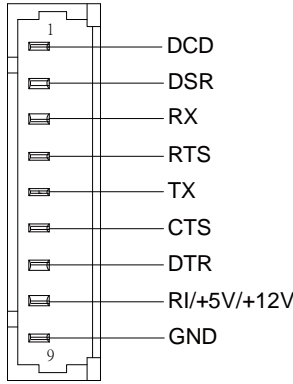
2.4.16 Internal USB 2.0 Connectors (CN16/CN17/CN18/CN19)



Pin	Pin Name	Signal Type	Signal Level
1	+5VSB	PWR	+5V
2	D-	DIFF	
3	D+	DIFF	
4	GND	GND	
5	GND	GND	

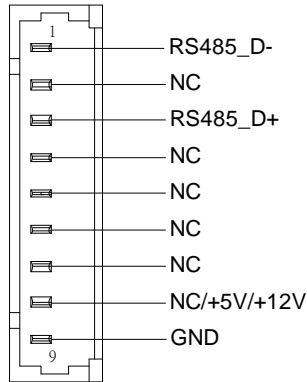
Note: Each USB 2.0 power current max: 0.5A.

2.4.17 COM Port (RS-232/422/485) (CN20)

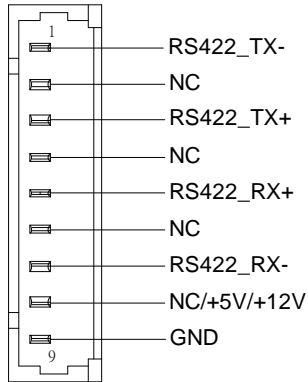


RS-232

Pin	Pin Name	Signal Type	Signal Level
1	DCD	IN	
2	DSR	IN	
3	RX	IN	
4	RTS	OUT	±9V
5	TX	OUT	±9V
6	CTS	IN	
7	DTR	OUT	±9V
8	RI/+5V/+12V	IN/ PWR	+5V/+12V
9	GND	GND	



RS-485			
Pin	Pin Name	Signal Type	Signal Level
1	RS485_D-	I/O	±5V
2	NC		
3	RS485_D+	I/O	±5V
4	NC		
5	NC		
6	NC		
7	NC		
8	NC/+5V/+12V	PWR	+5V/+12V
9	GND	GND	

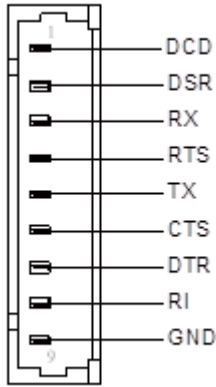


RS-422			
Pin	Pin Name	Signal Type	Signal Level
1	RS422_TX-	OUT	±5V
2	NC		
3	RS422_TX+	OUT	±5V
4	NC		
5	RS422_RX+	IN	
6	NC		
7	RS422_RX-	IN	
8	NC/+5V/+12V	PWR	+5V/+12V
9	GND	GND	

Note: RS-232/422/485 can be set by BIOS setting. Default is RS-232.

Note: Pin 8 function can be set by JP5.

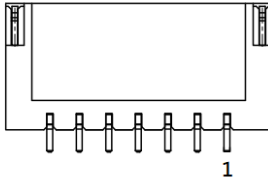
2.4.18 COM Port (RS-232) (CN21)



RS-232

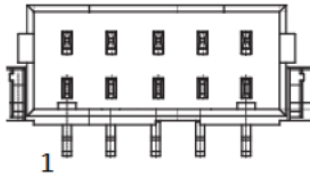
Pin	Pin Name	Signal Type	Signal Level
1	DCD	IN	
2	DSR	IN	
3	RX	IN	
4	RTS	OUT	±9V
5	TX	OUT	±9V
6	CTS	IN	
7	DTR	OUT	±9V
8	RI	IN	
9	GND	GND	

2.4.19 SPI (For BIOS) (CN22)



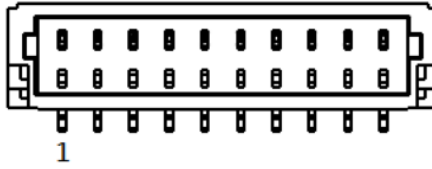
Pin	Pin Name	Signal Type	Signal Level
1	SPI_SO	Signal	
2	GND	GND	
3	SPI_CLK	Signal	
4	+V3P3A_SPI	PWR	+3.3V
5	SPI_SI	Signal	
6	SPI_CS	Signal	
7	NC		

2.4.20 I2C/SMBus (CN23)



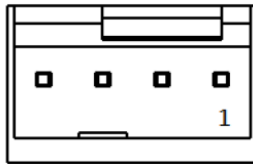
Pin	Pin Name	Signal Type	Signal Level
1	3.3V	PWR	+5V
2	SMB_CLK / I2C_CLK	DIFF	
3	SMB_SDA/ I2C_DATA	DIFF	
4	SMB_ALERT#/ INT_SERIRQ	GND	
5	GND	GND	

2.4.21 Debug Port (eSPI) (CN24)



Pin	Pin Name	Signal Type	Signal Level
1	ESPI_IO0	Signal	+1.8V
2	ESPI_IO1	Signal	+1.8V
3	ESPI_IO2	Signal	+1.8V
4	ESPI_IO3	Signal	+1.8V
5	+V3.3S	PWR	+3.3V
6	ESPI_CS	Signal	
7	ESPI_RESET#	Signal	+1.8V
8	GND	GND	
9	ESPI_CLK	Signal	1.8V
10	+V3P3A	POWER	+3.3V

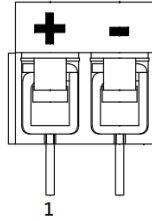
2.4.22 Fan Connector (CN25)



Pin	Pin Name	Signal Type	Signal Level
1	GND	GND	
2	+V12S	PWR	+12V
3	FAN_TAC	Signal	
4	FAN_CTL	Signal	

Note: Smart FAN power current max: 1.0A.

2.4.23 Power Input (CN26/CN30)



Pin	Pin Name	Signal Type	Signal Level
1	+V_IN	PWR	+12V
2	GND	GND	

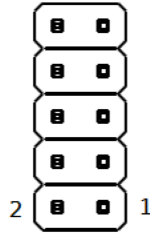
Note: Colay CN30.

2.4.24 ATX-2X2P Input [Reserved] (CN27)

Pin	Pin Name	Signal Type	Signal Level
1	GND	GND	
2	GND	GND	
3	+V_IN	PWR	+12V
4	+V_IN	PWR	+12V

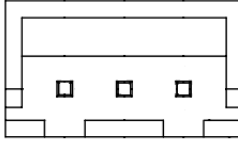
Note: CN27 only for +12V.

2.4.25 Front Panel (CN28)



Pin	Pin Name	Signal Type	Signal Level
1	GND	GND	
2	EXT_PWRBTN#	Signal	
3	FP_IDELED#	Signal	
4	+V3P3S	PWR	+3.3V
5	FP_BUZZER	Signal	
6	+V5S	PWR	+5V
7	GND		
8	+V3P3S	PWR	+3.3V
9	GND		
10	HWRST#	Signal	

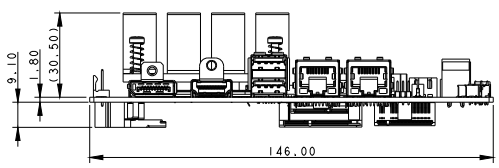
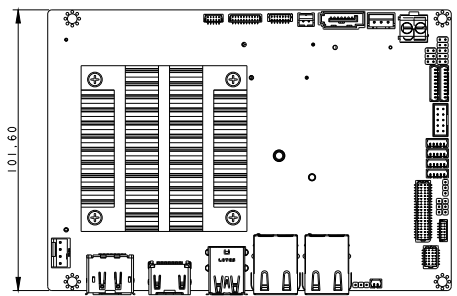
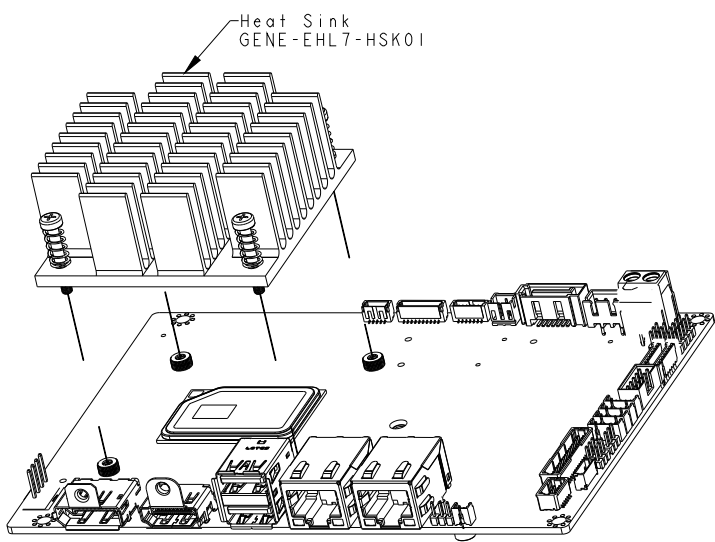
2.4.26 5VB Standby Input (CN29)



Pin	Pin Name	Signal Type	Signal Level
1	PS_ON#	Signal	
2	GND	GND	
3	+V5A_SB_IN	PWR	+5V

2.5 Thermal Solution

Optional accessory: GENE-EHL7-HSK01



Chapter 3

AMI BIOS Setup

3.1 System Test and Initialization

The GENE-EHL7 uses certain routines to perform testing and initialization during the boot up sequence. If an error, fatal or non-fatal, is encountered, the module will output a few short beeps or display an error message. The module can usually continue the boot up sequence with non-fatal errors.

These routines test and initialize board hardware. If the routines encounter an error during the tests, you will either hear a few short beeps or see an error message on the screen. There are two kinds of errors: fatal and non-fatal. The system can usually continue the boot up sequence with non-fatal errors.

System configuration verification

These routines check the current system configuration stored in the CMOS memory and BIOS NVRAM. If system configuration is not found or system configuration data error is detected, system will load optimized default and re-boot with this default system configuration automatically.

There are four situations in which you will need to setup system configuration:

1. You are starting your system for the first time
2. You have changed the hardware attached to your system
3. The system configuration is reset by Clear-CMOS jumper
4. The CMOS memory has lost power and the configuration information has been erased.

The GENE-EHL7 CMOS memory has an integral lithium battery backup for data retention. However, you will need to replace the complete unit when it finally runs down.

3.2 AMI BIOS Setup

The AMI BIOS ROM has a pre-installed Setup program that allows users to modify basic system configurations, which is stored in the battery-backed CMOS RAM and BIOS NVRAM so that the information is retained when the power is turned off.

To enter BIOS Setup, press or <ESC> immediately while your computer is powering up.

The function for each interface can be found below.

Main – Date and time can be set here. Press <Tab> to switch between date elements

Advanced – Access hardware monitor and advanced board features, options

Chipset – Host bridge parameters

Boot – Enable/ Disable Quiet Boot option

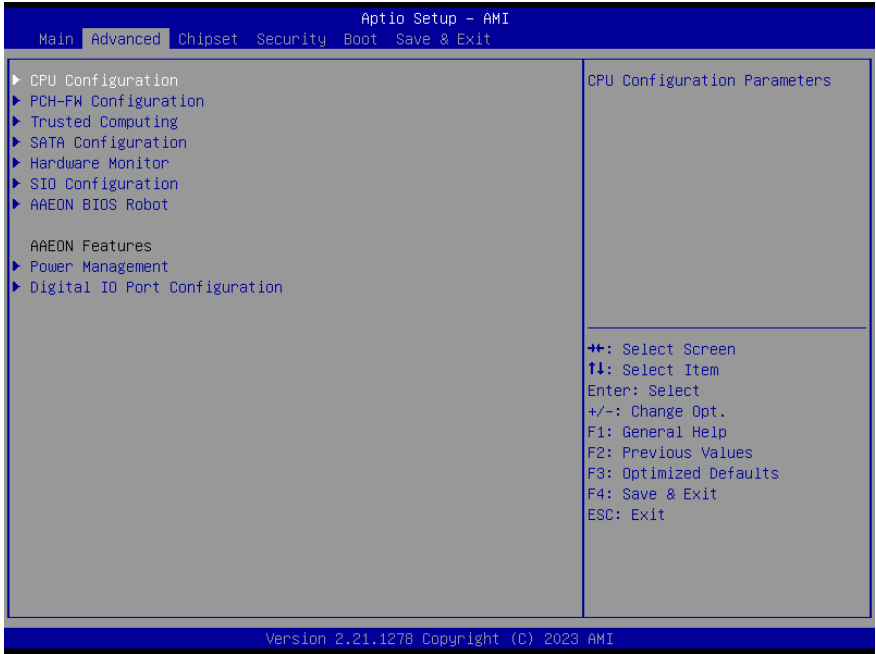
Security – The setup administrator password can be set here

Save & Exit – Save your changes and exit the program

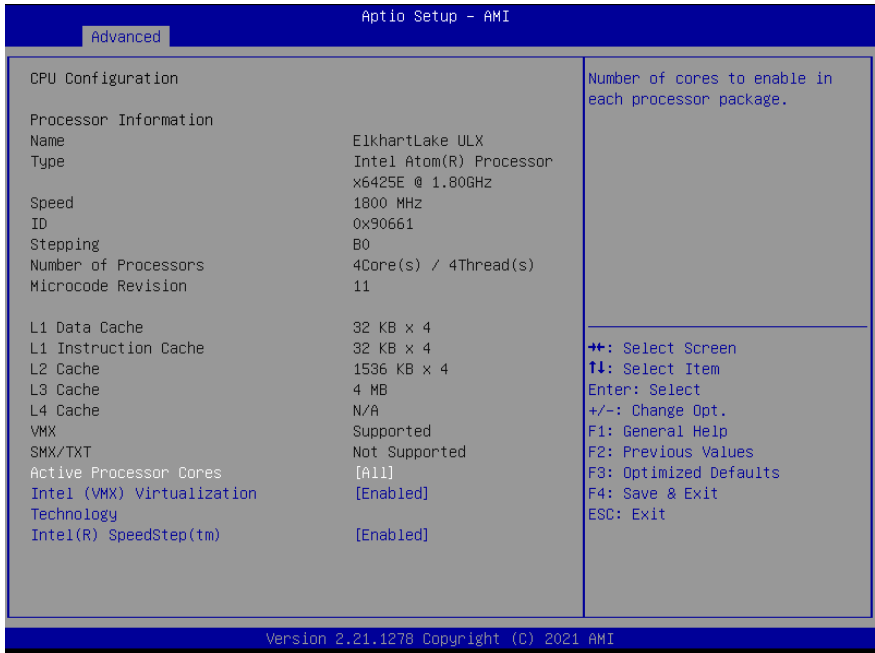
3.3 Setup Submenu: Main



3.4 Setup Submenu: Advanced

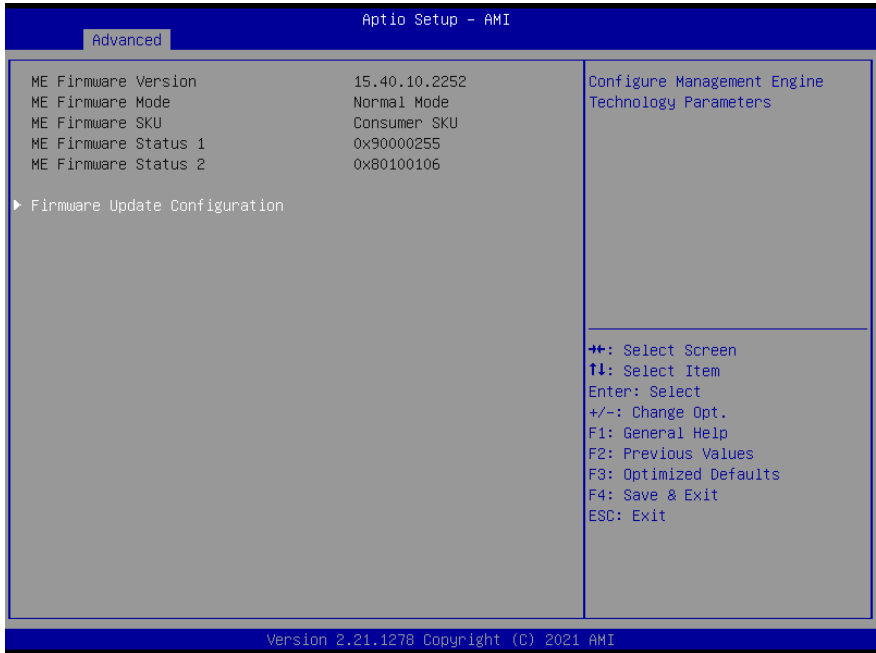


3.4.1 CPU Configuration

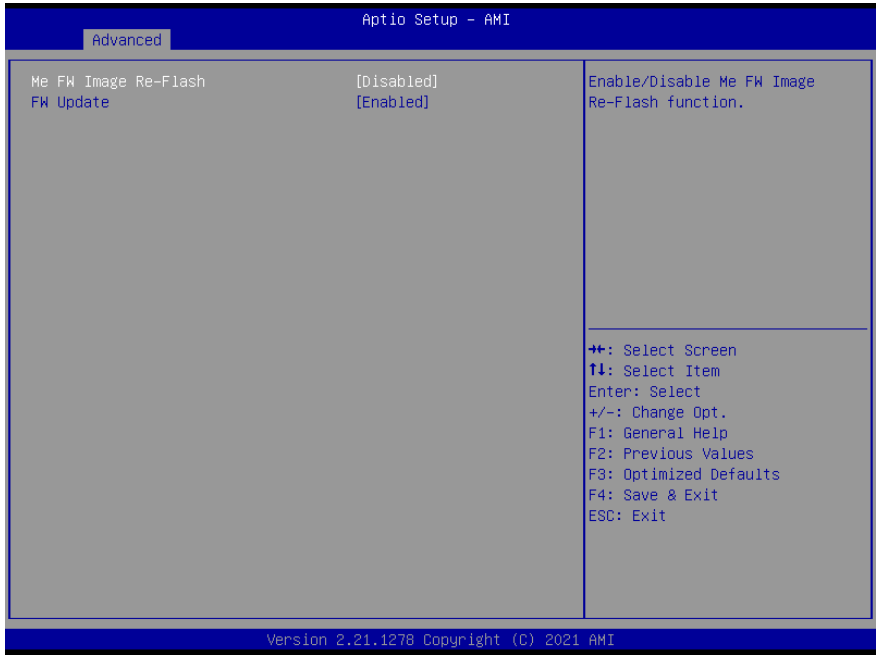


Options Summary		
Active Processor Cores	All	Optimal Default, Failsafe Default
	1~N	
Number of cores to enable in each processor package.		
Intel (VMX) Virtualization Technology	Disabled	
	Enabled	Optimal Default, Failsafe Default
When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.		
Intel® SpeedStep™	Disabled	
	Enabled	Optimal Default, Failsafe Default
Allows more than two frequency ranges to be supported.		

3.4.2 PCH-FW Configuration

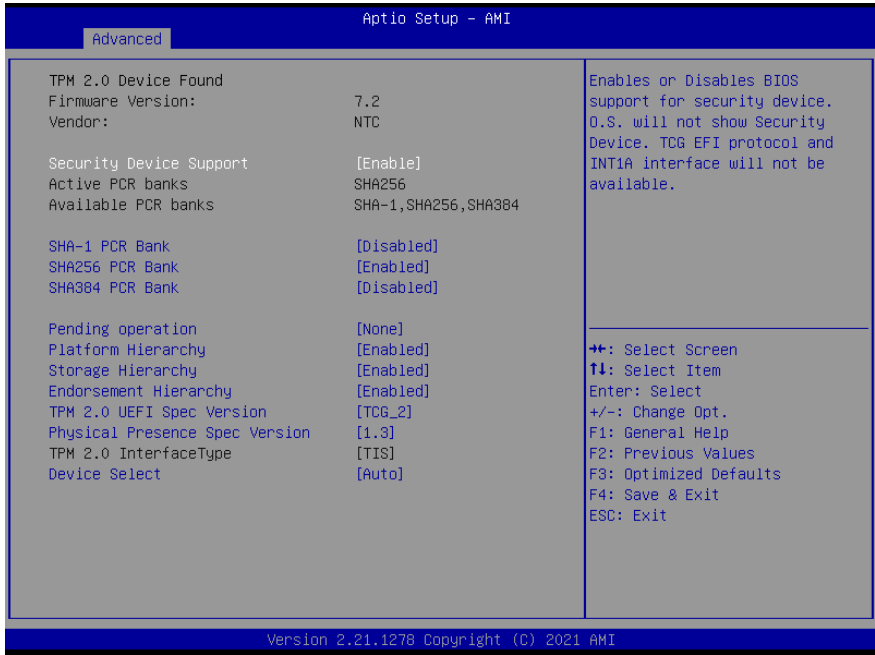


3.4.2.1 Firmware Update Configuration



Options Summary		
Me FW Image Re-Flash	Enabled	
	Disabled	Optimal Default, Failsafe Default
Enable/Disable Me FW Image Re-Flash function.		
FW Update	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enable/Disable ME FW Update function.		

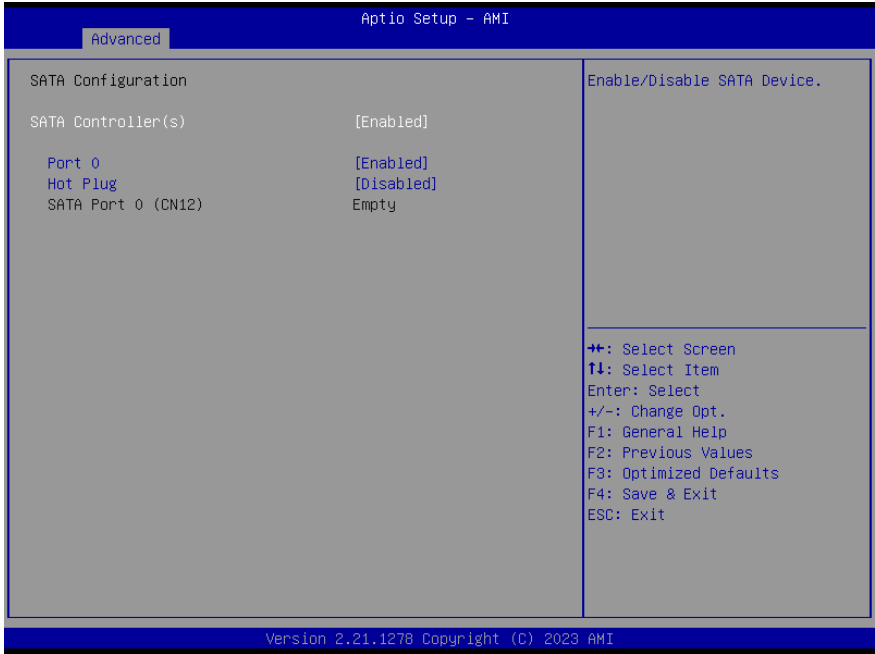
3.4.3 Trusted Computing



Options Summary		
Security Device Support	Enable	Optimal Default, Failsafe Default
	Disable	
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.		
SHA-1 PCR Bank	Disabled	Optimal Default, Failsafe Default
	Enabled	
Enable or Disable SHA-1 PCR Bank.		
SHA256 PCR Bank	Enabled	Optimal Default, Failsafe Default
	Disabled	
Enable or Disable SHA256 PCR Bank.		
SHA384 PCR Bank	Enabled	Optimal Default, Failsafe Default
	Disabled	
Enable or Disable SHA384 PCR Bank.		
SM3_256 PCR Bank	Enabled	Optimal Default, Failsafe Default
	Disabled	

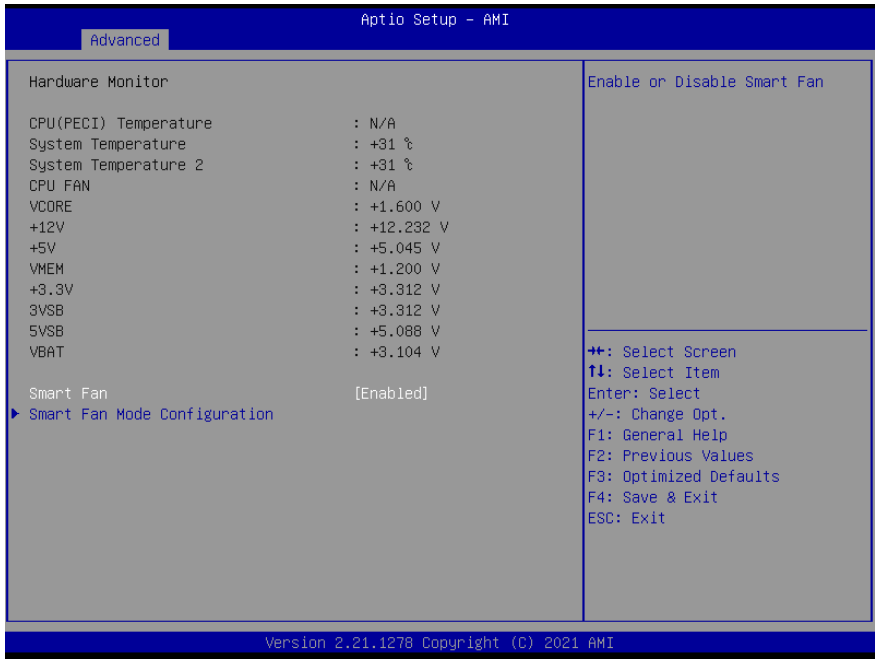
Options Summary		
Enable or Disable SM3_256 PCR Bank.		
Pending operation	None	Optimal Default, Failsafe Default
	TPM Clear	
Schedule an Operation for the Security Device. NOTE: Your Computer will reboot during restart in order to change State of Security Device.		
Platform Hierarchy	Enabled	Optimal Default, Failsafe Default
	Disabled	
Enable or Disable Platform Hierarchy.		
Storage Hierarchy	Enabled	Optimal Default, Failsafe Default
	Disabled	
Enable or Disable Storage Hierarchy.		
Endorsement Hierarchy	Enabled	Optimal Default, Failsafe Default
	Disabled	
Enable or Disable Endorsement Hierarchy		
TPM 2.0 UEFI Spec Version	TCG_2	Optimal Default, Failsafe Default
	TCG_1_2	
Select the TCH2 Spec Version Support. TCG_1_2: The Compatible mode for Win8/Win10. TCG_2: Support new TCG2 protocol and event format for Win10 or later.		
Physical Presence Spec Version	1.3	Optimal Default, Failsafe Default
	1.2	
Select to Tell O.S. to support PPI Spec Version 1.2 or 1.3. Note some HCK tests might not support 1.3.		
Device Select	Auto	Optimal Default, Failsafe Default
	TPM 1.2	
	TPM 2.0	
TPM 1.2 will restrict support to TPM 1.2 devices. TPM 2.0 will restrict support to TPM 2.0 devices. Auto will support both with the default set to TPM 2.0 devices if not found. TPM 1.2 devices will be enumerated.		

3.4.4 SATA Configuration



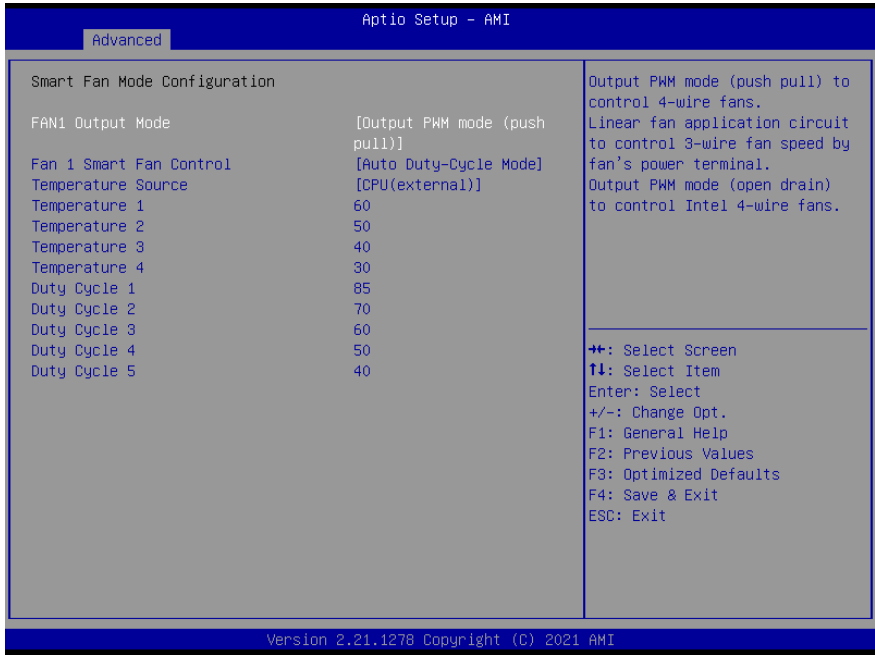
Options Summary		
SATA Controller(s)	Enabled	Optimal Default, Failsafe Default
	Disabled	
Enable/Disable SATA Device.		
Port*	Enabled	Optimal Default, Failsafe Default
	Disabled	
Enable or Disable SATA Port.		

3.4.5 Hardware Monitor



Options Summary		
Smart Fan	Disable	
	Enable	Optimal Default, Failsafe Default
Enables or Disables Smart Fan.		

3.4.5.1 Smart Fan Mode Configuration



Options Summary		
FAN1 Output Mode	Output PWM mode (open drain)	
	Linear Fan Application	
	Output PWM mode (push pull)	Optimal Default, Failsafe Default
Fan 1 Smart Fan Control	Manual Duty Mode	
	Auto Duty-Cycle Mode	Optimal Default, Failsafe Default
Smart Fan Mode Select.		
Temperature Source	CPU(PECI) Temperature	
	System Temperature	Optimal Default, Failsafe Default
	System Temperature 2	
Select the monitored temperature source for this fan.		
Temperature 1	60	
Duty Cycle 1	85	

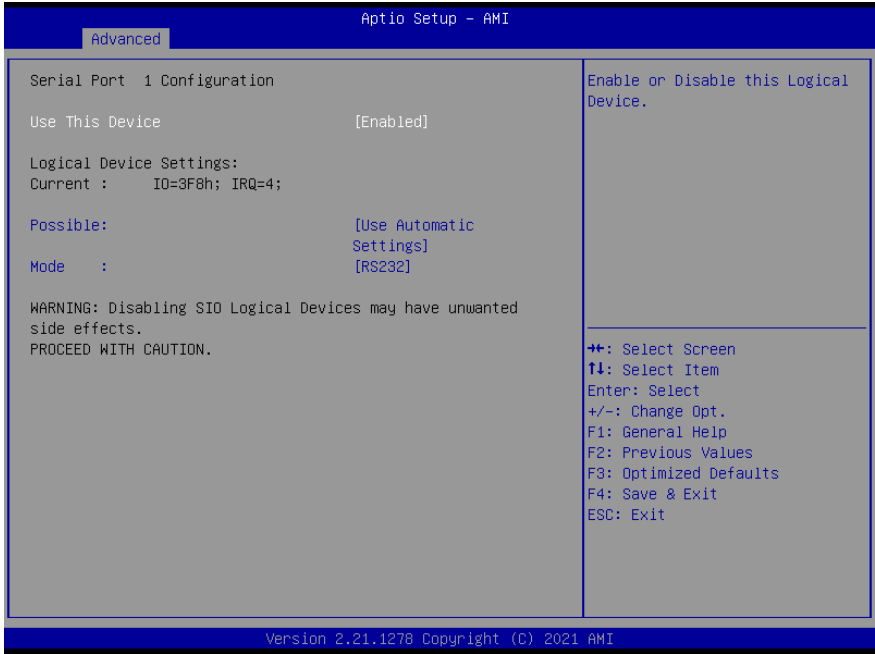
Options Summary

Auto fan speed control. Fan speed will follow different temperature by different duty cycle 1-100.

3.4.6 SIO Configuration

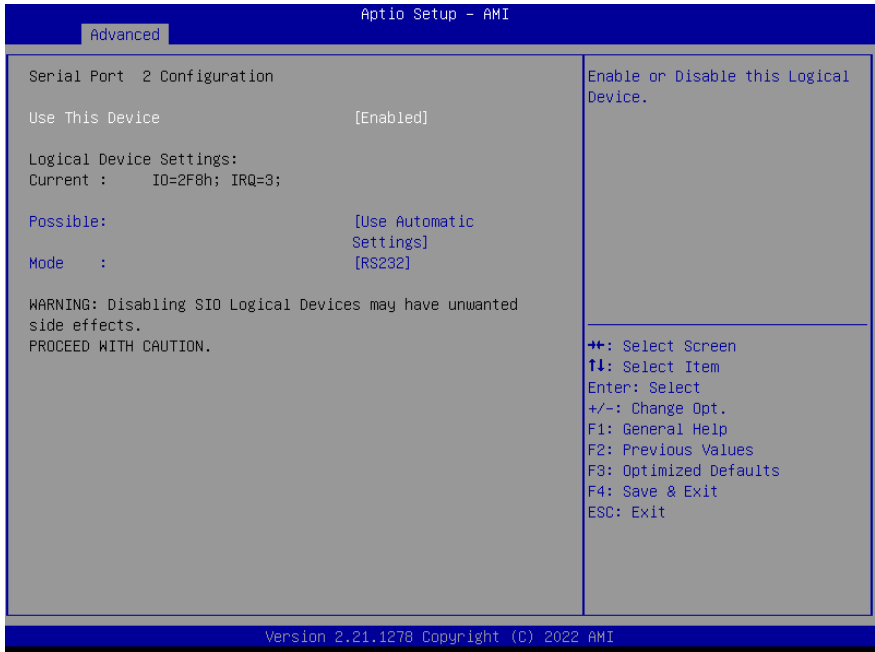


3.4.6.1 Serial Port 1 Configuration



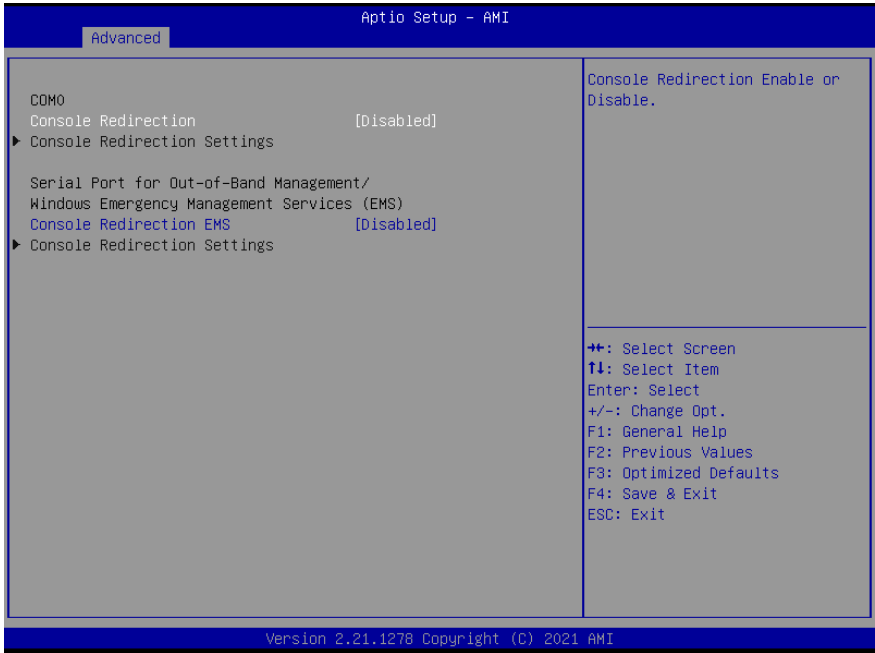
Options Summary		
Use This Device	Disable	
	Enable	Optimal Default, Failsafe Default
Enable or Disable this Logical Device.		
Possible:	Use Automatic Settings	Optimal Default, Failsafe Default
	IO=3F8h; IRQ=4	
	IO=2F8h; IRQ=3	
Allows user to change Device's Resource settings. New settings will be reflected on This Setup Page after System restarts.		
Mode:	RS232	Optimal Default, Failsafe Default
	RS422	
	RS485	
UART RS232, 422, 485 selection.		

3.4.6.2 Serial Port 2 Configuration



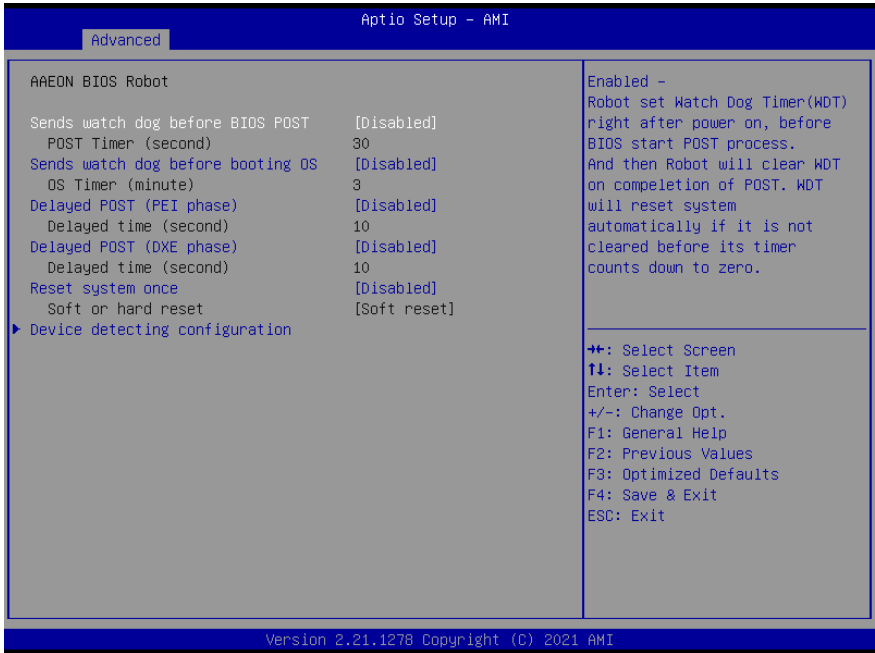
Options Summary		
Use This Device	Disable	
	Enable	Optimal Default, Failsafe Default
Enable or Disable this Logical Device.		
Possible:	Use Automatic Settings	Optimal Default, Failsafe Default
	IO=2F8h; IRQ=3	
	IO=3F8h; IRQ=4	
Allows user to change Device's Resource settings. New settings will be reflected on This Setup Page after System restarts.		
Mode:	RS232	Optimal Default, Failsafe Default
UART RS232 selection.		

3.4.7 Serial Port Console Redirection



Options Summary		
Console Redirection	Disabled	Optimal Default, Failsafe Default
	Enabled	
Console Redirection Enable or Disable.		
Console Redirection EMS	Disabled	Optimal Default, Failsafe Default
	Enabled	
Console Redirection Enable or Disable.		

3.4.8 AAEON BIOS Robot



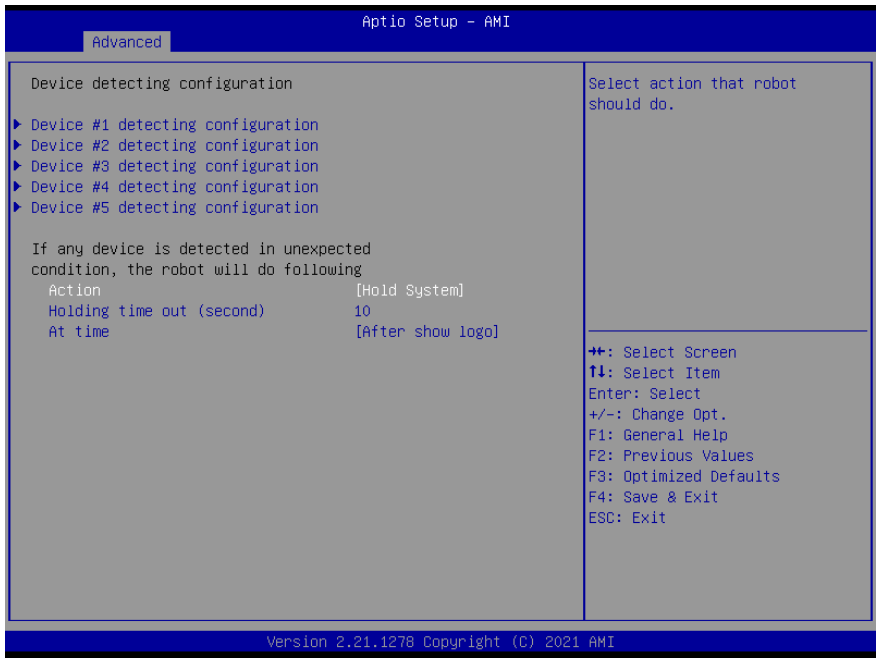
Options Summary		
Sends watch dog before BIOS POST	Disabled	Optimal Default, Failsafe Default
	Enabled	
Enabled - Robot set Watch Dog Timer (WDT) right after power on, before BIOS start POST process. And then Robot will clear WDT on completion of POST. WDT will reset system automatically if it is not cleared before its timer counts down to zero.		
POST Timer (second)	30	Optimal Default, Failsafe Default
Timer count set to Watch Dog Timer for POST. WARNING: Do not set to a value equal or shorter than normal POST time, otherwise system may never complete POST unless clearing BIOS settings. More than 2x normal POST time is suggested.		
Sends watch dog before booting OS	Disabled	Optimal Default, Failsafe Default
	Enabled	
Enabled - Robot set Watch Dog Timer (WDT) after POST completion, before BIOS transfer control to OS. WARNING: Before enabling this function, a program in OS must be responsible for clearing WDT. Also, this function should be disabled if OS is going to update itself.		

Options Summary		
OS Timer (minute)	3	Optimal Default, Failsafe Default
Timer count set to Watch Dog Timer for OS loading.		
Delayed POST (PEI phase)	Disabled	Optimal Default, Failsafe Default
	Enabled	
Enabled - Robot holds BIOS from starting POST, right after power on. This allows BIOS POST to start with stable power or start after system is physically warmed-up. Note: Robot does this before 'Sends watch dog'.		
Delayed time (second)	10	Optimal Default, Failsafe Default
Period of time for Robot to hold BIOS from POST.		
Delayed POST (DXE phase)	Disabled	Optimal Default, Failsafe Default
	Enabled	
Enabled - Robot holds BIOS before POST completion. This allows BIOS POST to start with stable power or start after system is physically warmed-up. Note: Robot does this after 'Sends watch dog before BIOS POST'.		
Delayed time (second)	10	Optimal Default, Failsafe Default
Period of time for Robot to hold BIOS from POST.		
Reset system once	Disabled	Optimal Default, Failsafe Default
	Enabled	
Enabled - Robot resets system for one time on each boot. This will send a soft or hard reset to onboard devices, thus puts devices to more stable state.		
Soft or hard reset	Soft reset	Optimal Default, Failsafe Default
	Hard reset"	
Select reset type robot should send on each boot.		

3.4.9 Device Detecting Configuration

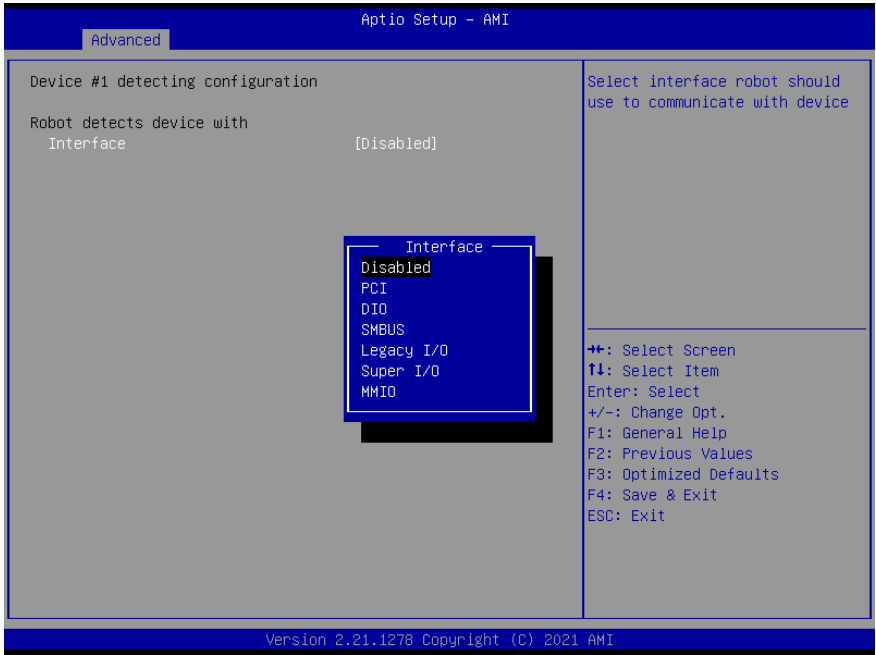


Options Summary		
Action	Reset System	Optimal Default, Failsafe Default
	Hold System	
Select action that robot should do.		
Soft or hard reset	Soft	Optimal Default, Failsafe Default
	Hard	
Select reset type robot should send on each boot.		
Retry-Count	3	Optimal Default, Failsafe Default
Fill retry counter here. Robot will reset system at most counter times, and then let system continue its POST.		
At time	After show logo	Optimal Default, Failsafe Default
	Before show logo	
Select robot action time: After show logo -Robot will do action after logo is displayed. System devices are almost ready. Before show logo - Robot will do action before logo, but some devices may not be ready.		

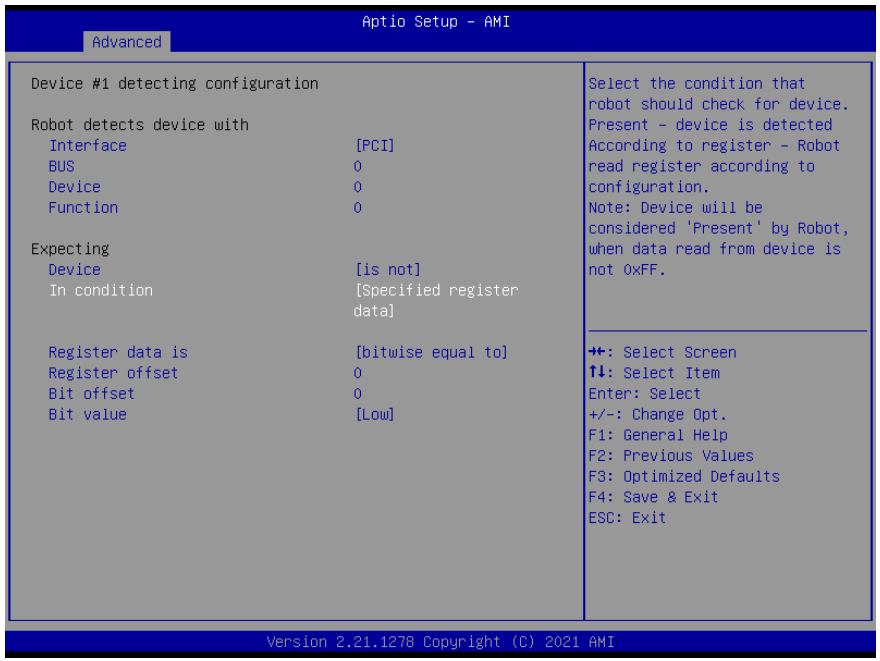


Options Summary		
Action	Reset System	Optimal Default, Failsafe Default
	Hold System	
Select action that robot should do.		
Holding time out (second)	10	Optimal Default, Failsafe Default
Fill hold time out here. Robot will hold system no longer then time-out value, and then let system continue its POST.		
At time	After show logo	Optimal Default, Failsafe Default
	Before show logo	
Select robot action time: After show logo - Robot will do action after logo is displayed. System devices are almost ready.		
Before show logo - Robot will do action before logo, but some devices may not be ready.		

3.4.9.1 Device #* Detecting Configuration

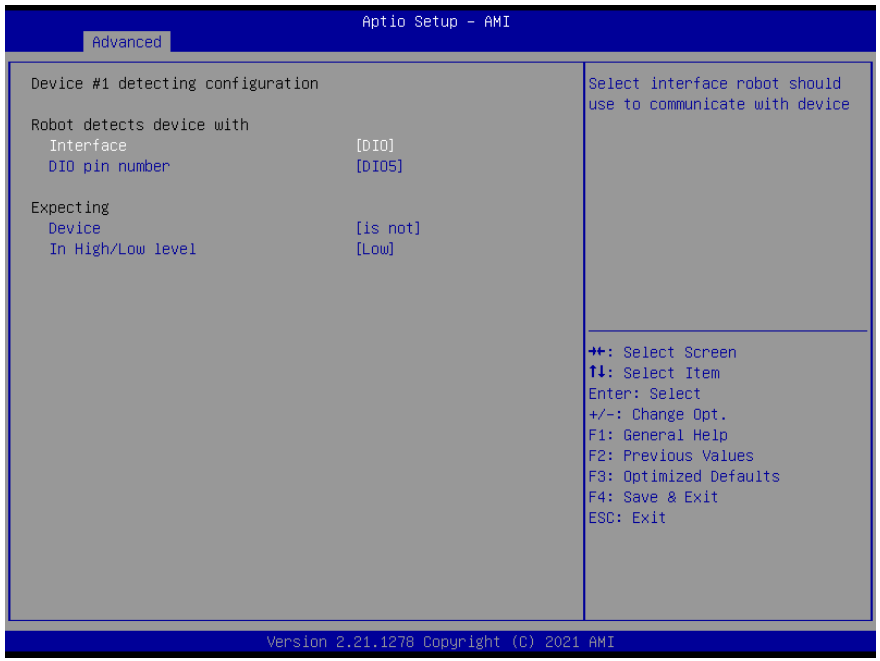


Options Summary		
Interface	Disabled	Optimal Default, Failsafe Default
	PCI	
	DIO	
	SMBUS	
	Legacy I/O	
	Super I/O	
	MMIO	
Select interface robot should use to communicate with device.		

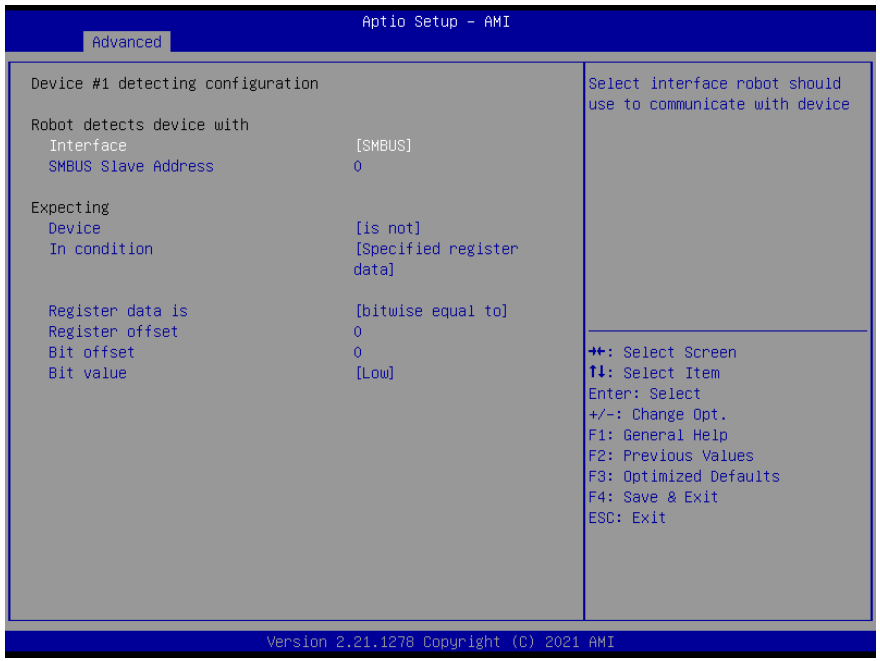


Options Summary: "PCI"		
BUS	0	Optimal Default, Failsafe Default
Fill BUS number to a PCI device, in hexadecimal. Range: 0 – FF.		
Device	0	Optimal Default, Failsafe Default
Fill DEVICE number to a PCI device, in hexadecimal. Range: 0 – FF.		
Function	0	Optimal Default, Failsafe Default
Fill FUNCTION number to a PCI device, in hexadecimal. Range: 0 – FF.		
Device	is	
	Is not	Optimal Default, Failsafe Default
Select that robot should or should not do action if condition met.		
In condition	Present	Optimal Default, Failsafe Default
	Specified register data	
Select the condition that robot should check for device.		
Present - device is detected.		
According to register - Robot read register according to configuration.		
Note: Device will be considered 'Present' by Robot, when data read from device is not 0xFF.		

Options Summary: "PCI"		
Register data is	bitwise equal to	Optimal Default, Failsafe Default
	byte-wise equal to	
	byte-wise lesser than	
	byte-wise larger than	
Select how robot should compare data read from register, to a value configured below.		
Register offset	0	Optimal Default, Failsafe Default
Fill register offset (or index) for robot to read, in hexadecimal. Range: 0 – FF.		
Bit offset	0	Optimal Default, Failsafe Default
Fill bit offset for register, for robot to compare with bit value.		
Bit value	Low	Optimal Default, Failsafe Default
	High	
Fill bit value for robot to compare register-bit with specified offset.		
Byte value	0	Optimal Default, Failsafe Default
Fill a byte value for robot to compare register data with, in hexadecimal. Range: 0 – FF.		



Options Summary: "DIO"		
Device	is	
	Is not	Optimal Default, Failsafe Default
Select that robot should or should not do action if condition met.		
DIO pin	DIO1	Optimal Default, Failsafe Default
	DIO*	
Fill DIO pin number. 0 - DIO01 - DIO1\n... and so on. For COM express product: \0-3 - GPIO-3\n4-7 - GPO0-3.		
Device	is	
	Is not	Optimal Default, Failsafe Default
Select that robot should or should not do action if condition met.		
In High/Low level	Low	Optimal Default, Failsafe Default
	High	
Select High/Low level of the DIO pin that robot should do action.		



Options Summary: "SMBUS"		
SMBUS Slave Address	0	Optimal Default, Failsafe Default
Fill slave address to a SMBUS device, in hexadecimal. Range: 0 – FF.		
Device	is	
	Is not	Optimal Default, Failsafe Default
Select that robot should or should not do action if condition met.		
In condition	Present	Optimal Default, Failsafe Default
	Specified register data	
Select the condition that robot should check for device. Present - device is detected. According to register - Robot read register according to configuration. Note: Device will be considered 'Present' by Robot, when data read from device is not 0xFF.		
Register data is	bitwise equal to	Optimal Default, Failsafe Default
	bytewise equal to	
	bytewise lesser than	
	bytewise larger than	
Select how robot should compare data read from register, to a value configured below.		
Register offset	0	Optimal Default, Failsafe Default
Fill register offset (or index) for robot to read, in hexadecimal.\nRange: 0 – FF.		

Options Summary: "SMBUS"		
Bit offset	0	Optimal Default, Failsafe Default
Fill bit offset for register, for robot to compare with bit value.		
Bit value	Low	Optimal Default, Failsafe Default
	High	
Fill bit value for robot to compare register-bit with specified offset.		
Byte value	0	Optimal Default, Failsafe Default
Fill a byte value for robot to compare register data with, in hexadecimal. Range: 0 – FF.		

Aptio Setup - AMI

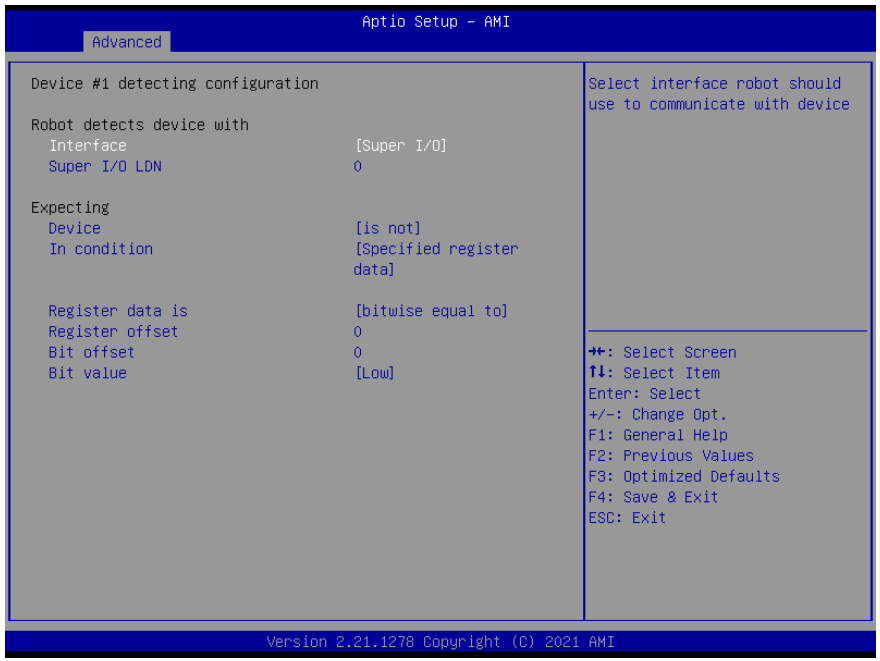
Advanced

<p>Device #1 detecting configuration</p> <p>Robot detects device with</p> <p> Interface [Legacy I/O]</p> <p> I/O Address 0</p> <p>Expecting</p> <p> Device [is not]</p> <p> In condition [Specified register data]</p> <p>Register data is [bitwise equal to]</p> <p> Bit offset 0</p> <p> Bit value [Low]</p>	<p>Select interface robot should use to communicate with device</p> <hr/> <p> ++: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit </p>
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Options Summary: "Legacy I/O"		
I/O Address	0	Optimal Default, Failsafe Default
Fill I/O address device is responding to. Range: 0~FFFF.		
Device	is	
	Is not	Optimal Default, Failsafe Default
Select that robot should or should not do action if condition met.		
In condition	Present	Optimal Default, Failsafe Default
	Specified register data	

Options Summary: "Legacy I/O"		
Select the condition that robot should check for device.		
Present - device is detected.		
According to register - Robot read register according to configuration. Note: Device will be considered 'Present' by Robot, when data read from device is not 0xFF.		
Register data is	bitwise equal to	Optimal Default, Failsafe Default
	byte-wise equal to	
	byte-wise lesser than	
	byte-wise larger than	
Select how robot should compare data read from register, to a value configured below.		
Bit offset	0	Optimal Default, Failsafe Default
Fill bit offset for register, for robot to compare with bit value.		
Bit value	Low	Optimal Default, Failsafe Default
	High	
Fill bit value for robot to compare register-bit with specified offset.		
Byte value	0	Optimal Default, Failsafe Default
Fill a byte value for robot to compare register data with, in hexadecimal. Range: 0 – FF.		



Options Summary: "Super I/O"		
Super I/O LDN	0	Optimal Default, Failsafe Default
Fill LDN number to a Super I/O device. Range: 0~FF.		
Device	is	
	Is not	Optimal Default, Failsafe Default
Select that robot should or should not do action if condition met.		
In condition	Present	Optimal Default, Failsafe Default
	Specified register data	
Select the condition that robot should check for device. Present - device is detected. According to register - Robot read register according to configuration. Note: Device will be considered 'Present' by Robot, when data read from device is not 0xFF.		
Register data is	bitwise equal to	Optimal Default, Failsafe Default
	byte-wise equal to	
	byte-wise lesser than	
	byte-wise larger than	
Select how robot should compare data read from register, to a value configured below.		
Register offset	0	Optimal Default, Failsafe Default
Fill register offset (or index) for robot to read, in hexadecimal. Range: 0 – FF.		

Options Summary: "Super I/O"		
Bit offset	0	Optimal Default, Failsafe Default
Fill bit offset for register, for robot to compare with bit value.		
Bit value	Low	Optimal Default, Failsafe Default
	High	
Fill bit value for robot to compare register-bit with specified offset.		
Byte value	0	Optimal Default, Failsafe Default
Fill a byte value for robot to compare register data with, in hexadecimal. Range: 0 – FF.		

Aptio Setup - AMI

Advanced

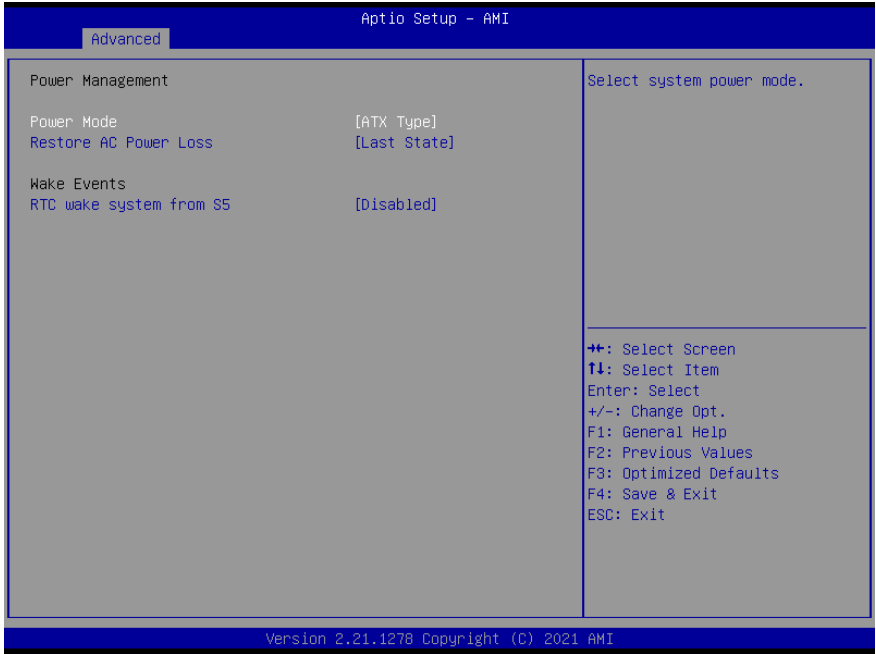
<p>Device #1 detecting configuration</p> <p>Robot detects device with</p> <p style="margin-left: 20px;">Interface [MMIO]</p> <p style="margin-left: 20px;">MMIO Address 0</p> <p>Expecting</p> <p style="margin-left: 20px;">Device [is not]</p> <p style="margin-left: 20px;">In condition [Specified register data]</p> <p style="margin-left: 20px;">Register data is [bitwise equal to]</p> <p style="margin-left: 20px;">Bit offset 0</p> <p style="margin-left: 20px;">Bit value [Low]</p>	<p>Select interface robot should use to communicate with device</p> <hr/> <p> ++: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit </p>
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Options Summary: "MMIO"		
MMIO Address	0	Optimal Default, Failsafe Default
Fill Memory Mapped I/O address device is responding to. Range: 0~FFFFFFFF.		
Device	is	
	Is not	Optimal Default, Failsafe Default
Select that robot should or should not do action if condition met.		
In condition	Present	Optimal Default, Failsafe Default
	Specified register data	

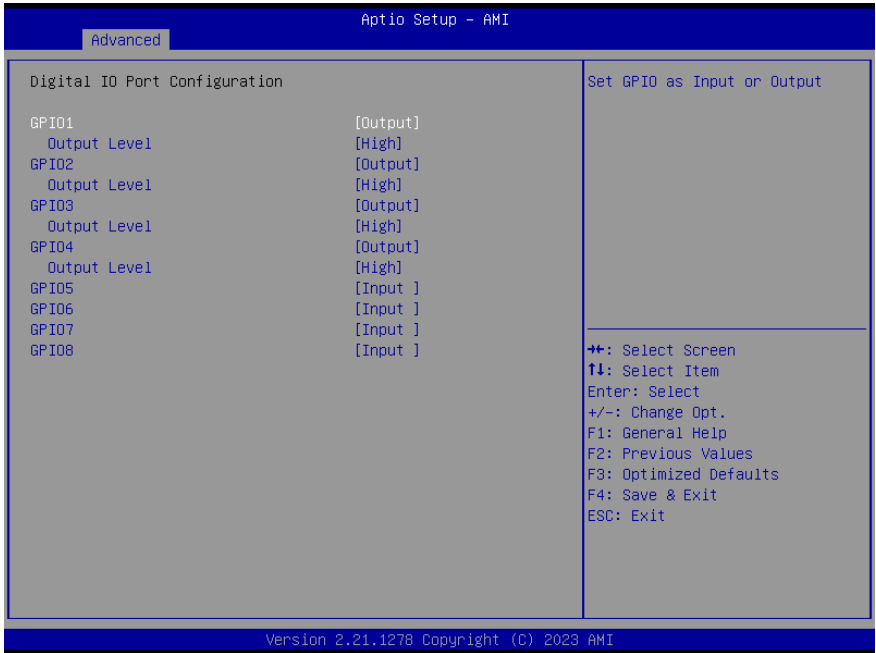
Options Summary: "MMIO"		
Select the condition that robot should check for device.		
Present - device is detected.		
According to register - Robot read register according to configuration. Note: Device will be considered 'Present' by Robot, when data read from device is not 0xFF.		
Register data is	bitwise equal to	Optimal Default, Failsafe Default
	bitwise equal to	
	bitwise lesser than	
	bitwise larger than	
Select how robot should compare data read from register, to a value configured below.		
Bit offset	0	Optimal Default, Failsafe Default
Fill bit offset for register, for robot to compare with bit value.		
Bit value	Low	Optimal Default, Failsafe Default
	High	
Fill bit value for robot to compare register-bit with specified offset.		
Byte value	0	Optimal Default, Failsafe Default
Fill a byte value for robot to compare register data with, in hexadecimal. Range: 0 – FF.		

3.4.10 Power Management



Options Summary:		
Power Mode	ATX Type	Optimal Default, Failsafe Default
	AT Type	
Select power supply mode.		
Restore AC Power Loss	Last State	Optimal Default, Failsafe Default
	Always On	
	Always Off	
Select power state when power is re-applied after a power failure.		
RTC wake system from S5	Disable	Optimal Default, Failsafe Default
	Fixed Time	
Fixed Time: System will wake on the hr::min::sec specified./n Dynamic Time: System will wake on the current time + Increase minute(s).		

3.4.11 Digital IO Port Configuration

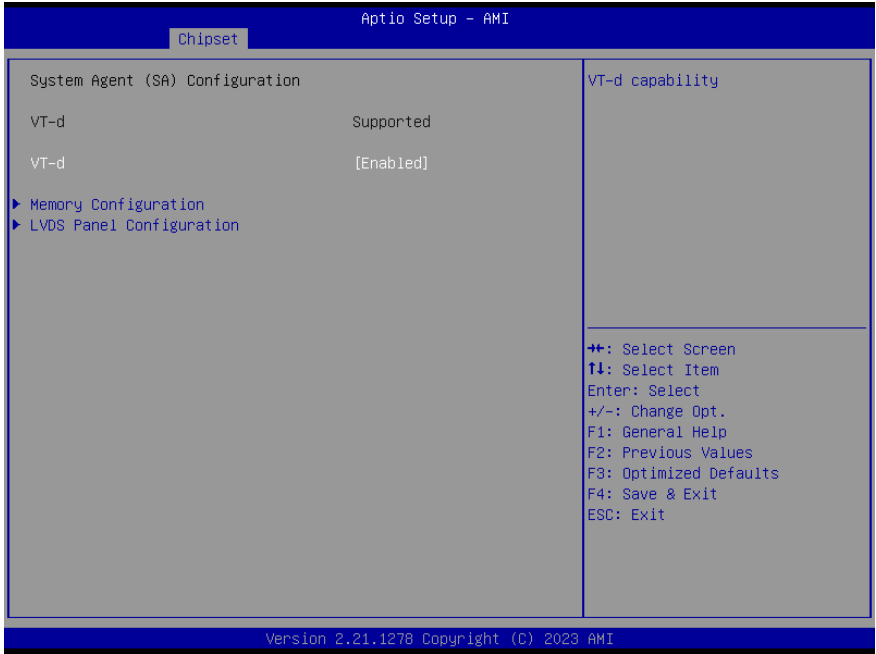


Options Summary:		
GPIO Port*	Output	
	Input	
Set GPIO as Input or Output.		
Output Level	High	
	Low	
Set output level when GPIO pin is output.		

3.5 Setup Submenu: Chipset

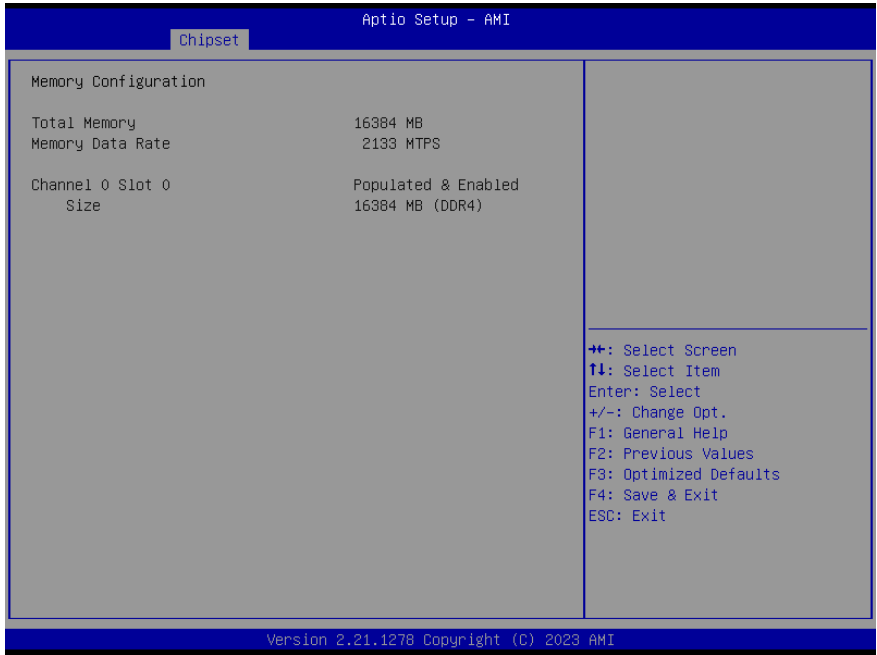


3.5.1 System Agent (SA) Configuration

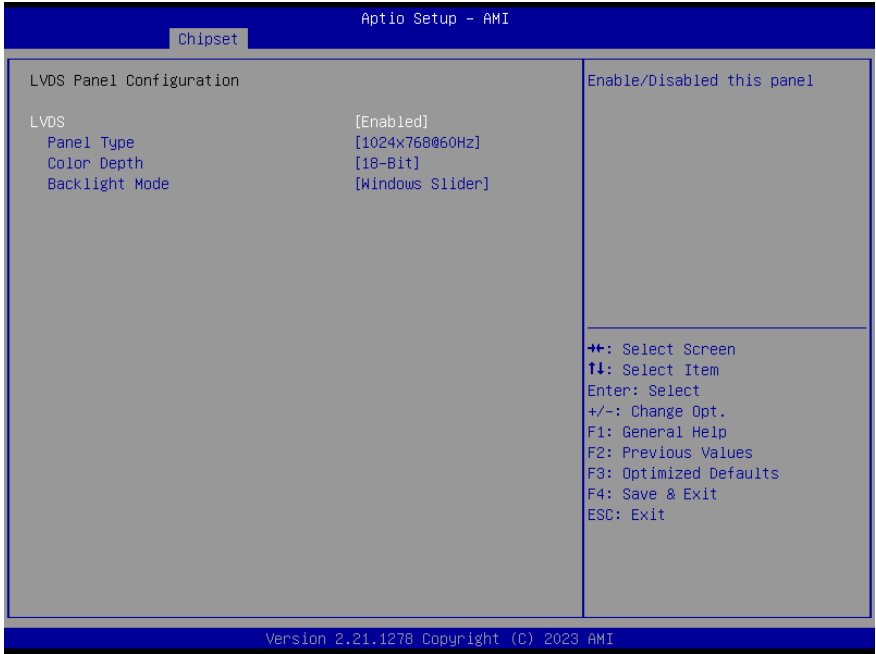


Options Summary:		
VT-d	Disabled	
	Enabled	Optimal Default, Failsafe Default
VT-d capability.		

3.5.1.1 Memory Configuration



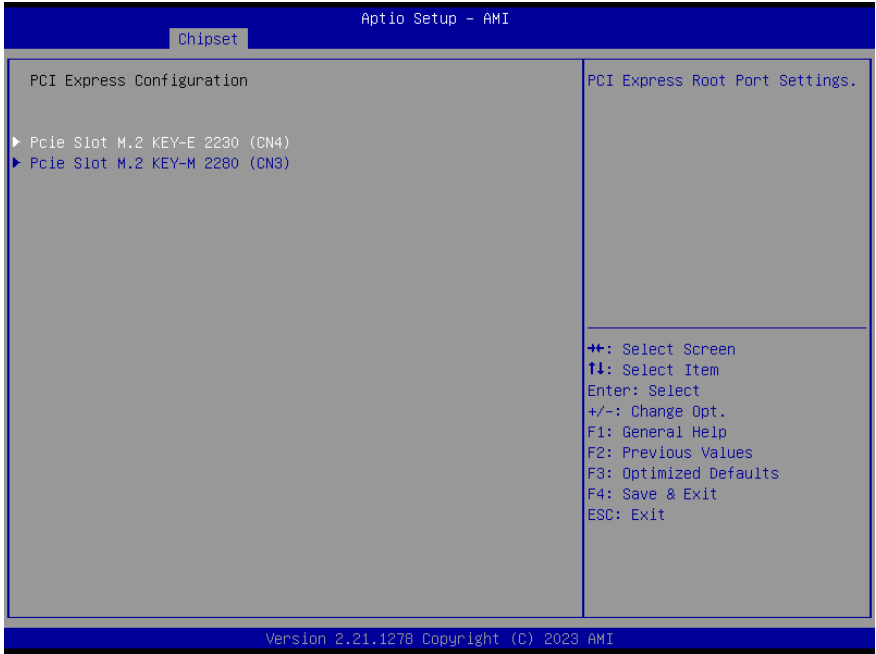
3.5.1.2 LVDS Panel Configuration



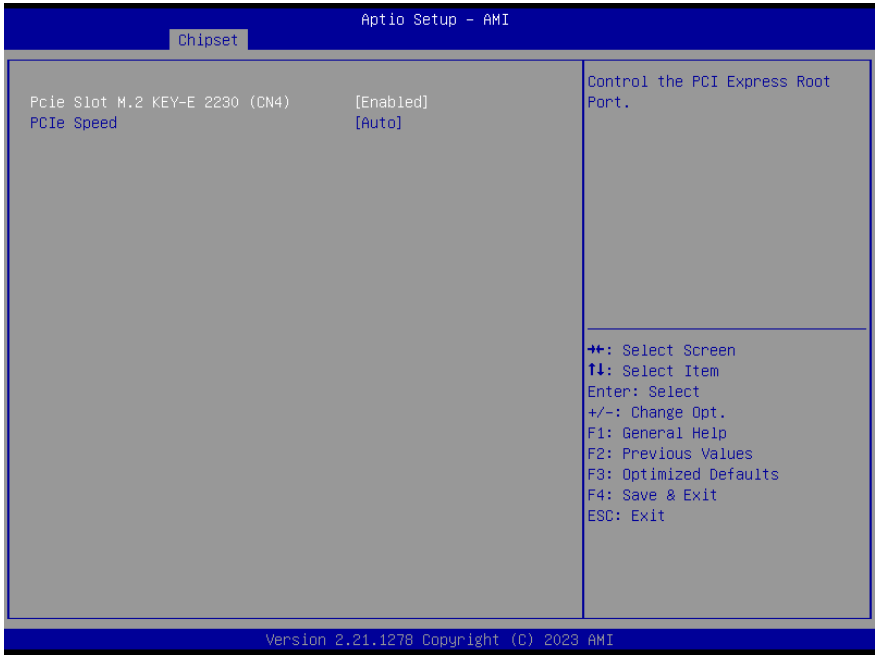
Options Summary:		
LVDS	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enabled/Disabled this panel.		
LCD Panel Type	640x480@60Hz	
	800x480@60Hz	
	800x600@60Hz	
	1024x600@60Hz	
	1024x768@60Hz	Optimal Default, Failsafe Default
	1280x768@60Hz	
	1280x800@60Hz	
	1280x1024@60Hz	
	1366x768@60Hz	
	1440x900@60Hz	
	1600x1200@60Hz	

Options Summary:		
LCD Panel Type cont.	1920x1080@60Hz	
	1920x1200@60Hz	
Select LCD panel used by internal graphics device by selecting the appropriate setup item.		
Color Depth	18-Bit	Optimal Default, Failsafe Default
	24-Bit	
	36-Bit	
	48-Bit	
Select panel type.		
Backlight Mode	BIOS & Application	
	Window Slider	Optimal Default, Failsafe Default
Select backlight control signal type.		

3.5.2 PCI Express Configuration

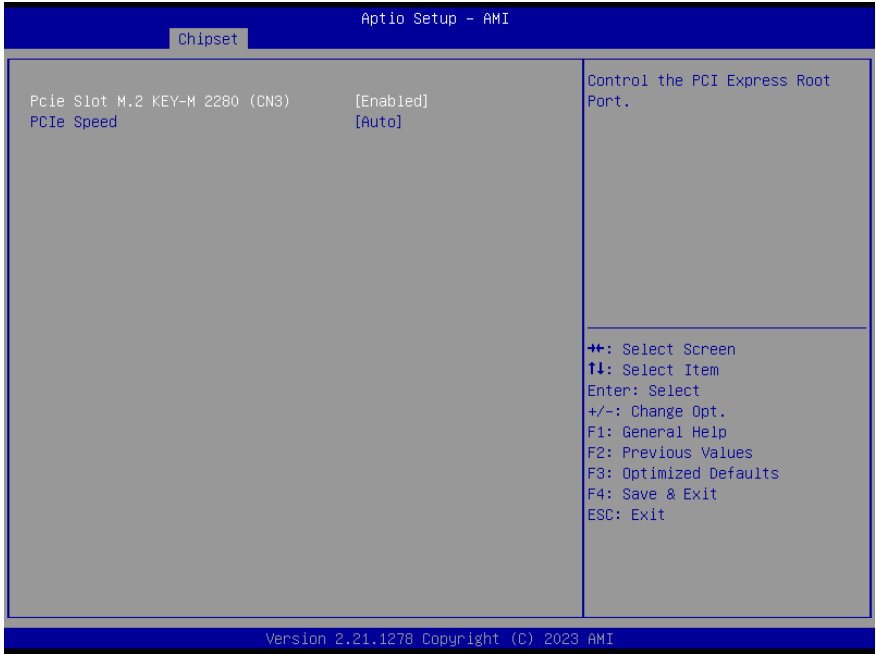


3.5.2.1 Pcie Slot M.2 KEY-E 2230 (CN4)



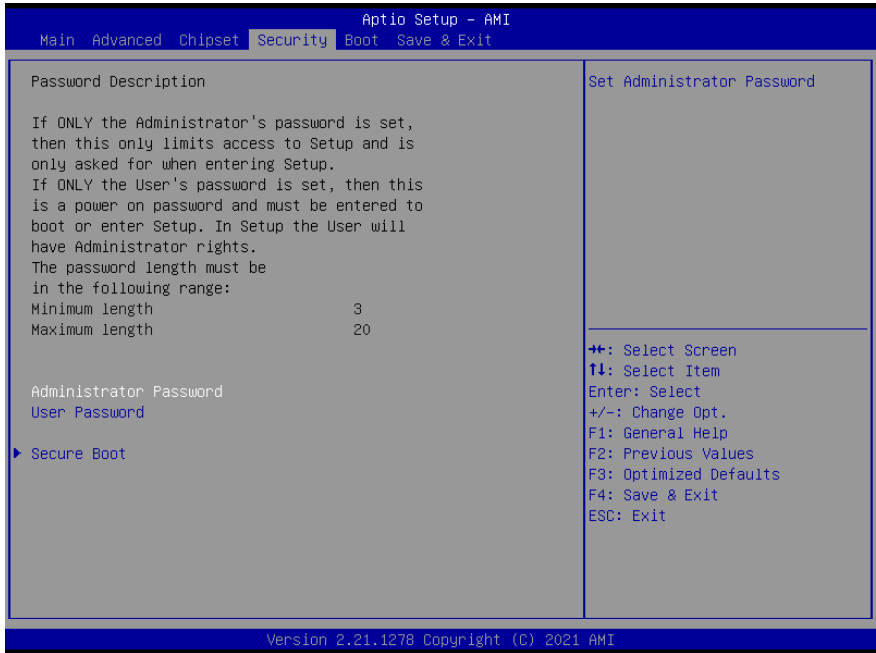
Options Summary:		
Pcie Slot M.2 KEY-E 2230 (CN4)	Disabled	
	Enabled	Optimal Default, Failsafe Default
Control the PCI Express Root Port.		
Pcie Slot M.2 KEY-E 2230 (CN4)	Auto	Optimal Default, Failsafe Default
	Gen1	
	Gen2	
	Gen3	
Configure PCIe Speed.		

3.5.2.2 Pcie Slot M.2 KEY-E 2280 (CN3)



Options Summary:		
Pcie Slot M.2 KEY-E 2280 (CN3)	Disabled	
	Enabled	Optimal Default, Failsafe Default
Control the PCI Express Root Port.		
Pcie Slot M.2 KEY-E 2280 (CN3)	Auto	Optimal Default, Failsafe Default
	Gen1	
	Gen2	
	Gen3	
Configure PCIe Speed.		

3.6 Setup Submenu: Security



Change User/Administrator Password

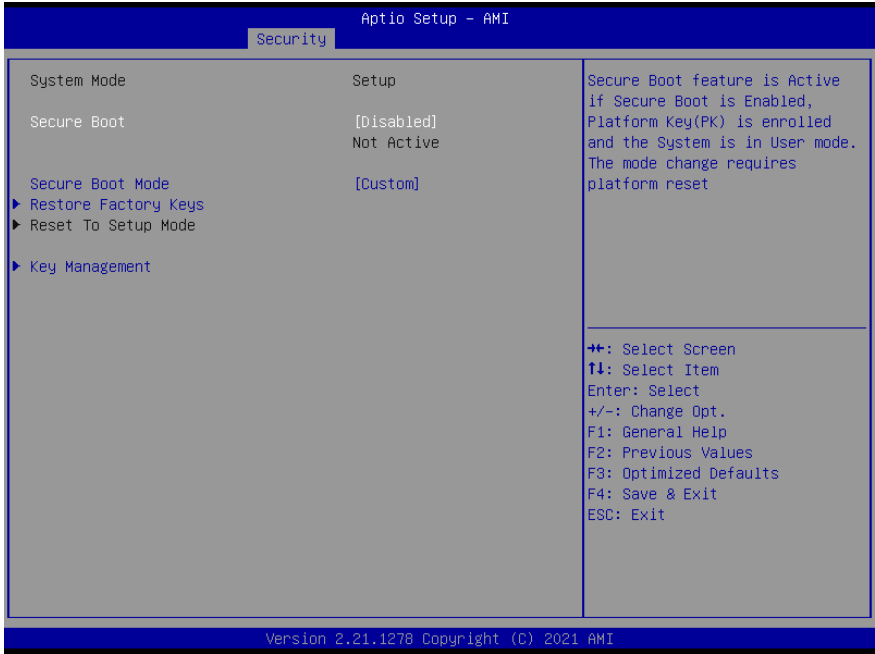
You can set an Administrator Password or User Password. An Administrator Password must be set before you can set a User Password. The password will be required during boot up, or when the user enters the Setup utility. A User Password does not provide access to many of the features in the Setup utility.

Select the password you wish to set, and press Enter. In the dialog box, enter your password (must be between 3 and 20 letters or numbers). Press Enter and retype your password to confirm. Press Enter again to set the password.

Removing the Password

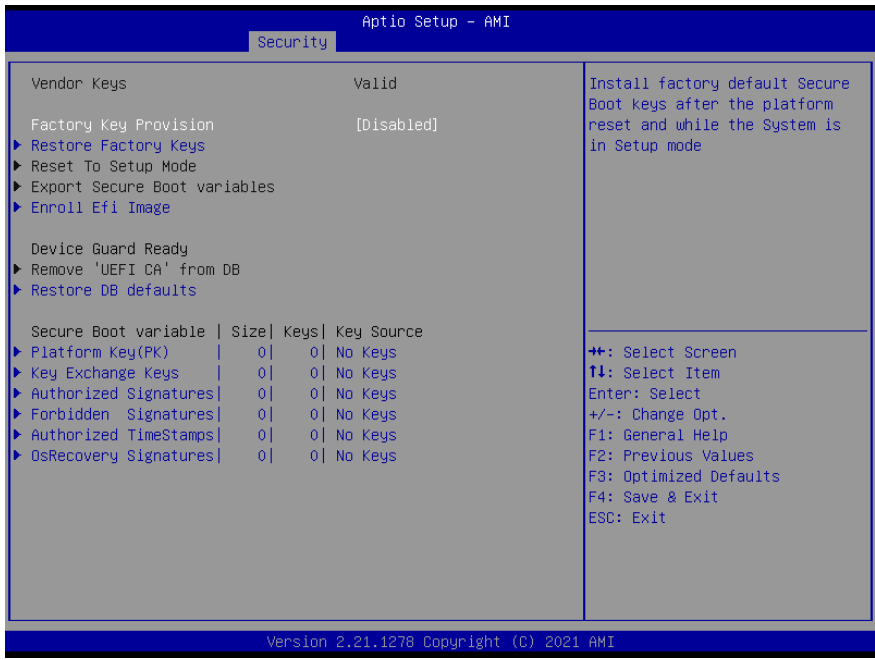
Select the password you want to remove and enter the current password. At the next dialog box press Enter to disable password protection.

3.6.1 Secure Boot



Options Summary		
Secure Boot	Disabled	Optimal Default, Failsafe Default
	Enabled	
Secure Boot feature is Active if Secure Boot is Enabled, Platform Key (PK) is enrolled and the System is in User mode. The mode change requires platform reset.		
Secure Boot Mode	Custom	Optimal Default, Failsafe Default
	Standard	
Secure Boot mode options: Standard or Custom. In Custom mode, Secure Boot Policy variables can be configured by a physically present user without full authentication.		
Restore Factory Keys		
Force System to User Mode. Install factory default Secure Boot key databases.		
Reset to Setup Mode		
Delete all Secure Boot key databases from NVRAM.		

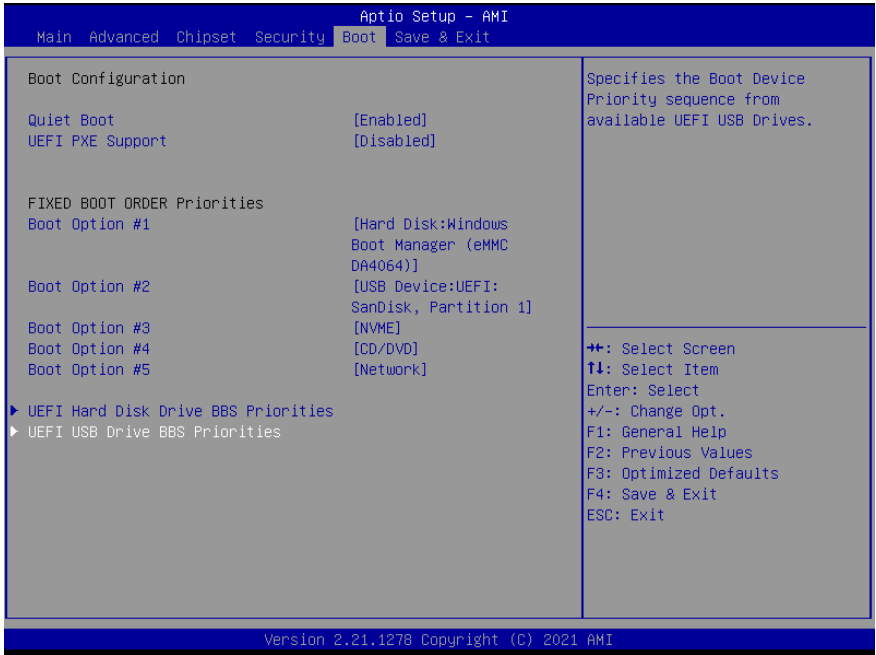
3.6.1.1 Key Management



Options Summary:		
Factory Key Provision	Disabled	Optimal Default, Failsafe Default
	Enabled	
Secure Boot feature is Active if Secure Boot is Enabled, Platform Key (PK) is enrolled and the System is in User mode.		
The mode change requires platform reset.		
Restore Factory Keys		
Force System to User Mode. Install factory default Secure Boot key databases.		
Reset to Setup Mode		
Delete all Secure Boot key databases from NVRAM.		
Export Secure Boot variables		
Copy NVRAM content of Secure Boot variables to files in a root folder on a file system device.		
Enroll Efi Image		
Allow the image to run in Secure Boot mode.		
Enroll SHA256 Hash certificate of a PE image into Authorized Signature Database (db).		

Options Summary:	
Remove 'UEFI CA' from DB	
Device Guard ready system must not list 'Microsoft UEFI CA' Certificate in Authorized Signature database (db).	
Restore DB defaults	
Restore DB variable to factory defaults.	
Platform Key(PK)	Details
	Export
	Update
	Delete
Key Exchange Keys	Details
	Export
	Update
	Append
	Delete
Authorized Signatures	Details
	Export
	Update
	Append
	Delete
Forbidden Signatures	Details
	Export
	Update
	Append
	Delete
Authorized TimeStamps	Update
	Append
OsRecovery Signatures	Update
	Append
Enroll Factory Defaults or load certificates from a file:	
1. Public Key Certificate:	
a) EFI_SIGNATURE_LIST	
b) EFI_CERT_X509 (DER)	
c) EFI_CERT_RSA2048 (bin)	
d) EFI_CERT_SHAXXX	
2. Authenticated UEFI Variable	
3. EFI PE/COFF Image (SHA256)	
Key Source: Factory, External, Mixed.	

3.7 Setup Submenu: Boot

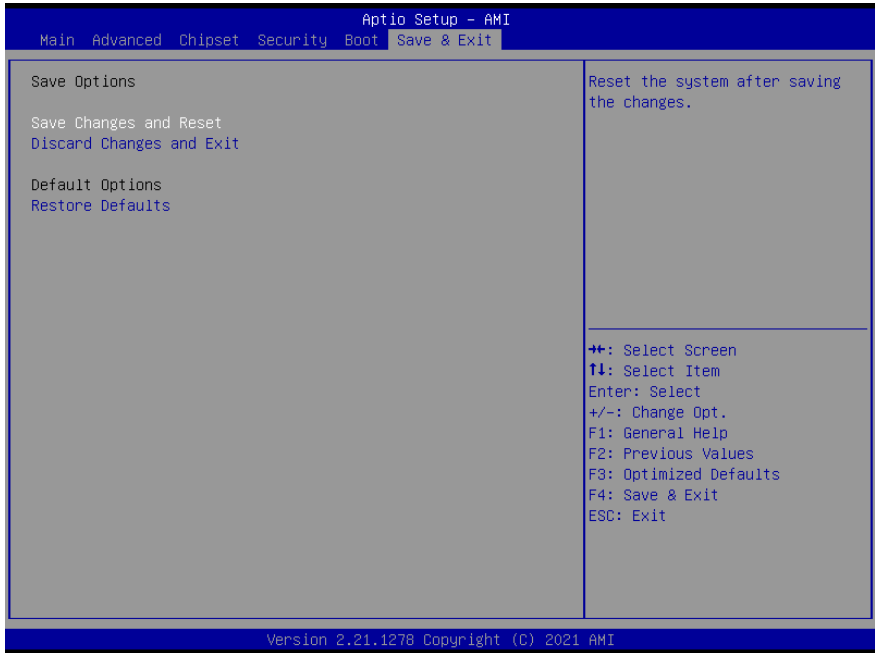


Options Summary:		
Quiet Boot	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enable or Disable Quiet Boot option.		
UEFI PXE Support	Disabled	Optimal Default, Failsafe Default
	Enabled	
Enable/Disable UEFI Network Stack.		
FIXED BOOT ORDER Priorities		
Sets the system boot order.		

3.7.1 BBS Priorities



3.8 Setup Submenu: Save & Exit



Options Summary:	
Save Changes and Reset	Reset the system after saving the changes.
Discard Changes and Exit	Exit system setup without saving any changes.
Restore Defaults	Restore/Load Default values for all the setup options.

Chapter 4

Driver Installation

4.1 Driver Download/Installation

Drivers for the GENE-EHL7 can be downloaded from the product page on the AAEON website by following this link:

<https://www.aaeon.com/en/>

Download the driver(s) you need and follow the steps below to install them.

Install Chipset Drivers

1. Open the **Intel Chipset** folder
2. Run the **SetupChipset.exe** in the folder
3. Follow the instructions
4. Drivers will be installed automatically

Install Graphics Drivers

1. Open the **Intel Graphics** folder
2. Run the **igxpin.exe** file in the folder
3. Follow the instructions
4. Drivers will be installed automatically

Install LAN Driver

1. Open the **Intel LAN** folder
2. Run the **PROWinx64.exe** file in the folder
3. Follow the instructions
4. Drivers will be installed automatically

Install Audio Driver

1. Open the **Audio** folder
2. Run the **Setup.exe** file in the folder
3. Follow the instructions
4. Drivers will be installed automatically

Install Serial IO Drivers

1. Open the **Serial IO** folder
2. Follow the instructions
3. Drivers will be installed automatically

Install ME Drivers

1. Open the **ME** folder
2. Run the **SetupME.exe** file in the folder
3. Follow the instructions
4. Drivers will be installed automatically

Install Touch Drivers

1. Open the **Touch** folder
2. Run the **Setup.exe** file in the folder
3. Follow the instructions
4. Drivers will be installed automatically

Peripheral Drivers

1. Open the **Ecilite, PSE_HECI, or PSEIO** folder.
2. Peripheral Drivers .inf files will need to be installed manually.

Appendix A

I/O Information

A.1 I/O Address Map

Address Range	Component Name
[0000000000000000 - 000000000000CF7]	PCI Express Root Complex
[000000000000020 - 000000000000021]	Programmable interrupt controller
[000000000000024 - 000000000000025]	Programmable interrupt controller
[000000000000028 - 000000000000029]	Programmable interrupt controller
[00000000000002C - 00000000000002D]	Programmable interrupt controller
[00000000000002E - 00000000000002F]	Motherboard resources
[000000000000030 - 000000000000031]	Programmable interrupt controller
[000000000000034 - 000000000000035]	Programmable interrupt controller
[000000000000038 - 000000000000039]	Programmable interrupt controller
[00000000000003C - 00000000000003D]	Programmable interrupt controller
[000000000000040 - 000000000000043]	System timer
[00000000000004E - 00000000000004F]	Motherboard resources
[000000000000050 - 000000000000053]	System timer
[000000000000060 - 000000000000060]	Standard PS/2 Keyboard
[000000000000061 - 000000000000061]	Motherboard resources
[000000000000063 - 000000000000063]	Motherboard resources
[000000000000064 - 000000000000064]	Standard PS/2 Keyboard
[000000000000065 - 000000000000065]	Motherboard resources
[000000000000067 - 000000000000067]	Motherboard resources
[000000000000070 - 000000000000077]	System CMOS/real time clock
[000000000000080 - 000000000000080]	Motherboard resources
[000000000000092 - 000000000000092]	Motherboard resources
[0000000000000A0 - 0000000000000A1]	Programmable interrupt controller
[0000000000000A4 - 0000000000000A5]	Programmable interrupt controller
[0000000000000A8 - 0000000000000A9]	Programmable interrupt controller
[0000000000000AC - 0000000000000AD]	Programmable interrupt controller
[0000000000000B0 - 0000000000000B1]	Programmable interrupt controller
[0000000000000B2 - 0000000000000B3]	Motherboard resources
[0000000000000B4 - 0000000000000B5]	Programmable interrupt controller
[0000000000000B8 - 0000000000000B9]	Programmable interrupt controller
[0000000000000BC - 0000000000000BD]	Programmable interrupt controller
[0000000000000F0 - 0000000000000F0]	Numeric data processor
[000000000000280 - 000000000000287]	Communications Port (COM11)
[000000000000288 - 00000000000028F]	Communications Port (COM12)
[0000000000002A0 - 0000000000002A7]	Communications Port (COM7)
[0000000000002A8 - 0000000000002AF]	Communications Port (COM8)
[0000000000002B0 - 0000000000002B7]	Communications Port (COM9)
[0000000000002B8 - 0000000000002BF]	Communications Port (COM10)
[0000000000002C0 - 0000000000002C7]	Communications Port (COM6)
[0000000000002D0 - 0000000000002D7]	Communications Port (COM5)
[0000000000002E8 - 0000000000002EF]	Communications Port (COM4)
[0000000000002F8 - 0000000000002FF]	Communications Port (COM2)
[0000000000003E8 - 0000000000003EF]	Communications Port (COM3)
[0000000000003F8 - 0000000000003FF]	Communications Port (COM1)
[0000000000004D0 - 0000000000004D1]	Programmable interrupt controller
[000000000000680 - 00000000000069F]	Motherboard resources
[000000000000800 - 00000000000087F]	Motherboard resources
[000000000000A00 - 000000000000A0F]	Motherboard resources
[000000000000A10 - 000000000000A1F]	Motherboard resources
[000000000000A20 - 000000000000A2F]	Motherboard resources





















































- [00000000000002E8 - 00000000000002EF] Communications Port (COM4)
- [00000000000002F8 - 00000000000002FF] Communications Port (COM2)
- [00000000000003E8 - 00000000000003EF] Communications Port (COM3)
- > [00000000000003F8 - 00000000000003FF] Communications Port (COM1)
- > [00000000000004D0 - 00000000000004D1] Programmable interrupt controller
- [0000000000000680 - 000000000000069F] Motherboard resources
- [0000000000000800 - 000000000000087F] Motherboard resources
- [0000000000000A00 - 0000000000000A0F] Motherboard resources
- [0000000000000A10 - 0000000000000A1F] Motherboard resources
- [0000000000000A20 - 0000000000000A2F] Motherboard resources
- ▼ [0000000000000D00 - 0000000000000FFF] PCI Express Root Complex
 - [000000000000164E - 000000000000164F] Motherboard resources
 - > [0000000000001800 - 00000000000018FE] Motherboard resources
 - [0000000000002000 - 00000000000020FE] Motherboard resources
 - ▼ [0000000000003000 - 0000000000003FFF] PCI Express Root Port
 - ▼ [0000000000003000 - 0000000000003FFF] PCI Express Root Port
 - > [0000000000003000 - 0000000000003FFF] PCI-to-PCI Bridge
 - ▼ [0000000000004000 - 0000000000004FFF] PCI Express Root Port
 - > [0000000000004000 - 00000000000040FF] Realtek PCIe GbE Family Controller #4
 - > [0000000000005000 - 000000000000503F] Intel(R) UHD Graphics
 - [0000000000005060 - 000000000000507F] Standard SATA AHCI Controller
 - [0000000000005080 - 0000000000005083] Standard SATA AHCI Controller
 - [0000000000005090 - 0000000000005097] Standard SATA AHCI Controller
 - [000000000000B000 - 000000000000BFFF] PCI Express Root Port
 - ▼ [000000000000C000 - 000000000000CFFF] PCI Express Root Port
 - ▼ [000000000000C000 - 000000000000CFFF] PCI Express Root Port
 - > [000000000000C000 - 000000000000CFFF] PCI-to-PCI Bridge
 - ▼ [000000000000D000 - 000000000000DFFF] PCI Express Root Port
 - ▼ [000000000000D000 - 000000000000DFFF] PCI Express Root Port
 - > [000000000000D000 - 000000000000DFFF] PCI-to-PCI Bridge
 - ▼ [000000000000E000 - 000000000000EFFF] PCI Express Root Port
 - ▼ [000000000000E000 - 000000000000EFFF] PCI Express Root Port
 - ▼ [000000000000E000 - 000000000000EFFF] PCI Express Root Port
 - ▼ [000000000000E000 - 000000000000EFFF] PCI Express Upstream Switch Port
 - ▼ [000000000000E000 - 000000000000EFFF] PCI Express Downstream Switch Port
 - ▼ [000000000000E000 - 000000000000EFFF] PCI Express Root Port
 - > [000000000000E000 - 000000000000E01F] Intel(R) I211 Gigabit Network Connection #2
 - [000000000000E020 - 000000000000E03F] Standard SATA AHCI Controller
 - [000000000000E040 - 000000000000E043] Standard SATA AHCI Controller
 - [000000000000E050 - 000000000000E057] Standard SATA AHCI Controller
 - [000000000000E060 - 000000000000E063] Standard SATA AHCI Controller
 - [000000000000E070 - 000000000000E077] Standard SATA AHCI Controller
 - > [000000000000EFA0 - 000000000000EFBF] SM Bus Controller
 - [000000000000F000 - 000000000000F03F] Intel(R) HD Graphics 620
 - > [000000000000F040 - 000000000000F05F] SM Bus Controller
 - > [000000000000F060 - 000000000000F07F] Standard SATA AHCI Controller
 - > [000000000000F080 - 000000000000F083] Standard SATA AHCI Controller
 - > [000000000000F090 - 000000000000F097] Standard SATA AHCI Controller



















































A.2 Memory Address Map

- Memory
 - [000000000A0000 - 0000000000BFFFFF] PCI Express Root Complex
 - > [000000004F400000 - 000000004F5FFFFF] PCI Express Root Port
 - [000000004F620000 - 000000004F621FFF] Standard SATA AHCI Controller
 - [000000004F622000 - 000000004F6227FF] Standard SATA AHCI Controller
 - [000000004F623000 - 000000004F6230FF] Standard SATA AHCI Controller
 - > [000000007FC00000 - 00000000BFFFFFFF] PCI Express Root Complex
 - > [00000000C0000000 - 00000000CFFFFFFF] Motherboard resources
 - [00000000C0000000 - 00000000CFFFFFFF] Intel(R) HD Graphics 620
 - [00000000D0400000 - 00000000D04FFFFFFF] PCI Encryption/Decryption Controller
 - [00000000D0500000 - 00000000D05FFFFFFF] PCI Encryption/Decryption Controller
 - > [00000000D0600000 - 00000000D06FFFFFFF] PCI-to-PCI Bridge
 - > [00000000D0700000 - 00000000D07FFFFFFF] PCI-to-PCI Bridge
 - [00000000D0800000 - 00000000D080FFFFF] Intel(R) USB 3.0 eXtensible Host Controller - 1.0 (Microsoft)
 - [00000000D0814000 - 00000000D0817FFF] High Definition Audio Controller
 - [00000000D081C000 - 00000000D081C01F] SM Bus Controller
 - [00000000D0820000 - 00000000D08207FF] Standard SATA AHCI Controller
 - [00000000D0821000 - 00000000D0821FFF] SDA Standard Compliant SD Host Controller
 - [00000000D0822000 - 00000000D0822FFF] SDA Standard Compliant SD Host Controller
 - [00000000D0C00000 - 00000000D0C00653] Intel(R) Serial IO GPIO Host Controller - INT3452
 - [00000000D0C40000 - 00000000D0C40763] Intel(R) Serial IO GPIO Host Controller - INT3452
 - [00000000D0C50000 - 00000000D0C5076B] Intel(R) Serial IO GPIO Host Controller - INT3452
 - [00000000D0C70000 - 00000000D0C70673] Intel(R) Serial IO GPIO Host Controller - INT3452
 - [00000000DE000000 - 00000000DEFFFFFFF] Intel(R) HD Graphics 620
 - > [00000000DF000000 - 00000000DF0FFFFFFF] PCI Express Root Port
 - > [00000000DF100000 - 00000000DF1FFFFFFF] PCI Express Root Port
 - > [00000000DF200000 - 00000000DF2FFFFFFF] PCI Express Root Port
 - > [00000000DF300000 - 00000000DF3FFFFFFF] PCI Express Root Port
 - > [00000000DF400000 - 00000000DF4FFFFFFF] PCI Express Root Port
 - [00000000E00000D0 - 00000000E00000DB] Unknown device
 - [00000000E0690000 - 00000000E069FFFFF] Intel(R) Serial IO GPIO Host Controller - INTC1056
 - [00000000E06A0000 - 00000000E06AFFFFF] Intel(R) Serial IO GPIO Host Controller - INTC1056
 - [00000000E06B0000 - 00000000E06BFFFFF] Intel(R) Serial IO GPIO Host Controller - INTC1056
 - [00000000E06D0000 - 00000000E06DFFFFF] Intel(R) Serial IO GPIO Host Controller - INTC1056
 - [00000000E06E0000 - 00000000E06EFFFFF] Intel(R) Serial IO GPIO Host Controller - INTC1056
 - [00000000FD000000 - 00000000FD68FFFFF] Motherboard resources
 - > [00000000FD690000 - 00000000FD69FFFFF] Unknown device
 - [00000000FD6A0000 - 00000000FD6AFFFFF] Unknown device
 - > [00000000FD6B0000 - 00000000FD6CFFFFF] Motherboard resources
 - [00000000FD6B0000 - 00000000FD6BFFFFF] Unknown device
 - [00000000FD6C0000 - 00000000FD6CFFFFF] Unknown device
 - > [00000000FD6D0000 - 00000000FD6DFFFFF] Unknown device
 - [00000000FD6E0000 - 00000000FD6EFFFFF] Unknown device
 - [00000000FD6F0000 - 00000000FDFFFFFFF] Motherboard resources
 - > [00000000FE000000 - 00000000FE01FFFFF] Motherboard resources
 - [00000000FE001210 - 00000000FE001247] Unknown device
 - [00000000FE001310 - 00000000FE001347] Unknown device
 - > [00000000FE010000 - 00000000FE010FFF] PCI Device
 - [00000000FE050000 - 00000000FE053FFF] Unknown device
 - [00000000FE060000 - 00000000FE063FFF] Unknown device
 - [00000000FE200000 - 00000000FE7FFFFFFF] Motherboard resources
 - [00000000FEC80000 - 00000000FECFFFFFFF] Motherboard resources

A.3 IRQ Mapping Chart

Interrupt request (IRQ)	
(ISA) 0x00000000 (00)	System timer
(ISA) 0x00000000 (00)	System timer
(ISA) 0x00000000 (00)	System timer
(ISA) 0x00000000 (00)	System timer
(ISA) 0x00000000 (00)	System timer
(ISA) 0x00000000 (00)	System timer
(ISA) 0x00000000 (00)	System timer
(ISA) 0x00000000 (00)	System timer
(ISA) 0x00000000 (00)	System timer
(ISA) 0x00000001 (01)	Standard PS/2 Keyboard
(ISA) 0x00000001 (01)	Standard PS/2 Keyboard
(ISA) 0x00000003 (03)	Communications Port (COM2)
(ISA) 0x00000003 (03)	Standard SATA AHCI Controller
(ISA) 0x00000004 (04)	Communications Port (COM1)
(ISA) 0x00000004 (04)	Communications Port (COM1)
(ISA) 0x00000005 (05)	High Definition Audio Controller
(ISA) 0x00000005 (05)	Intel(R) I211 Gigabit Network Connection #3
(ISA) 0x00000005 (05)	Intel(R) USB 3.0 eXtensible Host Controller - 1.0 (Micro
(ISA) 0x00000005 (05)	Intel(R) USB 3.0 eXtensible Host Controller - 1.0 (Micro
(ISA) 0x00000005 (05)	PCI-to-PCI Bridge
(ISA) 0x00000005 (05)	SDA Standard Compliant SD Host Controller
(ISA) 0x00000005 (05)	SM Bus Controller
(ISA) 0x00000005 (05)	SM Bus Controller
(ISA) 0x00000005 (05)	Standard SATA AHCI Controller
(ISA) 0x00000006 (06)	Intel(R) I211 Gigabit Network Connection #4
(ISA) 0x00000006 (06)	PCI Data Acquisition and Signal Processing Controller
(ISA) 0x00000006 (06)	PCI Express Root Port
(ISA) 0x00000007 (07)	PCI Express Root Port
(ISA) 0x00000007 (07)	PCI Simple Communications Controller
(ISA) 0x00000008 (08)	System CMOS/real time clock
(ISA) 0x00000008 (08)	System CMOS/real time clock
(ISA) 0x0000000A (10)	Communications Port (COM10)
(ISA) 0x0000000A (10)	Communications Port (COM11)
(ISA) 0x0000000A (10)	Communications Port (COM12)
(ISA) 0x0000000A (10)	Communications Port (COM7)
(ISA) 0x0000000A (10)	Communications Port (COM8)
(ISA) 0x0000000A (10)	Communications Port (COM9)
(ISA) 0x0000000A (10)	Intel(R) I210 Gigabit Network Connection
(ISA) 0x0000000A (10)	PCI Express Root Port
(ISA) 0x0000000A (10)	PCI Express Root Port
(ISA) 0x0000000A (10)	PCI Express Root Port
(ISA) 0x0000000B (11)	Communications Port (COM3)
(ISA) 0x0000000B (11)	Communications Port (COM4)
(ISA) 0x0000000B (11)	Communications Port (COM5)
(ISA) 0x0000000B (11)	Communications Port (COM6)
(ISA) 0x0000000B (11)	Intel(R) HD Graphics 620
(ISA) 0x0000000B (11)	Intel(R) I211 Gigabit Network Connection #2
(ISA) 0x0000000B (11)	Intel(R) I211 Gigabit Network Connection #8
(ISA) 0x0000000B (11)	Intel(R) I211 Gigabit Network Connection
(ISA) 0x0000000B (11)	Intel(R) I211 Gigabit Network Connection #9
(ISA) 0x0000000B (11)	Intel(R) I211 Gigabit Network Connection #10

	(ISA) 0x0000000B (11)	PCI Data Acquisition and Signal Processing Controller
	(ISA) 0x0000000B (11)	PCI Encryption/Decryption Controller
	(ISA) 0x0000000B (11)	PCI Express Downstream Switch Port
	(ISA) 0x0000000B (11)	PCI Express Downstream Switch Port
	(ISA) 0x0000000B (11)	PCI Express Root Port
	(ISA) 0x0000000B (11)	PCI Express Root Port
	(ISA) 0x0000000B (11)	PCI Express Root Port
	(ISA) 0x0000000B (11)	PCI Express Root Port
	(ISA) 0x0000000B (11)	PCI Express Root Port
	(ISA) 0x0000000B (11)	PCI Express Root Port
	(ISA) 0x0000000B (11)	PCI Express Root Port
	(ISA) 0x0000000B (11)	PCI Express Root Port
	(ISA) 0x0000000B (11)	PCI Express Upstream Switch Port
	(ISA) 0x0000000B (11)	PCI-to-PCI Bridge
	(ISA) 0x0000000B (11)	PCI-to-PCI Bridge
	(ISA) 0x0000000B (11)	PCI-to-PCI Bridge
	(ISA) 0x0000000B (11)	SM Bus Controller
	(ISA) 0x0000000B (11)	Standard NVM Express Controller
	(ISA) 0x0000000B (11)	Standard SATA AHCI Controller
	(ISA) 0x0000000B (11)	Standard SATA AHCI Controller
	(ISA) 0x0000000C (12)	Microsoft PS/2 Mouse
	(ISA) 0x0000000C (12)	PS/2 Compatible Mouse
	(ISA) 0x0000000D (13)	Numeric data processor
	(ISA) 0x0000000E (14)	Intel(R) Serial IO GPIO Host Controller - INT3452
	(ISA) 0x0000000E (14)	Intel(R) Serial IO GPIO Host Controller - INT3452
	(ISA) 0x0000000E (14)	Intel(R) Serial IO GPIO Host Controller - INT3452
	(ISA) 0x0000000E (14)	Intel(R) Serial IO GPIO Host Controller - INT3452
	(ISA) 0x0000000E (14)	Intel(R) Serial IO GPIO Host Controller - INTC1056
	(ISA) 0x0000000E (14)	Unknown device
	(ISA) 0x0000000E (14)	Unknown device
	(ISA) 0x00000011 (17)	Intel(R) USB 3.0 eXtensible Host Controller - 1.0 (Microsoft)
	(ISA) 0x00000011 (17)	Intel(R) USB 3.0 eXtensible Host Controller - 1.0 (Microsoft)
	(ISA) 0x00000019 (25)	High Definition Audio Controller
	(ISA) 0x00000019 (25)	High Definition Audio Controller
	(ISA) 0x0000001B (27)	Intel(R) Serial IO I2C Host Controller - 5AAC
	(ISA) 0x0000001B (27)	Intel(R) Serial IO I2C Host Controller - 5AAC
	(ISA) 0x0000001C (28)	Intel(R) Serial IO I2C Host Controller - 5AAE
	(ISA) 0x0000001C (28)	Intel(R) Serial IO I2C Host Controller - 5AAE
	(ISA) 0x00000023 (35)	Unknown device
	(ISA) 0x00000024 (36)	Unknown device
	(ISA) 0x00000027 (39)	Intel SD Host Controller
	(ISA) 0x00000037 (55)	Microsoft ACPI-Compliant System
	(ISA) 0x00000038 (56)	Microsoft ACPI-Compliant System
	(ISA) 0x00000039 (57)	Microsoft ACPI-Compliant System
	(ISA) 0x0000003A (58)	Microsoft ACPI-Compliant System
	(ISA) 0x0000003B (59)	Microsoft ACPI-Compliant System
	(ISA) 0x0000003C (60)	Microsoft ACPI-Compliant System
	(ISA) 0x0000003D (61)	Microsoft ACPI-Compliant System
	(ISA) 0x0000003E (62)	Microsoft ACPI-Compliant System
	(ISA) 0x0000003F (63)	Microsoft ACPI-Compliant System
	(ISA) 0x00000040 (64)	Microsoft ACPI-Compliant System
	(ISA) 0x00000041 (65)	Microsoft ACPI-Compliant System

 (ISA) 0x000001D8 (472)	Microsoft ACPI-Compliant System
 (ISA) 0x000001D9 (473)	Microsoft ACPI-Compliant System
 (ISA) 0x000001DA (474)	Microsoft ACPI-Compliant System
 (ISA) 0x000001DB (475)	Microsoft ACPI-Compliant System
 (ISA) 0x000001DC (476)	Microsoft ACPI-Compliant System
 (ISA) 0x000001DD (477)	Microsoft ACPI-Compliant System
 (ISA) 0x000001DE (478)	Microsoft ACPI-Compliant System
 (ISA) 0x000001DF (479)	Microsoft ACPI-Compliant System
 (ISA) 0x000001E0 (480)	Microsoft ACPI-Compliant System
 (ISA) 0x000001E1 (481)	Microsoft ACPI-Compliant System
 (ISA) 0x000001E2 (482)	Microsoft ACPI-Compliant System
 (ISA) 0x000001E3 (483)	Microsoft ACPI-Compliant System
 (ISA) 0x000001E4 (484)	Microsoft ACPI-Compliant System
 (ISA) 0x000001E5 (485)	Microsoft ACPI-Compliant System
 (ISA) 0x000001E6 (486)	Microsoft ACPI-Compliant System
 (ISA) 0x000001E7 (487)	Microsoft ACPI-Compliant System
 (ISA) 0x000001E8 (488)	Microsoft ACPI-Compliant System
 (ISA) 0x000001E9 (489)	Microsoft ACPI-Compliant System
 (ISA) 0x000001EA (490)	Microsoft ACPI-Compliant System
 (ISA) 0x000001EB (491)	Microsoft ACPI-Compliant System
 (ISA) 0x000001EC (492)	Microsoft ACPI-Compliant System
 (ISA) 0x000001ED (493)	Microsoft ACPI-Compliant System
 (ISA) 0x000001EE (494)	Microsoft ACPI-Compliant System
 (ISA) 0x000001EF (495)	Microsoft ACPI-Compliant System
 (ISA) 0x000001F0 (496)	Microsoft ACPI-Compliant System
 (ISA) 0x000001F1 (497)	Microsoft ACPI-Compliant System
 (ISA) 0x000001F2 (498)	Microsoft ACPI-Compliant System
 (ISA) 0x000001F3 (499)	Microsoft ACPI-Compliant System
 (ISA) 0x000001F4 (500)	Microsoft ACPI-Compliant System
 (ISA) 0x000001F5 (501)	Microsoft ACPI-Compliant System
 (ISA) 0x000001F6 (502)	Microsoft ACPI-Compliant System
 (ISA) 0x000001F7 (503)	Microsoft ACPI-Compliant System
 (ISA) 0x000001F8 (504)	Microsoft ACPI-Compliant System
 (ISA) 0x000001F9 (505)	Microsoft ACPI-Compliant System
 (ISA) 0x000001FA (506)	Microsoft ACPI-Compliant System
 (ISA) 0x000001FB (507)	Microsoft ACPI-Compliant System
 (ISA) 0x000001FC (508)	Microsoft ACPI-Compliant System
 (ISA) 0x000001FD (509)	Microsoft ACPI-Compliant System
 (ISA) 0x000001FE (510)	Microsoft ACPI-Compliant System
 (ISA) 0x000001FF (511)	Microsoft ACPI-Compliant System
 (PCI) 0x00000010 (16)	High Definition Audio Controller
 (PCI) 0xFFFFFFFF6 (-10)	Intel(R) Management Engine Interface #1
 (PCI) 0xFFFFFFFF7 (-9)	Intel(R) UHD Graphics
 (PCI) 0xFFFFFFFF8 (-8)	Intel(R) USB 3.10 eXtensible Host Controller - 1.20 (Microsoft)
 (PCI) 0xFFFFFFFF9 (-7)	Realtek PCIe GbE Family Controller #4
 (PCI) 0xFFFFFFFFFA (-6)	Realtek PCIe GbE Family Controller #5
 (PCI) 0xFFFFFFFFFB (-5)	Standard SATA AHCI Controller
 (PCI) 0xFFFFFFFFFC (-4)	PCI Express Root Port
 (PCI) 0xFFFFFFFFFD (-3)	PCI Express Root Port
 (PCI) 0xFFFFFFFFFE (-2)	PCI Express Root Port

Appendix B

Mating Connectors and Cables

B.1 Mating Connectors and Cables

Conn Label	Function	Mating Connector		Available Cable	Cable P/N
		Vendor	Model No.		
CN1	RTC Battery	Molex	51021-0200	Battery Cable	175011301C
CN2	Audio			Audio cable	170X000156
CN6	LVDS/eDP Port Inverter/ Backlight Connector	SHR	WL1010H-6P	LVDS Inverter Cable	170X000152
CN7	LVDS	SHDR	WL1010H-2*2	LVDS Cable	170X000280
	eDP	JCTC	11002H0 0-2*20P	eDP Cable	170X000409
CN12	SATA	Molex	887505318	SATA Cable	1709070500
CN13	SATA Power	JST	PHR-2	SATA Power Cable	1702150155
CN14	8-bit GPIO Header	TE	E001H-2X5	N/A	N/A
CN16~ CN19	USB2.0 Internal	Molex	51021-0500	USB2.0 Cable	1700050207
CN24	eSPI/Debug card	JST	SHR-10V-S-B	eSPI Cable	1703100133
CN28	Front Panel	Molex	51110-1050	N/A	N/A
CN19	5V Standby	JST	XHP-3	N/A	N/A
CN20/ CN21	COM port	Molex	51021-0900	Serial Port Cable	1701090150
CN23	I2C/SMBUS	JST	SHR-05V-S-B		170X000743