

PICO-EHL4-SEMI

PICO-SEMI System

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
● PICO-EHL4-SEMI	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 on 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 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 WHERE THE STORAGE TEMPERATURE IS BELOW -20°C (-4°F) OR ABOVE 60°C (140°F) 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 System

QQ04-381 Rev.A0

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	×	○	○	○	○	○
外部信号连接器及线材	×	○	○	○	○	○
外壳	○	○	○	○	○	○
中央处理器与内存	×	○	○	○	○	○
硬盘	×	○	○	○	○	○
液晶模块	×	○	○	○	○	○
光驱	×	○	○	○	○	○
触控模块	×	○	○	○	○	○
电源	×	○	○	○	○	○
电池	×	○	○	○	○	○

本表格依据 SJ/T 11364 的规定编制。

○：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 GB/T 26572标准规定的限量要求以下。

×：表示该有害物质的某一均质材料超出了GB/T 26572的限量要求，然而该部件仍符合欧盟指令2011/65/EU 的规范。

备注：

- 一、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。
- 二、上述部件物质中央处理器、内存、硬盘、光驱、电源为选购品。
- 三、上述部件物质液晶模块、触控模块仅一体机产品适用。

Hazardous and Toxic Materials List

AAEON System

QO4-381 Rev.A0

Component Name	Hazardous or Toxic Materials or Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr(VI))	Polybrominated biphenyls (PBBS)	Polybrominated ethers (PBDES)
PCB and Components	X	O	O	O	O	O
Wires & Connectors for Ext.Connections	X	O	O	O	O	O
Chassis	O	O	O	O	O	O
CPU & RAM	X	O	O	O	O	O
HDD Drive	X	O	O	O	O	O
LCD Module	X	O	O	O	O	O
Optical Drive	X	O	O	O	O	O
Touch Control Module	X	O	O	O	O	O
PSU	X	O	O	O	O	O
Battery	X	O	O	O	O	O

This form is prepared in compliance with the provisions of SJ/T 11364.

O: The level of toxic or hazardous materials present in this component and its parts is below the limit specified by GB/T 26572.

X: The level of toxic of hazardous materials present in the component exceed the limits specified by GB/T 26572, but is still in compliance with EU Directive 2011/65/EU (RoHS 2).

Notes:

1. The Environment Friendly Use Period indicated by labelling on this product is applicable only to use under normal conditions.
2. Individual components including the CPU, RAM/memory, HDD, optical drive, and PSU are optional.
3. LCD Module and Touch Control Module only applies to certain products which feature these components.

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Chapter 1

Product Specifications

1.1 Specifications

System

Form Factor	PICO-SEMI
CPU	Intel® Pentium® and Celeron® N and J Series Processors: 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	Onboard Single-Channel LPDDR4x 3200MHz, (Non-ECC, Max. 16GB)
BIOS	UEFI
Wake on LAN	Yes
Watchdog Timer	255 Levels
Security	Intel® Platform Trust Technology (Intel® PTT) (Integrated TPM)
RTC Battery	Lithium Battery 3V/240mAh
Dimensions	4.80" x 3.18" x 1.75" (122mm x 80.8mm x 44.4mm)
Gross Weight	0.88 lb. (0.40Kg)
OS Support	Windows® 10 (64-bit) Ubuntu 20.04.3 (IoT)/Kernel 5.13

Power

Power Requirement	12V Only
Power Supply Type	ATX
Connector	DC Jack Connector

Power

Power Consumption	Intel Atom® x6425E, 16GB Onboard LPDDR4x, 2.48A @+12V (Typical)
	Intel Atom® x6425E, 16GB Onboard LPDDR4x, 2.62A @+12V (Max)

Display

Controller	Intel® UHD Graphics for 10 th Gen Intel® Processors
LVDS/eDP	-
Display Interface	HDMI 2.0 x 1, 3480 x 2160 @60Hz
Multiple Display	Up to 1 Display

Audio

Codec	-
Audio Interface	-
Speaker	-

External I/O

Ethernet	RTL8111H-CG 1GbE, RJ-45 x 2
USB	USB 3.2 Gen 2 x 2
Serial Port	COM 1, COM 2 (RS-232/422/485, supports 5V/12V/RI, Optional)
Video	HDMI 2.0 x 1

Internal I/O

USB	-
Serial Port	-
Video	-
SATA	32GB eMMC 5.1 (Optional: 64GB/128GB)

Internal I/O

Audio	-
DIO/GPIO	-
SMBus/I2C	-
Fan	-
Front Panel	HDD LED, PWR LED, Power Button, Buzzer, Reset
Others	-

Expansion

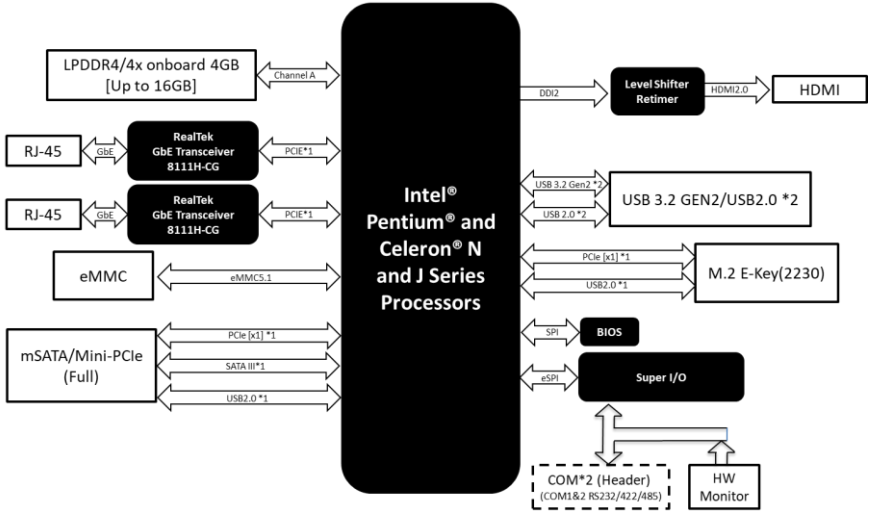
Mini PCIe/mSATA	Full Size mPCIe/mSATA x 1 (SATA as default, PCIe selected by BIOS)
M.2	M.2 2230 E-Key x 1 (PCIe [x1]/USB 2.0)
Others	-

Environmental

Operating Temperature	32°F ~ 122°F (0°C ~ 50°C) with 0.5m/s air flow
Storage Temperature	-40°F ~ 185°F (-40°C ~ 85°C)
Operating Humidity	0% ~ 90% relative humidity, non-condensing
MTBF (Hours)	489,989
EMC	CE/FCC Class A

1.2 Function Block Diagram

PICO-EHL4-SEMI Block Diagram

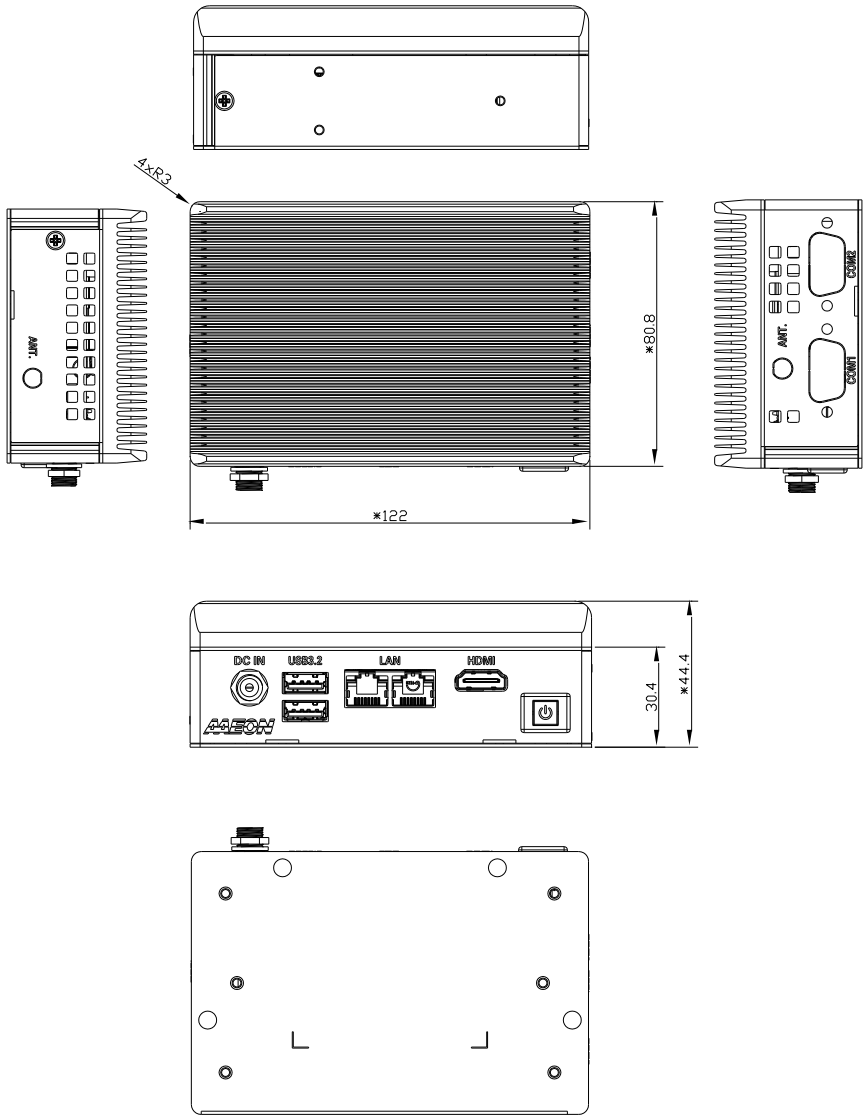


Chapter 2

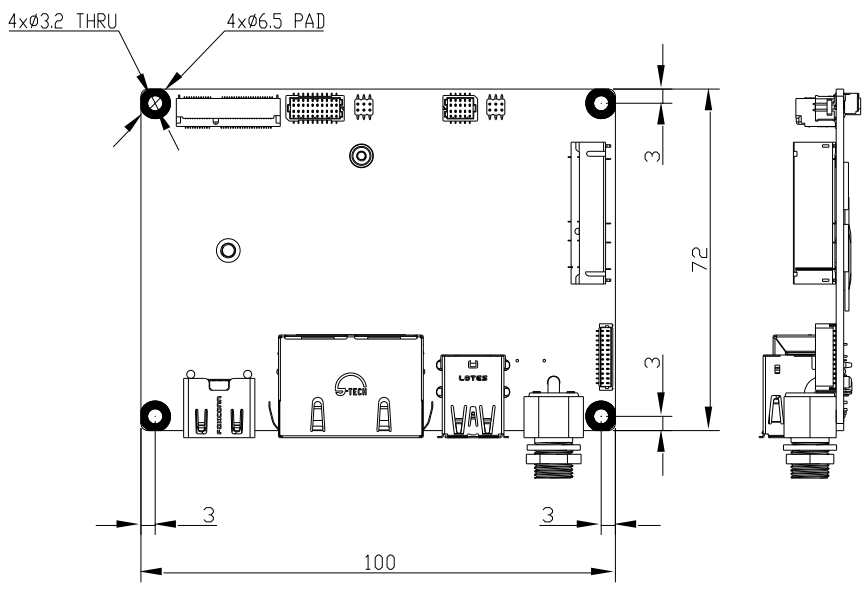
Hardware Information

2.1 Dimensions

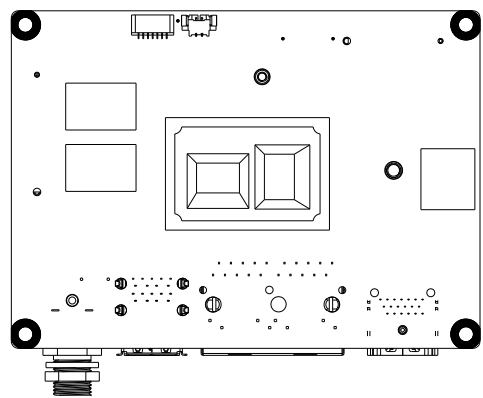
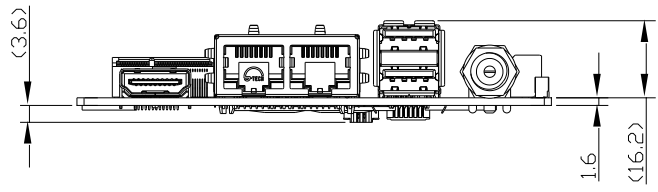
System



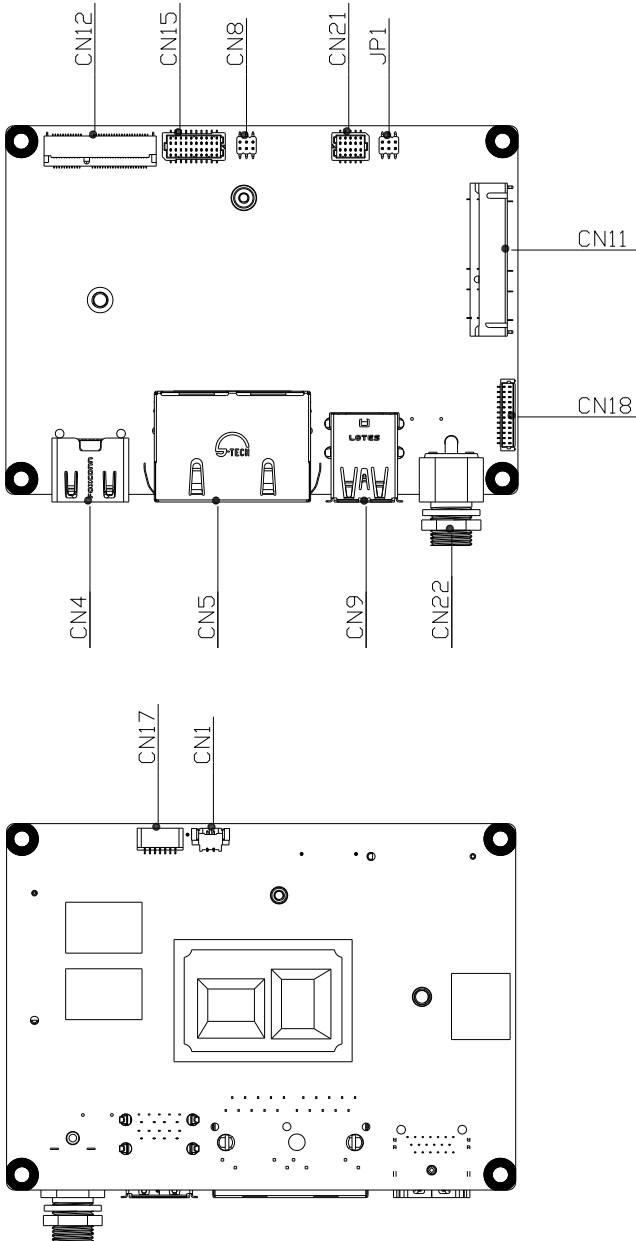
Board



Component Side



2.2 Jumpers and Connectors



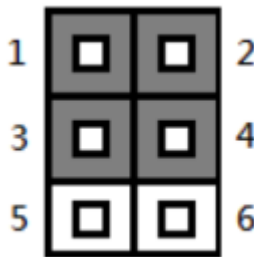
2.3 List of Jumpers

Jumpers allow users to manually customize system configurations to their suitable application needs.

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 & Auto Power Button Enable/Disable

2.3.1 Clear CMOS Jumper & Auto Power Button Enable/Disable (JP1)



Clear CMOS Jumper		
1-3	Save CMOS	Default
3-5	Clear CMOS	-

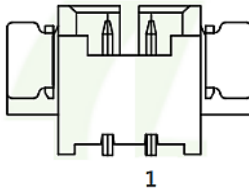
Auto Power Button Enable/Disable		
2-4	Disable	Default
4-6	Enable	-

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

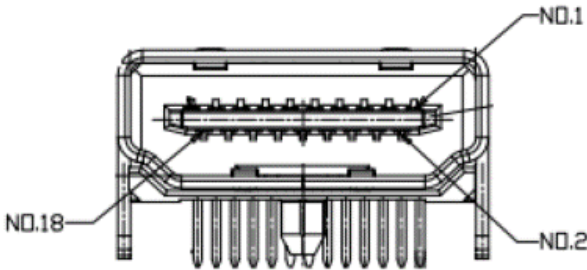
Label	Function
CN1	RTC Battery Connector
CN4	HDMI Port
CN5	Dual RJ-45
CN9	USB 2.0/USB 3.2 Gen 2 Port 1 ~ Port 2
CN11	mSATA/Mini Card
CN12	M.2 2230 E-Key
CN15	Dual COM Port Header
CN17	SPI
CN20	Power Input 12V
CN21	Front Panel
CN22	DC Jack Power Input [Reserved]

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 HDMI Port (CN4)

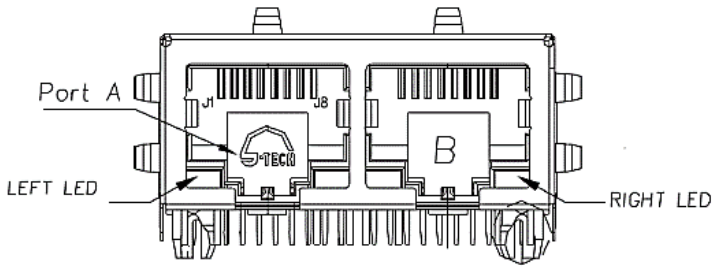


Pin	Pin Name	Signal Type	Signal Level
1	HDMI_TX2+	DIFF	-
2	GND	GND	-
3	HDMI_TX2-	DIFF	-
4	HDMI_TX1+	DIFF	-
5	GND	GND	-
6	HDMI_TX1-	DIFF	-
7	HDMI_TX0+	DIFF	-
8	GND	GND	-

Pin	Pin Name	Signal Type	Signal Level
9	HDMI_TX0-	DIFF	-
10	HDMI_CLK+	DIFF	-
11	GND	GND	-
12	HDMI_CLK-	DIFF	-
13	NC	-	-
14	NC	-	-
15	DDC_CLK	I/O	+5V
16	DDC_DATA	I/O	+5V
17	GND	GND	-
18	+5V	PWR	+5V
19	HDMI_HPD	-	-
20	HDMI_TX2+	DIFF	-
21	GND	GND	-
22	HDMI_TX2-	DIFF	-
23	HDMI_TX1+	DIFF	-
24	GND	GND	-
25	HDMI_TX1-	DIFF	-
26	HDMI_TX0+	DIFF	-
27	GND	GND	-
28	HDMI_TX0-	DIFF	-
29	HDMI_CLK+	DIFF	-
30	GND	GND	-
31	HDMI_CLK-	DIFF	-
32	NC	-	-
33	NC	-	-
34	DDC_CLK	I/O	+5V
35	DDC_DATA	I/O	+5V

Pin	Pin Name	Signal Type	Signal Level
36	GND	GND	-
37	+5V	PWR	+5V
38	HDMI_HPD	-	-

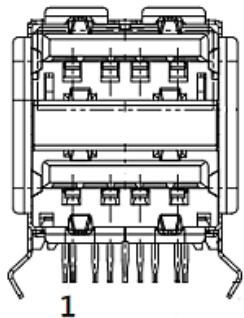
2.4.3 Dual RJ-45 (CN5)



Pin	Pin Name	Signal Type	Signal Level
1P1	LAN1_MDI0+	DIFF	-
1P2	LAN1_MDI0-	DIFF	-
1P3	LAN1_MDI1+	DIFF	-
1P4	LAN1_MDI1-	DIFF	-
1P5	GND	GND	-
1P6	GND	GND	-
1P7	LAN1_MDI2+	DIFF	-
1P8	LAN1_MDI2-	DIFF	-
1P9	LAN1_MDI3+	DIFF	-
1P10	LAN1_MDI3-	DIFF	-
1L1	LAN1_LED_LNK#_ACT	Signal	-
1L2	+V3P3A	VDD	3.3V
1L3	LAN1_LED_100#	Signal	-
1L4	LAN1_LED_1000#	Signal	-

Pin	Pin Name	Signal Type	Signal Level
2P1	LAN2_MDI0+	DIFF	-
2P2	LAN2_MDI0-	DIFF	-
2P3	LAN2_MDI1+	DIFF	-
2P4	LAN2_MDI1-	DIFF	-
2P5	GND	GND	-
2P6	GND	GND	-
2P7	LAN2_MDI2+	DIFF	-
2P8	LAN2_MDI2-	DIFF	-
2P9	LAN2_MDI3+	DIFF	-
2P10	LAN2_MDI3-	DIFF	-
2L1	LAN2_LED_LNK#_ACT	Signal	-
2L2	+V3P3A	VDD	3.3V
2L3	LAN2_LED_100#	Signal	-
2L4	LAN2_LED_1000#	Signal	-

2.4.4 USB 2.0/USB 3.2 Gen 2 Port 1 ~ Port 2 (CN9)

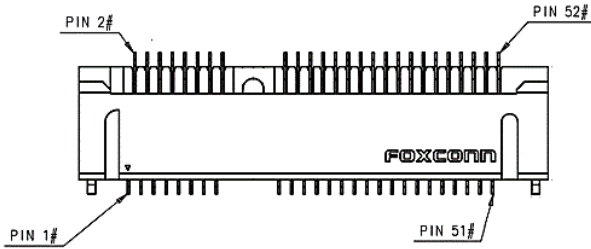


Pin	Pin Name	Signal Type	Signal Level
1	+V5A_USB12	PWR	+5V
2	USB2_0_DN	DIFF	-

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

Note: CN9 USB Power max current: 2.0A, 1.0A for each port.

2.4.5 mSATA/Mini Card Slot (CN11)

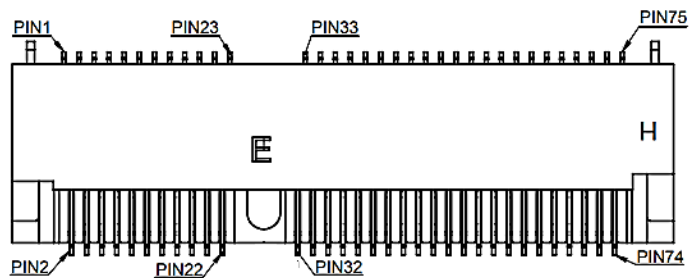


Pin	Pin Name	Signal Type	Signal Level
1	PCIE_WAKE#	IN	-
2	+3.3V	PWR	+3.3V
3	NC	-	-
4	GND	GND	-
5	NC	-	-
6	+1.5V	PWR	+1.5V
7	PCIE_CLK_REQ#	IN	-
8	NC	-	-
9	GND	GND	-
10	NC	-	-
11	PCIE_REF_CLK-	DIFF	-
12	NC	-	-
13	PCIE_REF_CLK+	DIFF	-
14	NC	-	-
15	GND	GND	-
16	NC	-	-
17	NC	-	-
18	GND	GND	-
19	NC	-	-

Pin	Pin Name	Signal Type	Signal Level
20	W_DISABLE#	OUT	+3.3V
21	GND	GND	-
22	PCIE_RST#	OUT	+3.3V
23	PCIE_RX-/SATA_RX+	DIFF	-
24	+3.3V	PWR	+3.3V
25	PCIE_RX+/SATA_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-/SATA_TX-	DIFF	-
32	SMB_DATA	I/O	+3.3V
33	PCIE_TX+/SATA_TX+	DIFF	-
34	GND	GND	-
35	GND	GND	-
36	USB_D-	DIFF	-
37	GND	GND	-
38	USB_D+	DIFF	-
39	+3.3V	PWR	+3.3V
40	GND	GND	-
41	+3.3V	PWR	+3.3V
42	NC	-	-
43	GND	GND	-
44	NC	-	-
45	NC	-	-
46	NC	-	-

Pin	Pin Name	Signal Type	Signal Level
47	NC	-	-
48	+1.5V	PWR	+1.5V
49	NC	-	-
50	GND	GND	-
51	NC	-	-
52	+3.3V	PWR	+3.3V

2.4.6 M.2 2230 E-Key Slot (CN12)



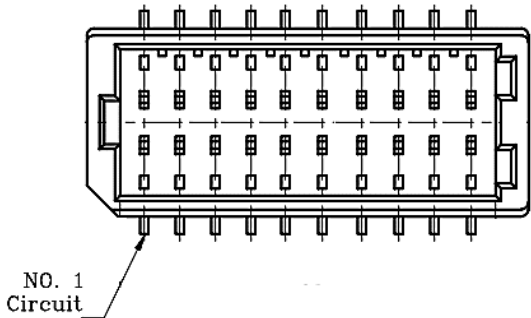
Pin	Pin Name	Signal Type	Signal Level
1	GND	GND	-
2	+V3P3A	PWR	3.3V
3	USB2_4_DP	DIFF	-
4	+V3P3A	PWR	3.3V
5	USB2_4_DN	DIFF	-
6	NC	-	-
7	GND	GND	-
8	NC	-	-
9	NC	-	-
10	NC	-	-
11	NC	-	-

Pin	Pin Name	Signal Type	Signal Level
12	NC	-	-
13	NC	-	-
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_2_TXP	DIFF	-
36	NC	-	-
37	PCIE_2_TXN	DIFF	-
38	NC	-	-
39	GND	GND	-
40	NC	-	-
41	PCIE_2_RXP	DIFF	-
42	NC	-	-
43	PCIE_2_RXN	GND	-
44	NC	-	-
45	GND	GND	-
46	NC	-	-

Pin	Pin Name	Signal Type	Signal Level
47	PCIE_0_CLK_DP	DIFF	-
48	NC	-	-
49	PCIE_0_CLK_DN	DIFF	-
50	NC	-	--
51	GND	GND	-
52	BUF_PLT_RST#	Signal	-
53	PCIE_CLKREQ#0	Signal	-
54	SOC_BT_EN	Signal	-
55	PCIE_WAKE#	Signal	-
56	SOC_WIFI_EN	Signal	-
57	GND	GND	--
58	NC	-	-
59	NC	-	-
60	NC	-	-
61	NC	-	-
62	NC	-	-
63	GND	GND	-
64	NC	-	-
65	NC	-	-
66	NC	-	-
67	NC	-	-
68	NC	-	-
69	GND	GND	-
70	NC	-	-
71	NC	-	-
72	+V3P3A	PWR	3.3V
73	NC	-	-

Pin	Pin Name	Signal Type	Signal Level
74	+V3P3A	PWR	3.3V
75	GND	GND	-

2.4.7 Dual COM Port Header (CN15)



Pin	RS-232 Signal	RS-422 Signal	RS-485 Signal
1	DCD_1	TX_1-	DATA_1-
2	DCD_2	TX_2-	DATA_2-
3	RX_1	TX_1+	DATA_1+
4	RX_2	TX_2+	DATA_2+
5	TX_1	RX_1+	-
6	TX_2	RX_2+	-
7	DTR_1	RX_1-	-
8	DTR_2	RX_2-	-
9	GND	GND	GND
10	GND	GND	GND
11	DSR_1	-	-
12	DSR_2	-	-
13	RTS_1	-	-
14	RTS_2	-	-

Pin	RS-232 Signal	RS-422 Signal	RS-485 Signal
15	CTS_1	-	-
16	CTS_2	-	-
17	RI_1/12V/5V	-	-
18	RI_2/12V/5V	-	-
19	UART_TX	-	-
20	UART_RX	-	-

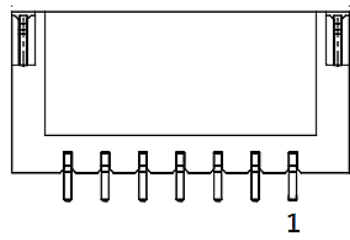
Note 1: COM RS-232/ 422/ 485 mode can be set by BIOS. Default is RS-232.

Note 2: RI1/+5V/+12V can be set by BOM (R423 RI/ R369 +12V/ R370 +5V). Default is RING.

Note 3: RI2/+5V/+12V can be set by BOM (R424 RI/ R372 +12V/ R373 +5V). Default is RING.

Note 4: Max current: 0.5A for each port.

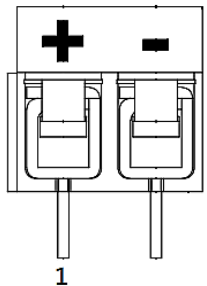
2.4.8 SPI Port (CN17)



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	-

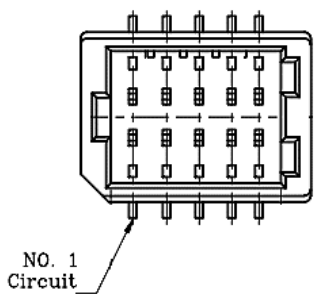
Pin	Pin Name	Signal Type	Signal Level
6	SPI_CS	Signal	-
7	NC	-	-

2.4.9 Power Input +12V (CN20)



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

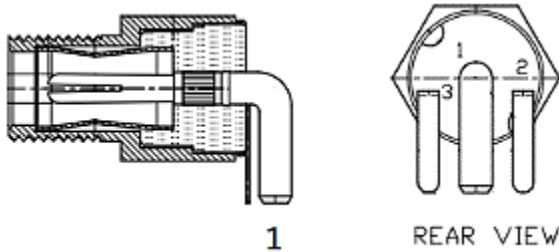
2.4.10 Front Panel (CN21)



Pin	Pin Name	Signal Type	Signal Level
1	GND	GND	-
2	EXT_PWRBTN#	Signal	-

Pin	Pin Name	Signal Type	Signal Level
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	-

2.4.11 DC Jack Power Input [Reserved] (CN22)



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

Chapter 3

AMI BIOS Setup

3.1 System Test and Initialization

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 a system configuration data error is detected, the 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 PICO-EHL4-SEMI 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

AMI BIOS ROM has a built-in Setup program that allows users to modify the basic system configuration. This type of information is stored in battery-backed CMOS RAM and BIOS NVRAM so that it retains the Setup information when the power is turned off.

Entering Setup

Power on the computer and press or <ESC> immediately. This will allow you to enter Setup.

Main

Set the date, use tab to switch between date elements.

Advanced

Enable/disable boot option for legacy network devices.

Chipset

Host bridge parameters.

Security

Set setup administrator password.

Boot

Enables/disables quiet boot option.

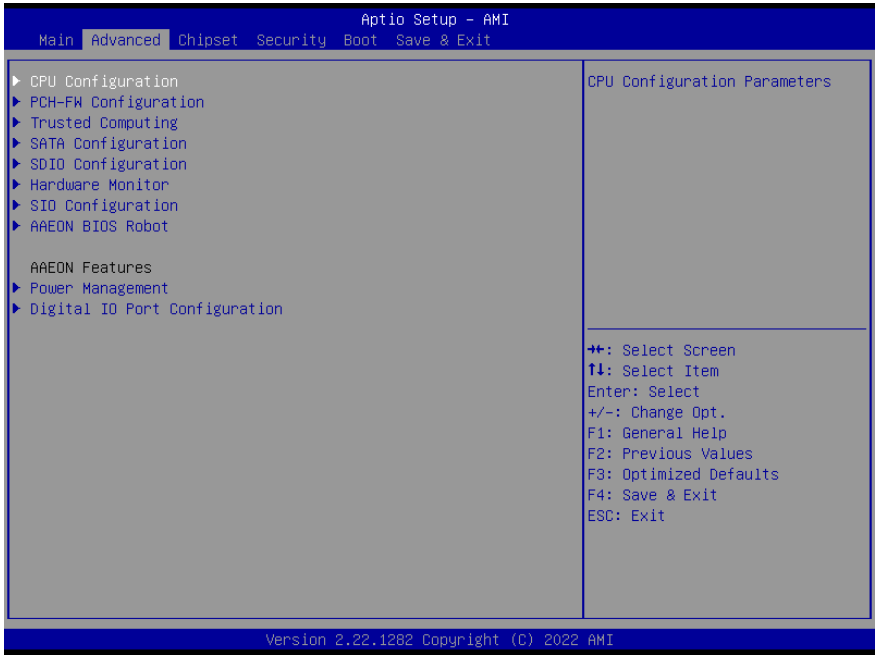
Save & Exit

Exit system setup after saving the changes.

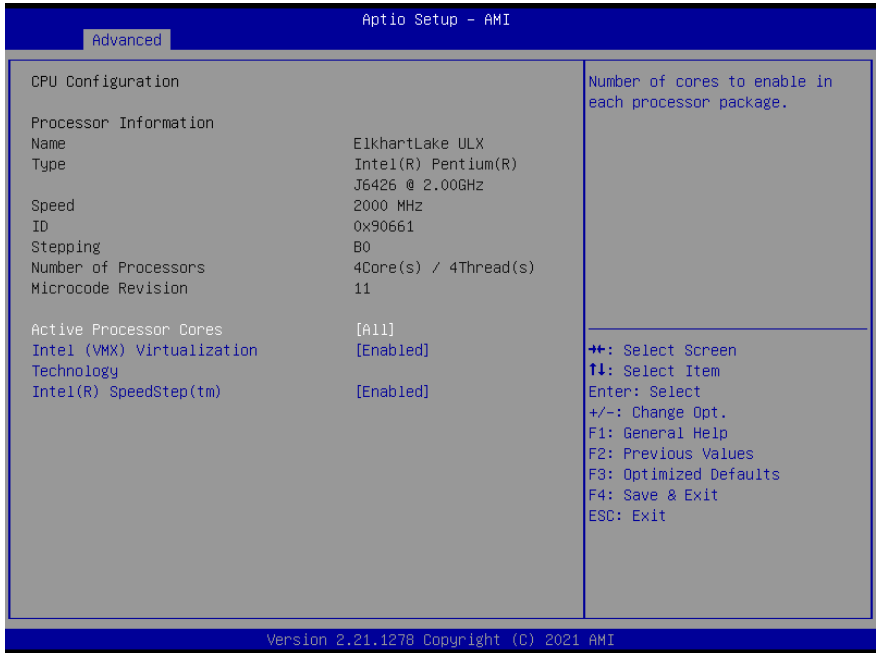
3.3 Setup Submenu: Main



3.4 Setup Submenu: Advanced

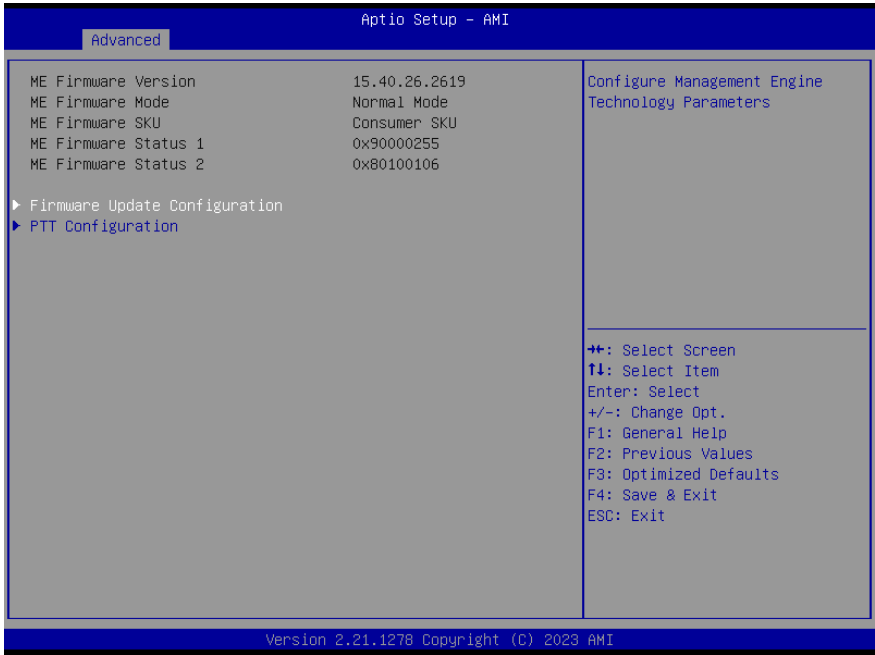


3.4.1 CPU Configuration

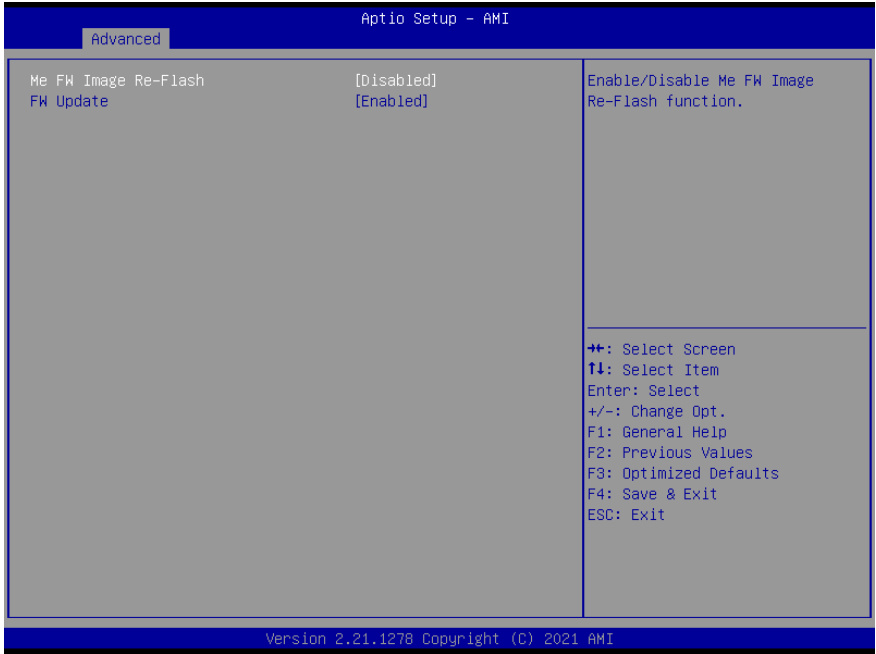


Options Summary		
Active Processor Cores	All	Optimal Default, Failsafe Default
	1~N	
Number of cores to enable in each processor package.		
Intel (VMX) Virtualization Technology	Disabled	
	Enabled	Optimal Default, Failsafe Default
When enabled, a VMM can utilize the additional hardware capabilities provided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

3.4.2 PCH-FW Configuration



3.4.2.1 Firmware Update Configuration



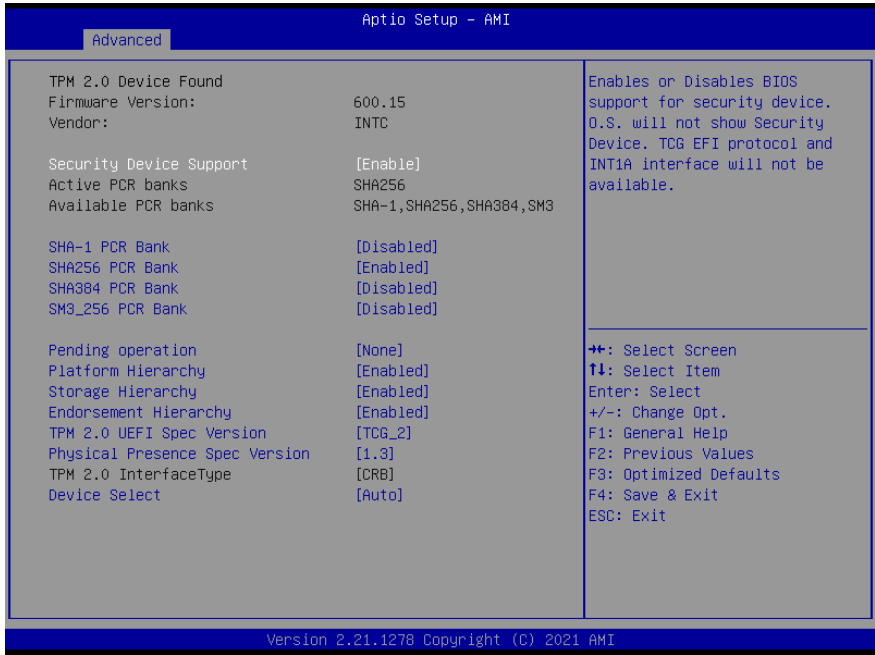
Options Summary		
Me FW Image Re-Flash	Enabled	
	Disabled	Optimal Default, Failsafe Default
Enable/Disable Me FW Image Re-Flash function.		
FW Update	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enable/Disable ME FW Update function.		

3.4.3 PTT Configuration



Options Summary		
TPM Device Selection	dTPM	
	PTT	Optimal Default, Failsafe Default
Selects TPM device: PTT or discrete TPM. PTT - enables PTT in SkuMgr dTPM - disables PTT in SkuMgr Warning! PTT/dTPM will be disabled and all data saved on it will be lost.		

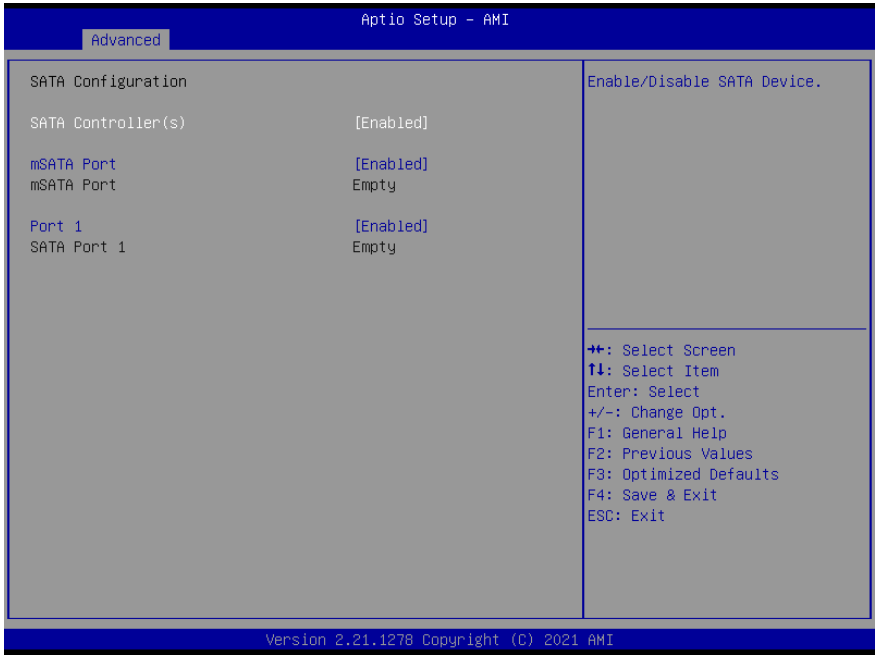
3.4.4 Trusted Computing



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	

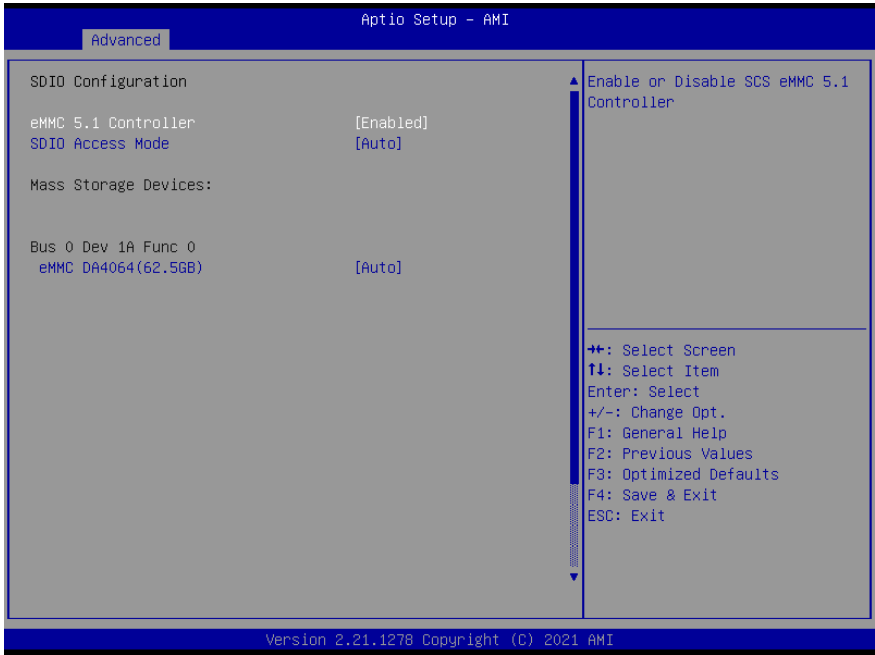
Options Summary		
Enable or Disable SM3_256 PCR Bank.		
Pending operation	None	Optimal Default, Failsafe Default
	TPM Clear	
Schedule an Operation for the Security Device. NOTE: Your Computer will reboot during restart in order to change State of Security Device.		
Platform Hierarchy	Enabled	Optimal 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.		

3.4.5 SATA Configuration



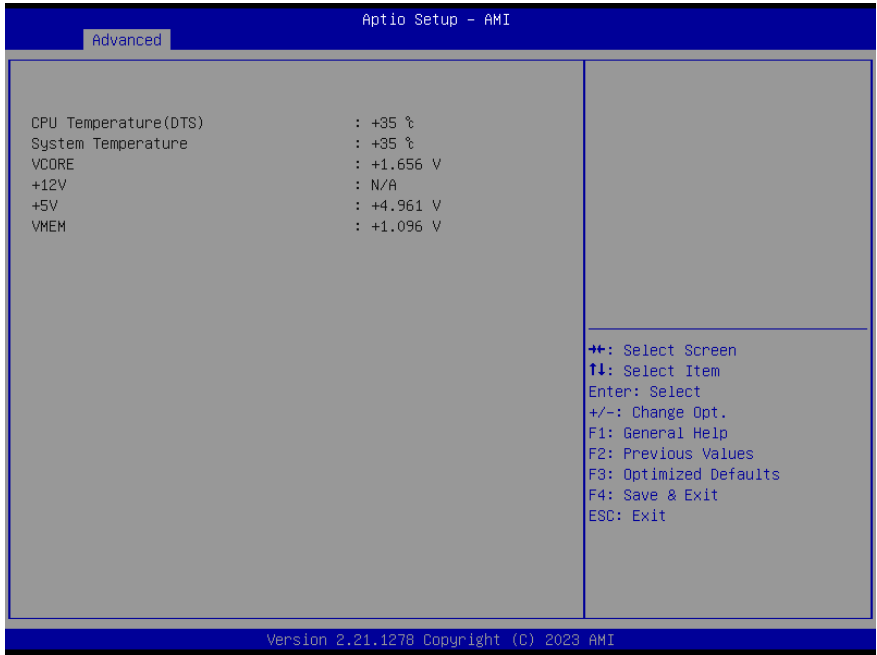
Options Summary		
SATA Controller(s)	Enabled	Optimal Default, Failsafe Default
	Disabled	
Enable/Disable SATA Device.		
Port*	Enabled	Optimal Default, Failsafe Default
	Disabled	
Enable or Disable SATA Port.		

3.4.6 SDIO Configuration



Options Summary		
eMMC 5.1 Controller	Enabled	Optimal Default, Failsafe Default
	Disabled	
Enable or Disable SCS eMMC 5.1 Controller		
SDIO Access Mode	Auto	Optimal Default, Failsafe Default
	ADMA	
	SDMA	
<p>Auto Option: Access SD device in DMA mode if controller supports it, otherwise in PIO mode.</p> <p>DMA Option: Access SD device in DMA mode.</p> <p>PIO Option: Access SD device in PIO mode.</p>		

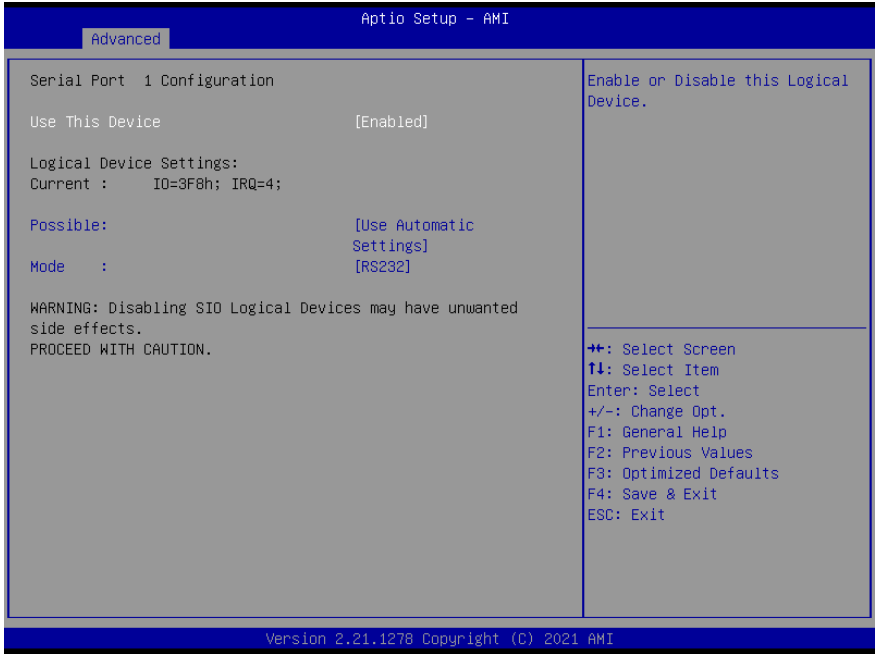
3.4.7 Hardware Monitor



3.4.8 SIO Configuration



3.4.8.1 Serial Port Configuration



Options Summary		
Use This Device	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enable or Disable Serial Port (COM).		
Possible:	Use Automatic Settings	Optimal Default, Failsafe Default
	IO=2F8; IRQ=3;	
	IO=3F8; IRQ=4;	
Select an optimal setting for IO device.		
Mode	RS232	Optimal Default, Failsafe Default
	RS422	
	RS485	
UART RS-232/422/485 selection.		

3.4.9 AAEON BIOS Robot

Aptio Setup - AMI

Advanced

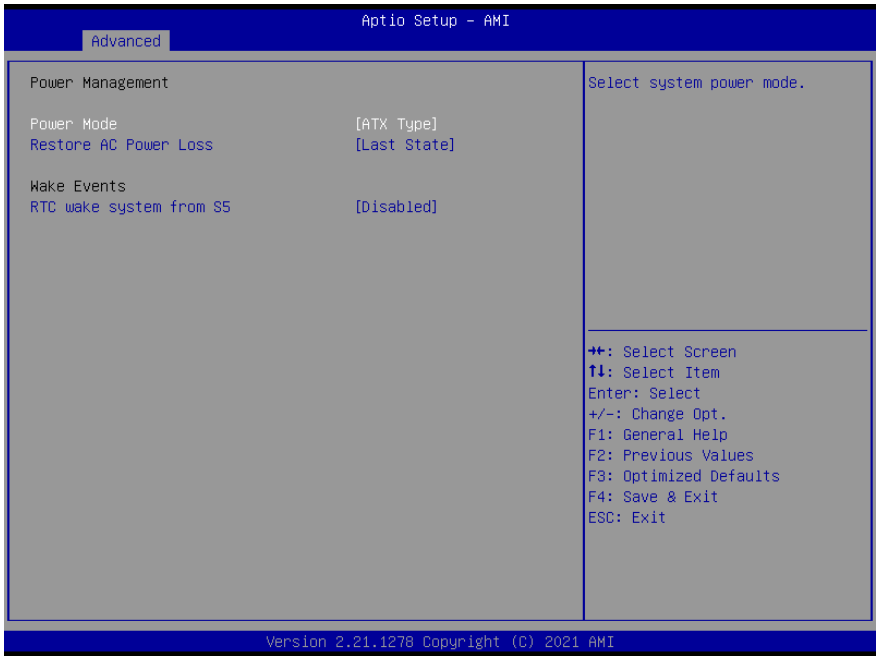
AAEON BIOS Robot		Enabled - Robot set Watch Dog Timer(WDT) right after power on, before BIOS start POST process. And then Robot will clear WDT on completion of POST. WDT will reset system automatically if it is not cleared before its timer counts down to zero.
Sends watch dog before BIOS POST	[Disabled]	++: Select Screen T1: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
POST Timer (second)	30	
Sends watch dog before booting OS	[Disabled]	
OS Timer (minute)	3	
Delayed POST (PEI phase)	[Disabled]	
Delayed time (second)	10	
Delayed POST (DXE phase)	[Disabled]	
Delayed time (second)	10	
Reset system once	[Disabled]	
Soft or hard reset	[Soft reset]	
▶ Device detecting configuration		

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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 in 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.		

3.4.10 Power Management

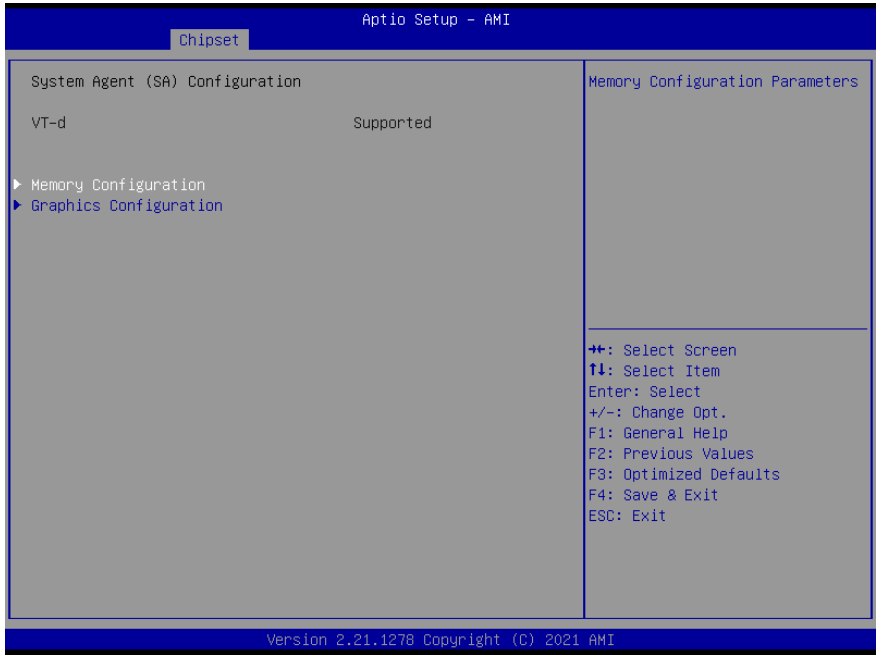


Options Summary		
Power Mode	ATX Type	Optimal Default, Failsafe Default
	AT Type	
Select power supply mode.		
Restore AC Power Loss	Last State	Optimal Default, Failsafe Default
	Always On	
	Always Off	
Select power state when power is re-applied after a power failure.		
RTC wake system from S5	Disabled	Optimal Default, Failsafe Default
	Fixed Time	
	Dynamic Time	
	Bypass	
Fixed Time: System will wake on the hr :: min :: sec specified.		
Dynamic Time : System will wake on the current time + Increase minutes(s).		
Bypass: BIOS will not control RTC wake function during system shutdown.		

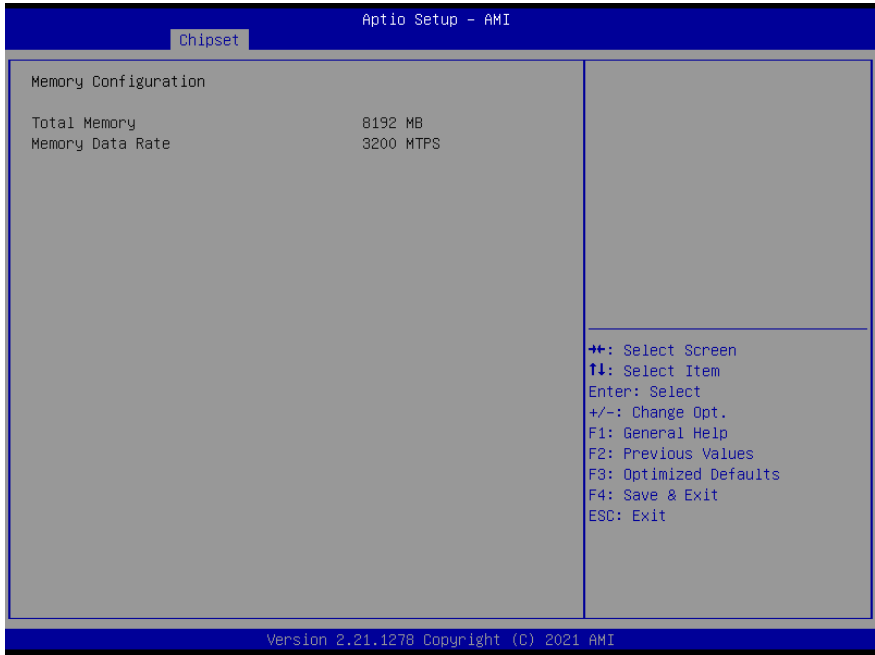
3.5 Setup Submenu: Chipset



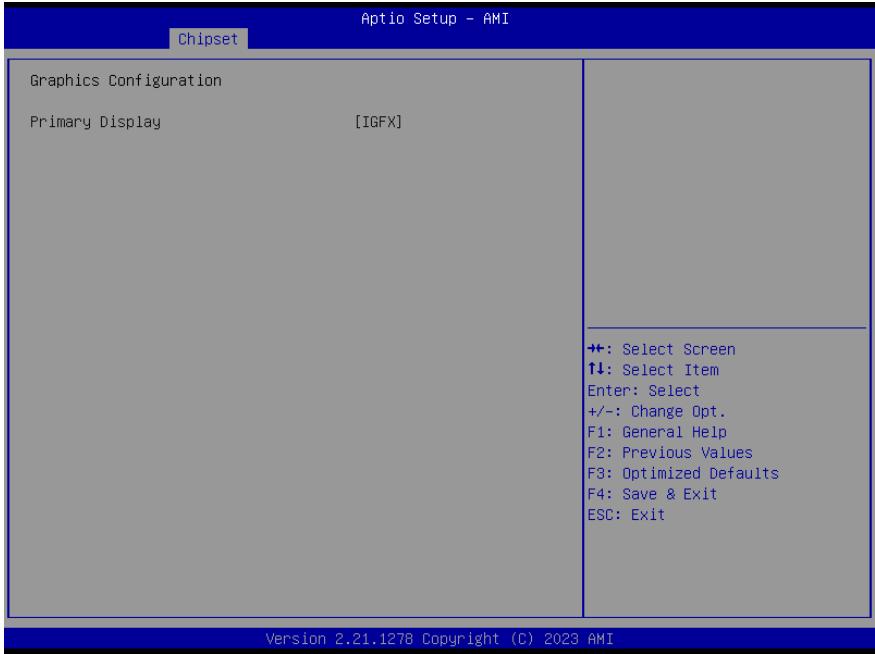
3.5.1 System Agent (SA) Configuration



3.5.1.1 Memory Configuration



3.5.1.2 Graphics Configuration



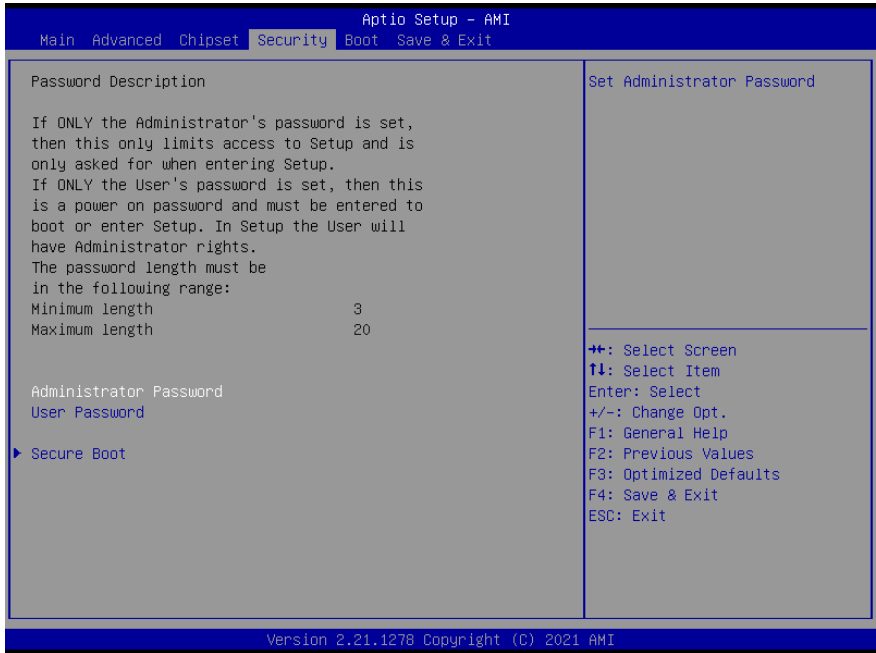
Options Summary		
Internal Graphics	Auto	Optimal Default, Failsafe Default
	Disabled	
	Enabled	
Keep IGFX enabled based on the setup options.		

3.5.2 PCH-IO Configuration



Options Summary		
HD Audio	Enabled	Optimal Default, Failsafe Default
	Disabled	
Control Detection of the HD-Audio device. Disabled = HDA will be unconditionally disabled. Enabled = HDA will be unconditionally enabled.		
Full-MiniCard Slot Function (CN11)	SATA	Optimal Default, Failsafe Default
	PCIe	
Select function enabled for Full-MiniCard (CN11) Slot.		

3.6 Setup Submenu: Security



Change User/Supervisor Password

You can install a Supervisor password, and if you install a supervisor password, you can then install a user password. A user password does not provide access to many of the features in the Setup utility.

If you highlight these items and press Enter, a dialog box appears which lets you enter a password. You can enter no more than six letters or numbers. Press Enter after you have typed in the password. A second dialog box asks you to retype the password for confirmation. Press Enter after you have retyped it correctly. The password is required at boot time, or when the user enters the Setup utility.

Removing the Password

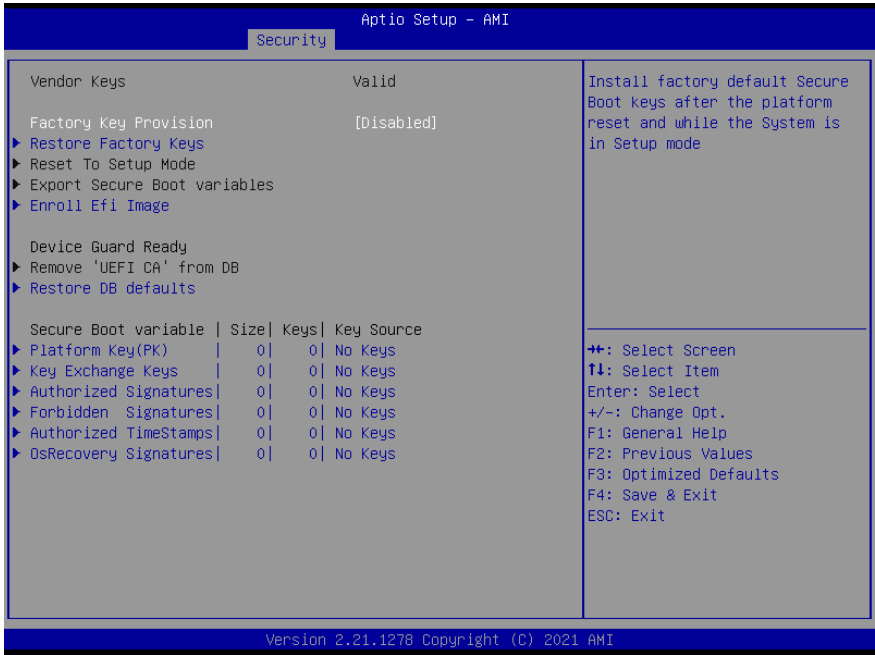
Highlight this item and type in the current password. At the next dialog box press Enter to disable password protection.

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	Standard	
	Custom	Optimal Default, Failsafe Default
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	
Install factory default Secure Boot keys after the platform reset and while the System is in Setup mode.		
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.

Secure Boot Variables

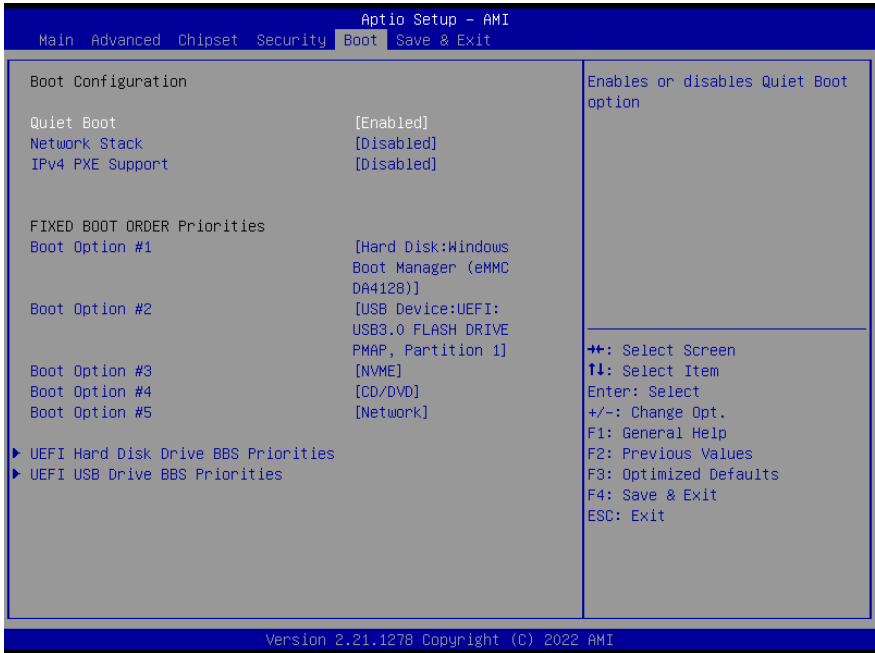
Enroll Factory Defaults or load certificates from a file:

1. Public Key Certificate in:
 - a) EFI_SIGNATURE_LIST
 - b) EFI_CERT_X509 (DER encoded)
 - c) EFI_CERT_RSA2048 (bin)
 - d) EFI_CERT_SHAXXX
2. Authenticated UEFI Variable
3. EFI PE/COFF Image (SHA256)

Key Source:

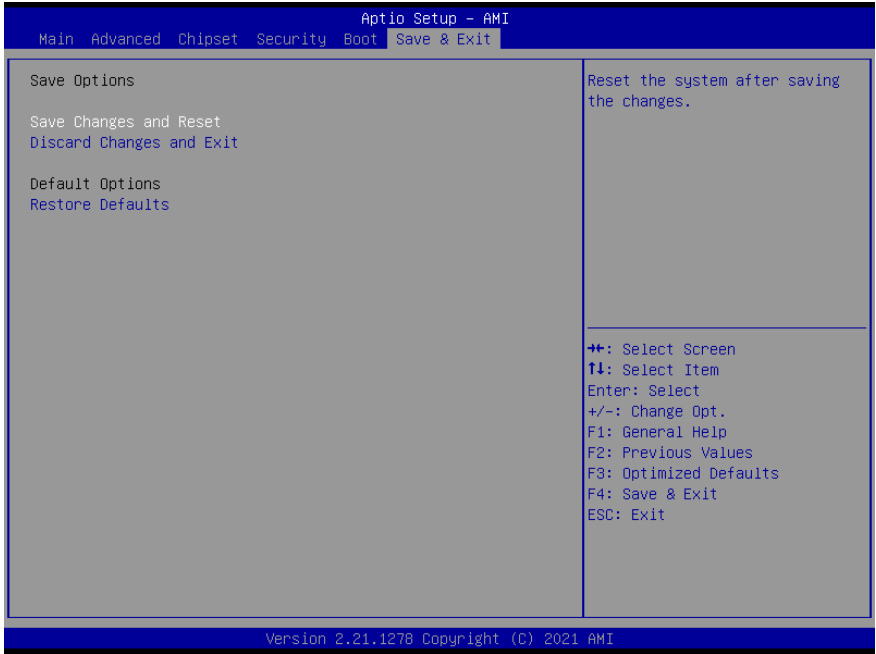
Default, External, Mixed.

3.7 Setup Submenu: Boot



Options Summary		
Quiet Boot	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enable or Disable Quiet Boot option.		
Network Stack	Disabled	Optimal Default, Failsafe Default
	Enabled	
Enable/Disable UEFI Network Stack.		
IPv4 PXE Support	Disabled	Optimal Default, Failsafe Default
	Enabled	
Enable/Disable IPv4 PXE boot support. If disabled, IPv4 PXE boot support will not be available.		
FIXED BOOT ORDER Priorities		
Sets the system boot order.		

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

Drivers Installation

4.1 Drivers Download and Installation

Drivers for the PICO-EHL4-SEMI 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 Driver

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

Install Graphics Driver

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

Install LAN Driver

1. Open the **LAN** folder.
2. Run the **Install_Win10_10050_08132021.exe** file
3. Follow the instructions
4. Driver will be installed automatically

Install ME Driver

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

Install Serial IO Drivers

1. Open the **Serial IO** folder.
2. Follow the information provided in the **.inf** file for each I/O function to manually install drivers

Install Peripheral Drivers

1. Open the **Peripheral Drivers** folder.
2. Follow the information provided in the **.inf** files for to manually install drivers

For Linux Peripheral Drivers, follow the instructions included in the file to download and install the relevant drivers.

Appendix A

Mating Connectors

A.1 List of Mating Connectors and Cables

The following table lists mating connectors and available cables.

Conn Label	Function	Mating Connector		Available Cable	AAEON Cable P/N
		Vendor	Model no		
CN1	RTC Battery	Molex	51021-0200	Battery Cable	175011301C
CN15	COM Header	JST	SHDR-20V-S-B	COM Port Cable	170X000654
CN20	Power Input	Molex	19211-0003	Power Cable	170204010R
CN21	Front Panel	ACES	50247-010H0H0-001	Front Panel Cable	1709100108
CN22	DC Jack Power Input	HUANG JI	5525C257-3T00-R1-7.5	Power Cable	1702041004

Appendix B



















































I/O Information

B.1 Direct Memory Access (DMA) Map

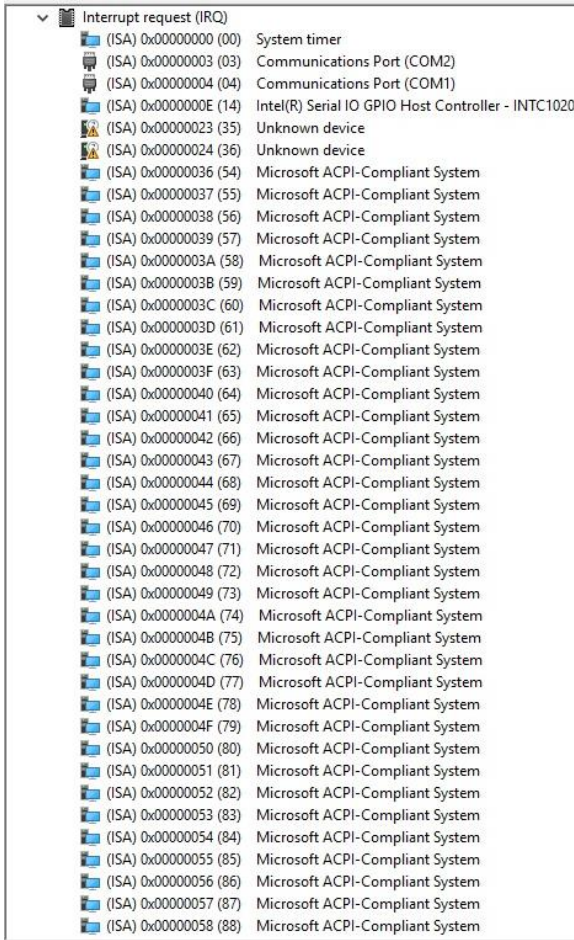
```

    Desktop - NRBQB4H
    - Direct memory access (DMA)
      - 0 Intel(R) Serial IO I2C Host Controller - 4BB9
      - 0 Intel(R) Serial IO SPI Host Controller - 4B84
      - 0 Intel(R) Serial IO UART Host Controller - 4B96
      - 1 Intel(R) Serial IO I2C Host Controller - 4BB9
      - 1 Intel(R) Serial IO SPI Host Controller - 4B84
      - 1 Intel(R) Serial IO UART Host Controller - 4B96
      - 2 Intel(R) Serial IO I2C Host Controller - 4BBA
      - 2 Intel(R) Serial IO UART Host Controller - 4B97
      - 3 Intel(R) Serial IO I2C Host Controller - 4BBA
      - 3 Intel(R) Serial IO UART Host Controller - 4B97
      - 4 Intel(R) Serial IO I2C Host Controller - 4BBF
      - 5 Intel(R) Serial IO I2C Host Controller - 4BBF
      - 6 Intel(R) Serial IO I2C Host Controller - 4BC0
      - 7 Intel(R) Serial IO I2C Host Controller - 4BC0
    - Input/output (IO)
    - Interrupt request (IRQ)
    - Large Memory
    - Memory
  
```











































B.2 I/O Address Map











































Input/output (I/O)		
	[0000000000000000 - 000000000000CF7]	PCI Express Root Complex
	[0000000000000020 - 000000000000021]	Programmable interrupt controller
	[0000000000000024 - 000000000000025]	Programmable interrupt controller
	[0000000000000028 - 000000000000029]	Programmable interrupt controller
	[000000000000002C - 00000000000002D]	Programmable interrupt controller
	[000000000000002E - 00000000000002F]	Motherboard resources
	[0000000000000030 - 000000000000031]	Programmable interrupt controller
	[0000000000000034 - 000000000000035]	Programmable interrupt controller
	[0000000000000038 - 000000000000039]	Programmable interrupt controller
	[000000000000003C - 00000000000003D]	Programmable interrupt controller
	[0000000000000040 - 000000000000043]	System timer
	[000000000000004E - 00000000000004F]	Motherboard resources
	[0000000000000050 - 000000000000053]	System timer
	[0000000000000061 - 000000000000061]	Motherboard resources
	[0000000000000063 - 000000000000063]	Motherboard resources
	[0000000000000065 - 000000000000065]	Motherboard resources
	[0000000000000067 - 000000000000067]	Motherboard resources
	[0000000000000070 - 000000000000070]	Motherboard resources
	[0000000000000080 - 000000000000080]	Motherboard resources
	[0000000000000092 - 000000000000092]	Motherboard resources
	[00000000000000A0 - 0000000000000A1]	Programmable interrupt controller
	[00000000000000A4 - 0000000000000A5]	Programmable interrupt controller
	[00000000000000A8 - 0000000000000A9]	Programmable interrupt controller
	[00000000000000AC - 0000000000000AD]	Programmable interrupt controller
	[00000000000000B0 - 0000000000000B1]	Programmable interrupt controller
	[00000000000000B2 - 0000000000000B3]	Motherboard resources
	[00000000000000B4 - 0000000000000B5]	Programmable interrupt controller
	[00000000000000B8 - 0000000000000B9]	Programmable interrupt controller
	[00000000000000BC - 0000000000000BD]	Programmable interrupt controller
	[00000000000002F8 - 0000000000002FF]	Communications Port (COM2)
	[00000000000003F8 - 0000000000003FF]	Communications Port (COM1)
	[00000000000004D0 - 0000000000004D1]	Programmable interrupt controller
	[0000000000000680 - 00000000000069F]	Motherboard resources
	[0000000000000A00 - 000000000000A0F]	Motherboard resources
	[0000000000000A10 - 000000000000A1F]	Motherboard resources
	[0000000000000A20 - 000000000000A2F]	Motherboard resources
	[0000000000000D00 - 000000000000FFFF]	PCI Express Root Complex
	[000000000000164E - 000000000000164F]	Motherboard resources
	[0000000000001800 - 00000000000018FE]	Motherboard resources
	[0000000000001854 - 0000000000001857]	Motherboard resources
	[0000000000002000 - 00000000000020FE]	Motherboard resources
	[0000000000003000 - 00000000000030FF]	Realtek PCIe GbE Family Controller
	[0000000000003000 - 0000000000003FFF]	Intel(R) PCI Express Root Port #3 - 4B3B
	[0000000000004000 - 00000000000040FF]	Realtek PCIe GbE Family Controller #2
	[0000000000004000 - 0000000000004FFF]	Intel(R) PCI Express Root Port #0 - 4B38
	[0000000000005000 - 000000000000503F]	Intel(R) UHD Graphics
	[0000000000005060 - 000000000000507F]	Standard SATA AHCI Controller
	[0000000000005080 - 0000000000005083]	Standard SATA AHCI Controller
	[0000000000005090 - 0000000000005097]	Standard SATA AHCI Controller
	[000000000000EFA0 - 000000000000EFBF]	Intel(R) SMBus Controller - 4B23











































B.3 IRQ Mapping Chart























































































Device Name	IRQ
System timer	(ISA) 0x00000000 (00)
Communications Port (COM2)	(ISA) 0x00000003 (03)
Communications Port (COM1)	(ISA) 0x00000004 (04)
Intel(R) Serial IO GPIO Host Controller - INTCT1020	(ISA) 0x0000000E (14)
Unknown device	(ISA) 0x00000023 (35)
Unknown device	(ISA) 0x00000024 (36)
Microsoft ACPI-Compliant System	(ISA) 0x00000036 (54)
Microsoft ACPI-Compliant System	(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) 0x00000042 (66)
Microsoft ACPI-Compliant System	(ISA) 0x00000043 (67)
Microsoft ACPI-Compliant System	(ISA) 0x00000044 (68)
Microsoft ACPI-Compliant System	(ISA) 0x00000045 (69)
Microsoft ACPI-Compliant System	(ISA) 0x00000046 (70)
Microsoft ACPI-Compliant System	(ISA) 0x00000047 (71)
Microsoft ACPI-Compliant System	(ISA) 0x00000048 (72)
Microsoft ACPI-Compliant System	(ISA) 0x00000049 (73)
Microsoft ACPI-Compliant System	(ISA) 0x0000004A (74)
Microsoft ACPI-Compliant System	(ISA) 0x0000004B (75)
Microsoft ACPI-Compliant System	(ISA) 0x0000004C (76)
Microsoft ACPI-Compliant System	(ISA) 0x0000004D (77)
Microsoft ACPI-Compliant System	(ISA) 0x0000004E (78)
Microsoft ACPI-Compliant System	(ISA) 0x0000004F (79)
Microsoft ACPI-Compliant System	(ISA) 0x00000050 (80)
Microsoft ACPI-Compliant System	(ISA) 0x00000051 (81)
Microsoft ACPI-Compliant System	(ISA) 0x00000052 (82)
Microsoft ACPI-Compliant System	(ISA) 0x00000053 (83)
Microsoft ACPI-Compliant System	(ISA) 0x00000054 (84)
Microsoft ACPI-Compliant System	(ISA) 0x00000055 (85)
Microsoft ACPI-Compliant System	(ISA) 0x00000056 (86)
Microsoft ACPI-Compliant System	(ISA) 0x00000057 (87)
Microsoft ACPI-Compliant System	(ISA) 0x00000058 (88)











































 (ISA) 0x00000058 (88)	Microsoft ACPI-Compliant System
 (ISA) 0x00000059 (89)	Microsoft ACPI-Compliant System
 (ISA) 0x0000005A (90)	Microsoft ACPI-Compliant System
 (ISA) 0x0000005B (91)	Microsoft ACPI-Compliant System
 (ISA) 0x0000005C (92)	Microsoft ACPI-Compliant System
 (ISA) 0x0000005D (93)	Microsoft ACPI-Compliant System
 (ISA) 0x0000005E (94)	Microsoft ACPI-Compliant System
 (ISA) 0x0000005F (95)	Microsoft ACPI-Compliant System
 (ISA) 0x00000060 (96)	Microsoft ACPI-Compliant System
 (ISA) 0x00000061 (97)	Microsoft ACPI-Compliant System
 (ISA) 0x00000062 (98)	Microsoft ACPI-Compliant System
 (ISA) 0x00000063 (99)	Microsoft ACPI-Compliant System
 (ISA) 0x00000064 (100)	Microsoft ACPI-Compliant System
 (ISA) 0x00000065 (101)	Microsoft ACPI-Compliant System
 (ISA) 0x00000066 (102)	Microsoft ACPI-Compliant System
 (ISA) 0x00000067 (103)	Microsoft ACPI-Compliant System
 (ISA) 0x00000068 (104)	Microsoft ACPI-Compliant System
 (ISA) 0x00000069 (105)	Microsoft ACPI-Compliant System
 (ISA) 0x0000006A (106)	Microsoft ACPI-Compliant System
 (ISA) 0x0000006B (107)	Microsoft ACPI-Compliant System
 (ISA) 0x0000006C (108)	Microsoft ACPI-Compliant System
 (ISA) 0x0000006D (109)	Microsoft ACPI-Compliant System
 (ISA) 0x0000006E (110)	Microsoft ACPI-Compliant System
 (ISA) 0x0000006F (111)	Microsoft ACPI-Compliant System
 (ISA) 0x00000070 (112)	Microsoft ACPI-Compliant System
 (ISA) 0x00000071 (113)	Microsoft ACPI-Compliant System
 (ISA) 0x00000072 (114)	Microsoft ACPI-Compliant System
 (ISA) 0x00000073 (115)	Microsoft ACPI-Compliant System
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 (ISA) 0x00000079 (121)	Microsoft ACPI-Compliant System
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 (ISA) 0x0000007B (123)	Microsoft ACPI-Compliant System
 (ISA) 0x0000007C (124)	Microsoft ACPI-Compliant System
 (ISA) 0x0000007D (125)	Microsoft ACPI-Compliant System
 (ISA) 0x0000007E (126)	Microsoft ACPI-Compliant System
 (ISA) 0x0000007F (127)	Microsoft ACPI-Compliant System
 (ISA) 0x00000080 (128)	Microsoft ACPI-Compliant System
 (ISA) 0x00000081 (129)	Microsoft ACPI-Compliant System











































 (ISA) 0x00000080 (128)	Microsoft ACPI-Compliant System
 (ISA) 0x00000081 (129)	Microsoft ACPI-Compliant System
 (ISA) 0x00000082 (130)	Microsoft ACPI-Compliant System
 (ISA) 0x00000083 (131)	Microsoft ACPI-Compliant System
 (ISA) 0x00000084 (132)	Microsoft ACPI-Compliant System
 (ISA) 0x00000085 (133)	Microsoft ACPI-Compliant System
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 (ISA) 0x00000087 (135)	Microsoft ACPI-Compliant System
 (ISA) 0x00000088 (136)	Microsoft ACPI-Compliant System
 (ISA) 0x00000089 (137)	Microsoft ACPI-Compliant System
 (ISA) 0x0000008A (138)	Microsoft ACPI-Compliant System
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 (ISA) 0x0000008C (140)	Microsoft ACPI-Compliant System
 (ISA) 0x0000008D (141)	Microsoft ACPI-Compliant System
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 (ISA) 0x0000008F (143)	Microsoft ACPI-Compliant System
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 (ISA) 0x000000A3 (163)	Microsoft ACPI-Compliant System
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 (ISA) 0x000000A5 (165)	Microsoft ACPI-Compliant System
 (ISA) 0x000000A6 (166)	Microsoft ACPI-Compliant System
 (ISA) 0x000000A7 (167)	Microsoft ACPI-Compliant System
 (ISA) 0x000000A8 (168)	Microsoft ACPI-Compliant System
 (ISA) 0x000000A9 (169)	Microsoft ACPI-Compliant System











































 (ISA) 0x000000A8 (168)	Microsoft ACPI-Compliant System
 (ISA) 0x000000A9 (169)	Microsoft ACPI-Compliant System
 (ISA) 0x000000AA (170)	Microsoft ACPI-Compliant System
 (ISA) 0x000000AB (171)	Microsoft ACPI-Compliant System
 (ISA) 0x000000AC (172)	Microsoft ACPI-Compliant System
 (ISA) 0x000000AD (173)	Microsoft ACPI-Compliant System
 (ISA) 0x000000AE (174)	Microsoft ACPI-Compliant System
 (ISA) 0x000000AF (175)	Microsoft ACPI-Compliant System
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 (ISA) 0x000000B2 (178)	Microsoft ACPI-Compliant System
 (ISA) 0x000000B3 (179)	Microsoft ACPI-Compliant System
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 (ISA) 0x00000102 (258)	Microsoft ACPI-Compliant System
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 (ISA) 0x00000103 (259)	Microsoft ACPI-Compliant System
 (ISA) 0x00000104 (260)	Microsoft ACPI-Compliant System
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 (ISA) 0x0000012C (300)	Microsoft ACPI-Compliant System











































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	(ISA) 0x0000015A (346)	Microsoft ACPI-Compliant System
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	(ISA) 0x00000166 (358)	Microsoft ACPI-Compliant System
	(ISA) 0x00000167 (359)	Microsoft ACPI-Compliant System
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	(ISA) 0x00000169 (361)	Microsoft ACPI-Compliant System
	(ISA) 0x0000016A (362)	Microsoft ACPI-Compliant System
	(ISA) 0x0000016B (363)	Microsoft ACPI-Compliant System
	(ISA) 0x0000016C (364)	Microsoft ACPI-Compliant System
	(ISA) 0x0000016D (365)	Microsoft ACPI-Compliant System
	(ISA) 0x0000016E (366)	Microsoft ACPI-Compliant System
	(ISA) 0x0000016F (367)	Microsoft ACPI-Compliant System
	(ISA) 0x00000170 (368)	Microsoft ACPI-Compliant System
	(ISA) 0x00000171 (369)	Microsoft ACPI-Compliant System
	(ISA) 0x00000172 (370)	Microsoft ACPI-Compliant System
	(ISA) 0x00000173 (371)	Microsoft ACPI-Compliant System
	(ISA) 0x00000174 (372)	Microsoft ACPI-Compliant System
	(ISA) 0x00000175 (373)	Microsoft ACPI-Compliant System
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	(ISA) 0x00000177 (375)	Microsoft ACPI-Compliant System
	(ISA) 0x00000178 (376)	Microsoft ACPI-Compliant System
	(ISA) 0x00000179 (377)	Microsoft ACPI-Compliant System
	(ISA) 0x0000017A (378)	Microsoft ACPI-Compliant System
	(ISA) 0x0000017B (379)	Microsoft ACPI-Compliant System
	(ISA) 0x0000017C (380)	Microsoft ACPI-Compliant System
	(ISA) 0x0000017D (381)	Microsoft ACPI-Compliant System

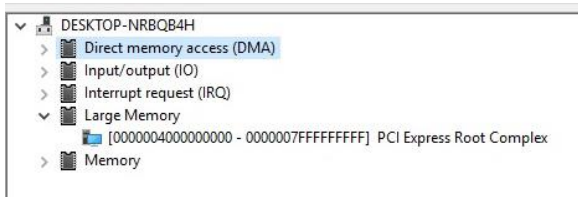
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 (ISA) 0x0000018B (395)	Microsoft ACPI-Compliant System
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 (ISA) 0x0000018D (397)	Microsoft ACPI-Compliant System
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 (ISA) 0x00000191 (401)	Microsoft ACPI-Compliant System
 (ISA) 0x00000192 (402)	Microsoft ACPI-Compliant System
 (ISA) 0x00000193 (403)	Microsoft ACPI-Compliant System
 (ISA) 0x00000194 (404)	Microsoft ACPI-Compliant System
 (ISA) 0x00000195 (405)	Microsoft ACPI-Compliant System
 (ISA) 0x00000196 (406)	Microsoft ACPI-Compliant System
 (ISA) 0x00000197 (407)	Microsoft ACPI-Compliant System
 (ISA) 0x00000198 (408)	Microsoft ACPI-Compliant System
 (ISA) 0x00000199 (409)	Microsoft ACPI-Compliant System
 (ISA) 0x0000019A (410)	Microsoft ACPI-Compliant System
 (ISA) 0x0000019B (411)	Microsoft ACPI-Compliant System
 (ISA) 0x0000019C (412)	Microsoft ACPI-Compliant System
 (ISA) 0x0000019D (413)	Microsoft ACPI-Compliant System
 (ISA) 0x0000019E (414)	Microsoft ACPI-Compliant System
 (ISA) 0x0000019F (415)	Microsoft ACPI-Compliant System
 (ISA) 0x000001A0 (416)	Microsoft ACPI-Compliant System
 (ISA) 0x000001A1 (417)	Microsoft ACPI-Compliant System
 (ISA) 0x000001A2 (418)	Microsoft ACPI-Compliant System
 (ISA) 0x000001A3 (419)	Microsoft ACPI-Compliant System
 (ISA) 0x000001A4 (420)	Microsoft ACPI-Compliant System
 (ISA) 0x000001A5 (421)	Microsoft ACPI-Compliant System

 (ISA) 0x000001A4 (420)	Microsoft ACPI-Compliant System
 (ISA) 0x000001A5 (421)	Microsoft ACPI-Compliant System
 (ISA) 0x000001A6 (422)	Microsoft ACPI-Compliant System
 (ISA) 0x000001A7 (423)	Microsoft ACPI-Compliant System
 (ISA) 0x000001A8 (424)	Microsoft ACPI-Compliant System
 (ISA) 0x000001A9 (425)	Microsoft ACPI-Compliant System
 (ISA) 0x000001AA (426)	Microsoft ACPI-Compliant System
 (ISA) 0x000001AB (427)	Microsoft ACPI-Compliant System
 (ISA) 0x000001AC (428)	Microsoft ACPI-Compliant System
 (ISA) 0x000001AD (429)	Microsoft ACPI-Compliant System
 (ISA) 0x000001AE (430)	Microsoft ACPI-Compliant System
 (ISA) 0x000001AF (431)	Microsoft ACPI-Compliant System
 (ISA) 0x000001B0 (432)	Microsoft ACPI-Compliant System
 (ISA) 0x000001B1 (433)	Microsoft ACPI-Compliant System
 (ISA) 0x000001B2 (434)	Microsoft ACPI-Compliant System
 (ISA) 0x000001B3 (435)	Microsoft ACPI-Compliant System
 (ISA) 0x000001B4 (436)	Microsoft ACPI-Compliant System
 (ISA) 0x000001B5 (437)	Microsoft ACPI-Compliant System
 (ISA) 0x000001B6 (438)	Microsoft ACPI-Compliant System
 (ISA) 0x000001B7 (439)	Microsoft ACPI-Compliant System
 (ISA) 0x000001B8 (440)	Microsoft ACPI-Compliant System
 (ISA) 0x000001B9 (441)	Microsoft ACPI-Compliant System
 (ISA) 0x000001BA (442)	Microsoft ACPI-Compliant System
 (ISA) 0x000001BB (443)	Microsoft ACPI-Compliant System
 (ISA) 0x000001BC (444)	Microsoft ACPI-Compliant System
 (ISA) 0x000001BD (445)	Microsoft ACPI-Compliant System
 (ISA) 0x000001BE (446)	Microsoft ACPI-Compliant System
 (ISA) 0x000001BF (447)	Microsoft ACPI-Compliant System
 (ISA) 0x000001C0 (448)	Microsoft ACPI-Compliant System
 (ISA) 0x000001C1 (449)	Microsoft ACPI-Compliant System
 (ISA) 0x000001C2 (450)	Microsoft ACPI-Compliant System
 (ISA) 0x000001C3 (451)	Microsoft ACPI-Compliant System
 (ISA) 0x000001C4 (452)	Microsoft ACPI-Compliant System
 (ISA) 0x000001C5 (453)	Microsoft ACPI-Compliant System
 (ISA) 0x000001C6 (454)	Microsoft ACPI-Compliant System
 (ISA) 0x000001C7 (455)	Microsoft ACPI-Compliant System
 (ISA) 0x000001C8 (456)	Microsoft ACPI-Compliant System
 (ISA) 0x000001C9 (457)	Microsoft ACPI-Compliant System
 (ISA) 0x000001CA (458)	Microsoft ACPI-Compliant System
 (ISA) 0x000001CB (459)	Microsoft ACPI-Compliant System
 (ISA) 0x000001CC (460)	Microsoft ACPI-Compliant System
 (ISA) 0x000001CD (461)	Microsoft ACPI-Compliant System

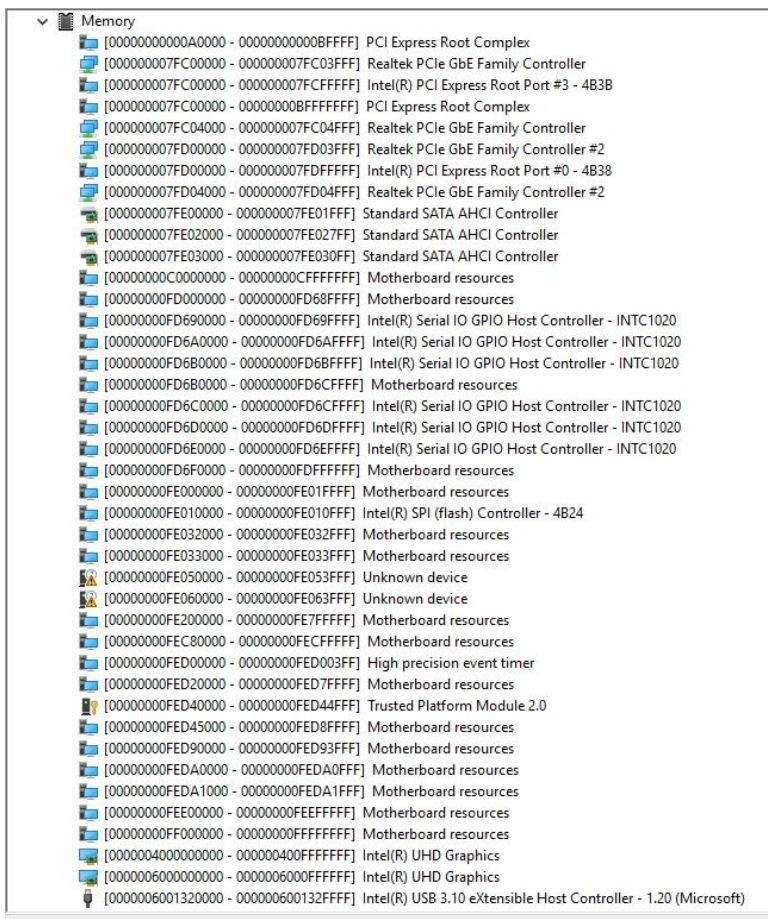
 (ISA) 0x000001CC (460)	Microsoft ACPI-Compliant System
 (ISA) 0x000001CD (461)	Microsoft ACPI-Compliant System
 (ISA) 0x000001CE (462)	Microsoft ACPI-Compliant System
 (ISA) 0x000001CF (463)	Microsoft ACPI-Compliant System
 (ISA) 0x000001D0 (464)	Microsoft ACPI-Compliant System
 (ISA) 0x000001D1 (465)	Microsoft ACPI-Compliant System
 (ISA) 0x000001D2 (466)	Microsoft ACPI-Compliant System
 (ISA) 0x000001D3 (467)	Microsoft ACPI-Compliant System
 (ISA) 0x000001D4 (468)	Microsoft ACPI-Compliant System
 (ISA) 0x000001D5 (469)	Microsoft ACPI-Compliant System
 (ISA) 0x000001D6 (470)	Microsoft ACPI-Compliant System
 (ISA) 0x000001D7 (471)	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) 0x00001EF (495)	Microsoft ACPI-Compliant System
 (ISA) 0x00001F0 (496)	Microsoft ACPI-Compliant System
 (ISA) 0x00001F1 (497)	Microsoft ACPI-Compliant System
 (ISA) 0x00001F2 (498)	Microsoft ACPI-Compliant System
 (ISA) 0x00001F3 (499)	Microsoft ACPI-Compliant System
 (ISA) 0x00001F4 (500)	Microsoft ACPI-Compliant System
 (ISA) 0x00001F5 (501)	Microsoft ACPI-Compliant System
 (ISA) 0x00001F6 (502)	Microsoft ACPI-Compliant System
 (ISA) 0x00001F7 (503)	Microsoft ACPI-Compliant System
 (ISA) 0x00001F8 (504)	Microsoft ACPI-Compliant System
 (ISA) 0x00001F9 (505)	Microsoft ACPI-Compliant System
 (ISA) 0x00001FA (506)	Microsoft ACPI-Compliant System
 (ISA) 0x00001FB (507)	Microsoft ACPI-Compliant System
 (ISA) 0x00001FC (508)	Microsoft ACPI-Compliant System
 (ISA) 0x00001FD (509)	Microsoft ACPI-Compliant System
 (ISA) 0x00001FE (510)	Microsoft ACPI-Compliant System
 (ISA) 0x00001FF (511)	Microsoft ACPI-Compliant System
 (PCI) 0x00000010 (16)	High Definition Audio Controller
 (PCI) 0x00000010 (16)	Intel SD Host Controller
 (PCI) 0x00000010 (16)	Intel(R) Serial IO I2C Host Controller - 4B44
 (PCI) 0x00000011 (17)	Intel(R) Serial IO I2C Host Controller - 4B45
 (PCI) 0xFFFFFEC (-20)	Intel(R) Serial IO I2C Host Controller - 4B8A
 (PCI) 0xFFFFFED (-19)	Intel(R) Serial IO I2C Host Controller - 4BB9
 (PCI) 0xFFFFFEE (-18)	Intel(R) Serial IO I2C Host Controller - 4BC0
 (PCI) 0xFFFFFEF (-17)	Intel(R) Management Engine Interface #1
 (PCI) 0xFFFFFFF0 (-16)	Intel(R) Serial IO I2C Host Controller - 4BBF
 (PCI) 0xFFFFFFF1 (-15)	Intel(R) Serial IO SPI Host Controller - 4B84
 (PCI) 0xFFFFFFF2 (-14)	Intel(R) Serial IO UART Host Controller - 4B97
 (PCI) 0xFFFFFFF3 (-13)	Intel(R) Serial IO UART Host Controller - 4B96
 (PCI) 0xFFFFFFF4 (-12)	Intel(R) Integrated Sensor Solution
 (PCI) 0xFFFFFFF5 (-11)	Intel(R) USB 3.10 eXtensible Host Controller - 1.20 (Microsoft)
 (PCI) 0xFFFFFFF6 (-10)	Intel(R) UHD Graphics
 (PCI) 0xFFFFFFF7 (-9)	Realtek PCIe GbE Family Controller #2
 (PCI) 0xFFFFFFF8 (-8)	Realtek PCIe GbE Family Controller
 (PCI) 0xFFFFFFF9 (-7)	Standard SATA AHCI Controller
 (PCI) 0xFFFFF0FA (-6)	Intel(R) PCI Express Root Port #6 - 4B3E
 (PCI) 0xFFFFF0FB (-5)	Intel(R) PCI Express Root Port #2 - 4B3A
 (PCI) 0xFFFFF0FC (-4)	Intel(R) PCI Express Root Port #1 - 4B39
 (PCI) 0xFFFFF0FD (-3)	Intel(R) PCI Express Root Port #3 - 4B3B
 (PCI) 0xFFFFF0FE (-2)	Intel(R) PCI Express Root Port #0 - 4B38
 Large Memory	
 Memory	











































B.4 Large Memory Map



B.5 Memory Address Map



Address Range	Device Name
[0000000000A00000 - 0000000000BFFFFF]	PCI Express Root Complex
[000000007FC00000 - 000000007FC03FFF]	Realtek PCIe GbE Family Controller
[000000007FC00000 - 000000007FCFFFFF]	Intel(R) PCI Express Root Port #3 - 4B3B
[000000007FC00000 - 00000000BFFFFFFF]	PCI Express Root Complex
[000000007FC04000 - 000000007FC04FFF]	Realtek PCIe GbE Family Controller
[000000007FD00000 - 000000007FD03FFF]	Realtek PCIe GbE Family Controller #2
[000000007FD00000 - 000000007FD0FFFF]	Intel(R) PCI Express Root Port #0 - 4B38
[000000007FD04000 - 000000007FD04FFF]	Realtek PCIe GbE Family Controller #2
[000000007FE00000 - 000000007FE01FFF]	Standard SATA AHCI Controller
[000000007FE02000 - 000000007FE027FF]	Standard SATA AHCI Controller
[000000007FE03000 - 000000007FE030FF]	Standard SATA AHCI Controller
[00000000C0000000 - 00000000CFFFFFFF]	Motherboard resources
[00000000FD000000 - 00000000FD68FFFF]	Motherboard resources
[00000000FD690000 - 00000000FD69FFFF]	Intel(R) Serial IO GPIO Host Controller - INT1020
[00000000FD6A0000 - 00000000FD6AFFFF]	Intel(R) Serial IO GPIO Host Controller - INT1020
[00000000FD6B0000 - 00000000FD6BFFFF]	Intel(R) Serial IO GPIO Host Controller - INT1020
[00000000FD6B0000 - 00000000FD6CFFFF]	Motherboard resources
[00000000FD6C0000 - 00000000FD6CFFFF]	Intel(R) Serial IO GPIO Host Controller - INT1020
[00000000FD6D0000 - 00000000FD6DFFFF]	Intel(R) Serial IO GPIO Host Controller - INT1020
[00000000FD6E0000 - 00000000FD6EFFFF]	Intel(R) Serial IO GPIO Host Controller - INT1020
[00000000FD6F0000 - 00000000FDFFFFFF]	Motherboard resources
[00000000FE000000 - 00000000FE01FFFF]	Motherboard resources
[00000000FE010000 - 00000000FE010FFF]	Intel(R) SPI (flash) Controller - 4B24
[00000000FE032000 - 00000000FE032FFF]	Motherboard resources
[00000000FE033000 - 00000000FE033FFF]	Motherboard resources
[00000000FE050000 - 00000000FE053FFF]	Unknown device
[00000000FE060000 - 00000000FE063FFF]	Unknown device
[00000000FE200000 - 00000000FE7FFFFF]	Motherboard resources
[00000000FEC80000 - 00000000FECFFFFFFF]	Motherboard resources
[00000000FED00000 - 00000000FED003FF]	High precision event timer
[00000000FED20000 - 00000000FED7FFFF]	Motherboard resources
[00000000FED40000 - 00000000FED44FFF]	Trusted Platform Module 2.0
[00000000FED45000 - 00000000FED8FFFF]	Motherboard resources
[00000000FED90000 - 00000000FED93FFF]	Motherboard resources
[00000000FEDA0000 - 00000000FEDA0FFF]	Motherboard resources
[00000000FEDA1000 - 00000000FEDA1FFF]	Motherboard resources
[00000000FEE00000 - 00000000FEEFFFFFFF]	Motherboard resources
[00000000FF000000 - 00000000FFFFFFF]	Motherboard resources
[0000000400000000 - 0000000400FFFFFFF]	Intel(R) UHD Graphics
[0000000600000000 - 0000000600FFFFFFF]	Intel(R) UHD Graphics
[00000006001320000 - 0000000600132FFFFF]	Intel(R) USB 3.10 eXtensible Host Controller - 1.20 (Microsoft)

	[00000000FD6A0000 - 00000000FD6AFFFF]	Intel(R) Serial IO GPIO Host Controller - INTC1020
	[00000000FD6B0000 - 00000000FD6BFFFF]	Intel(R) Serial IO GPIO Host Controller - INTC1020
	[00000000FD6C0000 - 00000000FD6CFFFF]	Motherboard resources
	[00000000FD6C0000 - 00000000FD6CFFFF]	Intel(R) Serial IO GPIO Host Controller - INTC1020
	[00000000FD6D0000 - 00000000FD6DFFFF]	Intel(R) Serial IO GPIO Host Controller - INTC1020
	[00000000FD6E0000 - 00000000FD6EFFFF]	Intel(R) Serial IO GPIO Host Controller - INTC1020
	[00000000FD6F0000 - 00000000FD6FFFFF]	Motherboard resources
	[00000000FE000000 - 00000000FE01FFFF]	Motherboard resources
	[00000000FE010000 - 00000000FE010FFF]	Intel(R) SPI (flash) Controller - 4B24
	[00000000FE032000 - 00000000FE032FFF]	Motherboard resources
	[00000000FE033000 - 00000000FE033FFF]	Motherboard resources
	[00000000FE050000 - 00000000FE053FFF]	Unknown device
	[00000000FE060000 - 00000000FE063FFF]	Unknown device
	[00000000FE200000 - 00000000FE7FFFFF]	Motherboard resources
	[00000000FEC80000 - 00000000FECFFFFF]	Motherboard resources
	[00000000FED00000 - 00000000FED003FF]	High precision event timer
	[00000000FED20000 - 00000000FED7FFFF]	Motherboard resources
	[00000000FED40000 - 00000000FED44FFF]	Trusted Platform Module 2.0
	[00000000FED45000 - 00000000FED8FFFF]	Motherboard resources
	[00000000FED90000 - 00000000FED93FFF]	Motherboard resources
	[00000000FEDA0000 - 00000000FEDA0FFF]	Motherboard resources
	[00000000FEDA1000 - 00000000FEDA1FFF]	Motherboard resources
	[00000000FEE00000 - 00000000FEEFFFFF]	Motherboard resources
	[00000000FF000000 - 00000000FFFFFFFF]	Motherboard resources
	[0000004000000000 - 0000004000000000]	Intel(R) UHD Graphics
	[0000006000000000 - 0000006000000000]	Intel(R) UHD Graphics
	[0000006001320000 - 000000600132FFFF]	Intel(R) USB 3.1o eXtensible Host Controller - 1.20 (Microsoft)
	[0000006001346000 - 00000060013460FF]	Intel(R) SMBus Controller - 4B23
	[0000006001349000 - 0000006001349FFF]	Intel SD Host Controller
	[0000007FFFCEB000 - 0000007FFFCEBFFF]	Intel(R) Management Engine Interface #1
	[0000007FFFCEC000 - 0000007FFFCECFFF]	Intel(R) Serial IO I2C Host Controller - 4B45
	[0000007FFFCE0000 - 0000007FFFCE0FFF]	Intel(R) Serial IO I2C Host Controller - 4B44
	[0000007FFFCEE000 - 0000007FFFCEEFFF]	Intel(R) Serial IO I2C Host Controller - 4BBA
	[0000007FFFCE0000 - 0000007FFFCE1FFF]	Intel(R) Serial IO I2C Host Controller - 4BB9
	[0000007FFFCE2000 - 0000007FFFCE3FFF]	Intel(R) Serial IO I2C Host Controller - 4BC0
	[0000007FFFCE4000 - 0000007FFFCE5FFF]	Intel(R) Serial IO I2C Host Controller - 4BBF
	[0000007FFFCE6000 - 0000007FFFCE7FFF]	Intel(R) Serial IO SPI Host Controller - 4B84
	[0000007FFFCE8000 - 0000007FFFCE9FFF]	Intel(R) Serial IO UART Host Controller - 4B97
	[0000007FFFCEA000 - 0000007FFFCEBFFF]	Intel(R) Serial IO UART Host Controller - 4B96
	[0000007FFFCE0000 - 0000007FFFCEFFFF]	High Definition Audio Controller
	[0000007FFFCE0000 - 0000007FFFCEFFFF]	High Definition Audio Controller
	[0000007FFFE00000 - 0000007FFFEFFFFF]	Intel(R) Integrated Sensor Solution

Appendix C

Watchdog Timer Programming

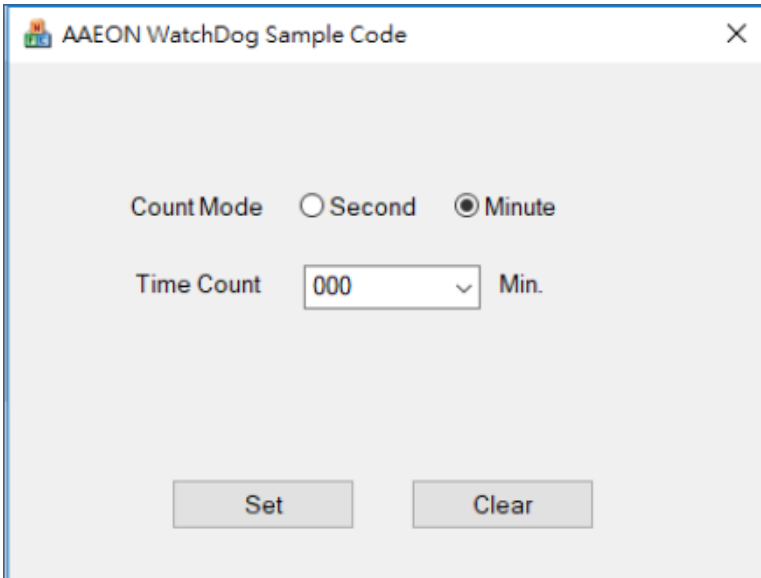
C.1 Introduction to Watchdog Timer

This section details how to set up and program the Watchdog Timer for your AAEON system or board. The watchdog timer is used to automatically detect malfunctions and recover the system. During normal operation, the system will regularly send a signal to reset the watchdog timer. If the system does not reset the watchdog timer, it will timeout and force the system into recovery and/or reboot.

The following sections refer to additional software used for programming your board, such as the AAEON Framework, AAEON SDK and AAEON Windows EAPI. If you need assistance with utilizing these tools, programming your Watchdog Timer, or would like additional documentation on these resources, contact your AAEON representative or visit our support page at <https://www.aaeon.com/en/support/>

C.2 Programing the Watchdog Timer with AAEON SDK

If you have installed the AAEON Framework, you can program the Watchdog Timer using the AAEON SDK. Simply locate where the SDK is installed, and double click the icon. The following dialog box will appear:



Count Mode: Set Watchdog Timer to count in minutes or seconds.

Time Count: The length of time (in minutes or seconds) before the Watchdog Timer will initiate a system recovery/ reboot.

Set: After selecting Count Mode and Time Count, this will save your changes and enable the Watchdog Timer function.

Clear: This will reset settings and disable the Watchdog Timer function.

C.3 Programing Watchdog Timer with AAEON Windows EAPI

AAEON Framework (KMDF Driver) must be installed before calling these functions.

EapiLibInitialize() should be the first to call before calling other EAPI functions.

EapiLibUnInitialize() should be called to release resources before program exit.

When building C/C++ apps, Lib (Library, aaeonEAPI.lib) is needed.

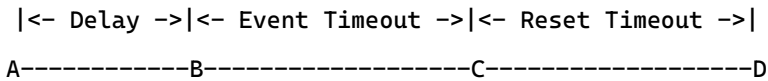
aaeonEAPI.lib is needed for C/C++ based app, make sure the lib files and executable files are in the same folder.

The following shows how to build and run codes:

There are two scenarios to invoke Watchdog Timer functions:

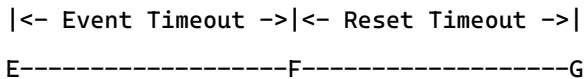
1. Use **EApiWDogStart**

After EApiWDogStart



2. Use **EApiWDogTrigger**

After EApiWDogTrigger



Stage A: Watchdog is started.

Stage B: Initial Delay Period.

Stage C/F: Event is triggered, NMI, IRQ, or PIN is Triggered. This allows for possible Software Recovery.

Stage D/G: System is reset.

Stage E: Watchdog is Triggered.

EapiWDogStop must be called before Stage C/F to prevent event from being generated.

EapiWDogStop must be called before Stage D/G to prevent system from being reset.

C.3.1 Watchdog Timer Functions

C.3.1.1 EapiWDogGetCap()

Command Line:

```
EapiWDogGetCap(...)
    __OUTOPT uint32_t *pMaxDelay,
    __OUTOPT uint32_t *pMaxEventTimeout,
    __OUTOPT uint32_t *pMaxResetTimeout
)
```

Use this command to get maximum Supported Delay / Supported Event Timeout / Supported Reset Timeout of the watchdog timer.

Parameters	Function Parameters
*pMaxDelay	Maximum Supported Delay in milliseconds
*pMaxEvenTimeout	Maximum Supported Event Timeout in milliseconds; 0 = Unsupported
*pMaxResetTimeout	Maximum Supported Reset Timeout in milliseconds
Condition	Return Values
Library Uninitialized	EAPI_STATUS_NOT_INITIALIZED
pMaxDelay == NULL && pMaxResetTimeout == NULL && pMaxEventTimeout == NULL	EAPI_STATUS_INVALID_PARAMETER
Common Error	Common Error Code
Others	EAPI_STATUS_SUCCESS

C.3.1.2 EapiWDogStart()

Command Line:

```
EapiWDogStart(  
    __IN uint32_t Delay,  
    __IN uint32_t Minute,  
    __IN uint32_t EventTimeout,  
    __IN uint32_t ResetTimeout  
)
```

Use this command to start the Watchdog Timer and set the timeout values.

To stop the Watchdog Timer, issue the command **EapiWDogStop**. After issuing EAPIWDogStop, the command EAPIWDogStart must be called again with new values to restart.

If the hardware implementation of the watchdog timer does not allow the user to select the exact time they want, the EAPI will select the next longer time setting available.

Parameters	Function Parameters
Delay	Delay in milliseconds
Minute	Control minutes or seconds
EventTimeout	Event Timeout in milliseconds
ResetTimeout	Reset Timeout in milliseconds
Condition	Return Values
Library Uninitialized	EAPI_STATUS_NOT_INITIALIZED
(Delay > gMaxDelay) (EventTimeout > gMaxEventTimeout) (ResetTimeout > gMaxResetTimeout)	EAPI_STATUS_INVALID_PARAMETER
Common Error	Common Error Code
Others	EAPI_STATUS_SUCCESS

C.3.1.3 EapiWDogTrigger()

Command Line:

EapiWDogTrigger()

Use this command to trigger the Watchdog Timer.

Parameters	Function Parameters
None	
Condition	Return Values
Library Uninitialized	EAPI_STATUS_NOT_INITIALIZED
Watchdog Not Started	EAPI_STATUS_ERROR
Common Error	Common Error Code
Others	EAPI_STATUS_SUCCESS

C.3.1.4 EapiWDogStop()

Command Line:

EapiWDogStop()

Use this command to close the Watchdog Instance. This will disable the Watchdog Timer and clear previous settings.

Parameters	Function Parameters
None	
Condition	Return Values
Library Uninitialized	EAPI_STATUS_NOT_INITIALIZED
Common Error	Common Error Code
Others	EAPI_STATUS_SUCCESS

C.3.1.5 EapiWDogReloadTimer()

Command Line:

```
EapiWDogReloadTimer()
```

Use this command to reload the Timeout count

Parameters	Function Parameters
None	
Condition	Return Values
Library Uninitialized	EAPI_STATUS_NOT_INITIALIZED
Common Error	Common Error Code
Others	EAPI_STATUS_SUCCESS

C.3.1.6 EapiWDogGetStatus()

Command Line:

```
EapiWDogGetStatus(  
    __OUTOPT uint32_t *pwdtMinute,  
    __OUTOPT uint32_t *pwdtCountTime,  
    __OUTOPT uint32_t *pwdtReloadTime  
)
```

Use this command to get the Watchdog Timer mode, time count value and reload timer.

Parameters	Function Parameters
*pwdtMinute	Get the mode of minute or second
*pwdtCountTime	Get WDT time count
*pwdtReloadTime	Get WDT ReloadTime
Condition	Return Values
Library Uninitialized	EAPI_STATUS_NOT_INITIALIZED
Common Error	Common Error Code
Others	EAPI_STATUS_SUCCESS

C.3.1.7 EapiWDogSetStatus()

Command Line:

```
EApiWDogSetStatus(  
    __IN uint32_t wdtMinute,  
    __IN uint32_t wdtCountTime,  
    __IN uint32_t wdtReloadTime  
)
```

Use this command to set Watchdog Timer mode, time count value and reload timer.

Parameters	Function Parameters
wdtMinute	Set the mode of minute or second
wdtCountTime	Set WDT time count
wdtReloadTime	Set WDT ReloadTime
Condition	Return Values
Library Uninitialized	EAPI_STATUS_NOT_INITIALIZED
Common Error	Common Error Code
Others	EAPI_STATUS_SUCCESS