

PICO-EHL1

PICO-ITX Single Board Computer

User's Manual 2nd Ed

Copyright Notice

This document is copyrighted, 2023. All rights are reserved. The original manufacturer reserves the right to make improvements to the products described in this manual at any time without notice.

No part of this manual may be reproduced, copied, translated, or transmitted in any form or by any means without the prior written permission of the original manufacturer. Information provided in this manual is intended to be accurate and reliable. However, the original manufacturer assumes no responsibility for its use, or for any infringements upon the rights of third parties that may result from its use.

The material in this document is for product information only and is subject to change without notice. While reasonable efforts have been made in the preparation of this document to assure its accuracy, AAEMON assumes no liabilities resulting from errors or omissions in this document, or from the use of the information contained herein.

AAEMON reserves the right to make changes in the product design without notice to its users.

Acknowledgement

All other products' name or trademarks are properties of their respective owners.

- Microsoft Windows® is a registered trademark of Microsoft Corp.
- Intel®, Atom®, and Celeron® are registered trademarks of Intel Corporation
- ITE is a trademark of Integrated Technology Express, Inc.
- IBM, PC/AT, PS/2, and VGA are trademarks of International Business Machines Corporation.
- Ubuntu and Canonical are registered trademarks of Canonical Ltd.

All other product names or trademarks are properties of their respective owners.

Omission of a product name from this list does not imply any claim to ownership by the publisher of this document.

Packing List

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

Item	Quantity
● PICO-EHL1	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 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 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 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	○	○	○	○

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。

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。

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。

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	O	O	O	O
Wires & Connectors for External Connections	X	X	O	O	O	O
<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>						

Table of Contents

Chapter 1 - Product Specifications	1
1.1 Specifications.....	2
1.2 Function Block Diagram.....	5
Chapter 2 – Hardware Information	6
2.1 Dimensions.....	7
2.2 Jumpers and Connectors	8
2.3 List of Jumpers.....	10
2.3.1 Clear CMOS Jumper & Auto Power Button Enable/Disable (JP1).....	10
2.4 List of Connectors.....	11
2.4.1 RTC Battery Connector (CN1).....	12
2.4.2 LVDS Back Light Inverter (CN2).....	12
2.4.3 LVDS/eDP [Reserved] (CN3).....	13
2.4.4 HDMI (CN4).....	15
2.4.5 Audio (CN5).....	16
2.4.6 RJ-45 (CN8).....	17
2.4.7 M.2 2242 B-Key (CN9).....	18
2.4.8 SATA (CN10).....	21
2.4.9 SATA Power (CN11).....	21
2.4.10 4-bit DIO Header (CN12).....	22
2.4.11 USB 3.2 Connector (Supports 2 Ports) (CN13).....	23
2.4.12 mSATA/Mini Card (CN15).....	24
2.4.13 BIO (CN16).....	26
2.4.14 Dual COM Port Header (CN17).....	29
2.4.15 SPI Port (CN18).....	31
2.4.16 eSPI (Debug Card)/SMBus/I2C (CN19).....	31
2.4.17 4-pin Smart Fan Connector (CN20).....	32

2.4.18	Power Input +12V (CN21)	33
2.4.19	DC Jack Power Input (Reserved) (CN23)	33
2.4.20	USB 2.0 Connector (CN24/CN25).....	34
2.4.21	Front Panel (CN26).....	35
2.5	Thermal Assembly Options.....	36
2.5.1	Active Cooling Fan FAN01/02	36
2.5.2	Fanless Heatspreader HSP01/02.....	37
Chapter 3 - AMI BIOS Setup		38
3.1	System Test and Initialization	39
3.2	AMI BIOS Setup.....	40
3.3	Setup Submenu: Main.....	41
3.4	Setup Submenu: Advanced	42
3.4.1	CPU Configuration	43
3.4.2	PCH-FW Configuration	44
3.4.2.1	Firmware Update Configuration.....	45
3.4.3	PTT Configuration.....	46
3.4.4	Trusted Computing	47
3.4.5	SATA Configuration	49
3.4.6	Hardware Monitor.....	50
3.4.6.1	Smart Fan Mode Configuration.....	51
3.4.7	SIO Configuration	52
3.4.7.1	Serial Port Configuration.....	53
3.4.7.2	Serial Port Console Redirection	54
3.4.8	AAEON BIOS Robot.....	55
3.4.9	Power Management	57
3.4.10	Digital IO Port Configuration	58
3.5	Setup Submenu: Chipset.....	59
3.5.1	System Agent (SA) Configuration	60

- 3.5.1.1 Memory Configuration61
- 3.5.1.2 LVDS Panel Configuration..... 62
- 3.6 Setup Submenu: Security 64
 - 3.6.1 Secure Boot 65
 - 3.6.1.1 Key Management 66
- 3.7 Setup Submenu: Boot 68
 - 3.7.1 BBS Priorities..... 69
- 3.8 Setup Submenu: Save & Exit 70
- Chapter 4 – Drivers Installation..... 71**
 - 4.1 Drivers Download and Installation 72
- Appendix A – Mating Connectors 74**
 - A.1 List of Mating Connectors and Cables 75
- Appendix B - I/O Information 76**
 - B.1 Direct Memory Access (DMA) Map 77
 - B.2 I/O Address Map 78
 - B.3 IRQ Mapping Chart 80
 - B.4 Large Memory Map..... 82
 - B.5 Memory Address Map 82
- Appendix C - Watchdog Timer Programming..... 83**
 - C.1 Introduction to Watchdog Timer 84
 - C.2 Programing the Watchdog Timer with AAeon SDK..... 85
 - C.3 Programing Watchdog Timer with AAeon Windows EAPI..... 86
 - C.3.1 Watchdog Timer Functions 87
 - C.3.1.1 EapiWDogGetCap()..... 87
 - C.3.1.2 EapiWDogStart()..... 88
 - C.3.1.3 EapiWDogTrigger()..... 89
 - C.3.1.4 EapiWDogStop() 89
 - C.3.1.5 EapiWDogReloadTimer() 90

C.3.1.6	EpiWDogGetStatus()	90
C.3.1.7	EpiWDogSetStatus()	91

Chapter 1

Product Specifications

1.1 Specifications

System

Form Factor	PICO-ITX
CPU	Intel® Celeron® Processor J6412 (4C/4T, 2.0 GHz, 10W) Intel® Celeron® Processor N6210 (2C/2T, 1.2 GHz, 6.5W) Intel Atom® x6425E (4C/4T, 2.0 GHz, 12W) Intel Atom® x6211E (2C/2T, 1.3 GHz, 6W)
Chipset	Integrated with Intel® SoC
Memory Type	DDR4 3200MHz SODIMM x 1, up to 32GB
BIOS	UEFI
Wake on LAN	Yes
Watchdog Timer	255 Levels
Security	TPM 2.0 (Optional)
RTC Battery	Lithium Battery 3V/240mAh
Dimensions	3.94" x 2.84" (100mm x 72mm)
Gross Weight	0.18 lb. (0.08Kg)
OS Support	Windows® 10 (64-bit) Ubuntu 20.04.5/Kernel 5.15

Power

Power Requirement	+12V
Power Supply Type	AT/ATX
Connector	2-pin Phoenix Connector (Default) Lockable DC Jack Connector (colay)
Power Consumption	Intel Atom® x6425E, DDR4 32GB, 2.67A@ +12V (Typical) Intel Atom® x6425E, DDR4 32GB, 2.84A@ +12V (Max)

Display

Controller	Intel® UHD Graphics for 10th Gen Intel® Processors
LVDS/eDP	LVDS x 1 (2CH 18/24-bit) 1920 x 1200 @60Hz eDP 1.3 x 1, 3840 x 2160 @60Hz (Optional)
Display Interface	HDMI 1.4 x 1, 3480 x 2160 @30Hz
Multiple Display	Up to 2 Simultaneous Displays

Audio

Codec	Realtek ALC269 (Optional)
Audio Interface	Line-in/Line-out/MIC (Optional)
Speaker	—

External I/O

Ethernet	Realtek 8111H-CG GbE, RJ-45 x 1
USB	USB 3.2 Gen 2 x 2
Serial Port	—
Video	HDMI 1.4 x 1

Internal I/O

USB	USB 2.0 x 2
Serial Port	COM 1, COM 2 (RS-232/422/485, support 5V/12V/RI)
Video	LVDS/eDP x 1 (Default: LVDS)
SATA	SATA III x 1 +5V SATA Power Connector x 1
Audio	Audio Header (Optional)
DIO/GPIO	GPIO 4-bit
SMBus/I2C	SMBus/I2C x 1 (Default: SMBus)
Touch	—

Internal I/O

Fan	4-pin Smart Fan x 1
SIM	—
Front Panel	HDD LED, PWR LED, Power Button, Buzzer, Reset

Expansion

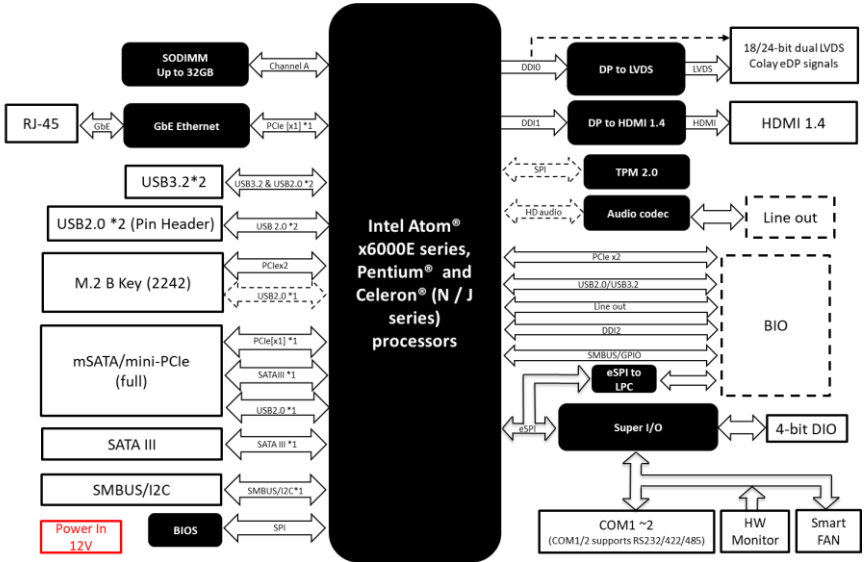
Mini PCIe/mSATA	Full-Size mSATA/mPCIe x 1 (Default: mSATA, select with BIOS)
M.2	M.2 2242 B-Key x 1 (PCIe 3.0 [x2] as default, USB 2.0 is optional)
Others	BIO x 1 (Optional, supports PCIe [x2], Line-Out, DDI, GPIO, LPC, SMBus, USB 3.0/2.0)

Environmental

Operating Temp	32°F ~ 140°F (0°C ~ 60°C) WiTAS 2: -40°F ~ 185°F (-40°C ~ 85°C)
Storage Temp	-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

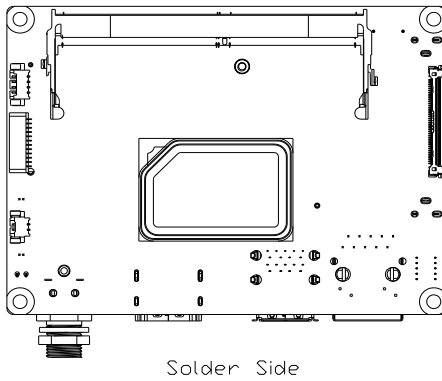
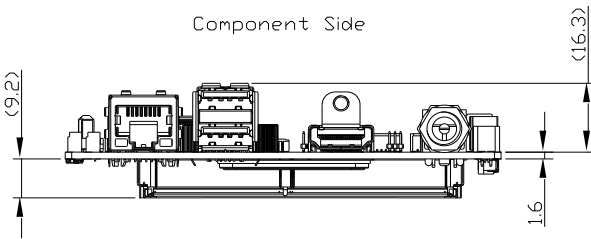
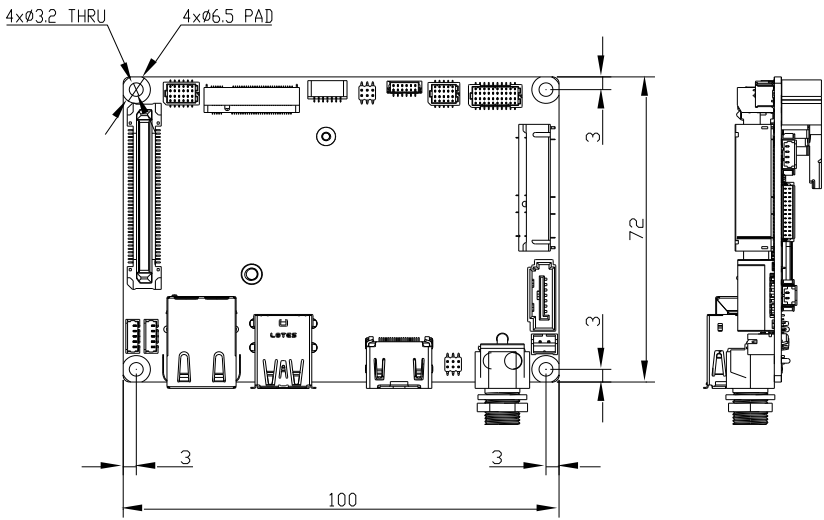
PICO-EHL1 Block Diagram



Chapter 2

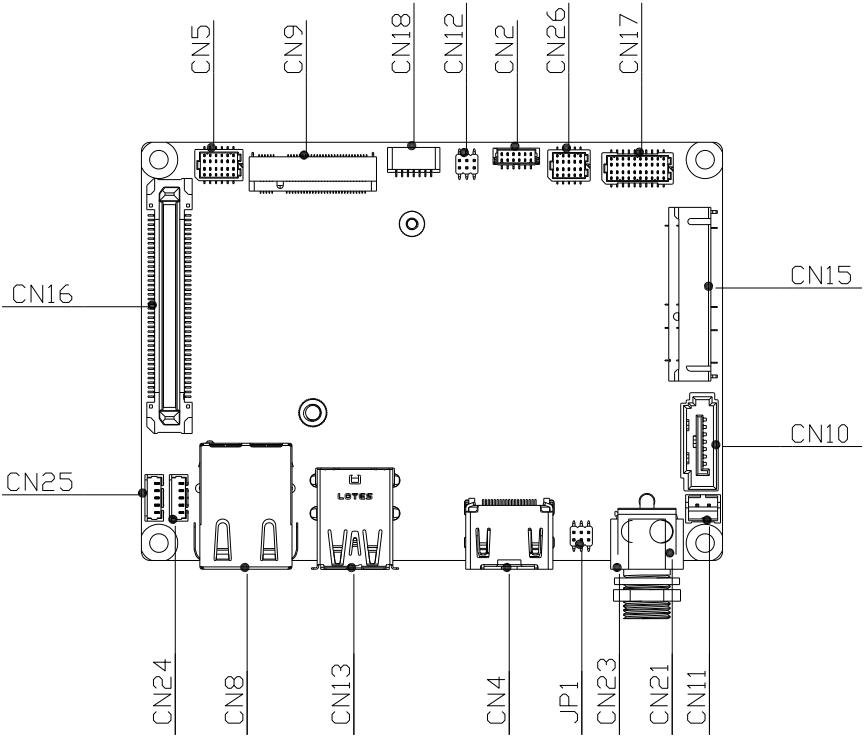
Hardware Information

2.1 Dimensions

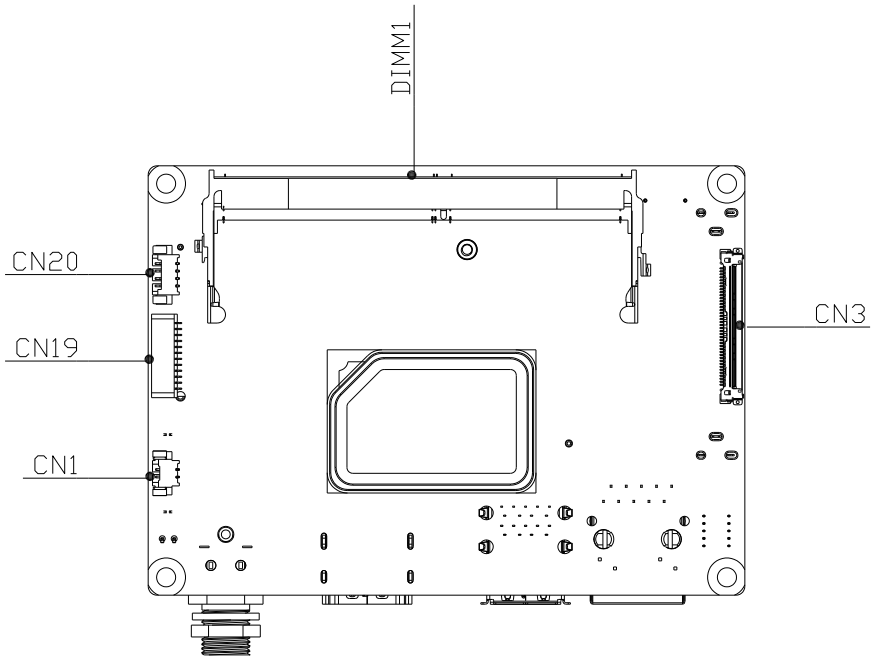


2.2 Jumpers and Connectors

Component Side:



Solder Side:



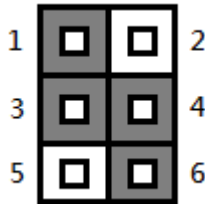
2.3 List of Jumpers

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	
Pin	Function
1-3	Save CMOS (Default)
3-5	Clear CMOS

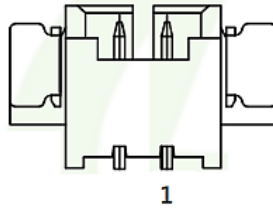
Auto Power Button Enable/Disable	
Pin	Function
2-4	Disable
4-6	Enable (Default)

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

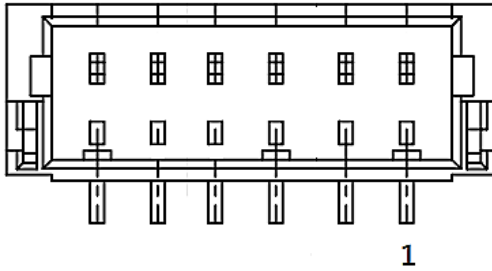
Label	Function
CN1	RTC Battery Connector
CN2	LVDS Back Light Inverter
CN3	LVDS/eDP [Reserved]
CN4	HDMI
CN5	Audio
CN8	RJ-45
CN9	M.2 2242 B-Key
CN10	SATA
CN11	SATA Power
CN12	4-bit DIO
CN13	Dual USB 3.2 Port
CN15	Mini Card/mSATA
CN16	BIO
CN17	COM Port (Supports 2 Ports)
CN18	SPI (For BIOS)
CN19	Debug Card/I2C/SMBus
CN20	4-Pin Fan
CN21	Power Input 12V
CN23	DC Jack Power Input [Reserved]
CN24	USB 2.0 Connector
CN25	USB 2.0 Connector
CN26	Front Panel

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 LVDS Back Light Inverter (CN2)

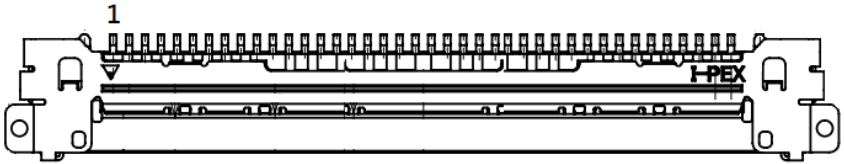


Pin	Pin Name	Signal Type	Signal Level
1	BLK_PWR	PWR	+12V (Default) / +5V
2	BLK_PWR	PWR	+12V (Default) / +5V
3	BKL_CONTROL	Signal	-
4	GND	GND	-
5	GND	GND	-
6	BKL_ENABLE	Signal	-

Note 1: Backlight Power can be 12V or 5V, set by BOM: Stuff R285 for 12V and stuff R287 for 5V. (Default: 12V)

Note 2: CN2 max current 2A.

2.4.3 LVDS/eDP [Reserved] (CN3)

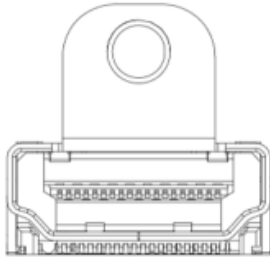


Pin	Pin Name	Signal Type	Signal Level
1	GND	GND	-
2	LVD1_CB_3_DP	DIFF	-
3	LVD1_CB_3_DN	DIFF	-
4	GND	GND	-
5	LVD1_CB_CLKP	DIFF	-
6	LVD1_CB_CLKN	DIFF	-
7	GND	GND	-
8	LVD1_CB_2_DP	DIFF	-
9	LVD1_CB_2_DN	DIFF	-
10	GND	GND	-
11	LVD1_CB_1_DP	DIFF	-
12	LVD1_CB_1_DN	DIFF	-
13	GND	GND	-
14	LVD1_CB_0_DP	DIFF	-
15	LVD1_CB_0_DN	DIFF	-
16	GND	GND	-
17	+V3P3S	PWR	+3.3V

Pin	Pin Name	Signal Type	Signal Level
18	LVD1_DDC_CLK/DDIO_HPD	Signal	-
19	LVD1_BKLTEN/DDIO_BKLTEN	Signal	-
20	LVD1_DDC_DATA	Signal	-
21	LVD1_BKLCTL/DDIO_BKLCTL	Signal	-
22	GND	GND	-
23	LVD1_CA_CLKP/ DDIO_AUX_DP	DIFF	-
24	LVD1_CA_CLKN/DDIO_AUX_DN	DIFF	-
25	GND	GND	-
26	LVD1_CA_3_DP/DDIO_LANE3_DP	DIFF	-
27	LVD1_CA_3_DN/DDIO_LANE3_DN	DIFF	-
28	GND	GND	-
29	LVD1_CA_0_DP/DDIO_LANE0_DP	DIFF	-
30	LVD1_CA_0_DN/DDIO_LANE0_DN	DIFF	-
31	GND	GND	-
32	LVD1_CA_1_DP/DDIO_LANE1_DP	DIFF	-
33	LVD1_CA_1_DN/DDIO_LANE1_DN	DIFF	-
34	GND	GND	-
35	LVD1_CA_2_DP/DDIO_LANE2_DP	DIFF	-
36	LVD1_CA_2_DN/DDIO_LANE2_DN	DIFF	-
37	GND	GND	-
38	+VDD	PWR	+3.3V
39	+VDD	PWR	+3.3V
40	+VDD	PWR	+3.3V

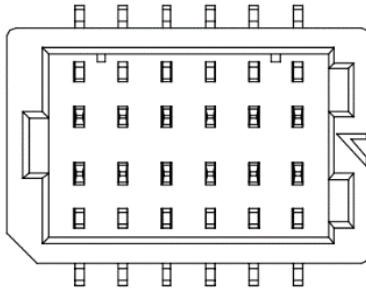
Note: CN3: VDD power current max: 1.5A.

2.4.4 HDMI (CN4)



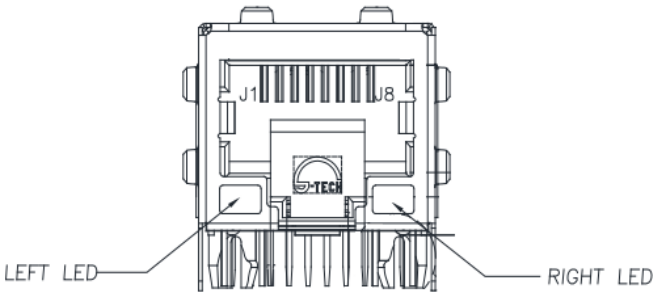
Pin	Pin Name	Signal Type	Signal Level
1	HDMI_TX2+	DIFF	-
2	GND	GND	-
3	HDMI_TX2-	DIFF	-
4	HDMI_TX1+	DIFF	-
5	GND	GND	-
6	HDMI_TX1-	DIFF	-
7	HDMI_TX0+	DIFF	-
8	GND	GND	-
9	HDMI_TX0-	DIFF	-
10	HDMI_CLK+	DIFF	-
11	GND	GND	-
12	HDMI_CLK-	DIFF	-
13	NC	-	-
14	NC	-	-
15	DDC_CLK	Signal	+5V
16	DDC_DATA	Signal	+5V
17	GND	GND	-
18	+5V	PWR	+5V
19	HDMI_HPD	-	-

2.4.5 Audio (CN5)



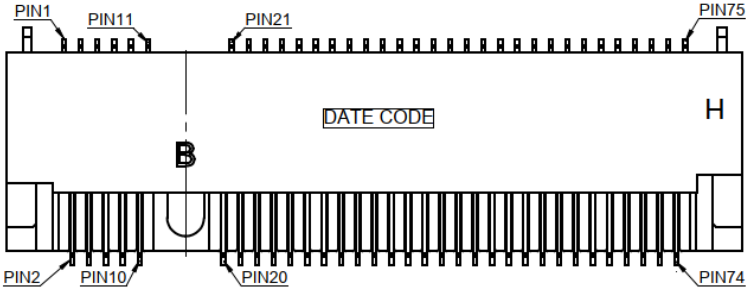
Pin	Pin Name	Signal Type	Signal Level
1	LOUT_R	Signal	-
2	MIC_R	Signal	-
3	LOUT_L	Signal	-
4	MIC_L	Signal	-
5	JD_LOUT	Signal	-
6	JD_MIC	Signal	-
7	AUD_GND	GND	-
8	AUD_GND	GND	-
9	JD_LIN	Signal	-
10	LIN_R	Signal	-
11	+V5A_AUD	PWR	+5V
12	LIN_L	Signal	-
13	AUD_GND	GND	-
14	AUD_GND	GND	-

2.4.6 RJ-45 (CN8)



Pin	Pin Name	Signal Type	Signal Level
P1	LAN1_MDI0+	DIFF	-
P2	LAN1_MDI0-	DIFF	-
P3	LAN1_MDI1+	DIFF	-
P4	LAN1_MDI1-	DIFF	-
P5	LAN1_CT	-	-
P6	LAN1_CT	-	-
P7	LAN1_MDI2+	DIFF	-
P8	LAN1_MDI2-	DIFF	-
P9	LAN1_MDI3+	DIFF	-
P10	LAN1_MDI3-	DIFF	-
2L2	+V3P3A	VDD	+3.3V
2L3	LAN2_LED_100#	Signal	-
2L4	LAN2_LED_1000#	Signal	-

2.4.7 M.2 2242 B-Key (CN9)

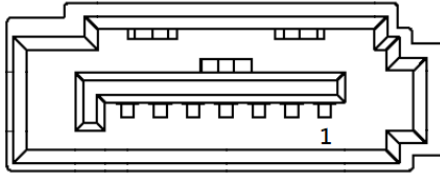


Pin	Pin Name	Signal Type	Signal Level
1	GND	GND	-
2	+V3P3A	PWR	3.3V
3	GND	GND	-
4	+V3P3A	PWR	3.3V
5	GND	GND	-
6	FULL_CARD_PWR_OFF	-	-
7	USB2_4_DP	DIFF	-
8	W_DISABLE2#	Signal	-
9	USB2_4_DN	FIFF	-
10	SSD_LED#	Signal	-
11	GND	-	-
20	NC	-	-
21	GND	-	-
22	NC	-	-
23	NC	-	-
24	NC	-	-
25	NC	-	-
26	NC	-	-

Pin	Pin Name	Signal Type	Signal Level
27	GND	-	-
28	NC	-	-
29	PCIE_5_RXN	DIFF	-
30	NC	-	-
31	PCIE_5_RXP	DIFF	-
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	GND	-
44	NC	-	-
45	GND	GND	-
46	NC	-	-
47	PCIE_4_TXN	DIFF	-
48	NC	-	-
49	PCIE_4_TXP	DIFF	-
50	BUF_PLT_RST#	Signal	-
51	GND	GND	-
52	PCIE_CLKREQ#0	Signal	-
53	PCIE_0_CLK_DN	DIFF	-

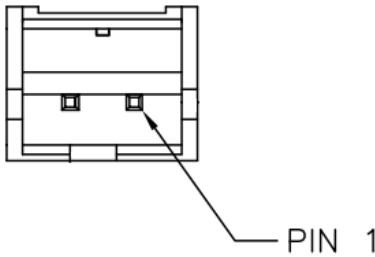
Pin	Pin Name	Signal Type	Signal Level
54	PCIE_WAKE#	Signal	-
55	PCIE_0_CLK_DP	DIFF	-
56	NC	-	-
57	GND	GND	-
58	NC	-	-
59	NC	-	-
60	NC	-	-
61	NC	-	-
62	NC	-	-
63	NC	-	-
64	NC	-	-
65	NC	-	-
66	NC	-	-
67	NC	-	-
68	NC	-	-
69	GND	GND	-
70	+V3P3A_2242	PWR	3.3V
71	GND	GND	-
72	+V3P3A_2242	PWR	3.3V
73	GND	GND	-
74	+V3P3A_2242	PWR	3.3V
75	NC	-	-

2.4.8 SATA (CN10)



Pin	Pin Name	Signal Type
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

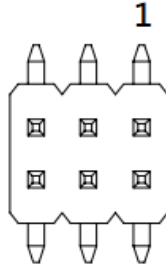
2.4.9 SATA Power (CN11)



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

Note: SATA power current max: 1.5A.

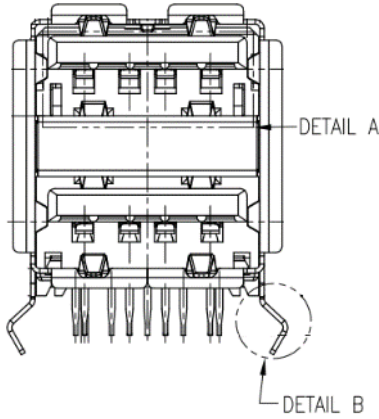
2.4.10 4-bit DIO Header (CN12)



Pin	Pin Name	Signal Type	Signal Level
1	+V5S	VDD	5V
2	DIO_0	Signal	-
3	DIO_1	Signal	-
4	DIO_2	Signal	-
5	DIO_3	Signal	-
6	GND	GND	-

Note: DIO power current max: 0.5A.

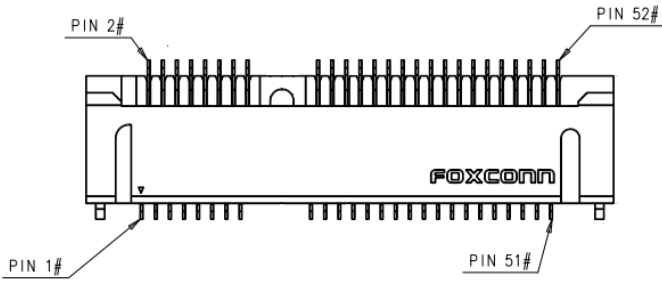
2.4.11 USB 3.2 Connector (Supports 2 Ports) (CN13)



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	-
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	-	-

Pin	Pin Name	Signal Type	Signal Level
17	USB3_1_TXN	DIFF	-
18	USB3_1_TXP	DIFF	-

2.4.12 mSATA/Mini Card (CN15)



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

Pin	Pin Name	Signal Type	Signal Level
15	GND	GND	-
16	NC	-	-
17	NC	-	-
18	GND	GND	-
19	NC	-	-
20	W_DISABLE#	Signal	+3.3V
21	GND	GND	-
22	PCIE_RST#	Signal	+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	Signal	+3.3V
31	PCIE_TX-/SATA_TX-	DIFF	-
32	SMB_DATA	Signal	+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

Pin	Pin Name	Signal Type	Signal Level
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	+3.3V	PWR	+3.3V

2.4.13 BIO (CN16)

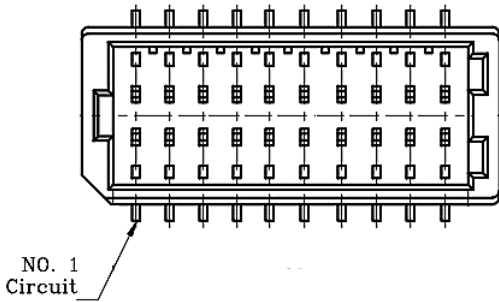
Pin	Pin Name	Signal Type	Signal Level
1	+V12A	PWR	+12V
2	GND	GND	-
3	GND	GND	-
4	PCIE_0_TXN	DIFF	-
5	PCIE_0_RXN	DIFF	-
6	PCIE_0_TXP	DIFF	-
7	PCIE_0_RXP	DIFF	-
8	GND	GND	-
9	GND	GND	-
10	PCIE_1_TXN	DIFF	-
11	PCIE_1_RXN	DIFF	-
12	PCIE_1_TXP	DIFF	-

Pin	Pin Name	Signal Type	Signal Level
13	PCIE_1_RXP	DIFF	-
14	GND	GND	-
15	GND	GND	-
16	PS_ON#	Signal	-
17	DDI1_CTRL_CLK	-	-
18	DDI1_CTRL_DATA	-	-
19	+V5A	PWR	+5V
20	+V5A	PWR	+5V
21	+V5A	PWR	+5V
22	+V5A	PWR	+5V
23	PCIE_1_CLK_DP	DIFF	-
24	BUF_PLT_RST#	Signal	-
25	PCIE_1_CLK_DN	DIFF	-
26	GND	GND	-
27	GND	GND	-
28	DDI1_LANE1_DN	DIFF	-
29	DDI1_LANE0_DN	DIFF	-
30	DDI1_LANE1_DP	DIFF	-
31	DDI1_LANE0_DP	DIFF	-
32	GND	GND	-
33	GND	GND	-
34	DDI1_LANE3_DN	DIFF	-
35	DDI1_LANE2_DN	DIFF	-
36	DDI1_LANE3_DP	DIFF	-
37	DDI1_LANE2_DP	DIFF	-
38	GND	GND	-
39	GND	GND	-

Pin	Pin Name	Signal Type	Signal Level
40	DDI1_HPDP_BIO	Signal	-
41	DDI1_AUXN	DIFF	-
42	GND	GND	-
43	DDI1_AUXP	DIFF	-
44	USB3_2_TXN	DIFF	-
45	GND	GND	-
46	USB3_2_TXP	DIFF	-
47	USB2_6_DN	DIFF	-
48	GND	GND	-
49	USB2_6_DP	DIFF	-
50	USB3_2_RXN	DIFF	-
51	GND	GND	-
52	USB3_2_RXP	DIFF	-
53	SMB_CLK	-	-
54	GND	GND	-
55	SMB_DATA	-	-
56	PCIE_WAKE#	Signal	-
57	GND	GND	-
58	USB2_OC2#	Signal	-
59	+5V	PWR	+5V
60	USB 2.0_OC#	Signal	-
61	+5V	PWR	+5V
62	+5V	PWR	+5V
63	+5V	PWR	+5V
64	+5V	PWR	+5V
65	LPC_AD0	Signal	-
66	LPC_FRAME#	Signal	-

Pin	Pin Name	Signal Type	Signal Level
67	LPC_AD1	Signal	-
68	SERIRQ#	Signal	-
69	LPC_AD2	Signal	-
70	NC	-	-
71	LPC_AD3	Signal	-
72	GPIO	Signal	-
73	GND	GND	-
74	Audio_GND	GND	-
75	LPC_CLK	Signal	-
76	Audio_OUT_L	Signal	-
77	PME#	Signal	-
78	Audio_OUT_R	Signal	-
79	GND	GND	-
80	GND	GND	-

2.4.14 Dual COM Port Header (CN17)



Pin	Pin Name_RS232	Pin Name_RS422	Pin Name_RS485
1	DCD_1	TX_1-	DATA_1-
2	DCD_2	TX_2-	DATA_2-
3	RX_1	TX_1+	DATA_1+

Pin	Pin Name_RS232	Pin Name_RS422	Pin Name_RS485
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	-	-
15	CTS_1	-	-
16	CTS_2	-	-
17	RI_1/12V/5V	-	-
18	RI_2/12V/5V	-	-
19	UART_TX	-	-
20	UART_RX	-	-

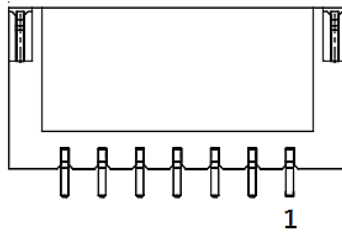
Note 1: COM RS-232/422/485 can be set by BIOS setting. Default is RS-232.

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

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

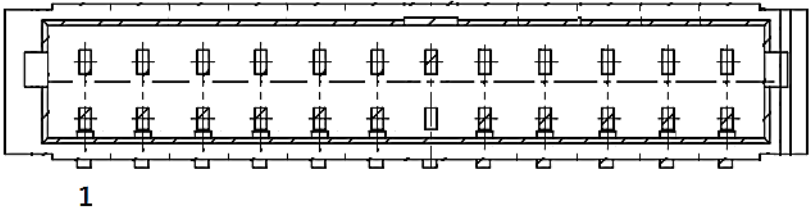
Note 4: Max current: 0.5A for each port.

2.4.15 SPI Port (CN18)



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

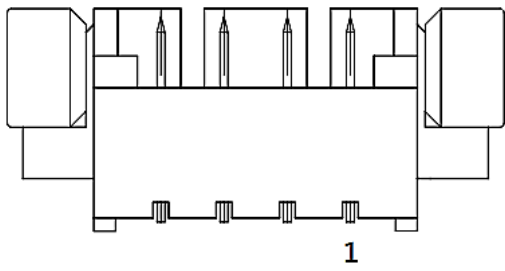
2.4.16 eSPI (Debug Card)/SMBus/I2C (CN19)



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

Pin	Pin Name	Signal Type	Signal Level
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	SMB_DATA/ I2C_SDA	Signal	+3.3V
11	SMB_CLK/ I2C_CLK	Signal	+3.3V
12	SMB_ALERT/INT_SERIRQ	Signal	+3.3V

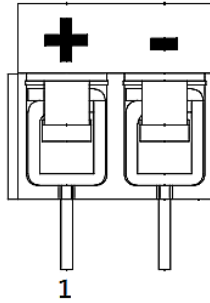
2.4.17 4-pin Smart Fan Connector (CN20)



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

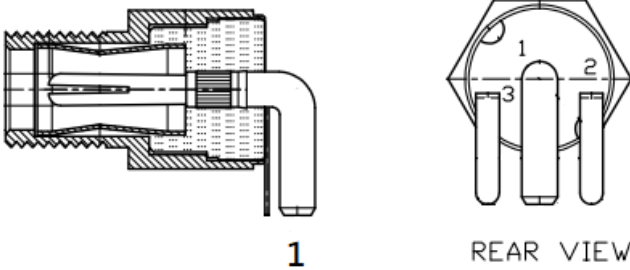
Note: Smart Fan power max current: 1.0A.

2.4.18 Power Input +12V (CN21)



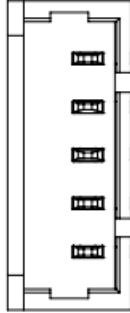
Pin	Pin Name	Signal Type	Signal Level
1	+V_IN	PWR	+12V
2	GND	GND	-

2.4.19 DC Jack Power Input (Reserved) (CN23)



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

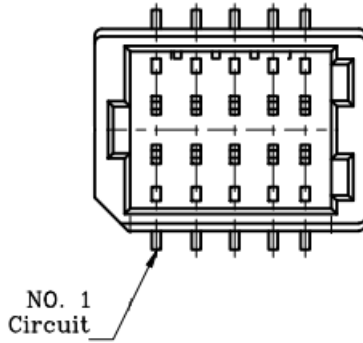
2.4.20 USB 2.0 Connector (CN24/CN25)



Pin	Pin Name	Signal Type	Signal Level
P1	+V5A	PWR	5V
P2	USB2_DN	DIFF	-
P3	USB2_DP	DIFF	-
P4	GND	GND	-
P5	GND	GND	-

Note: Each connector power current max: 0.5A.

2.4.21 Front Panel (CN26)

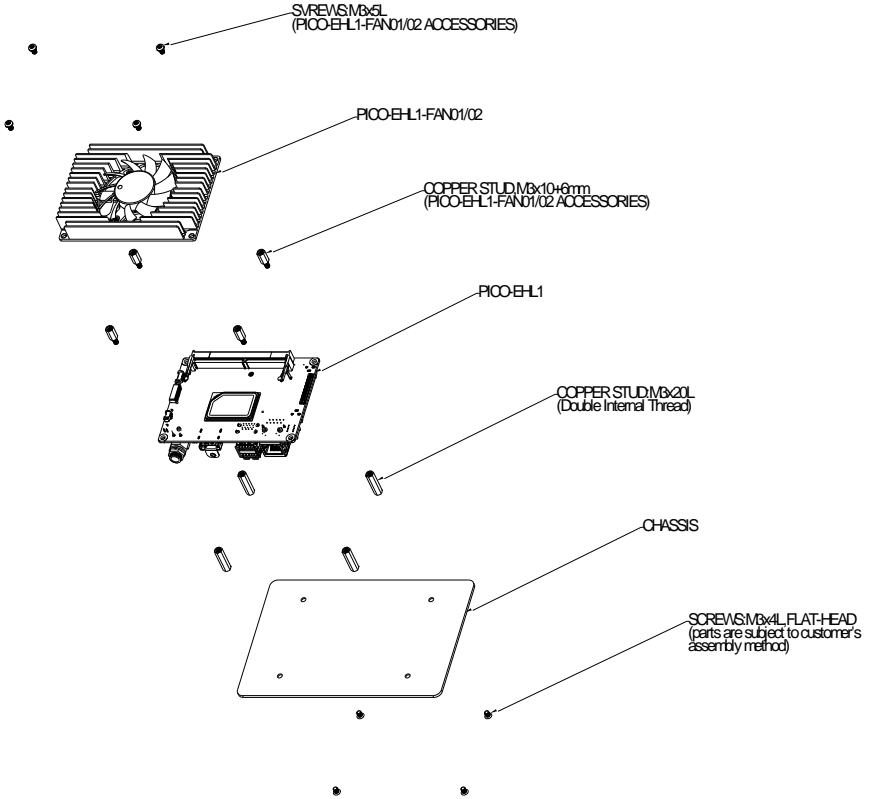


Pin	Pin Name	Signal Type	Signal Level
1	GND	GND	-
2	EXT_PWRBTN#	Signal	-
3	FP_IDELED#	Signal	-
4	+V3P3S	PWR	+3.3V
5	FP_BUZZER	Signal	-
6	+V5S	PWR	+5V
7	GND	-	-
8	+V3P3S	PWR	+3.3V
9	GND	-	-
10	HWRST#	Signal	-

2.5 Thermal Assembly Options

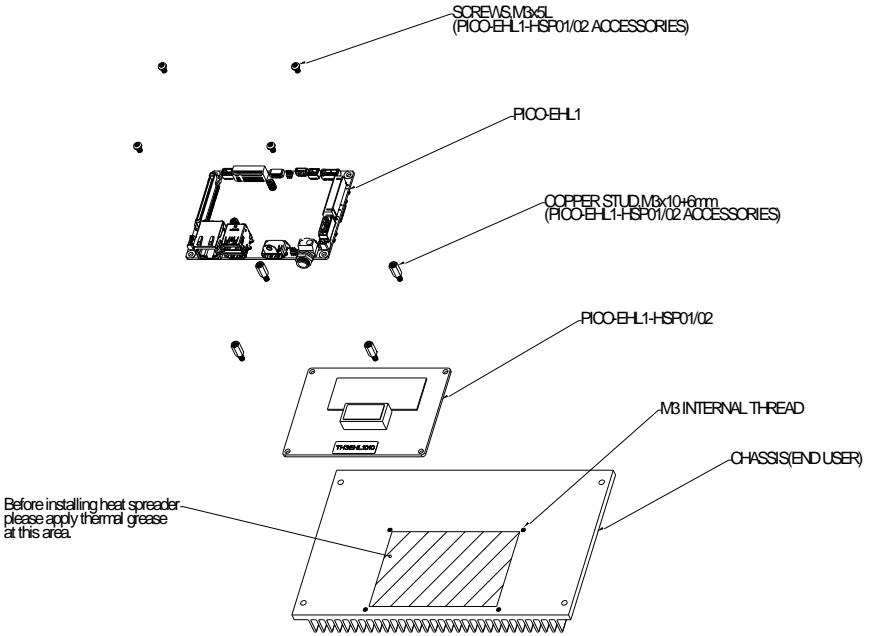
2.5.1 Active Cooling Fan FAN01/02

Active Cooling Fan, Part Number: PICO-EHL1-FAN01/02



2.5.2 Fanless Heatspreader HSP01/02

Heat spreader/fanless assembly, Part Number: PICO-EHL1-HSP01/02



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-EHL1 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.

Boot

Enables/disables quiet boot option.

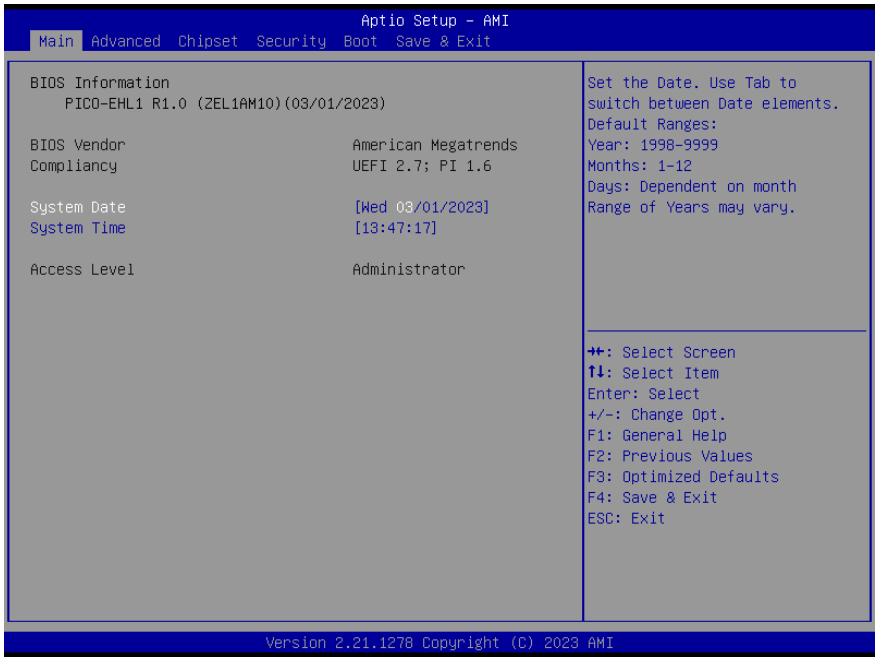
Security

Set setup administrator password.

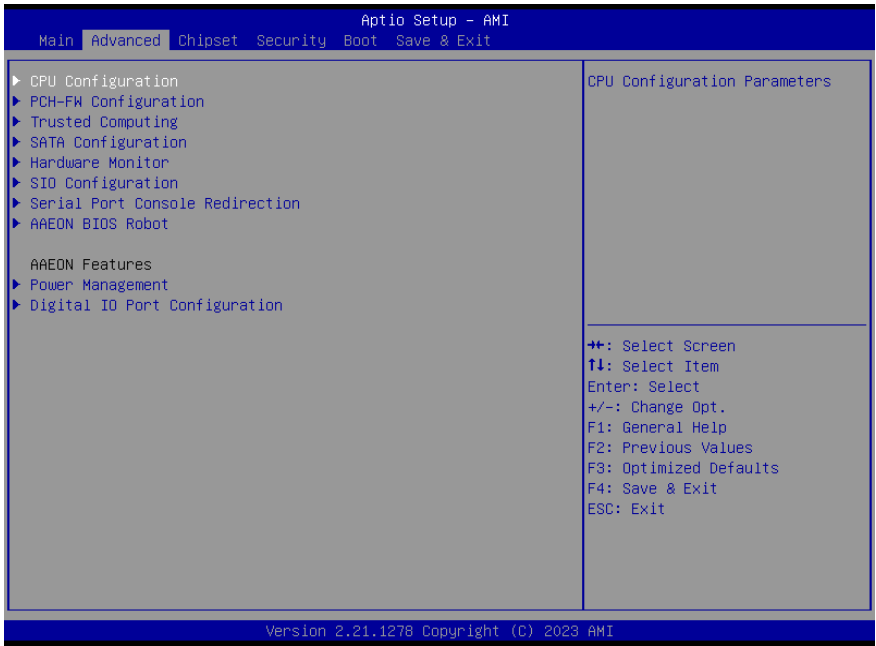
Save & Exit

Exit system setup after saving the changes.

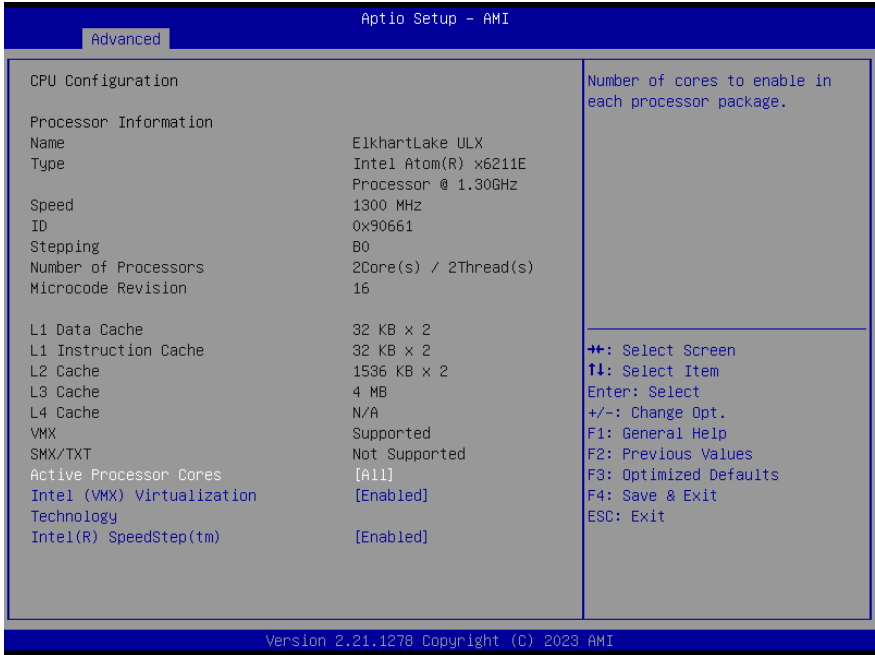
3.3 Setup Submenu: Main



3.4 Setup Submenu: Advanced

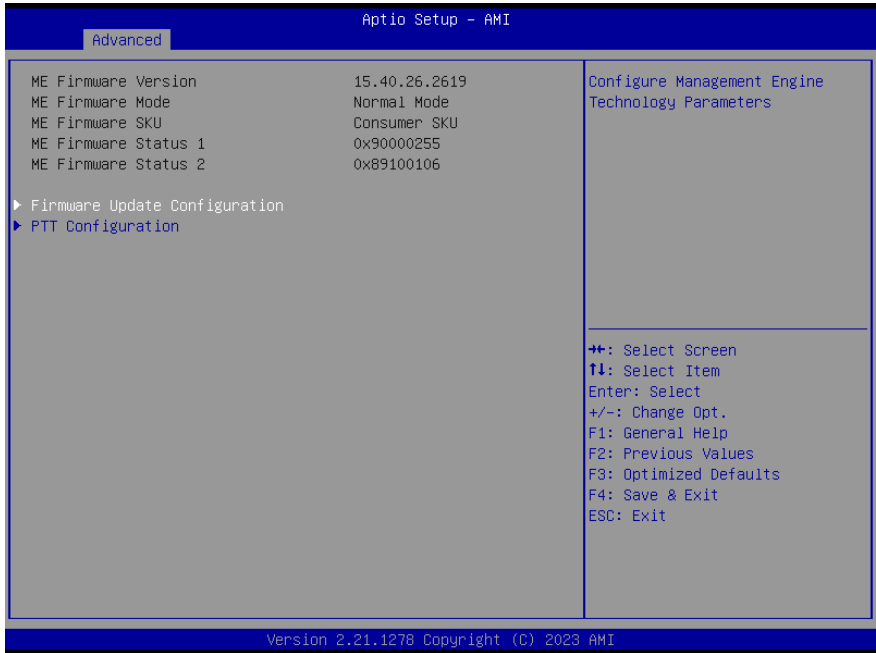


3.4.1 CPU Configuration

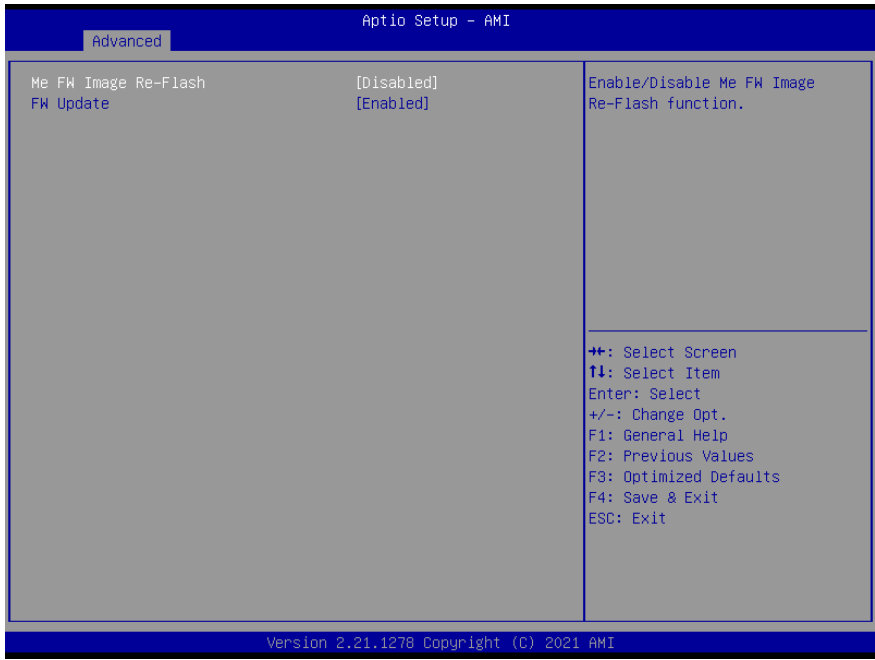


Options Summary		
Active Processor Cores	All	Optimal Default, Failsafe Default
	1~N	
Number of cores to enable in each processor package.		
Intel (VMX) Virtualization Technology	Disabled	Optimal Default, Failsafe Default
	Enabled	
When enabled, a VMM can utilize the additional hardware capabilities provided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

3.4.2 PCH-FW Configuration



3.4.2.1 Firmware Update Configuration



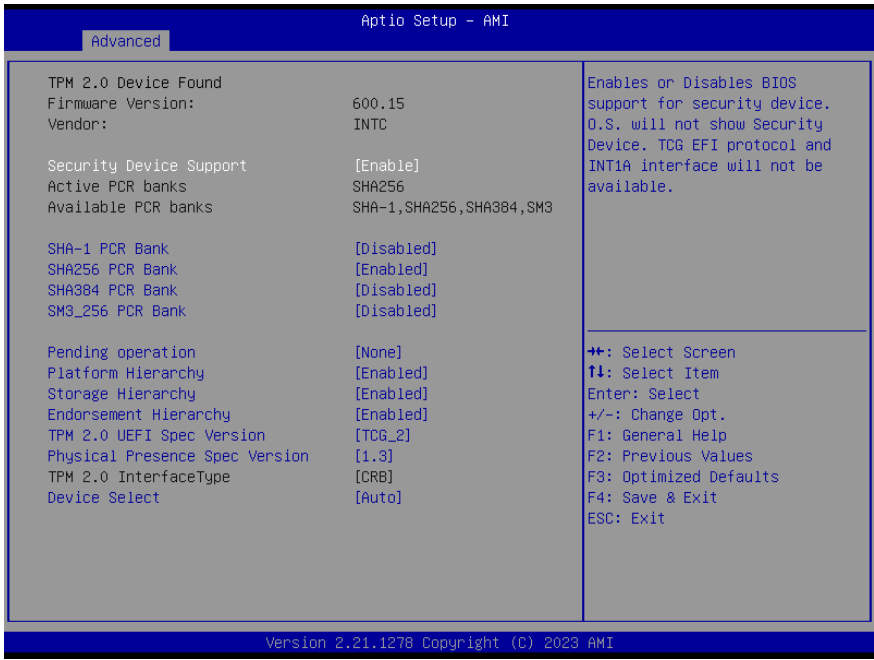
Options Summary		
Me FW Image Re-Flash	Enabled	
	Disabled	Optimal Default, Failsafe Default
Enable/Disable Me FW Image Re-Flash function.		
FW Update	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enable/Disable ME FW Update function.		

3.4.3 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.		

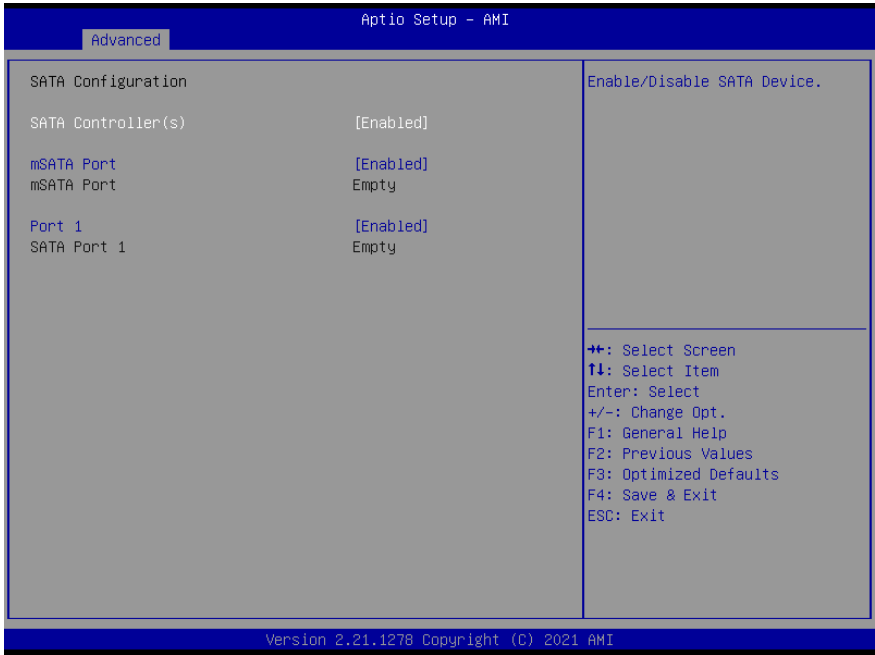
3.4.4 Trusted Computing



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	
Enable or Disable SM3_256 PCR Bank.		

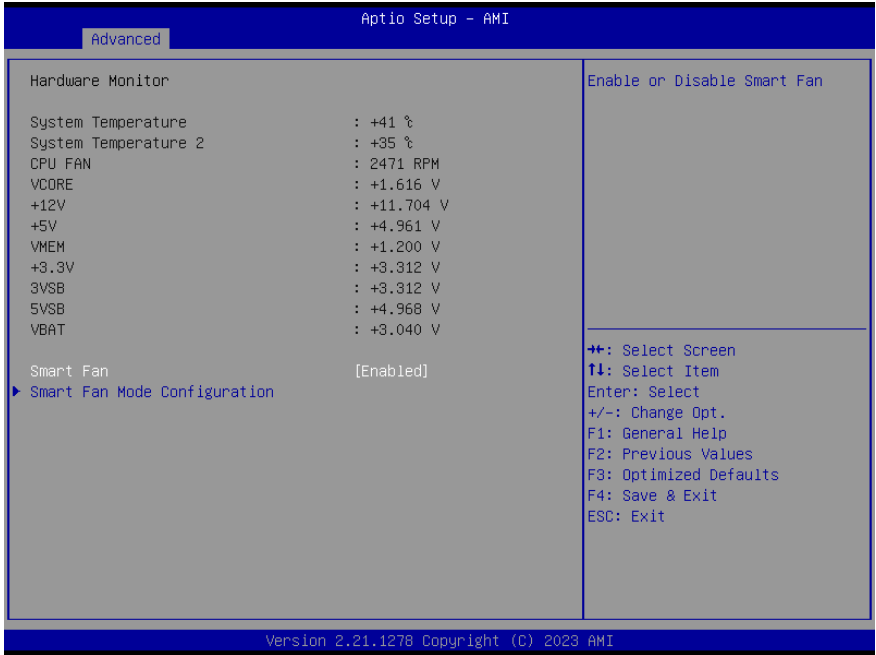
Options Summary		
Pending operation	None	Optimal Default, Failsafe Default
	TPM Clear	
Schedule an Operation for the Security Device. NOTE: Your Computer will reboot during restart in order to change State of Security Device.		
Platform Hierarchy	Enabled	Optimal Default, Failsafe Default
	Disabled	
Enable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



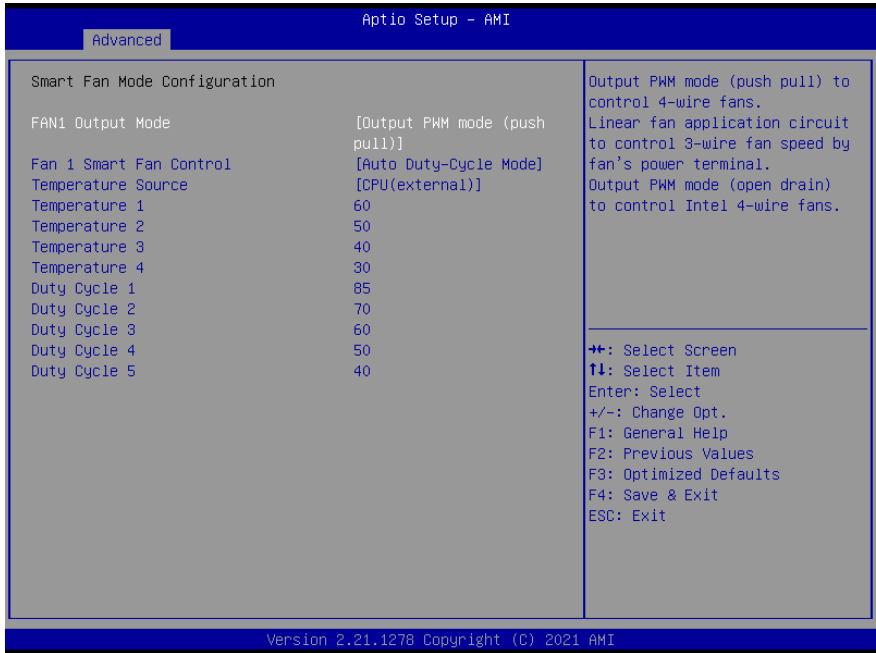
Options Summary		
SATA Controller(s)	Enabled	Optimal Default, Failsafe Default
	Disabled	
Enable/Disable SATA Device.		
Port*	Enabled	Optimal Default, Failsafe Default
	Disabled	
Enable or Disable SATA Port.		

3.4.6 Hardware Monitor



Options Summary		
Smart Fan	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enables or Disables Smart Fan.		

3.4.6.1 Smart Fan Mode Configuration

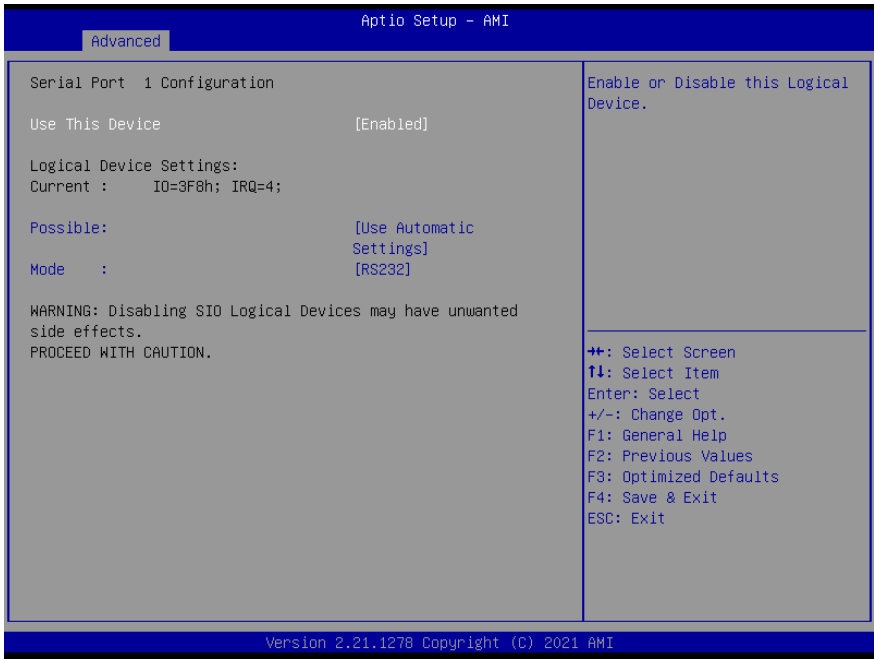


Options Summary		
Fan1 Output Mode	Output PWM mode (open drain)	
	Linear Fan Application	
	Output PWM mode (push pull)	Optimal Default, Failsafe Default
Fan1 Smart Fan control	Manual Duty Mode	
	Auto Duty-Cycle Mode	Optimal Default, Failsafe Default
Smart Fan Mode select.		
Manual Duty Mode	60	Optimal Default, Failsafe Default
Manual mode fan control, user can write expected duty cycle (PWM fan type) 1-100.		
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	
Auto fan speed control. Fan speed will follow different temperature by different duty cycle 1-100.		

3.4.7 SIO Configuration

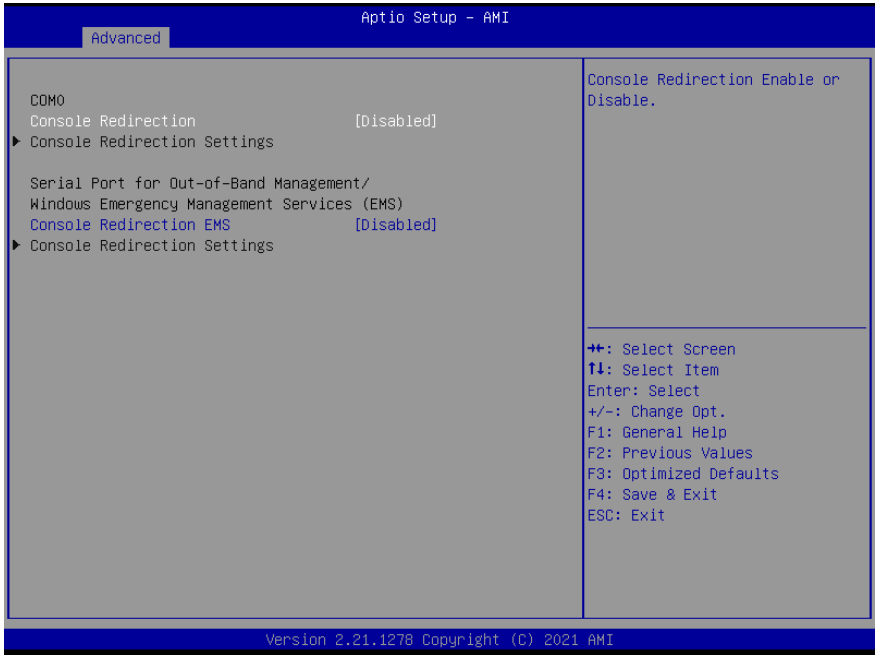


3.4.7.1 Serial Port Configuration



Options Summary		
Use This Device	Disabled	
	Enabled	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.		

3.4.7.2 Serial Port Console Redirection



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

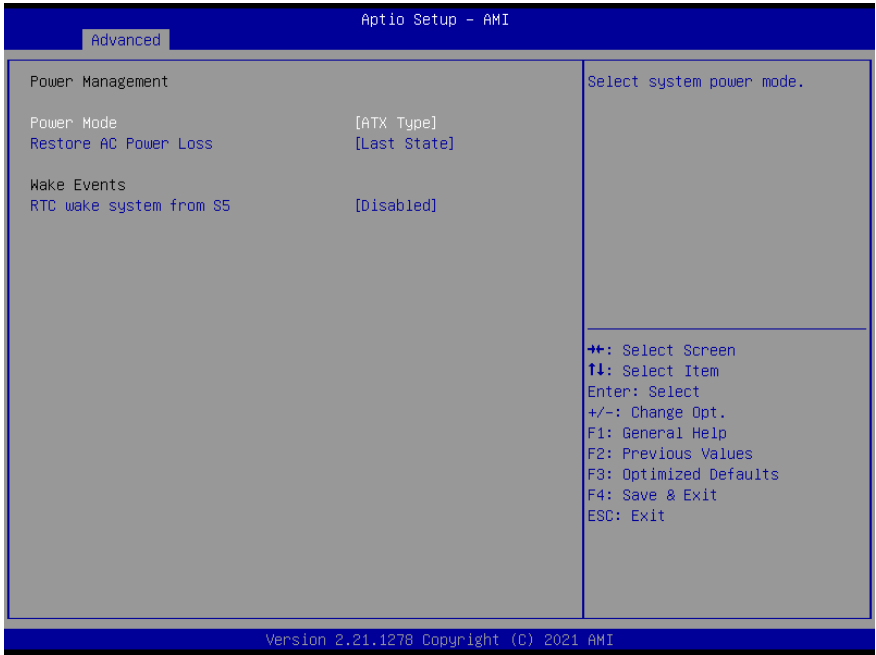
3.4.8 AAEON BIOS Robot



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 in responsible for clearing WDT. Also, this function should be disabled if OS is going to update itself.		
OS Timer (minute)	3	Optimal Default, Failsafe Default
Timer count set to Watch Dog Timer for OS loading.		

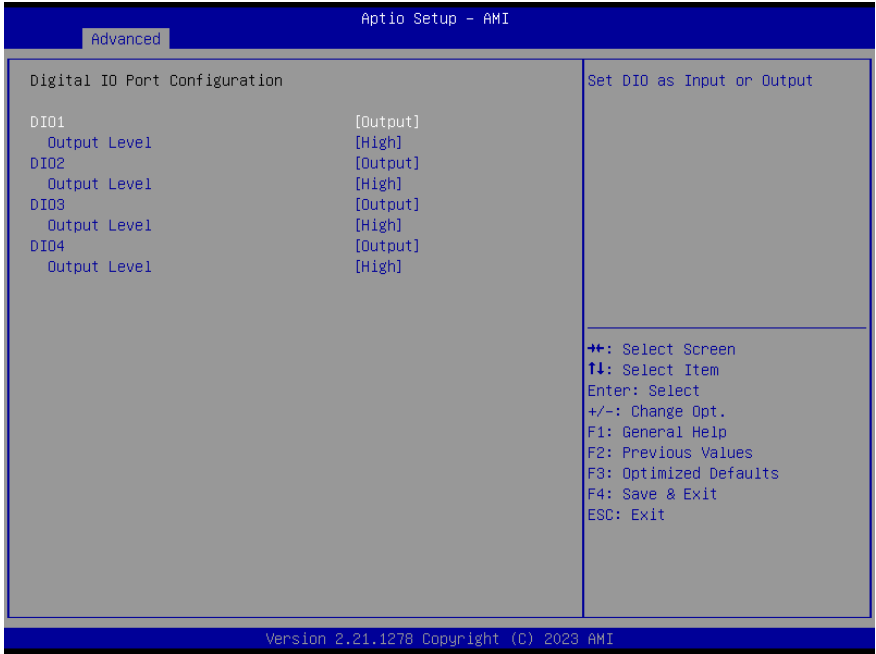
Options Summary		
Delayed POST (PEI phase)	Disabled	Optimal Default, Failsafe Default
	Enabled	
Enabled - Robot holds BIOS from starting POST, right after power on. This allows BIOS POST to start with stable power or start after system is physically warmed-up. Note: Robot does this before 'Sends watch 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 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	
Fixed Time: System will wake on the hr :: min :: sec specified		
Dynamic Time : System will wake on the current time + Increase minutes(s).		

3.4.10 Digital IO Port Configuration

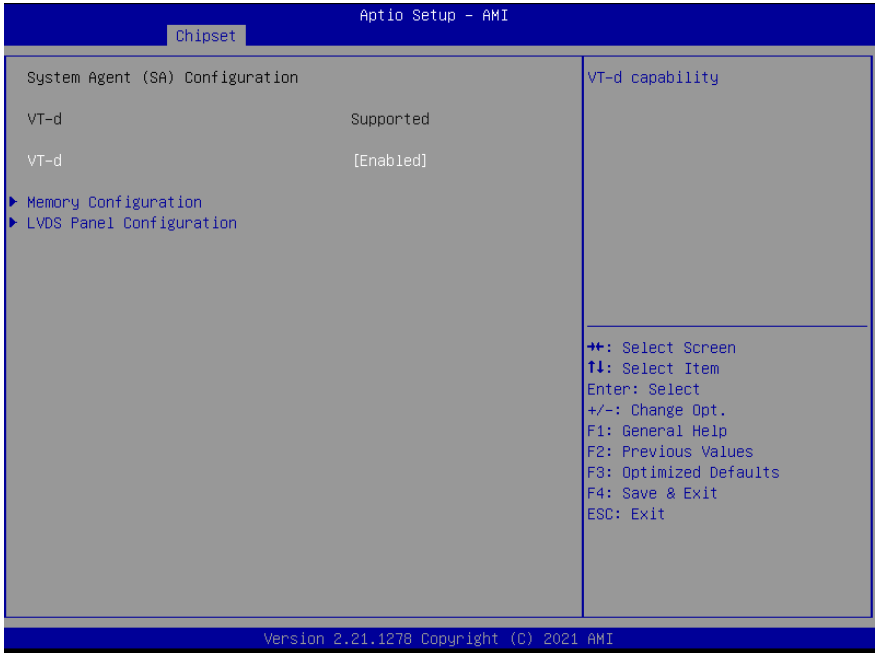


Options Summary		
DIO Port*	Output	
	Input	
Set DIO as Input or Output.		
Output Level	High	
	Low	
Set output level when DIO pin is output.		

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.		

3.5.11 Memory Configuration

The screenshot shows the 'Aptio Setup - AMI' BIOS interface. At the top, a blue bar contains the text 'Aptio Setup - AMI' and a 'Chipset' button. The main area is divided into two columns. The left column, titled 'Memory Configuration', lists the following settings:

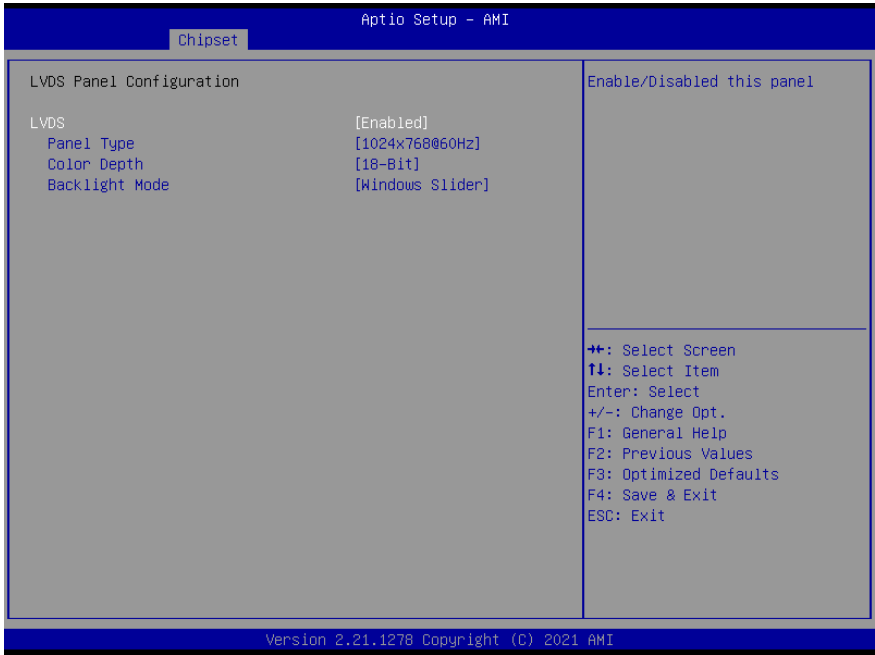
Total Memory	4096 MB
Memory Data Rate	2400 MT/PS
Channel 1 Slot 0 Size	Populated & Enabled 4096 MB (DDR4)
In-Band ECC	[Disabled]

The right column is titled 'Enable/Disable In-Band ECC' and contains a legend of navigation keys:

- ←→: Select Screen
- ↑↓: Select Item
- Enter: Select
- +/-: Change Opt.
- F1: General Help
- F2: Previous Values
- F3: Optimized Defaults
- F4: Save & Exit
- ESC: Exit

At the bottom of the screen, a blue bar displays the text 'Version 2.21.1278 Copyright (C) 2023 AMI'.

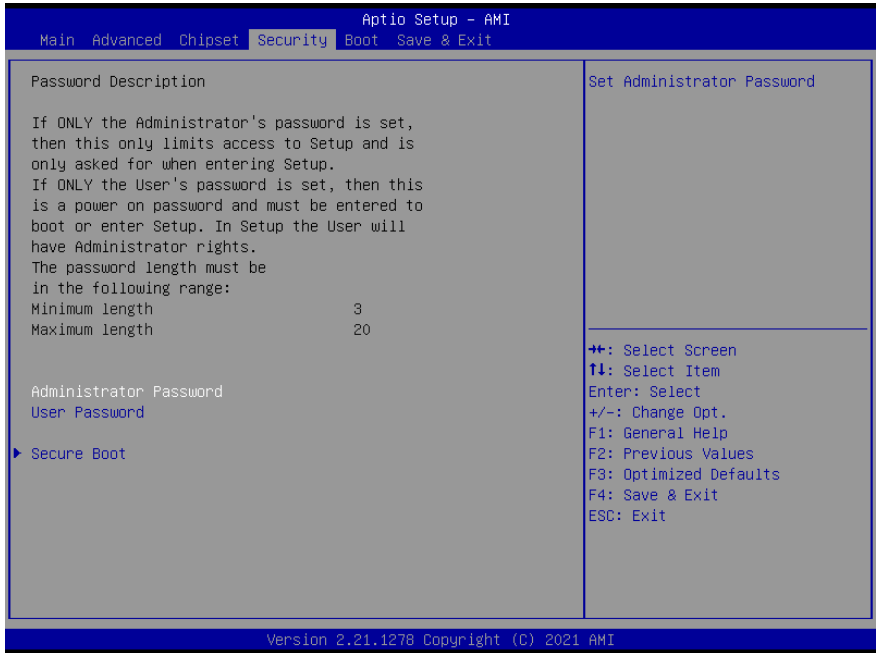
3.5.1.2 LVDS Panel Configuration



Options Summary		
LVDS	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enable/Disable this panel.		
LVDS Panel Type	640x480,18bit,60Hz	
	800x480,18bit,60Hz	
	800x600,18bit,60Hz	
	1024x600,18bit,60Hz	
	1024x768,18bit,60Hz	
	1024x768,24bit,60Hz	Optimal Default, Failsafe Default
	1280x768,24bit,60Hz	
	1280x1024,48bit,60Hz	
	1366x768,24bit,60Hz	
	1440x900,48bit,60Hz	
	1600x1200,48bit,60Hz	
	1920x1080,48bit,60Hz	
1920x1200,48bit,60Hz		
Select LCD panel used by Internal Graphics Device by selecting the appropriate setup item.		

Options Summary		
Panel Mode	Single Channel	Optimal Default, Failsafe Default
	Dual Channel	
Panel mode selection for Single channel or Dual channel.		
Color Depth	18-bit	Optimal Default, Failsafe Default
	24-bit	
	36-bit	
	48-bit	
Select panel type.		
Backlight Mode	BIOS & Application	
	Windows Slider	Optimal Default, Failsafe Default
Select backlight control signal type.		

3.6 Setup Submenu: Security



Change User/Supervisor Password

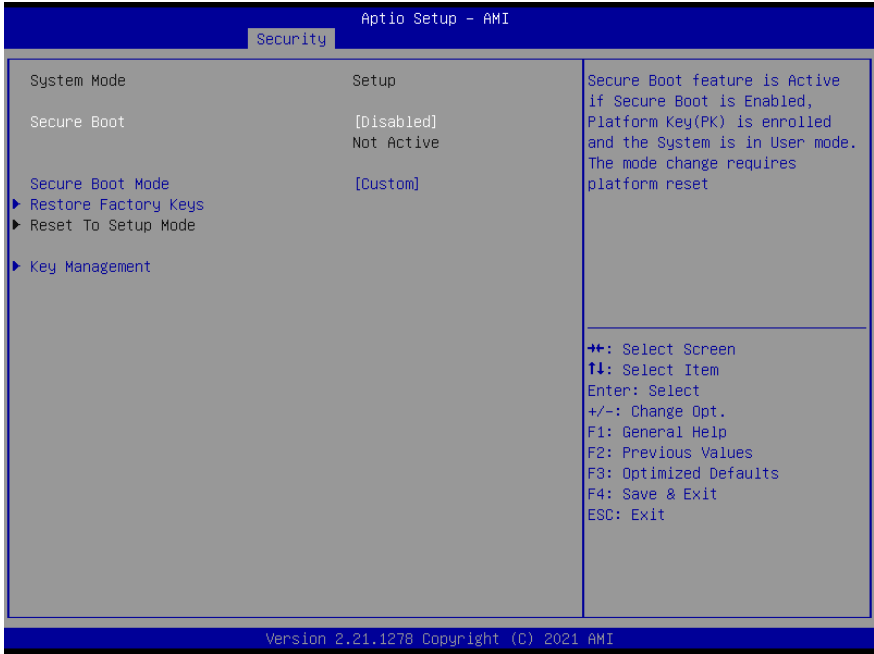
You can install a Supervisor password, and if you install a supervisor password, you can then install a user password. A user password does not provide access to many of the features in the Setup utility.

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

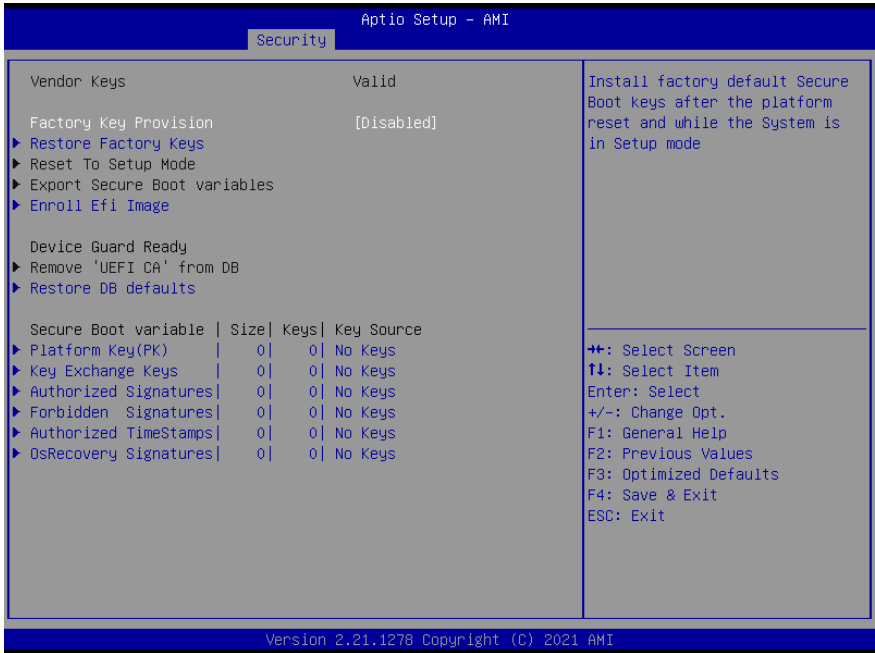
Highlight this item and type in the current password. At the next dialog box press Enter to disable password protection.

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	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.		

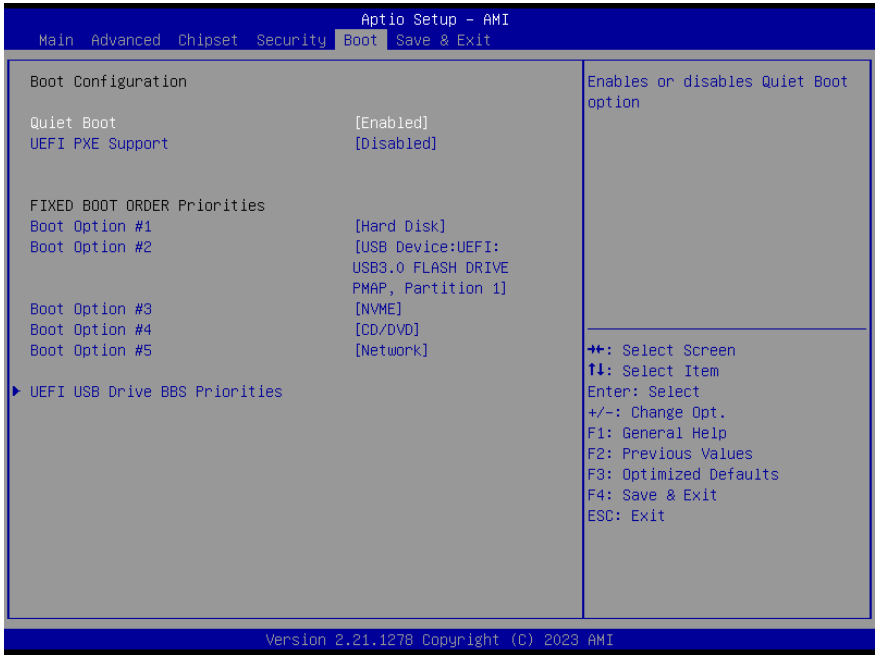
3.6.1.1 Key Management



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).		
Remove 'UEFI CA' from DB		
Device Guard ready system must not list 'Microsoft UEFI CA' Certificate in Authorized Signature database (db).		

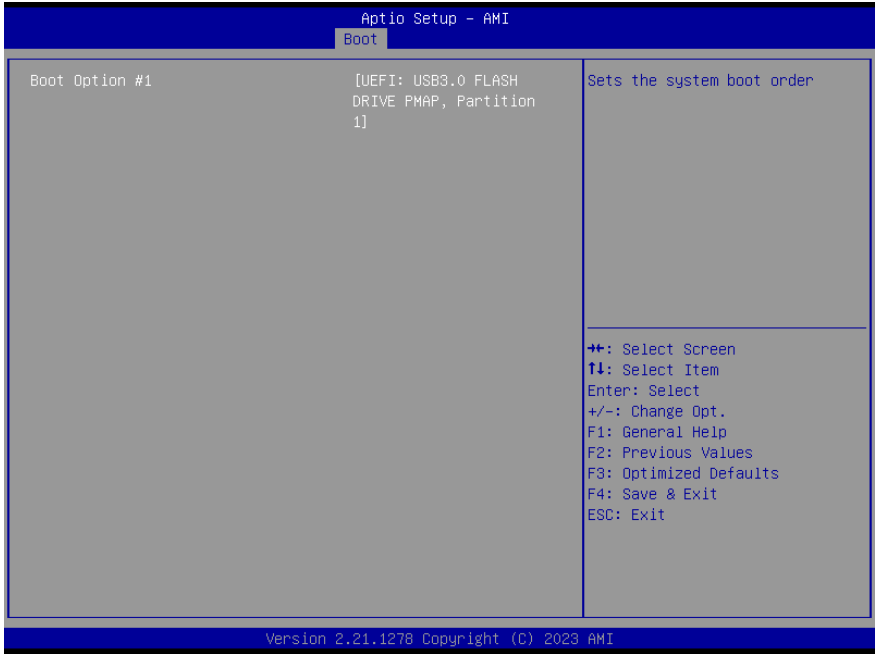
Options Summary	
Restore DB defaults	
Restore DB variable to factory defaults.	
Platform Key (PK)	Details
	Export
	Update
	Delete
Key Exchange Keys	Details
	Export
	Update
	Append
	Delete
Authorized Signatures	Details
	Export
	Update
	Append
	Delete
Forbidden Signatures	Details
	Export
	Update
	Append
	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

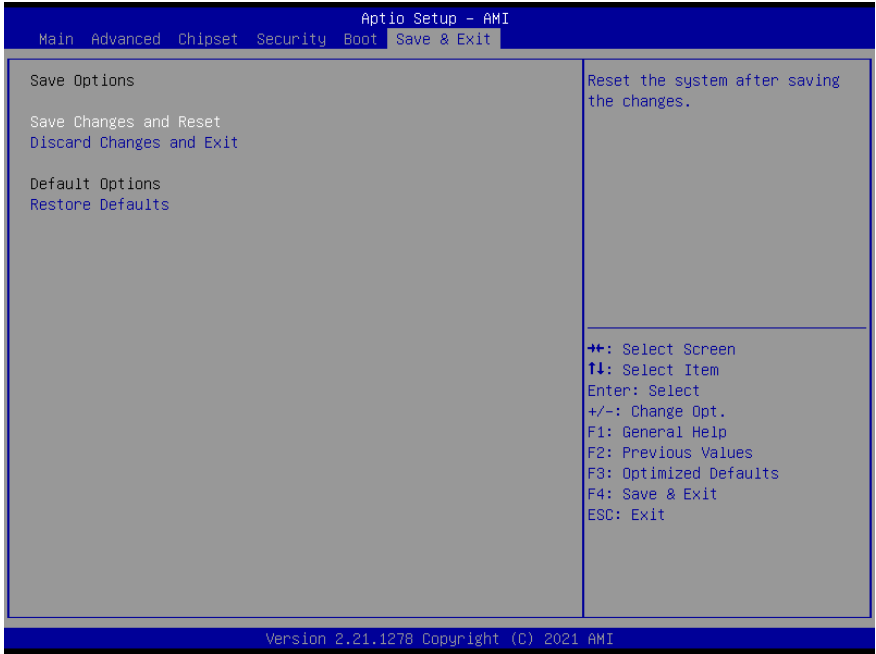


Options Summary		
Quiet Boot	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enable or Disable Quiet Boot option.		
UEFI PXE Support	Disabled	Optimal Default, Failsafe Default
	Enabled	
Enable/Disable UEFI Network Stack.		
FIXED BOOT ORDER Priorities		
Sets the system boot order.		

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

Drivers Installation

4.1 Drivers Download and Installation

Drivers for the PICO-EHL1 can be downloaded from the product page on the AAEON website by following this link:

<https://www.aaeon.com/en/p/pico-itx-board-pico-ehl1>

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 **Installer.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 Driver

1. Open the **Serial IO** folder.
2. Follow the instructions in the .inf files to manually install drivers.

Install Intel® PSE Drivers (Optional)

1. Open the **Intel® PSE Drivers** folder followed by the folder for the drivers you want to install
2. Follow the instructions in the .inf files to manually install drivers

Install Intel® Peripheral Drivers

1. Open **Intel® Peripheral Drivers** folder followed by the folder for the drivers you want to install
2. Follow the instructions in the .inf files to manually install drivers

Install Audio Drivers

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

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
CN2	LVDS Back Light Inverter	JST	SHR-06V-S-B	LVDS Inverter Cable	170X000152
CN3	LVDS EDP	I-PEX	20453-040T-11	LVDS Cable	170X000532
				EDP Cable	170X000531
CN5	Audio with detect	ACES	50247-012H 0H0-001	Audio Cable	170X000156
CN10	SATA	Molex	887505318	SATA Cable	1709070500
CN11	SATA Power	JST	PHR-2	SATA Power Cable	1702150155
CN12	4-bit DIO Header	SAMTEC	SFMC-103-T1-S-D	N/A	N/A
CN17	COM Header	JST	SHDR-20V-S-B	Dual COM Cable	170X000231
CN19	eSPI/SMBUS/I2C	JST	SHR-12V-S-B	LPC/eSPI Cable	1703120130
CN20	4-pin Smart FAN	Molex	51021-0400	N/A	N/A
CN21	Power Input	Molex	19211-0003	Power Cable	170204010R
CN23	DC Jack Power Input	HUANG JI	5525C257-3T 00-R1-7.5	Power Cable	1702041004
CN24/25	USB 2.0 Header	Molex	51021-0500	USB 2.0 Cable	1700050207
CN26	Front Panel	TE	E001H-2X5	Front Panel Cable	1709100108










































Appendix B











I/O Information

B.1 Direct Memory Access (DMA) Map











































- ▼  Direct memory access (DMA)
 -  0 Intel(R) Serial IO I2C Host Controller - 4BB9
 -  0 Intel(R) Serial IO I2C Host Controller - 4BBD
 -  1 Intel(R) Serial IO I2C Host Controller - 4BB9
 -  1 Intel(R) Serial IO I2C Host Controller - 4BBD
 -  6 Intel(R) Serial IO I2C Host Controller - 4BC0
 -  7 Intel(R) Serial IO I2C Host Controller - 4BC0
 -  ...











































B.2 I/O Address Map

▼		Input/output (IO)
	[0000000000000000 - 000000000000CF7]	PCI Express Root Complex
	[0000000000000020 - 0000000000000021]	Programmable interrupt controller
	[0000000000000024 - 0000000000000025]	Programmable interrupt controller
	[0000000000000028 - 0000000000000029]	Programmable interrupt controller
	[000000000000002C - 000000000000002D]	Programmable interrupt controller
	[000000000000002E - 000000000000002F]	Motherboard resources
	[0000000000000030 - 0000000000000031]	Programmable interrupt controller
	[0000000000000034 - 0000000000000035]	Programmable interrupt controller
	[0000000000000038 - 0000000000000039]	Programmable interrupt controller
	[000000000000003C - 000000000000003D]	Programmable interrupt controller
	[0000000000000040 - 0000000000000043]	System timer
	[000000000000004E - 000000000000004F]	Motherboard resources
	[0000000000000050 - 0000000000000053]	System timer
	[0000000000000061 - 0000000000000061]	Motherboard resources
	[0000000000000063 - 0000000000000063]	Motherboard resources
	[0000000000000065 - 0000000000000065]	Motherboard resources
	[0000000000000067 - 0000000000000067]	Motherboard resources
	[0000000000000070 - 0000000000000070]	Motherboard resources
	[0000000000000080 - 0000000000000080]	Motherboard resources
	[0000000000000092 - 0000000000000092]	Motherboard resources
	[00000000000000A0 - 00000000000000A1]	Programmable interrupt controller
	[00000000000000A4 - 00000000000000A5]	Programmable interrupt controller
	[00000000000000A8 - 00000000000000A9]	Programmable interrupt controller
	[00000000000000AC - 00000000000000AD]	Programmable interrupt controller
	[00000000000000B0 - 00000000000000B1]	Programmable interrupt controller
	[00000000000000B2 - 00000000000000B3]	Motherboard resources
	[00000000000000B4 - 00000000000000B5]	Programmable interrupt controller
	[00000000000000B8 - 00000000000000B9]	Programmable interrupt controller
	[00000000000000BC - 00000000000000BD]	Programmable interrupt controller
	[000000000000002E8 - 000000000000002EF]	Communications Port (COM4)
	[000000000000002F8 - 000000000000002FF]	Communications Port (COM2)
	[000000000000003E8 - 000000000000003EF]	Communications Port (COM3)
	[000000000000003F8 - 000000000000003FF]	Communications Port (COM1)
	[000000000000004D0 - 000000000000004D1]	Programmable interrupt controller
	[00000000000000680 - 0000000000000069F]	Motherboard resources
	[00000000000000A00 - 00000000000000A0F]	Motherboard resources
	[00000000000000A10 - 00000000000000A1F]	Motherboard resources
	[00000000000000A20 - 00000000000000A2F]	Motherboard resources
	[00000000000000D00 - 00000000000000FFF]	PCI Express Root Complex
	[0000000000000164E - 0000000000000164F]	Motherboard resources

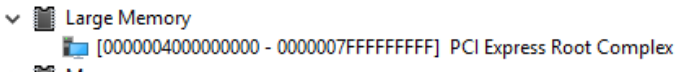
-  [000000000000164E - 000000000000164F] Motherboard resources
-  [0000000000001800 - 00000000000018FE] Motherboard resources
-  [0000000000001854 - 0000000000001857] Motherboard resources
-  [0000000000002000 - 00000000000020FE] Motherboard resources
-  [0000000000003000 - 0000000000003FFF] Intel(R) PCI Express Root Port #6 - 4B3E
-  [0000000000004000 - 000000000000403F] Intel(R) UHD Graphics
-  [0000000000004060 - 000000000000407F] Standard SATA AHCI Controller
-  [0000000000004080 - 0000000000004083] Standard SATA AHCI Controller
-  [0000000000004090 - 0000000000004097] Standard SATA AHCI Controller
-  [000000000000EFA0 - 000000000000EFBF] Intel(R) SMBus Controller - 4B23

B.3 IRQ Mapping Chart

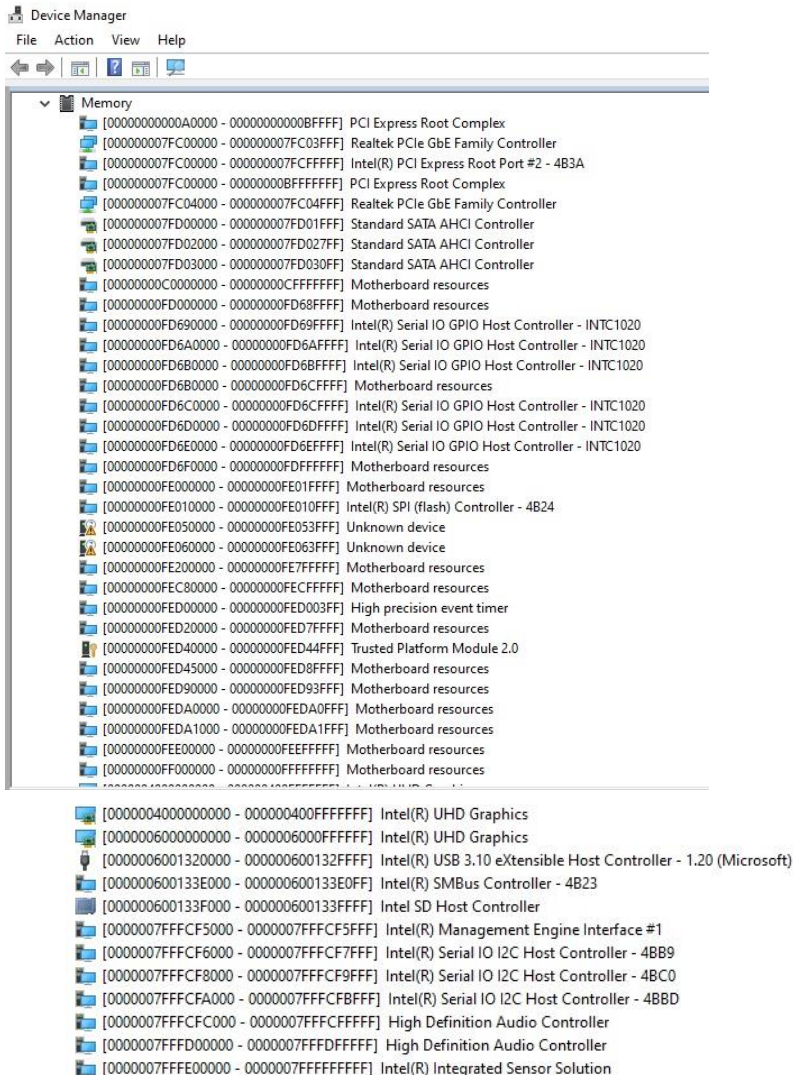
▼		Interrupt request (IRQ)	
		(ISA) 0x00000000 (00)	System timer
		(ISA) 0x00000003 (03)	Communications Port (COM2)
		(ISA) 0x00000004 (04)	Communications Port (COM1)
		(ISA) 0x0000000B (11)	Communications Port (COM3)
		(ISA) 0x0000000B (11)	Communications Port (COM4)
		(ISA) 0x0000000E (14)	Intel(R) Serial IO GPIO Host Controller - INTC1020
		(ISA) 0x00000023 (35)	Unknown device
		(ISA) 0x00000024 (36)	Unknown device
		(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) 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) 0x00000010 (16)	SDA Standard Compliant SD Host Controller
	(PCI) 0xFFFFFFFF (-18)	Intel(R) Serial IO I2C Host Controller - 4BB9
	(PCI) 0xFFFFFFFF (-17)	Intel(R) Serial IO I2C Host Controller - 4BBD
	(PCI) 0xFFFFFFFF0 (-16)	Intel(R) Serial IO I2C Host Controller - 4BC0
	(PCI) 0xFFFFFFFF1 (-15)	Intel(R) Integrated Sensor Solution
	(PCI) 0xFFFFFFFF2 (-14)	Intel(R) Management Engine Interface #1
	(PCI) 0xFFFFFFFF3 (-13)	Intel(R) I210 Gigabit Network Connection
	(PCI) 0xFFFFFFFF4 (-12)	Intel(R) I210 Gigabit Network Connection
	(PCI) 0xFFFFFFFF5 (-11)	Intel(R) I210 Gigabit Network Connection
	(PCI) 0xFFFFFFFF6 (-10)	Intel(R) I210 Gigabit Network Connection
	(PCI) 0xFFFFFFFF7 (-9)	Intel(R) I210 Gigabit Network Connection
	(PCI) 0xFFFFFFFF8 (-8)	Intel(R) I210 Gigabit Network Connection
	(PCI) 0xFFFFFFFF9 (-7)	Intel(R) USB 3.10 eXtensible Host Controller - 1.20 (Microsoft)
	(PCI) 0xFFFFFFFFFA (-6)	Intel(R) UHD Graphics
	(PCI) 0xFFFFFFFFFB (-5)	Standard SATA AHCI Controller
	(PCI) 0xFFFFFFFFFC (-4)	Intel(R) PCI Express Root Port #1 - 4B39
	(PCI) 0xFFFFFFFFFD (-3)	Intel(R) PCI Express Root Port #0 - 4B38

B.4 Large Memory Map



B.5 Memory Address Map



Appendix C

Watchdog Timer Programming

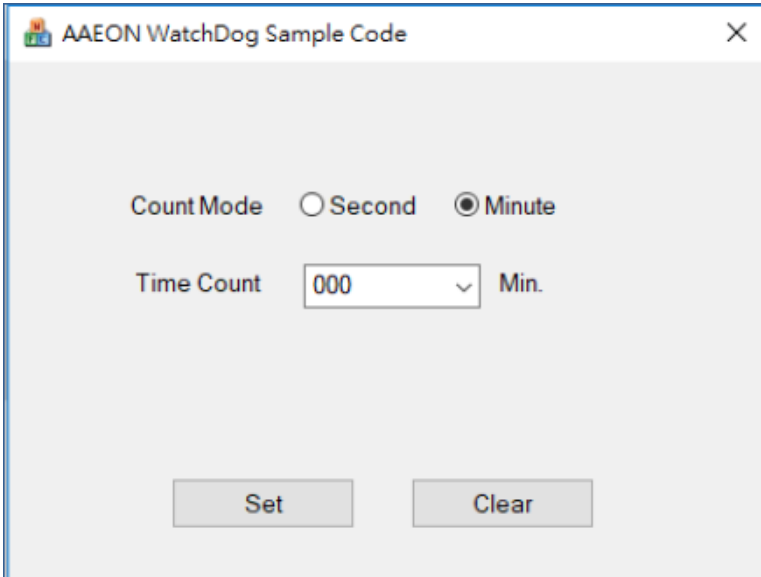
C.1 Introduction to Watchdog Timer

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.

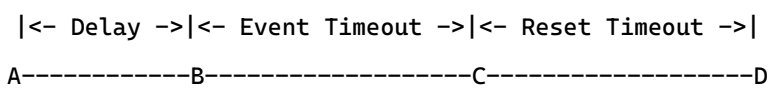
aaeonEAPI.lib is needed for C/C++ based app, make sure the lib files and executable files are in the same folder.

The following shows how to build and run codes:

There are two scenarios to invoke Watchdog Timer functions:

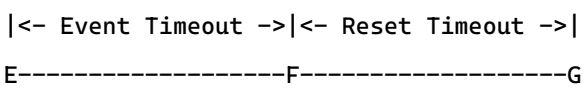
1. Use **EApiWDogStart**

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