

NanoCOM-RAP

COM Express Module

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
● NanoCOM-RAP	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 AAEON.com for the latest version of this document.

Safety Precautions

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

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

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

Warning!



This device complies with Part 15 FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received including interference that may cause undesired operation.

Caution:

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

Attention:

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

China RoHS Requirements (CN)

产品中有毒有害物质或元素名称及含量

AAEON 主板/子板/背板

QQ04-381 Rev.A2

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	×	○	○	○	○	○

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。

环保使用期限(EFUP (Environmental Friendly Use Period)) : 10年

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)

Name and content of hazardous substances in product

AAEON Main Board/Daughter Board/Backplane

QQ4-381 Rev.A2

Part Name	Hazardous Substances					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
PCB Assemblies	×	○	○	○	○	○
Connector and Cable	×	○	○	○	○	○

The table is prepared in accordance with the provisions of SJ/T 11364.

○: Indicates that said hazardous substance contained in all of the homogenous materials for this product is below the limit requirement of GB/T 26572.

×: Indicates that said hazardous substance contained in at least one of the homogenous materials used for this part is above the limit requirement of GB/T 26572. But this product still be compliance with 2011/65/EU Directive (allowed with 2011/65/EU Annex III of RoHS exemption with number 6(c),7(a),7(c)-1).

EFUP (Environment Friendly Use Period) value: 10 years

Notes: This product defined period of use is under normal condition.

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Chapter 1

Product Specifications

1.1 Specifications

System

Form Factor	COM Express, Type 10
CPU	13th Generation Intel® Core™ U-series Processors: Intel® Core™ i7-1365UE (10C/12T, 1.70 GHz, 15W) Intel® Core™ i5-1335UE (10C/12T, 1.30 GHz, 15W) Intel® Core™ i3-1315UE (6C/8T, 1.20 GHz, 15W) Intel® Processor U300E (5C/6T, 1.10 GHz, 15W)
Chipset	Integrated with Intel® SoC
Memory	Onboard LPDDR5x
Onboard Storage	NVMe, up to 128GB (Optional)
BIOS	AMI UEFI
Wake on LAN	Yes
Watchdog Timer	255 Levels
Dimension (L x W)	3.31" x 2.17" (84mm x 55mm)
Security	TPM 2.0

Power

Power Requirement	+9V ~ 15V and +5VSB for ATX, +9V ~ 15V for AT
Power Type	AT/ATX
Power Consumption (Typical)	Intel® Core™ i7-1365UE, LPDDR5 8GB, 2.82A @+12V

Display

Graphics Controller	Intel® UHD Graphics for 13th Gen Intel® Processors
Video Output	Dual Display: DDI x 1, up to 3840 x 2160 eDP x 1, up to 3840 x 2160

I/O

Ethernet	Intel® Ethernet Controller I226-IT, 2.5GbE x 1
Audio	High Definition Audio Interface
USB Port	USB 2.0 x 8 USB 3.2 Gen 2 x 2
Serial Port	2-Wire UART x 2 (Tx/Rx)
HDD Interface	SATA 6Gb/s x 2
Expansion	PCIe 3.0 x 4 LPC x 1
GPIO	8-bit
SMBus/I2C	I2C x 1 SMBus x 1

Environmental

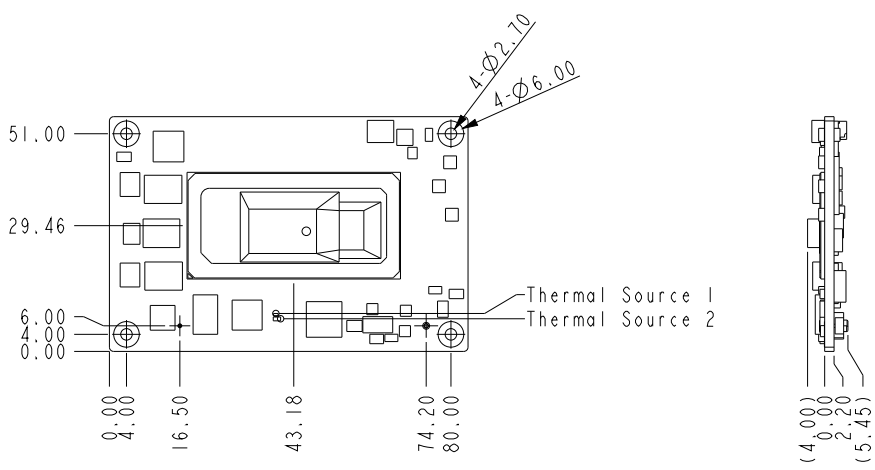
Operating Temperature	32°F ~ 140°F (0°C ~ 60°C)
Storage Temperature	-40°F ~ 185°F (-40°C ~ 85°C)
Operating Humidity	0% ~ 90% relative humidity, non-condensing
EMC	CE/FCC Class A
OS Support	Windows® 10 (64-bit) Linux Ubuntu 22.04.3/Kernel 5.19
Weight	0.15 lb. (0.07Kg)

Chapter 2

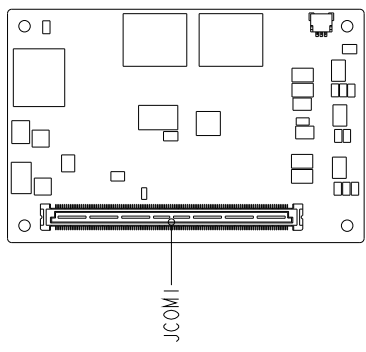
Hardware Information

2.1 Dimensions, Jumpers and Connectors

Top Side

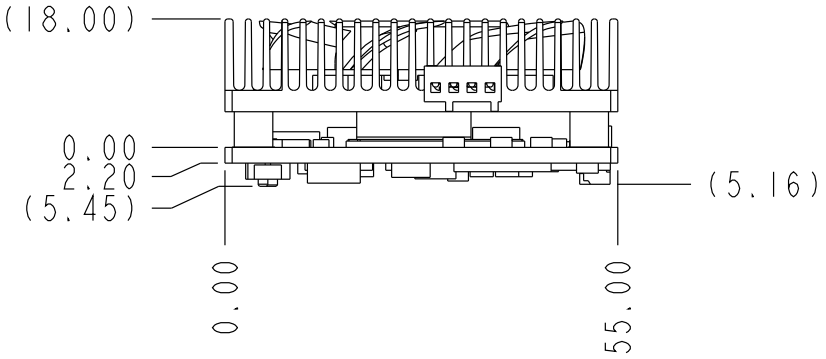


Bottom Side

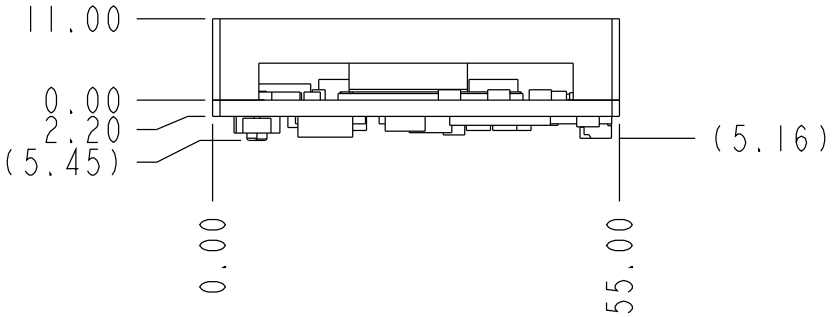


Thermal Solutions

With Active Cooler (P/N: NANOCOM-RAP-FAN01)



With Heatspreader (P/N: NANOCOM-RAP-HSP01)



2.2 List of Jumpers and Connectors

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

Label	Function
JCOM1	ROW A/B

2.2.1 ROW A/B Connector (JCOM1)

Row A		Row B	
A1	GND (FIXED)	B1	GND (FIXED)
A2	GBE0_MDI3-	B2	GBE0_ACT#
A3	GBE0_MDI3+	B3	LPC_FRAME#
A4	GBE0_LINK1000#	B4	LPC_ADO
A5	GBE0_LINK2500#	B5	LPC_AD1
A6	GBE0_MDI2-	B6	LPC_AD2
A7	GBE0_MDI2+	B7	LPC_AD3
A8	GBE0_LINK#	B8	N.C
A9	GBE0_MDI1-	B9	N.C
A10	GBE0_MDI1+	B10	LPC_CLK
A11	GND (FIXED)	B11	GND (FIXED)
A12	GBE0_MDI0-	B12	PWRBTN#
A13	GBE0_MDI0+	B13	SMB_CK
A14	N.C	B14	SMB_DAT
A15	SUS_S3#	B15	SMB_ALERT#
A16	SATA0_TX+	B16	SATA1_TX+
A17	SATA0_TX-	B17	SATA1_TX-
A18	SUS_S4#	B18	SUS_STAT#
A19	SATA0_RX+	B19	SATA1_RX+
A20	SATA0_RX-	B20	SATA1_RX-
A21	GND (FIXED)	B21	GND (FIXED)
A22	USB3_RXN0	B22	USB3_TXN0

Row A		Row B	
A23	USB3_RXP0	B23	USB3_TXP0
A24	SUS_S4#	B24	PWR_OK
A25	USB3_RX1_N	B25	USB3_TX1_N
A26	USB3_RX1_P	B26	USB3_TX1_P
A27	BATLOW#	B27	WDT
A28	ATA_ACT#	B28	N.C
A29	HDA_SYNC	B29	HDA_SDI1
A30	HDA_RST#	B30	HDA_SDI0
A31	GND (FIXED)	B31	GND (FIXED)
A32	HDA_BCLK	B32	SPKR
A33	HDA_SDO	B33	I2C_CK
A34	BIOS_DIS0#	B34	I2C_DAT
A35	THRMTRIP#	B35	THRM#
A36	USB6-	B36	USB7-
A37	USB6+	B37	USB7+
A38	USB_6_7_OC#	B38	USB_4_5_OC#
A39	USB4-	B39	USB5-
A40	USB4+	B40	USB5+
A41	GND (FIXED)	B41	GND (FIXED)
A42	USB2-	B42	USB3-
A43	USB2+	B43	USB3+
A44	USB_2_3_OC#	B44	USB_0_1_OC#
A45	USB0-	B45	USB1-
A46	USB0+	B46	USB1+
A47	VCC_RTC	B47	BUF_PLT_RST#(reserve)
A48	RSMRST#(reserve)	B48	N.C
A49	LAN_SDPO	B49	SYS_RESET#
A50	LPC_SERIRQ	B50	CB_RESET#
A51	GND (FIXED)	B51	GND (FIXED)
A52	N.C	B52	N.C
A53	N.C	B53	N.C
A54	GPIO	B54	GPO1
A55	GSPI0_CS0#	B55	GSPI0_MISO

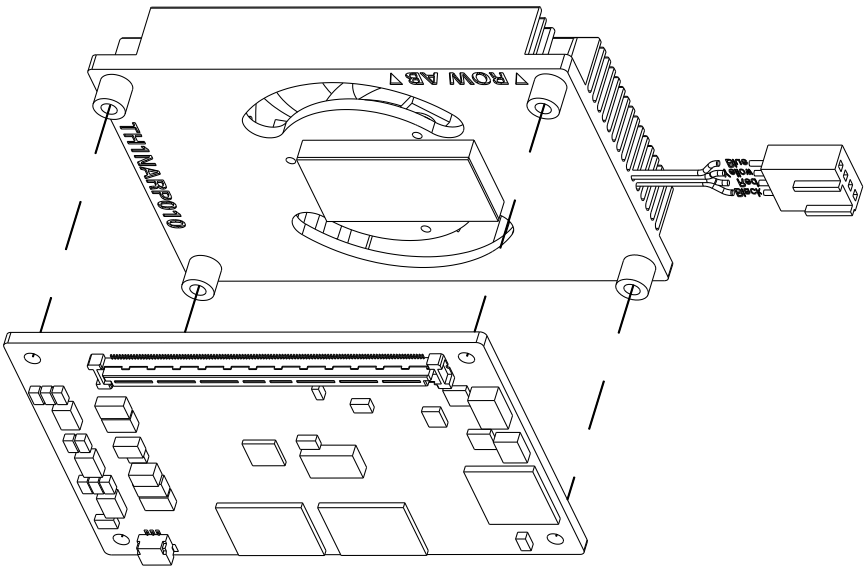
Row A		Row B	
A56	GSPI0_CLK	B56	GSPI0_MOSI
A57	GND	B57	GPO2
A58	PCIE_TX3+	B58	PCIE_RX3+
A59	PCIE_TX3-	B59	PCIE_RX3-
A60	GND (FIXED)	B60	GND (FIXED)
A61	PCIE_TX2+	B61	PCIE_RX2+
A62	PCIE_TX2-	B62	PCIE_RX2-
A63	GPI1	B63	GPO3
A64	PCIE_TX1+	B64	PCIE_RX1+
A65	PCIE_TX1-	B65	PCIE_RX1-
A66	GND	B66	PCIE_WAKE#
A67	GPI2	B67	EC_WAKE#
A68	PCIE_TX0+	B68	PCIE_RX0+
A69	PCIE_TX0-	B69	PCIE_RX0-
A70	GND (FIXED)	B70	GND (FIXED)
A71	EDP_TXP2	B71	DDIO_PAIR0+
A72	EDP_TXN2	B72	DDIO_PAIR0-
A73	EDP_TXP1	B73	DDIO_PAIR1+
A74	EDP_TXN1	B74	DDIO_PAIR1-
A75	EDP_TXP0	B75	DDIO_PAIR2+
A76	EDP_TXN0	B76	DDIO_PAIR2-
A77	LVDS_VDD_EN(EDP_VDDEN_3_3)	B77	N.C
A78	N.C	B78	N.C
A79	N.C	B79	EDP_BKLT_EN
A80	GND (FIXED)	B80	GND (FIXED)
A81	EDP_TXP3	B81	DDIO_PAIR3+
A82	EDP_TXN3	B82	DDIO_PAIR3-
A83	EDP_AUXP	B83	EDP_BKLT_CTRL
A84	EDP_AUXN	B84	VCC_5V_SBY
A85	GPI3	B85	VCC_5V_SBY
A86	EC_KBRST#(reserve)	B86	VCC_5V_SBY
A87	EDP_HPDP	B87	VCC_5V_SBY
A88	PCIE_CK_REF+	B88	BISO_DIS1#

Row A		Row B	
A89	PCIE_CK_REF-	B89	DDIO_HPD
A90	GND (FIXED)	B90	GND (FIXED)
A91	SPI_POWER	B91	N.C
A92	SPI_MISO	B92	N.C
A93	GPO0	B93	N.C
A94	SPI_CLK	B94	N.C
A95	SPI_MOSI	B95	DDIO_DDC_AUX_SEL
A96	GND	B96	N.C
A97	TYPE10#	B97	SPI_CS#
A98	RS1_TX	B98	DDIO_CTRL_CLK
A99	RS1_RX	B99	DDIO_CTRL_DATA
A100	GND (FIXED)	B100	GND (FIXED)
A101	RS2_TX	B101	FAN_PWMOUT
A102	RS2_RX	B102	FAN_TACHIN
A103	LID#	B103	SLEEP#
A104	VCC_12V	B104	VCC_12V
A105	VCC_12V	B105	VCC_12V
A106	VCC_12V	B106	VCC_12V
A107	VCC_12V	B107	VCC_12V
A108	VCC_12V	B108	VCC_12V
A109	VCC_12V	B109	VCC_12V
A110	GND (FIXED)	B110	GND (FIXED)

2.3 Thermal Solution Installation

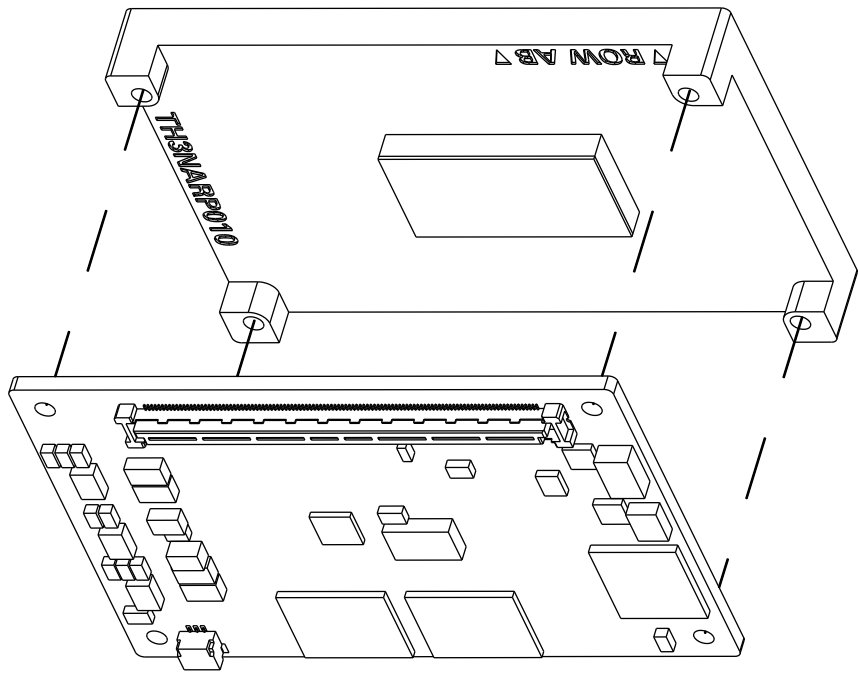
2.3.1 Fan Assembly

Tighten all four screws following the alignment shown below in order to affix the fan to the NanoCOM-RAP.



2.3.2 Heatspreader Assembly

Tighten all four screws following the alignment shown below in order to affix the heatspreader to the NanoCOM-RAP.



Chapter 3

AMI BIOS Setup

3.1 System Test and Initialization

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

The system configuration verification routines check the current system configuration against the values stored in the CMOS memory. If they do not match, an error message will be output, and the BIOS setup program will need to be run to set the configuration information in memory.

There are three situations in which the CMOS settings will need to be set or changed:

- Starting the system for the first time
- The system hardware has been changed
- The CMOS memory has lost power and the configuration information is erased

The system's CMOS memory uses a backup battery for data retention. The battery must be replaced when it runs down.

3.2 AMI BIOS Setup

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

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

The function for each interface can be found below.

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

Advanced – Enable/ Disable boot option for legacy network devices

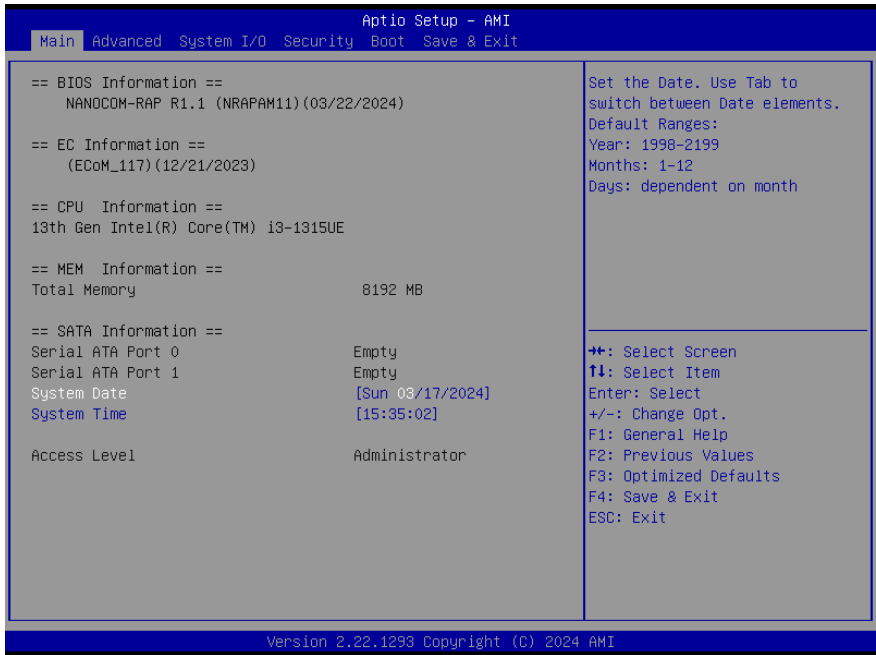
System I/O – Enable/ Disable System input and output port

Security – The setup administrator password can be set here

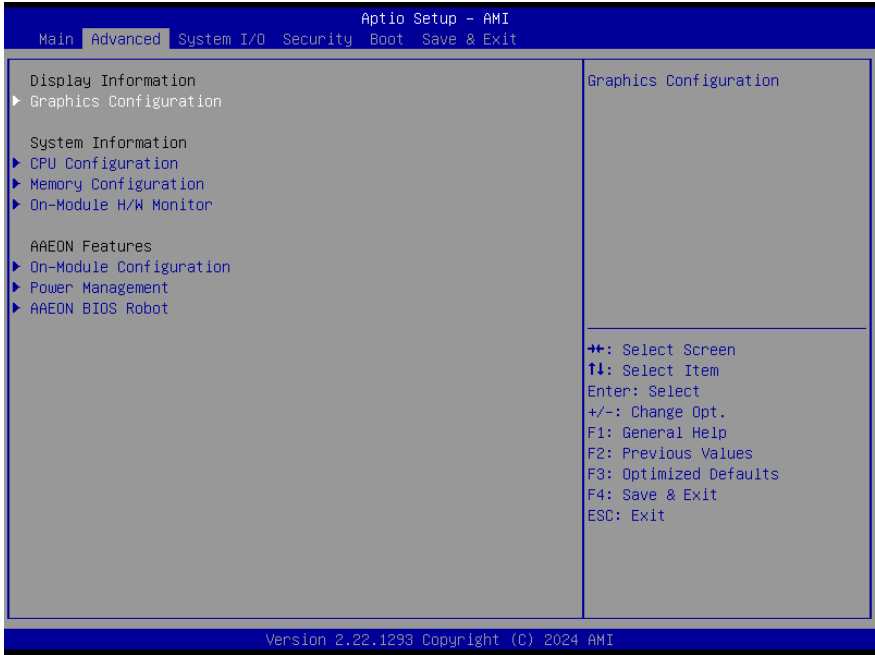
Boot – Enable/ Disable quiet Boot Option

Save & Exit – Save your changes and exit the program

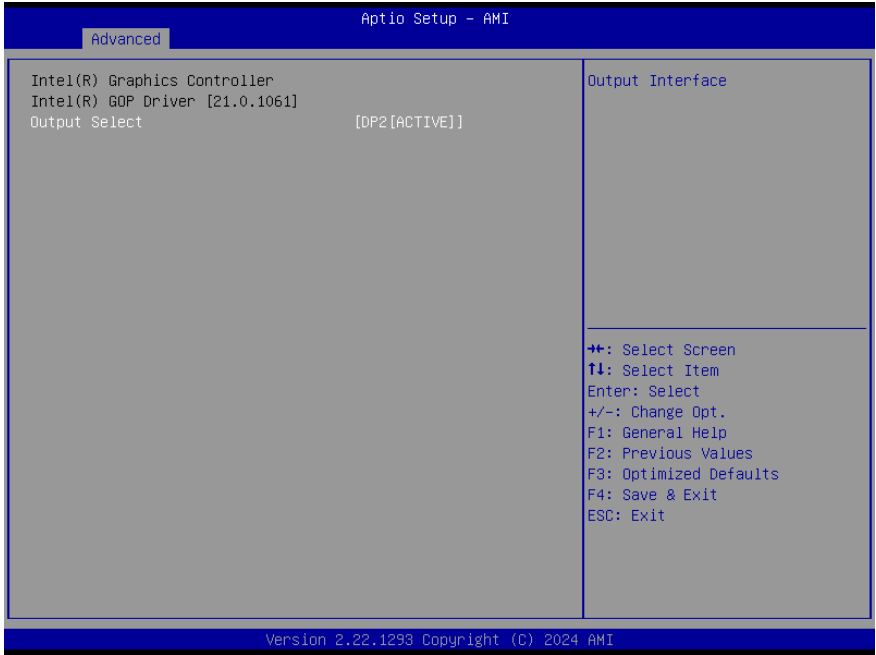
3.3 Setup Submenu: Main



3.4 Setup Submenu: Advanced

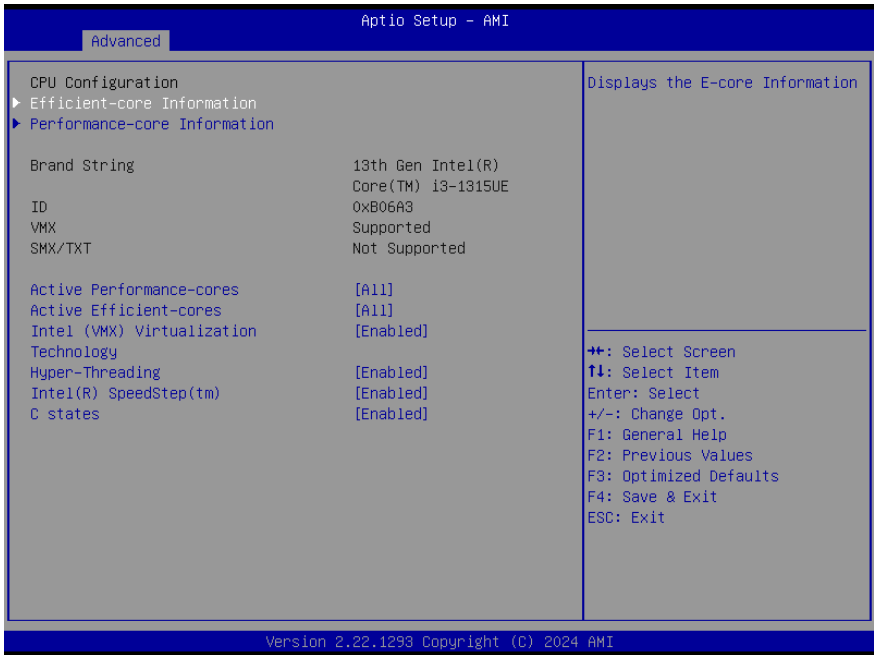


3.4.1 Graphics Configuration



Options Summary		
Output Select	DP2 [ACTIVE]	Optimal Default, Failsafe Default
Output Interface.		

3.4.2 CPU Configuration



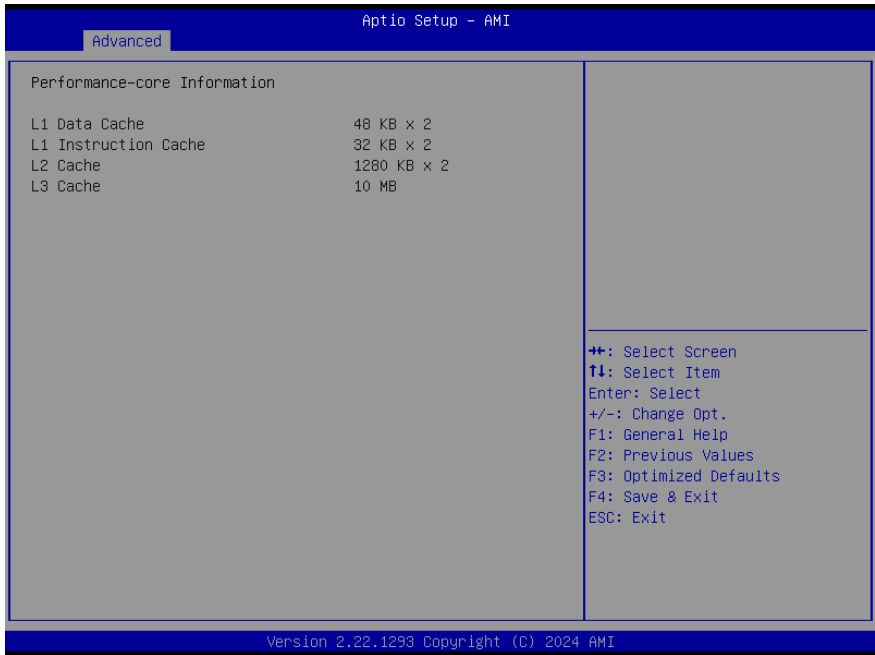
Options Summary		
Active Performance-cores	All	Optimal Default, Failsafe Default
	1	
Number of P-cores to enable in each processor package. Note: Number of Cores and E-cores are looked at together. When both are {0, 0}, Pcode will enable all cores.		
Active Efficient-cores	All	Optimal Default, Failsafe Default
	3	
	2	
	1	
	0	
Number of E-cores to enable in each processor package. Note: Number of Cores and E-cores are looked at together. When both are {0, 0}, Pcode will enable all cores.		
Intel (VMX) Virtualization Technology	Disabled	Optimal Default, Failsafe Default
	Enabled	
When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.		

Options Summary		
Hyper-Threading	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enable or Disable Hyper-Threading Technology.		
Intel® SpeedStep™	Disabled	
	Enabled	Optimal Default, Failsafe Default
Allows more than two frequency ranges to be supported.		
C states	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enable/Disable CPU Power Management. Allows CPU to go to C states when it's not 100% utilized.		

3.4.2.1 Efficient-core Information

Aptio Setup - AMI	
Advanced	
Efficient-core Information	
L1 Data Cache	32 KB × 4
L1 Instruction Cache	64 KB × 4
L2 Cache	2048 KB
L3 Cache	10 MB
++: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit	
Version 2.22.1293 Copyright (C) 2024 AMI	

3.4.2.2 Performance-core Information



3.4.3 Memory Configuration

Aptio Setup - AMI

Advanced

Memory Configuration	
Memory RC Version	0.0.4.133
Total Memory	8192 MB
Memory Frequency	4800 MHz
tCL-tRCD-tRP-tRAS	13-11-11-26
MC 0 Ch 0 DIMM 0	Populated & Enabled
Size	2048 MB (LPDDR5)
Number of Ranks	1
Manufacturer	Samsung
MC 0 Ch 1 DIMM 0	Populated & Enabled
Size	2048 MB (LPDDR5)
Number of Ranks	1
Manufacturer	Samsung
MC 0 Ch 2 DIMM 0	Populated & Enabled
Size	2048 MB (LPDDR5)
Number of Ranks	1
Manufacturer	Samsung
MC 0 Ch 3 DIMM 0	Populated & Enabled
Size	2048 MB (LPDDR5)
Number of Ranks	1
Manufacturer	Samsung

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

Version 2.22.1293 Copyright (C) 2024 AMI

3.4.4 On-Module H/W Monitor

Fan Mode: Auto – Slope Linear

Aptio Setup - AMI

Advanced

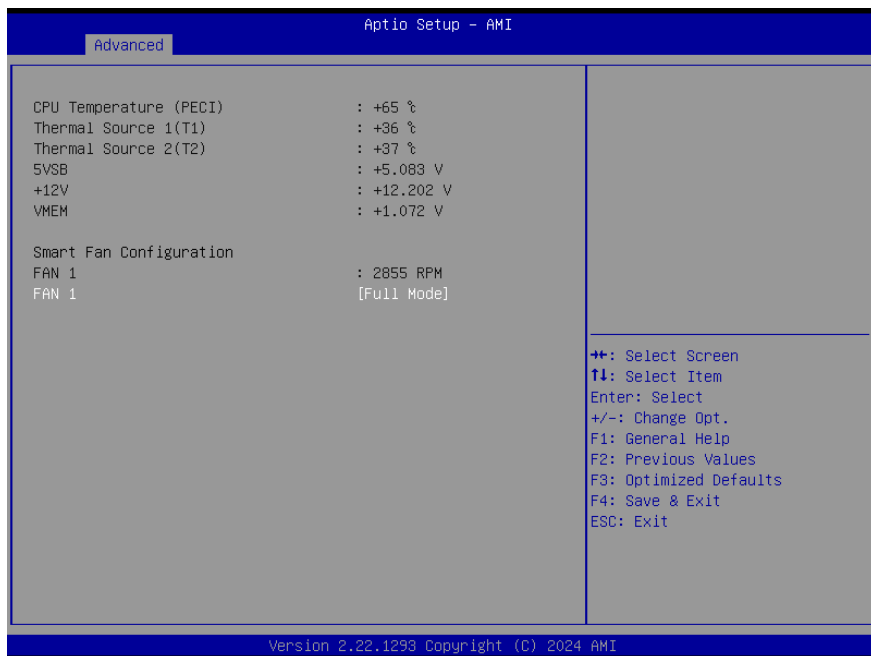
<pre> CPU Temperature (PECI) : +56 ℃ Thermal Source 1(T1) : +33 ℃ Thermal Source 2(T2) : +33 ℃ 5VSB : +5.083 V +12V : +12.202 V VMEM : +1.072 V Smart Fan Configuration FAN 1 : 2484 RPM FAN 1 [Auto - Slope Linear] PWM signal [Non-inverting] Thermal Monitoring [CPU Temperature (PECI)] Start-Up temperature 10 Shut-Off temperature 0 START PWM 30 Slope (PWM) [1 (PWM)] </pre>	<pre> ++: Select Screen T1: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit </pre>
--	---

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Options Summary		
FAN 1	Full Mode	
	Manual Mode	
	Auto – Slope Linear	Optimal Default, Failsafe Default
Fan Mode select.		
PWM signal	Non-inverting	Optimal Default, Failsafe Default
	Inverting	
Select output PWM of inverting or non-inverting signal.		
Thermal Monitoring	CPU Temperature (PECI)	Optimal Default, Failsafe Default
	Thermal Source 1 (T1)	
	Thermal Source 2 (T2)	
Monitoring thermal sensor select.		
Start-Up temperature	10	
PWM output when monitoring thermal sensor is exceeded. Range: 0 – 100		

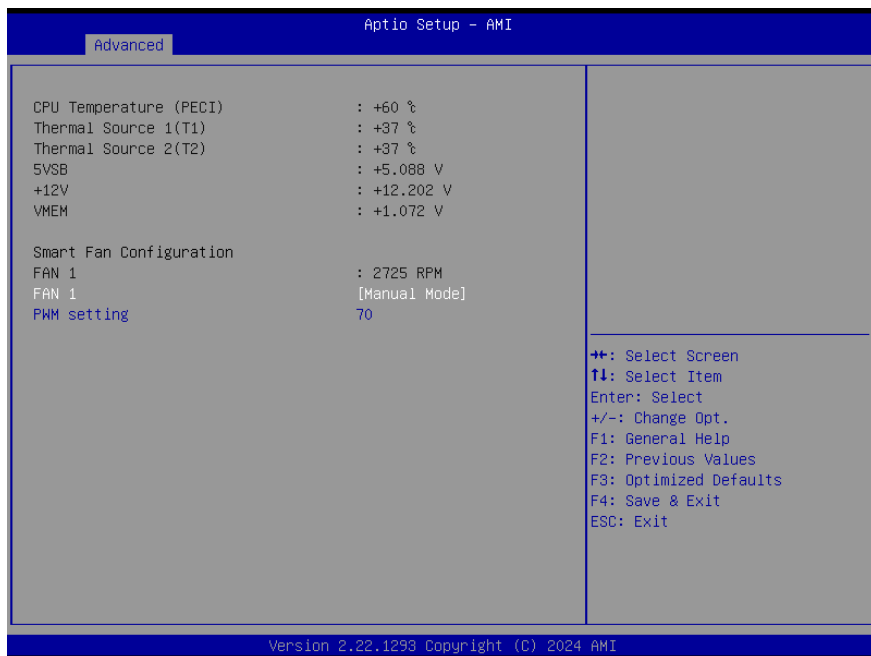
Options Summary		
Shut-Off temperature	0	
PWM turns off when monitored thermal sensor is less or equal to. Range: 0- 100		
START PWM	30	
The beginning PWM output value when Start-Up temperature is triggered.		
Slope (PWM)	0 (PWM)	
	1 (PWM)	Optimal Default, Failsafe Default
	2 (PWM)	
	4 (PWM)	
	8 (PWM)	
	16 (PWM)	
	32 (PWM)	
	64 (PWM)	
When the monitored temperature is higher than the Start-Up temperature, the PWM output increases per degree.		

Fan Mode: Full Mode



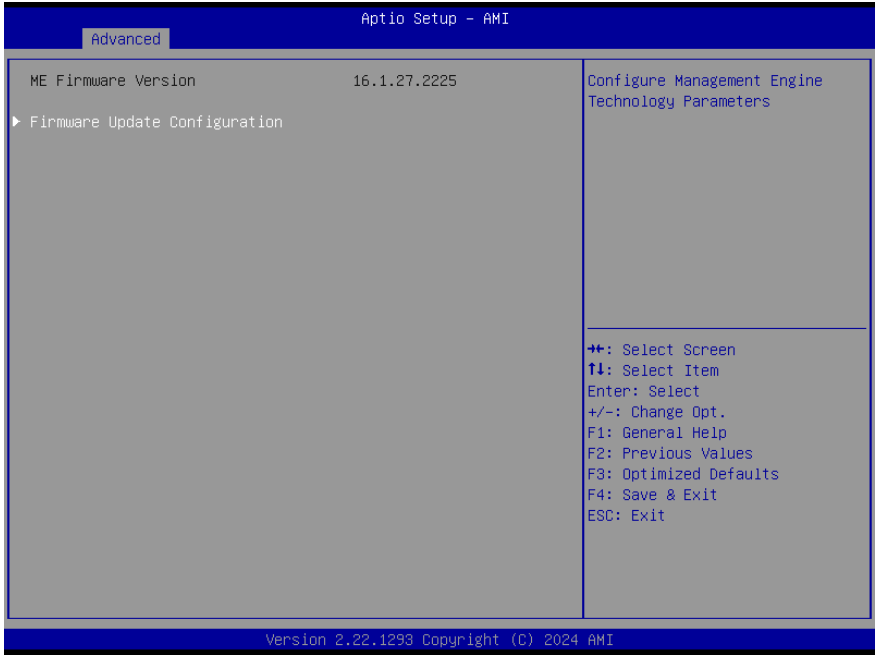
Options Summary		
FAN 1	Full Mode	Optimal Default, Failsafe Default
	Manual Mode	
	Auto – Slope Linear	
Fan Mode select.		

Fan Mode: Manual Mode

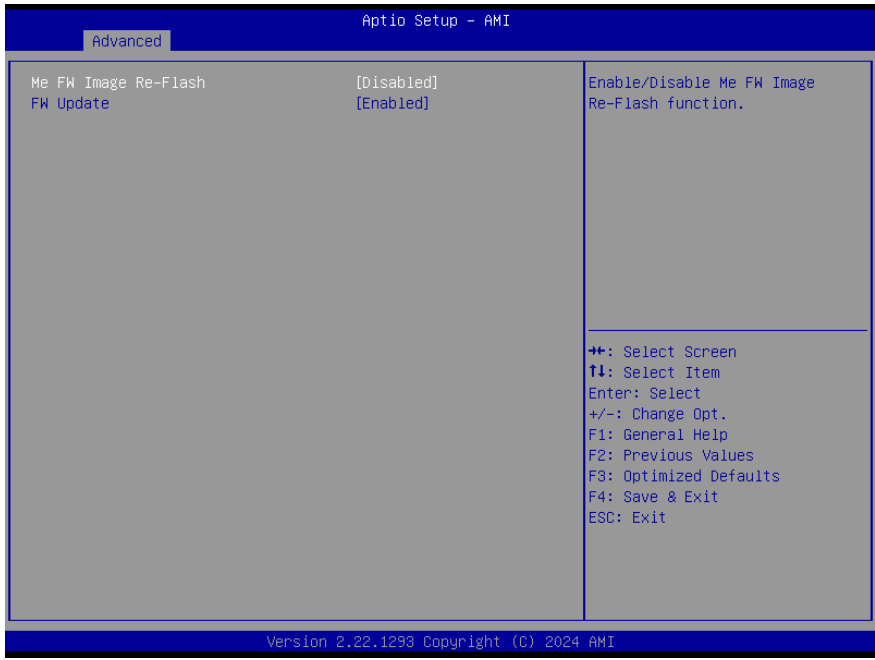


Options Summary		
FAN 1	Full Mode	
	Manual Mode	Optimal Default, Failsafe Default
	Auto – Slope Linear	
Fan Mode select.		
PWM setting	70	
The PWM value of manual mode. Range: 0 – 100.		

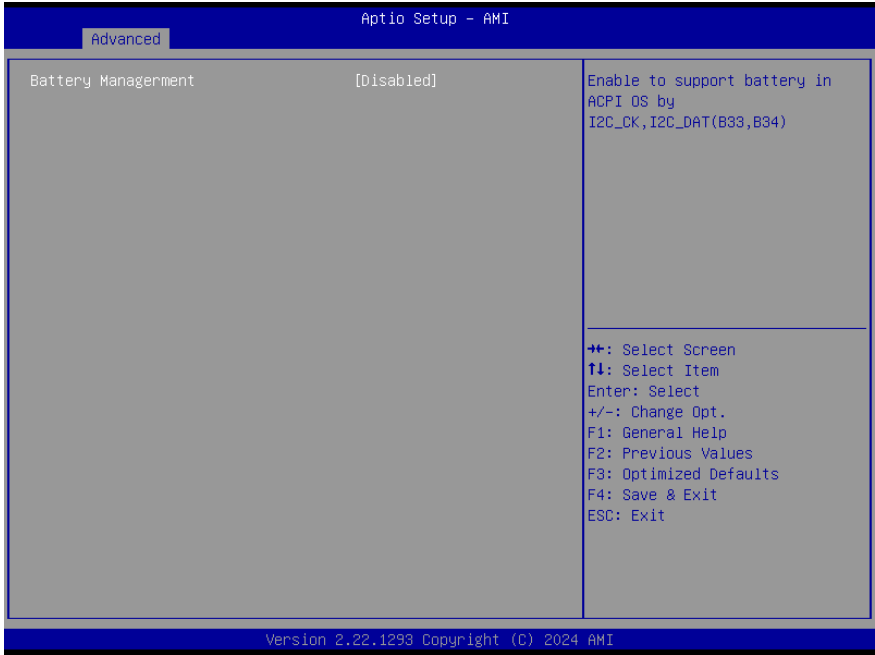
3.4.5 PCH-FW Configuration



3.4.5.1 Firmware Update Configuration

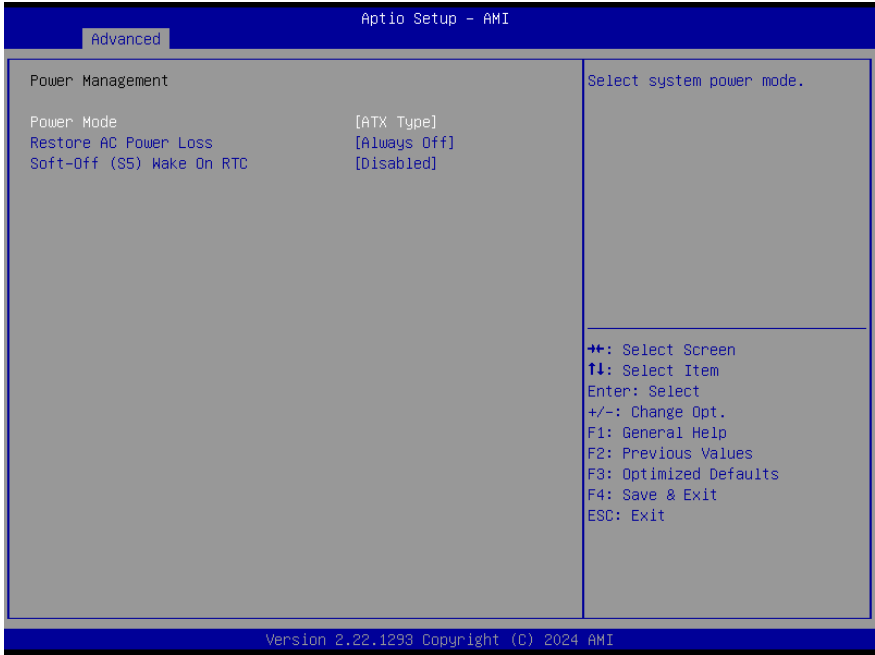


3.4.6 On-Module Configuration



Options Summary		
Battery Management	Disabled	Optimal Default, Failsafe Default
	One Battery	
Enable to support battery in ACPI OS by I2C_CK, I2C_DAT(B33, B34).		

3.4.7 Power Management



Options Summary		
Power Mode	ATX Type	Optimal Default, Failsafe Default
	AT Type	
Select system power mode.		
Restore AC Power Loss	Last State	
	Always On	
	Always Off	Optimal Default, Failsafe Default
Restore AC Power Loss: To decide the behavior after system power cut then resupply. Note: The CMOS battery must present.		
Soft-Off (S5) Wake On RTC	Disabled	Optimal Default, Failsafe Default
	By Date	
	By Weekday	
	Bypass	

Options Summary

By Date: System will wake on the day with hr::min::sec specified.

By Weekday: System will wake on the enabled weekday with hr::min::sec specified.

Bypass: BIOS will not control RTC wake function.

3.4.8 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]	
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		
		++: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit

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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 2 x normal POST time is suggested.		

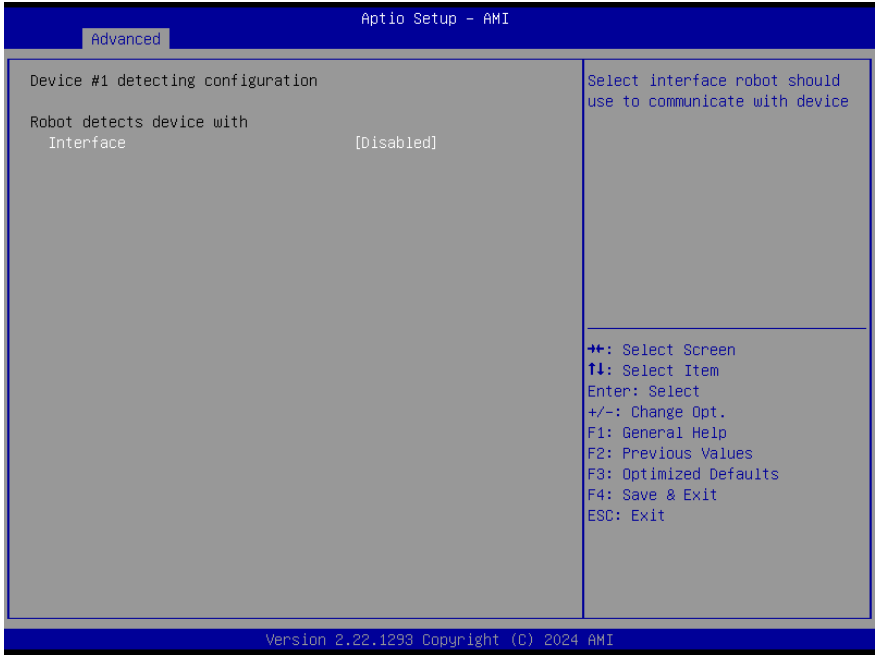
Options Summary		
Sends watch dog before booting OS	Disabled	Optimal Default, Failsafe Default
	Enabled	
Enabled - Robot set Watch Dog Timer (WDT) after POST completion, before BIOS transfer control to OS. WARNING: Before enabling this function, a program in OS must be in responsible for clearing WDT. 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.		
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.		

3.4.8.1 Device Detecting Configuration



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

3.4.8.2 Device #* Detecting Configuration

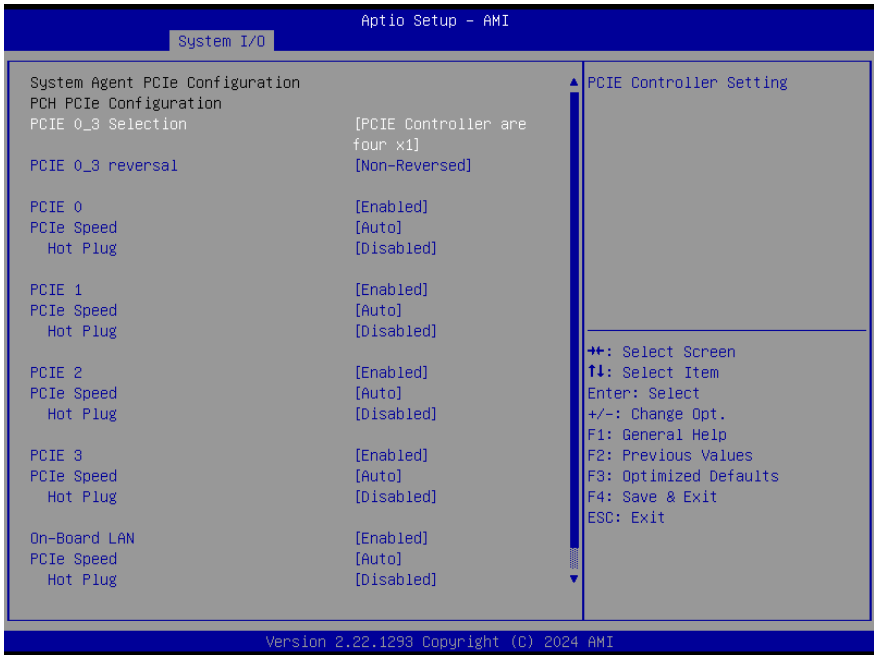


Options Summary		
Interface	Disabled	Optimal Default, Failsafe Default
	PCI	
	DIO	
	SMBUS	
	Legacy I/O	
	Super I/O	
	MMIO	
Select interface robot should use to communicate with device.		

3.5 Setup Submenu: System I/O



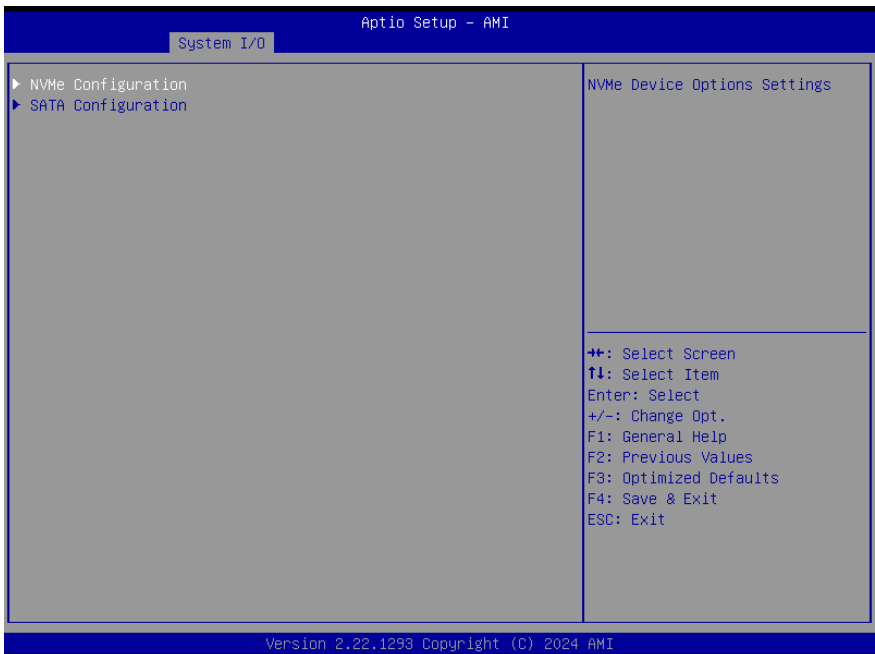
3.5.1 PCI Express Configuration



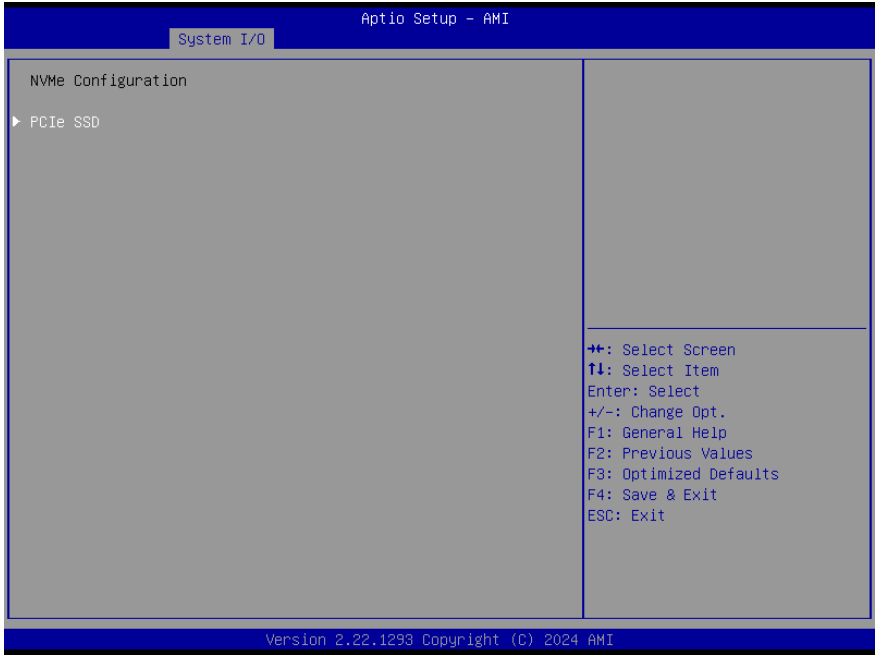
Options Summary		
PCIE 0_3 Selection	PCIE Controller are four x1	Optimal Default, Failsafe Default
	PCIE Controller are one x2 and two x1	
	PCIE Controller are two x2	
	PCIE Controller is one x4	
PCIe Controller Setting.		
PCIE 0_3 reversal	Non-Reversed	Optimal Default, Failsafe Default
	Reversed	
PCIe LANE REVERSAL.		
PCIE 0 ~ 3	Disabled	
	Enabled	Optimal Default, Failsafe Default
Control the PCI Express Root Port.		
PCIE Speed	Auto	Optimal Default, Failsafe Default

Options Summary		
	Gen1	
	Gen2	
	Gen3	
Configure PCIe Speed.		
Hot Plug	Disabled	Optimal Default, Failsafe Default
	Enabled	
PCI Express Hot Plug Enable/Disable.		
On-Board LAN	Disabled	
	Enabled	Optimal Default, Failsafe Default
Control the PCI Express Root Port.		

3.5.2 Storage Configuration



3.5.2.1 NVMe Configuration

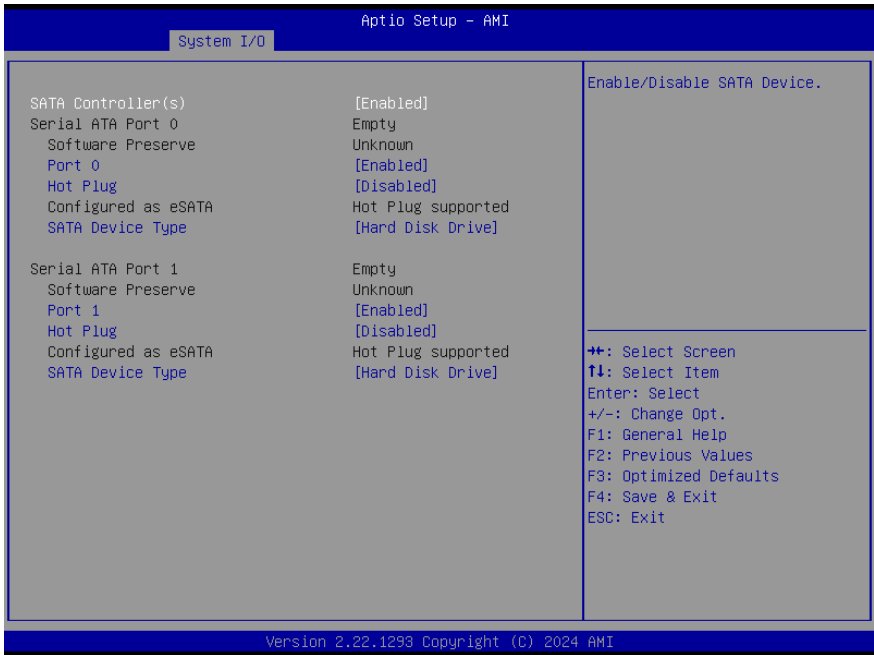


3.5.2.2 PCIe SSD



Options Summary		
Self-Test Option	Short	Optimal Default, Failsafe Default
	Extended	
Select either Short or Extended Self Test. Short option will take couple of minutes and extended option will take several minutes to complete.		
Self Test Action	Controller Only Test	Optimal Default, Failsafe Default
	Controller and NameSpace Test	
Select either to test Controller alone or Controller and NameSpace. Selecting Controller and NameSpace option will take lot longer to complete the test.		
Run Device Self Test	Perform device self test for the corresponding Option and Action selected by user. Pressing 'Esc' key will abort the test. Result shown below is the recent result logged in the device.	

3.5.2.3 SATA Configuration



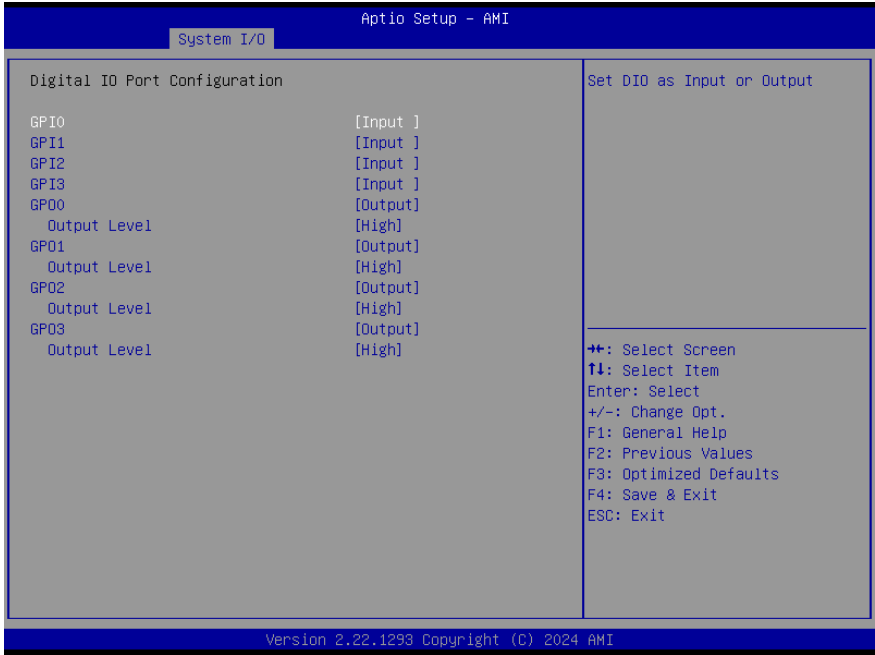
Options Summary		
SATA Controller(s)	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enable/Disable SATA Device.		
Port 0 ~ 1	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enable or Disable SATA Port.		
Hot Plug	Disabled	Optimal Default, Failsafe Default
	Enabled	
Designates this port as Hot Pluggable.		
SATA Device Type	Hard Disk Drive	Optimal Default, Failsafe Default
	Solid State Drive	
Identify the SATA port is connected to Solid State Drive or Hard Disk Drive.		

3.5.3 HD Audio Configuration



Options Summary		
HD Audio	Disabled	
	Enabled	Optimal Default, Failsafe Default
Control Detection of the HD-Audio device. Disabled = HDA will be unconditionally disabled. Enabled = HDA will be unconditionally enabled.		

3.5.4 Digital IO Port Configuration

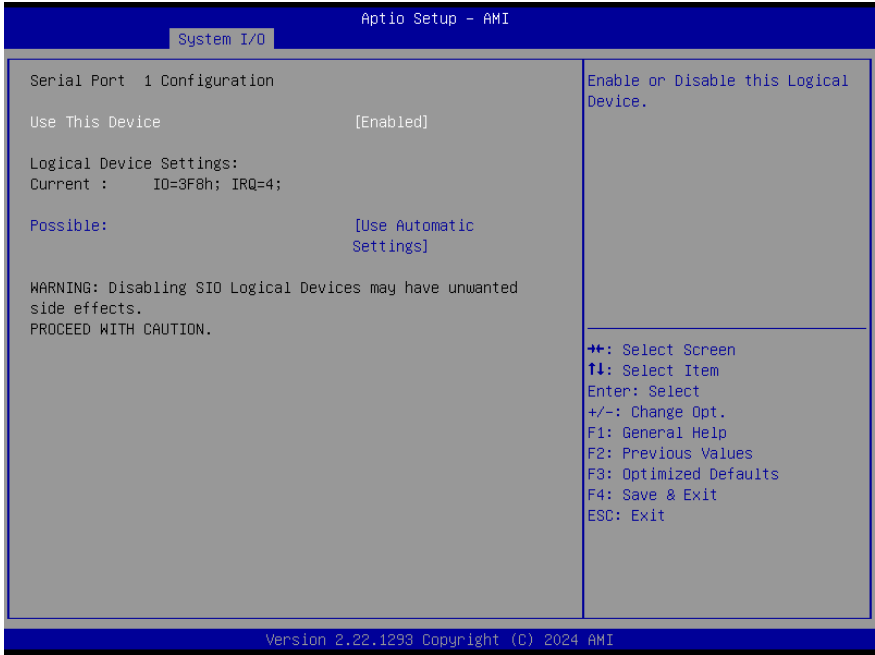


Options Summary		
GPI 0 ~ 3	Input	Optimal Default, Failsafe Default
	Output	
Set DIO as Input or Output.		
GPO 0 ~ 3	Input	Optimal Default, Failsafe Default
	Output	
Set DIO as Input or Output.		
Output Level	Low	
	High	Optimal Default, Failsafe Default
Set output level when DIO pin is Output.		

3.5.5 Legacy Devices Configuration

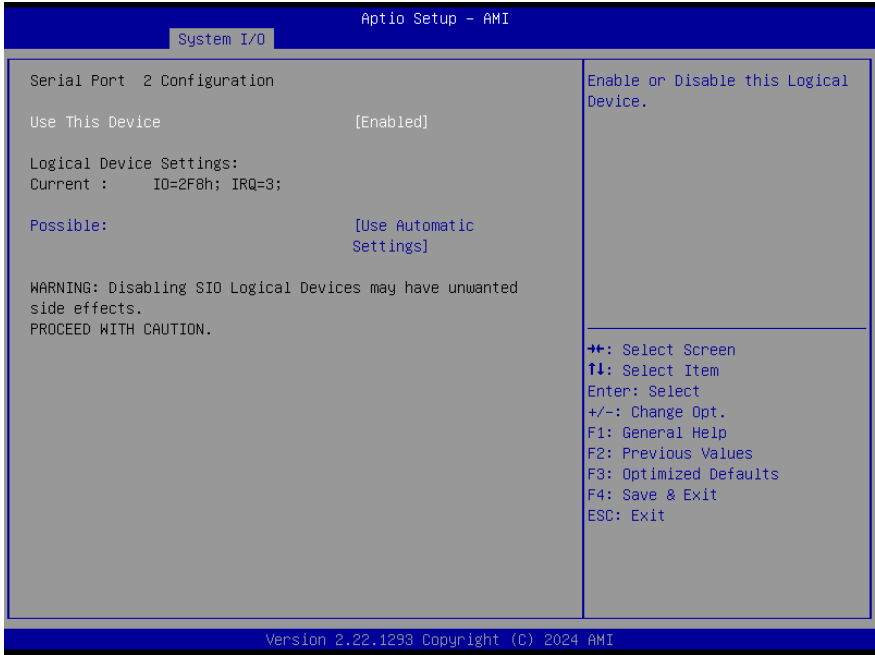


3.5.5.1 Serial Port 1



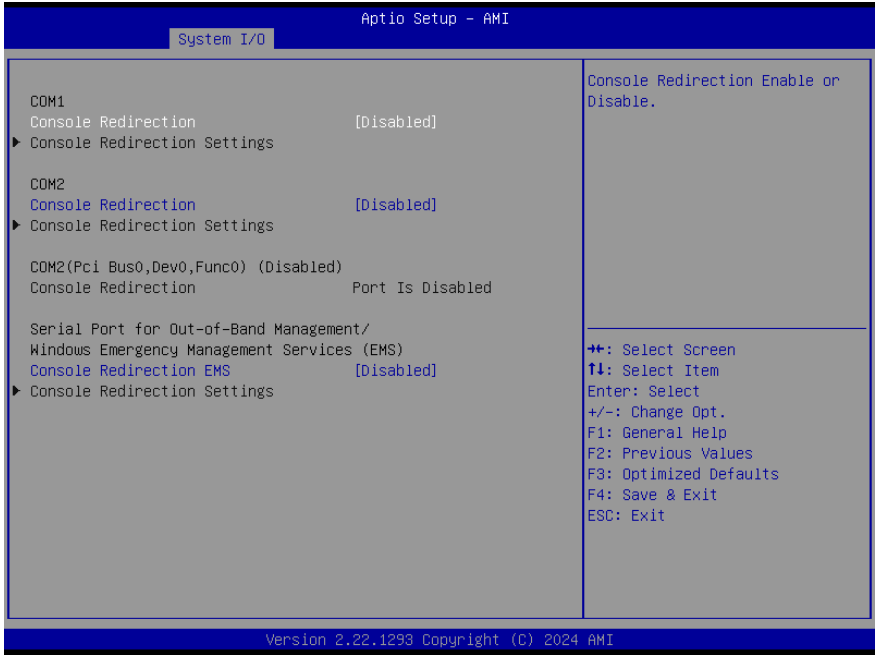
Options Summary		
Use This Device	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enable or Disable this Logical Device.		
Possible	Use Automatic Settings	Optimal Default, Failsafe Default
	IO=3F8h; IRQ=4; DMA;	
	IO=2C8h; IRQ=11; DMA;	
Allows the user to change the device resource settings. New settings will be reflected on this setup page after system restarts.		

3.5.5.2 Serial Port 2



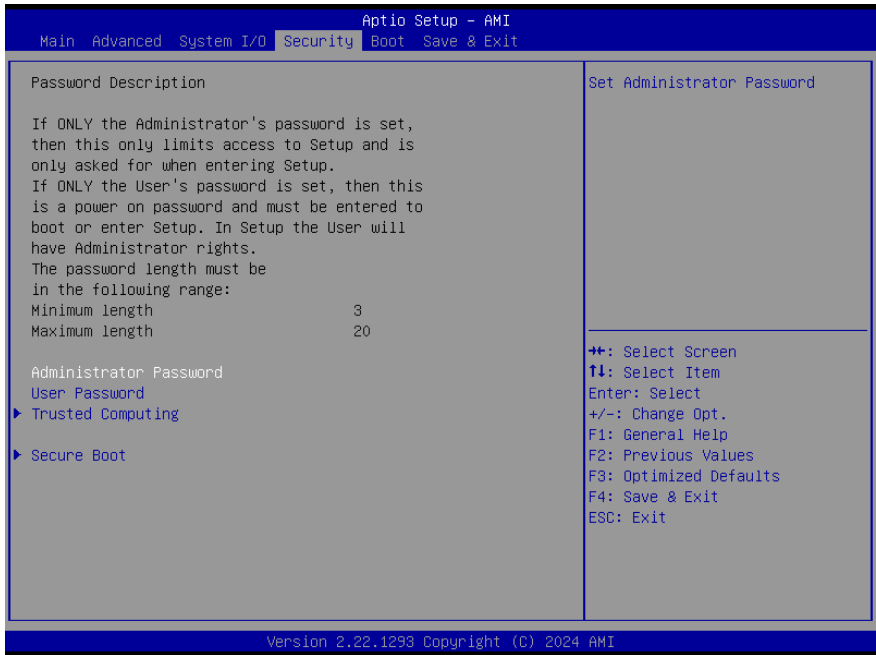
Options Summary		
Use This Device	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enable or Disable this Logical Device.		
Possible	Use Automatic Settings	Optimal Default, Failsafe Default
	IO=2F8h; IRQ=3; DMA;	
	IO=2D8h; IRQ=10; DMA;	
Allows the user to change the device resource settings. New settings will be reflected on this setup page after system restarts.		

3.5.6 Serial Port Console Redirection



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

3.6 Setup Submenu: Security



Change User/Administrator Password

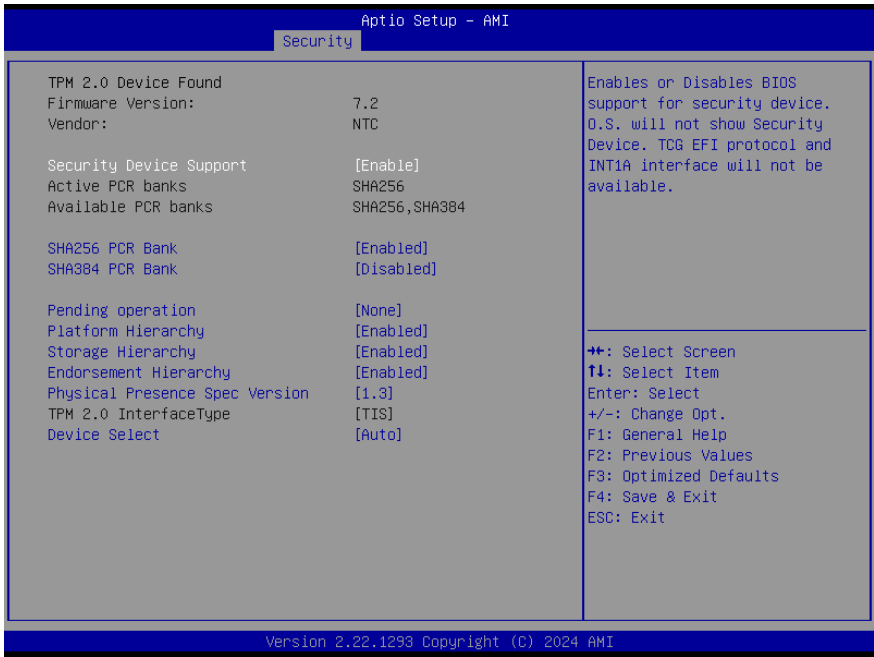
You can set an Administrator Password or User Password. An Administrator Password must be set before you can set a User Password. The password will be required during boot up, or when the user enters the Setup utility. A User Password does not provide access to many of the features in the Setup utility.

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

Removing the Password

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

3.6.1 Trusted Computing



Options Summary		
Security Device Support	Disable	
	Enable	Optimal Default, Failsafe Default
Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.		
SHA256 PCR Bank	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enable or Disable SHA256 PCR Bank.		
SHA384 PCR Bank	Disabled	Optimal Default, Failsafe Default
	Enabled	
Enable or Disable SHA384 PCR Bank.		
Pending operation	None	Optimal Default, Failsafe Default
	TPM Clear	

Options Summary

Schedule an Operation for the Security Device.

Note: Your Computer will reboot during restart in order to change State of Security Device.

Platform Hierarchy	Disabled	
	Enabled	Optimal Default, Failsafe Default

Enable or Disable Platform Hierarchy.

Storage Hierarchy	Disabled	
	Enabled	Optimal Default, Failsafe Default

Enable or Disable Storage Hierarchy.

Endorsement Hierarchy	Disabled	
	Enabled	Optimal Default, Failsafe Default

Enable or Disable Endorsement Hierarchy.

Physical Presence Spec Version	1.2	
	1.3	Optimal Default, Failsafe Default

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	TPM 1.2	
	TPM 2.0	
	Auto	Optimal Default, Failsafe Default

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.

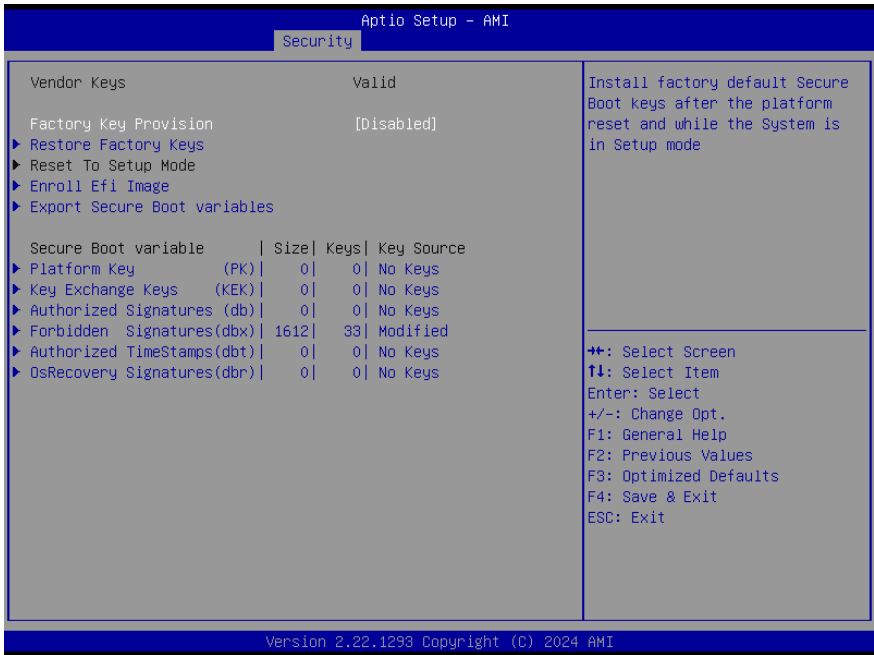
TPM 1.2 devices will be enumerated.

3.6.2 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.	

3.6.2.1 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.	
Enroll EFI Image	Allow the image to run in Secure Boot mode. Enroll SHA256 hash of a PE image into Authorized Signature Database (db).	
Export Secure Boot variables	Save NVRAM content of Secure Boot variable to a file.	
Platform Key(PK)		
Key Exchange Keys		
Authorized Signatures		
Forbidden Signatures		

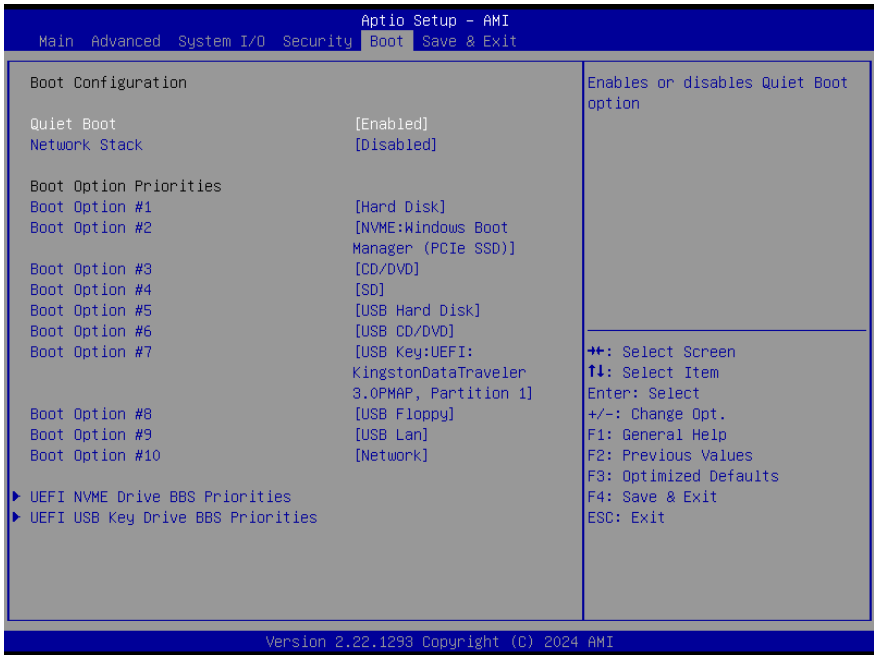
Options Summary**Authorized TimeStamps****OsRecovery Signatures**

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)

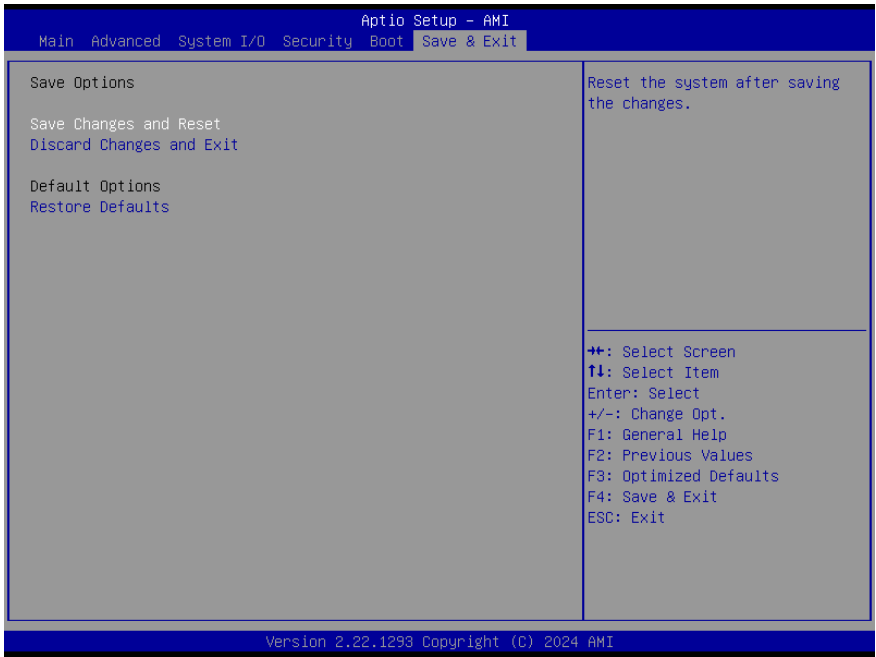
Key Source:
Factory, External, Mixed.

3.7 Setup Submenu: Boot



Options Summary		
Quiet Boot	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enables or disables Quiet Boot option.		
Network Stack	Disabled	Optimal Default, Failsafe Default
	Enabled	
Enable/Disable UEFI Network Stack.		

3.8 Setup Submenu: Save & Exit



Chapter 4

Drivers Installation

4.1 Driver Download and Installation

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

<https://www.aaeon.com/en/p/com-express-cpu-modules-nanocom-rap>

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

Audio Driver

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

Chipset Driver

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

Graphics Driver

1. Open the folder where you unzipped the **Graphics Drivers**.
2. Run the **Installer.exe** file in the folder.
3. Follow the instructions.
4. Drivers will be installed automatically.

LAN Drivers (Windows 10/11)

1. Open the folder where you unzipped the **LAN Drivers**.
2. Run the **Autorun.exe** file in the folder.
3. Follow the instructions.
4. Drivers will be installed automatically.

Peripheral Drivers

A. Linux Peripheral Driver

1. Open the folder where you unzipped the **Linux Peripheral Drivers**.
2. Follow the instructions contained within the user guides.

B. Peripheral Driver Windows 10 (64-bit)

1. Open the folder and unzip the **SST Drivers**.
2. Follow the instructions contained within the user guides.















































ME & TXE Drivers (Windows 10/11)

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

Appendix A

I/O Information

A.1 I/O Address Map

- ▼  DESKTOP-6AB77TL
 - ▼  Input/output (IO)
 -  [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
 -  [0000000000000068 - 000000000000068] Microsoft ACPI-Compliant Embedded Controller
 -  [000000000000006C - 00000000000006C] Microsoft ACPI-Compliant Embedded Controller
 -  [0000000000000070 - 000000000000070] Motherboard resources
 -  [0000000000000080 - 000000000000080] Motherboard resources
 -  [0000000000000092 - 000000000000092] 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
 -  [00000000000002F8 - 0000000000002FF] Communications Port (COM2)
 -  [00000000000003F8 - 0000000000003FF] Communications Port (COM1)
 -  [00000000000004D0 - 00000000000004D1] Programmable interrupt controller
 -  [0000000000000680 - 000000000000069F] Motherboard resources
 -  [0000000000000D00 - 000000000000FFF] PCI Express Root Complex
 -  [000000000000164E - 000000000000164F] Motherboard resources
 -  [0000000000001854 - 0000000000001857] Motherboard resources
 -  [0000000000002000 - 00000000000020FE] Motherboard resources
 -  [0000000000003000 - 000000000000303F] Intel(R) UHD Graphics
 -  [0000000000003060 - 000000000000307F] Standard SATA AHCI Controller
 -  [0000000000003080 - 0000000000003083] Standard SATA AHCI Controller
 -  [0000000000003090 - 0000000000003097] Standard SATA AHCI Controller
 -  [000000000000EFA0 - 000000000000EFBF] Intel(R) SMBus - 51A3

A.2 Memory Address Map

COM Express Module

NanoCOM-RAP

Memory





















































[0000000000A0000 - 0000000000BFFFF]	PCI Express Root Complex
[0000000080400000 - 00000000804FFFF]	Intel(R) Ethernet Controller I226-IT
[0000000080400000 - 00000000805FFFF]	Intel(R) PCI Express Root Port #9 - 51B0
[0000000080400000 - 00000000BFFFFFFF]	PCI Express Root Complex
[0000000080500000 - 0000000080503FFF]	Intel(R) Ethernet Controller I226-IT
[0000000080600000 - 0000000080603FFF]	Standard NVM Express Controller
[0000000080600000 - 00000000806FFFF]	PCI Express Root Port
[0000000080700000 - 0000000080701FFF]	Standard SATA AHCI Controller
[0000000080702000 - 00000000807027FF]	Standard SATA AHCI Controller
[0000000080703000 - 00000000807030FF]	Standard SATA AHCI Controller
[00000000C0000000 - 00000000CFFFFFFF]	Motherboard resources
[00000000FE010000 - 00000000FE010FFF]	Intel(R) SPI (flash) Controller - 51A4
[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
[00000000FEDC0000 - 00000000FEDC7FFF]	Motherboard resources
[00000000FEE00000 - 00000000FEEFFFFFFF]	Motherboard resources
[0000004000000000 - 000000400FFFFFFF]	Intel(R) UHD Graphics
[0000006000000000 - 0000006000FFFFFFF]	Intel(R) UHD Graphics
[0000006001100000 - 000000600110FFFF]	Intel(R) USB 3.10 eXtensible Host Controller - 1.20 (Microsoft)
[0000006001118000 - 00000060011180FF]	Intel(R) SMBus - 51A3
[00000077FFFEFA000 - 00000077FFFEFAFFF]	Intel(R) Management Engine Interface #1
[00000077FFFEFB000 - 00000077FFFEFBFFF]	Intel(R) GNA Scoring Accelerator module
[00000077FFFEFC000 - 00000077FFFEFCFFF]	Intel® Smart Sound Technology BUS
[00000077FFF000000 - 00000077FFF0FFFFFFF]	Intel® Smart Sound Technology BUS





















































A.3 Large Memory Address Map





















































- ▼  Large Memory
 -  [0000004000000000 - 000007FFFFFFFF] PCI Express Root Complex





















































A.4 IRQ Mapping Chart





















































IRQ	Device
00	System timer
03	Communications Port (COM2)
04	Communications Port (COM1)
41	Trusted Platform Module 2.0
55	Microsoft ACPI-Compliant System
56	Microsoft ACPI-Compliant System
57	Microsoft ACPI-Compliant System
58	Microsoft ACPI-Compliant System
59	Microsoft ACPI-Compliant System
60	Microsoft ACPI-Compliant System
61	Microsoft ACPI-Compliant System
62	Microsoft ACPI-Compliant System
63	Microsoft ACPI-Compliant System
64	Microsoft ACPI-Compliant System
65	Microsoft ACPI-Compliant System
66	Microsoft ACPI-Compliant System
67	Microsoft ACPI-Compliant System
68	Microsoft ACPI-Compliant System
69	Microsoft ACPI-Compliant System
70	Microsoft ACPI-Compliant System
71	Microsoft ACPI-Compliant System
72	Microsoft ACPI-Compliant System
73	Microsoft ACPI-Compliant System
74	Microsoft ACPI-Compliant System
75	Microsoft ACPI-Compliant System
76	Microsoft ACPI-Compliant System
77	Microsoft ACPI-Compliant System
78	Microsoft ACPI-Compliant System
79	Microsoft ACPI-Compliant System
80	Microsoft ACPI-Compliant System
81	Microsoft ACPI-Compliant System
82	Microsoft ACPI-Compliant System
83	Microsoft ACPI-Compliant System
84	Microsoft ACPI-Compliant System
85	Microsoft ACPI-Compliant System
86	Microsoft ACPI-Compliant System
87	Microsoft ACPI-Compliant System
88	Microsoft ACPI-Compliant System
89	Microsoft ACPI-Compliant System
90	Microsoft ACPI-Compliant System
91	Microsoft ACPI-Compliant System
92	Microsoft ACPI-Compliant System
93	Microsoft ACPI-Compliant System
94	Microsoft ACPI-Compliant System
95	Microsoft ACPI-Compliant System
96	Microsoft ACPI-Compliant System
97	Microsoft ACPI-Compliant System
98	Microsoft ACPI-Compliant System
99	Microsoft ACPI-Compliant System
100	Microsoft ACPI-Compliant System
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
 (ISA) 0x00000074 (116)	Microsoft ACPI-Compliant System
 (ISA) 0x00000075 (117)	Microsoft ACPI-Compliant System
 (ISA) 0x00000076 (118)	Microsoft ACPI-Compliant System
 (ISA) 0x00000077 (119)	Microsoft ACPI-Compliant System
 (ISA) 0x00000078 (120)	Microsoft ACPI-Compliant System
 (ISA) 0x00000079 (121)	Microsoft ACPI-Compliant System
 (ISA) 0x0000007A (122)	Microsoft ACPI-Compliant System
 (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) 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
 (ISA) 0x00000086 (134)	Microsoft ACPI-Compliant System
 (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
 (ISA) 0x0000008B (139)	Microsoft ACPI-Compliant System
 (ISA) 0x0000008C (140)	Microsoft ACPI-Compliant System
 (ISA) 0x0000008D (141)	Microsoft ACPI-Compliant System
 (ISA) 0x0000008E (142)	Microsoft ACPI-Compliant System
 (ISA) 0x0000008F (143)	Microsoft ACPI-Compliant System
 (ISA) 0x00000090 (144)	Microsoft ACPI-Compliant System
 (ISA) 0x00000091 (145)	Microsoft ACPI-Compliant System
 (ISA) 0x00000092 (146)	Microsoft ACPI-Compliant System
 (ISA) 0x00000093 (147)	Microsoft ACPI-Compliant System
 (ISA) 0x00000094 (148)	Microsoft ACPI-Compliant System
 (ISA) 0x00000095 (149)	Microsoft ACPI-Compliant System
 (ISA) 0x00000096 (150)	Microsoft ACPI-Compliant System
 (ISA) 0x00000097 (151)	Microsoft ACPI-Compliant System
 (ISA) 0x00000098 (152)	Microsoft ACPI-Compliant System
 (ISA) 0x00000099 (153)	Microsoft ACPI-Compliant System





















































 (ISA) 0x0000009A (154)	Microsoft ACPI-Compliant System
 (ISA) 0x0000009B (155)	Microsoft ACPI-Compliant System
 (ISA) 0x0000009C (156)	Microsoft ACPI-Compliant System
 (ISA) 0x0000009D (157)	Microsoft ACPI-Compliant System
 (ISA) 0x0000009E (158)	Microsoft ACPI-Compliant System
 (ISA) 0x0000009F (159)	Microsoft ACPI-Compliant System
 (ISA) 0x000000A0 (160)	Microsoft ACPI-Compliant System
 (ISA) 0x000000A1 (161)	Microsoft ACPI-Compliant System
 (ISA) 0x000000A2 (162)	Microsoft ACPI-Compliant System
 (ISA) 0x000000A3 (163)	Microsoft ACPI-Compliant System
 (ISA) 0x000000A4 (164)	Microsoft ACPI-Compliant System
 (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) 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
 (ISA) 0x000000B0 (176)	Microsoft ACPI-Compliant System
 (ISA) 0x000000B1 (177)	Microsoft ACPI-Compliant System
 (ISA) 0x000000B2 (178)	Microsoft ACPI-Compliant System
 (ISA) 0x000000B3 (179)	Microsoft ACPI-Compliant System
 (ISA) 0x000000B4 (180)	Microsoft ACPI-Compliant System
 (ISA) 0x000000B5 (181)	Microsoft ACPI-Compliant System
 (ISA) 0x000000B6 (182)	Microsoft ACPI-Compliant System
 (ISA) 0x000000B7 (183)	Microsoft ACPI-Compliant System
 (ISA) 0x000000B8 (184)	Microsoft ACPI-Compliant System
 (ISA) 0x000000B9 (185)	Microsoft ACPI-Compliant System
 (ISA) 0x000000BA (186)	Microsoft ACPI-Compliant System
 (ISA) 0x000000BB (187)	Microsoft ACPI-Compliant System
 (ISA) 0x000000BC (188)	Microsoft ACPI-Compliant System
 (ISA) 0x000000BD (189)	Microsoft ACPI-Compliant System
 (ISA) 0x000000BE (190)	Microsoft ACPI-Compliant System
 (ISA) 0x000000BF (191)	Microsoft ACPI-Compliant System
 (ISA) 0x000000C0 (192)	Microsoft ACPI-Compliant System
 (ISA) 0x000000C1 (193)	Microsoft ACPI-Compliant System
 (ISA) 0x000000C2 (194)	Microsoft ACPI-Compliant System
 (ISA) 0x000000C3 (195)	Microsoft ACPI-Compliant System
 (ISA) 0x000000C4 (196)	Microsoft ACPI-Compliant System
 (ISA) 0x000000C5 (197)	Microsoft ACPI-Compliant System
 (ISA) 0x000000C6 (198)	Microsoft ACPI-Compliant System
 (ISA) 0x000000C7 (199)	Microsoft ACPI-Compliant System
 (ISA) 0x000000C8 (200)	Microsoft ACPI-Compliant System
 (ISA) 0x000000C9 (201)	Microsoft ACPI-Compliant System
 (ISA) 0x000000CA (202)	Microsoft ACPI-Compliant System
 (ISA) 0x000000CB (203)	Microsoft ACPI-Compliant System
 (ISA) 0x000000CC (204)	Microsoft ACPI-Compliant System
 (ISA) 0x00000100 (256)	Microsoft ACPI-Compliant System




















 (ISA) 0x00000101 (257)	Microsoft ACPI-Compliant System
 (ISA) 0x00000102 (258)	Microsoft ACPI-Compliant System
 (ISA) 0x00000103 (259)	Microsoft ACPI-Compliant System
 (ISA) 0x00000104 (260)	Microsoft ACPI-Compliant System
 (ISA) 0x00000105 (261)	Microsoft ACPI-Compliant System
 (ISA) 0x00000106 (262)	Microsoft ACPI-Compliant System
 (ISA) 0x00000107 (263)	Microsoft ACPI-Compliant System
 (ISA) 0x00000108 (264)	Microsoft ACPI-Compliant System
 (ISA) 0x00000109 (265)	Microsoft ACPI-Compliant System
 (ISA) 0x0000010A (266)	Microsoft ACPI-Compliant System
 (ISA) 0x0000010B (267)	Microsoft ACPI-Compliant System
 (ISA) 0x0000010C (268)	Microsoft ACPI-Compliant System
 (ISA) 0x0000010D (269)	Microsoft ACPI-Compliant System
 (ISA) 0x0000010E (270)	Microsoft ACPI-Compliant System
 (ISA) 0x0000010F (271)	Microsoft ACPI-Compliant System
 (ISA) 0x00000110 (272)	Microsoft ACPI-Compliant System
 (ISA) 0x00000111 (273)	Microsoft ACPI-Compliant System
 (ISA) 0x00000112 (274)	Microsoft ACPI-Compliant System
 (ISA) 0x00000113 (275)	Microsoft ACPI-Compliant System
 (ISA) 0x00000114 (276)	Microsoft ACPI-Compliant System
 (ISA) 0x00000115 (277)	Microsoft ACPI-Compliant System
 (ISA) 0x00000116 (278)	Microsoft ACPI-Compliant System
 (ISA) 0x00000117 (279)	Microsoft ACPI-Compliant System
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 (ISA) 0x00000119 (281)	Microsoft ACPI-Compliant System
 (ISA) 0x0000011A (282)	Microsoft ACPI-Compliant System
 (ISA) 0x0000011B (283)	Microsoft ACPI-Compliant System
 (ISA) 0x0000011C (284)	Microsoft ACPI-Compliant System
 (ISA) 0x0000011D (285)	Microsoft ACPI-Compliant System
 (ISA) 0x0000011E (286)	Microsoft ACPI-Compliant System
 (ISA) 0x0000011F (287)	Microsoft ACPI-Compliant System
 (ISA) 0x00000120 (288)	Microsoft ACPI-Compliant System
 (ISA) 0x00000121 (289)	Microsoft ACPI-Compliant System
 (ISA) 0x00000122 (290)	Microsoft ACPI-Compliant System
 (ISA) 0x00000123 (291)	Microsoft ACPI-Compliant System
 (ISA) 0x00000124 (292)	Microsoft ACPI-Compliant System
 (ISA) 0x00000125 (293)	Microsoft ACPI-Compliant System
 (ISA) 0x00000126 (294)	Microsoft ACPI-Compliant System
 (ISA) 0x00000127 (295)	Microsoft ACPI-Compliant System
 (ISA) 0x00000128 (296)	Microsoft ACPI-Compliant System
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 (ISA) 0x0000012A (298)	Microsoft ACPI-Compliant System
 (ISA) 0x0000012B (299)	Microsoft ACPI-Compliant System
 (ISA) 0x0000012C (300)	Microsoft ACPI-Compliant System
 (ISA) 0x0000012D (301)	Microsoft ACPI-Compliant System
 (ISA) 0x0000012E (302)	Microsoft ACPI-Compliant System
 (ISA) 0x0000012F (303)	Microsoft ACPI-Compliant System
 (ISA) 0x00000130 (304)	Microsoft ACPI-Compliant System
 (ISA) 0x00000131 (305)	Microsoft ACPI-Compliant System
 (ISA) 0x00000132 (306)	Microsoft ACPI-Compliant System
 (ISA) 0x00000133 (307)	Microsoft ACPI-Compliant System
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 (ISA) 0x00000135 (309)	Microsoft ACPI-Compliant System
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 (ISA) 0x00000138 (312)	Microsoft ACPI-Compliant System
 (ISA) 0x00000139 (313)	Microsoft ACPI-Compliant System
 (ISA) 0x0000013A (314)	Microsoft ACPI-Compliant System
 (ISA) 0x0000013B (315)	Microsoft ACPI-Compliant System
 (ISA) 0x0000013C (316)	Microsoft ACPI-Compliant System
 (ISA) 0x0000013D (317)	Microsoft ACPI-Compliant System
 (ISA) 0x0000013E (318)	Microsoft ACPI-Compliant System
 (ISA) 0x0000013F (319)	Microsoft ACPI-Compliant System
 (ISA) 0x00000140 (320)	Microsoft ACPI-Compliant System
 (ISA) 0x00000141 (321)	Microsoft ACPI-Compliant System
 (ISA) 0x00000142 (322)	Microsoft ACPI-Compliant System
 (ISA) 0x00000143 (323)	Microsoft ACPI-Compliant System
 (ISA) 0x00000144 (324)	Microsoft ACPI-Compliant System
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 (ISA) 0x00000146 (326)	Microsoft ACPI-Compliant System
 (ISA) 0x00000147 (327)	Microsoft ACPI-Compliant System
 (ISA) 0x00000148 (328)	Microsoft ACPI-Compliant System
 (ISA) 0x00000149 (329)	Microsoft ACPI-Compliant System
 (ISA) 0x0000014A (330)	Microsoft ACPI-Compliant System
 (ISA) 0x0000014B (331)	Microsoft ACPI-Compliant System
 (ISA) 0x0000014C (332)	Microsoft ACPI-Compliant System
 (ISA) 0x0000014D (333)	Microsoft ACPI-Compliant System
 (ISA) 0x0000014E (334)	Microsoft ACPI-Compliant System
 (ISA) 0x0000014F (335)	Microsoft ACPI-Compliant System
 (ISA) 0x00000150 (336)	Microsoft ACPI-Compliant System
 (ISA) 0x00000151 (337)	Microsoft ACPI-Compliant System
 (ISA) 0x00000152 (338)	Microsoft ACPI-Compliant System
 (ISA) 0x00000153 (339)	Microsoft ACPI-Compliant System
 (ISA) 0x00000154 (340)	Microsoft ACPI-Compliant System
 (ISA) 0x00000155 (341)	Microsoft ACPI-Compliant System
 (ISA) 0x00000156 (342)	Microsoft ACPI-Compliant System
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 (ISA) 0x00000158 (344)	Microsoft ACPI-Compliant System
 (ISA) 0x00000159 (345)	Microsoft ACPI-Compliant System
 (ISA) 0x0000015A (346)	Microsoft ACPI-Compliant System
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 (ISA) 0x0000015C (348)	Microsoft ACPI-Compliant System
 (ISA) 0x0000015D (349)	Microsoft ACPI-Compliant System
 (ISA) 0x0000015E (350)	Microsoft ACPI-Compliant System
 (ISA) 0x0000015F (351)	Microsoft ACPI-Compliant System
 (ISA) 0x00000160 (352)	Microsoft ACPI-Compliant System
 (ISA) 0x00000161 (353)	Microsoft ACPI-Compliant System
 (ISA) 0x00000162 (354)	Microsoft ACPI-Compliant System
 (ISA) 0x00000163 (355)	Microsoft ACPI-Compliant System
 (ISA) 0x00000164 (356)	Microsoft ACPI-Compliant System
 (ISA) 0x00000165 (357)	Microsoft ACPI-Compliant System
 (ISA) 0x00000166 (358)	Microsoft ACPI-Compliant System
 (ISA) 0x00000167 (359)	Microsoft ACPI-Compliant System
 (ISA) 0x00000168 (360)	Microsoft ACPI-Compliant System

 (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
 (ISA) 0x00000176 (374)	Microsoft ACPI-Compliant System
 (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
 (ISA) 0x0000017E (382)	Microsoft ACPI-Compliant System
 (ISA) 0x0000017F (383)	Microsoft ACPI-Compliant System
 (ISA) 0x00000180 (384)	Microsoft ACPI-Compliant System
 (ISA) 0x00000181 (385)	Microsoft ACPI-Compliant System
 (ISA) 0x00000182 (386)	Microsoft ACPI-Compliant System
 (ISA) 0x00000183 (387)	Microsoft ACPI-Compliant System
 (ISA) 0x00000184 (388)	Microsoft ACPI-Compliant System
 (ISA) 0x00000185 (389)	Microsoft ACPI-Compliant System
 (ISA) 0x00000186 (390)	Microsoft ACPI-Compliant System
 (ISA) 0x00000187 (391)	Microsoft ACPI-Compliant System
 (ISA) 0x00000188 (392)	Microsoft ACPI-Compliant System
 (ISA) 0x00000189 (393)	Microsoft ACPI-Compliant System
 (ISA) 0x0000018A (394)	Microsoft ACPI-Compliant System
 (ISA) 0x0000018B (395)	Microsoft ACPI-Compliant System
 (ISA) 0x0000018C (396)	Microsoft ACPI-Compliant System
 (ISA) 0x0000018D (397)	Microsoft ACPI-Compliant System
 (ISA) 0x0000018E (398)	Microsoft ACPI-Compliant System
 (ISA) 0x0000018F (399)	Microsoft ACPI-Compliant System
 (ISA) 0x00000190 (400)	Microsoft ACPI-Compliant System
 (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) 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) 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) 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) 0xFFFFFE7 (-25)	Intel(R) Management Engine Interface #1
 (PCI) 0xFFFFFE8 (-24)	Intel(R) GNA Scoring Accelerator module
 (PCI) 0xFFFFFE9 (-23)	Intel® Smart Sound Technology BUS
 (PCI) 0xFFFFFEA (-22)	Intel(R) Ethernet Controller I226-IT
 (PCI) 0xFFFFFEB (-21)	Intel(R) Ethernet Controller I226-IT

	(PCI) 0xFFFFFEC (-20)	Intel(R) Ethernet Controller I226-IT
	(PCI) 0xFFFFFED (-19)	Intel(R) Ethernet Controller I226-IT
	(PCI) 0xFFFFFEE (-18)	Intel(R) Ethernet Controller I226-IT
	(PCI) 0xFFFFFEF (-17)	Intel(R) Ethernet Controller I226-IT
	(PCI) 0xFFFFFFF0 (-16)	Intel(R) Ethernet Controller I226-IT
	(PCI) 0xFFFFFFF1 (-15)	Intel(R) UHD Graphics
	(PCI) 0xFFFFFFF2 (-14)	Intel(R) USB 3.10 eXtensible Host Controller - 1.20 (Microsoft)
	(PCI) 0xFFFFFFF3 (-13)	Standard NVM Express Controller
	(PCI) 0xFFFFFFF4 (-12)	Standard NVM Express Controller
	(PCI) 0xFFFFFFF5 (-11)	Standard NVM Express Controller
	(PCI) 0xFFFFFFF6 (-10)	Standard NVM Express Controller
	(PCI) 0xFFFFFFF7 (-9)	Standard NVM Express Controller
	(PCI) 0xFFFFFFF8 (-8)	Standard NVM Express Controller
	(PCI) 0xFFFFFFF9 (-7)	Standard NVM Express Controller
	(PCI) 0xFFFFFFFA (-6)	Standard NVM Express Controller
	(PCI) 0xFFFFFFFB (-5)	Standard NVM Express Controller
	(PCI) 0xFFFFFFFC (-4)	Standard SATA AHCI Controller
	(PCI) 0xFFFFFFFD (-3)	Intel(R) PCI Express Root Port #9 - 51B0
	(PCI) 0xFFFFFFF0 (-2)	PCI Express Root Port