

Reference Manual

19 inch rack mount type Custom Computers Solution-ePC series

MR4100

CONTENTS

Introduction.....	5
Safety Precautions.....	12
Product Nomenclature and Function.....	19
Hardware Setup.....	36
BIOS Set up	48
Appendix.....	113
Replacement Parts for Maintenance	128
Customer Support and Inquiry.....	130

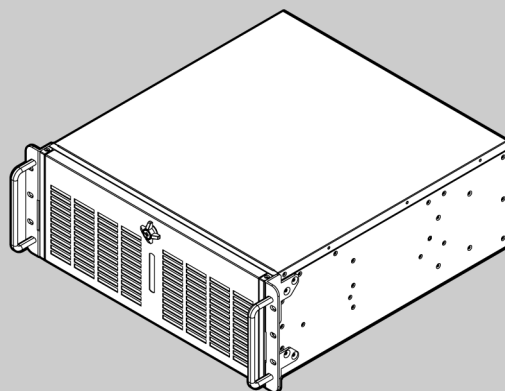


Table of Contents

Introduction5

- 1. Related Manuals 6
- 2. About the Product..... 8
- 3. Features 9
- 4. Supported OS..... 10
- 5. Included Items..... 11

Safety Precautions12

- 1. Safety Information..... 13
- 2. Handling Precautions..... 14
 - 1. VCCI Class A Notice..... 16
 - 2. FCC PART 15 Class A Notice 16
 - 3. EN55032 Class A Notice..... 16
 - 4. Regarding "CE Marking Notice" 17
 - 5. Display Marking 17
- 3. Security Warning..... 18
 - 1. Information security risks..... 18
 - 2. Security measures – e.g..... 18

Product Nomenclature and Function.....19

- 1. Nomenclature of Product Components.....20
 - 1. Front View20
 - 2. Rear View.....23
- 2. Description of Product Components.....26
 - 1. Power Switch: AC POWER SW, POWER SW26
 - 2. Reset Switch: RESET SW.....26
 - 3. Frame Ground: FG.....26
 - 4. Giga bit-Ethernet: LAN A, B27
 - 5. Serial Port Interface: SERIAL 1, 2, 3, 4, 5.....28
 - 6. Analog RGB interface: RGB29
 - 7. HDMI Interface: HDMI30
 - 8. DisplayPort Interface: Display port.....31
 - 9. USB 3.2 Gen2 (USB3.1) Ports: USB3.2 Gen2.....32
 - 10.USB 2.0 Ports: USB2.0.....32
 - 11.Battery: BATTERY I/F.....32
 - 12.Expansion Slot.....33
 - 13.LED: Power, Access, Drive, POWER, HDD.....35

Hardware Setup36

- 1. Before Using the Product for the First Time37
- 2. Hardware Setup38
 - 1. Removing the Top Cover, the Expansion Card Bracket.....38
 - 2. Setting the Expansion Card39

Table of Contents

3. Setting the Storage.....	40
4. Installation Requirements.....	42
5. Attaching/Removing the Vertical Resin Stands.....	44
6. Attaching/Removing the Mount Bracket.....	45
7. Attaching the RS-232C Cable For Battery.....	46
8. Remote PW Switch.....	47

BIOS Set up.....48

1. Before Configuring BIOS Settings.....	49
1. Using Aptio Setup Utility.....	50
2. Setup Utility Menu.....	53
1. Menu Items.....	53
2. Main Menu.....	55
3. Advanced Menu.....	56
4. Chipset Menu.....	74
5. Security Menu.....	80
6. Boot Menu.....	83
7. Save & Exit Menu.....	84
8. Event Logs Menu.....	85
3. Configuring Settings to Start with Directly Applied AC Power.....	87

Software RAID Setup88

1. Outline.....	89
2. Software RAID Setting in the BIOS.....	90
3. Delete RAID Volume.....	94
4. RAID Setup When Replacing the Storage.....	96
5. Software RAID Monitoring Tool.....	97
1. Starting The Rapid Storage Technology (Reference).....	97
2. Exiting The Rapid Storage Technology.....	98
3. Rebuild Mirroring.....	99
4. For The Error.....	100
5. Confirming The Error Log.....	101
6. RAID Setup When Replacing The Storage (OS).....	101

Hardware RAID Setup102

1. Outline.....	103
2. Function Specifications.....	104
1. Mirror Card Product Specifications.....	104
2. LED Status.....	105
3. Mirror Card Operation.....	106
1. Operation Flow.....	106
2. Error Occurrence.....	107
3. RAID Setup During Storage Replacement.....	108
4. Hot-Swapping.....	109
4. OS Recovery.....	110

Table of Contents

5. FAQ / Troubleshooting	111
1. FAQ	111
2. Troubleshooting	112

Appendix 113

1. System Reference	114
1. Specifications	114
2. Physical Dimensions	118
3. Model Name Description	120
4. Battery	124
1. Battery Specification	124
2. Removing the Battery	125
3. Dispose of the Battery	125
5. Nickel Metal Hydride Battery Pack	126
1. Battery Pack Specifications	126
6. Life of SSD	127
1. About write endurance	127

Replacement Parts for Maintenance 128

1. Replacement Parts for Maintenance	129
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Customer Support and Inquiry 130

1. Services	131
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Introduction

This section provides necessary information of the product such as the outline, bundled items and manuals before actual use.

1. Related Manuals

The manuals related to the product are listed below.

Read them as necessary along with this document.

◆ Must Read the Following Manuals.

Name	Purpose	Contents	How to get
Product Guide	Must read this after opening the package.	This lists the product configuration and describes the precautions.	Included in the package (Printed matter)
Reference Manual (This document)	Read this when operating the product.	This describes the hardware aspects such as functions and settings.	 Download from the Contec website (PDF)
IPC Precaution List	Read this before operating the product.	This describes the precautions when using the product.	 Download from the Contec website (PDF)
MICROSOFT SOFTWARE LICENSE TERMS *1	Read this before operating the product.	This describes the rights and conditions of user when using Windows software.	 Download from the Contec website (PDF)
Manual for OS Pre-installed Type *1	Read this before operating the product.	This describes the basic information of OS, and the procedures of setup and recovery.	 Download from the Contec website (PDF)
MIRACLE LINUX 9.0 END USER LICENSE AGREEMENT *2	Read this before operating the product.	This describes the customer rights for and conditions on the usage of MIRACLE LINUX 9.0.	 Download from the Contec website (PDF)
MIRACLE LINUX 9.0 (OEM version) Support SLA (Service Level Agreement) *2 Japanese only.	Read this before operating the product.	This describes the support for MIRACLE LINUX pre-installed types.	 Download from the Contec website (PDF)
Pre-installed OS Manual MIRACLE LINUX 9.0 *2 Japanese only.	Read this before operating the product.	This explains basic OS information, setup procedures and recovery procedures.	 Download from the Contec website (PDF)

*1 Refer to Windows pre-installed types only.

*2 Refer to MIRACLE LINUX pre-installed types only. (Japanese version only)

* Also refer to the Cybertrust website for the latest information on MIRACLE LINUX 9.0 as well as for technical information such as that on specifications.

◆ Download End-user License Agreements

Download it from the following URL.

Download

<https://www.contec.com/support/useterms/>

◆ Download Manuals

Download the manuals accordingly from the following URL.

Download

<https://www.contec.com/download/>

2.About the Product

This product is a 19-inch rack-mount industrial-use PC that supports the 10th (Comet Lake-S) of Intel® Core™ series and contains the W480E chipset. In addition to a wide range of interfaces, expansion slots of PCI bus x 3, PCI Express 3.0(x16) bus x 1, or PCI Express 3.0(x8) x 1, PCI Express 3.0(x4) x 2 bus are equipped. A reliable, Japan-made power supply can be selected. A power supply equipped with a nickel metal hydride battery, for optimal countermeasures against momentary and prolonged power outages, and a 1000 W power supply that supports high-end GPU cards are also available. *1

Solution-ePC is an industrial-use computer that offers BTO (Build to Order) specifications to suit the requests of customers.

Only carefully selected components offering high reliability and stable supply are used, making the product suitable for industrial use.

*1 The nickel metal hydride battery and 1000W power supply cannot be selected if the UL-certified type or CCC-certified type is selected.

3.Features

■ High-power, 4U rack-mounted PC

This product is an EIA 19 rack-mounted (4U) industrial computer compatible with 10th generation Intel® Core™ processors (Comet Lake-S).

It is ideal for fields requiring advanced multiprocessing such as semiconductor manufacturing equipment, inspection equipment, social infrastructure, and medical equipment.

■ Can house up to seven function expansion cards

This product is equipped with one PCI Express 3.0(x16), one PCI Express 3.0(x8), two PCI Express 3.0(x4), and three PCI expansion slots. It can house the signal input and output required for measurement control systems as well as multiple expansion interface cards required for AI/ML workloads and machine vision.

Function expansion via M.2 modules is also possible.

* When using the PCI Express 3.0(x8) slot, the PCI Express 3.0(x16) slot needs to be set to PCI Express 3.0(x8).

■ Equipped with various expansion interfaces

This product is equipped with various expansion interfaces including one 2.5 Gigabit LAN port, one Gigabit LAN port, 10 USB ports, five COM communication ports, and video output ports (DisplayPort, HDMI, and analog RGB).

In addition, M.2 sockets such as 1× M.2 M-key 2242/2280, 1× M.2 E-key 2230, and 1× M.2 B-key 3042/3052 are equipped, allowing the use of M.2 modules such as M.2 SSDs.

■ Supports Windows 11 IoT Enterprise LTSC 2024 in multiple languages

Windows 11 IoT Enterprise LTSC 2024, an OS designed for specific applications, can be selected in one of four languages: English, Japanese, Chinese, and Korean.

This OS can be used as a long-term fixed version with no function updates.

The built-in lockdown function allows users to limit writing to storage.

■ MIRACLE LINUX 9.0 support

Cybertrust MIRACLE LINUX 9.0, a clone of RHEL (Red Hat Enterprise Linux) developed in Japan, can be selected.

A support menu (purchase required) equivalent to MIRACLE LINUX Standard Support is provided as an OEM license.

(Japanese version only)

4.Supported OS

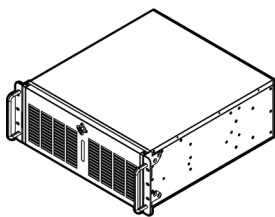
- Windows 10 IoT Enterprise 2021 LTSC 64bit (Japanese / English / Chinese / Korean)
- Windows 10 IoT Enterprise 2019 LTSC 64bit (Japanese / English / Chinese / Korean)
- Windows 11 IoT Enterprise LTSC 2024 (Japanese / English / Chinese / Korean)
- MIRACLE LINUX 9.0 (Japanese version only)

5. Included Items

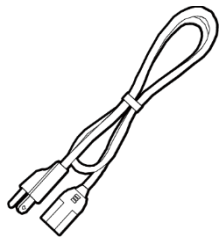
The product consists of the items listed below.

Check, with the following list, that your package is complete.

If you discover damaged or missing items, contact your retailer.



Product...1



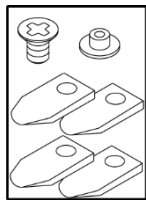
AC Cable...1



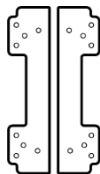
Front Bezel Key...2



Key For Removable...4 *1



Vertical Resin Stand...1 Set



Mount Bracket...1set



RS-232C Cable For
Battery...1 *1



Vertical orientation stand
bracket...2 *1



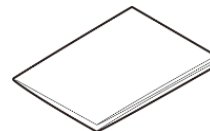
Output Harnesses...2 *1



Keyboard...1 *1



Mouse...1 *1



Product Guide...1

*1 The quantity varies depending on the product configuration.

Safety Precautions

Understand the following definitions and precautions to use the product safely.

Never fail to read them before using the product.

1.Safety Information

This document provides safety information using the following symbols to prevent accidents resulting in injury or death and the destruction of equipment and resources.

Understand the meanings of these labels to operate the equipment safely.

 DANGER	Signal word used to indicate an imminently hazardous situation which, if not avoided, will result in death or serious injury.
 WARNING	Signal word used to indicate a potentially hazardous situation which, if not avoided, could result in death or serious injury.
 CAUTION	Signal word used to indicate a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

2. Handling Precautions

WARNING

- Always check that the power supply is turned off before connecting or disconnecting power cable.
- Do not modify the product.
- Always turn off the power before inserting or removing the cards or cables.
- This product is not intended for use in aerospace, space, nuclear power, medical equipment, or other applications that require a very high level of reliability. Do not use the product in such applications.
- If using this product in applications where safety is critical such as in railways, automotive, or disaster prevention or security systems, please contact your retailer.
- Do not attempt to replace the battery as inappropriate battery replacement poses a risk of explosion.
- For battery replacement, contact your retailer as it must be performed as a process of repair.
- When disposing of a used battery, follow the disposal procedures stipulated under the relevant laws and municipal ordinances. For details on replacing the battery, refer to the appendix.
- This product is connected to a socket-outlet with earthing connection by means of a power cord.
- This product is not suitable for use in locations where children are likely to be present.

CAUTION

- Do not use or store this product in a location exposed to high or low temperature that exceeds range of specification or susceptible to rapid temperature changes.
Example: - Exposure to direct sun
- In the vicinity of a heat source
- Do not use this product in extremely humid or dusty locations. It is extremely dangerous to use this product with its interior penetrated by water or any other fluid or conductive dust. If this product must be used in such an environment, install it on a dust-proof control panel, for example.
- Avoid using or storing this product in locations subject to shock or vibration that exceeds range of specification.
- Do not use this product in the vicinity of devices that generate strong magnetic force or noise. Such products will cause this product to malfunction.
- Avoid using or storing this product in environments with chemicals or oil mist diffused in the air or in locations where this product may come into contact with chemicals or oil mist.

- To clean this product, wipe it gently with a soft cloth dampened with either water or mild detergent. Do not use chemicals or a volatile solvent, such as benzene or thinner, to prevent peeling or discoloration of the paint.
- Continuously operating the product may decrease the service life of the hard disk drive, so use the standby mode.
- Always disconnect the power cable from the receptacle before mounting or removing the expansion card, before connecting or disconnecting any connector.
- As for the product with a D-SUB connector, the appropriate tightening torque for the cable connector is less than 0.2N·m.
- CONTEC reserves the right to refuse to service a product modified by the user.
- In the event of failure or abnormality (foul smells or excessive heat generation), unplug the power cord immediately and contact your retailer.
- Use an power cable that matches the power supply voltage and outlet plug that you are using.

Component Life:

- Power----- The assumed life is about 4 years when the product is continuously operated at a temperature of 40°C. However, it may be shortened due to operating temperature.
- Battery----- The internal calendar clock and CMOS RAM are backed by a Lithium primary battery. The backup time at a temperature of 25°C with the power disconnected is 7 years.
- SSD (256GB 3D TLC) ----Endurance (Terabytes Written): 300(TB)
- SSD (512GB 3D TLC) ----Endurance (Terabytes Written): 600(TB)
- SSD (1TB 3D TLC) -----Endurance (Terabytes Written): 1200(TB)
- NVMe (2280 SSD 256GB) ----Endurance (Terabytes Written): 560(TB)
- NVMe (2280 SSD 512GB) ----Endurance (Terabytes Written): 1120(TB)
- NVMe (2280 SSD 1TB) -----Endurance (Terabytes Written): 2240(TB)
- NVMe (2280 SSD 2TB) -----Endurance (Terabytes Written): 4480(TB)

- System fan Life expectancy: 7 or more years at 40°C
- CPU-FAN Life expectancy: 4.5 or more years at 40°C
- * Replacement of expendables is handled as a repair (there will be a charge).

- To connect with peripherals, use a grounded, shielded cable.
 - Do not use a UPS (Uninterruptible Power Supply) that generates square waves. Connecting the product to this type of UPS may lead to product failure.
 - Replacing the battery with an inappropriate type of battery may lead to explosions. Dispose of used batteries according to the instructions in the instruction manual.
-

1. VCCI Class A Notice

この装置は、クラスA機器です。この装置を住宅環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

VCCI-A

2. FCC PART 15 Class A Notice

NOTE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC WARNING

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

CAUTION

The object of the standard of this product become only a main body.

3. EN55032 Class A Notice

Warning:

Operation of this equipment in a residential environment could cause radio interference.

4. Regarding "CE Marking Notice"

To meet the CE standard, use the LAN-B port at a speed of 1 Gbps.

CAUTION

To use this product at 2.5 Gbps, implement thorough noise countermeasures.

5. Display Marking



Indicates "Caution, hot! To prevent burns on your fingers, do not touch the CPU fan motor, heat sink, or circuit board".

3. Security Warning

When connecting to the network, be aware of security-related problems. See the examples of Security measures below and set up the product properly along with the network devices.

1. Information security risks

- Unauthorized access from the outside through a network could cause the system halt, data damage, or exposure to malware. *1
- Invaded and used as a stepping stone, a device might attack the others through networks. (a victim becomes an assailant)
- Information might leak without realizing due to the connection to the network.
- Secondary damages such as harmful rumors, liability in damages, social credibility fall, and opportunity loss are expected led by the troubles described above.

*1: Malware (Malicious Software) is software that brings harm to a computer system and performs unintended operations.

2. Security measures – e.g.

- Do not keep using the default password. (Refer to the product manual for the password setting).
- Set a strong password.

Combined with upper and lowercase letters, and numbers so that it cannot be easily analogized by others.

- Change the password periodically.
- Disable unnecessary network services and functions.
- Restrict access to the network with network devices. *2
- Restrict ports to be released on the network with network devices. *2
- Create a closed network connection using such as dedicated network or VPN*3

*2: Inquire for setting procedure to manufacturers.

*3: VPN (Virtual Private Network) a secured network that wards off unauthorized access by protecting the communication path with authentication and encryption.

Unfortunately, there are no perfect ways to avert unauthorized access or close a security hole that are endlessly found day and night.

Please understand that risks are always involved with the Internet connection, and we strongly recommend a user should constantly update information security measures.

Product Nomenclature and Function

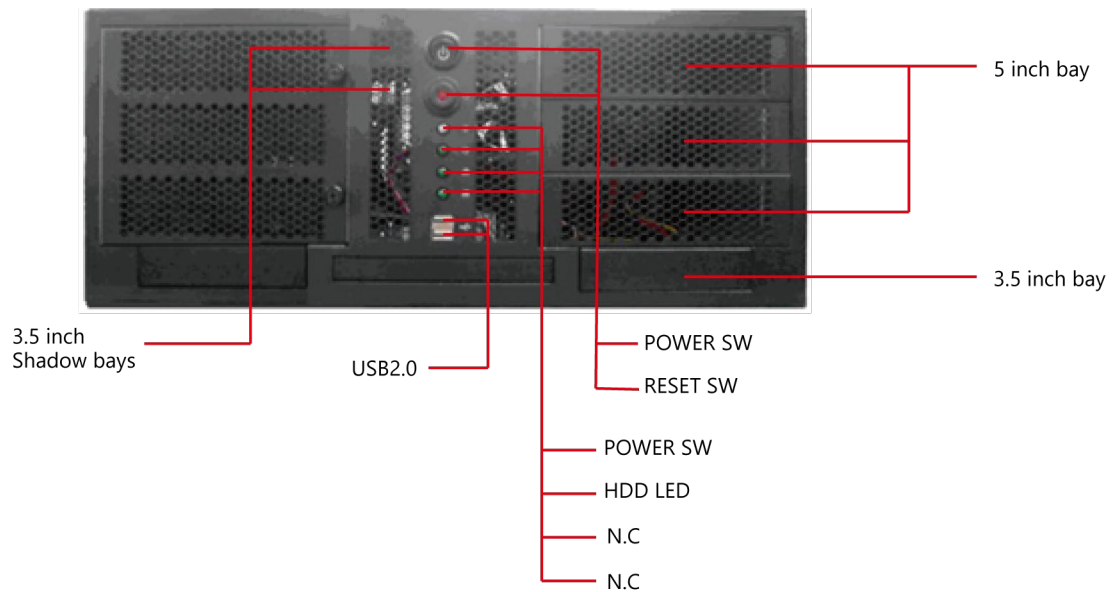
This section describes product component names and their functions, pin assignment of each connector.

1. Nomenclature of Product Components

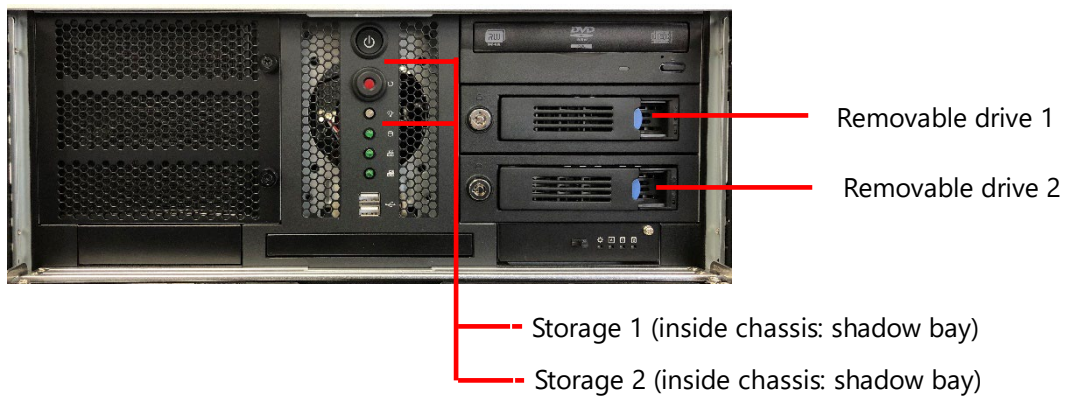
Component names of the product are shown in the figure below.

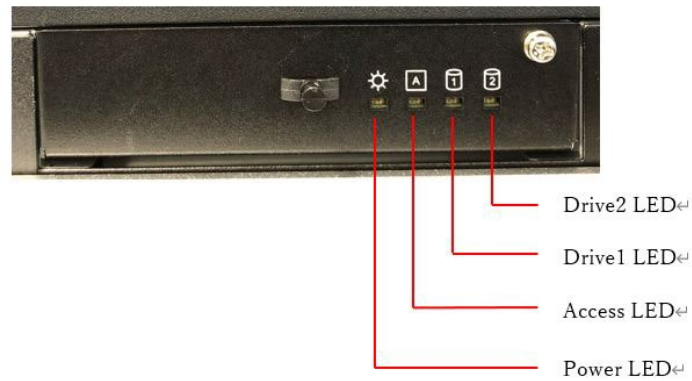
1. Front View

◆ Front components



Front components with options installed



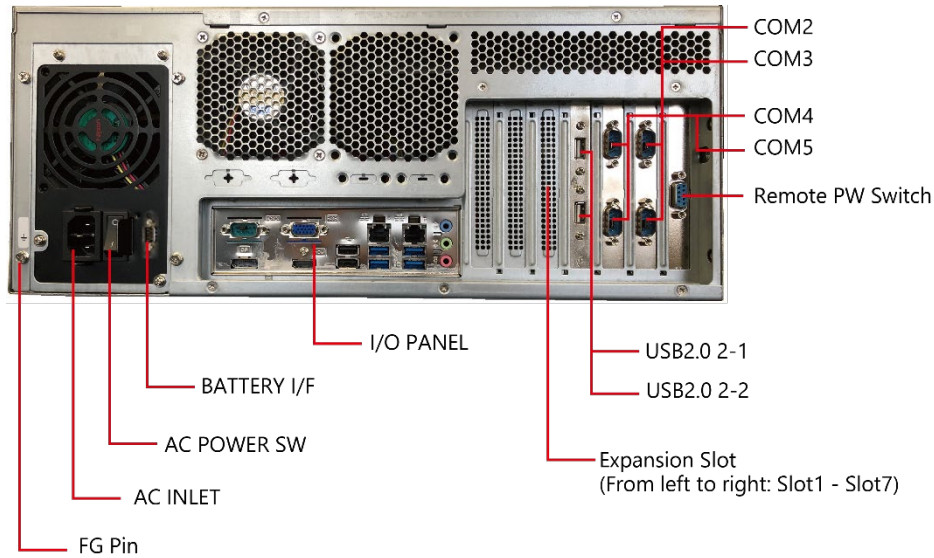
LEDs with hardware RAID selected (3.5 inch bay)**◆ With front cover attached**

- The 5 inch bays store the customer-selected optical drives, batteries, and storage devices.
- The 3.5 inch bay stores the RAID board when RAID is selected.
- The 3.5 inch shadow bays store the selected storage devices.

Name		Function
Front	Optical drive	Slim DVD super multi drive (5 inch bay)
	Nickel metal hydride battery	Selectable when the Japan-made 520 W power supply is selected (upper 5 inch bay)
	Power LED (For hardware RAID)	Power LED with hardware RAID selected (3.5 inch bay for hardware RAID)
	Access LED	Status LED with hardware RAID selected (3.5 inch bay for hardware RAID)
	Drive 1 LED	SATA device 1 access LED with hardware RAID selected (3.5 inch bay for hardware RAID)
	Drive 2 LED	SATA device 2 access LED with hardware RAID selected (3.5 inch bay for hardware RAID)
	POWER SW	Power switch
	RESET SW	System reset switch
	POWER LED	Power LED (For PC main body)
	HDD LED	SATA device LED
	USB2.0	USB2.0 (TYPE-A connector) x 2
	Removable drive 1	SATAIII, 2.5 inch / 3.5 inch removable drive

Name		Function
		(5 inch bay)
	Removable drive 2	SATAIII, 2.5 inch / 3.5 inch removable drive (5 inch bay)
	Storage 1	SATAIII, 3.5 inch drive (Shadow bay)
	Storage 2	SATAIII, 3.5 inch drive (Shadow bay)

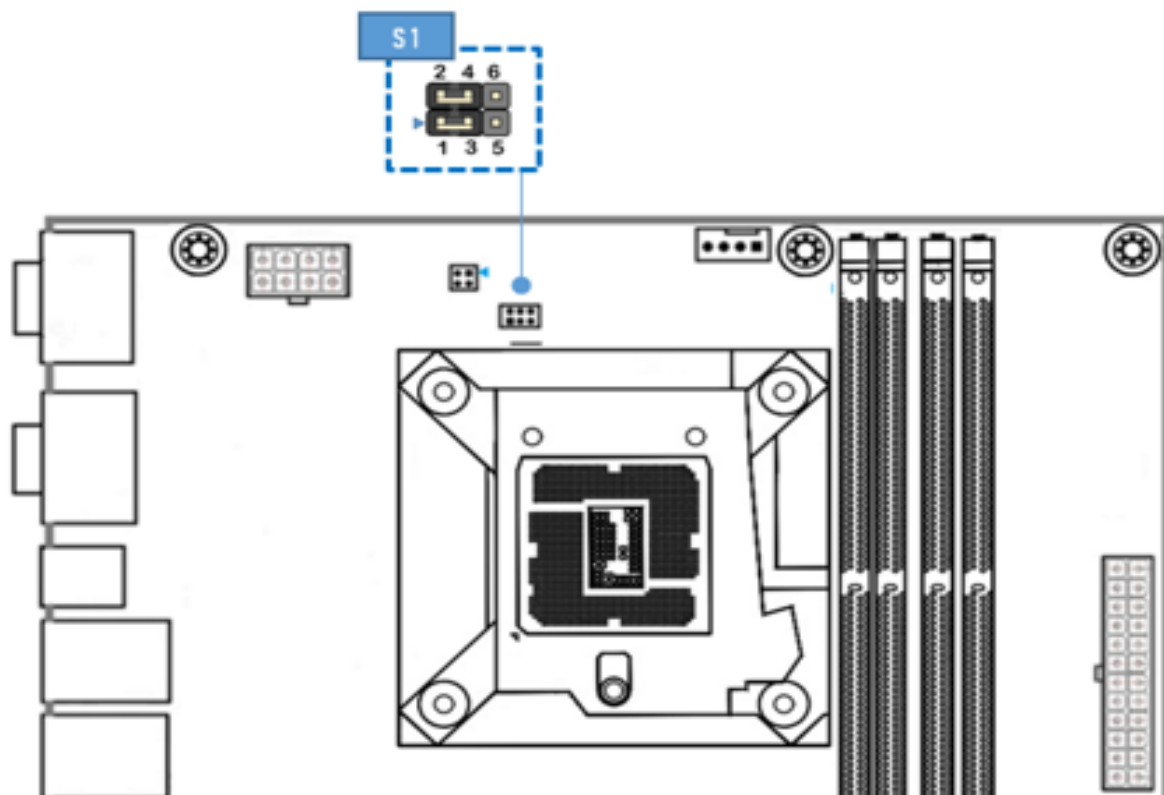
2. Rear View



Name		Function
Rear	I/O PANEL	Stores various interfaces
	COM 2/3/4/5	RS-232C (9pin D-SUB connector (Male)) 2 port x2 *Selection
	Remote PW Switch	Allows the product to be started remotely
	USB2.0 2-1/2-1	Expanded USB 2.0
	FG Pin	Frame ground terminal
	AC INLET	100 - 240VAC Power Input Connector
	AC POWER SW	AC Power Switch
	Expansion Slot	From the left Slot1 (PCI Express 1) : PCI Express 3.0(x16)/(x8) slot x1 Slot2 (PCI Express 2) : PCI Express 3.0(x4) slot x1 Slot3 (PCI Express 3) : PCI Express 3.0(x4) slot x1 Slot4 (PCI Express 4) : PCI Express 3.0(x8) slot x1 Slot5 (PCI1) : PCI slot x1 Slot6 (PCI2) : PCI slot x1 Slot7 (PCI3) : PCI slot x1 * Use the jumper (S1) to switch between PCI Express 3.0(x16) and PCI Express 3.0(x8). The other PCI Express 3.0(x8) slot cannot be used when PCI Express 3.0(x16) is selected. * Remote PW switch, COM 2/3/4/5, and USB 2.0 2-1/2-2 occupy expansion slots. From right to left on the rear panel: Remote PW switch, COM 2/3, COM 4/5, USB 2-1/2-2, and right to left.
	BATTERY I/F	COM port for battery

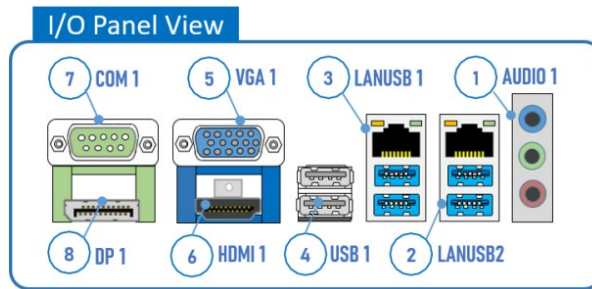
Jumper (S1) settings

When configuring this setting, use the jumper (S1) on the motherboard.



Label	Setting	Function
S1	(Initial value)	PCI Express(x16) x 1
	2 - 4 : connection	
	1 - 3 : connection	
	2 - 4 : connection	PCI Express(x8) x 2
	3 - 5 : connection	

I/O panel details



Name		No.	Function
I/O PANEL	AUDIO1 (LINE IN)	1	Line input (3.5φPHONE JACK)
	AUDIO1 (LINE OUT)	1	Line output (3.5φ PHONE JACK)
	AUDIO1 (MIC IN)	1	Mic input (3.5φ PHONE JACK)
	LANUSB1 (LAN A)	3	1000BASE-T/100BASE-TX/10BASE-T (RJ-45 Connector)
	LANUSB2 (LAN B)	2	1000BASE-T/100BASE-TX/10BASE-T (RJ-45 Connector)
	LANUSB1 (USB3.2 Gen2)	3	USB3.2 Gen2 (USB3.1) (TYPE-A connector) 2 ports
	LANUSB2 (USB3.2 Gen2)	2	USB3.2 Gen2 (USB3.1) (TYPE-A connector) 2 ports
	USB 1 (USB2.0)	4	USB2.0 (TYPE-A connector) 2 ports
	VGA 1	5	Analog RGB (15pin, female)
	HDMI 1	6	Display (19pin, female)
	COM 1	7	RS-232C/RS-422A/RS-485 (9pin D-SUB Connector (male))
	DP 1 (DisplayPort)	8	DisplayPort (20pin, female)

2. Description of Product Components

Components such as connectors, switches are described.

1. Power Switch: AC POWER SW, POWER SW

This is the power switch.

2. Reset Switch: RESET SW

The product is equipped with a hardware reset switch. To avoid pressing this switch by mistake, it is designed to make it harder to press down. Use a fine-tipped object to press the switch.

3. Frame Ground: FG

The product has FG for functional earth. Use this terminal "**Rear View (page23)**" when necessary.

4. Giga bit-Ethernet: LAN A, B

This product is equipped with 2 ports of giga bit-Ethernet.

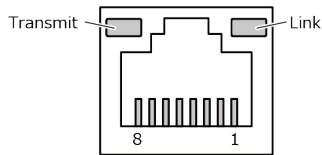
- Network type : 1000BASE-T/100BASE-TX/10BASE-T
- Transmission speed* : 1000M/100M/10M bps
- Max. network path length : 100m/segment
- Controller : Intel® Ethernet Connection I219-LM (LAN-A)
Intel® Ethernet Controller I225-LM (LAN-B)

* Operation at 1000Mbps requires a category 5e cable.

* To use this product at 2.5 Gbps, implement thorough noise countermeasures.

Giga bit-Ethernet Connector

Pin No.	Signal Name	
	100BASE-TX/10BASE-T	1000BASE-T
1	TX+	TRD+(0)
2	TX-	TRD-(0)
3	RX+	TRD+(1)
4	N.C.	TRD+(2)
5	N.C.	TRD-(2)
6	RX-	TRD-(1)
7	N.C.	TRD+(3)
8	N.C.	TRD-(3)



LEDs for display of network statuses

LED	Description
Left LED	Operation LED 10Mbps: off 100Mbps: Green 1Gbps : Orange
Right LED	Link LED Normal connection : Lighting (Green) Operation : Flashing (Green)

5. Serial Port Interface: SERIAL 1, 2, 3, 4, 5

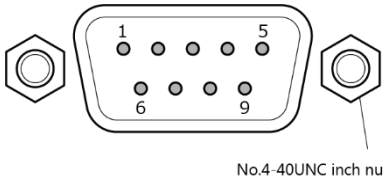
The product has one RS-232C/RS-422A/RS-485 compliant serial port that offer a baud rate of 115,200bps(max.) with a 16-byte transmission-dedicated data buffer and a 16-byte reception-dedicated data buffer. Options can also be selected to add up to four RS-232C-compliant serial ports.

SERIAL I/O Addresses and Interrupts

SERIAL	Display on BIOS *		Reference Display on CONTEC recovery OS (Windows) *		Reference MIRACLE LINUX 8.4 pre-installed model*	
	I/O address	Interrupt	I/O address	Interrupt	I/O address	Interrupt
A	3F8h	IRQ4	3F8h – 3FFh	IRQ4	3F8h – 3FFh	IRQ4
B	2F8h	IRQ3	2F8h – 2FFh	IRQ3	2F8h – 2FFh	IRQ3
C	3E8h	IRQ7	3E8h – 3EFh	IRQ7	3E8h – 3EFh	IRQ7
D	2E8h	IRQ5	2E8h – 2EFh	IRQ5	2E8h – 2EFh	IRQ5
E	2F0h	IRQ6	2F0h – 2F7h	IRQ6	2F0h – 2F7h	IRQ6

* BIOS and OS Serial Port (COM) 6 cannot be used.

Serial port connector

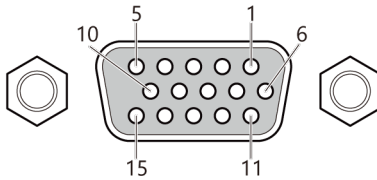
Connector used on the product		9-pin D-SUB (MALE)			
 No.4-40UNC inch nut					
RS-232C		RS-422A*		RS-485*	
Pin No.	Signal Name	Pin No.	Signal Name	Pin No.	Signal Name
1	DCD	1	TX-	1	DATA-
2	RD	2	TX+	2	DATA+
3	TD	3	RX+	3	N.C.
4	DTR	4	RX-	4	N.C.
5	GND	5	GND	5	GND
6	DSR	6	N.C.	6	N.C.
7	RTS	7	N.C.	7	N.C.
8	CTS	8	N.C.	8	N.C.
9	RI	9	N.C.	9	N.C.

* Only COM A (Serial Port 1) can be set.

6. Analog RGB interface: RGB

The product is equipped with a connector for Analog RGB connections.

RGB connector

Connector used on the product		15Pin HD-SUB (FEMALE)	
			
Pin No.	Signal name	Pin No.	Signal name
1	RED	9	+5V
2	GREEN	10	GND
3	BLUE	11	N.C.
4	N.C.	12	DDC DATA
5	GND	13	HSYNC
6	GND	14	VSYNC
7	GND	15	DDC CLK
8	GND		

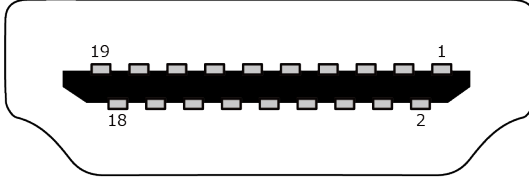
CAUTION

If the OS is booted without connecting the display cable, and then the display is connected after the OS boots, the display may not be shown properly.

7. HDMI Interface: HDMI

The product is equipped with a connector for HDMI connections.

HDMI connector

Connector used on the product		HDMI 19Pin	
			
Pin No.	Signal name	Pin No.	Signal name
1	TMDA DATA2+	2	DATA2 SHGND
3	TMDA DATA2-	4	TMDA DATA1+
5	DATA1 SHGND	6	TMDA DATA1-
7	TMDA DATA0+	8	DATA0 SHGND
9	TMDA DATA0-	10	TMDA CLK+
11	CLK SHGNG	12	TMDA CLK-
13	CEC	14	RESERVED
15	SCL	16	SDA
17	DDC/CEC GND	18	+5V Power
19	HPDET		



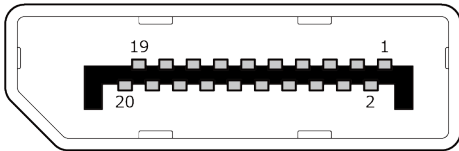
CAUTION

If the OS is booted without connecting the display cable, and then the display is connected after the OS boots, the display may not be shown properly.

8. DisplayPort Interface: Display port

The product is equipped with a connector for DisplayPort interface.

DisplayPort connector

Connector used on the product		Display Port 20 Pin	
			
Pin No.	Signal name	Pin No.	Signal name
1	Lane0+	2	GND
3	Lane0-	4	Lane1+
5	GND	6	Lane1-
7	Lane2+	8	GND
9	Lane2-	10	Lane3+
11	GND	12	Lane3-
13	GND	14	GND
15	Aux+	16	GND
17	Aux-	18	HotPlug
19	GND	20	3.3V

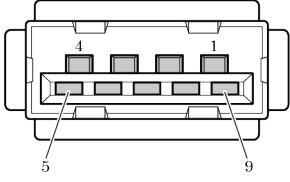
CAUTION

The display may not be viewed if you start the BIOS setup menu without connecting the display cable to the DisplayPort interface, then connect the display cable after booting.

9. USB 3.2 Gen2 (USB3.1) Ports: USB3.2 Gen2

This product is equipped with 4 ports for USB 3.2 Gen2 (USB3.1) connector.

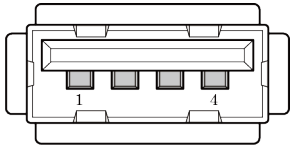
USB3.2 Gen2 Connector

	Pin No.	Signal Name
	1	USB_VCC
	2	DATA-
	3	DATA+
	4	GND
	5	SSRX-
	6	SSRX+
	7	GND
	8	SSTX-
	9	SSTX+

10. USB 2.0 Ports: USB2.0

This product is equipped with 2 ports for USB 2.0 connector. Options can also be selected to add up to two USB 2.0 connectors.

USB2.0 Connector

	Pin No.	Signal Name
	1	USB_VCC
	2	DATA-
	3	DATA+
	4	USB_GND

11. Battery: BATTERY I/F

When the optional Japan-made 520 W power supply (with battery) is selected, the product is equipped with an RS-232C connector (the COM port for the battery).

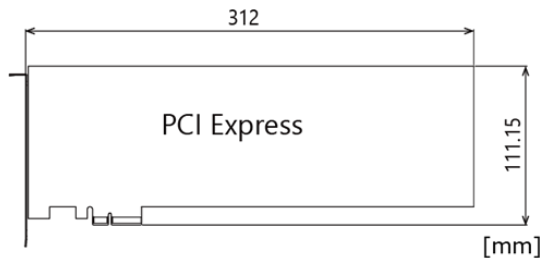
12. Expansion Slot

The expansion slots of this product can be used as follows; one slot for a PCI-Express 3.0(x16) or PCI-Express 3.0(x8) bus-type expansion card, two slots for a PCI-Express 3.0(x4) bus-type expansion card, and three slots for a PCI bus-type expansion card.

- Use the jumper to switch between PCI-Express 3.0(x16) and PCI-Express 3.0(x8). PCI-Express 3.0(x8) cannot be used when PCI-Express 3.0(x16) is selected. When PCI-Express 3.0(x8) is selected, the number of PCI-Express 3.0(x8) slots increases by one, resulting in seven slots being available for cards.

◆ Card Dimensions Allowed

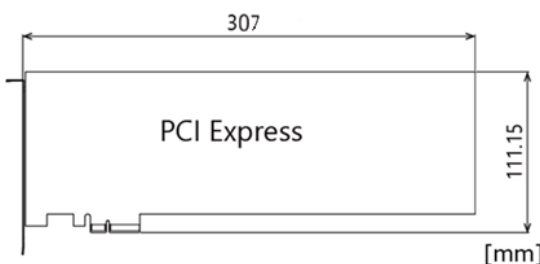
Expansion Card Dimensions



* If the expansion card is wider than 18.71 mm, it will cover the adjacent PCI-Express 3.0(x4) bus, limiting the available PCI-Express 3.0(x4) buses to two slots.

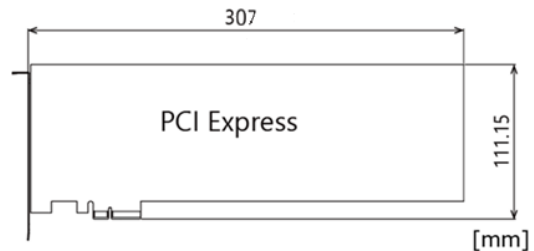
(Example: The adjacent PCI-Express 3.0(x4) bus cannot be used with a dual-slot graphics card. Depending on the card being installed, the adjacent bus may also not be usable with some single-slot graphics cards.)

**PCI-Express 3.0(x16) bus card
Slot1**



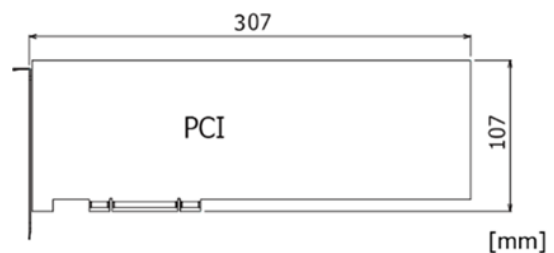
* If the expansion card is wider than 18.71 mm, it will cover the adjacent PCI bus, limiting the available PCI buses to two slots.

**PCI-Express 3.0(x8) bus card
Slot4**



* If the expansion card is wider than 18.71 mm, it will cover the adjacent PCI-Express 3.0(x4) bus, limiting the available PCI-Express 3.0(x4) buses to one slot.

**PCI-Express 3.0(x4) bus card
Slot2, Slot3**



**PCI bus card
Slot5 – Slot7**

**CAUTION**

- PCI bus uses 32bit.
 - This product might be frozen when using the expansion slot. If that is the case, follow the settings described below. (If you are using the bundled Windows OS recovery media, the following procedure is unnecessary as the described settings are already set)
 - Open the Control Panel by right-clicking on the "Start" button. Go to "Hardware and Sound" > "Power Options" > "Change plan settings" > "Change advanced power settings", then set the "Link state power management" off in the "PCI Express".
-

13. LED: Power, Access, Drive, POWER, HDD

LED name State	LED name State (Display color)	Display content
POWER LED	ON (Green)	Normal operation (ON)
HDD LED	ON (Orange)	Data transmission/reception (Flashing)

If hardware RAID is selected, the 3.5 inch bay on the front of this product has four LEDs.

LED name State	LED name State (Display color)	Display content
Power LED (For hardware RAID)	OFF	This LED lights up when the hardware RAID is selected. *1
Access LED	OFF	This LED lights up when the hardware RAID is selected. *1
Drive 1 LED	OFF	This LED lights up when the hardware RAID is selected. *1
Drive 2 LED	OFF	This LED lights up when the hardware RAID is selected. *1

*1 For more details, see the [Hardware RAID Setup] - **[LED Status (page105)]**.

Hardware Setup

This section describes how to install, connect, and set up the product.

1. Before Using the Product for the First Time

Follow the next steps to set up this product:

- STEP1 By referring to the information in this section, install, connect and set up this product.
- STEP2 Connect cables.
Connect the cable of necessary external devices, such as keyboard and a display, to this product using appropriate cables.
- STEP3 Turn on the power.
After verifying that you have correctly followed steps 1 and 2, turn on the power.
If you find any abnormality after turning on the power, turn it off and check to see if the setup has been performed properly.
- STEP4 Set up BIOS.
By referring to "**BIOS Set up (Page48)**", set up BIOS. This setup requires a keyboard and a display.
*Before using this product, be sure to execute "Restore Defaults" to initialize the BIOS settings to their default values. (See "**Main Menu (Page49)**")

CAUTION

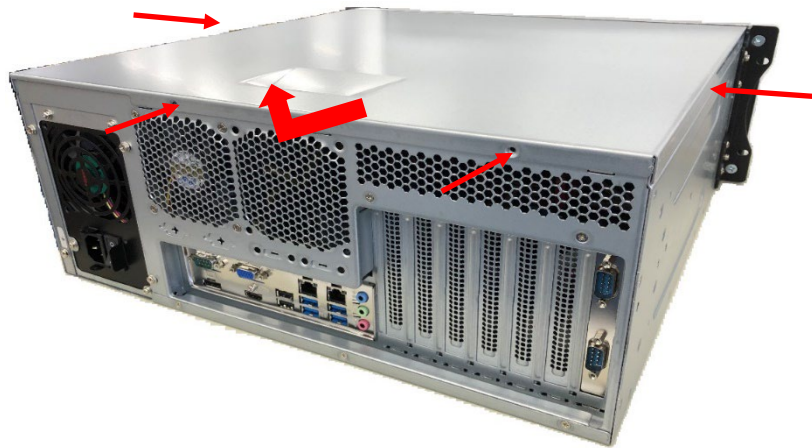
- Be sure to connect the keyboard and mouse to it before turning the power on for the first time.
- Be sure to connect the display before turning the power on. Connecting the display after turning the power on may prevent it from being displayed properly.

2. Hardware Setup

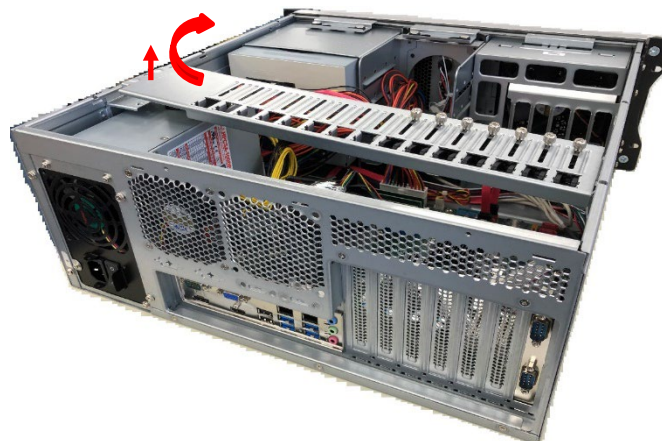
- Before you start, be sure that the power is turned off.
- When setting up the built-in hard disk, handle with care so as not to give a shock.
- Remove only those screws that are explained. Do not move any other screws.

1. Removing the Top Cover, the Expansion Card Bracket

- 1 Remove the four screws indicated by the arrows, and then slide and lift up the top cover to remove it.



- 2 Remove the one screw indicated by the arrow, and then remove the expansion card bracket.

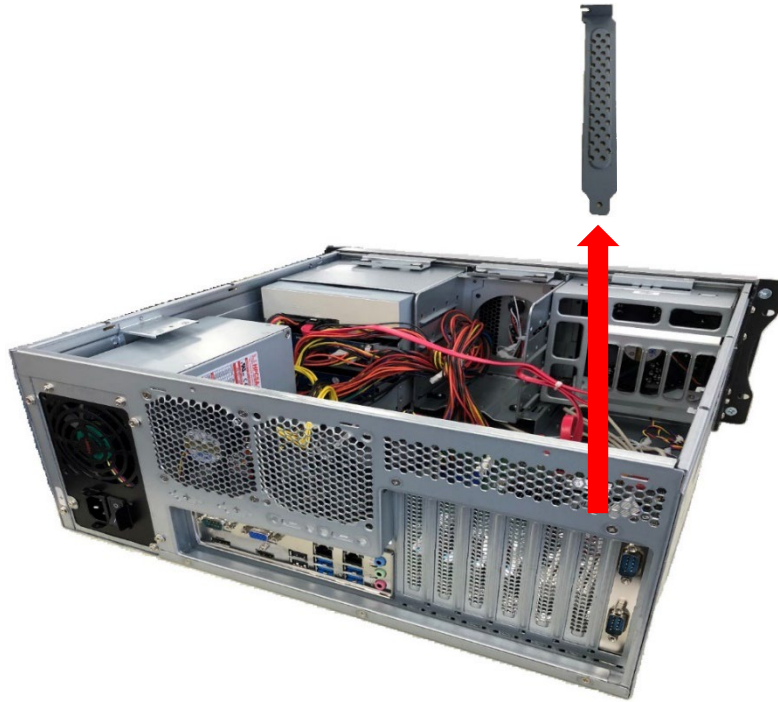


CAUTION

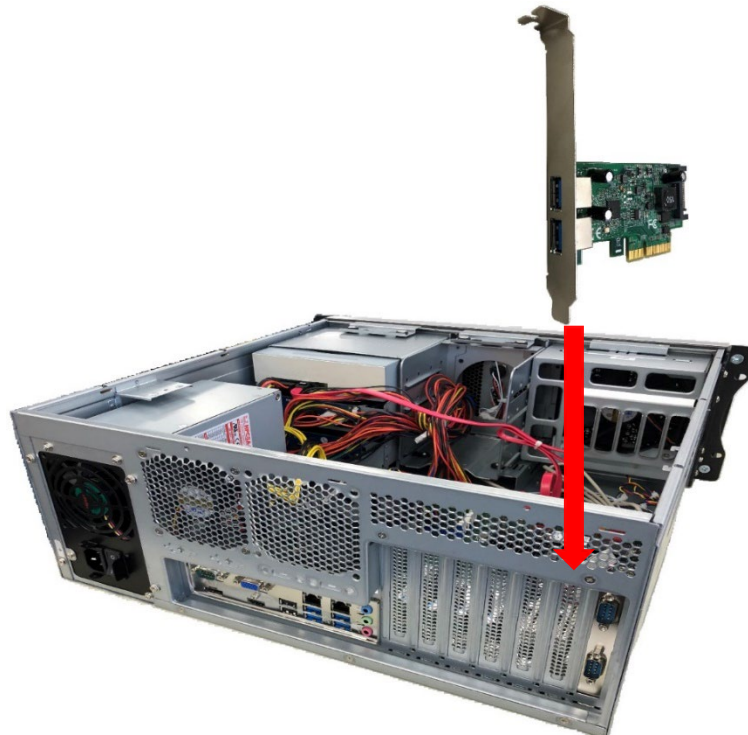
If you tighten the screw with a tightening torque greater than specified, the hole may be damaged.
The specified tightening torque is 0.5 - 0.6 N·m.

2. Setting the Expansion Card

- 1 Loosen the screws and remove the slot cover from the back of the chassis.



- 2 Install the expansion card and secure it with the screw.



CAUTION

If you tighten the screw with a tightening torque greater than specified, the hole may be damaged.
The specified tightening torque is 0.5 - 0.6 N·m.

3. Setting the Storage

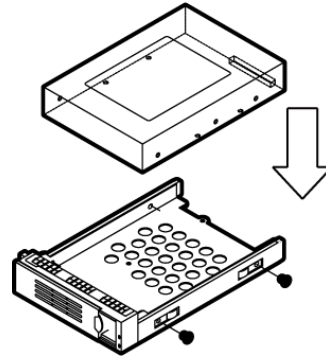
Slot-in SATA storage is available.

- 1 Open the door on the plastic cover.
Push the blue lock to unlock it, pull the arm toward you, and then remove the removable case from the drive bay.

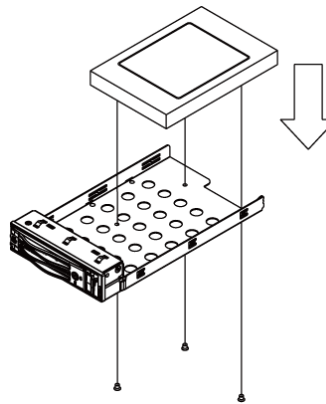


2 Set the storage into the removed case.

For 3.5-inch storage



For 2.5-inch storage



* Three screw locations

3 Put the removable case back into the drive bay until the lock clicks.

CAUTION

Using the storage other than the replacement parts for maintenance cannot satisfy this product specification and is outside the scope of the warranty.

Use the replacement parts for maintenance one if you would like to operate the product within the specification.

Pay attention to the orientation of the storage.

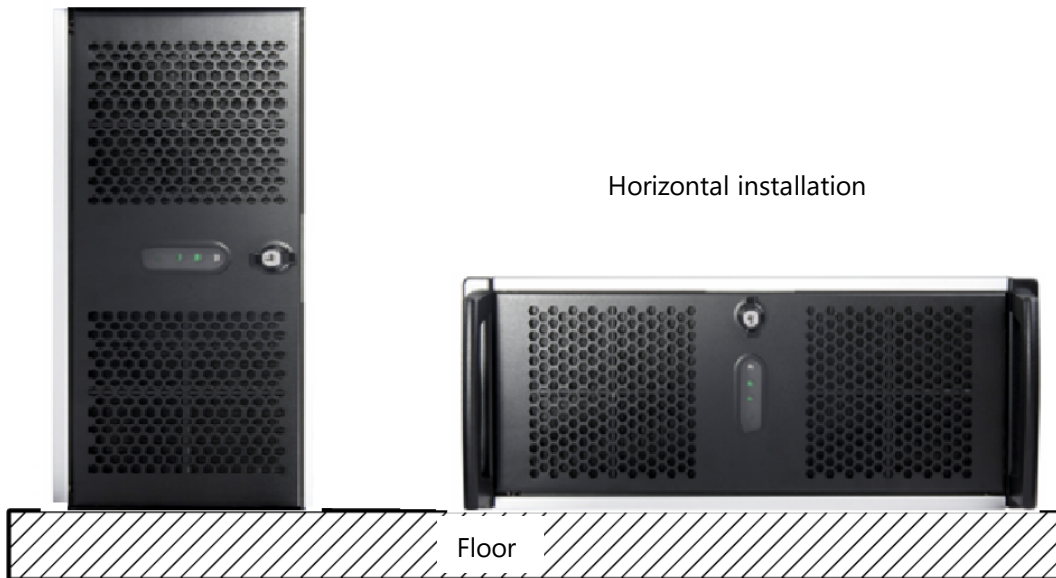
The appropriate screw tightening torque is 0.5 - 0.6 N·m for HDDs and 0.3 N·m for SSDs.

4. Installation Requirements

In order to enjoy reliable use of the MR4100 series, maintain the following conditions.

◆ Installation Orientation

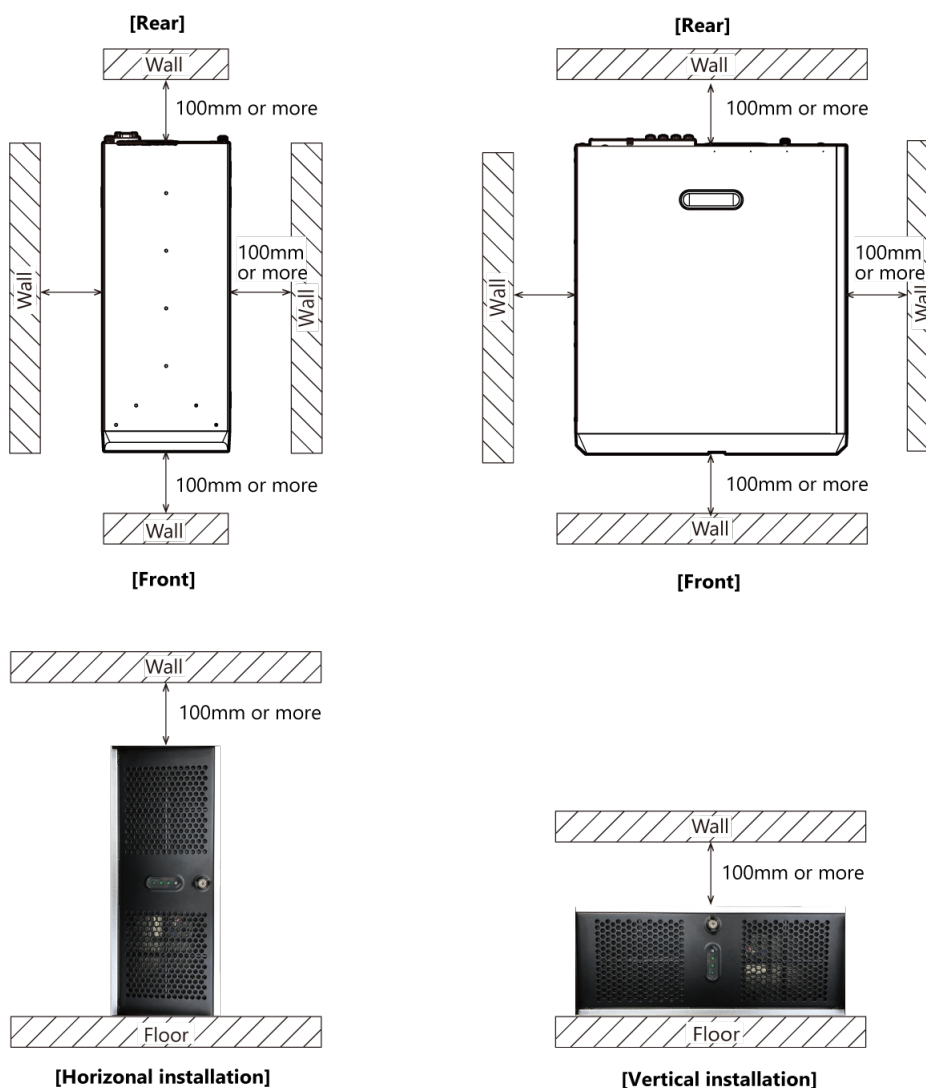
Vertical installation



◆ Space between the main unit and its surroundings

The main unit of the MR4100 series is equipped with air vents and fans for regulating temperature. In order to secure room around the air vents and to facilitate connecting the cables, install the main unit with a space of 100 mm or more between the front, side, and rear surfaces of the main unit and other items such as the surrounding devices and walls.

Install the product in a location in which air can circulate.



⚠ CAUTION

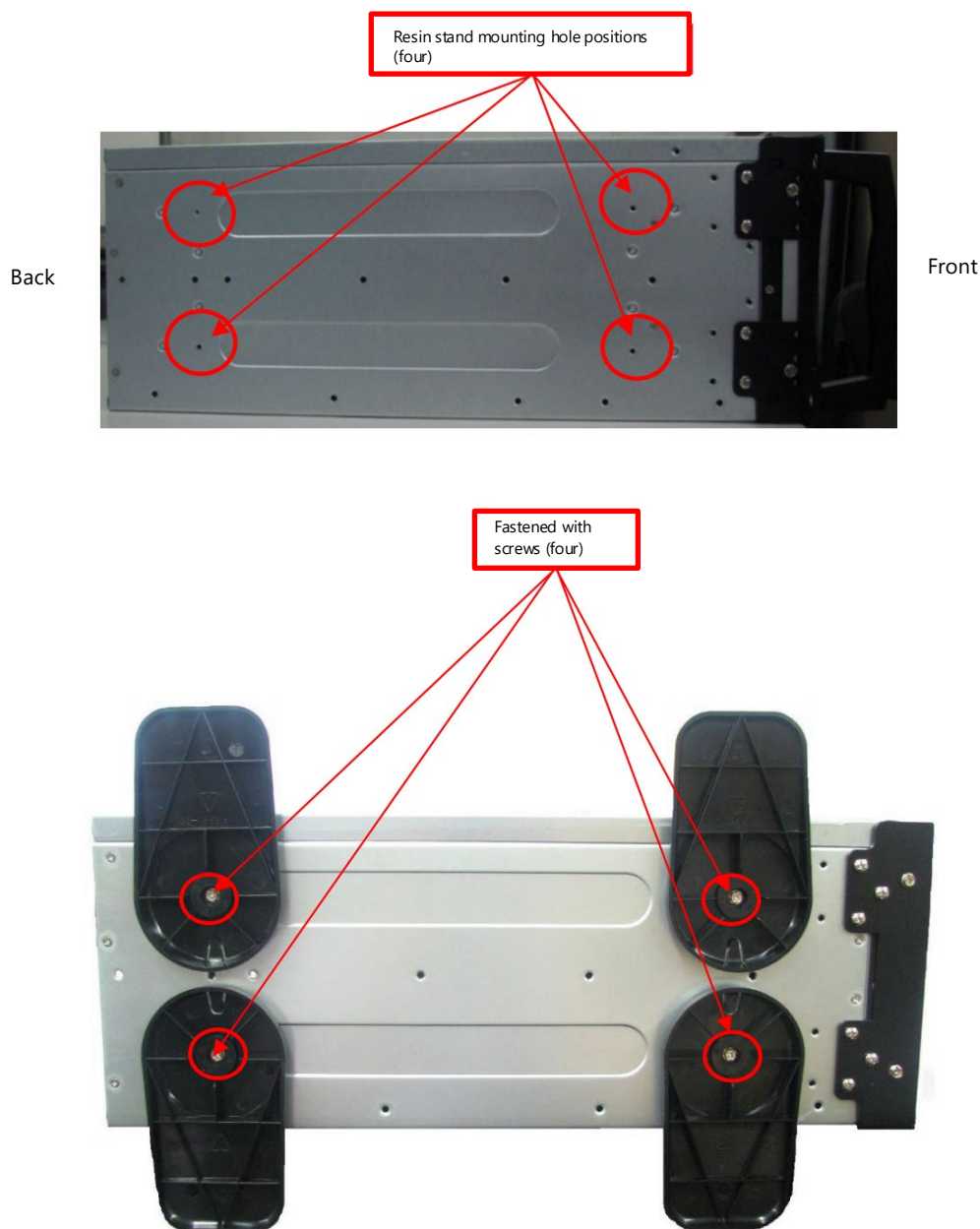
Note that even if the ambient temperature is within the usage range, if devices that generate high temperatures are near the main unit, it may become hot due to the effect of the radiated heat and may consequently exhibit poor operation.

5. Attaching/Removing the Vertical Resin Stands

This section explains how to attach the vertical resin stands included with this product.
All these stands must be attached to the side of the chassis (the same side).

◆ Attaching/Removing the Stands

Refer to the following figure for the mounting hole positions.



To remove the vertical resin stands, perform operations in the reverse order as when attaching them.

⚠ CAUTION

The vertical resin stands cannot be attached to the chassis side opposite that shown in the above figure.

6. Attaching/Removing the Mount Bracket

This section explains how to attach the mount bracket included with this product.

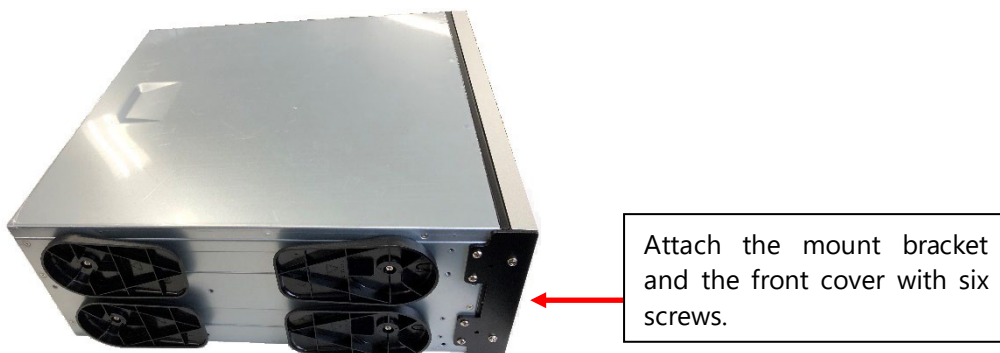
◆ Attaching/Removing the Mount Bracket

Remove the six screws from each rack handle, and then remove the rack handles.

Align the mount bracket and the front cover on the chassis, and then attach these components with six screws.



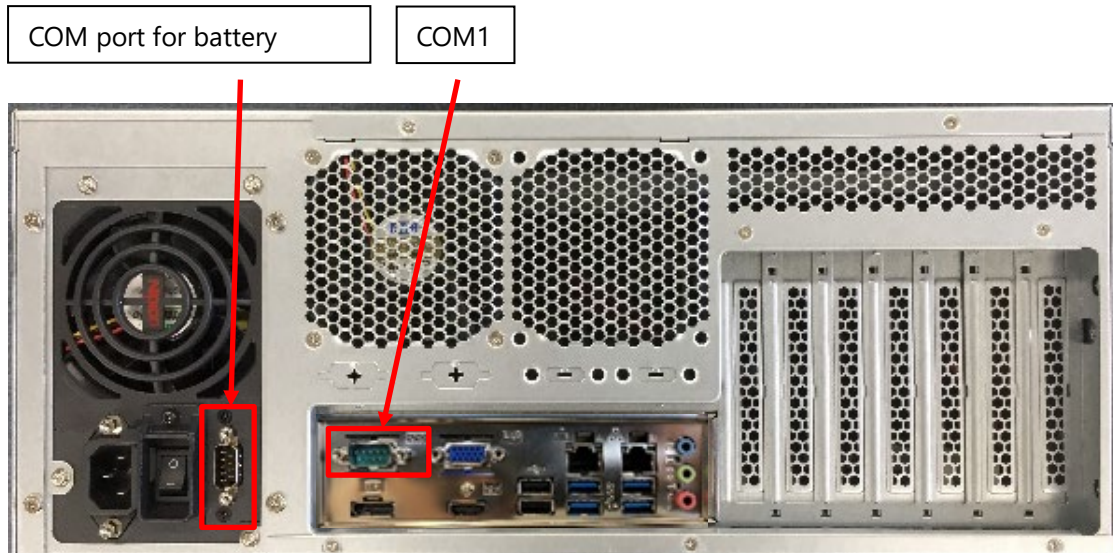
Attach the mount bracket and the front cover with six screws.



7. Attaching the RS-232C Cable For Battery

When the Japan-made 520 W power supply (with battery) is selected, an RS-232C cable for the battery is included with the product.

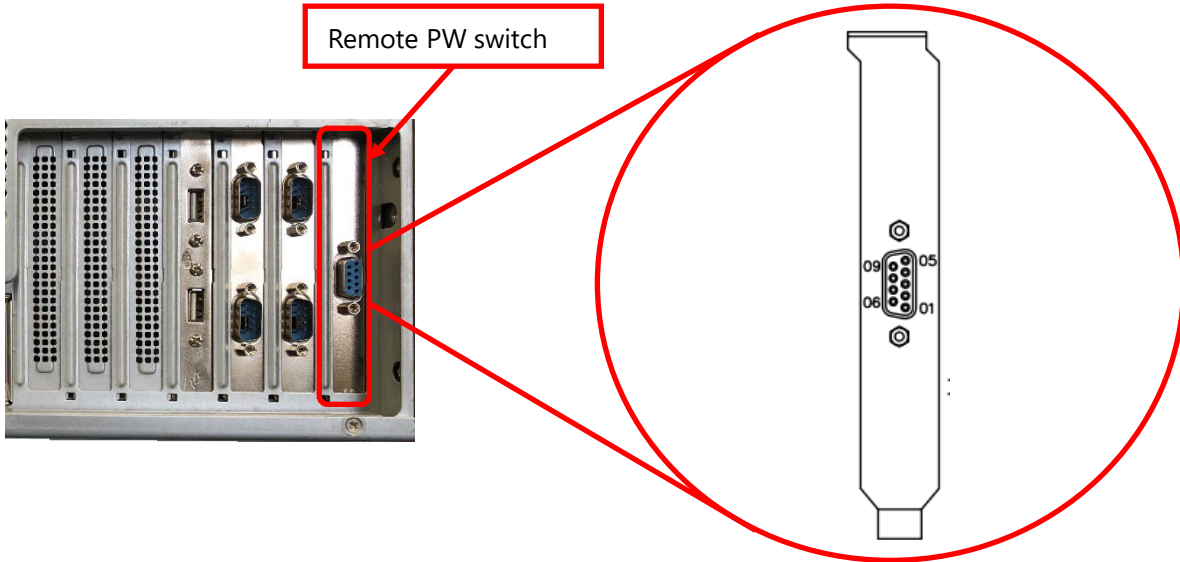
Connect this cable to the COM port for battery and to COM 1.



8. Remote PW Switch

Optional remote PW switch ports can be mounted in the expansion slots.

If selected as an option, it will be factory installed and shipped.



Connector	Pin No.	Signal Name
Housing : DB09F D-SUB 9-pin (female) connector	01	PW RSW
	02	GND
	03	N.C.
	04	N.C.
	05	N.C.
	06	N.C.
	07	N.C.
	08	N.C.
	09	N.C.

BIOS Set up

This section describes how to configure, change, and check BIOS settings used to manage basic computer information.

1. Before Configuring BIOS Settings

The BIOS software controls the hardware required for booting the system. The default BIOS settings are configured for optimal performance under normal use. These default settings are recommended under the following circumstances.

- If an error message instructing the user to start Aptio Setup Utility appears when starting up the system.



WARNING

- Configuring the settings incorrectly can lead to the system not starting up or operation becoming unstable. When making any changes to the equipment, requesting advice from a skilled engineer is highly recommended.
- If you cannot boot the computer after using Setup to change and save system settings, the computer will have to be repaired. Do not change any settings you do not fully understand. The default CPU and chipset settings in particular should not be changed. These default settings were configured after thorough consideration by both AMI and the system manufacturer to ensure maximum performance and reliability. Even the slightest changes to these settings could result in the need for system repairs.

1. Using Aptio Setup Utility

This section explains how to use Aptio Setup Utility.

◆ Starting the Setup Utility

Aptio Setup Utility can be started by any of the following methods.

- By pressing or <Esc> key immediately after turning on the pc.
- By pressing the or <Esc> key when the message "Press or <Esc> to enter SETUP." is displayed on the screen during POST (Power On Self-Test).

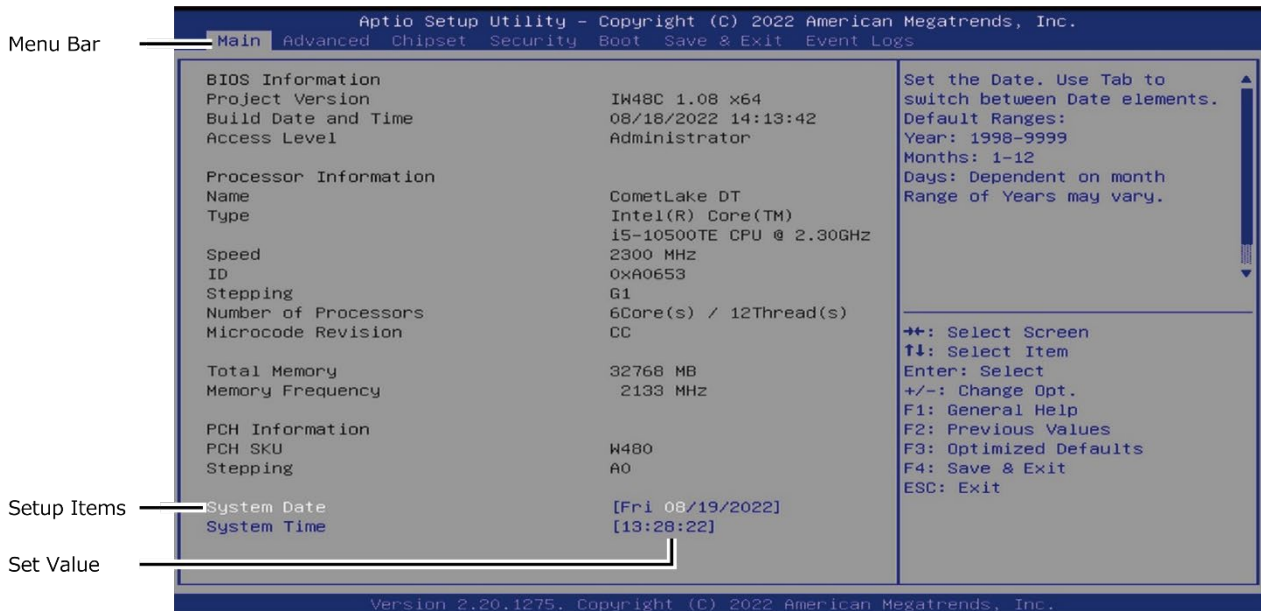
If the message "Press or <Esc> to enter SETUP." disappears before pressing the key, turn the computer power off and back on to access Aptio Setup Utility.

The computer can also be restarted by pressing the <Ctrl>, <Alt>, and keys at the same time on a connected USB keyboard.

◆ Screen Configuration

Use the keyboard to operate Aptio Setup Utility. Use the arrow keys on the keyboard to move between menu items and settings, press the <Enter> key to make selections.

Use the <+> and <-> keys to change the values of settings. Press the <F1> key to display help and the <Esc> key to exit the setup utility.



◆ Key Operations

Use the following keys to operate the setup utility.

Key	Function
Up Arrow	Move to the previous item
Down Arrow	Move to the next item
Left Arrow	Move to the item on the left (menu bar)
Right Arrow	Move to the item on the right (menu bar)
Esc	Main Menu: Quit without saving changes Submenus: Exit Current page to the next higher level menu
Enter	Move to the item you desired
+	Increase the numeric value or make changes
-	Decrease the numeric value or make changes
F1	General help on Setup navigation keys
F2	Load the previous number from NVRAM.
F3	Load the optimized defaults from BIOS default table
F4	Save all settings changes to the NVRAM and exit

◆ Getting Help

Press <F1> key to pop up a small help window that describes the appropriate keys to use and the possible selections for the highlighted item. To exit the Help Window press <Esc> key.

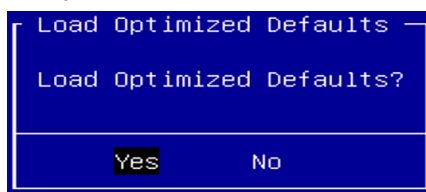
◆ Exiting Aptio Setup Utility

Use one of the following methods to exit Aptio Setup Utility.

Save Changes and Exit

Save the changed settings and exit Aptio Setup Utility. Restart the system if settings that require a restart have been changed.

- 1 Press the <F4> key or select "Save Changes and Exit" in the "Save & Exit" menu screen. The following message will be displayed.

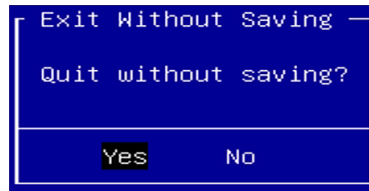


- 2 Select [Yes], and press the <Enter> key.
Aptio Setup Utility will close, and the PC will restart.

Discard Changes and Exit

Exit Aptio Setup Utility without saving the changed settings.

- 1 Press the <Esc> key or select "Discard Changes and Exit" in the "Save & Exit" menu screen. The following message will be displayed.

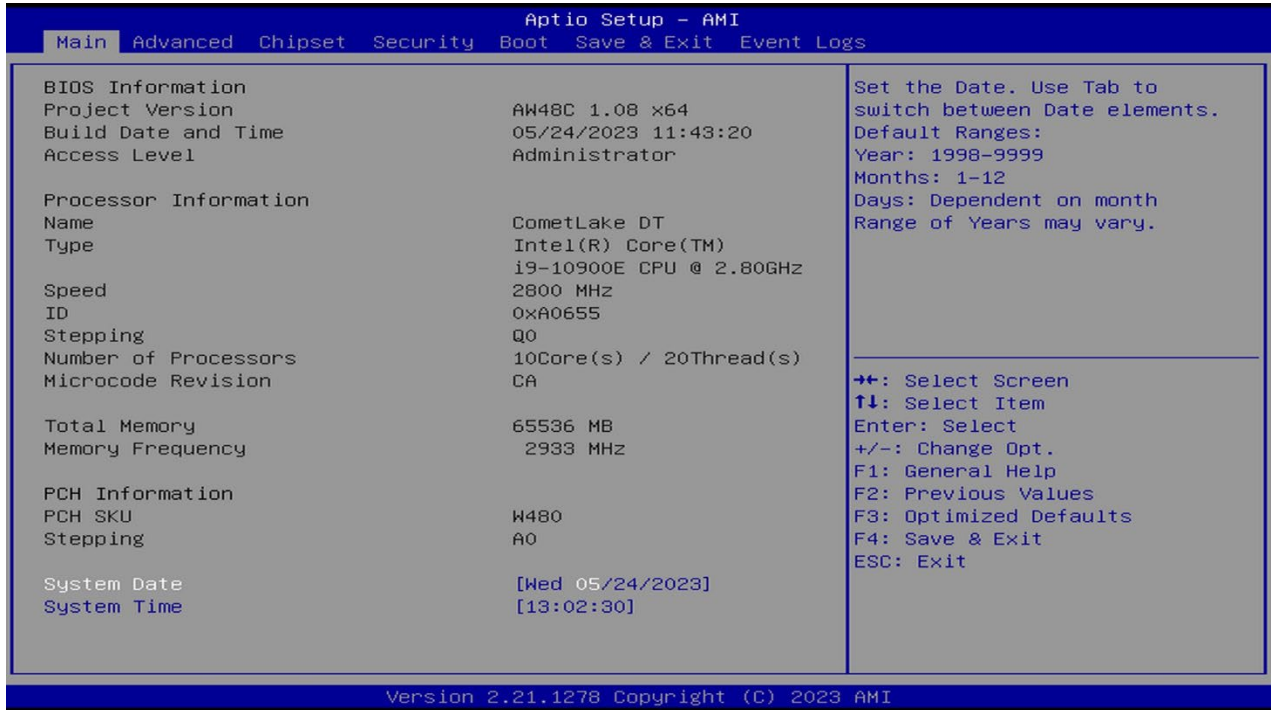


- 2 Select [Yes], and press the <Enter> key.
Aptio Setup Utility will close, and the OS will boot.

2.Setup Utility Menu

The six menu options in Aptio Setup Utility are shown below.

Use the right or left arrow key to navigate between menus, and use the up or down arrow key to access the settings.



(Actual display may differ)

1. Menu Items

You can choose the following tabs.

Main Menu

Use this menu to confirm the system basic configuration and set the language and time at the same time.

Advanced Menu

Use this menu to specify the detailed functions that can be set on the system in use.

Chipset Menu

Use this menu to specify the detailed functions that can be set on the system in use.

Security Menu

Use this menu to set the password so that the system security can be protected.

Boot Menu

Use this menu to specify the setting about the system boot.

Save & Exit Menu

Use this menu to load or save the setup item and to exit the setup menu.

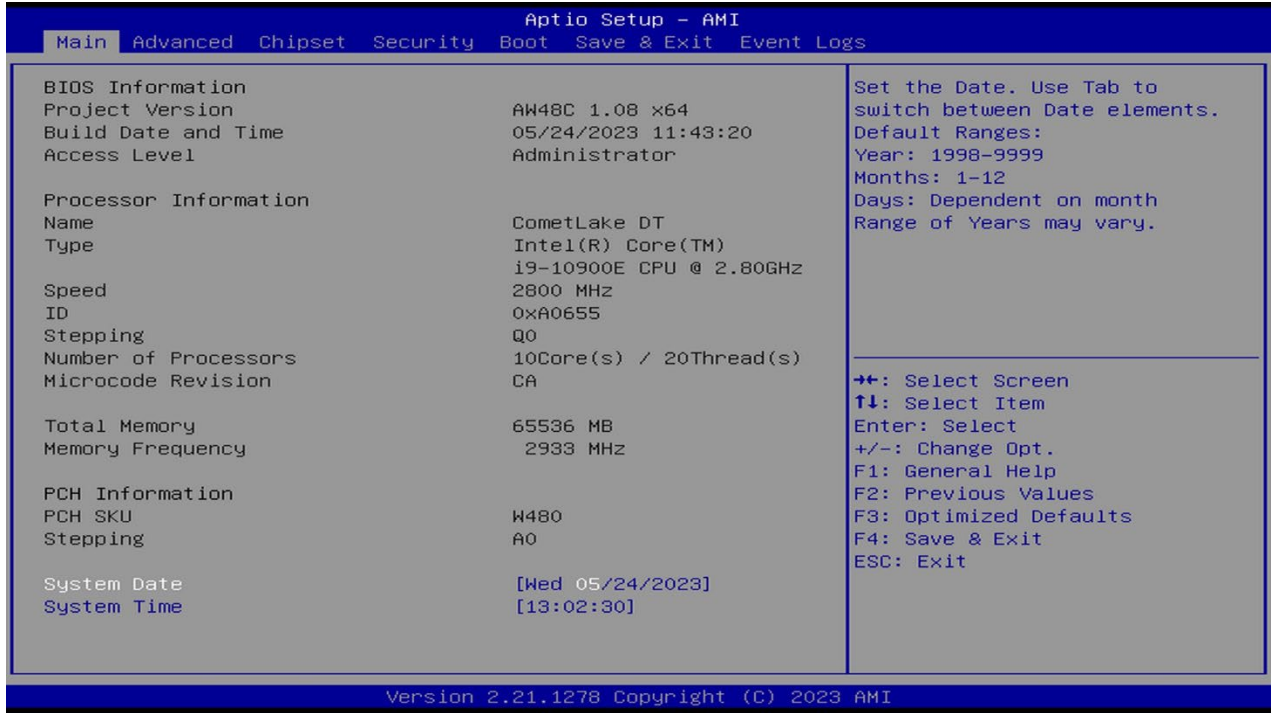
Event Logs Menu

Use this menu to confirm the Event Logs.

2. Main Menu

Use this menu to check basic system configuration.

The following items are displayed.



(Actual display may differ)

You can configure the following settings.

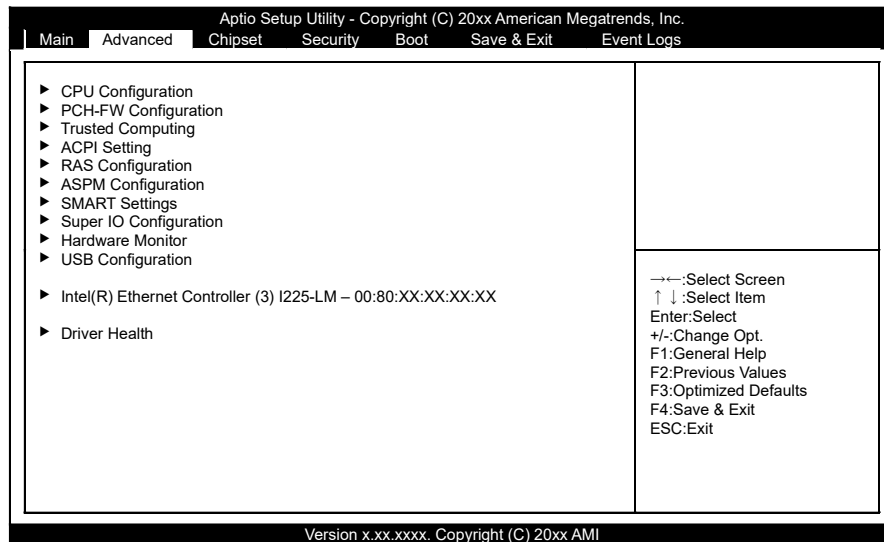
Main Menu Selections

Item	Options	Description
System Date	Month / Day / Year	Set the system date. The day of the week is set automatically.
System Time	Hour : Minute : Second	Set the system time.

3. Advanced Menu

Use the Advanced menu to configure the settings for the CPU and other devices on the motherboard.

The following items are available:



CPU Configuration

Use this to check the CPU Configuration.

PCH-FW Configuration

Use this to check the firmware version of Intel ME.

Trusted Computing

Use this to check the TPM settings.

ACPI Setting

Use this to check the ACPI settings.

RAS Configuration

Use this to check the RAS settings.

ASPM Configuration

Use this to check the ASPM settings.

PCIe Configuration

Use this to check the PCIe settings.

SMART Settings

Use this menu to check the operation settings for SMART.

Super IO Configuration

Use this to check the Super IO Configuration.

Hardware Monitor

Use this to check such information as the CPU temperature.

USB Configuration

Use this to check the USB configuration.

NVMe Configuration

Use this to check the NVMe settings.

Intel(R) Ethernet Controller (3) I225-LM – 00:80:xx:xx:xx:xx

Use this to set the parameters of the Gigabit Ethernet device.

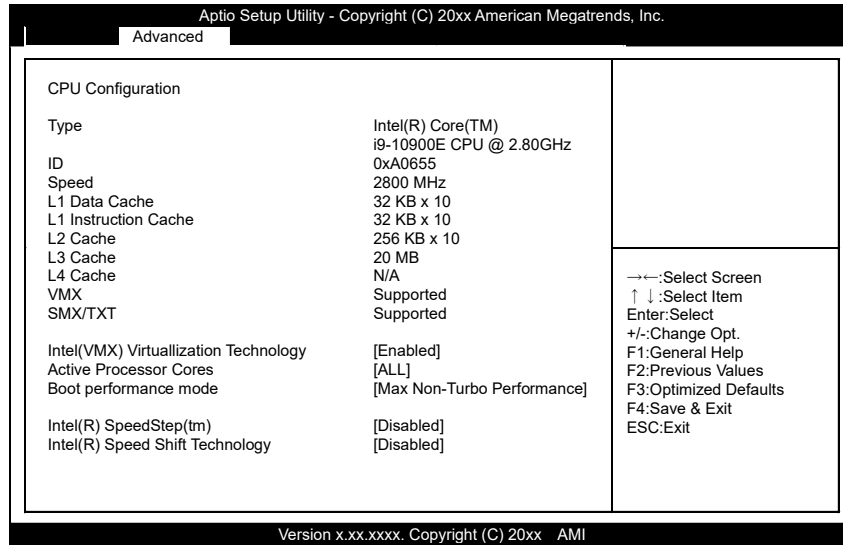
This may not appear the first time the product turns on.

Driver Health

Use this to check the health status of the driver/controller.

◆ CPU Configuration

Configure the CPU setting.



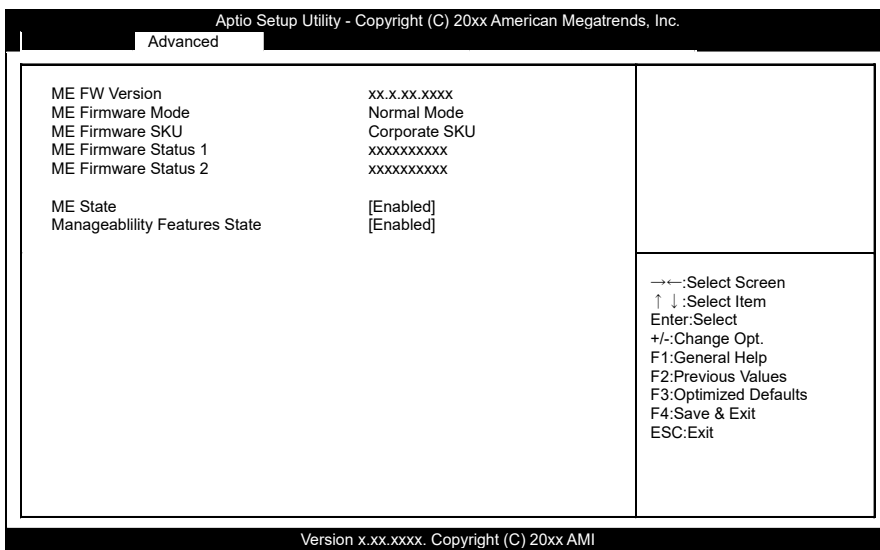
Display items differ depending on the installed CPU.

CPU Configuration

Item	Options	Description
Intel(VMX) Virtualization Technology	Disabled / Enabled	Do not change this setting.
Active Processor Cores	ALL / 1 / 2 / 3 / 4 / 5 / 6 / 7	Do not change this setting.
Boot performance mode	Max Battery / Max Non-Turbo Performance / Turbo Performance	Do not change this setting.
Intel(R) SpeedStep(tm)	Disabled / Enabled	Specify the Intel SpeedStep® Technology settings.
Turbo Mode	Disabled / Enabled	Specify the Turbo Mode settings.
Intel(R) Speed Shift Technology	Disabled / Enabled	Specify the Intel® Speed Shift Technology.

◆ PCH-FW Configuration

Use this menu to view the PCH-FW version and settings related to Intel ME.

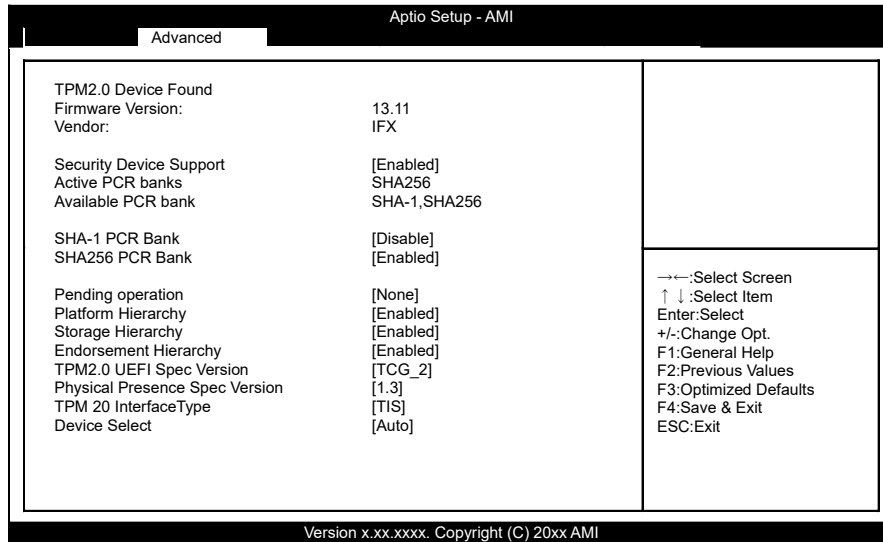


PCH-FW Configuration

Item	Options	Description
ME State	Disabled / ☐ Enabled	Do not change this setting.
Manageability Features State	Disabled / ☐ Enabled	Do not change this setting.

◆ Trusted Computing

Configure the TPM setting.

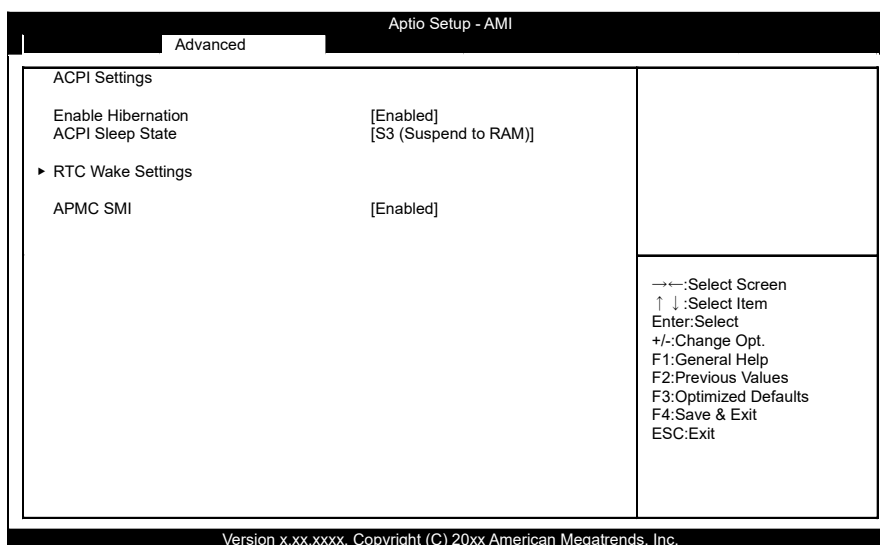


Trusted Computing

Item	Options	Description
Security Device Support	Disabled / Enabled	Configure whether to use the Security Device. Normally, do not change this setting.
SHA-1 PCR Bank	Disabled / Enabled	Do not change this setting.
SHA256 PCR Bank	Disabled / Enabled	Do not change this setting.
Pending operation	None / TPM Clear	Configure the scheduling of TPM operations.
Platform Hierarchy	Disabled / Enabled	Do not change this setting.
Storage Hierarchy	Disabled / Enabled	Do not change this setting.
Endorsement Hierarchy	Disabled / Enabled	Do not change this setting.
TPM2.0 UEFI Spec Version	TCG_1_2 / TCG_2	Configure the TPM version.
Physical Presence Spec Version	1.2 / 1.3	Do not change this setting.
Device Select	TPM1.2 / TPM2.0 / Auto	Do not change this setting.

◆ ACPI Settings

Configure the ACPI setting.



ACPI Settings

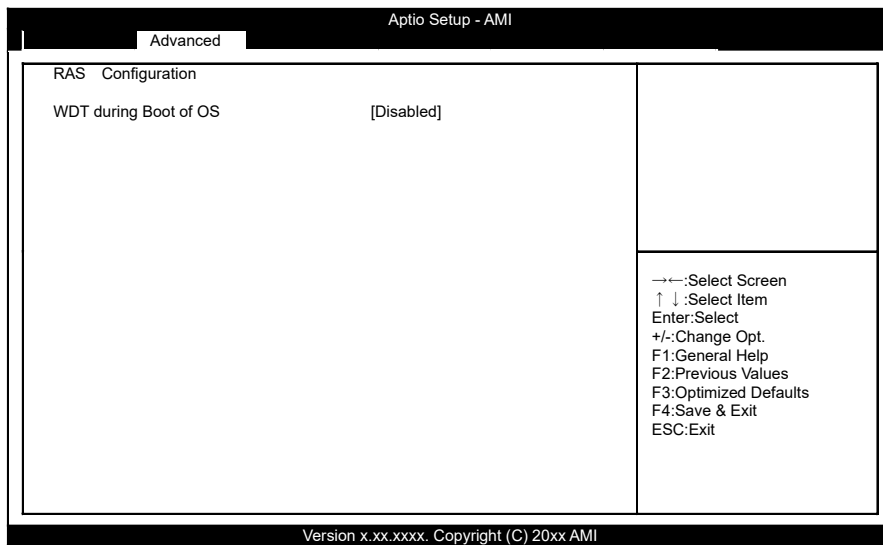
Item	Options	Description
Enable Hibernation	Disabled / Enabled	Specify whether to use the Hibernation.
ACPI Sleep State	Suspend Disabled / S3 (Suspend to RAM)	Specify ACPI Sleep mode.
RTC Wake Settings	Refer to "RTC Wake Settings"	-
APMC SMI	Disabled / Enabled	Set to Disabled to disable software SMI on the OS. Because software SMI is a delay factor, disabling it may improve real-time performance.

RTC Wake Settings

Item	Options	Description
Wake system from S5	Disabled / Enabled	Set whether to start the system automatically from the S5 state. The following three items appear when Enabled is selected.
Wake up day	0	Specify the day on which to start the system.
Wake up hour	0	Specify the hour at which to start the system.
Wake up minute	0	Specify the minute at which to start the system.
Wake up second	0	Specify the second at which to start the system.

◆ RAS Configuration

Use this menu to check the RAS settings.

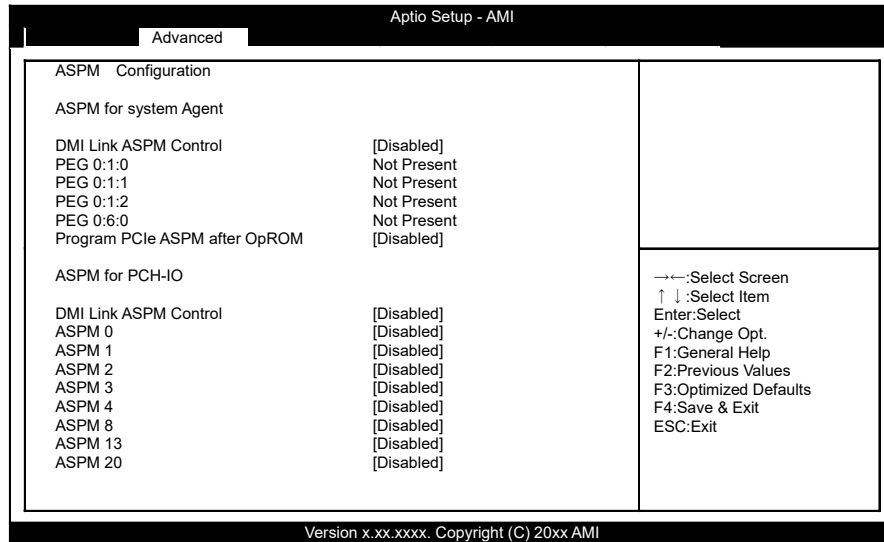


RAS Configuration

Item	Options	Description
WDT during Boot of OS	Disabled / Enabled	Do not change this setting.

◆ ASPM Configuration

Use this menu to check the ASPM settings.

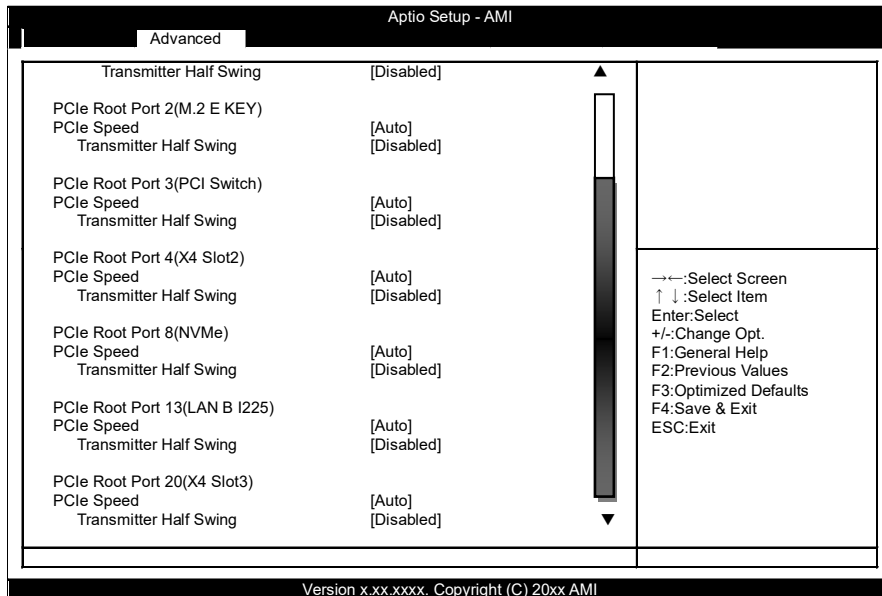
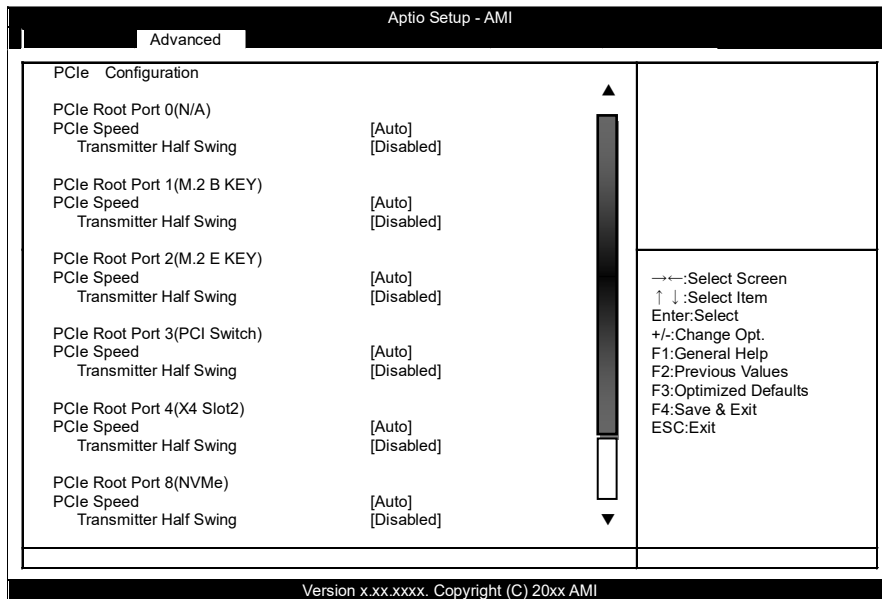


ASPM Configuration

Item	Options	Description
DMI Link ASPM Control	Disabled / LOS / L1 / LOSL1	Do not change this setting.
Program PCIe ASPM after OpROM	Disabled / Enabled	Do not change this setting.
DMI LINK ASPM Control	Disabled / LOS / L1 / LOSL1 / Auto	Do not change this setting.
ASPM 0	Disabled / LOS / L1 / LOSL1 / Auto	Do not change this setting.
ASPM 1	Disabled / LOS / L1 / LOSL1 / Auto	Do not change this setting.
ASPM 2	Disabled / LOS / L1 / LOSL1 / Auto	Do not change this setting.
ASPM 3	Disabled / LOS / L1 / LOSL1 / Auto	Do not change this setting.
ASPM 4	Disabled / LOS / L1 / LOSL1 / Auto	Do not change this setting.
ASMP 8	Disabled / LOS / L1 / LOSL1 / Auto	Do not change this setting.
ASPM 13	Disabled / LOS / L1 / LOSL1 / Auto	Do not change this setting.
ASPM 20	Disabled / LOS / L1 / LOSL1 / Auto	Do not change this setting.

◆ PCIe Configuration

Configure the PCIe setting.

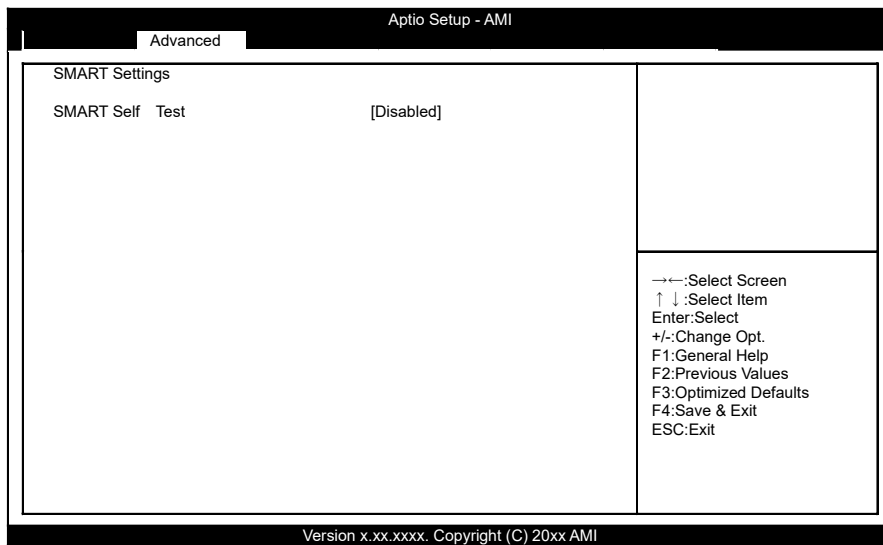


PCIe Configuration

Item	Options	Description
PCIe Speed	<u>Auto</u> / Gen1 / Gen2 / Gen3	Specify the PCIe transfer speed.
Transmitter Half Swing	<u>Disabled</u> / Enabled	Specify the PCIe transfer method.

◆ SMART Settings

Use this menu to check the SMART settings.

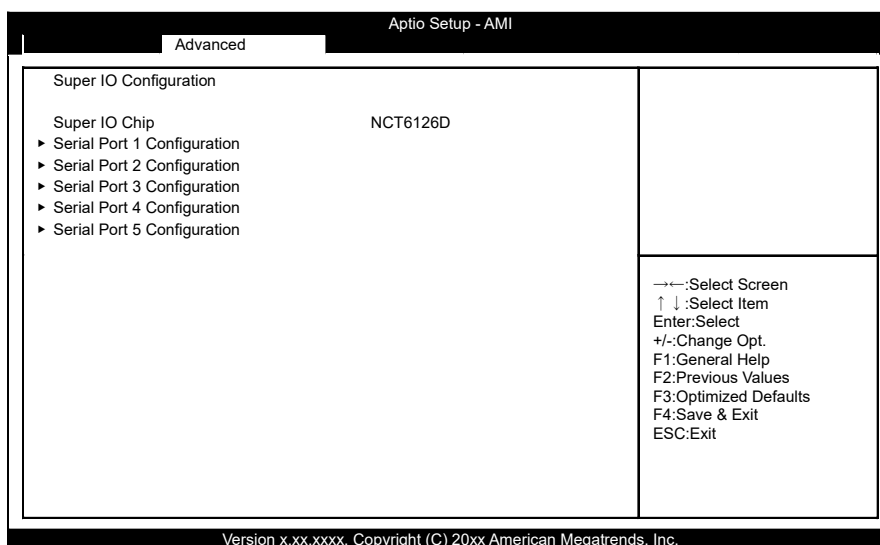


SMART Settings

Item	Options	Description
SMART Self Test	Disabled / Enabled	Do not change this setting.

◆ Super IO Configuration

Configure the Super IO setting.



Super IO Configuration

Item	Options	Description
Serial Port 1 Configuration	Refer to "Serial Port 1 Configuration"	-
Serial Port 2 Configuration	Refer to "Serial Port 2 Configuration"	-
Serial Port 3 Configuration	Refer to "Serial Port 3 Configuration"	-
Serial Port 4 Configuration	Refer to "Serial Port 4 Configuration"	-
Serial Port 5 Configuration	Refer to "Serial Port 5 Configuration"	-

Serial Port 1 Configuration

Item	Options	Description
Serial Port	Disabled / <u>Enabled</u>	Configure the operation settings for serial port.
Device Settings	IO=3F8h; IRQ=4;	Check the setting configuration.
Mode Select	<u>RS-232</u> / RS-485 / RS-422	Setting of RS-232C/RS-422A/RS-485 mode.
RS422 / 485 Terminator Control	<u>Disabled</u> / Enabled	Enable or disable the RS-422/485 internal terminal resistor.

Serial Port 2 Configuration

Item	Options	Description
Serial Port	Disabled / Enabled	Configure the operation settings for serial port.
Device Settings	IO=2F8h; IRQ=3;	Check the setting configuration.

Serial Port 3 Configuration

Item	Options	Description
Serial Port	Disabled / Enabled	Configure the operation settings for serial port.
Device Settings	IO=3E8h; IRQ=7;	Check the setting configuration.

Serial Port 4 Configuration

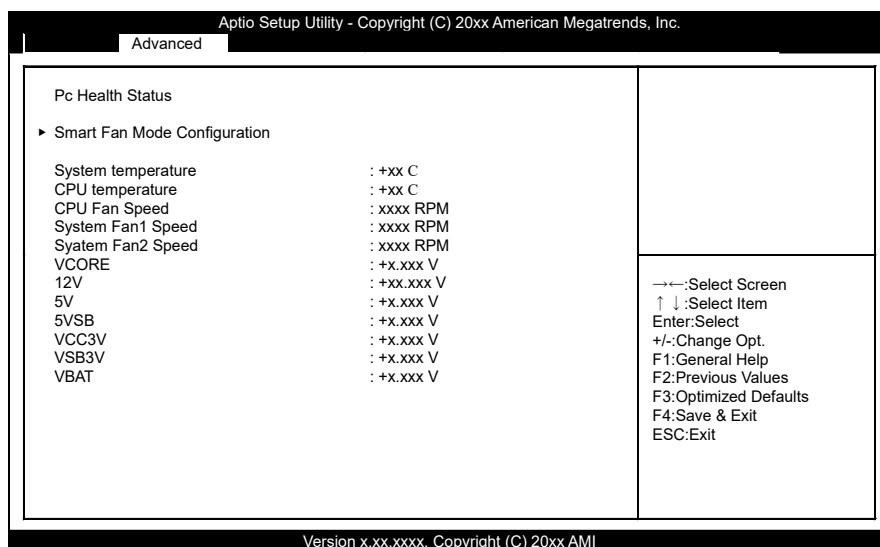
Item	Options	Description
Serial Port	Disabled/ Enabled	Configure the operation settings for serial port.
Device Settings	IO=2E8h; IRQ=5;	Check the setting configuration.

Serial Port 5 Configuration

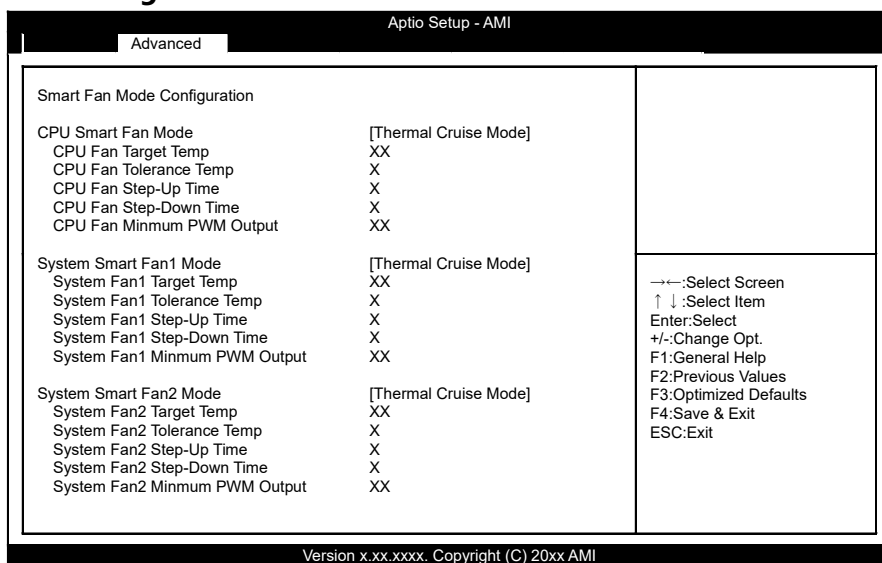
Item	Options	Description
Serial Port	Disabled / Enabled	Configure the operation settings for serial port.
Device Settings	IO=2F0h; IRQ=6;	Check the setting configuration.

◆ Hardware Monitor

Use this menu to check hardware monitor information such as the CPU temperature.



Smart Fan Mode Configuration

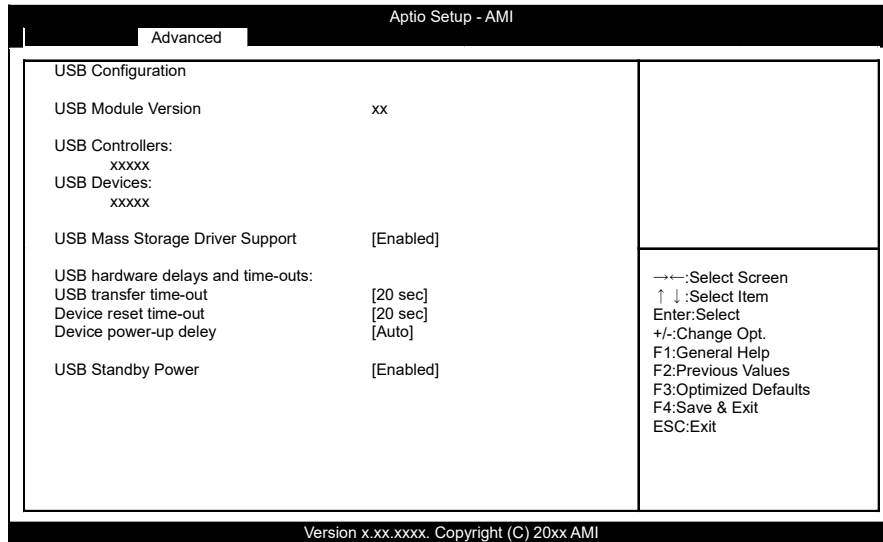


Item	Options	Description
CPU Smart Fan Mode	PWM Manual Mode / Thermal Cruise Mode /	Do not change this setting.
CPU Fan Target Temp	xx	Do not change this setting.
CPU Fan Tolerance Temp	xx	Do not change this setting.
CPU Fan Step-Up Time	xx	Do not change this setting.
CPU Fan Step-Down Time	xx	Do not change this setting.
CPU Fan Minimum PWM Output	xx	Do not change this setting.
System Smart Fan2 Mode	PWM Manual Mode / Thermal Cruise Mode	Do not change this setting.
System Fan2 Target Temp	xx	Do not change this setting.

Item	Options	Description
System Fan2 Tolerance Temp	xx	Do not change this setting.
System Fan2 Step-Up Time	xx	Do not change this setting.
System Fan2 Step-Down Time	xx	Do not change this setting.
System Fan2 Minimum PWM Output	xx	Do not change this setting.

◆ USB Configuration

Configure the USB Controller setting.

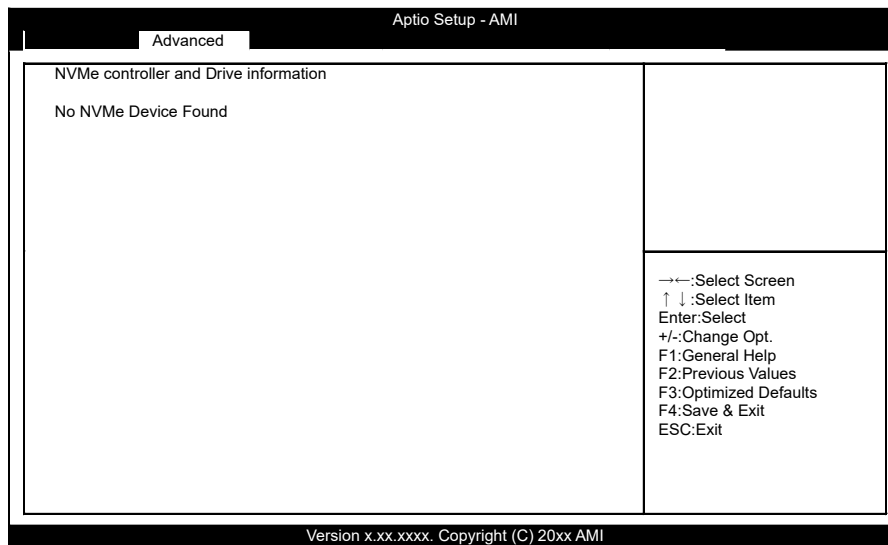


USB Configuration

Item	Options	Description
Legacy USB Support	Disabled / Enabled	Do not change this setting.
USB transfer time-out	1 sec / 5 sec / 10 sec / 20 sec	Set the time-out value for control, bulk, and interrupt transfers.
Device reset time-out	10 sec / 20 sec / 30 sec / 40 sec	Set the time-out value for the Start and Unit commands of USB high-capacity storage devices.
Device Power-up delay	Auto / Manual	This is the maximum time until the device is recognized by the host controller. This time is 100 ms for the root port. For hub ports, the hub descriptor delay time is used.
USB Standby Power	Disabled / Enabled	Do not change this setting.

◆ NVMe Settings

Use this menu to check the NVMe Settings.



◆ Intel(R) Ether Controller (3) I225-LM – 00:80:XX:XX:XX:XX

Use this menu to check the Ether Controller.

Aptio Setup -AMI	
Advanced	
UEFI Driver	Intel(R) Gigabit X.X.XX
Device Name	Intel(R) Ethernet
PCI Device ID	Controller (3) I225-LM
	15F2
Link Status	[Disconnected]:
MAC Address	00:80:XX:XX:XX:XX
→←:Select Screen ↑ ↓:Select Item Enter:Select +/-:Change Opt. F1:General Help F2:Previous Values F3:Optimized Defaults F4:Save & Exit ESC:Exit	
Version x.xx.xxxx. Copyright (C) 20xx AMI	

◆ Driver Health

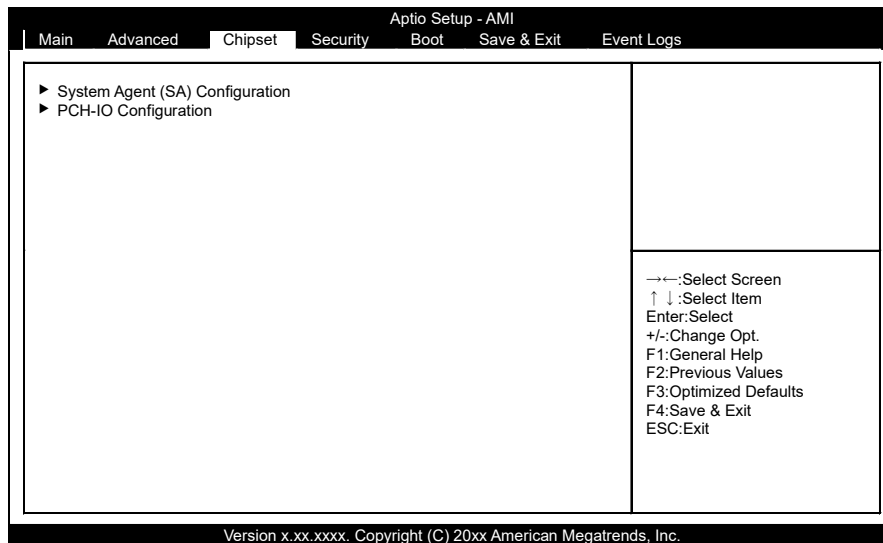
Use this menu to check the Ethernet Driver.

Aptio Setup Utility - Copyright (C) 20xx American Megatrends, Inc.	
Advanced	
▶ Intel(R) Gigabit X.X.XX Healthy	
→←:Select Screen ↑↓:Select Item Enter:Select +/-:Change Opt. F1:General Help F2:Previous Values F3:Optimized Defaults F4:Save & Exit ESC:Exit	
Version x.xx.xxxx. Copyright (C) 20xx AMI	

Aptio Setup - AMI	
Advanced	
Controller: XXXXXXXX Child 0 Healthy Intel(R) Ethernet Controller (3) I225-LM Healthy	
→←:Select Screen ↑↓:Select Item Enter:Select +/-:Change Opt. F1:General Help F2:Previous Values F3:Optimized Defaults F4:Save & Exit ESC:Exit	
Version x.xx.xxxx. Copyright (C) 20xx AMI	

4. Chipset Menu

Use this menu to check the detailed features of chipset. The following items are available:



System Agent (SA) Configuration

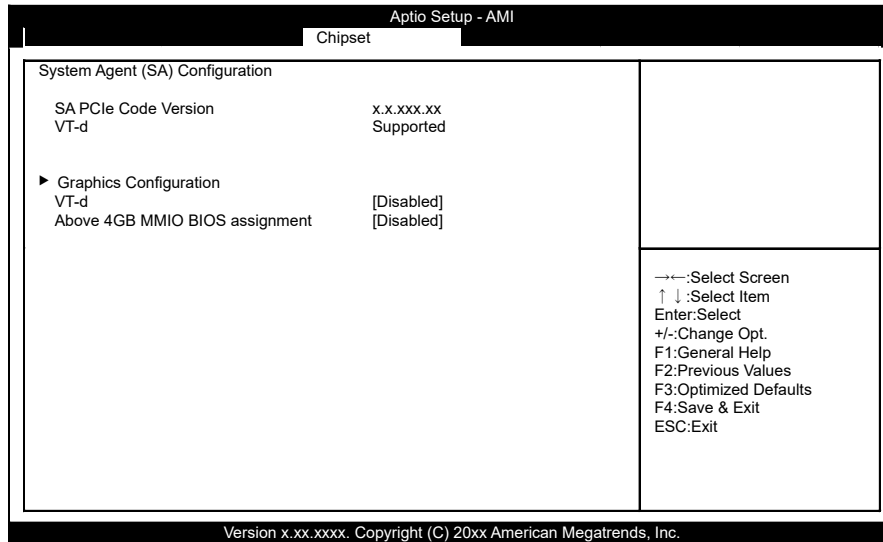
Use this to check the System Agent configuration.

PCH-IO Configuration

Use this to check the PCH-IO configuration.

◆ System Agent (SA) Configuration

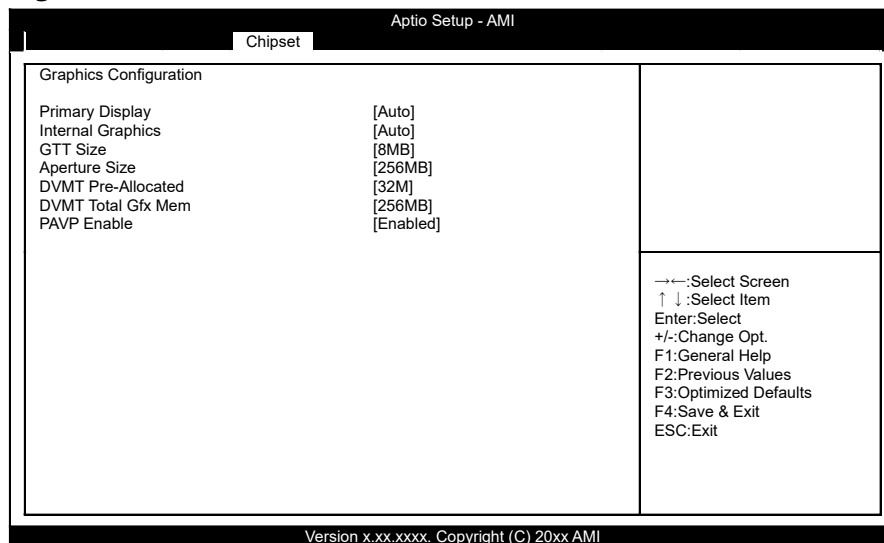
Use this menu to check the System Agent configuration.



System Agent (SA) Configuration

Item	Options	Description
Graphics Configuration	Refer to "Graphics Configuration"	-
VT-d	<u>Disabled</u> / Enabled	Do not change this setting.
Above 4GB MMIO BIOS assignment	Enabled / <u>Disabled</u>	Do not change this setting.

Graphics Configuration

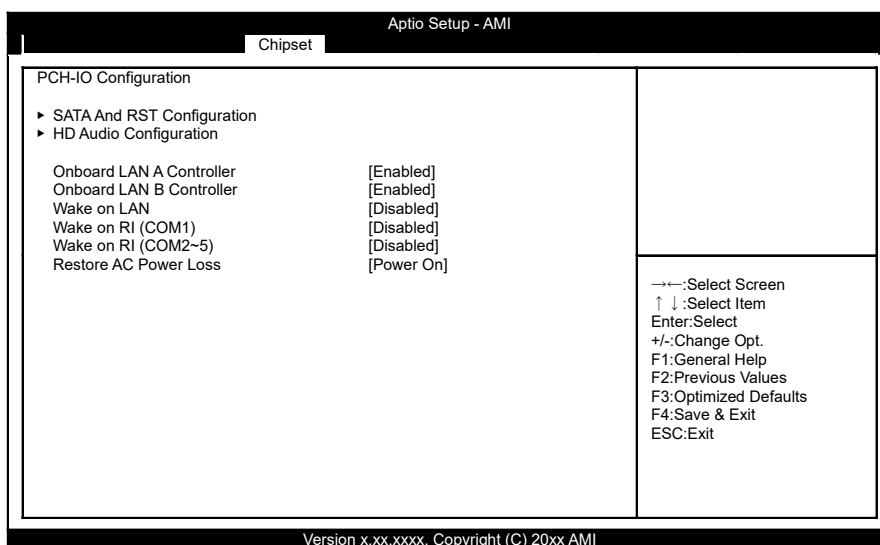


Item	Options	Description
Primary Display	<u>Auto</u> / IGFX / PEG / PCI / SG	Do not change this setting.
Internal Graphics	<u>Auto</u> / Disabled / Enabled	Do not change this setting.

Item	Options	Description
GTT Size	2MB / 4MB / 8MB	Do not change this setting.
Aperture Size	128MB / 256MB / 512MB / 1024MB / 2048MB	Do not change this setting.
DVMT Pre-Allocated	0M / 32M / 64M / 4M / 8M / 12M / 16M / 20M / 24M / 28M / 32M/F7 / 36M / 40M / 44M / 52M / 56M / 60M	Do not change this setting.
DVMT Total Gfx Mem	128M / 256M / MAX	Do not change this setting.
PAVP Enable	Enabled / Disabled	Do not change this setting.

◆ PCH-IO Configuration

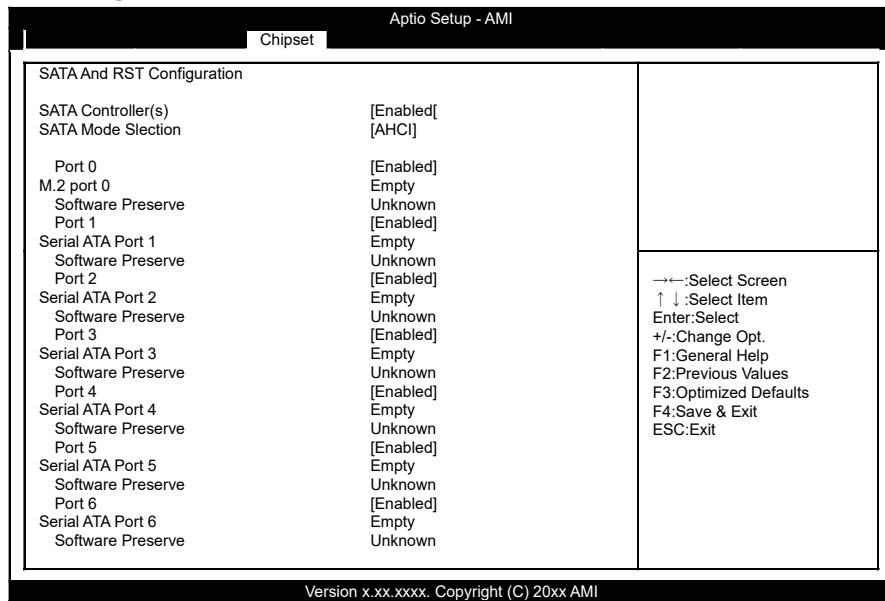
Configure the PCH-IO setting.



PCH-IO Configuration

Item	Options	Description
SATA And RST Configuration	Refer to "SATA And RST Configuration"	-
HD Audio Configuration	Refer to "HD Audio Configuration"	-
Onboard LAN A Controller	Enabled / Disabled	Do not change this setting.
Onboard LAN B Controller	Enabled / Disabled	Do not change this setting.
Wake ON LAN	Enabled / Disabled	Wake on LAN setting.
Wake on RI(COM1)	Enabled / Disabled	Do not change this setting.
Wake on RI(COM2~5)	Enabled / Disabled	Do not change this setting.
Restore AC Power Loss	Power On / Power Off	Set to start the system at the same time AC power supply starts. Power On: The system will start at the same time the power supply starts. Power Off: Press the power button to start the system. The system does not start at the same time the power supply starts.

SATA And RST Configuration



Item	Options	Description
SATA Controller(s)	Enabled / Disabled	Do not change this setting.
SATA Mode Selection	AHCI / Intel RST Premium With Intel Optane System Acceleration	Select the SATA device mode.
Port 0	Disabled / Enabled	Specify the M.2 operation setting.
Port 1	Disabled / Enabled	Specify the SATA1 operation setting.
Port 2	Disabled / Enabled	Specify the SATA2 operation setting.
Port 3	Disabled / Enabled	Specify the SATA3 operation setting.
Port 4	Disabled / Enabled	Specify the SATA4 operation setting.
Port 5	Disabled / Enabled	Specify the SATA5 operation setting.
Port 6	Disabled / Enabled	Specify the SATA6 operation setting.
Write Protect	Disabled / Enabled	Apply hardware protection to each of the port SSDs individually. This setting is available only when using a supported SSD. (Up to two ports)

HD Audio Configuration

Aptio Setup - AMI

Chipset

HD Audio Subsystem Configuration Settings

HD Audio [Enabled]

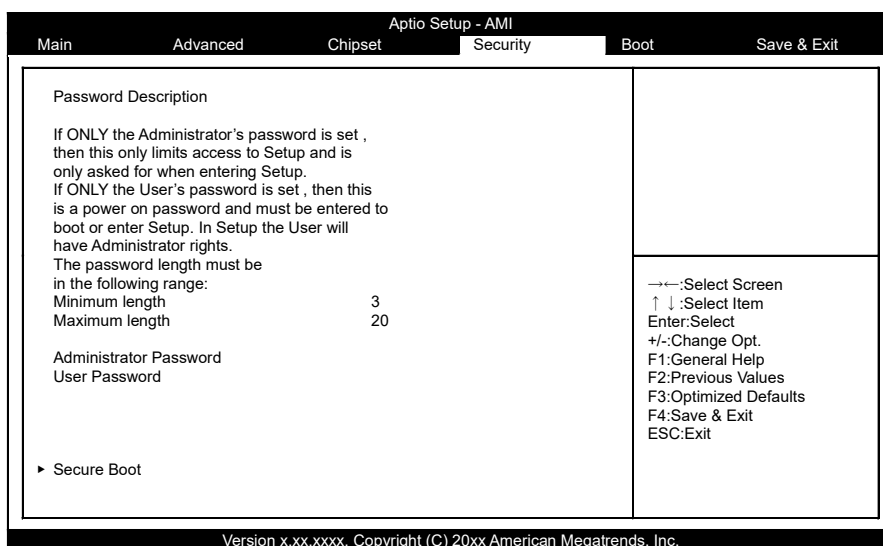
→←:Select Screen
↑↓:Select Item
Enter:Select
+/-:Change Opt.
F1:General Help
F2:Previous Values
F3:Optimized Defaults
F4:Save & Exit
ESC:Exit

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Item	Options	Description
HD Audio	Disabled / Enabled	Do not change this setting.

5. Security Menu

Configure the security of the system settings. The following items are available.



Administrator Password

Set the Administrator Password.

Press Enter to display the following screen for entering the password.

Administrator Password		
Create New Password	[****]	]
Confirm New Password	[****]	]

Enter a password at least 3 characters long twice.

To disable the password, enter the Administrator Password entry screen again.

User Password

Set the user password.

Press Enter to display the following screen for entering the password.

User Password		
Create New Password	[****]	]
Confirm New Password	[****]	]

Enter a password at least 3 characters long twice.

To disable the password, enter the User Password entry screen again.

CAUTION

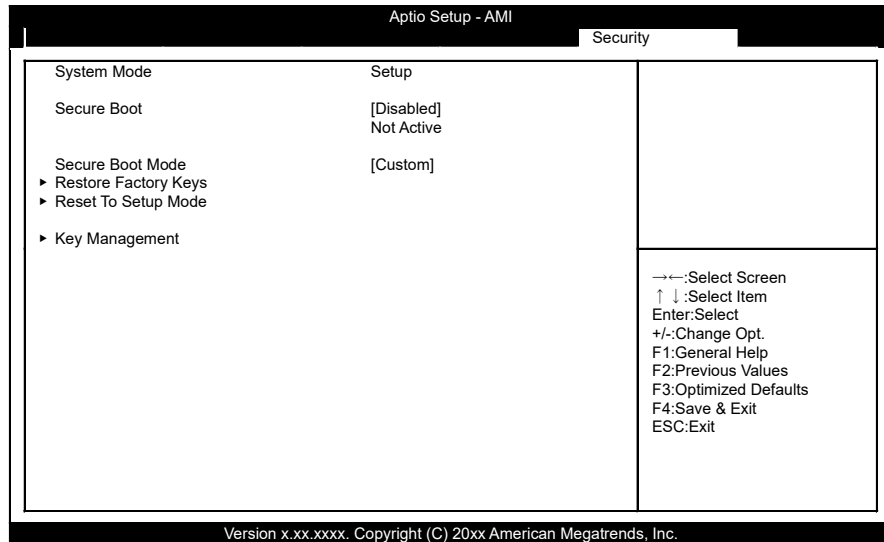
Be careful to not forget the password. Depending on the configuration, forgetting the password will make it impossible to configure BIOS settings or boot Windows.

If the password is forgotten, fees may be incurred for repairs.

◆ Secure Boot

Configure the Secure Boot settings.

Do not change the settings from the factory defaults.



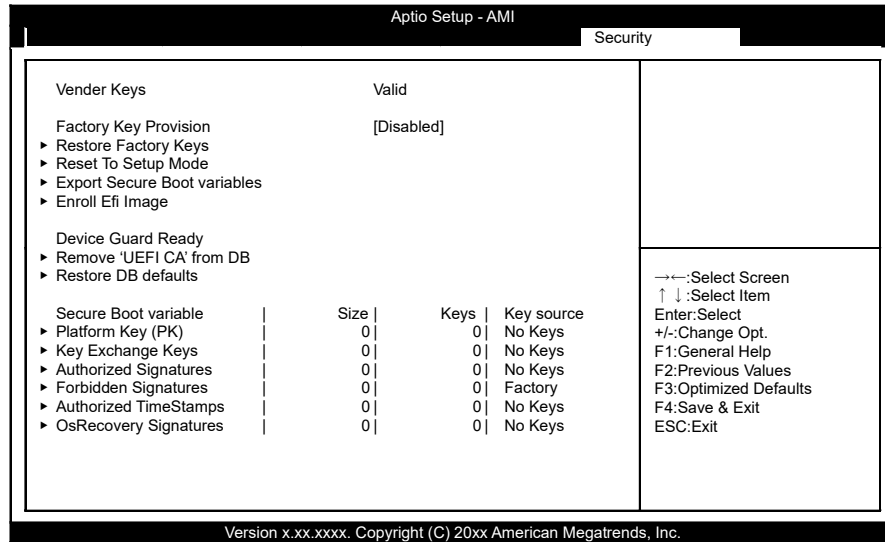
Secure Boot

Item	Options	Description
Secure Boot	<u>Disabled</u> / Enabled	Do not change this setting.
Secure Boot Mode	Standard / <u>Custom</u>	Do not change this setting.
Restore Factory Keys	Yes / No	Restores the factory default settings.
Key Management	See "Key Management"	

◆ Key Management

Use this menu to check the Key Management settings.

Do not change the settings from the factory defaults.

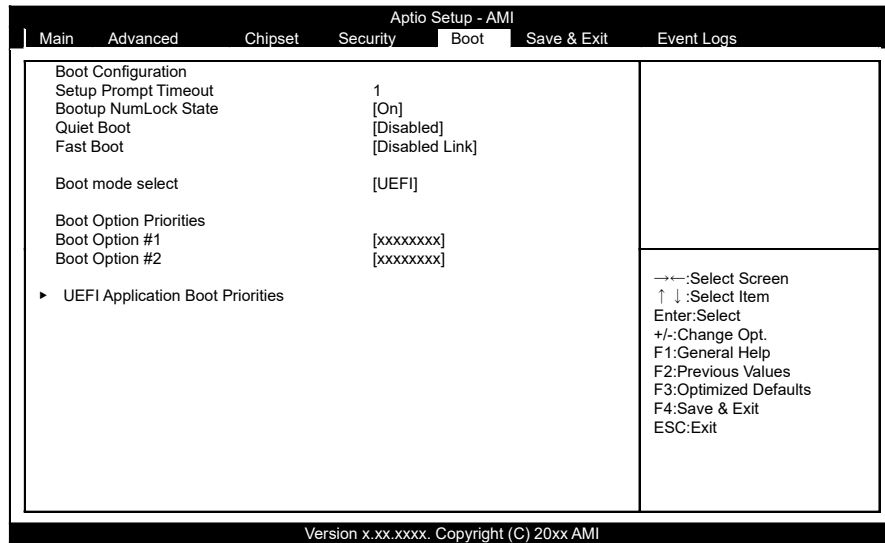


Key Management

Item	Options	Description
Factory Key Provision	Disabled / Enabled	Do not change this setting.

6. Boot Menu

Use this menu to configure system startup (BOOT) settings. The following items are available.



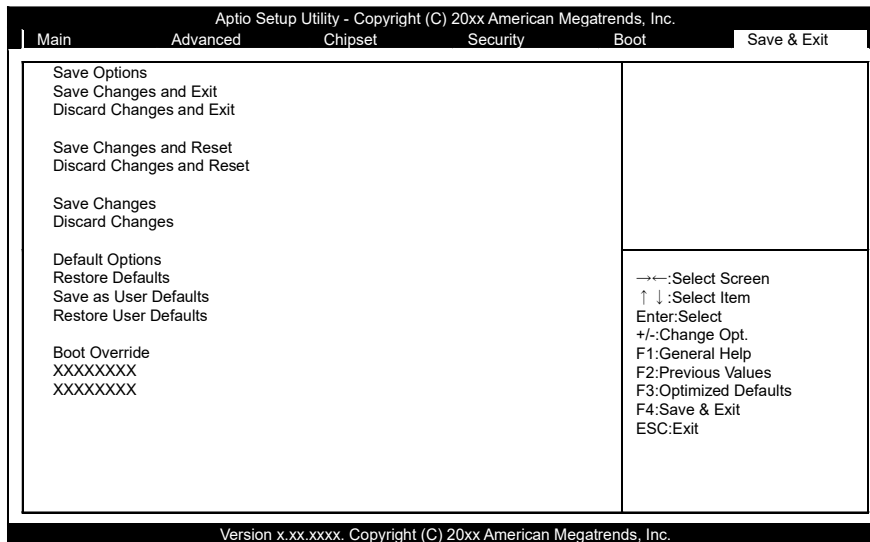
Boot Configuration

Item	Options	Description
Setup Prompt Timeout	1	Set the standby time for BIOS Setup or <ESC> input. Unit : [second]
Bootup NumLock State	On / Off	Set the NumLock status when the system starts.
Quiet Boot	Disabled / Enabled	Do not change this setting.
Fast Boot	Disabled Link / Enabled	Do not change this setting
Boot Option #x	XXXXXXXX (Specify arbitrary device)	Specify the boot sequence of connected devices. *1

*1 Displayed when devices are connected.

7. Save & Exit Menu

Use this menu to save/restore BIOS settings and exit the setup utility. The following items are available.



Save Changes and Exit

Save the changed settings and exit.

Discard Changes and Exit

Exit without saving the changed settings.

Save Changes and Reset

Save the changed settings and restart.

Discard Changes and Reset

Restart without saving the changed settings.

Save Changes

Save the changed settings.

Discard Changes

Discard the changed settings.

Restore Defaults

Return the settings to the user default values.

Save as User Defaults

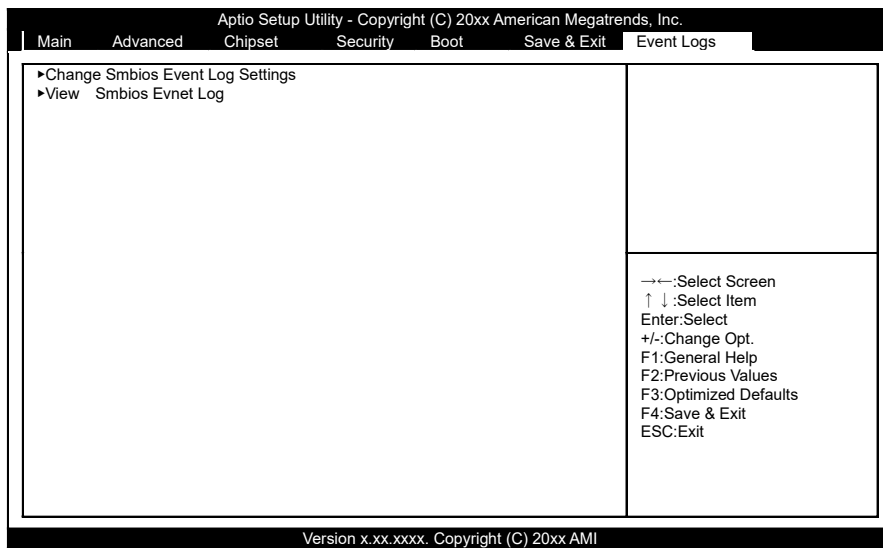
Save the settings as the user default values.

Restore User Defaults

Return the settings to the user default values.

8. Event Logs Menu

Use this menu to check the BIOS event log.



Change Smbios Event Log Settings

Use this to check the Event Log settings.

View Smbios Event Log

Use this to check the Event Log.

Change Smbios Event Log Settings

Aptio Setup - AMI		Event Logs
Enabling/Disabling Options Smbios Event Log	[Enabled]	→←:Select Screen ↑ ↓:Select Item Enter:Select +/-:Change Opt. F1:General Help F2:Previous Values F3:Optimized Defaults F4:Save & Exit ESC:Exit
Erasing Settings Erase Event Log When Log is Full	[No] [Erase Immediately]	
Smbios Event Log Standard Settings Log System Boot Event MECI METW	[Enabled] 1 60	
Custom Option Log EFI Status Code Convert EFI Status Codes to Standard Smbios Type	[Enabled] [Disabled]	
NOTE: All values changed here do not take effect until computer is restarted.		

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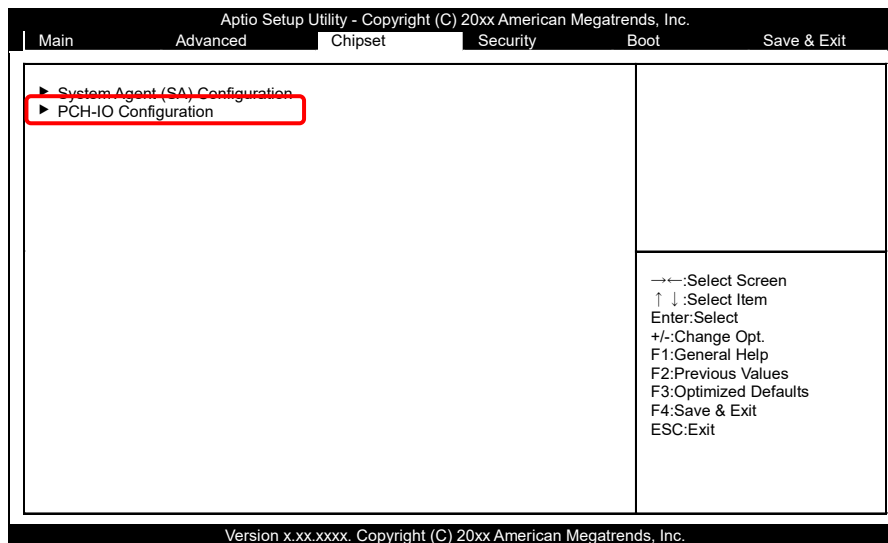
Item	Options	Description
Smbios Event Log	Disabled / Enabled	Enable or disable all the functions of the running Smbios event log.
Erase vent Log	No / Yes, Next reset / Yes, Every reset	Select the option for deleting the Smbios event log. The log is deleted before it becomes active while the system restarts.
When Log is Full	Do Nothing / Erase Immediately	Select the option for the Smbios event log.
Log System Boot Event	Enabled / Disabled	Enable or disable the logging of system boot events.
Log EFI Status Code	Disabled / Enabled	Enable or disable the logging of EFI status codes as type E0.
Convert EFI Status Codes to Standard Smbios Type	Disabled / Enabled	Enable or disable the conversion of EFI status codes to the standard Smbios types.

3. Configuring Settings to Start with Directly Applied AC Power

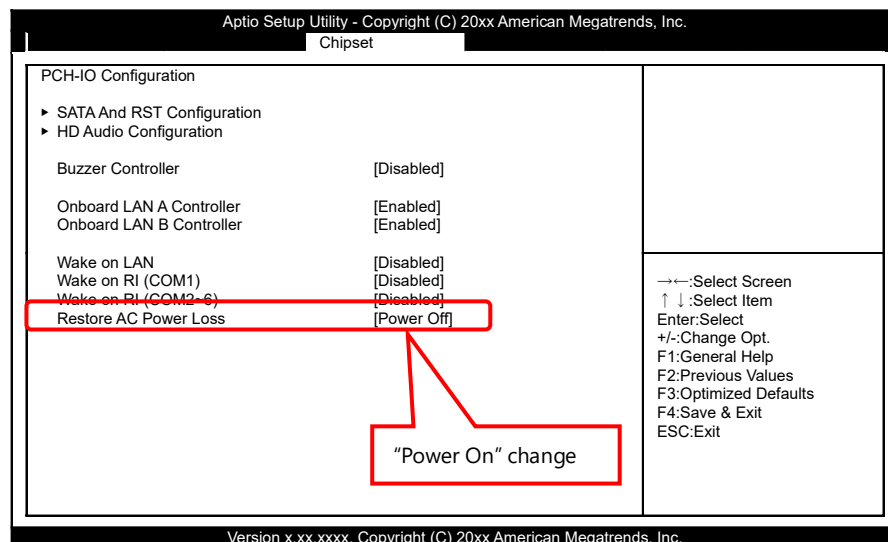
To start the system by directly applying AC power (AT operation), make the changes indicated by the following procedure.

The factory setting is ATX operation.

- 1 On the menu screen, select "PCH-IO Configuration" from the "Chipset" menu.



- 2 Change "Restore AC Power Loss" to "Power On."



- 3 Press the <Esc> key to return to the menu screen.
- 4 Select "Save Changes and Exit" from the "Save & Exit" menu to exit the BIOS.
- 5 The settings will be applied the next time the PC starts.

Software RAID Setup

This section describes software mirroring (RAID1) setup.

1.Outline

This section describes software mirroring (RAID1) setup. We only support mirroring. We do not support operation for other RAIDs (RAID0, RAID5, and RAID10). Be aware that functions not supported are outside the scope of the warranty.

Software RAIDs are not hot-swappable.

Also, Windows10 IoT Enterprise 2019 LTSC is the only supported OS.

CAUTION

If RAID settings are changed, all data on the storage will be erased.

Back up necessary data in advance.

2. Software RAID Setting in the BIOS

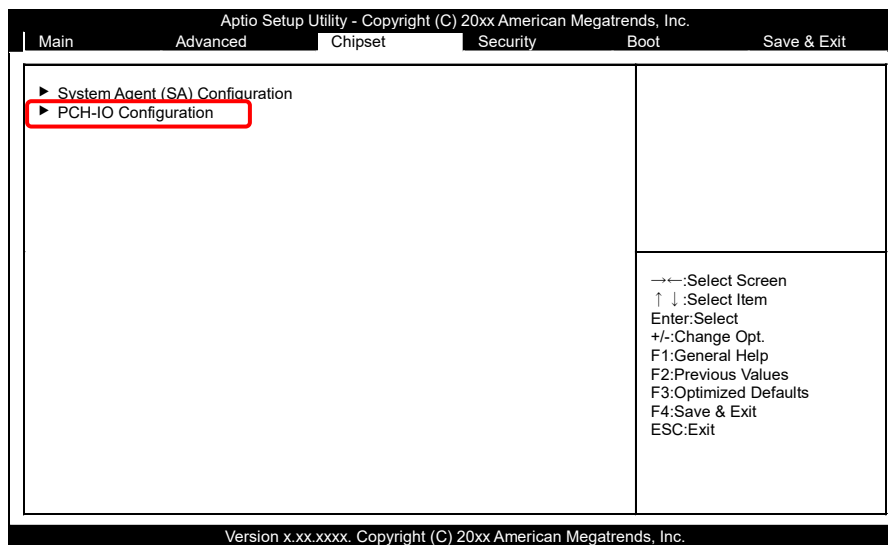
If you are using software RAID, you can set the RAID volume (mirroring) with the following procedure.

* 1

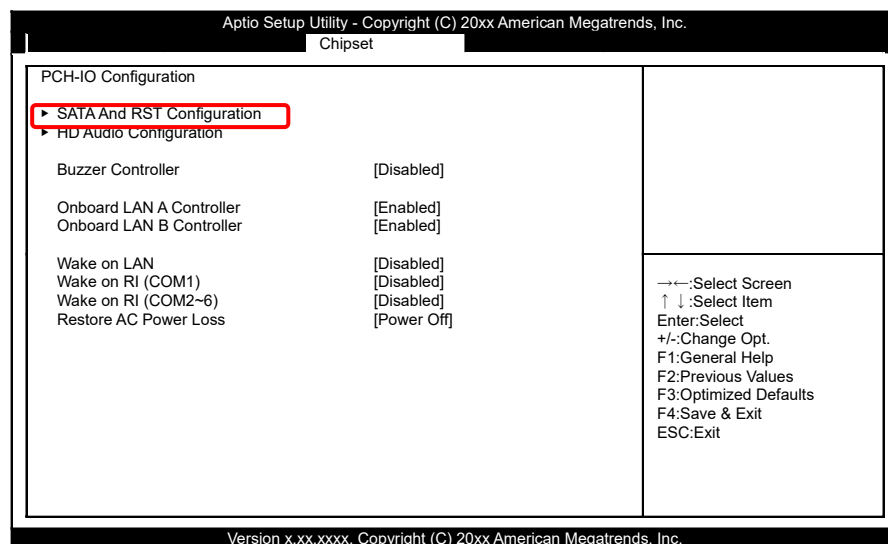
Please perform system recovery after RAID volume creation.

*1 For the software RAID model, the RAID volume has already been created.

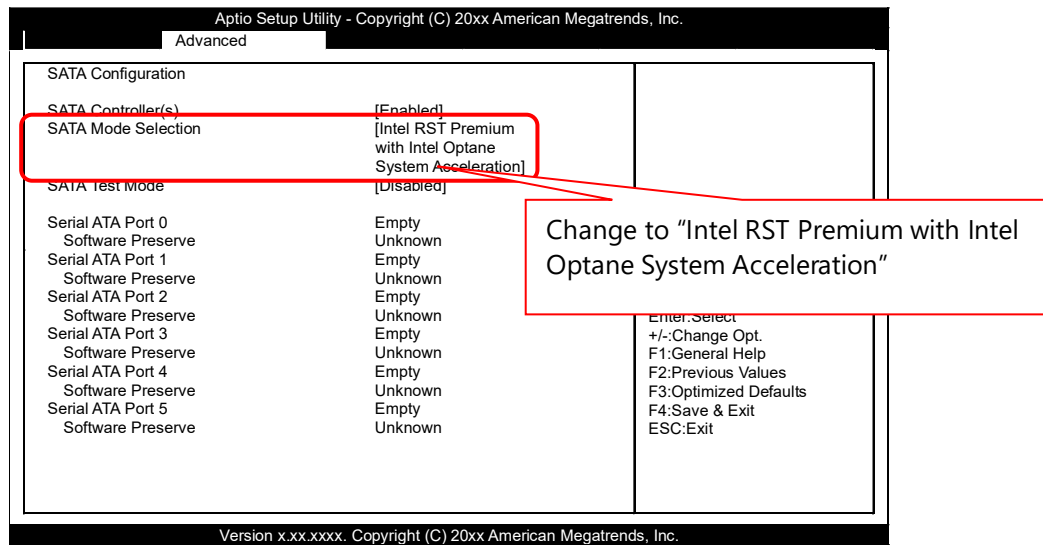
- 1 On the menu screen, select "PCH-IO Configuration" from the "Chipset" menu.



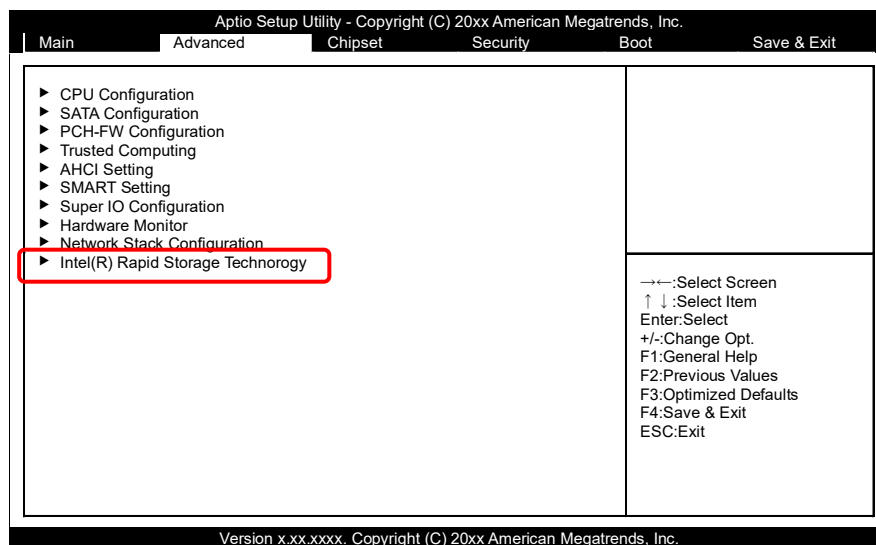
- 2 Select "SATA And RST Configuration" under "PCH-IO Configuration."



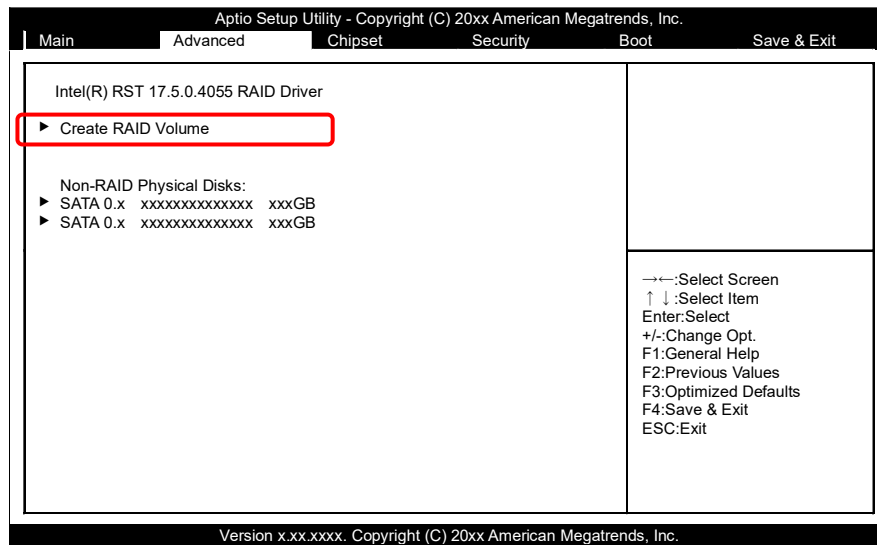
- 3** Change the "SATA Mode Selection" item to "Intel RST Premium with Intel Optane System Acceleration".



- 4** Select "Save Changes and Reset" from the "Save & Exit" menu to exit the BIOS. After the system restarts, start the BIOS. On the menu screen, select "Intel(R) Rapid Storage Technology" from the "Advanced" menu, and then create the RAID volume.

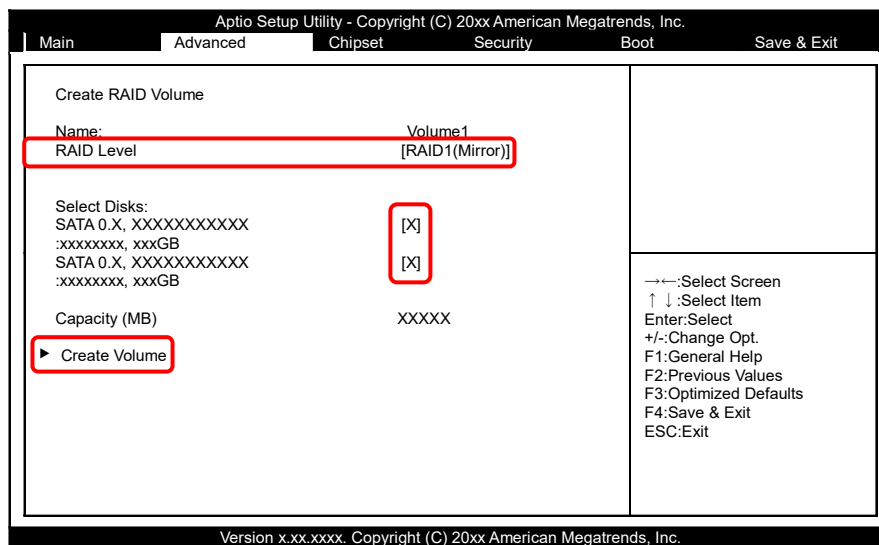


5 Select "Create RAID Volume".

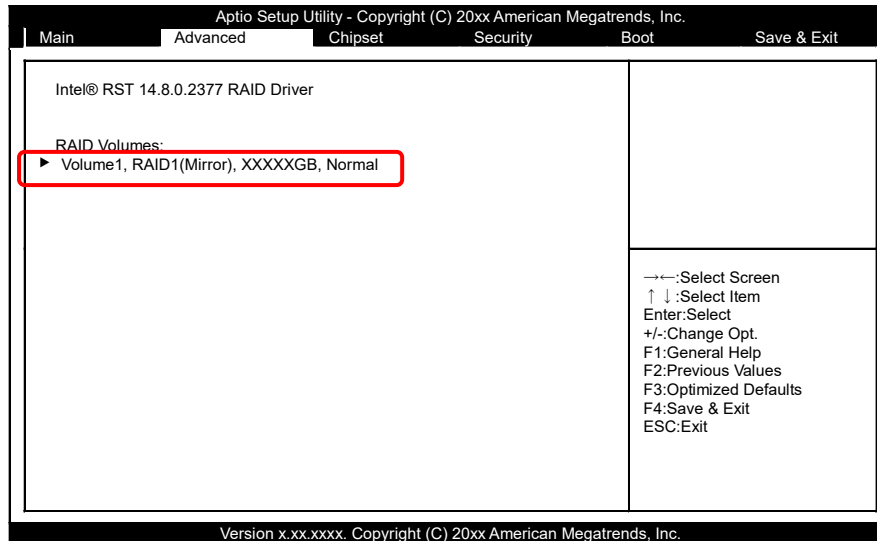


6 Change the "RAID Level" setting to "RAID1(Mirror)."

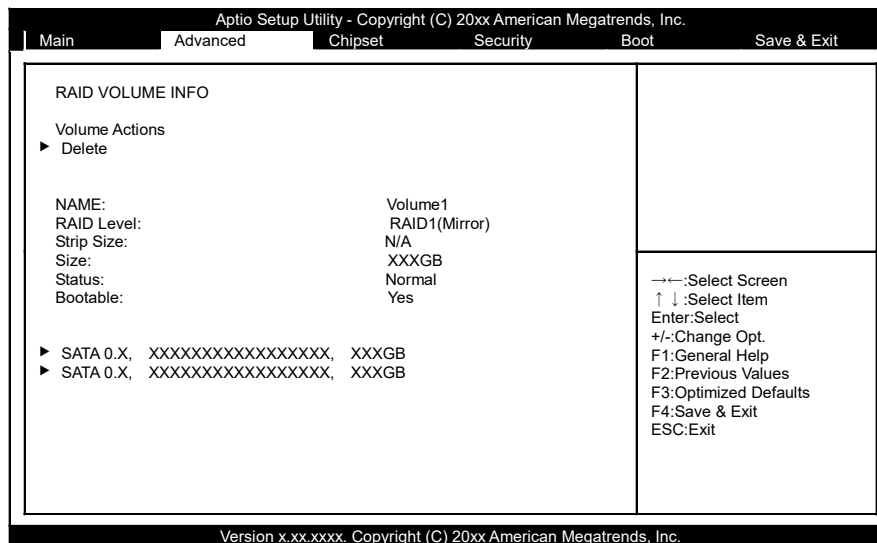
Select the target drive under the "Select Disks" item, and then select "Create Volume."



- 7** Select "Save Changes and Exit" from the "Save & Exit" menu to exit the BIOS. Select "Volume1, RAID1 (Mirror), XXXXXGB, Normal" to check the RAID configuration information.



Software RAID configuration information



Volume is created and configuration information can be checked on the screen displayed above. Now, you have completed the Software RAID setup.

3.Delete RAID Volume

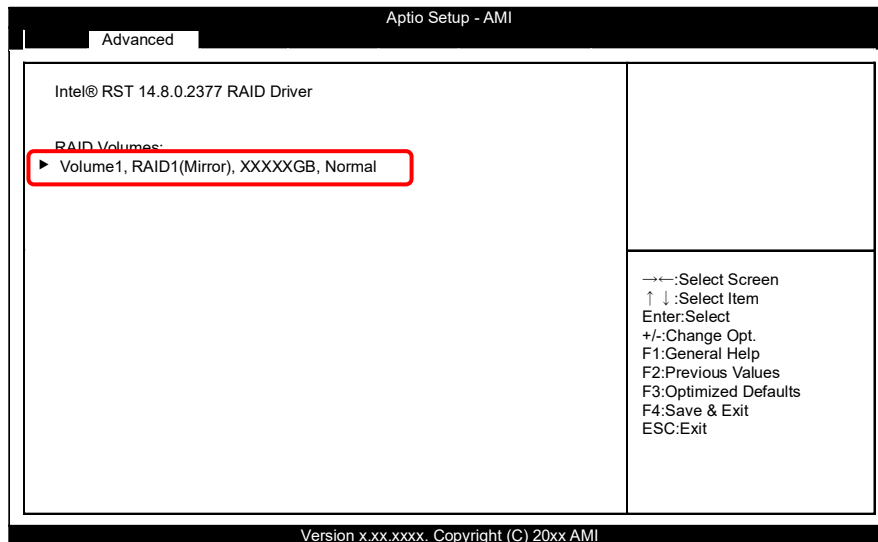
Describe the procedure for deleting a RAID volume.

To delete a RAID volume, follow the procedure below to delete the RAID volume.

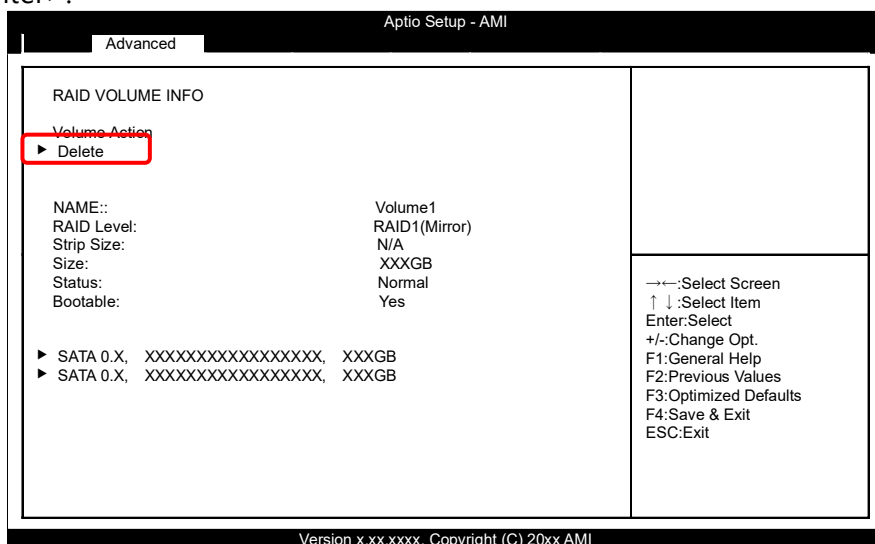
⚠ CAUTION

When an existing RAID drive is deleted, data may be lost. Back up the data on a RAID drive before deleting it if the data is important.

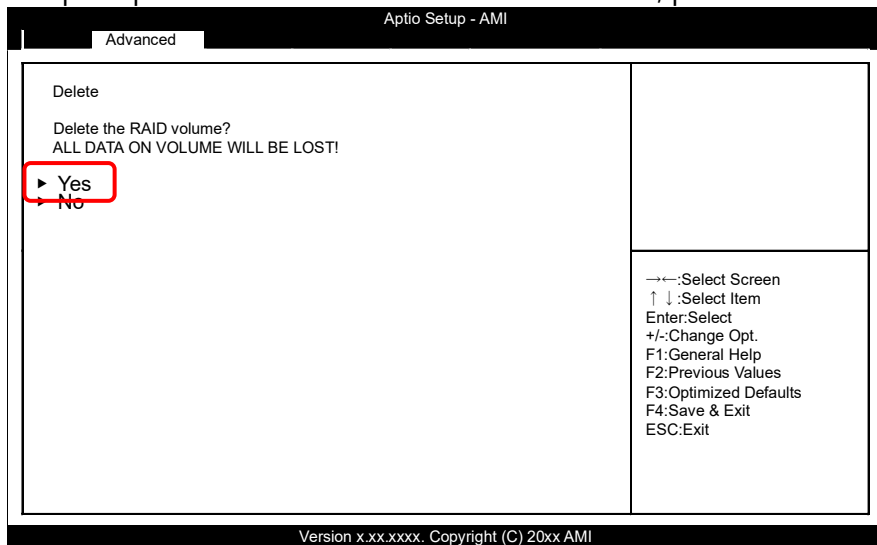
- 1 Turn the power on and enter the BIOS menu. On the menu screen, select "Intel(R) Rapid Storage Technology" from the "Advanced" menu. Select "Volume1, RAID1 (Mirror), XXXXXGB, Normal" to display the RAID configuration information.



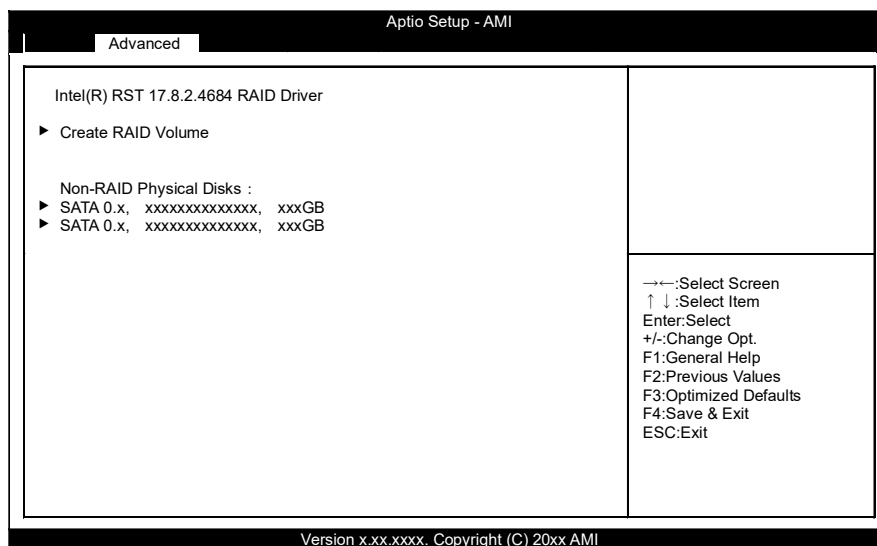
- 2 From the RAID configuration information, press <↑ ↓> to move the cursor to "Delete" and press <Enter>.



- 3** Since you are prompted to delete the selected RAID volume, press <YES>.



- 4** The RAID configuration screen opens.
Next, select "Save Changes and Exit" from the "Save & Exit" menu to exit the BIOS.



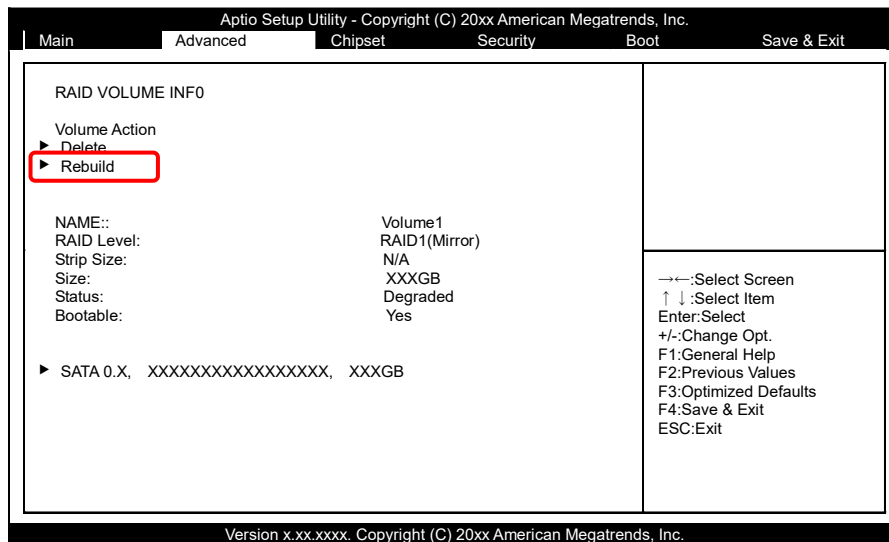
4. RAID Setup When Replacing the Storage

While creating RAID 1 and replace the storage, you need to rebuild the mirroring RAID drive. Follow the steps below to setup RAID.

CAUTION

RAIDs in this product are not hot-swappable. Always turn off the power before replacing a storage.

- 1 Replace the storage device, and then start the PC.
- 2 Enter the BIOS menu. On the menu screen, select "Intel(R) Rapid Storage Technology" from the "Advanced" menu.
- 3 From the RAID configuration information, press <↑ ↓> to move the cursor to "Rebuild" and press <Enter>.
- 4 Select "Save Changes and Exit" from the "Save & Exit" menu to exit the BIOS.



5. Software RAID Monitoring Tool

Windows OS

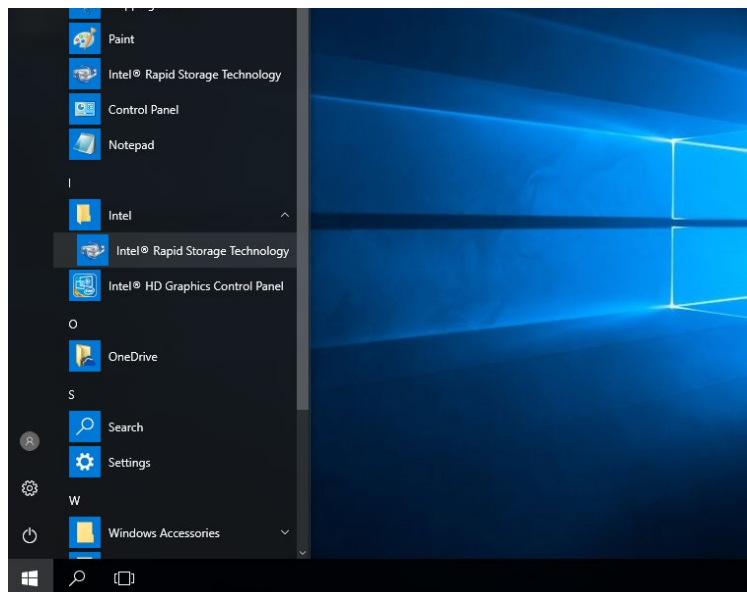
Software RAID monitoring tool (Rapid storage technology) can monitor the existing RAID volume or monitor the information and conditions of storage that configures RAID volume.

MIRACLE LINUX 9.0

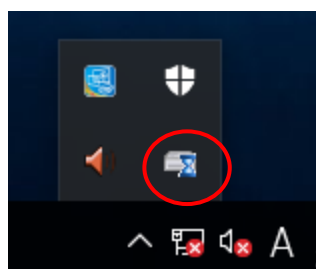
Intel RST RAID volumes (IRST external metadata) created in the BIOS are supported by MD RAID. The mdadm utility is available for RAID volume operations.

1. Starting The Rapid Storage Technology (Reference)

After installing Rapid storage technology, you can launch it from "Start Menu" - "Application".

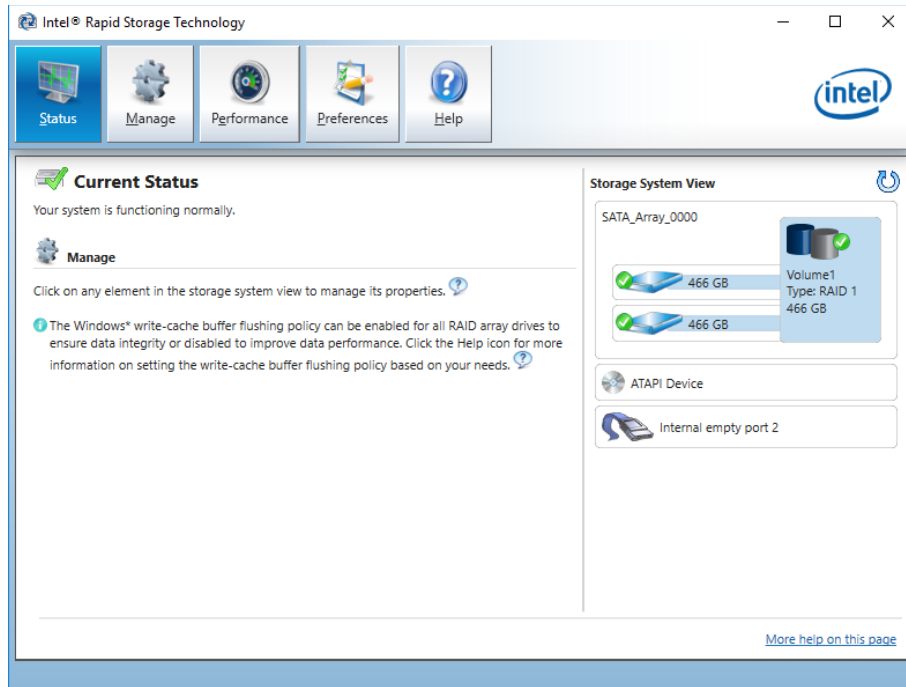


When the contents of Rapid storage technology are updated or activities are in progress internally, an icon is display in the Task Manager. You can also launch it by clicking the icon. If the icon cannot be found in the Task Bar, start from the "Start Menu".



2. Exiting The Rapid Storage Technology

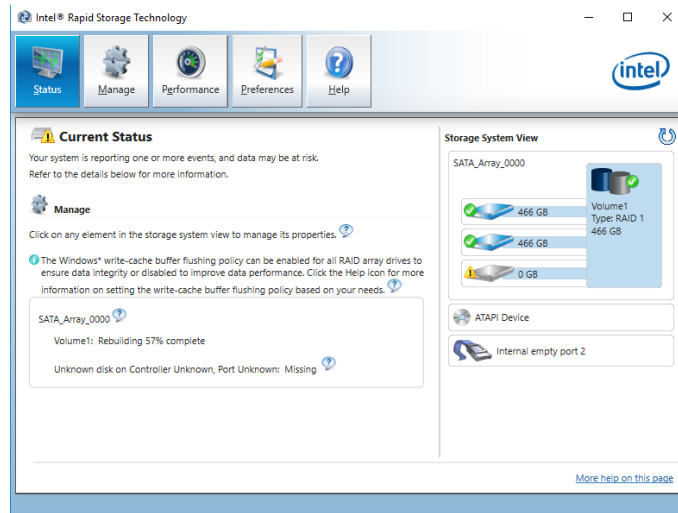
You can exit Rapid storage technology by clicking "×" on the upper right corner of the window.



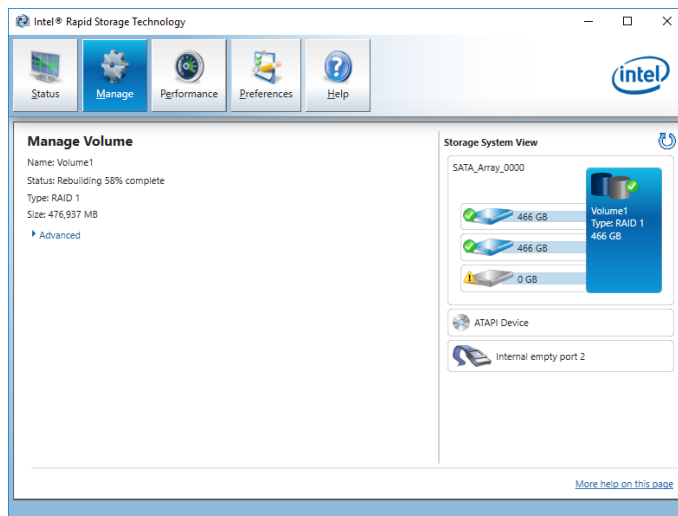
3. Rebuild Mirroring

Data on mirrored drives is compared, and if a difference is found, data on the drives will be copied between storage and data on the mirrored drives will be automatically unified.

Status



Manage



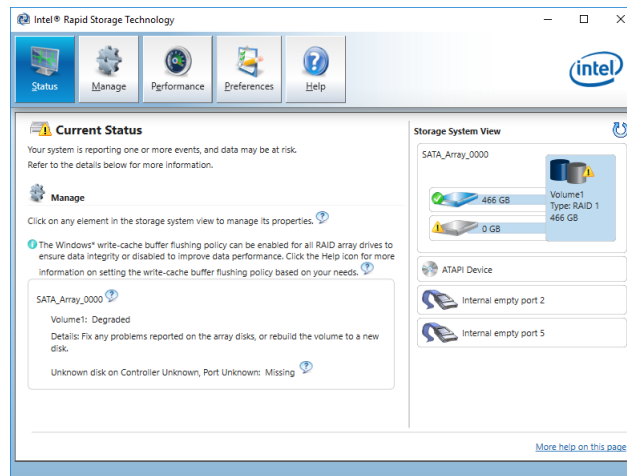
⚠ CAUTION

Rebuild by Rapid storage technology cannot be suspended while it is in progress. In addition, you should not turn off the power to the PC while rebuild is in progress. Doing so will cause data loss and data error.

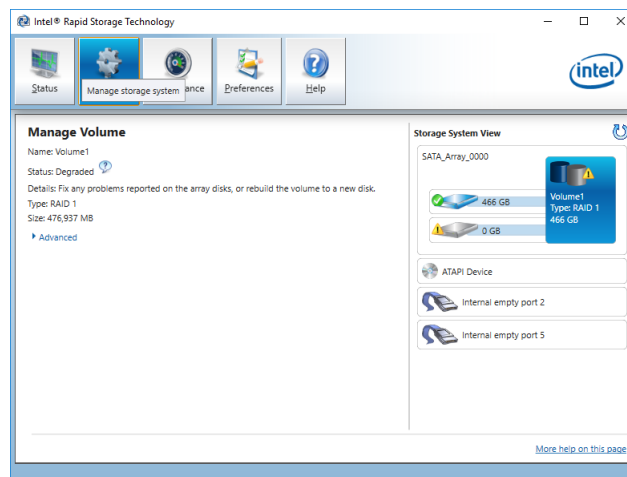
4. For The Error

If an error occurs in a RAID drive or storage, you can check the status of the Array, the mirroring-configured RAID drive, and the storage using Rapid storage technology. Each status can be checked through the "Status" or "Management" of Rapid storage technology.

Status *One mirroring-configured storage is not connected.



Manage *One mirroring-configured storage is not connected.



Details on errors storage and RAID drive errors are shown. Repair the RAID drive or replace the storage optionally in accordance with the type of error.

! CAUTION

RAID errors cannot be detected by the application.
Therefore, check for errors using the icon displayed in the status bar.

5. Confirming The Error Log

When an error occurs in a RAID drive, it is logged into the Windows-standard "Event Viewer". You can check errors using the Windows-standard "Event Viewer".

⚠ CAUTION

Rapid storage technology does not provide a logging function.

6. RAID Setup When Replacing The Storage (OS)

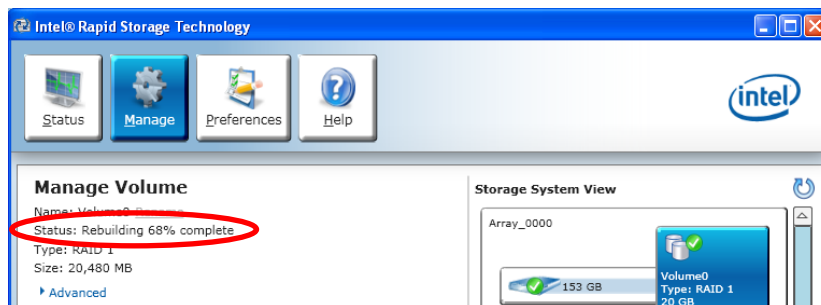
This product is installed with a RAID-1 Array created. However, if storage is replaced, you must reconfigure the mirroring RAID drive in the Array.

Set up the RAID in accordance with the following procedure.

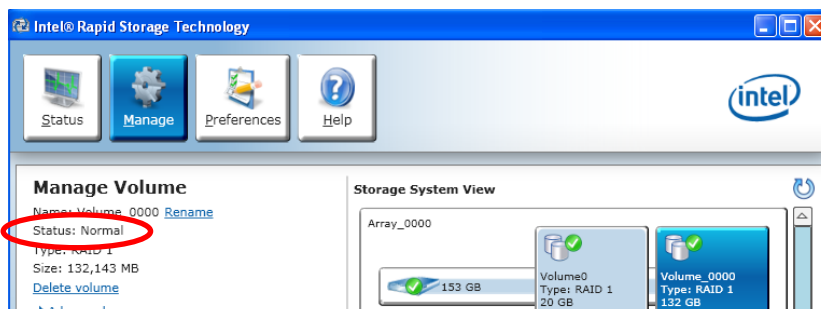
⚠ CAUTION

RAIDs in this product are not hot-swappable. Always turn off the power before replacing storage.

- 1 Replace the storage and boot the PC.
- 2 After the OS boots, the reconfiguration of the RAID drive starts automatically.



- 3 The status will be normal when the reconfiguration is finished.



Hardware RAID Setup

This section describes hardware mirroring setup.

1.Outline

This section describes hardware mirroring setup. We only support mirroring. We do not support operation for other RAIDs (RAID0, RAID5, and RAID10). Be aware that functions not supported are outside the scope of the warranty.

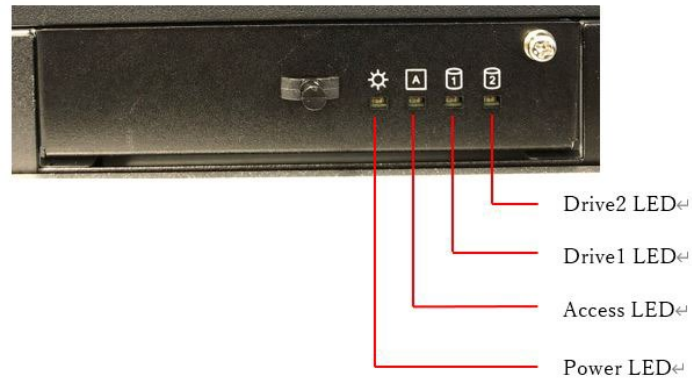
Hardware RAIDs are not hot-swappable.

2.Function Specifications

1. Mirror Card Product Specifications

Item	Explanation
Model name	SVRC-C600SA
Number of connectable drives	2
RAID level	1
Storage capacity	Max. 2TB
Cache memory size	1MB
Host interface	Serial ATA 3.0
Transfer mode	6.0Gb/s, 3.0Gb/s (Auto or fixed into 3.0Gb/s)
Max transfer speed	6.0Gb/s (Theoretical value)
Drive interface	Serial ATA 3.0
Transfer mode	6.0Gb/s, 3.0Gb/s (Auto or fixed into 3.0Gb/s)
Max transfer speed	6.0Gb/s (Theoretical value)
Power voltage range	4.75VDC - 5VDC
Current consumption	Max. 1.5A
Physical dimensions (mm)	96.0(W) x 98.2(D)
Weight	Approx. 51g

2. LED Status



Operation		Power LED	Access LED	Drive1 / Drive2 LED
Boot up		Green ON	Green ON	Green ON
Normal operation		Green ON	Green ON *1	Green ON *1
Malfunction		Green ON	Lights off or Flashing orange	Orange ON
Rebuild		Green ON	Green ON *1	Copy destination : Green ON + Flashing orange Copy source : Green ON *1
System stopped	Both drives are hung	Green ON	Orange Flashing	OFF
	Non-conformity of composition information	Green ON	Orange Flashing	Green ON

*1 Turns ON during access

CAUTION

The mirror card LEDs can be checked from front bezel.

3. Mirror Card Operation

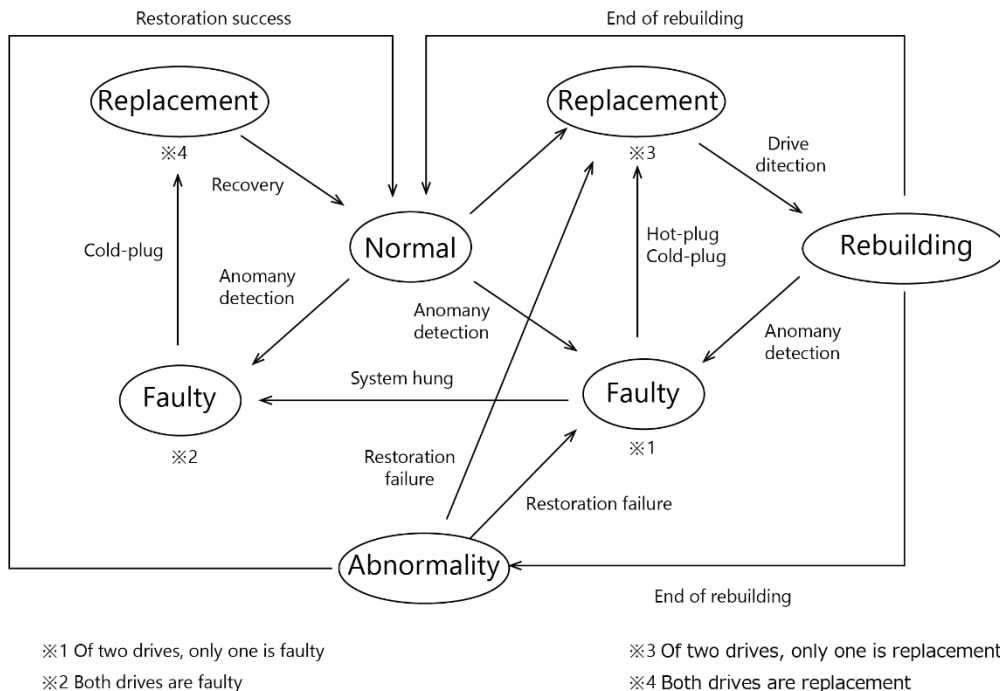
You can use the mirror card LEDs to monitor the status of the existing storages in the mirroring configuration. For details on the mirror card LEDs, see **“LED Status (page105)”**.

For details on the Utility (CONTEC Solution Manager), see CONTEC Solution Manager help file.

* Download the Utility (CONTEC Solution Manager) and help file from the CONTEC website.

1. Operation Flow

During hardware RAID operation, the following statuses exist, and the system is in one of them.



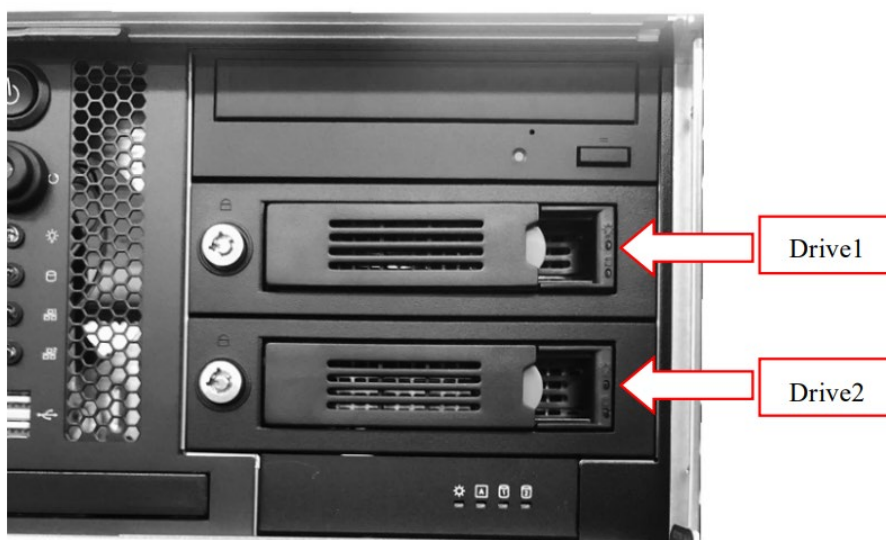
Status	Explanation
Normal	The system is performing regular operation and the two drives are functioning normally. Reading is performed from one drive, and the same data is written to both drives.
Faulty	One drive has malfunctioned. System operation is possible. Two drives have malfunctioned. The system has stopped.
Replacement	Replace the malfunctioning drive with a good drive.
Rebuild	While one drive is being rebuilt, system operation is possible. If the system is restarted during a rebuild, the system restarts from the last block that was completed. Drive replacement can be performed in the following two modes. Hot-plug Drive replacement is performed while the RAID card is operating (while the power is ON). Even if the replaced drive is the same as the drive from before the replacement, the rebuild is started. Cold-plug

Status	Explanation
	Drive replacement is performed while the RAID card is stopped (while the power is OFF). The rebuild is not performed if a new drive has not been inserted.
Abnormality	A reading error occurred at the copy source during rebuilding. Data that causes a reading error to occur is written to the copy destination.

2. Error Occurrence

If an error occurs in a storage in the mirroring configuration, you can use the mirror card LEDs to check the status of the storage. Perform storage replacement or other appropriate operations according to the error status.

Drive 1 and Drive 2 in the mirror card correspond to the drive bays illustrated below.
(Drive1: removable drive 1, Drive2: removable drive 2)



CAUTION

When installing storages and when wiring mirror card cables, exercise caution to ensure that the top and bottom/left and right storages are not reversed.

3. RAID Setup During Storage Replacement

This section describes the setup when replacing an storage in the mirroring configuration. Perform setup according to the number of storages to replace.

CAUTION

When replacing an storage, prepare a new one that is the same model and has the same capacity.

◆ Replacing one storage

Replace the malfunctioning storage with a good one that you have prepared.

For details on storage replacement, see **"Setting the Storage"** in the **"Hardware Setup (page36)"**. After the storage is replaced, rebuilding starts automatically.

CAUTION

Check the storage to replace before replacing it. If one storage is malfunctioning, removing the storage that is functioning normally will cause the system to stop, possibly leading to system damage.

If the rebuild does not start automatically, see **"Troubleshooting" (page 112)**. Also, if the rebuild does not end normally, see **"Troubleshooting" (page 112)**.

◆ Replacing two storages

Replace the two existing storages with good ones that you have prepared. Then, carry out recovery. Regarding replacement of storage, refer to **"Setting the Storage"** in the **"Hardware Setup (page36)"**.

For details on OS recovery, **"OS Recovery (page110)"** in this section.

If the OS is not installed on the mirroring storage, all you have to do is replace the storage.

CAUTION

After it is set up, the product status is the same as when the product was shipped from CONTEC. The data on the good storages that you have prepared is deleted.

4. Hot-Swapping

Hot-swapping is possible with this mirror card, enabling the user to replace storages while the OS is running.

Regarding replacement of storage, see **“Setting the Storage”** in the **“Hardware Setup (page38)”**. This function is useful when one storage has malfunctioned. However, if both storages are faulty, this function cannot be used.

CAUTION

- Before using the hot-swapping function to replace an storage, check the storage that you will remove.
 - If one storage is malfunctioning, removing the storage that is functioning normally with the power ON may lead to system damage.
 - Removing one storage while the two storages are functioning normally is not recommended.
-

4.OS Recovery

Normally, connect the two storages to the mirror card before using the recovery media *1 to carry out recovery.

When the mirror card recognizes the two storages connected to it as functioning normally, carry out recovery as-is from the recovery media.

However, if a storage was used with a different RAID system, the mirror card may not recognize this HDD as functioning normally due to the mirroring configuration information.

In this situation, contact your retailer.

*1 If you have purchased a model with a pre-installed OS and you require recovery media, contact your retailer.

5. FAQ / Troubleshooting

This section provides an FAQ and troubleshooting related to the mirror card. If you have problems, see the corresponding item.

1. FAQ

◆ I don't understand the direction that data is copied between storages.

- When a malfunctioning storage is replaced with hot-plugging, data is copied from the existing storage to the replacement storage.
- When a malfunctioning storage is replaced with cold-plugging, data is copied from the existing storage to the replacement storage.

◆ I replaced the storages connected to the mirror card.

- If the two storages are functioning normally, data is not copied.
- If one storage is malfunctioning, data is not copied between the storages.

◆ I want to use an existing storage to make a mirroring configuration from a backup storage.

- If you want to configure mirroring using an storage as a backup, which is different from the case of two storages used in an existing mirroring configuration, follow the procedure shown below.

< Procedure >

- 1** Turn the PC OFF.
- 2** Remove the two existing storages from the mirror card.
For instructions on how to remove the storages, see "**Hardware Setup**" (page 36).
- 3** Install only the backup storage on the mirror card.
For instructions on how to install the storage, see "**Hardware Setup**" (page 36).
- 4** Turn the PC ON.
- 5** Then, attach to the empty drive in the mirror card the storage to use in the mirroring configuration, and then rebuild the system.
- 6** After the rebuild finishes normally, the two connected storages are contained in a mirroring configuration.

2. Troubleshooting

◆ When an storage is replaced, rebuilding does not start.

- Check that the replacement storage is a good product.
- Check the capacity of the replacement storage.
Rebuilding is not possible if the capacity of the replacement storage is smaller than the capacity of the existing storage.
Furthermore, even if the capacity is the same, rebuilding may not be possible due to various specifications if the storages have different manufacturer models. Therefore, prepare a replacement storage that has the same manufacturer and model as the existing storage.

◆ Both storages are damaged.

Prepare two good storages, and then carry out recovery.

◆ Error skip rebuild

This error skip rebuild state indicates that the copy source storage has unreadable sectors and then completed to rebuild by skipping unreadable sectors. If unreadable sectors presence on copy source storage, unreadable data is recorded to same sectors on destination storage and keep on rebuilding.

- Prepare a good storage and rebuild with backup storage as the copy source.
- Prepare two good storages and perform to recovery.

CAUTION

Lost data may lead to system instability, so carry out recovery as necessary.

Appendix

This section lists the specifications and the physical dimensions of the product, and the details of model name.

1. System Reference

1. Specifications

Function Specifications

Item		Description
CPU [Selection]		Intel® Core i9-10900E Processor 2.8GHz Intel® Core i7-10700E Processor 2.9GHz Intel® Core i5-10500E Processor 3.1GHz Intel® Core i3-10100E Processor 3.2GHz/ECC
Chip set		Intel® W480E
BIOS		BIOS (mfd. by AMI)
Memory [Selection]		Max. 128GB Core i9 / i7: 8GB: 8GB DDR4 2933MHz x 1 Non-ECC 16GB: 8GB DDR4 2933MHz x 2 Non-ECC 32GB: 16GB DDR4 2933MHz x 2 Non-ECC 64GB: 16GB DDR4 2933MHz x 4 Non-ECC 128GB: 32GB DDR4 2933MHz x 4 Non-ECC Core i5: 8GB: 8GB DDR4 2666MHz x 1 Non-ECC 16GB: 8GB DDR4 2666MHz x 2 Non-ECC 32GB: 16GB DDR4 2666MHz x 2 Non-ECC 64GB: 16GB DDR4 2666MHz x 4 Non-ECC 128GB: 32GB DDR4 2666MHz x 4 Non-ECC Core i3: 8GB: 8GB DDR4 2666MHz x 1 ECC 16GB: 8GB DDR4 2666MHz x 2 ECC 32GB: 16GB DDR4 2666MHz x 2 ECC 64GB: 16GB DDR4 2666MHz x 4 ECC 128GB: 32GB DDR4 2666MHz x 4 ECC
NVMe [Selection]		256GB: NVMe 2280 SSD 256GB 512GB: NVMe 2280 SSD 512GB 1TB: NVMe 2280 SSD 1TB 2TB: NVMe 2280 SSD 2TB
Graphic		
Controller		Intel® UHD Graphics 630 (CPU integrated)
System Resolution	HDMI	800 x 600, 1,024 x 768, 1,152 x 864, 1,280 x 600, 1,280 x 720, 1,280 x 768, 1,280 x 800, 1,280 x 960, 1,280 x 1,024, 1,360 x 768, 1,366 x 768, 1,400 x 1,050, 1,440 x 900, 1,600 x 900, 1,600 x 1,200, 1,680 x 1,050, 1,792 x 1,344, 1,856 x 1,392, 1,920 x 1,080, 1,920 x 1,200, 1,920 x 1,440, 2,048 x 1,152, 2,048 x 1,536, 2,560 x 1,600, 2,560 x 1,920, 2,560 x 2,048, 3,840 x 2,160 (16,770,000 colors)
	DisplayPort	800 x 600, 1,024 x 768, 1,152 x 864, 1,280 x 600, 1,280 x 720, 1,280 x 768, 1,280 x 800, 1,280 x 960, 1,280 x 1,024, 1,360 x 768, 1,366 x 768, 1,400 x 1,050, 1,440 x 480, 1,440 x 576, 1,440 x 900, 1,600 x 900, 1,600 x 1,200, 1,680 x 1,050, 1,792 x 1,344, 1,856 x 1,392, 1,920 x 1,080, 1,920 x 1,200, 1,920 x 1,440, 2,048 x 1,152, 2,048 x 1,536, 2,560 x 1,440, 2,560 x 1,600, 2,560 x 1,920,

Item		Description
		2,560 x 2,048, 3,840 x 2,160 (16,770,000 colors)
	Analog RGB	800 x 600, 1,024 x 768, 1,152 x 864, 1,280 x 600, 1,280 x 720, 1,280 x 768, 1,280 x 800, 1,280 x 960, 1,280 x 1,024, 1,360 x 768, 1,366 x 768, 1,400 x 1,050, 1,440 x 900, 1,600 x 900, 1,680 x 1,050, 1,920 x 1,080 (16,770,000 colors)
Storage [Selection]		SATAⅢ 3.5-inch HDD 2TB SATAⅢ 3.5-inch HDD 4TB SATAⅢ 2.5-inch SSD 256GB SATAⅢ 2.5-inch SSD 512GB SATAⅢ 2.5-inch SSD 1TB Hardware RAID (Mirroring) Software RAID (Mirroring)
Optical Drive *6 [Selection]		DVD Super Multi Drive or DVD slim multi drive
Interface	Display	Analog RGB x 1, HDMI x 1, DisplayPort x 1
	USB	A-TYPE connector Front : USB2.0 x 2ports Rear : USB3.2 Gen2 (USB3.1) x 4ports , USB2.0 x 2ports
	Audio	HD Audio compliant, 3.5φ stereo mini jack, Rear : LINE OUT x 1, LINE IN x 1, MIC IN x 1
	Serial	9pin D-SUB connector(male) x 1 (RS-232C/422A/485 x 1) RS-232C x 4 (Internal connector) Baud rate : 50 - 115,200bps
	LAN	2ports (RJ-45 connector) 1000BASE-T/100BASE-TX/10BASE-T, Wake On LAN * LAN-B supports speeds up to 2.5 Gbps. * To use this product at 2.5 Gbps, implement thorough noise countermeasures.
	M.2	- M.2 M-key socket 2242/2280 x 1 (PCIe+SATA) - M.2 E-key socket 2230 x 1 (PCIe+USB2.0) - M.2 B-key socket 3042/3052 x 1 (USB3.1+Nano SIM)
Expansion Slot [Selection]		- PCI Express 3.0(x16)/(x8) slot x 1 * Switched with the jumper Usable card dimension: Max. 312mm(L) x 111.15mm(H) - PCI Express 3.0(x4) slot x 2 Usable card dimension: Max. 307mm(L) x 111.15mm(H) - PCI Express 3.0(x8) slot x 1 * Not usable when PCI Express 3.0(x16) selected Usable card dimension: Max. 307mm(L) x 111.15mm(H) - PCI slot x 3 Usable card dimension: Max. 307mm(L) x 107mm(H)
	USB Card *7 [Selection]	Slot3 : PCI Express 3.0(x4) slot mounted - USB Card (USB3.1 Gen1 8port)
	LAN Card *7 [Selection]	Slot3 : PCI Express 3.0(x4) slot mounted - PoE LAN Card (4port) - PoE LAN Card (2 port) - PoE LAN Card+surge protection(4 port)
RAS		WDT: 1sec - 255 sec (Causes a reset upon time-out.) Remote reset / Remote power on, External input signal Monitoring function (fan speed, CPU temperature, voltage data readout)
Security (TPM)		TCG TPM2.0
RTC/CMOS		The real-time clock is accurate within ±3 minutes (at 25°C) per month,

Item	Description
	Lithium backup battery life : 7 years or more
Supportable OS *4 [Selection]	None Windows 10 IoT Enterprise 2019 LTSC 64bit (Japanese / English / Chinese / Korean) Windows 10 IoT Enterprise 2021 LTSC 64bit (Japanese / English / Chinese / Korean) Windows 11 IoT Enterprise LTSC 2024 (Japanese / English / Chinese / Korean) MIRACLE LINUX 9.0 *3
Power Supply *5	Japan-made 520W ATX power supply (50/60Hz Input auto switching) Japan-made 520W ATX power supply Supports UPS nickel metal hydride battery (50/60Hz Input auto switching) Non-Japan-made 500W ATX power supply (50/60Hz Input auto switching) High-capacity specifications made in Japan 1000W ATX power supply (50/60Hz Input auto switching)
Rated input voltage	100 - 240VAC
Range of input voltage	90 - 264VAC
Power consumption	With 1000 W power supply : 6.5A (100VAC) (Max.) * Current when using the included output harnesses and applying an internal load of 25 A With 500/520 W power supply : 2.8A (100VAC) (Max.)
External device power supply capacity	USB 2.0 : 5V 0.5A×4 2.0A USB 3.1 : 5V 0.9A×4 5.4A PCI Express 3.0(x16) slot : 3.3V 3A, 12V 5.5A PCI Express 3.0(x4) slot : 3.3V 3A, 12V 2.1A (2 slots total) Expansion PCI : 3.3V 2A, 5V 2A, 12V 0.5A (3 slots total)
Physical dimensions (mm)	430(W) x 445(D) x 177(H) (Excluding Front Bezel)
Weight *2	15.6Kg (approx.) (500W power supply, HDD x 2 (Removable), optical drive configuration) *2

*1 If the expansion card is wider than 18.71 mm, it may cover the adjacent PCI Express 3.0(×4) bus, limiting the available PCI Express 3.0(×4) buses to two slots.

(Example: The adjacent PCI Express 3.0(×4) bus cannot be used with a dual-slot graphics card. Depending on the card being installed, the adjacent bus may also not be usable with some single-slot graphics cards.).

*2 The weight (which does not include accessories) may vary depending on the product configuration.

*3 With MIRACLE LINUX 9.0, the language and keyboard layout are set to Japanese in the default setup.

*4 "None" for the OS option cannot be selected if the CCC-certified type is selected.

*5 The Japan-made 520W ATX power supply (50/60Hz Input auto switching) will be used if the UL-certified type or CCC-certified type is selected.

*6 No optical drive will be installed if the UL-certified type or CCC-certified type is selected. You cannot select one of the optical drives listed here.

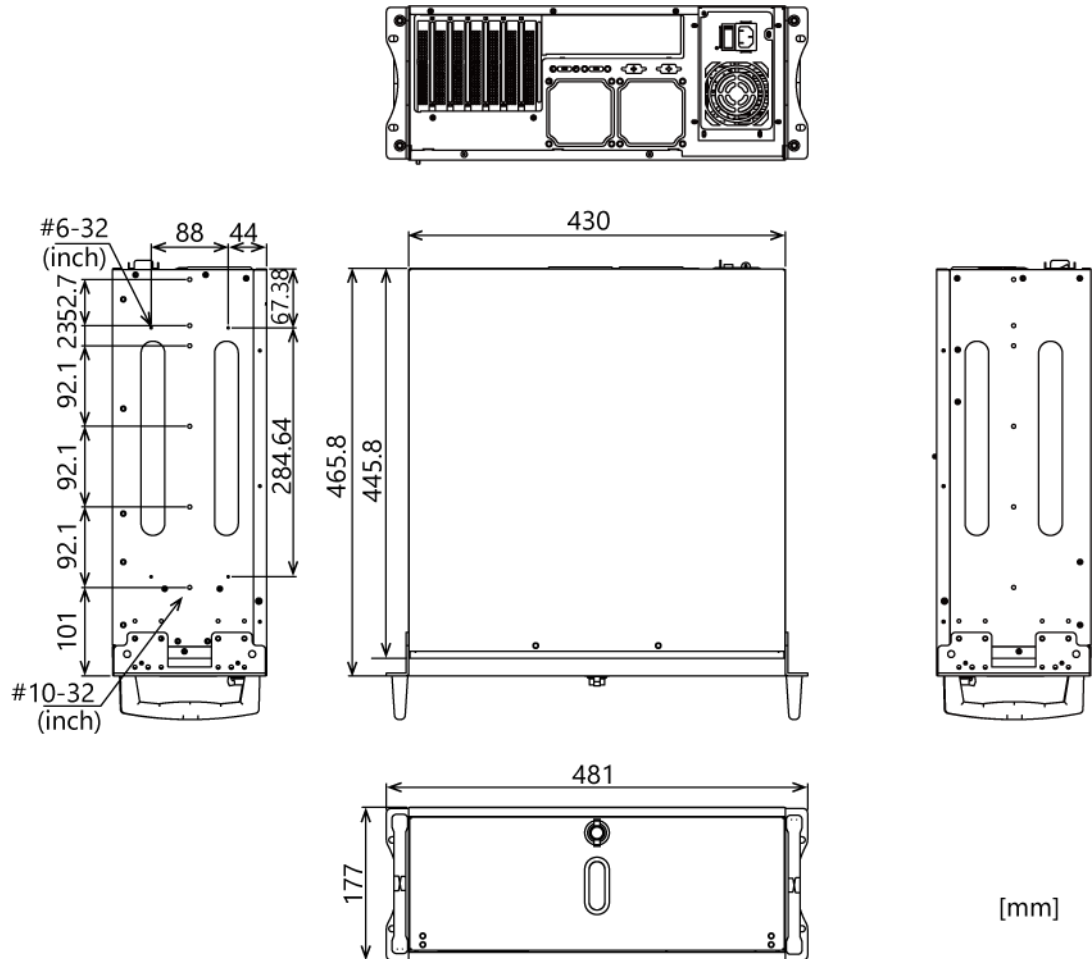
*7 The only standard for LAN card or USB card embedded type is VCCI.

Environment Requirements

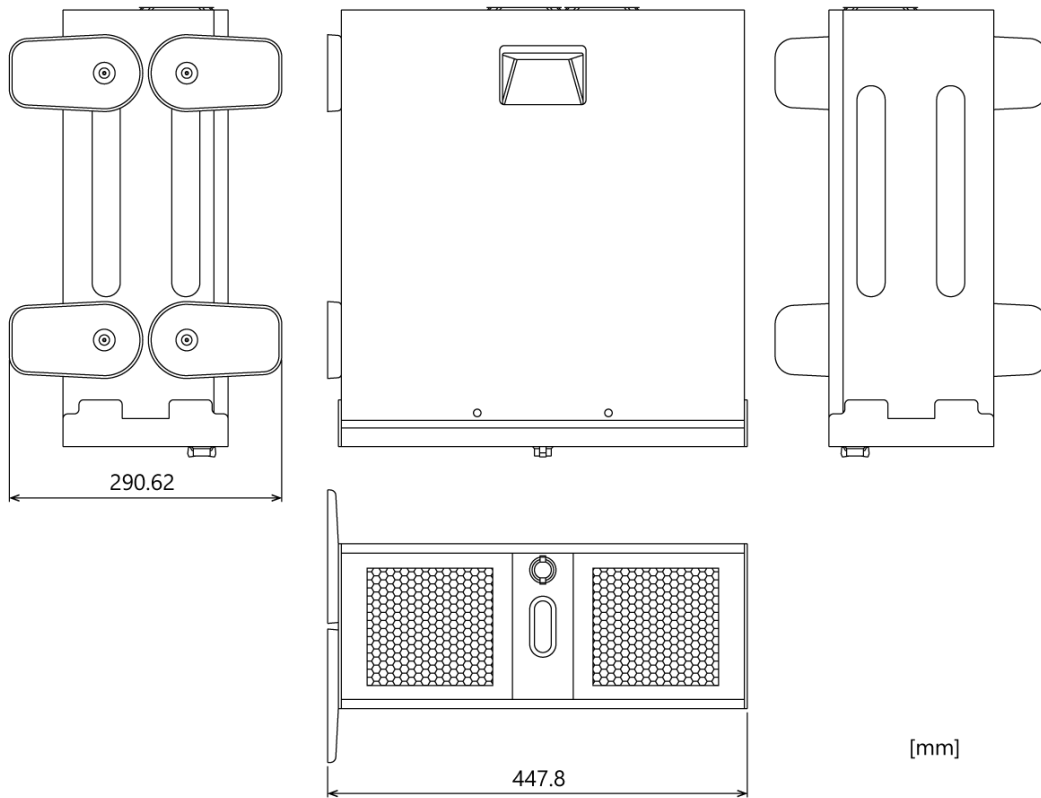
Item		Description
Operating ambient temperature		5 - 40°C
Non-operating ambient temperature		-20 - +60°C * With nickel metal hydride battery : 0 - 50°C
Humidity		20 - 80%RH (No condensation)
Floating dust particles		Not to be excessive
Corrosive gases		None
Line-noise resistance	Line noise	AC line / ± 2 kV (IEC61000-4-4 Level 3, EN61000-4-4 Level 3), Signal line / ± 1 kV (IEC61000-4-4 Level 3, EN61000-4-4 Level 3)
	Static electricity resistance	Contact discharge / ± 4 kV (IEC61000-4-2 Level 2, EN61000-4-2 Level 2) Air discharge / ± 8 kV (IEC61000-4-2 Level 3, EN61000-4-2 Level 3)
Vibration resistance	Sweep resistance	- HDD configuration (when powered on) 10 - 50Hz / 0.5G 25 min. each in x, y, and z directions (JIS C60068-2-6 compliant, IEC60068-2-6 compliant) - SSD configuration (when powered on) 10 - 57Hz / semi-amplitude : 0.075mm, 57 - 150Hz / 1.0G 40 min. each in x, y, and z directions (JIS C60068-2-6 compliant, IEC60068-2-6 compliant) * Excluding vertical installation and optical drive usage
Impact resistance		10G, half-sine shock for 11ms in x, y, and z directions (JIS C60068-2-27 compliant, IEC 60068-2-27 compliant)
Grounding		Class D grounding, SG-FG / continuity
Standard		VCCI Class A, FCC Class A, CE Marking (EMC Directive Class A, RoHS Directive), UKCA, UL, CCC

2. Physical Dimensions

◆ Horizontal Installation



◆ With Vertical Resin Stands Attached



3. Model Name Description

MR4100 Type Rule

Model Name **MR4100**

Type Name **P 1 3 8 9 9 1 H 3 1 0 0**

No. **1 2 3 4 5 6 7 8 9 10 11 12**

No.	Item	Type Name	Description
1	Power *2	P	Japan-made (1000W) power supply
		F	Non-Japan-made (500W) power supply
		N	Japan-made (520W) power supply
		U	Japan-made (520W) power supply (with nickel metal hydride battery pack)
2	CPU	1	Intel® Core™ i3 10100E Processor 3.2GHz
		2	Intel® Core™ i5 10500E Processor 3.1GHz
		3	Intel® Core™ i7 10700E Processor 2.9GHz
		4	Intel® Core™ i9 10900E Processor 2.8GHz
		A	Reserved
3	Memory	1	8GB : DDR4 ECC DIMM (8GB x 1)
		2	16GB : DDR4 ECC DIMM (8GB x 2)
		3	32GB : DDR4 ECC DIMM (16GB x 2)
		4	64GB : DDR4 ECC DIMM (16GB x 4)
		5	128GB : DDR4 ECC DIMM (32GB x 4)
		6	Reserved
		7	8GB : DDR4 non-ECC DIMM (8GB x 1)
		8	16GB : DDR4 non-ECC DIMM (8GB x 2)
		9	32GB : DDR4 non-ECC DIMM (16GB x 2)
		A	64GB : DDR4 non-ECC DIMM (16GB x 4)
		B	128GB : DDR4 non-ECC DIMM (32GB x 4)
		C	Reserved
4	Optical Drive *4/ NVMe (M.2-Key) *3	0	Without optical drive, Non NVMe
		1	Without optical drive, 256GB SSD (TLC) NVMe
		2	Without optical drive
		3	Without optical drive, 1TB SSD (TLC) NVMe
		4	Without optical drive, 2TB SSD (TLC) NVMe
		5	Reserved
		6	Reserved

No.	Item	Type Name	Description
		7	Reserved
		8	With optical drive, Non NVMe
		9	With optical drive, 256GB SSD (TLC) NVMe
		A	With optical drive, 512GB SSD (TLC) NVMe
		B	With optical drive, 1TB SSD (TLC) NVMe
		C	With optical drive, 2TB SSD (TLC) NVMe
		D -	Reserved
5	Removable drive Storage 1 *3 *Storage 1 and Storage 2 share the same settings when Removable is selected. (e.g., when "With 5 inch removable" is selected for Storage 1, "With 5 inch removable" will also be selected for Storage 2).	0	Without 5 inch removable, No Storage
		1	Without 5 inch removable, 3.5 inch SATA/HDD 2TB
		2	Without 5 inch removable, 3.5 inch SATA/HDD 4TB
		3	Without 5 inch removable, 3.5 inch SATA/SSD 256GB (3D TLC BICS5)
		4	Without 5 inch removable, 3.5 inch SATA/SSD 512GB (3D TLC BICS5)
		5	Without 5 inch removable, 3.5 inch SATA/SSD 1TB (3D TLC BICS5)
		6	Reserved
		7	Reserved
		8	Reserved
		9	With 5 inch removable, 3.5 inch SATA/HDD 2TB
		A	With 5 inch removable, 3.5 inch SATA/HDD 4TB
		B	With 5 inch removable, 3.5 inch SATA/SSD 256GB (3D TLC BICS5)
		C	With 5 inch removable, 3.5 inch SATA/SSD 512GB (3D TLC BICS5)
		D	With 5 inch removable, 3.5 inch SATA/SSD 1TB (3D TLC BICS5)
		E -	Reserved
6	Removable drive Storage 2 Storage 1 and Storage 2 share the same settings when Removable is selected. (e.g., when "With 5 inch removable" is selected for Storage 1, "With 5 inch removable" will also be selected for Storage 2).	0	Without 5" removable, No Storage
		1	Without 5 inch removable, 3.5 inch SATA/HDD 2TB
		2	Without 5 inch removable, 3.5 inch SATA/HDD 4TB
		3	Without 5 inch removable, 3.5 inch SATA/SSD 256GB (3D TLC BICS5)
		4	Without 5 inch removable, 3.5 inch SATA/SSD 512GB (3D TLC BICS5)
		5	Without 5 inch removable, 3.5 inch SATA/SSD 1TB (3D TLC BICS5)
		6	Reserved
		7	Reserved
		8	Reserved
		9	With 5 inch removable, 3.5 inch SATA/HDD 2TB
		A	With 5 inch removable, 3.5 inch SATA/HDD 4TB
		B	With 5 inch removable, 3.5 inch SATA/SSD 256GB (3D TLC BICS5)

No.	Item	Type Name	Description
		C	With 5 inch removable, 3.5 inch SATA/SSD 512GB (3D TLC BICS5)
		D	With 5 inch removable, 3.5 inch SATA/SSD 1TB (3D TLC BICS5)
		E -	Reserved
7	OS *1*3	0	None
		1	Windows10 IoT Enterprise 2021 LTSC 64bit (Japanese / English / Chinese / Korean)
		2	Windows10 IoT Enterprise 2019 LTSC 64bit (Japanese / English / Chinese / Korean)
		5	Windows11 IoT Enterprise LTSC 2024 (Japanese / English / Chinese / Korean)
		A	Reserved
		B	MIRACLE LINUX 9.0 (Japanese version only)
8	RAID	0	None
		R	Software RAID
		H	Hardware RAID
9	Keyboard & Mouse	0	None
		1	USB Japanese 109 keyboard (JP109)
		2	USB Optical mouse
		3	USB Japanese 109 keyboard (JP109) + USB Optical mouse
		4	USB English 104 keyboard (US104)
		6	USB English 104 keyboard (US104) + Optical mouse
10	Expansion slot COM&USB	0	no COM port expansion, no USB port expansion
		1	COM2, COM3 2 port expansion, no USB port expansion
		3	COM2, COM3, COM4, COM5 4 port expansion, no USB port expansion
		4	no COM port expansion, USB2.0 2 port expansion
		5	COM2, COM3 2 port expansion, USB2.0 2 port expansion
		7	COM2, COM3, COM4, COM5 4 port expansion, USB2.0 2 port expansion
		8 -	Reserved
11	Vertical Stand Remote PW Switch	0	Without Vertical Stand, Without remote PW switch
		1	With Vertical stand, Without remote PW switch
		2	Reserved
		3	Reserved
		4	Reserved
		5	Reserved
		6	Reserved

No.	Item	Type Name	Description
		7	Reserved
		8	Without Vertical Stand, With remote PW switch
		9	With Vertical Stand, With remote PW switch
		A -	Reserved
12	Standards AC Code Kitting * The common standards are VCCI, CE, and FCC.	0	Common Standard, AC Code PSE standard product, No kitting
		1	Common Standard+UL, AC Code UL standard product, No kitting
		2	Reserved
		3	Common Standard+CCC, AC Code CCC standard product, No kitting
		4	Common Standard+UL+CCC, AC Code UL standard product, No kitting
		5	Reserved
		A	VCCI, AC Code PSE standard product, USB Card (USB3.1 Gen1 8port)
		B	VCCI, AC Code PSE standard product, PoE LAN Card (4port)
		C	VCCI, AC Code PSE standard product, PoE LAN Card (2 port)
		D	VCCI, AC Code PSE standard product, PoE LAN Card + surge protection(4 port)

- *1 NVMe is prioritized for the drive on which to install the OS.
- *2 The Japan-made (520W) power supply (N) will be used if the UL-certified type or CCC-certified type is selected.
- *3 "None" for the OS option cannot be selected if the CCC-certified type is selected.
Storage 1 or NVMe must be selected.
- *4 The "With optical drive" options cannot be selected if the UL-certified type or CCC-certified type is selected.

4. Battery

1. Battery Specification

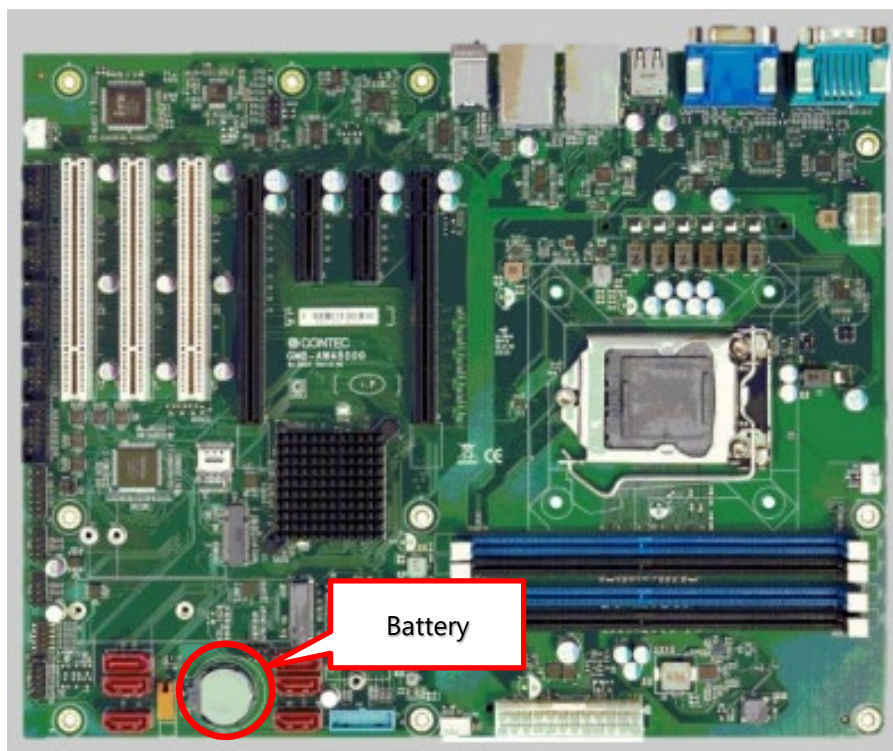
The product contains one battery, and the details are as follows:

Item	Description
Type	Lithium primary battery
Model	BR2032
Maker	Panasonic
Nominal Voltage	3V
Nominal capacity	200mAh
Lithium content	1g or less

2. Removing the Battery

Follow the instruction described below to remove the battery.

- 1 Refer to the "**Removing the Top Cover, the Expansion Card Bracket (Page38)**" to remove the battery.



1. Press in the retainer to release the lock.

2. Lift the battery up with the lock released.



3. Dispose of the Battery

WARNING

When disposing of a used battery, follow the disposal procedures stipulated under the relevant laws and municipal ordinances.

5. Nickel Metal Hydride Battery Pack

The specifications of the Japan-made (520 W) power supply (with nickel metal hydride battery pack) are as follows.

1. Battery Pack Specifications

◆ General Specifications

Electrical Specifications

Item	Specifications / Standard	Note
Used battery	1.2V 1800mA x 20 series	Airtight nickel metal hydride battery
Nominal battery voltage	24.0VDC	
Rating	1800mAh	
Max. output capacity	410W	
Charging specifications	0.20A typ. (Max: 15 hours)	
Heater	Operation with a battery temperature of 15°C (typ.) or less (Power consumption during heater operation: 10W typ.)	Warming up is performed to improve the battery discharge characteristics at low temperatures. Charging does not occur during warming up.
Built-in fuse ratings	30A 32V	

Environment Specification

Item	Specifications	Note
Physical dimensions (mm)	200(L) x 146(W) x 38(H)	
Weight	1.8Kg typ.	
Short-life component	battery	Requires periodic maintenance and replacement

Reference

Item	Specifications	Note
Replacement time	Approx. 3-4 years (5 times/year discharge) or approx. 2.5 years (1 time/day discharge)	Varies depending on operating conditions and ambient temperature. These are reference values and are not guaranteed.
Backup Time	Approx. 30 minutes (assuming power consumption of 63W (100VAC))	Varies depending on operating conditions and ambient temperature. These are reference values and are not guaranteed.

6. Life of SSD

1. About write endurance

SSD has write endurance which limits the number of times each memory may be written, due to the characteristic of the memory that is used. Write endurance can be calculated by the following formula as a reference value:

The write endurance of SSD is determined with the total capacity.
Life expectancy can be calculated by the number of writing per day.

$$\text{The number of writing into drive per day (DWPD)} = \frac{\text{SSD's TBW(TB)} \times 1000}{365 \text{ days} \times \text{years} \times \text{SSD user capacity}}$$

The actual TBW is determined by the free space (available space for user).

If the SSD has 256GB capacity and TBW = 374TB, and the user available space (rewrite area) is 1/2 size, the expected life can be calculated with an assumption that TBW is half of 172TB.

When the 4MB file of 256GB capacity and TBW = 374TB, user available space (rewrite area) is 1/2 size is made, and rewrites once per 10 seconds.

Writing size per day = $4 \times 6 \times 60 \times 24 = 34.56\text{GB}$

Write endurance = $374(\text{TB}) \times 1/2 \times 1000 / 34.56(\text{GB}) / 365 \approx 14.8(\text{years})$

These are reference values.

Replacement Parts for Maintenance

This section lists replacement parts for maintenance of the product.

1.Replacement Parts for Maintenance

Some parts such as CPU fan and disk (HDD, SSD) used in the product have limited life. Replacing items are available for maintenance purpose. Acquire them as necessary.

Parts name	Type	Description
Hard Disk	HDD-2TS-3	3.5 inch SATA HDD 2TB
	HDD-2TS-3R	3.5 inch SATA HDD 2TB (Support for RAID)



CAUTION

If a product other than our replacement parts one is used, the normal operation may be impaired or the functions may be limited.

Visit the CONTEC website for the latest replacement parts for maintenance.

Website

<https://www.contec.com/>

Customer Support and Inquiry

CONTEC provides the following support services for you to use CONTEC products more efficiently and comfortably.

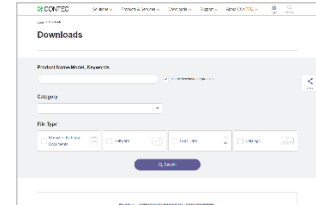
1.Services

CONTEC offers the useful information including product manuals that can be downloaded through the CONTEC website.

Download

<https://www.contec.com/download/>

You can download updated device driver, firmware, and differential manuals in several languages. Membership registration (myCONTEC) is required to use the services.



Revision History

MONTH YEAR	Summary of Changes
June 2023	The First Edition
August 2023	- M.2 description added - Removable description added - Battery pack life description added
September 2023	- Memory contents added
September 2023	- Remote PW switch description added
August 2024	- Notes on "Caution, hot!" mark added - Changes made due to UL certification and CCC certification Power supplies of UL-certified and CCC-certified products are limited to 520W. "None" for the OS option cannot be selected for CCC-certified products. No optical drive can be selected for the UL-certified and CCC-certified products. - Changes made due to the addition of USB Card and LAN Card.
April 2025	Add supported OS (Windows 11 IoT Enterprise LTSC 2024)

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