

IPC Series

BOX-PC
for BX956S Series
User's Manual

CONTEC CO., LTD.

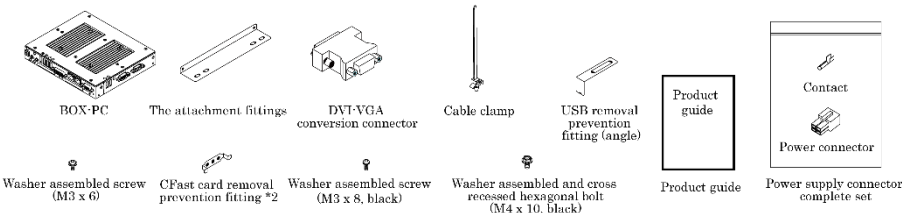
Check Your Package

Thank you for purchasing the CONTEC product.
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 Configuration List

		BX-956SD-DCx00000 [Base Type]	BX-956SD-DCxxxxxx *1 [OS Pre-install Type]
Name		Pcs.	Pcs.
BOX-PC		1	1
The attachment fittings		2	2
CFast card removal prevention fitting		1	1 *2
USB removal prevention fitting (angle)		6	6
Washer assembled screw (M3 x 6)		7	6
Washer assembled screw (M3 x 8, black)		4	4
Washer assembled and cross recessed hexagonal bolt (M4 x 10, black)		4	4
Cable clamp		1	2
Power supply connector complete set	Power connector	1	1
	Contact	4	4
DVI-analog RGB conversion adapter		1	1
Product guide		1	1

*1 Except for base type.
*2 It is attached to the main body.

Product Configuration Image



* See the Product Configuration List to check if all the components are included for the specified number of units.

Related Manuals

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	Must read this after opening the package.	This describes the rights and conditions of user when using Windows software.	 Download from the CONTEC website (PDF)
Manual for OS Pre-installed Typel *1	Must read this after opening the package.	This describes the basic information of OS, and the procedures of setup and recovery.	 Download from the CONTEC website (PDF)

*1 Reference for pre-installed typels only.

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1. Introduction

About the Product

This product is a fanless computer for embedded applications. It features an Intel Atom processor E3845 chipset. Thanks to a quad-core CPU, simultaneous stable high-speed processing for four applications is possible with four cores. This CPU also allows for computing power almost four times that of conventional products in addition to three times the graphics performance, a significant improvement. Moreover, power consumption has been significantly reduced, resulting in nearly double the power efficiency compared with the previous generation's architecture. This "resource-saving PC" helps you design more compact, energy efficient equipment to reduce running costs and promote energy efficiency. It has extension interfaces such as DVI-I, 1000BASE-T, USB 2.0, USB 3.0, DIO, and serial. It employs a CFast card for storage and is fanless to ensure a totally spindleless design that simplifies maintenance. Embedded-type CPU have been adopted. The use of readily available parts ensures the ease of the use of the product. In addition, the use of Contec-customized BIOS allows support to be provided at the BIOS level.

This product is available in the following 12 models:

- Base model with Intel Atom Processor E3845 1.91GHz
BX-956SD-DC700000 (Memory 4GB, ECC, without OS, without CFast)
BX-956SD-DC800000 (Memory 8GB, ECC, without OS, without CFast)
- OS-installed model with Intel Atom Processor E3845 1.91GHz
BX-956SD-DC731314 (Memory 4GB, ECC, Windows Embedded Standard 7 RUNTIME P 32bit
(Japanese, English, Chinese, Korean), CFast Card (SLC) 16GB)
BX-956SD-DC761314 (Memory 4GB, ECC, Windows Embedded Standard 7 RUNTIME P 32bit
(Japanese, English, Chinese, Korean), CFast Card (MLC) 32GB)
BX-956SD-DC771314 (Memory 4GB, ECC, Windows Embedded Standard 7 RUNTIME P 32bit
(Japanese, English, Chinese, Korean), CFast Card (Q-MLC) 16GB)
BX-956SD-DC 781314 (Memory 4GB, ECC, Windows Embedded Standard 7 RUNTIME P 32bit
(Japanese, English, Chinese, Korean), CFast Card (Q-MLC) 32GB)
BX-956SD-DC761724 (Memory 4GB, ECC, Windows 10 IoT Enterprise LTSB 2016 64bit
(Japanese, English, Chinese, Korean), CFast Card (MLC) 32GB)
BX-956SD-DC 781724 (Memory 4GB, ECC, Windows 10 IoT Enterprise LTSB 2016 64bit
(Japanese, English, Chinese, Korean), CFast Card (Q-MLC) 32GB)
BX-956SD-DC 7D1724 (Memory 4GB, ECC, Windows 10 IoT Enterprise LTSB 2016 64bit
(Japanese, English, Chinese, Korean), CFast Card (TLC) 128GB)
BX-956SD-DC 881724 (Memory 8GB, ECC, Windows 10 IoT Enterprise LTSB 2016 64bit
(Japanese, English, Chinese, Korean), CFast Card (Q-MLC) 32GB)
BX-956SD-DC 8C1724 (Memory 8GB, ECC, Windows 10 IoT Enterprise LTSB 2016 64bit
(Japanese, English, Chinese, Korean), CFast Card (iSLC) 40GB)
BX-956SD-DC 8D1724 (Memory 8GB, ECC, Windows 10 IoT Enterprise LTSB 2016 64bit
(Japanese, English, Chinese, Korean), CFast Card (TLC) 128GB)

Features

- Contributing to reduction of running cost and promotion of energy efficiency

It adopts the low-power platform with Intel® Atom™ Processor E3845 that realizes lower power consumption while ensuring sufficient performance.

- Design that meets the safety standard

This product, as in our other products, is designed to comply with the safety standard of VCCI, FCC, CE, and furthermore, its safety has been certified to meet the UL standard for Europe and the U.S.

- Slitless/fanless design that reduces maintenance work

This product's spindleless design eliminates the heat dissipating slit and CPU fan and adopts CFast card for the storage. There is no need to worry about the intrusion of dust or foreign objects, and the use of parts that degrade over time is minimized to facilitate maintenance.

- Remote power management function to reduce operation tasks

Supports system startup by external device over network (Wake-on-LAN), by general purpose input (power on by GPI), and by modem reception (power on by ring). It encourages significant labor saving in operation.

- Major types of peripherals are supported with rich interfaces including the two CFast card slots

It has a variety of extended interface such as DVI-I x 1, 1000BASE-T x 2, USB3.0 x 1, USB2.0 x 5, serial (RS-232C) x 2, DIO x 1.

It has two CFast card slots, providing the ability to separate data from the operating system, as well as the convenience of being able to use one slot for system startup and the other for maintenance or for taking home system logs or collected data.

- Falling-off prevention tools and fixing clamps provided to avoid trouble caused by disconnected cable

This product stays trouble-free, being equipped with USB removal prevention fitting and cable clamp for connectors with no locking mechanism, such as USB cable, and with hardware to properly mount and avoid falling out of CFast card.



- Safety design required for embedded applications

For Windows Embedded Standard installed model or Windows 10 IoT Enterprise LTSC 2016 installed model, it is possible to use the Wf*1 function of OS. It is designed for safety required for embedding purpose, for example, prohibiting unwanted writing to the CFast card with Wf function will relieve the concern about the writing limits to the CFast card and prevent an unintentional system alteration.

*1 EWF (Enhanced Write Filter) is a function of Windows Embedded Standard. UWF (Unified Write Filter) is a function of Windows 10 IoT Enterprise LTSC 2016. They protect the disk from being actually written by redirecting the writing to RAM.

- A wide range of power supplies (10.8 - 31.2VDC) supported

As the product supports a wide range of power (10.8 - 31.2VDC), it can be used in a variety of power environments. The separately available AC adapter adds support for 100 - 240VAC power.

- "Power failure protection system" features power-off without OS shutdown

Equipped with the "Power failure protection system" function that protects data and prohibits writing to storage in the event of power failure *2. Along with the lockdown (disk writing suppression) function of Windows IoT Enterprise, power can be safely turned off without a shutdown process. Moreover, file system damage or data damage caused by sudden power failure can be avoided.

*2 Only the CFast Card 40GB (iSLC) model and CFast Card 128GB (TLC) model are compatible with the "Power failure protection system".

- CONTEC-customized BIOS provides useful utility

Useful utility of BIOS *3 customized by CONTEC is provided. The "CONTEC Fast Boot" achieves Windows startup in less than half the normal time.*4

The "Disk Copy" function provides secure disk backup at the BIOS level, and also supports backup in file format or compressed file format. We also offer the CONTEC tools "BIOS update tool" for updating BIOS. *5

*3 For details, see each setting in the [BIOS Setup] section.

*4 Time may vary depending on configuration. Note that TXE, TPM, Network Stack, and SMART Self Test are not supported when the CONTEC Fast Boot is enabled.

*5 Contact your retailer for more information.

Supported OS

- Windows Embedded Standard 7 32bit (Japanese, English, Chinese, Korean)
- Windows 10 IoT Enterprise LTSC 2016 64bit (Japanese, English, Chinese, Korean)



CAUTION

2.10 or more than it of a main-frame BIOS version is an operating conditions of Windows 10.

Customer Support

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

Web Site

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

Latest product information

CONTEC provides up-to-date information on products.

CONTEC also provides product manuals and various technical documents in the PDF.

Free download

You can download updated driver software and differential files as well as sample programs available in several languages.

Note! For product information

Contact your retailer if you have any technical question about a CONTEC product or need its price, delivery time, or estimate information.

How to Obtain Service

For replacement or repair, return the device freight prepaid, with a copy of the original invoice. Please obtain a Return Merchandise Authorization number (RMA) from the CONTEC group office where you purchased before returning any product.

* No product will be accepted by CONTEC group without the RMA number.

Liability

The obligation of the warrantor is solely to repair or replace the product. In no event will the warrantor be liable for any incidental or consequential damages due to such defect or consequences that arise from inexperienced usage, misuse, or malfunction of this device.

Safety Precautions

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

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.

Caution on the BX-956S Series

Handling Precautions

WARNING

- Always check that the power supply is turned off before connecting or disconnecting power cables.
- Do not modify the product.
- Always turn off the power before inserting or removing circuit boards 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.

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.
- Do not use or store this product in the presence of chemicals.
- 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.
- This product's case may become hot. To avoid being burned, do not touch that section while this product is in operation or immediately after turning off the power. Avoid installation in a location where people may come into contact with that section.
- CONTEC does not provide any guarantee for the integrity of data on CFast.
- Always remove the power cable from the power outlet before mounting or removing an expansion board and before connecting or disconnecting a connector.
- Always remove the power cable from the power outlet before connecting or disconnecting a connector.
- As for the product with a D-SUB connector, the appropriate tightening torque for the cable connector is less than 2 kgf·cm.
- To prevent corruption of files, always shutdown the OS before turning off this product.
- 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.
- To connect with peripherals, use a grounded, shielded cable.
- The CFast card connector doesn't support hot plug. The pulling out opening of the CFast card cannot be done in the state of power supply ON. Please neither pulling out opening of CFast in the state of power supply ON of this product nor come in contact with CFast. This product may malfunction or cause a failure.
- If you use any other CFast than our CFast, we can not guarantee this product's specification. When you newly select CFast for this product, you should read "Chapter 7" at first. If you select unpreferable CFast, the system may work out of order.
- Component Life:
 - (1) 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 10 years or more.
 - (2) CFast --- Window installed model uses a CFast card in the OS storage area. The estimated failure rate is 1 every 60,000 rewrites for SLC models and 1 every 2,000 rewrites for MLC models and 1 every 3,000 rewrites for TLC models and 1 every 20,000 rewrites for Q-MLC models and 1 every 30,000 rewrites for iSLC models.
 - * Replacement of expendables is handled as a repair (there will be a charge).
 - * The service life for consumable parts are reference values and are not guaranteed values.

* This product's specifications allow the device to be rebooted from the BIOS screen during startup.
This has no effect on operation after the OS boots

The caution when you register UL for your system with this product

- The Pollution Degree of UL for this product is certified as 2.
- Use the power supply of Limited Power Source regulated in SELV and UL/IEC60950-1.
- Install mechanical enclosures to keep an operator from touching the heat sink of this product.
- Ensure that external enclosures must work as fire enclosures.

FCC PART15 Class A Notice**NOTE**

This equipment has been tested and found to comply with the limits for a ClassA 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.

CCC EMC 部分A类通告 *

警告：在居住环境中，运行此设备可能会造成无线电干扰。

高地 求警告声明

警告标识	警告声明
	仅适用于海拔2000m以下地区安全使用
	仅适用于非热带气候条件下安全使用

- * The following models are excluded from CCC.
- Base model with Intel Atom Processor E3845 1.91GHz
BX-956SD-DC700000 (Memory 4GB, ECC, without OS, without CFast)
BX-956SD-DC800000 (Memory 8GB, ECC, without OS, without CFast)

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.

[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.

[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.
- 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.

2. System Reference

Specifications

Table 2.1. Functional Specifications < 1 / 2 >

Model		BX-956SD-DC7xxxxx	BX-956SD-DC8xxxxx
CPU		Intel® Atom™ Processor E3845 1.91GHz	
BIOS		BIOS (mfd. by AMI)	
Memory		4GB, 204pin SO-DIMM socket x 1, PC3-10600(DDR3L 1333 ECC)	8GB, 204pin SO-DIMM socket x 1, PC3-10600(DDR3L 1333 ECC)
Graphic		Intel® HD Graphics (built-in CPU)	
System resolution	Analog RGB	640x480, 800x600, 1,024x768, 1,152x864, 1,280x600, 1,280x720, 1,280x768, 1,280x800, 1,280x960, 1,280x1,024, 1,360x768, 1,366x768, 1,400x1,050, 1,440x900, 1,600x900, 1,680x1,050, 1,920x1,080, 1,920x1,200 (16,770,000 colors)	
	DVI-D	640x480, 800x600, 1,024x768, 1,152x864, 1,280x600, 1,280x720, 1,280x768, 1,280x800, 1,280x960, 1,280x1,024, 1,360x768, 1,366x768, 1,400x1,050, 1,440x900, 1,600x900, 1,680x1,050, 1,920x1,080 (16,770,000 colors)	
Audio		HD Audio compliant, LINE OUT x 1, MIC IN x 1	
CFast card slot		2 slot, CFast CARD Type I x 2 bootable	
		BX-956SD-DC700000:- BX-956SD-DCx3xxxx: Built-in CFast card slot (SLC) (16GB, 1 partition) *1 BX-956SD-DCx6xxxx: Built-in CFast card slot (MLC) (32GB, 1 partition) *1 BX-956SD-DCx7xxxx: Built-in CFast card slot (Q-MLC) (16GB, 1 partition) *1 BX-956SD-DCx8xxxx: Built-in CFast card slot (Q-MLC) (32GB, 1 partition) *1 BX-956SD-DCxCxxxx: Built-in CFast card slot (iSLC) (40GB, 1 partition) *1 BX-956SD-DCxDxxxx: Built-in CFast card slot (TLC) (128GB, 1 partition) *1	
LAN *2		Intel I210IT Controller 1000BASE-T/100BASE-TX/10BASE-T 2 port (Wake On LAN support)	
USB		USB 3.0 compliant 1 port USB 2.0 compliant 5 port	
Serial I/F		RS-232C (general-purpose) : 2port (SERIAL PORTA, B), 9pin D-SUB connector (male) Baud rate : 50 ~ 115,200bps	
General-purpose I/O		Non-isolated type : I/O 6 channels, Power switch signal	
Hardware monitoring		Monitoring CPU temperature, power voltage	
Watchdog timer		Software programmable ,255 level(1sec ~ 255sec) Time up allows reset	
RTC/CMOS		Lithium backup battery life: 10 years or more. The real-time clock is accurate within ±3 minutes (at 25°C) per month	
Power Management		Power management setup via BIOS, Power On by Ring / Wake On LAN, Supports PC98/PC99 ACPI Power management	
Security (TPM)		TCG TPM2.0	

*1: The capacity of CFast is a value when 1GB is calculated by 1 billion bytes. The capacity that can be recognized from OS might be displayed fewer than an actual value.

Table 2.1. Functional Specification < 2 / 2 >

Model	BX-956SD-DC7xxxxx	BX-956SD-DC8xxxxx
Interface		
Display	DVI-I x 1 (29pin DVI-I connector)	
Audio	LINE OUT : 3.5φ Stereo mini jack, Full-scale output level 1.4Vrms(Typ.) MIC IN : 3.5φ Stereo mini jack, Full-scale input level 1.4Vrms(Typ.)	
CFast card slot	2 slot, CFast CARD Type I x 2, bootable BX-956SD-DC700000 : -, BX-956S D-DCx3xxxx : Built-in CFast card slot contains a CFast card(SLC) . (16GB, 1 partition)*1 BX-956S D-DCx6xxxx : Built-in CFast card slot contains a CFast card(MLC) . (32GB, 1 partition)*1 BX-956S D-DCx7xxxx : Built-in CFast card slot contains a CFast card(Q-MLC) . (16GB, 1 partition)*1 BX-956SD-DCx8xxxx : Built-in CFast card slot contains a CFast card(Q-MLC) . (32GB, 1 partition)*1 BX-956SD-DCxCxxxx : Built-in CFast card slot contains a CFast card (iSLC) . (40GB, 1 partition) *1 BX-956SD-DCxDxxxx : Built-in CFast card slot contains a CFast card (TLC) . (128GB, 1 partition) *1	
LAN *2	2 port (RJ-45 connector)	
USB	USB3.0 compliant 1port (TYPE-A connector x1) USB2.0 compliant 5port (TYPE-A connector x5)	
RS-232C	2 port (9pin D-SUB connector [male])	
DIO	1 port (9pin D-SUB connector [femaic])	
General-purpose I/O		
Power supply		
Rated input voltage	12 - 24VDC *3	
Range of input voltage	10.8 - 31.2VDC	
Power consumption	12V 3.4A, 24V 1.8A	
External device power supply capacity	CFast card slot : 3.3V : 1A(500mAx2) USB3.0 I/F : +5V : 0.9A (900mAx1) USB2.0 I/F : +5V : 2.5A (500mAx5)	
Physical dimensions (mm)	182 (W) x 115(D) x 29(H) (No protrusions)	
Weight	About 1.0kg (Excluding attachment fittings)	

*2: If you use the 1000BASE-T, be careful of the operating temperature.

For more details on this, refer to chapter3, Installation Requirements.

*3: Use a power cable shorter than 3m.

Table 2.2. Installation Environment Requirements

Model		BX-956SD-DC7xxxxx	BX-956SD-DC8xxxxx
Ambient specifications	Operating temperature *4	0 - 60°C (With 1000BASE-T: 0 - 55°C), airflow 0.7m/s 0 - 50°C (With 1000BASE-T: 0 - 45°C), no airflow	
	Storage temperature	-10 - 60°C	
	Humidity	10 - 90%RH (No condensation)	
	Floating dust particles	Not to be excessive	
	Corrosive gases	None	
	Line-noise resistance	Line noise	AC line / ± 2 kV *5, 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) Atmospheric discharge / ± 8 kV (IEC61000-4-2 Level 3, EN61000-4-2 Level 3)
	Vibration resistance	Sweep resistance	10 - 57Hz/semi-amplitude 0.375 mm 57 - 500Hz/5.0G 60 min. each in x, y, and z directions (JIS C60068-2-6compliant, IEC68-2-6compliant)
	Impact resistance		100G, half-sine shock for 6 ms in x, y, and z directions (JIS C0041-compliant, IEC68-2-27-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/c-UL, CCC *6

*4 : Derating occurs due to the way of installation. For more details on this, refer to the “Installation Requirements” in chapter 3.

*5 : When AC adapter “ACAP19-01” is used.

*6 : The models of BX-956SD-DC700000 and BX-956SD-DC800000 are excluded from CCC.

Power Management Features

- Support both ACPI (Advanced Configuration and Power Interface).
- ACPI v2.0 compliant
- Hardware automatic wake-up

Power Requirements

Your system requires a clean, steady power source for reliable performance of the high frequency CPU on the product, the quality of the power supply is even more important. For the best performance makes sure your power supply provides a range of 10.8 V minimum to 31.2 V maximum DC power source.

Power Consumption

For typical configurations, the CPU card is designed to operate with at least a 60W power supply. The power supply must meet the following requirements:

- Rise time for power supply: 2 ms - 30 ms

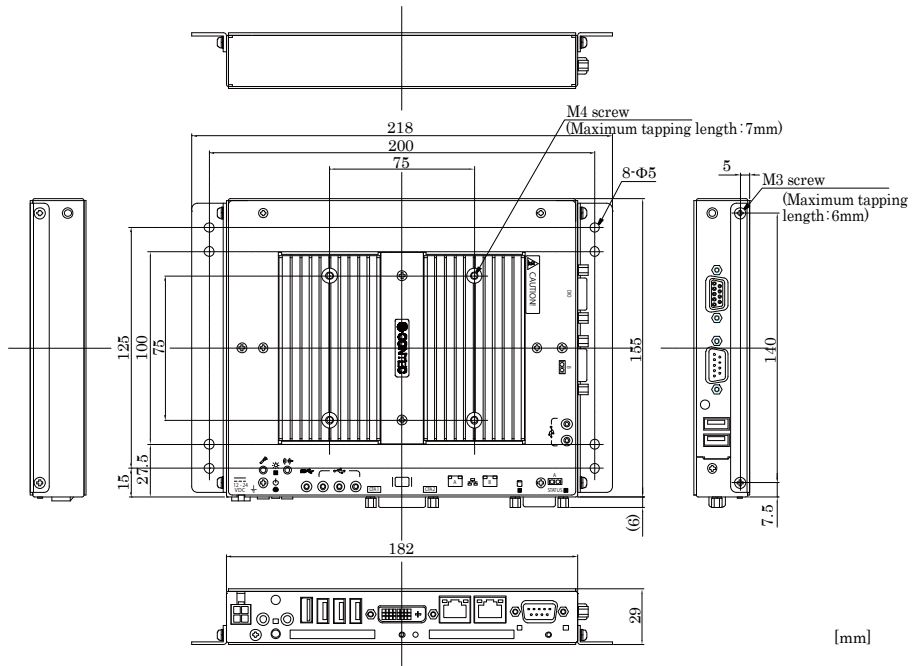
The following table lists the power supply’s tolerances for DC voltages:

Table 2.3. DC voltage tolerance

DC Voltage	Acceptable Tolerance
+ 12V - 24V	+ 10.8V - 31.2V

Physical Dimensions

BX-956SD-DCxxxxxx



*1: The length (L) from the tip of M4 boss to the M4 screw tip should be 5mm or less. If not doing so, it may be exactly fixed.

Figure 2.1. BX-956SD-DCxxxxxx

3. Hardware Setup

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 chapter, install, connect and set 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 Chapter 4, 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 Chapter 4, " Save &a Exit.")



CAUTION

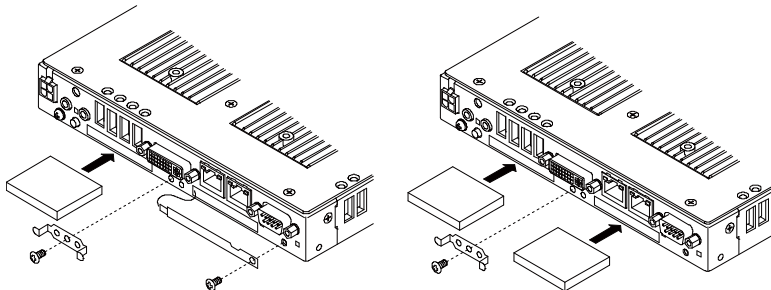
- Be sure to connect the keyboard and mouse to it before turning the power on for the first time.
 - Be sure to connect the display before turning the power on. Connecting the display after turning the power on may prevent it from being displayed properly.
-

Hardware Setup

- Before you start, be sure that the power is turned off.
- Remove only those screws that are explained. Do not move any other screw.

Attaching the CFast Attachment Fittings

- (1) After inserting a CFast Card, fasten the bundled CFast attachment fittings with a screw.



*1 Attached screw (M3 x 6)

Figure 3.1. Attaching the CFast Attachment Fittings

CAUTION

- Insert the CFast Card face up.
 - Screw holes may be damaged if screws are tightened with a torque greater than the specified torque. The specified tightening torque is 5 - 6 kgf·cm.
 - If you use a CFast card other than the optional card, we cannot guarantee the specifications of this product. To use the product within its specifications, be sure to use the optional CFast card.
 - To prevent potential damage caused by static electricity, take appropriate anti-static measures (for example, wearing an anti-static wristband) when inserting or removing the CFast card.
 - Do not touch the electronic board components when inserting or removing the CFast card.
 - Do not touch the terminals on the CFast card. Doing so may damage the card.
 - Be careful not to mistake the orientation of the CFast card when inserting it. Also, do not use excessive force when inserting the CFast card. Doing so may damage the connector.
 - Do not drop or otherwise subject the CFast card to strong impacts before insertion. Doing so may damage the card.
-

Attaching the Attachment Fittings

- (1) Use screws to attach the bundled attachment fittings with a screw.
Do not tighten screws with excess force.

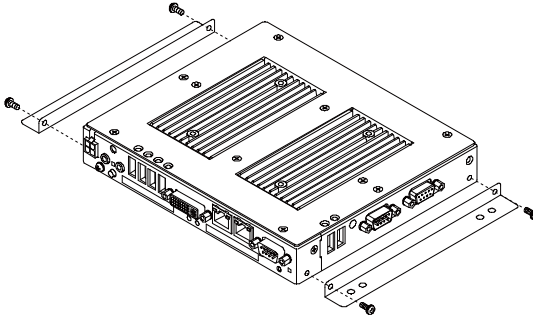


Figure 3.2. Attaching the Attachment Fittings

⚠ CAUTION

- Screw holes may be damaged if screws are tightened with a torque greater than the specified torque. The specified tightening torque is 5 - 6kgf·cm.

Attaching the FG

- (1) Use screws to attach the FG.

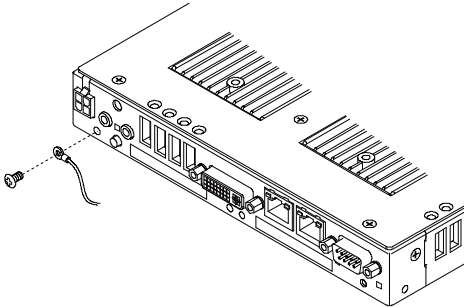


Figure 3.3. Attaching the FG

⚠ CAUTION

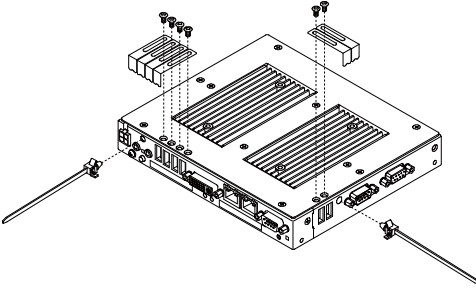
- The FG pin of this product is connected to the GND signal of the DC power connector (DC-IN).
- Note that the connection cannot be cut off.
- Screw holes may be damaged if screws are tightened with a torque greater than the specified torque. The specified tightening torque is 5 - 6kgf·cm.

Fastening the Cable

This product comes with clamps for fixing cables.

Fastening the LINEOUT, USB Cable

- (1) The system unit has a hole for attaching cable clamp to USB (*1) removal prevention fitting. Using a cable clamp for a cable with lock-less connector, such as the LINEOUT and USB Cable, prevents the connector from being unplugged. Use the cable ties and cable clamps appropriately according to the connecting states and wiring directions of cables.



*1 Attached screw (M3 x 6)

Figure 3.4. Attaching the cable clamp

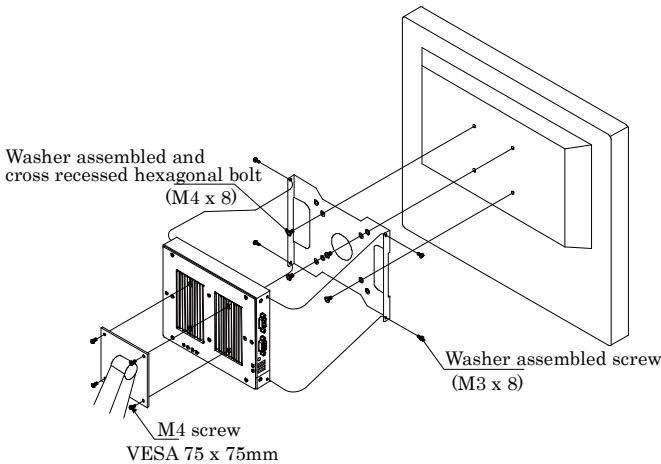
- (2) The photo below shows an example of using a cable clamp. Fix the cable with a clamp without applying stress to the connector.



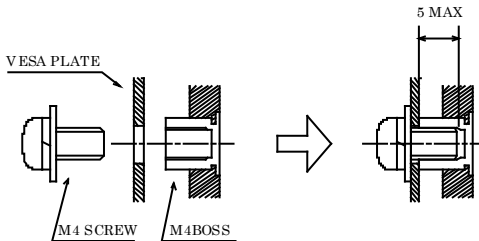
Figure 3.5. Using example of cable clamp

Installation of VESA metal fittings

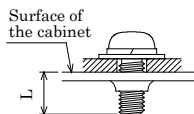
It corresponds to this product VESA standard. Please refer to the following for the VESA installation and the method of installing VESA mounting hardware "BX-BKT-VESA02".



- *1 : The screw length for VESA installation should be less than (VESA PLATE thickness + 5 mm).
If not doing so, it may be exactly fixed.



- *2 : When you fasten the bundled attachment fittings to be fixed to the body, you should use the attached screws (M3 x 8). Otherwise, the length (L) from the surface of the cabinet to the screw tip should be 6mm or less.
If not doing so, it may be damaged.



- *3 : The liquid crystal display is possible and weight that can be the installation it is 8 kg or less possible.

Figure 3.6. Installation of VESA metal fittings

Installation Requirements

There are limits to the ambient temperature range depending on the installation orientation.

Be sure that the operating temperature is within the range specified in the installation environment requirement by making space between the product and device that generates heat or exhaust air.

BX-956SD-DCxxxxxx

Installable directions at operating temperature 0 - +50°C

: (1), (6) Horizontal installation

Installable directions at operating temperature 0 - +45°C

: All type of installation other than above (including diagonal installation)

When using 1000BASE-T

Installable directions at operating temperature 0 - +45°C

: (1), (6) Horizontal installation

Installable directions at operating temperature 0 - +40°C

: All type of installation other than above (including diagonal installation)

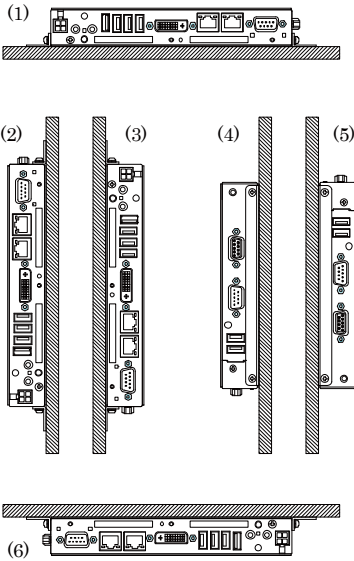


Figure 3.7. Installation Orientation

⚠ CAUTION

Note that even though the ambient temperature is within the specified range, an operational malfunction may occur if there is other device generating high heat; the radiation will influence the product to increase its temperature.

Distances between this product and its vicinity

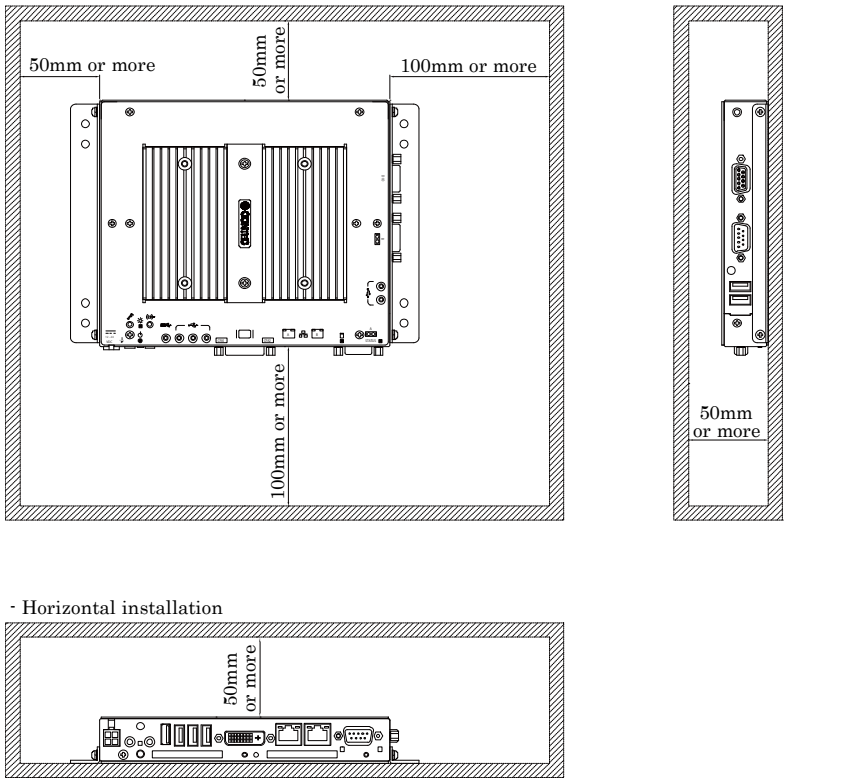


Figure 3.8. Distances between this product and its vicinity



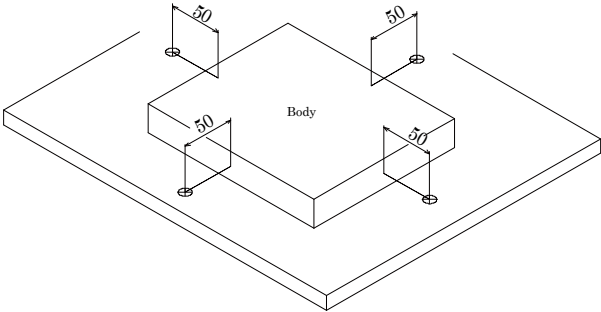
CAUTION

- Wall temperatures should be within the guaranteed operating temperature range of the product.
- Adjust the air flow so as not to allow waste heat from the product to accumulate around the product.
- Do not install this product in completely sealed spaces, except when it is possible to adjust the internal temperature using an air conditioner or similar equipment. Temperature increase caused by long-term usage may result in operational malfunction or other problems.

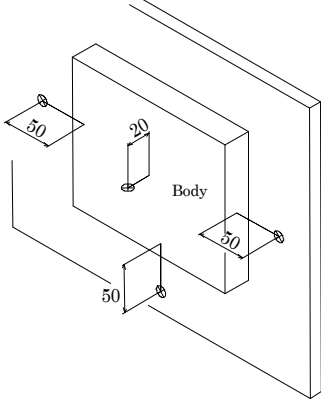
Operating temperature

In this product, the operating temperature is decided from the multiple measurement points as shown below. When making use of the product, the air current should be adjusted to prevent that all the temperatures measured at the measurement points exceed the specified temperature.

- Ground conditions 1



- Ground conditions 2 to 5



- Ground conditions 6

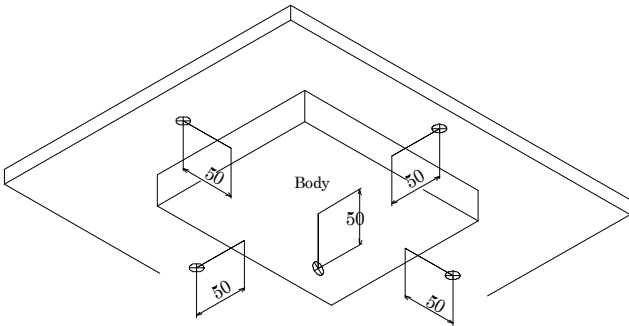


Figure 3.9. Operating temperature

4. BIOS Setup

Introduction

This chapter discusses American Megatrends's (AMI) Setup program built into the NVRAM BIOS. The Setup program allows users to modify the basic system configuration. This special information is then stored in NVRAM so that it retains the Setup information when the power is turned off.

The rest of this chapter is intended to guide you through the process of configuring your system using Setup.

Starting Setup

The AMI BIOS is immediately activated when you first power on the computer. The BIOS reads the system information contained in the NVRAM and begins the process of checking out the system and configuring it. When it finishes, the BIOS will seek an operating system on one of the disks and then launch and turn control over to the operating system.

While the BIOS is in control, the Setup program can be activated in one of two ways:

- 1 By pressing or <Esc> immediately after switching the system on, or
- 2 By pressing the or <ESC> key when the following message appears briefly at the bottom of the screen during the POST (Power On Self-Test).

Press or <Esc> to enter setup.

If the message disappears before you respond and you still wish to enter Setup, restart the system to try again by turning it OFF then ON on the system case. You may also restart by simultaneously pressing <Ctrl>, <Alt>, and <Delete> keys.

Using Setup

In general, you use the arrow keys to highlight items, press <Enter> to select, use the PageUp and PageDown keys to change entries, press <F1> for help and press <Esc> to quit. The following table provides more detail about how to navigate in the Setup program using the keyboard.

Table 4.1. Using Setup

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
Move 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 previous number from NVRAM.
F3	Load Windows 7 defaults from BIOS default table.
F4	Save all the changed settings to the NVRAM and exit
F5	Load Windows 10 defaults from BIOS default table.

Getting Help

Press F1 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> or the F1 key again.

In Case of Problems

If you cannot boot the computer after using Setup to change and save system settings, the computer will have to be repaired. It is safest not to change system settings you do not fully understand. Therefore, it is strongly recommended that you do not change any of the default settings for the cpu/chipset. These defaults have been selected with sufficient consideration by the AMI and system manufacturers to ensure maximum performance and reliability. Even changing the chipset settings slightly can result in an unavoidable need for repairs.

A Final Note About Setup

The information in this chapter is subject to change without notice.

Main Menu

When the setup program (Aptio Startup Utility) is started, the main menu will be displayed. Navigate through the various tabs by pressing the right and left arrow keys.

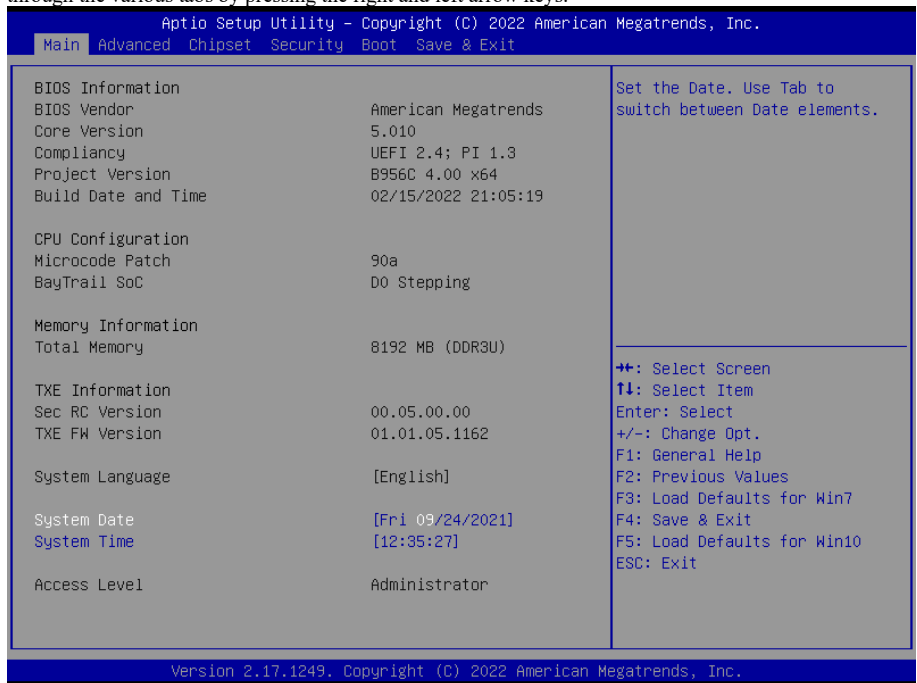


Figure 4.1. Main Menu (Actual Display May Vary)

Setup Items

The selectable tabs are as follows.

Main

View the basic system structure, and configure the language settings and the date and time settings.

Advanced

Specify the detailed functions that can be set on the system used.

Chipset

Specify the detailed functions that can be set on the system used.

Security

Set the password to be used to protect the security of the system.

Boot

Configure the settings related to how the system will boot.

Save & Exit
Load/save setup items and exit the setup menu.

Main

View the basic system structure. The following items are displayed.

Table 4.2. Indication item of the main menu

Item	Indication example	Explanation
BIOS Vendor	American Megatrends	Displays the BIOS manufacturer.
Core Version	5.010	Displays the BIOS core version.
Compliancy	UEFI 2.4; PI 1.3	Displays the UEFI version.
Project Version	B956C x.xx x64	Displays the BIOS version.
Build Data and Time	xx/xx/xxxx xx:xx:xx	Displays the BIOS creation date and time.
Access Level	Administrator	Displays the access rights level.

This table shows the selections that you can make on the Main Menu.

Table 4.3. Main Menu Selections

Item	Options	Description
System Date	Week Day Month / Day / Year	Set the system date. Note that the 'Day' automatically changes when you set the date
System Time	Hour : Minute : Second	Set the system time

Advanced

Specify the detailed system functions. The following items are available.

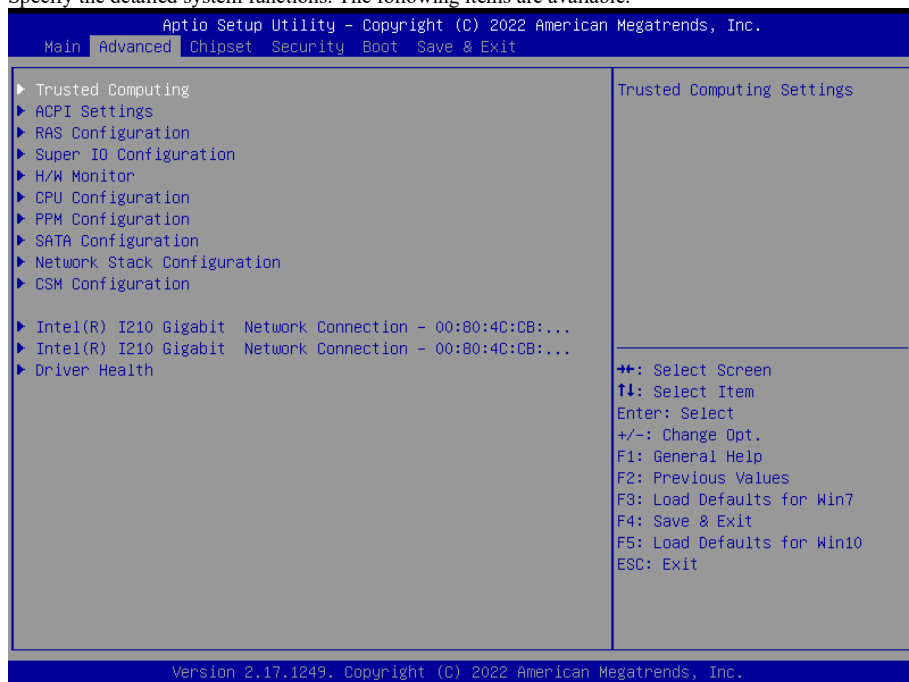


Figure 4.2. Advanced Menu

Trusted Computing

Configure the TPM settings.

ACPI Settings

Configure the ACPI settings.

RAS Configuration

Configure the RAS settings.

Super IO Configuration

Configure the Super IO settings.

H/W Monitor

View such hardwaremonitor information as the CPU temperature.

CPU Configuration

Configure the CPU settings.

PPM Configuration

Configure the power saving function settings.

SATA Configuration

Configure the SATA controller settings.

4. BIOS Setup

Network Stack Configuration

Use this menu to configure the network stack settings.

CSM Configuration

Configure such settings as the boot options.

Intel(R) I210 Gigabit Network Connection

Use this menu to configure the LAN A and B settings.

Trusted Computing

Configure the operation settings for TPM.



Figure 4.3 Trusted Computing

Table 4.4 Trusted Computing

Item	Option	Description
Security Device Support	Disabled	Enable or disable the TPM device.
	Enabled	Change to Enabled when using the TPM.

Table 4.5 Security Device Support (Only Available When "Enabled" Is Selected)

Item	Option	Description
Pending operation	None TPM Clear	Select the TPM Clear when reinitializing TPM. TPM will be reinitialized after rebooting.
Platform Hierarchy	Disabled Enabled	Generally, operate with "Enabled".
Storage Hierarchy	Disabled Enabled	Generally, operate with "Enabled".
Endorsement Hierarchy	Disabled Enabled	Generally, operate with "Enabled".
HashPolicy	Sha-1 Sha-2	Specify algorithms for hashing. Generally, operate with "Sha-1".
TPM 20 InterfaceType	CRB TIS	Specify how to access to TPM. Specify CRB when operating on Windows 10.
Device Select	TPM2.0	Select a device for operations.

4. BIOS Setup

Item	Option	Description
		Settings cannot be changed as TPM 2.0 is fixed.

 **CAUTION** — If TPM is already used with encryption software such as "Bit Locker", decode the encryption by selecting [TPM Clear] first. Then reinitialize the TPM. After the reinitialization, encrypt it with encryption software once more.

ACPI Settings

Configure the settings for ACPI power management.

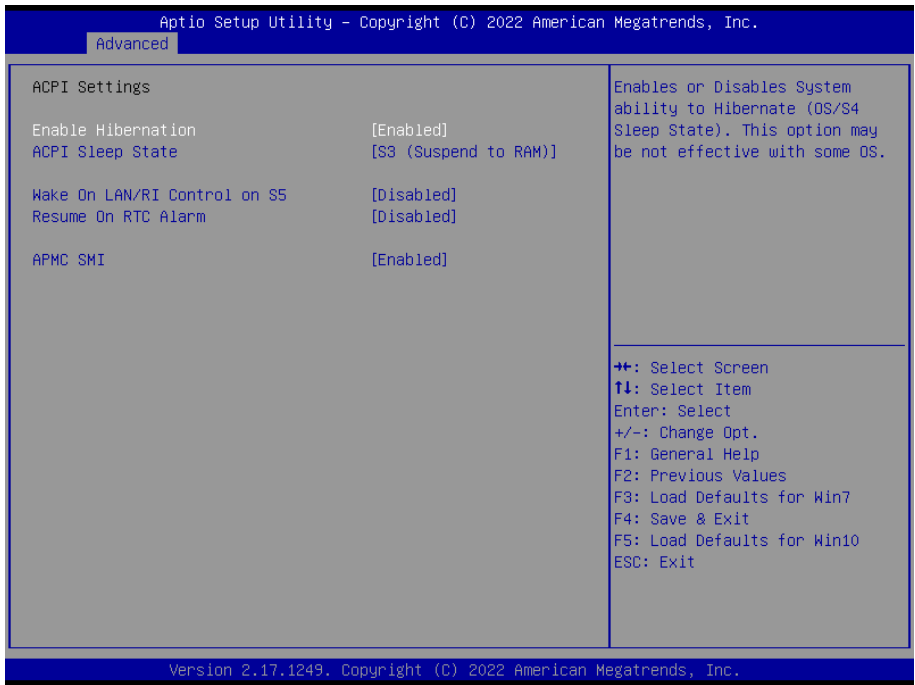


Figure 4.4. ACPI Settings

Table 4.6. ACPI Settings

Item	Option	Description
Enable Hibernation	Disabled Enabled	Configure the Hibernation settings.
ACPI Sleep State	Suspend Disabled S3 (Suspend to RAM)	Configure the Sleep State settings.
Wake on LAN/RI Control on S5	Disabled Enabled	Configure the Wake on LAN settings and Resume on Ring function settings.
Resume on RTC Alarm	Disabled Enabled	Enable or disable the function for automatically turning on the system at the specified date and time. When enabled, use the following items to set the date and time the system will automatically turn on.
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.

Table 4.7. Resume On RTC Alarm (Only Available When "Enabled" Is Selected)

Item	Option	Description
RTC Wake up Day	0-31	Sets the day the system will automatically turn on.
RTC Wake up Hour	0-23	Sets the time the system will automatically turn on.
RTC Wake up Minute	0-59	Sets the minute the system will automatically turn on.
RTC Wake up Second	0-59	Sets the second the system will automatically turn on.

RAS Configuration

Configure such settings as the RAS.



Figure 4.5. RAS Configuration (Actual Display May Vary.)

Table 4.8. RAS Configuraiton

Item	Option	Description
Auto Recovery	Disabled Enabled	Set the auto-recovery function for resetting the system if it freezes during BIOS startup. Normally set this to Enabled.
WDT during Boot of the OS	Disabled Enabled	Configure the WDT function settings at OS start-up.

Table 4.9. RAS Configuraiton

Item	Option	Description
WDT Value (Seconds)	1-254	Sets the timeout time of WDT functions

Super IO Configuration

Configure the operation settings for Super IO.



Figure 4.6. Super IO Configuration

Table 4.10. Super IO Configuration

Item	Option	Description
Serial Port A Configuration	Refer to Table 4.11.	-
Serial Port B Configuration	Refer to Table 4.12.	-
RS-485 Port Configuration	Refer to Table 4.13.	-

Table 4.11. Serial Port A Configuration

Item	Option	Description
Serial Port	Disabled Enabled	Configure the operation settings for serial port A.
Change Settings	IO=3F8h; IRQ=4 IO=2A0h; IRQ=3,4,5,6; IO=2E8h; IRQ=3,4,5,6; IO=2F8h; IRQ=3,4,5,6; IO=3E8h; IRQ=3,4,5,6; IO=3F8h; IRQ=3,4,5,6;	Do not change this setting.

Item	Option	Description
	IO=2D0-2F8h; IRQ=3,4,5,6;	

Table 4.12. Serial Port B Configuration

Item	Option	Description
Serial Port	Disabled Enabled	Configure the operation settings for serial port B.
Change Settings	IO=2F8h; IRQ=3; IO=2A0h; IRQ=3,4,5,6; IO=2E8h; IRQ=3,4,5,6; IO=2F8h; IRQ=3,4,5,6; IO=3E8h; IRQ=3,4,5,6; IO=3F8h; IRQ=3,4,5,6; IO=2D0-2F8h; IRQ=3,4,5,6;	Do not change this setting.

Table 4.13. Digital I/O Configuration

Item	Option	Description
GPIO 0 GPIO 1 GPIO 2 GPIO 3 GPIO 4 GPIO 5	Input Output High Output Low	Configure the operation settings for Digital I/O (input/output). And, configure the operation settings for output-level (High/Low). Input : Use as a general-purpose input. Output High : Use as a general-purpose output. Output Low : Use as a general-purpose output.

H/W Monitor

View hardware monitor information such as the CPU temperature.

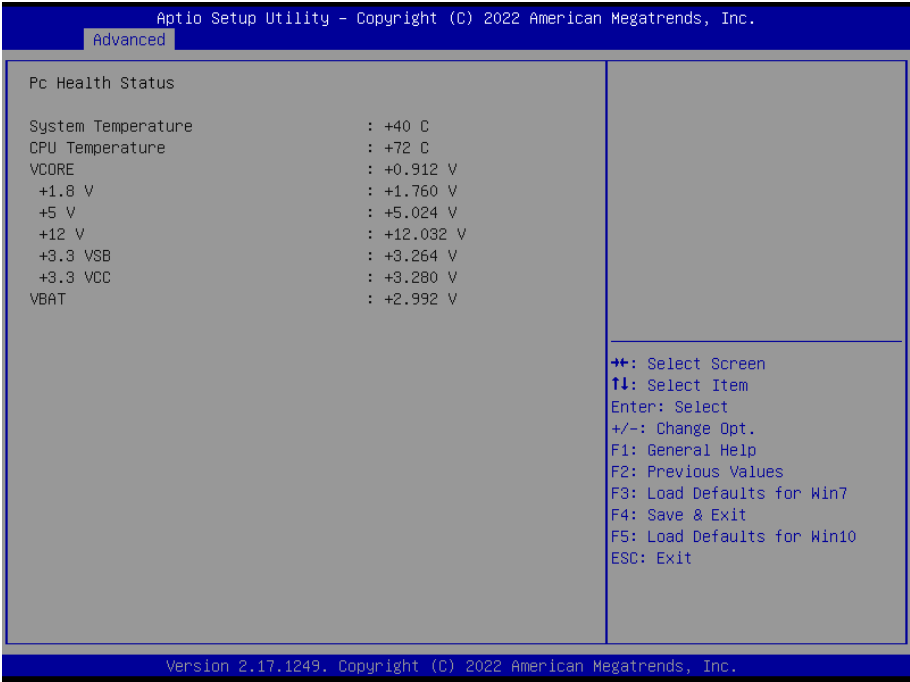


Figure 4.7. H/W Monitor (Actual Display May Vary.)

CPU Configuration

Configure the operation settings for CPU.



Figure 4.8. CPU Configuration

Table 4.14. CPU Configuration

Item	Option	Description
Socket 0 CPU Information		View CPU information.
Execute Disable Bit	Disabled Enabled	Do not change this setting.
Intel Virtualization Technology	Disabled Enabled	Do not change this setting.

PPM Configuration

Configure the power saving function settings.

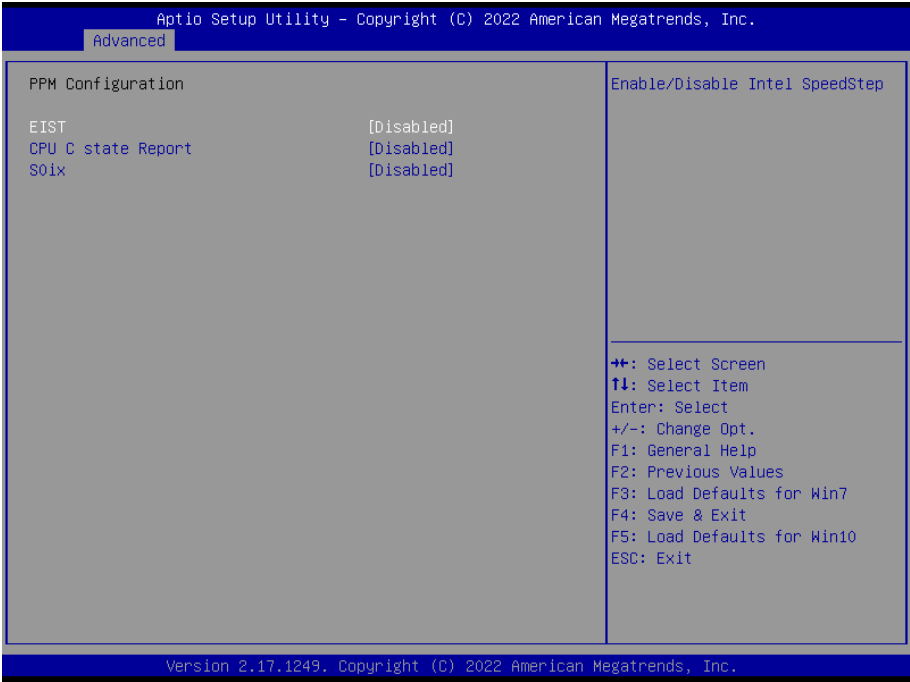


Figure 4.9. PPM Configuration

Table 4.15. PPM Configuration

Item	Option	Description
EIST	Disabled	Do not change this setting.
	Enabled	
CPU C-State Report	Disabled	Do not change this setting.
	Enabled	
SOix	Disabled	Do not change this setting.
	Enabled	

SATA Configuration

Configure the SATA controller settings.

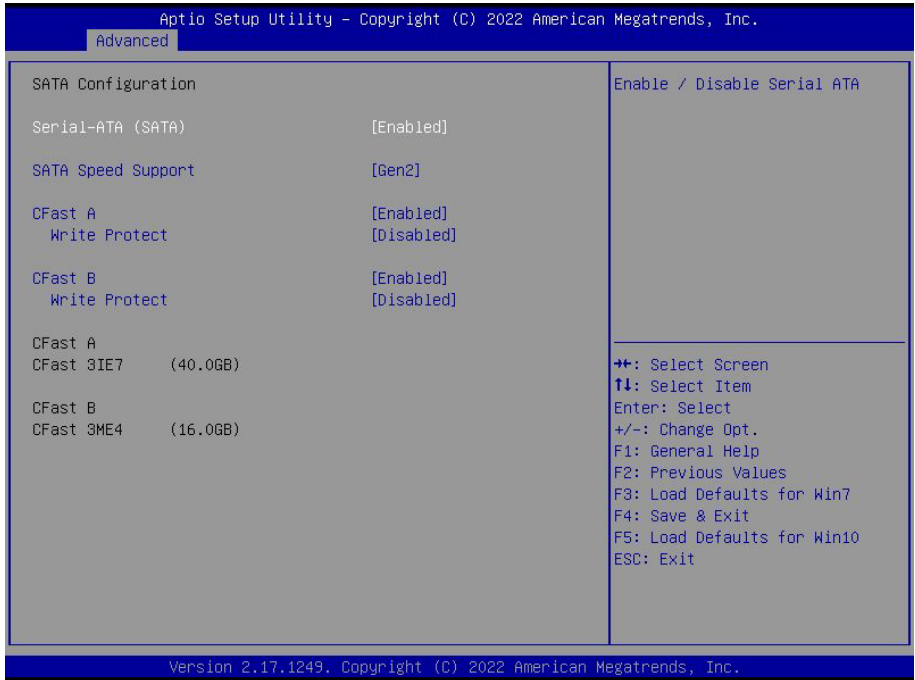


Figure 4.10. SATA Configuration

Table 4.16. SATA Configuration

Item	Option	Description
Serial-ATA (SATA)	Disabled Enabled	Configure the SATA controller operation settings. Changing this setting will cause the CFAST drive to become unrecognized.
SATA Speed Support	Gen1 Gen2	Do not change this setting.
CFAST A	Disabled Enabled	Configure the CFAST A settings.
CFAST B	Disabled Enabled	Configure the CFAST B settings.
Write Protect	Disabled Enabled	Displayed only when an SSD that supports CFAST is detected. Set to Enabled to disable writing to the target SATA device.

Network Stack Configuration

Use this menu to configure the network stack settings.

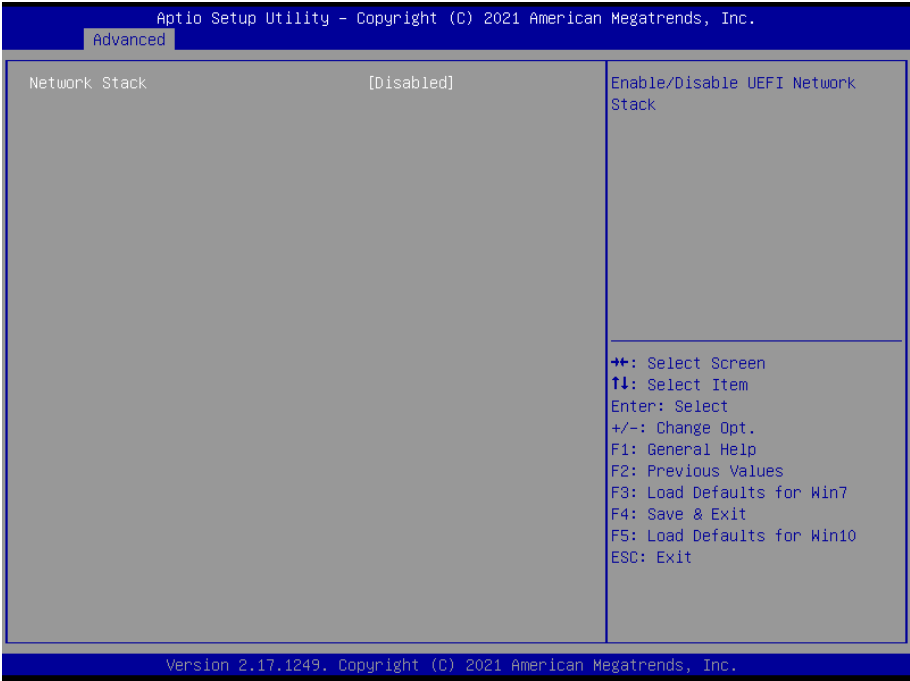


Figure 4.11. Network Stack Configuration

Table 4.17. Network Stack Configuration

Item	Option	Description
Network Stack	Disabled Enabled	Configure the UEFI network function settings.

Table 4.18. Network Stack (Available only when Enabled is selected)

Item	Option	Description
Ipv4 PXE Support	Disabled Enabled	Configure the IPv4 PXE settings.
PXE boot wait time	0	Set the wait time before canceling PXE boot by pressing the ESC key.
Media detect count	1	Set how many times to detect network devices.

Table 4.19. Ipv4 PXE Support (Only Enabled)

Item	Option	Description
Ipv4 Address 0-3	192.168.1.1	Set the IPv4 access address when starting Contec tools using PXE boot.

CSM Configuration

Configure settings associated with the CSM (Compatibility Support Module), such as Option ROM execution.

When Windows 7 Load Defaults is performed, CSM Support setting is [Enabled].

When Windows 10 Load Defaults is performed, CSM Support setting is [Disabled].

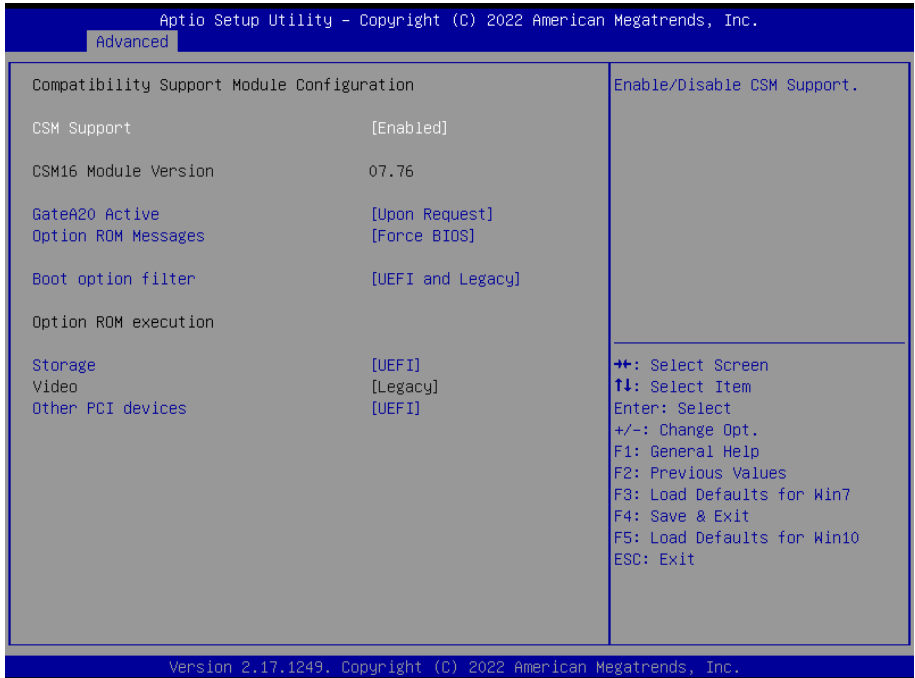


Figure 4.12. CSM Configuration

Table 4.20. CSM Configuration

Item	Option	Description
CSM Support	Disabled Enabled	Do not change this setting.
GateA20 Active	Upon Request Always	Do not change this setting.
Option ROM Message	Force BIOS Keep Current	Do not change this setting.
Boot option filter	UEFI and Legacy Legacy only UEFI only	Do not change this setting.
Storage	Do not launch UEFI Legacy	Do not change this setting.
Video	Do not launch UEFI Legacy	Do not change this setting.

4. BIOS Setup

Item	Option	Description
Other PCI devices	Do not launch UEFI Legacy	Do not change this setting.

Intel(R) I210 Gigabit Network Connection

Use this menu to configure Gigabit Ethernet settings.

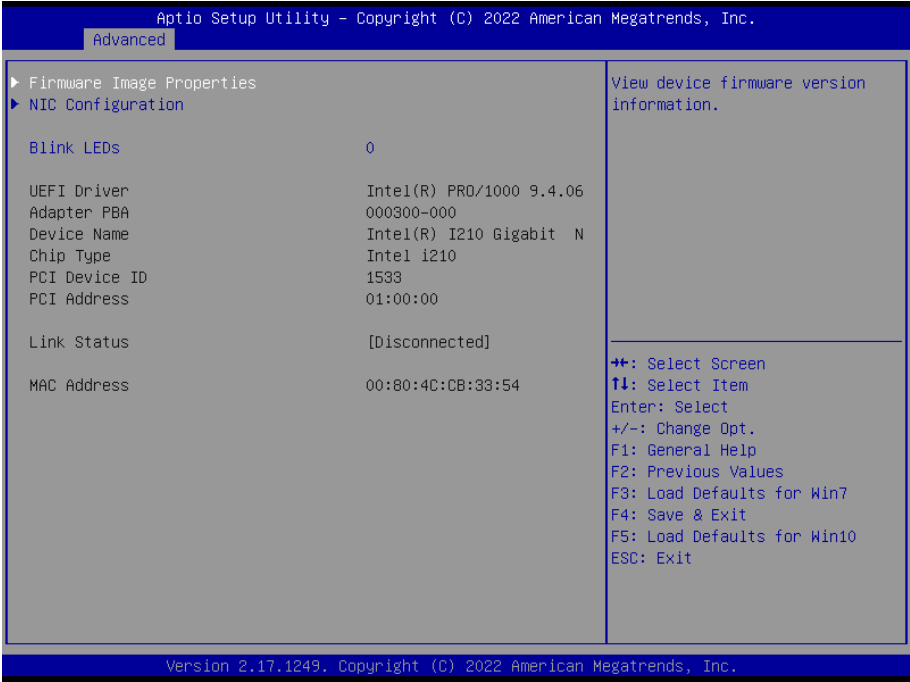


Figure 4.13. Intel(R) I210 Gigabit Network Connection (Actual display may differ)

Table 4.21. Intel(R) I210 Gigabit Network Connection

Item	Option	Description
Blink LEDs	0-15	Set the LEDs associated with the Ethernet connector to flash for the number of seconds specified under Options.

Table 4.22. NIC Configuration

Item	Option	Description
Link Speed	Auto Negotiated / 10 Mbps Half / 10 Mbps Full / 100 Mbps Half / 100 Mbps Full	Set the Ethernet communication speed. Select Auto Negotiated to automatically determine the best speed setting based on a full duplex of up to 1 Gbps. Select a different option to set a fixed communication speed and method.
Wake On LAN	Disabled <u>Enabled</u>	Configure the Wake On LAN settings. This function will be enabled only if the Wake On LAN/RI Control on S5 setting is set to Enabled in the ACPI Settings.

Chipset

Specify the detailed chipset functions.

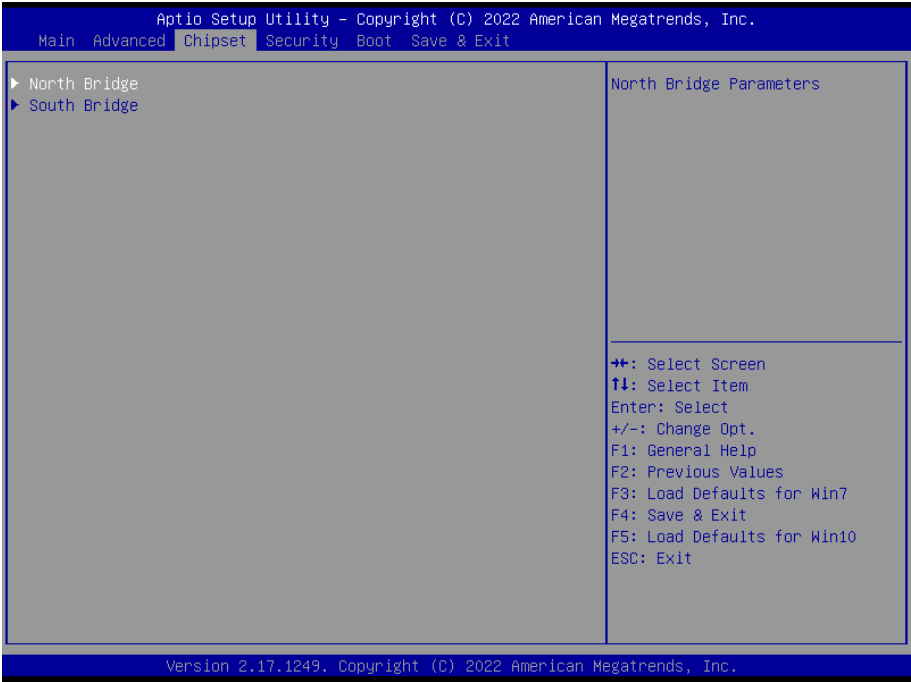


Figure 4.14. Chipset

The following items are available.

- North Bridge
Configure the operation settings for North Bridge.
- South Bridge
Configure the operation settings for South Bridge.

North Bridge

Configure the operation settings for North Bridge.

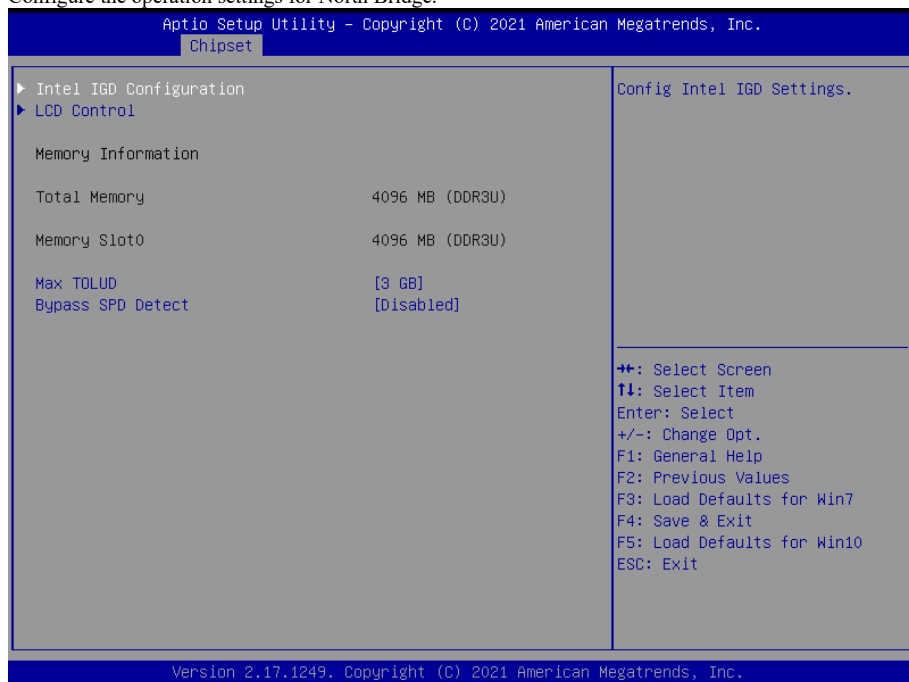


Figure 4.15. North Bridge

Table 4.23. North Bridge

Item	Option	Description
Intel IGD Configuration	Refer to Table 4.24.	-
LCD Control	Refer to Table 4.25.	-
Max TOLUD	2 GB 2.25 GB 2.5 GB 2.75 GB 3GB	Do not change this setting.
Bypass SPD Detect	Disable Enabled	Do not change this setting.

Intel IGD Configuration

Configure how memory will be used when using the graphic function.
Leave these settings as configured before shipment.

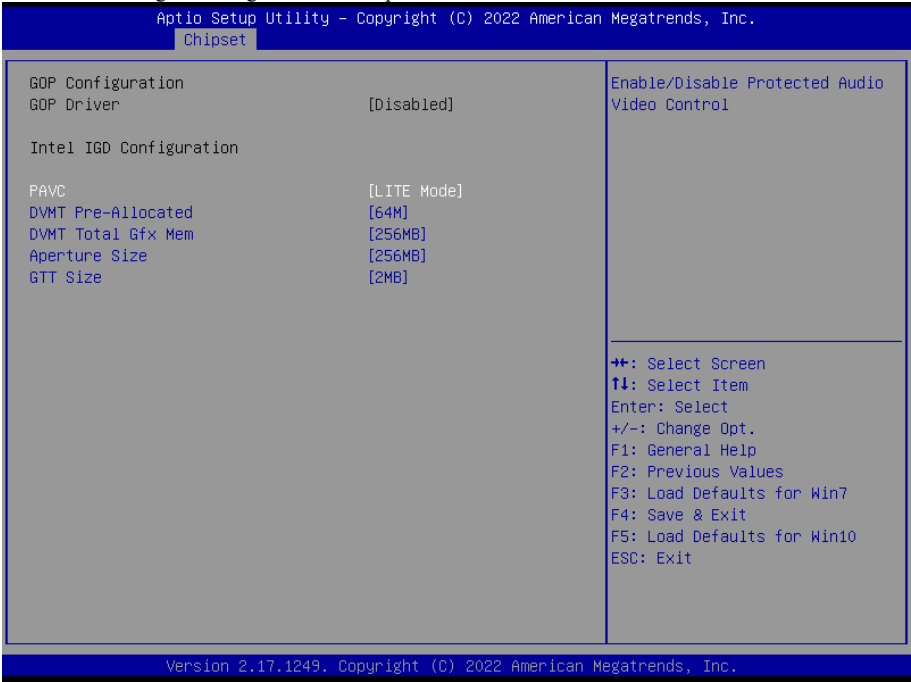


Figure 4.16. Intel GOP Configuration

Table 4.24. Intel GOP Configuration

Item	Option	Description
GOP Driver	Disabled	Do not change this setting.
	Enabled	
PAVC	Disabled	Do not change this setting.
	LITE Mode	
	SERPENT Mode	
DVMT Pre-Allocated	64MB	Do not change this setting.
	96MB	
	128MB	
	160MB	
	192MB	
	224MB	
	256MB	
	288MB	
	320MB	
	352MB	
	416MB	

Item	Option	Description
	448MB 512MB	
DVMT Total Gfx Mem	128MB 256MB Max	Do not change this setting.
Aperture Size	128MB 256MB 512MB	Do not change this setting.
GTT Size	1MB 2MB	Do not change this setting.

LCD Control

Configure the LCD settings.

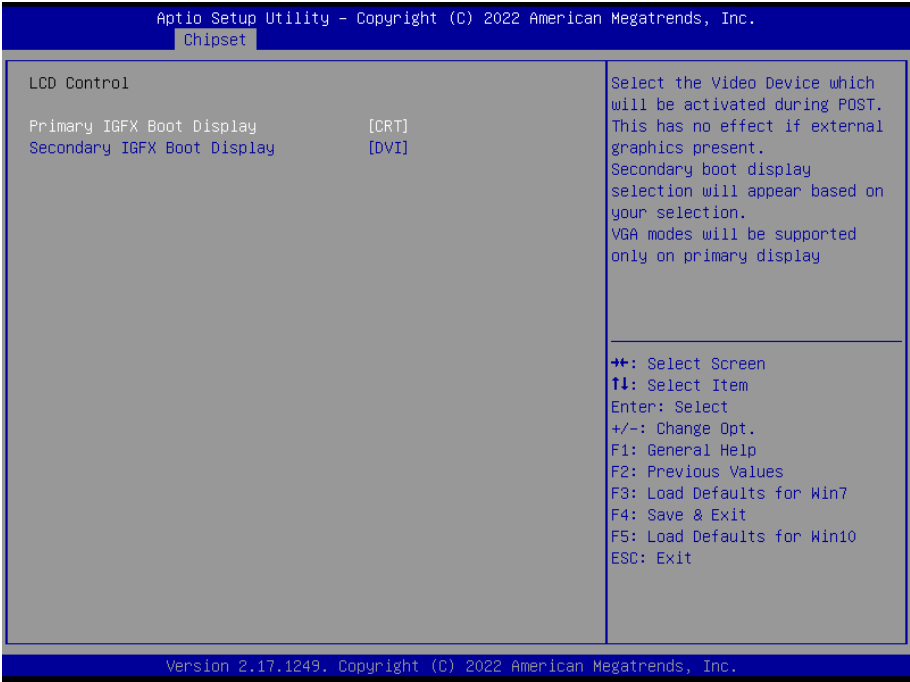


Figure 4.17. LCD Control

Table 4.25. LCD Control

Item	Option	Description
Primary IGFX Boot Display	CRT DVI LFP	Configure the settings for the port that will be output as the main display at start-up. Only the main display is displayed during OS recovery. Change the settings to suit the type of connected display.
Secondary IGFX Boot Display	Disabled CRT DVI LFP	Configure the settings for the port that will be output as the auxiliary display at start-up. This will make it possible to use an auxiliary display after the OS boots.

South Bridge Configuration

Configure the South Bridge settings.

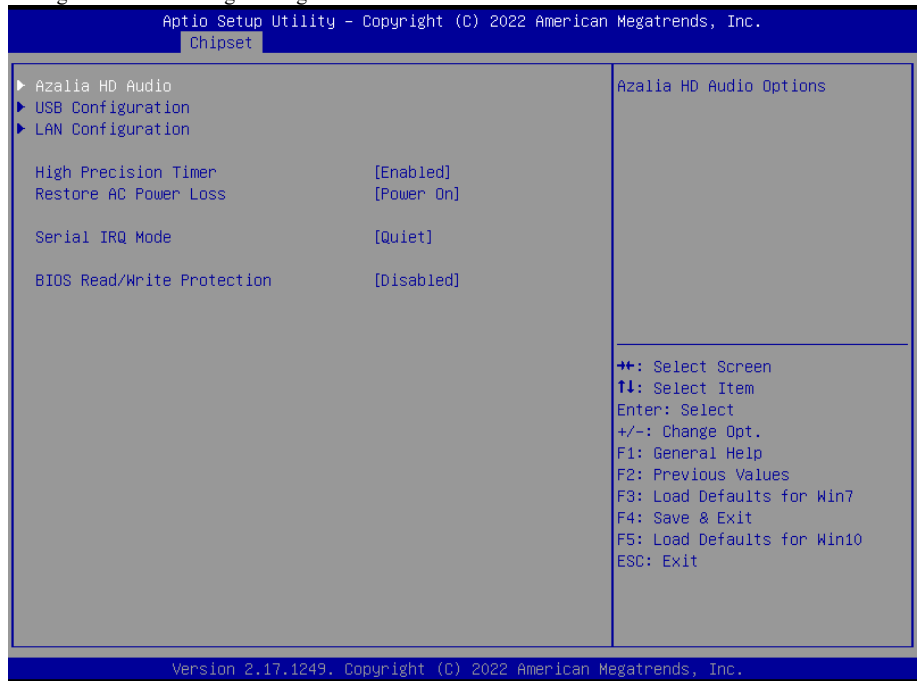


Figure 4.18. PCH-IO Configuration

Table 4.26. PCH-IO Configuration

Item	Option	Description
Azalia HD Audio	Refer to Table 4.27.	-
USB Configuration	Refer to Table 4.28.	-
LAN Configuration	Refer to Table 4.29.	-
High Precision Timer	Disabled Enabled	Configure the high-precision event timer settings.
Restore AC Power Loss	Power Off Power On Last State	Set whether to start the system 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. Power ON: The system will start at the same time the power supply starts. Last State: If the power is turned off while the system is on, the system will start the next time the power supply starts.

4. BIOS Setup

Item	Option	Description
Serial IRQ Mode	Quiet Continuous	Do not change this setting.
BIOS Read/Write Protection	Disabled Enabled	Configure the BIOS lock operation settings. Enable to prohibit BIOS rewrites.

Azalia HD Audio Configuration

Configure the Azalia HD Audio settings.

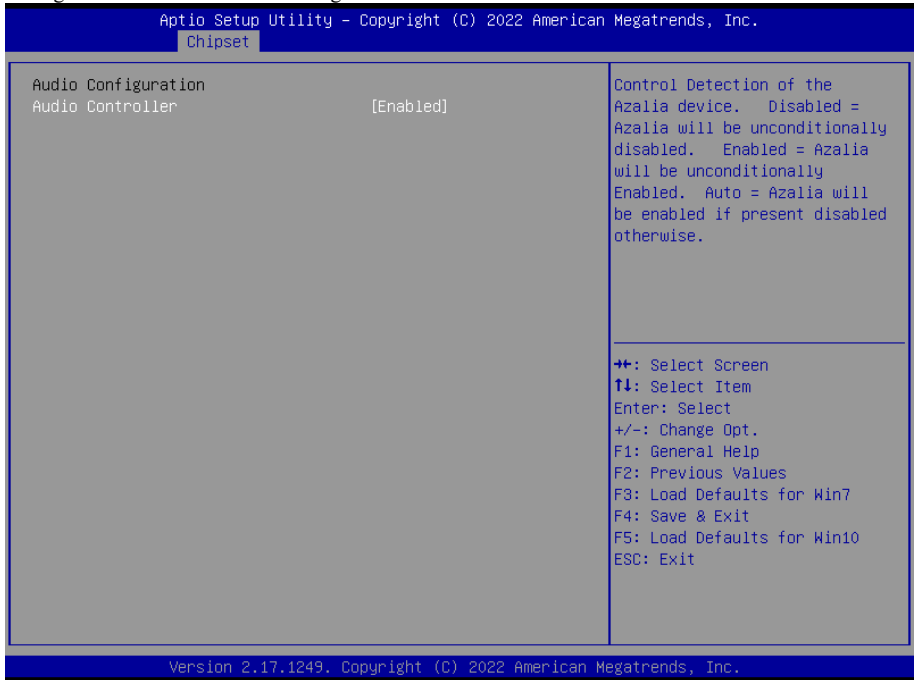


Figure 4.19. Azalia HD Audio Configuration

Table 4.27. Azalia HD Audio Configuration

Item	Option	Description
Audio Controller	Disabled	Configure the Audio Controller settings.
	Enabled	

USB Configuration

Configure the USB settings.

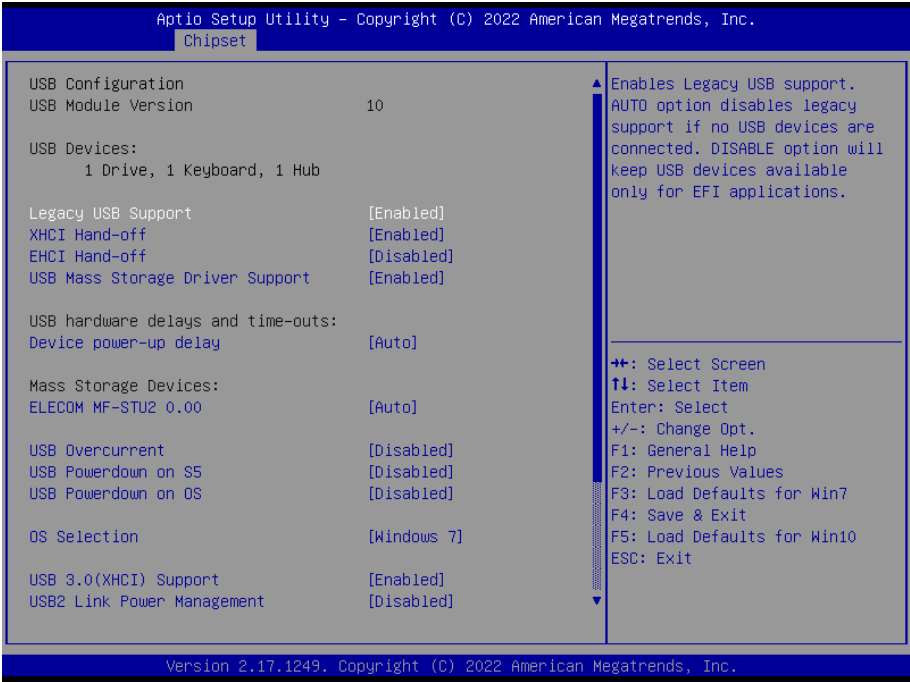


Figure 4.20. USB Configuration

Table 4.28. USB Configuration

Item	Option	Description
Legacy USB Support	Enabled	Configure whether USB keyboards and similar devices will be usable with legacy operating systems (such as MS-DOS).
	Disabled	
	Auto	
XHCI Hand-off	Disabled	Do not change this setting.
	Enabled	
EHCI Hand-off	Disabled	Do not change this setting.
	Enabled	
USB Mass Storage Driver Support	Disabled	Configure the USB storage support settings with BIOS.
	Enabled	
Device power-up delay	Auto	Do not change this setting.
	Manual	
USB Overcurrent	Disabled	Do not change this setting.
	Enabled	
USB Powerdown on S5	Disabled	Set the USB power (5 V) status when entering the S5 state after shutting down the OS. Disabled is set by default, meaning USB power (5 V) will remain on even after entering the S5 state.
	Enabled	

Item	Option	Description
		Set to Enabled to turn off USB power (5 V) when entering the S5 state.
USB Powerdown on OS	Disabled Enabled	Set to Enabled to turn off USB power (5 V) after OS booting to create a secure system with USB access prohibited.
OS Selection	Windows 8.X Android Windows 7	Do not change this setting.
USB3.0 (XHCI) Support	Enabled Disabled Smart Auto	Configure the USB 3.0 settings. This should normally be set to Enabled. Set to Smart Auto to set up a USB 3.0 driver in Windows 7.
USB2 Link Power Management	Disabled Enabled	Do not change this setting.
USB2.0 (EHCI) Support	Disabled Enabled	Do not change this setting. Setting to Disabled will prevent all USB ports from operating.

Table 4.29. USB Boot Protection

Item	Option	Description
USB Boot Protect on BIOS / OS	Enabled Disabled	Set to Enabled to store connected USB device information in NVRAM. When entering the BIOS setup menu or OS, the stored information will be checked against the actual connected USB device information. If the information does not match, the process will be stopped.
Vendor / Product / S/N	Enabled Disabled	Choose which USB information to use for checking. Vendor : Check vendor names. Product : Check product names. S/N : Check serial numbers.
USB Devine name (Vendor name)	Enabled Disabled Ignored Master	Set whether individual devices stored in NVRAM should be checked. Enabled : Check devices. Disabled : Do not check devices. *If a device set to Disabled is found, it will be considered a mismatch. Ignored : Devices set to Ignored will be considered a match whether they are found or not. Master : Devices set to Master will always be considered a match regardless of the status of other USB devices. Registering a device as Master is convenient for emergency login if the registered device is lost or does not function properly.

LAN Configuration

Configure the LAN settings

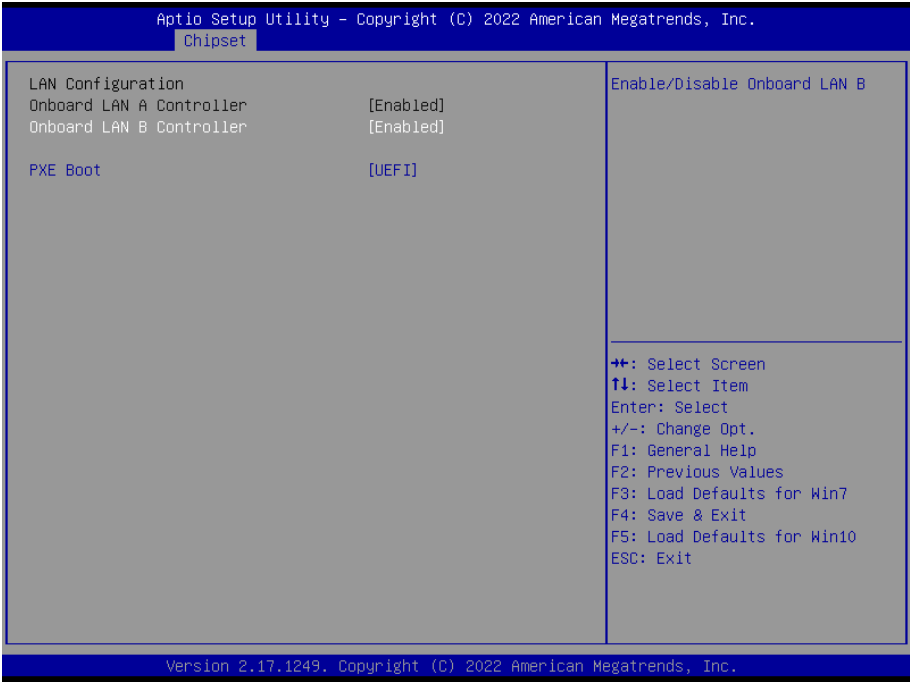


Figure 4.21. LAN Configuration

Table 4.30. LAN Configuration

Item	Option	Description
Onboard LAN A Controller	Enabled	Can not change this setting.
Onboard LAN B Controller	Disabled Enabled	Configure the LAN B Controller settings.
PXE Boot	Do not launch UEFI Legacy	Configure the PXE boot settings.

Security

Configure the security of the system settings.

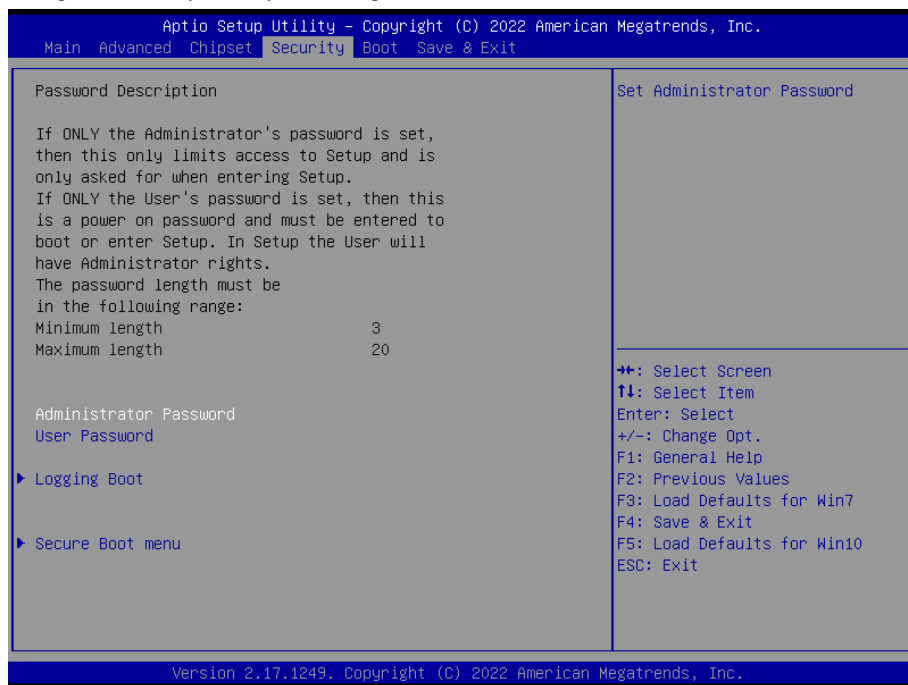


Figure 4.22. Security

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 Administrator Password entry screen again.

4. BIOS Setup

Logging Boot

Use this setting to save the system health status to USB memory at startup.

Secure Boot menu

Use this menu to configure the Secure Boot settings.



CAUTION

Be careful to not forget the password. If you forget the password, the product will have to be repaired at an extra cost.

Logging Boot

Configure the Logging Boot settings.

Use these settings to save self-diagnosis logs to a USB memory device at startup. The USB memory device must be in FAT32 format. The log will be saved as a .csv file.

Select whether to save the data at every startup, at the first startup of the day, or monthly on a specified day. Up to 512 data entries can be saved, after which older entries will be replaced by newer entries.

The saved data includes voltage, temperature, SSD erase count, SSD operating time, and date/time.

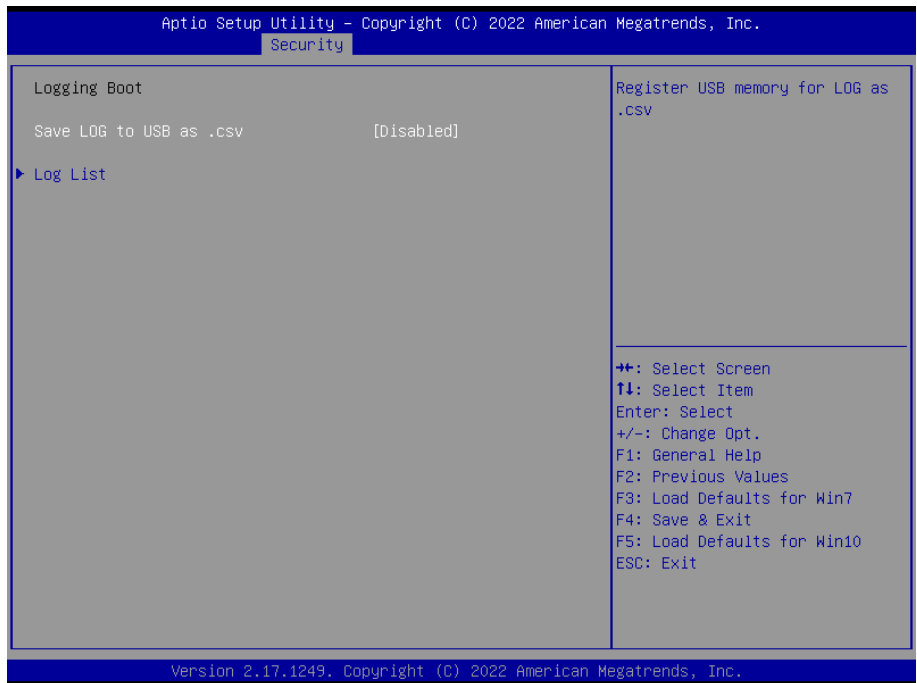


Figure 4.23. Logging Boot

Table 4.31. Logging Boot

Item	Option	Description
Save LOG to USB as .csv	Disabled Enabled	Enable or disable the function for saving logs to a USB memory device. The first USB memory device found will be set, so make sure only one USB memory device is attached to the PC during setup.
Log Timing	Always Everyday Everymonth	Select “Always” to save the log at every startup. Select “Everyday” to save the log at the first startup of every day. Select “Everymonth” to save the log at the first startup of a specified day each month.

Use the Log List menu to view the values stored in NVRAM.

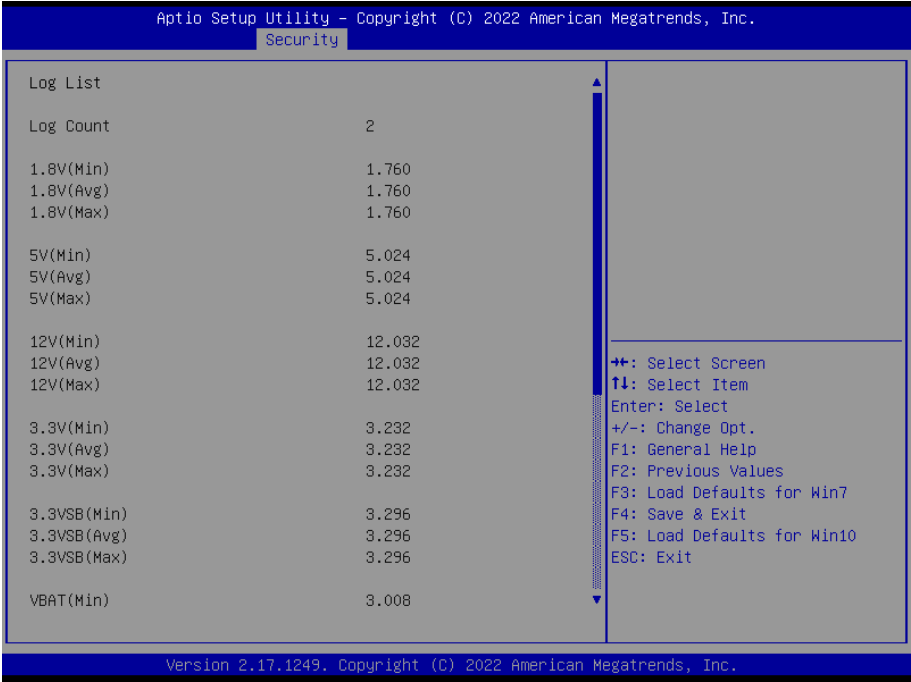


Figure 4.24. Log List (Actual display may differ)

The data will be saved to the USB memory device as a .csv file as shown below.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N				
1	COUNT	1.8V	5V	12V	3VS	3V	BAT	CPU	TEMP	SYSTEM	TEMP	ERASE	(CF)	ERASE	(CF)	TIME	(CF)	DATE
2	0	1.76	5.024	12.032	3.232	3.296	3.008	55	37	0	0	0	0	0	0	2021/9/24	18:39	
3	1	1.76	5.024	12.032	3.232	3.296	3.008	55	37	0	0	0	0	0	0	2021/9/25	0:00	

Figure 4.25 .csv file (Actual display may differ)

Secure Boot menu

Configure the Secure Boot settings.

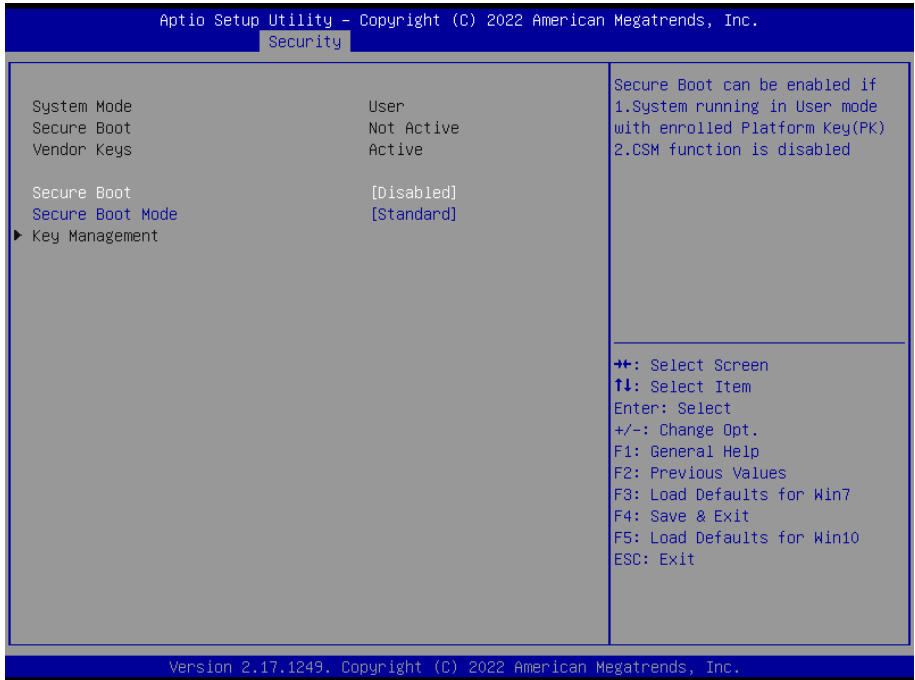


Figure 4.26. Secure Boot

Table 4.32. Secure Boot

Item	Option	Description
Secure Boot	Disabled Enabled	Enable this setting to prevent the startup and execution of anything other than UEFI apps authenticated by Windows and Contec for construction of a more secure system.
Secure Boot Mode	Standard Custom	Do not change this setting.

Boot Configuration

Configure the settings boot devices and other devices.

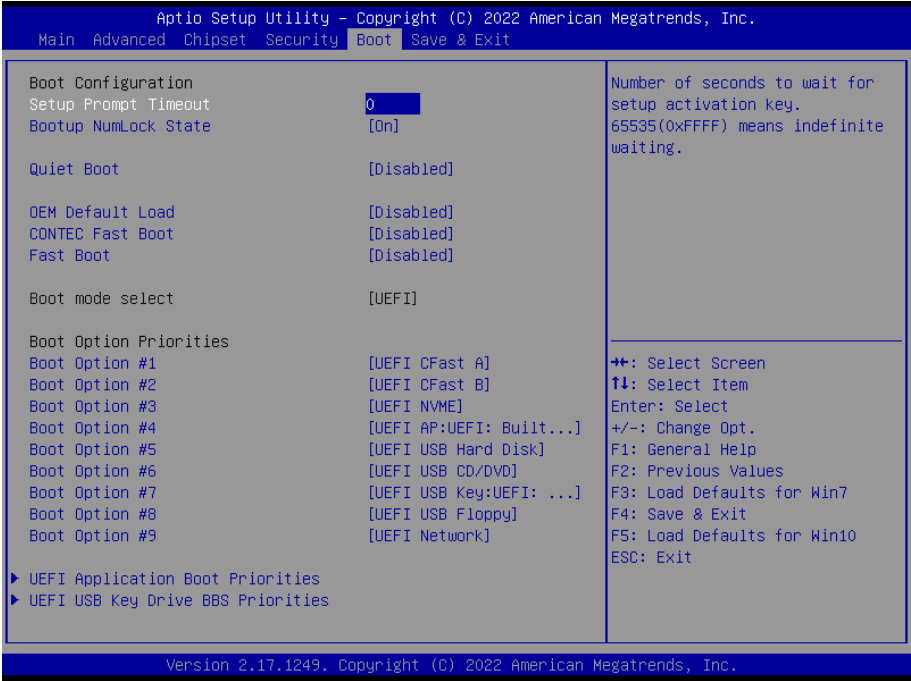


Figure 4.27. Boot Configuration

Table 4.33. Boot Configuration

Item	Option	Description
Setup Prompt Timeout	65535	Set the standby time for BIOS Setup or <F2> input. Unit : [second]
Bootup NumLock State	On Off	Set the NumLock status when the system starts.
Quiet Boot	Disabled Enabled	Specify whether to display on-screen text during BIOS startup.
OEM Default Load	Disabled Enabled	Set the initial OEM values when updating BIOS with Contec tools. When this menu is enabled, the OEM initial values are read when using Default Load.
CONTEC Fast Boot	Disabled Enabled	Configure this setting for faster startup times. When this function is enabled, Network Stack, and SMART Self Test cannot be used.
Fast Boot	Disabled Enabled	Do not change this setting.

Item	Option	Description
Boot Option #x	XXXXXXXX (Specify any device)	Set the start order of the connected USB floppy drives.

CAUTION

- In the Boot Option #x device list, the same device may be displayed as follows.
 - (1) USB Disk
 - (2) UEFI: USB Disk

In such cases, if (1) is selected, a legacy boot is performed under the assumption the disk is MBR-formatted. If (2) is selected, a UEFI boot is performed under the assumption the disk is GPT-formatted.

Windows 7 Load Defaults is performed, specify (1) for a boot setting.

Windows 10 Load Defaults is performed, specify (2) for a boot setting.
- Only devices set as the highest in individual settings like CD/DVD ROM Drive BBS Priorities are listed as selectable under Boot Option #x.

Save & Exit

Load/save setup items and exit the setup menu.

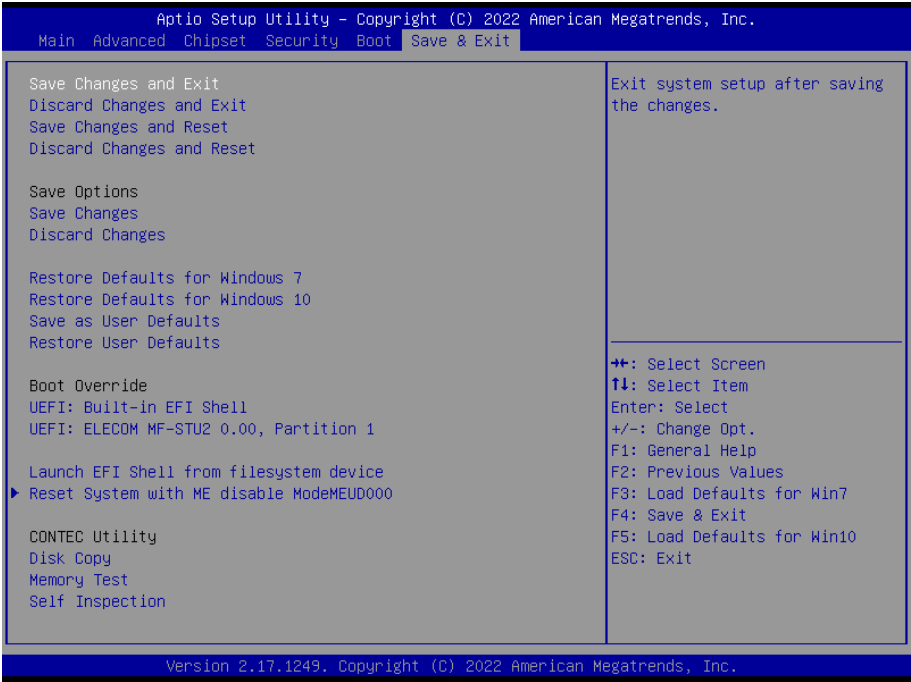


Figure 4.28. Save & Exit

- Saving Changes and Exit
Save the changed settings and exit.
- Save Changes and Reset
Save the changed settings and restart.
- Discard Change and Reset
Restart without saving the changed settings.
- Save Changes
Save the changed settings.
- Discard Changes
Discard the changed settings.
- Restore Defaults for Windows 7
Restore settings to Defaults for Windows 7.
- Restore Defaults for Windows 10
Restore settings to Defaults for Windows 10.
- Save as User Defaults
Save the settings as the user default values.

Restore User Defaults

Return the settings to the user default values.

Boot Override

Configure the settings for temporary booting from a connected device other than that set in Boot Configuration.

CONTEC Utility

Utility that runs on the UEFI environment can be used.

CONTEC Utility

Utility that runs on the UEFI environment can be used.

The following items are available.

Disk Copy

Copy the disk and perform such functions as backup and restore.

Memory Test

Execute the Memory Test of the PASSMARK.

Self Inspection

Execute the Self Inspection.

Disk Copy

Copy the disk and perform such functions as backup and restore.

This function (including the ERASE function) cannot be used unless two USB or SATA disks are connected.

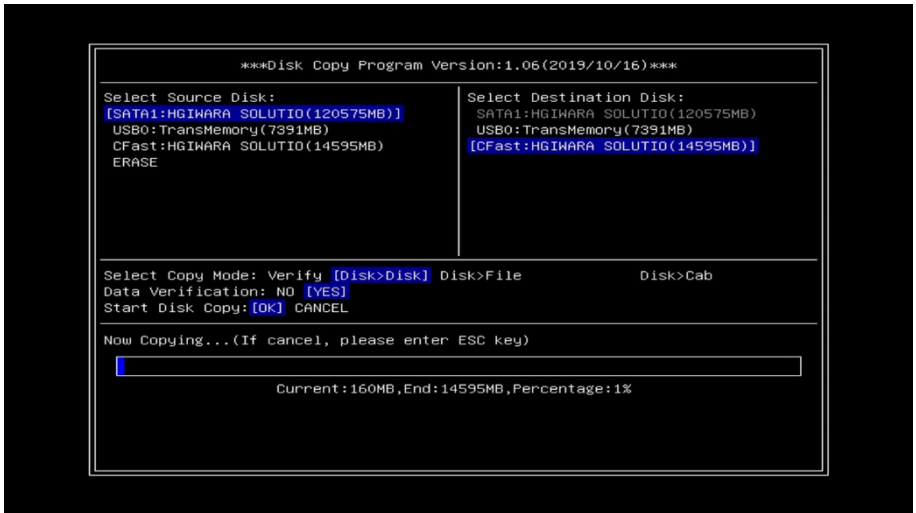


Figure 4.29. Disk Copy

Table 4.34. Disk Copy

Item	Option	Description
Select Source Disk	USBx:xxx SATAx:xxx CFast:xxx Erase	Display a connected USB or SATA disk. Select the disk you wish to copy from. When the Erase is selected, fill the entire area of the selected disk to copy with 0x00.
Select Destination Disk	USBx:xxx SATAx:xxx CFast:xxx	Display a connected USB or SATA disk. Select the disk you wish to copy to.
Select Copy Mode	Verify Disk to Disk Disk to File File to Disk Disk to Cab Cab to Disk	Select copy mode. Verify: This solely performs disk verification. Disk to Disk: Physics copy the data of source disk to destination disk. The smaller disk size is used to be copied. Disk to File: File copy the data of source disk to destination disk. File should be saved with the name of conback_x (x indicates serial number). Destination disk should be formatted as FAT32. Even copying is not yet completed, coping ends when the data is filled to the maximum size of the destination disk. File to Disk: Physics copy the data of source disk to destination disk. File is saved with the name of conback_x (x indicates serial number). Source disk should be formatted as FAT32. Even copying is not yet completed, coping ends when the data is filled to the maximum size of the destination disk. Disk to Cab: Compress file copy the data of source disk to destination disk. File should be saved with the name of concab_x (x indicates serial number). Destination disk should be formatted as FAT32. Even copying is not yet completed, coping ends when the data is filled to the maximum size of the destination disk. Cab to Disk: Compress and physics copy the compressed file data of source disk to destination disk. File should be saved with the name of concab_x (x indicates serial number). Source disk should be formatted as FAT32. Even copying is not yet completed, coping ends when the data is filled to the maximum size of the destination disk.
Data Verification	No Yes	When Yes is selected, data verification is performed to check whether copy has done

Item	Option	Description
		properly every time a unit block is copied. This ends out in error if discrepancy is found. This function is unavailable when [Disk to Cab] and [Cab to Disk] are selected.

CAUTION

- When performing Disk to Disk between the disks with the different capacities, booting OS cannot be guaranteed since the smaller disk size is used to be copied. If you intend to boot OS after performing Disk to Disk, either copy with the same capacity disks or copy to the larger size disk first, then write back to the original disk.
- When a backup has been completed, turn off the power and remove the storage from the product.

Self Inspection

Execute the Self Inspection.

PCI Device Activity:[PASS]	SSD Life:[Show Only]	Temperature:[Show Only]
Host (0/00/0/8086/0F00):[ACTIVE]	LAN EEPROM Check:[PASS]	MIN NOW MAX
Graphic (0/02/0/8086/0F31):[ACTIVE]	CONTEC MAC:[PASS]	CPU:[42 42 42]
SATA (x/xx/x/8086/0F23):[NODISK]	Unique MAC:[PASS]	SYS:[27 28 28]
xHCI(USB) (0/14/0/8086/0F35):[ACTIVE]	Good CS:[PASS]	Voltage:[Show Only]
TXE (0/1A/0/8086/0F18):[ACTIVE]	A MAC:[00804CB9C198]	MIN NOW MAX
HD Audio (0/1B/0/8086/0F04):[ACTIVE]	A CS(0x00-0x3F):[8AAF]	VCORE:[0.904 0.904 0.904]
PCIe RP 1(0/1C/0/8086/0F48):[ACTIVE]	B MAC:[00804CB9C199]	1.8V:[1.760 1.760 1.760]
PCIe RP 2(0/1C/1/8086/0F4A):[ACTIVE]	B CS(0x00-0x3F):[89AF]	5V:[5.056 5.056 5.056]
LPCbridge(0/1F/0/8086/0F1C):[ACTIVE]		5VSB:[5.056 5.056 5.056]
SMBus (0/1F/3/8086/0F12):[ACTIVE]		AVCC:[3.296 3.296 3.296]
I210 LAN (1/00/0/8086/1533):[ACTIVE]		3VSB:[3.248 3.248 3.248]
I210 LAN (2/00/0/8086/1533):[ACTIVE]		3VCC:[3.296 3.296 3.296]
LPC Device Activity:[PASS]		VBAT:[2.992 2.992 2.992]
KBC:[ACTIVE]		Time:[Show Only]
HWM:[ACTIVE]		Now:[2022/10/30 17:22:48]
COM Address Check:[PASS]		Elapsed:[5sec]
COM IRQ Check:[PASS]		GPIO Info:[Show Only]
UARTA:[3F8] [4/Edge/H]		GPI(0-2):[000]
UARTB:[2F8] [3/Edge/H]		ROMCLR:[OFF]
UARTC:[3E8] [7/Edge/H]		BEEP Test:[Press A-K keys]
		----- \ / \ / \ / \ / \ / \ / \ / \ / \ / \ / \ / \ / \ / \ / \ / -----
		Product Name:BX-830
		BIOS Version:B830C400
		APP Version:1.08 2021/12/27

Figure 4.30. Self Inspection (Actual Display May Vary)

Table 4.35. Self Inspection

Item	Option	Description
PCI Device Activity	PASS FAIL	Check the existence of PCI devices which should be existed. [PASS] appears when all the devices are found. [FAIL] appears when even one of the devices cannot be found.
Host	ACTIVE INACTV	Check the existence of PCI devices which should be existed. [Active] appears when devices exist appropriately. [INACTIV] appears when they do not.
Graphic		
SATA		
xHCI(USB)		
TXE		
HD Audio		
PCIe RP 1		
PCIe RP2		
LPCbridge		
SMBus		

Item	Option	Description
I210 LAN		
I210 LAN		
LPC Device Activity	PASS FAIL	Check the existence of LPC devices which should be existed. [PASS] appears when all the devices are found. [FAIL] appears when even one of the devices cannot be found.
KBC	ACTIVE INACTV	Check the existence of LPC devices which should be existed. [Active] appears when devices exist appropriately. [INACTIV] appears when they do not.
HWM		
COM Address Check COM IRQ Check	PASS FAIL	Check whether the address : IRQ for COM resource is set correctly.
SSD Life	Display only	Life time information of SATA Drive is displayed.
LAN EEPROM Check	PASS FAIL	Check whether LAN EEPROM is correct data. If LAN device cannot be found, that device cannot be determined.
CONTEC MAC	PASS FAIL	Check whether CONTEC's MAC data is written.
Unique MAC	PASS FAIL	Check whether the MAC data is unique within the operation device.
Good CS	PASS FAIL	Check whether check sums except MAC data are the same.
MAC	xxxxxxxxxxxx	Display the MAC data of each port.
CS	Xxxx	Display the check sums except MAC data of each port.
Temperature	MIN NOW MAX	Display the lowest, the highest, and the current temperature of CPU and system while the self-inspection program is running.
Voltage	MIN NOW MAX	Display the lowest, the highest, and the current voltage while the self-inspection program is running.
Time	Now Elapsed	Display the elapsed time since the self-inspection program was run as well as the current time.
GPIO Info		Display the GPIO Information.
ROMCLR	OFF ON	Display the state of ROM clear switch.
BEEP Test	A-K keys	Pressing any keys of A,S,D,F,G,H,J, or K makes the corresponding beep sound respectively.
The overall Pass or Fail	PASS FAIL	PASS appears when all the tests of PCI Device Activity, LPC Device Activity, COM Resource, and LAN EEPROM Check have been passed. FAIL appears when even one out of all the tests has been failed.

5. Each Component Function

Component Name

Front View

BX-956SD-DCxxxxxx

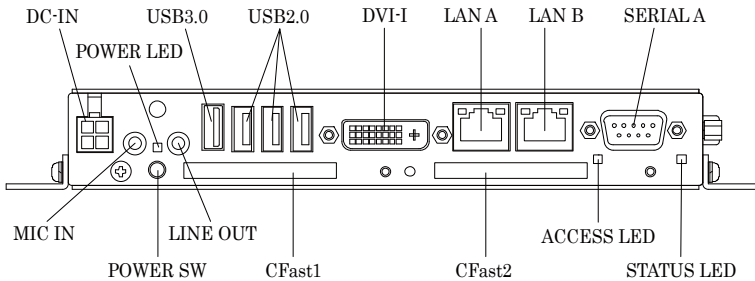


Figure 5.1. Component Name < 1 / 2 >

Right side view

BX-956SD-DCxxxxxx

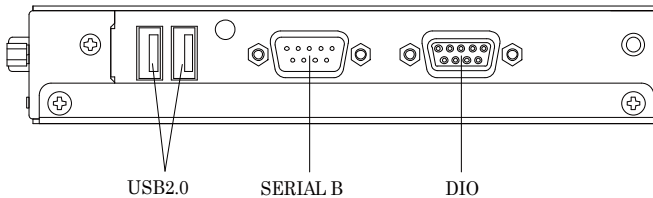


Figure 5.1. Component Name < 2 / 2 >

Table 5.1. Component Function

Name	Function
POWER LED	Power ON display LED
STATUS LED	Status LED
ACCESS LED	CFast disk access display LED
DC-IN	DC power input connector
POWER-SW	Power switch
MIC IN	Mike in (ø3.5 PHONE JACK)
LINE OUT	Line out (ø3.5 PHONE JACK)
DVI-I	Display (29 pin, female)
USB3.0	USB3.0 port TYPE-A connector x 1
USB2.0	USB2.0 port TYPE-A connector x 5
LAN A	Ethernet 1000BASE-T/100BASE-TX/10BASE-T RJ-45 connector
LAN B	Ethernet 1000BASE-T/100BASE-TX/10BASE-T RJ-45 connector
CFast1	CFast card slot (SATA connection)
CFast2	CFast card slot (SATA connection)
SERIAL A	Serial port A connector (9pin D-SUB, male)
SERIAL B	Serial port B connector (9pin D-SUB, male)
DIO	General-purpose I/O connector (9 pinD-SUB, female)

System Configuration

BX-956SD-DCxxxxxx

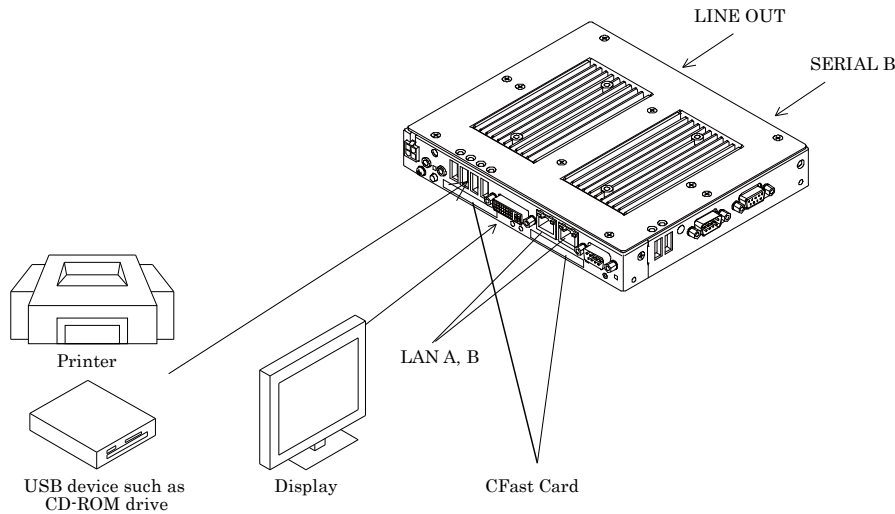


Figure 5.2. System Configuration

Component Function

LED: POWER, ACCESS, STATUS

There are 3 LED in front of this product.

Table 5.2. Display Contents of LED

LED name	State	Display contents
POWER LED	OFF	Indicates that this product is switched off.
	ON (Green)	Indicates that this product is switched on.
ACCESS LED	ON (Orange)	Indicates that the SATA device is being accessed.
STATUS LED	OFF	You can control the behavior of LED from the user application. *1
	ON (Red)	You can control the behavior of LED from the user application. *1

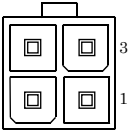
*1 API that controls STATUS LED is available. For more information, visit the CONTEC's Web site.

DC Power Input Connector: DC-IN

To supply the power, always use the power supply listed below.

Rated input voltage : 12 - 24VDC
Range of input voltage : 10.8 - 31.2VDC
Power capacity : 12V 3.4A or more, 24V 1.8A or more

Table 5.3. DC Power Connector

Connector type	9360-04P (mfd. by ALEX)	
	Pin No.	Signal name
	1	GND
	2	GND
	3	12 - 24V
	4	12 - 24V

Applicable connector on the connector side

Housing : 9357-04 (mfd. by ALEX) or 5557-04R (mfd. by MOLEX)
Contact : 4256T2-LF (AWG18-24) (mfd. by ALEX) or 5556 (AWG18-24) (mfd. by MOLEX)

Rise time of power supply

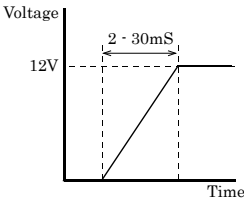


Figure 5.3. Graph of Rise Time of Power Supply

POWER SW

POWER SW is provided.

LINE OUT Interface: LINE OUT

The product is equipped with a connector for line output. As such, headphones or an amplified speaker can be connected.

MIC IN Interface: MIC

The product is equipped with a connector for microphone input. As such, a microphone can be connected for voice input.

DVI Interface: DVI-I

A DVI interface is provided. A CRT display (or a 15-pin D-SUB CRT when the included DVI–Analog RGB conversion adapter is used) or a flat-panel display from CONTEC can be connected. The connector name is DVI (DVI-I 29 pin).

Table 5.4. DVI Connector

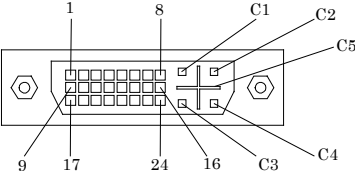
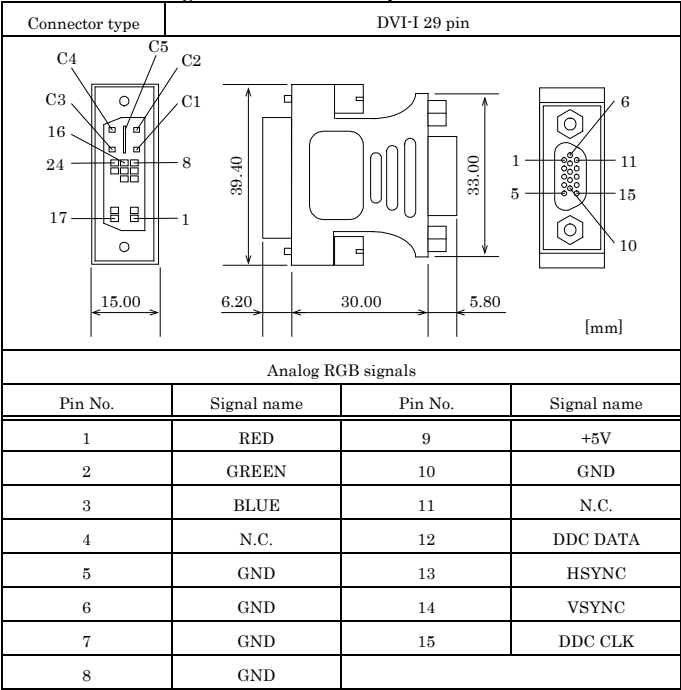
Connector type		DVI-I 29 pin			
					
Pin No.	Signal name	Pin No.	Signal name	Pin No.	Signal name
1	DATA2-	13	N.C.	C1	RED
2	DATA2+	14	+5V	C2	GREEN
3	DATA2 SHIELD	15	GND	C3	BLUE
4	N.C.	16	HPD	C4	HSYNC
5	N.C.	17	DATA0-	C5	GND
6	DDC CLK	18	DATA0+		
7	DDC DATA	19	DATA0 SHIELD		
8	VSYNC	20	N.C.		
9	DATA1-	21	N.C.		
10	DATA1+	22	DATA0 SHIELD		
11	DATA1 SHIELD	23	CLK+		
12	N.C.	24	CLK-		

Table 5.5. DVI-analog RGB conversion adapter



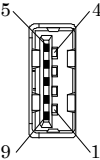
⚠ CAUTION

- If the OS is booted without connecting the display cable to the DVI interface, and then the display is connected after the OS boots, the display may not be shown properly.
- When the analog display is used, Windows MS-DOS may not be properly displayed in full-screen mode.
This is because the frequency and resolution of Windows and MS-DOS (full-screen display) are the same due to the screen settings while the display parameters are different.
For display, as only one parameter can be stored for one frequency or resolution, only either of Windows or MS-DOS screen can be displayed properly.
In this case, change the resolution or display frequency of Windows so that it is not the same as for the MS-DOS display.
- When using a digital display, an analog display may be detected even though no analog display is connected.
- This will not affect how the digital display appears. However, change the multi-display settings as necessary.
- To change the settings from digital output to analog output, change the settings from the standard Windows properties screen.

USB3.0 Port: USB3.0

This product is equipped with 1 channel for USB 3.0 TYPE-A interface.

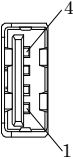
Table 5.6. USB3.0 Connector

	Pin No.	Signal name
		USB3.0
	1	USB_VCC
	2	DATA-
	3	DATA+
	4	USB_GND
	5	SSRX-
	6	SSRX+
	7	USB_GND
	8	SSTX-
	9	SSTX+

USB2.0 Port: USB2.0

This product is equipped with 2 channel for USB 2.0 TYPE-A interface.

Table 5.7. USB2.0 Connector

	Pin No.	Signal name
		USB2.0
	1	USB_VCC
	2	DATA-
	3	DATA+
	4	USB_GND

Giga bit-Ethernet: LAN A, B

This product is equipped with 2 ports for giga bit.

- Network type : 1000BASE-T/100BASE-TX/10BASE-T
- Transmission speed *2 : 1000M/100M/10M bps
- Max. network path length : 100m/segment
- Controller : Intel I210 controller

*2 Use a category 5e cable for 1000 Mbps operation.

Table 5.8. Giga bit-Ethernet Connector

Pin No.	Function	
	100BASE-TX	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:

- Right LED : Link LED
- Normal connection : Green ON, Operation: Green Blinking
- Left LED : Operation LED
- 10M: Off, 100M : Green, 1000M: Orange

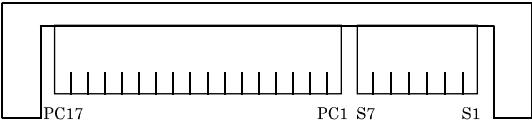
⚠ CAUTION

- If you are using an operating system other than the operating system of the preinstalled model, LAN-1 and LAN-2 may not be assigned to the silkscreen-printed "LAN-A" and "LAN-B."
- Attention should to be paid to the guaranteed operating range of temperature in using 1000BASE-T. For more details on this, refer to chapter3, Installation Requirements. Note that the Ethernet should be configured as 100BASE-TX or 10BASE-T in using under the temperature 0 - 50°C.

CFast Card Connector: CFast1, 2

The CF Card (Type I : dedicated to the memory card) can be connected.

Table 5.9. CFast Card Connector

Connector type		CFast Card Connector	
			
Pin No.	Signal name	Pin No.	Signal name
PC1	CDI	S1	GND
PC2	GND	S2	TX+
PC3	N.C.	S3	TX-
PC4	N.C.	S4	GND
PC5	N.C.	S5	RX-
PC6	N.C.	S6	RX+
PC7	GND	S7	GND
PC8	LED		
PC9	N.C.		
PC10	N.C.		
PC11	N.C.		
PC12	N.C.		
PC13	+3.3V		
PC14	+3.3V		
PC15	GND		
PC16	GND		
PC17	CDO		

CAUTION

The CFast card is not hotpluggable. While this product is turned on, do not insert or remove the CFast card or touch the CFast card connector on the product. Doing so may lead to a malfunction or failure.

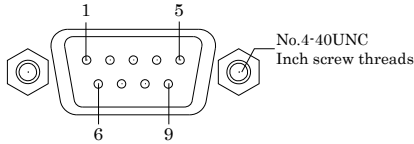
Serial Port Interface: SERIAL A, B

The product has 2 channels of RS-232C compliant serial ports supporting up to a baud rate of 115,200bps with a 16-byte transmission-dedicated data buffer and a 16-byte reception-dedicated data buffer. You can use “Chapter 4 BIOS Setup” to configure an I/O address, interrupt and unused state for each of the ports independently. (The same I/O address and IRQ cannot be shared with any other device.)

Table 5.10. SERIAL A, B, I/O Addresses and Interrupts

SERIAL	I/O address	Interrupt
A	3F8h - 3FFh	IRQ 4
B	2F8h - 2FFh	IRQ 3

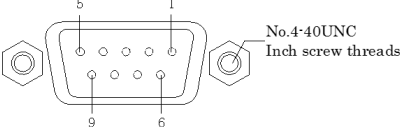
Table 5.11. Serial Port Connector

Connector type		9-pin D-SUB (MALE)	
			
Pin No.	Signal name	Meaning	Direction
1	CD	Carrier detect	Input
2	RD	Received data	Input
3	TD	Transmitted data	Output
4	DTR	Data terminal ready	Output
5	GND	Signal ground	-----
6	DSR	Data set ready	Input
7	RTS	Request to send	Output
8	CTS	Clear to send	Input
9	RI	Ring indicator	Input

GPIO Connector: DIO

The product is equipped with an interface to which you can connect a remote switch and a GPIO device. GPIO is not isolated.

Table 5.12. Serial Port Connector

Connector type		9-pin D-SUB (FEMALE)
		
Pin No	Signal name	Meaning
1	POWER SW(+)	Remote power switch. Contacting + and - performs the same operation as in POWER SW.
2	POWER SW(-)	
3	GND	Ground
4	GPIO0	General-purpose I/O Input and output can be selected respectively
5	GPIO1	
6	GPIO2	
7	GPIO3	
8	GPIO4	
9	GPIO5	

Item		Spec
The number of I/O channel		6 (Input and output can be selected with the BIOS settings.)
Input section		
	Input format	Non-isolated 3.3 VTTL level (positive logic; with internal 3.3 V standby, 1 kΩ pull-up)
Output section		
	Output format	Non-isolated 3.3 VTTL level (positive logic; with internal 3.3 V standby, 1 kΩ pull-up)
	Maximum rating	3.3VDC 12mA

Usage method

When controlling the general purpose I/O ports GPIO0 to GPIO5 and when using I/O, set the data to I/O port addresses 02A8h to 02AAh.

Usage procedure

- (1) GPIO selection ... Set port 02A8h to "06h" in order to enable the control of GPIO0 to GPIO5 with port 02A9h.
- (2) I/O mode setting ... Input data to port 02A9h to set the I/O mode of GPIO0 to GPIO5.
- (3) I/O ... Use port 02AAh to perform I/O.

Register supplemental explanation

*** 02A8h port : General purpose I/O selection register**

GPIO0 to GPIO5 use ports GP40 to GP45 of the NCT6106D Super I/O chip (NUVOTON).
Set "06h" to control I/O of GPIO0 to GPIO5.

*** 02A9h port : General purpose I/O switch register**

D7	D6	D5	D4	D3	D2	D1	D0	
—	—	IOR5	IOR4	IOR3	IOR2	IOR1	IOR0	W

Figure 5.5. General purpose I/O switch (02A9h)

- Input mode : Set IOR0 to IOR5 to "1".
- Output mode : Set IOR0 to IOR5 to "0".

Example 1 : To set GPIO4 to input mode and all the other GPIO ports to output mode, specify "0001 0000" ("10h").

Example 2 : To set GPIO2 and GPIO5 to input mode and all the other GPIO ports to output mode, specify "0010 0100" ("24h").

*** 02AAh port: General purpose I/O register**

D7	D6	D5	D4	D3	D2	D1	D0	
—	—	GPIO5	GPIO4	GPIO3	GPIO2	GPIO1	GPIO0	R/W

Figure 5.6. General purpose I/O (02AAh)

- Input mode : Read the data from GPIO0 to GPIO5. Even if you set values on GPIO ports Specified as input mode, these values will be ignored.
- Output mode : Set the data to output from GPIO0 to GPIO5.

Example : With GPIO0 to GPIO2 set to input mode and GPIO3 to GPIO5 set to output mode, to set GPIO3 output and GPIO4 output to "1" and GPIO5 output to "0," specify "0001 1000" ("18h") or "0001 1111" ("1Fh").

6. Appendix

POST Codes

Table 6.1. POST Codes < 1 / 3 >

POST (hex)	Description
< Security (SEC) phase >	
1h	Power ON. The detection of the reset kind (Hard/Soft)
2h	Initialize the microcode load previous AP
3h	Initialize the microcode load previous North Bridge
4h	Initialize the microcode load previous South Bridge
5h	Initialize the microcode load previous OEM
6h	Microcode load
7h	Initialize the microcode load previous AP
8h	Initialize the microcode load previous North Bridge
9h	Initialize the microcode load previous South
Ah	Initialize the microcode load previous OEM
Bh	Cache initialization
< Pre-EFI Initialization (PEI) phase >	
10h	Start of the PEIcore
11h	PRI memory CPU initialization starts
12h - 14h	PRI memory CPU initialization (Specific CPU module)
15h	PRI memory, North Bridge initialization starts
16h - 18h	PRI memory, North Bridge initialization (Specific North Bridge)
19h	PRI memory, South Bridge initialization starts
1Ah - 1Ch	PRI memory, South Bridge initialization (Specific South Bridge)
1Dh - 2Ah	OEM, PRI memory initialization code
2Bh	Memory initialization : Serial Presence Detect (SPD) Data loading
2Ch	Memory initialization : Memory detection
2Dh	Memory initialization : Programming of the memory timing information
2Eh	Memory initialization : Memory configuration
2Fh	Memory initialization : Others
30h	ASL for reserved (Refer to ACPI/ASL Checkpoints)
31h	Memory installed
32h	CPU post memory initialization starts
33h	CPU post memory initialization : Cache initialization
34h	CPU post memory initialization : Application Processor(s)(AP) initialization
35h	CPU post memory initialization : Boot strap processor(BSP) selection
37h	CPU post memory initialization : System Management Mode(SMM) initialization
38h	Post memory, North Bridge initialization starts
39h - 3Ah	Post memory, North Bridge initialization (Specific North Bridge module)
3Bh	Post memory, South Bridge initialization starts
3Ch - 3Eh	Post memory, South Bridge initialization (Specific South Bridge module)
3Fh - 4Eh	OEM post memory initialization code
4Fh	DXE IPL startup
< Driver Execution Environment (DXE) phase >	
60h	DXE core startup
61h	NVRAM initialization
62h	South Bridge runtime services installation

Table 6.1. POST Codes < 2 / 3 >

POST (hex)	Description
63h	CPU DXE installation start
64h - 67h	CPU DXE installation start (Specific CPU module)
68h	PCI host bridge installation
69h	North Bridge DXE initialization starts
6Ah	North Bridge DXE SMM initialization starts
6Bh - 6Fh	North Bridge DXE initialization (Specific North Bridge module)
70h	South Bridge DXE initialization starts
71h	South Bridge DXE SMM initialization starts
72h	South Bridge device initialization
73h - 77h	South Bridge DXE initialization (Specific South Bridge module)
78h	ACPI module initialization
79h	CSM initialization
7Ah - 7Fh	For future AMI DXE codes reserved
80h - 8Fh	OEM DXE initialization code
90h	Boot Device Selection(BDS) Phase
91h	Driver connection start
92h	PCI bus initialization starts
93h	PCI bus hot plug controller initialization
94h	Enumerate PCI bus number
95h	PCI bus resource requests
96h	PCI bus resource allocation
97h	Console output device connection
98h	Console input device connection
99h	Super IO initialization
9Ah	USB installation start
9Bh	USB reset
9Ch	USB detection
9Dh	USB enabling
9Eh - 9Fh	For future AMI codes reserved
A0h	IDE initialization starts
A1h	IDE reset
A2h	IDE detection
A3h	IDE enabling
A4h	SCSI initialization starts
A5h	SCSI reset
A6h	SCSI detection
A7h	SCSI enabling
A8h	Confirm Password Setup
A9h	Starting of a setup
AAh	ASL for reserved (Refer to ACPI/ASL Checkpoints)
ABh	Setup input wait
ACH	ASL for reserved (Refer to ACPI/ASL Checkpoints)
ADh	Boot preparation events
AEh	Legacy boot event
AFh	Boot Service event ends
B0h	Virtual address maps run-time settings begin.
B1h	Virtual address maps of runtime configuration exit
B2h	Legacy option ROM initialization
B3h	System reset

Table 6.1. POST code < 3 / 3 >

POST (hex)	Description
B4h	USB hotplug
B5h	PCI bus hot plug
B6h	NVRAM cleanup
B7h	Configuration reset (Reset the NVRAM settings)
B8h - BFh	For future AMI codes reserved
C0h - CFh	OEM BDS initialization code
ACPI/ASL Checkpoints	
01h	S1 sleep system during migration.
02h	S2 sleep system during migration.
03h	S3 sleep system during migration.
04h	S4 sleep system during migration.
05h	S5 sleep system during migration.
10h	From S1 sleep state during system restoration
20h	From S2 sleep state during system restoration
30h	From S3 sleep state during system restoration
40h	From S4 sleep state during system restoration
ACh	Move to system ACPI mode. The interrupt controller PIC mode.
AAh	Move to system ACPI mode. The interrupt controller APIC mode.

SERIAL I/O Address and Register Function

The following table lists the I/O addresses in case of SERIAL A.

Table 6.2. I/O Port Addresses

I/O address	DLAB	Read/Write	Register	
03F8H	0	W	Transmitter holding register	THR
		R	Receive buffer register	RBR
	1	W	Divisor latch register (LSB)	DLL
03F9H	1	W	Divisor latch register (MSB)	DLM
	0	W	Interrupt enable register	IER
03FAH	X	R	Interrupt ID register	IIR
03FBH	X	W	Line control register	LCR
03FCH	X	W	Modem control register	MCR
03FDH	X	R	Line status register	LSR
03FEH	X	R	Modem status register	MSR
03FFH	X	R/W	Scratch register	SCR

DLAB (Divisor Latch Access Bit) : The value in bit 7 of the line control register.

Table 6.3. Function of Each Register < 1 / 4 >

I/O address	Description																
03F8H	THR: Transmitter Holding Register [DLAB=0] <table><tr><td>D7</td><td>D6</td><td>D5</td><td>D4</td><td>D3</td><td>D2</td><td>D1</td><td>D0</td></tr><tr><td>bit7 MSB</td><td>←</td><td></td><td></td><td></td><td></td><td></td><td>→ bit0 LSB</td></tr></table> Register dedicated to write transmitted data to	D7	D6	D5	D4	D3	D2	D1	D0	bit7 MSB	←						→ bit0 LSB
D7	D6	D5	D4	D3	D2	D1	D0										
bit7 MSB	←						→ bit0 LSB										
03F8H	RBR: Reciever Buffer Register [DLAB=0] <table><tr><td>D7</td><td>D6</td><td>D5</td><td>D4</td><td>D3</td><td>D2</td><td>D1</td><td>D0</td></tr><tr><td>bit7 MSB</td><td>←</td><td></td><td></td><td></td><td></td><td></td><td>→ bit0 LSB</td></tr></table> Register dedicated to read received data from	D7	D6	D5	D4	D3	D2	D1	D0	bit7 MSB	←						→ bit0 LSB
D7	D6	D5	D4	D3	D2	D1	D0										
bit7 MSB	←						→ bit0 LSB										
03F8H	DLL: Divisor Latch (LSB) [DLAB=1] <table><tr><td>D7</td><td>D6</td><td>D5</td><td>D4</td><td>D3</td><td>D2</td><td>D1</td><td>D0</td></tr><tr><td>bit7 MSB</td><td>←</td><td></td><td></td><td></td><td></td><td></td><td>→ bit0 LSB</td></tr></table> Baud rate setting register (LSB)	D7	D6	D5	D4	D3	D2	D1	D0	bit7 MSB	←						→ bit0 LSB
D7	D6	D5	D4	D3	D2	D1	D0										
bit7 MSB	←						→ bit0 LSB										
03F9H	DLH: Divisor Latch (MSB) [DLAB=1] <table><tr><td>D7</td><td>D6</td><td>D5</td><td>D4</td><td>D3</td><td>D2</td><td>D1</td><td>D0</td></tr><tr><td>bit7 MSB</td><td>←</td><td></td><td></td><td></td><td></td><td></td><td>→ bit0 LSB</td></tr></table> Baud rate setting register (MSB)	D7	D6	D5	D4	D3	D2	D1	D0	bit7 MSB	←						→ bit0 LSB
D7	D6	D5	D4	D3	D2	D1	D0										
bit7 MSB	←						→ bit0 LSB										
03F9H	IER: Interrupt Enable Register [DLAB=0] <table><tr><td>D7</td><td>D6</td><td>D5</td><td>D4</td><td>D3</td><td>D2</td><td>D1</td><td>D0</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>EMS</td><td>ELSI</td><td>ETHREI</td><td>ERDAI</td></tr></table> Received data Interrupt enable Received data register empty Interrupt enable Receiver line status Interrupt enable Modem status interrupt enable [Always used at 0.] 1: Enable interrupt 0: Disable interrupt	D7	D6	D5	D4	D3	D2	D1	D0	0	0	0	0	EMS	ELSI	ETHREI	ERDAI
D7	D6	D5	D4	D3	D2	D1	D0										
0	0	0	0	EMS	ELSI	ETHREI	ERDAI										

Table 6.3. Function of Each Register < 2 / 4 >

I/O address	Description																														
03FAH	IIR : Interrupt Identification Register D7 D6 D5 D4 D3 D2 D1 D0 0 0 0 0 0 ← → Interrupt details 1: Do not generate interrupts 0: Generate interrupts <table><tr><th>bit2</th><th>bit1</th><th>bit0</th><th>Priority</th><th>Description</th></tr><tr><td>0</td><td>0</td><td>1</td><td>—</td><td>Interrupts are not generated.</td></tr><tr><td>1</td><td>1</td><td>0</td><td>1 (high)</td><td>Generated by overrun, parity, framing error or break interrupt. Cleared when the line status register is read.</td></tr><tr><td>1</td><td>0</td><td>0</td><td>2</td><td>Generated when the receive buffer register is ready. Cleared when the receiving buffer is read.</td></tr><tr><td>0</td><td>1</td><td>0</td><td>3</td><td>Generated when the transmitter holding register is empty. Cleared when the IIR is read or when transmitted data is written to THR.</td></tr><tr><td>0</td><td>0</td><td>0</td><td>4 (low)</td><td>Modem status interrupt is generated. (CTS, DSR, RI, CD) Cleared when the modem status register is read.</td></tr></table>	bit2	bit1	bit0	Priority	Description	0	0	1	—	Interrupts are not generated.	1	1	0	1 (high)	Generated by overrun, parity, framing error or break interrupt. Cleared when the line status register is read.	1	0	0	2	Generated when the receive buffer register is ready. Cleared when the receiving buffer is read.	0	1	0	3	Generated when the transmitter holding register is empty. Cleared when the IIR is read or when transmitted data is written to THR.	0	0	0	4 (low)	Modem status interrupt is generated. (CTS, DSR, RI, CD) Cleared when the modem status register is read.
bit2	bit1	bit0	Priority	Description																											
0	0	1	—	Interrupts are not generated.																											
1	1	0	1 (high)	Generated by overrun, parity, framing error or break interrupt. Cleared when the line status register is read.																											
1	0	0	2	Generated when the receive buffer register is ready. Cleared when the receiving buffer is read.																											
0	1	0	3	Generated when the transmitter holding register is empty. Cleared when the IIR is read or when transmitted data is written to THR.																											
0	0	0	4 (low)	Modem status interrupt is generated. (CTS, DSR, RI, CD) Cleared when the modem status register is read.																											
03FBH	LCR : Line Contror Regerster D7 D6 D5 D4 D3 D2 D1 D0 D1 D0 Bit table 0 0 5 0 1 6 1 0 7 1 1 8 0 : 1 STOP bit 1 : 1.5 STOP bits at 5-bit length 2 STOP bits at 6-, 7-, or 8-bit length 0 : Disable parity 1 : Enable parity 0 : Odd parity 1 : Even parity 0 : Disable stick parity 1 : Enable stick parity 0 : Break signal off 1 : Send break signal DLAB (Divisor Latch Access Bit) In order to access the divisor latch register, you need to set the bit to 1. To access another register, set the bit to 0.																														

Table 6.3. Function of Each Register <3 / 4>

I/O address	Description																
03FCH	MCR: Modem Control Register <table><tr><td>D7</td><td>D6</td><td>D5</td><td>D4</td><td>D3</td><td>D2</td><td>D1</td><td>D0</td></tr><tr><td>0</td><td>0</td><td>0</td><td>Loop</td><td>IRQ</td><td>X</td><td>RTS</td><td>DTR</td></tr></table> DTR 0 : Inactive [HIGH] 1 : Active [LOW] RTS 0 : Inactive [HIGH] 1 : Active [LOW] Interrupt control bit 0 : Disable 1 : Enable Diagnostic local loop-back test 0 : Disable 1 : Enable	D7	D6	D5	D4	D3	D2	D1	D0	0	0	0	Loop	IRQ	X	RTS	DTR
D7	D6	D5	D4	D3	D2	D1	D0										
0	0	0	Loop	IRQ	X	RTS	DTR										
03FDH	LSR: Line Status Register <table><tr><td>D7</td><td>D6</td><td>D5</td><td>D4</td><td>D3</td><td>D2</td><td>D1</td><td>D0</td></tr><tr><td>0</td><td>TEMT</td><td>THRE</td><td>BI</td><td>FE</td><td>PE</td><td>OE</td><td>DR</td></tr></table> Data ready (1 for existence of received data) Overrun error (1 for occurrence of an error) Parity error (1 for occurrence of an error) Framing error (1 for occurrence of an error) Break interrupt (1 for detection of break state) Transmitter holding register empty (1 for transmission buffer being empty) Transmitter empty (Set to 1 when both transmitter holding register and transmitter shift register are empty.)	D7	D6	D5	D4	D3	D2	D1	D0	0	TEMT	THRE	BI	FE	PE	OE	DR
D7	D6	D5	D4	D3	D2	D1	D0										
0	TEMT	THRE	BI	FE	PE	OE	DR										

Table 6.3. Function of Each Register < 4 / 4 >

I/O address	Description
03FEH	MSR : Modem Status Register D7 D6 D5 D4 D3 D2 D1 D0 DCD RI DSR CTS DDCD TERI DDSR DCTS DCD RI DSR CTS Delta data carrier detect Trailing edge RI Delta DSR Delta CTS
03FFH	SCR : Scratchpad Register This is an 8-bit, readable/writable register which is available to the user to allow data to be saved temporarily.

Baud Rate Settings

A baud rate is set by software by dividing the clock input (1.8432MHz). The baud rate in terms of hardware can be set to a maximum of 115,200 bps for SERIAL A, B. The baud rates available in practice depend on the operating environment (cable, software, etc.). The table below lists typical baud rates and their respective values to be written to the divisor latch register (LSB, MSB).

Table 6.4. Baud Rate Settings

Baud rate to be set	SERIAL A, B Clock input (1.8432MHz)	
	Value to be set in the divisor register (Decimal)	Setting error (%)
50	2304	---
75	1536	---
110	1047	0.026
134.5	857	0.058
150	768	---
300	384	---
600	192	---
1200	96	---
1800	64	---
2000	58	0.69
2400	48	---
3600	32	---
4800	24	---
7200	16	---
9600	12	---
14400	8	---
19200	6	---
28800	4	---
38400	3	---
57600	2	---
76800	---	---
115200	1	---
153600	---	---
230400	---	---

Example : To set 9,600 bps, write "00" to the (MSB) divisor latch register and "12 (decimal)" to the (LSB) divisor latch register.

Watch-Dog-Timer

The watchdog timer serves as a safeguard against possible system lock-up in your industrial computer system. In most industrial environments, there are heavy equipment, generators, high-voltage power lines, or power drops that have adverse effects on your computer system. For instance, when a power drop occurs, it could cause the CPU to come to a halt state or enter into an infinite loop, resulting in a system lock-up.

The application software created by user with the watchdog timer enabled, a RESET automatically generated unless the software periodically triggers the timer within the setting time-out interval. That is, while the system gets hung up, the running program can't trigger the timer periodically. The timer will generate a reset signal to reboot the system.

With this function, running programs can be restarted in the usual way even if an abnormal state occurs.

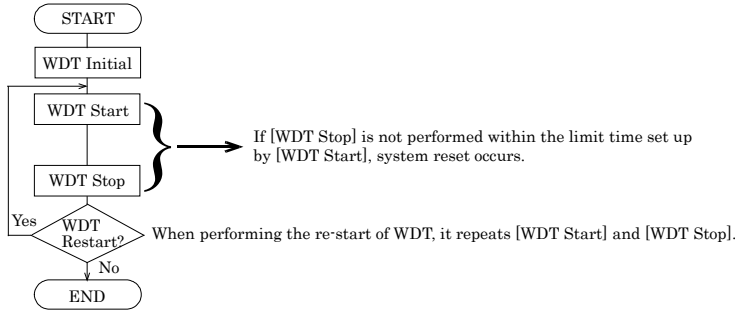
The software can be configured using 255 levels (1 to 255 seconds) of timeout intervals for the watchdog timer. There is also a 2-second tolerance for timeout intervals. To maintain normal system operation, trigger the watchdog timer again using a user-written program with the tolerance in mind.

Ex.) If the time-out interval is set to 30 seconds, the user-created program must retrigger the watchdog timer before 28 seconds will have elapsed in consideration of the tolerance. If the program failed to retrigger the timer (if 28 - 32 seconds have elapsed), the system will automatically reboot.

The I/O port is defined at address 2e/2fH. You can trigger/enable/disable the timer by writing address 2e/2fH.

Here is an example for flow chart and programming how to use the watch-dog-timer.

(1) Example flow chart



* It is also possible not to perform [WDT Stop] instead of performing [WDT Stop] to [WDT Start], but to perform [WDT Start] continuously at the time of a re-start.

(2) Example programming

The following example is written in Intel8086 assembly language.

```

;=====
;<WDT Initial>
;=====
;-----
;Enter the extended function mode

```

```

;-----
MOV DX,2EH
MOV AL,87H
OUT DX,AL
OUT DX,AL
;-----
; Select logical device WDT(number 8)
;-----
MOV DX,2EH
MOV AL,07H
OUT DX,AL
MOV DX,2FH
MOV AL,08H
OUT DX,AL
;-----
;Activate logical device WDT(number 8)
;-----
MOV DX,2EH
MOV AL,30H
OUT DX,AL
MOV DX,2FH
MOV AL,03H
OUT DX,AL
;-----
;Stop WDT
;-----
MOV DX,2EH
MOV AL,F1H
OUT DX,AL
MOV DX,2FH
MOV AL,00H
OUT DX,AL
;-----
;Exit the extended function mode
;-----
MOV DX,2EH
MOV AL,AAH
OUT DX,AL

;=====
;<WDT START :   counter set and a start >
;=====
;-----
;Enter the extended function mode
;-----
MOV DX,2EH
MOV AL,87H
OUT DX,AL
OUT DX,AL

```

```
;-----  
;Select logical device WDT(number 8)  
;-----  
MOV DX,2EH  
MOV AL,07H  
OUT DX,AL  
MOV DX,2FH  
MOV AL,08H  
OUT DX,AL  
  
;-----  
;Set time of WDT and start to count down  
;-----  
MOV DX,2EH  
MOV AL,F1H  
OUT DX,AL  
MOV DX,2FH  
  
;-----  
;The data of an example is 15 seconds.(01H=1sec.- FFH=255sec.)  
MOV AL,0FH ; 0FH = 15Sec.  
;-----  
OUT DX,AL  
  
;-----  
;Exit the extended function mode  
;-----  
MOV DX,2EH  
MOV AL,AAH  
OUT DX,AL  
  
;=====  
;<WDT STOP>  
;=====  
  
;-----  
;Enter the extended function mode  
;-----  
MOV DX,2EH  
MOV AL,87H  
OUT DX,AL  
OUT DX,AL  
  
;-----  
;Select logical device WDT(number 8)  
;-----  
MOV DX,2EH  
MOV AL,07H  
OUT DX,AL  
MOV DX,2FH  
MOV AL,08H  
OUT DX,AL
```

```
;-----  
;Stop count down of WDT  
;-----  
MOV DX,2EH  
MOV AL,F1H  
OUT DX,AL  
MOV DX,2FH  
;-----  
;The data of 00H is stop WDT  
MOV AL,00H  
;-----  
OUT DX,AL  
;-----  
;Exit the extended function mode  
;-----  
MOV DX,2EH  
MOV AL,AAH  
OUT DX,AL
```

**CAUTION**

The timer's intervals have a tolerance of ± 2 seconds.

Battery

Battery Specification

This product uses the following battery.

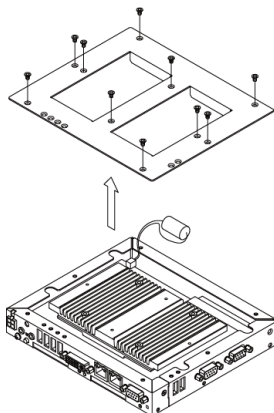
- Type : Lithium primary battery
- Model : BR-1/2AA
- Maker : Panasonic
- Nominal voltage : 3V
- Nominal capacity : 1000mAh
- Lithium content : 1g or less

Removing the battery

Remove the battery according to the following figure.

Removing the battery

Remove the battery according to the following figure.



Disposing of the battery

Dispose of the removed battery properly as instructed by local government.

Life of CFast

About write endurance

CFast contained in product has a 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:

CFast (SLC)

Write endurance (days) =

$((\text{Total capacity (MB)} / \text{Management block size (MB)}) \times \text{NAND Flash memory life span (cycles)}) / \text{The number of management block to be rewritten per 1 cycle}$

Example1 (SLC):

When the file of 4MB is made for CFS-16GB-A, and it rewrites it once per 10 minutes.

Write endurance = $((14,595 / 4) \times 60,000) / 1 = 218,925,000$ (cycles)

Life = $218,925,000 / ((60 / 10) \times 60 \times 24 \times 365) \approx 69.4$ (years)

CFast (MLC / Q-MLC)

Write endurance (days) =

$((\text{Total capacity (KB)} / \text{Management page size (KB)}) \times \text{NAND Flash memory life span (cycles)}) / \text{The number of management page to be rewritten per 1 cycle}$

Example2 (MLC):

When the file of 4MB is made for CFS-32GBM-A, and it rewrites it once per 10 minutes.

Write endurance = $((30,144,000 / 16) \times 20,000) / 250 = 150,720,000$ (cycles)

Life = $150,720,000 / ((60 / 10) \times 60 \times 24 \times 365) \approx 47.7$ (years)

Example3 (Q-MLC):

When the file of 4MB is made for CFS-16GBQ-A, and it rewrites it once per 10 minutes.

Write endurance = $((150,072,000 / 16) \times 20,000) / 250 = 75,360,000$ (cycles)

Life = $75,360,000 / ((60 / 10) \times 60 \times 24 \times 365) \approx 24$ (years)

Example4 (Q-MLC):

When the file of 4MB is made for CFS-32GBQ-B, and it rewrites it once per 10 minutes.

Write endurance = $((30,144,000 / 16) \times 20,000) / 250 = 150,720,000$ (cycles)

Life = $150,720,000 / ((60 / 10) \times 60 \times 24 \times 365) \approx 47.7$ (years)

CFast (iSLC)

Write endurance (years) =

$\text{Total capacity (cycles)} / (\text{The number of annual consumed blocks} / \text{The total number of blocks})$

Example5 (iSLC):

If a 4 MB file is created on the CFS-40GBIP-A and is rewritten once every 10 seconds:

The number of annual consumed blocks = $(4 \times (60 / 10) \times 60 \times 24 \times 365) / 6 = 2,102,400$ (cycles)

Life = $30,000 / (2,102,400 / 7,000) \approx 99.9$ (years)

CFast (TLC)

Write endurance (years) =

$\text{Total capacity (cycles)} / (\text{The number of annual consumed blocks} / \text{The total number of blocks})$

Example4 (TLC):

If a 4 MB file is created on the CFS-128GBTP-A and is rewritten once every 10 seconds:

The number of annual consumed blocks = $(4 \times (60 / 10) \times 60 \times 24 \times 365) / 18 = 700,800$ (cycles)

Life = $3,000 / (700,800 / 7,200) \approx 30.8$ (years)

6. Appendix

After all these are reference values, confirm its life span by the LiveMonitor
The details refer to the manual of the CFast card of the option product.

About LiveMonitor

* For more information, visit the CONTEC's Web site.

7. List of Optional Products

AC adapter

- | | |
|--------------|--|
| - ACAP19-01 | AC adapter (Input: 100-240VAC, Output: 19VDC 3.42A) |
| - PWA-65AWD1 | AC adapter (Input: 100-240VAC, Output: 12VDC 5.417A) |
| - PWA-90AWD1 | AC adapter (Input: 100-240VAC, Output: 12VDC 7.5A) |

Power supply unit

- | | |
|--------------|---|
| - PWI-60D6D2 | Power supply unit (Input: 12-24VDC, Output: 24VDC 2.5A) |
|--------------|---|

Bracket

- | | |
|-----------------|---|
| - BX-BKT-VESA02 | Bracket for VESA ("75 x 75", "100 x 100") |
|-----------------|---|

CFast Card (SLC)

- | | |
|--------------|-----------------|
| - CFS-4GB-A | 4GB CFast Card |
| - CFS-8GB-A | 8GB CFast Card |
| - CFS-16GB-A | 16GB CFast Card |

CFast Card (MLC)

- | | |
|---------------|-----------------|
| - CFS-32GBM-A | 32GB CFast Card |
|---------------|-----------------|

CFast Card (Q-MLC)

- | | |
|---------------|--|
| - CFS-16GBQ-A | 16GB CFast Card |
| - CFS-32GBQ-B | 32GB CFast Card (Higher environmental resistance type) |

CFast Card (iSLC)

- | | |
|----------------|---|
| - CFS-40GBIP-A | 40GB CFast Card (Power Failure Protection Supported type) |
|----------------|---|

CFast Card (TLC)

- | | |
|-----------------|--|
| - CFS-128GBTP-A | 128GB CFast Card (Power Failure Protection Supported type) |
|-----------------|--|



CAUTION

Precautions when using products other than our options

- If a product other than our option is used, the normal operation may be impaired or the functions may be limited.
 - When you use a power supply unit, use the cracking movement in consumption electricity 24V/1.5A.
-

*Visit Contec website regarding information on the optional products.

BX956S Series
User's Manual
BX-956SD-DCxxxxxx

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