IPC Series

BOX-PC for BX960 Series
Fanless, Core-i7 1.06GHz
User's Manual

CONTEC CO.,LTD.

Check Your Package

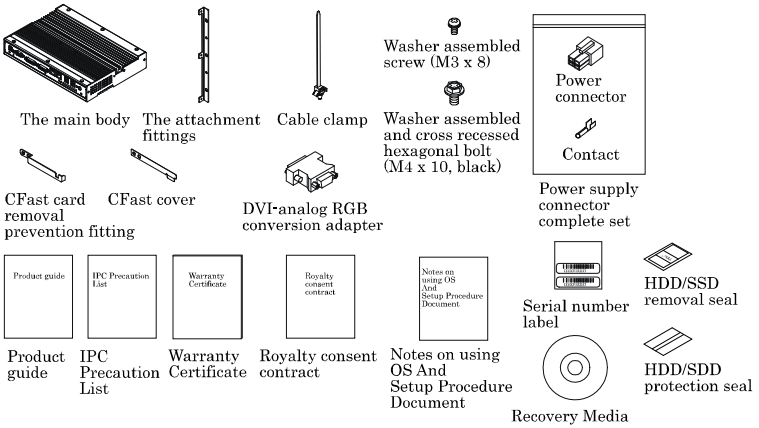
Thank you for purchasing the CONTEC product.
The product consists of the items listed below.
Check, with the following list, that your package is complete. If you discover damaged or missing items, contact your retailer.

Product Configuration List

Name		BX-960D-DCx000 [Base Model] Pcs.	BX-960D-DCx311 [WES2009 Model] Pcs.	BX-960D-DCx312 [WES7 Model] Pcs.
The main body		1	1	1
The attachment fittings		2	2	2
CFast card removal prevention fitting		1	1	1
CFast cover		1	1	1
Washer assembled screw (M3 x 8)		7	7	7
Washer assembled and cross recessed hexagonal bolt (M4 x 10, black)		6	6	6
Power supply connector complete set				
	Power connector	1	1	1
	Contact	4	4	4
Cable clamp		1	1	1
DVI-analog RGB conversion adapter		1	1	1
HDD/SSD removal seal		1	1	1
HDD/SSD protection seal		2	2	2
Product guide (this sheet)		1	1	1
IPC Precaution List		1	1	1
Warranty Certificate		1	1	1
Serial number label		1	1	1
Royalty consent contract		None	1	1
Notes on using OS And Setup Procedure Document		None	1	1
Recovery Media		None	1	1

* When your model is not OS-installed model, please download IPC-SLIB-01 (driver & utility software set) from our website if necessary.

Product Configuration Image



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

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Trademarks

Table of Contents

1. Introduction

About the Product

This product is a fan-less and high-performance embedded PC which has dual-core CPU Intel® Core™ i7 processor and high-performance embedded GPU.

Speedy processing system with dual-core CPU, DDR3 SDRAM 4GB and SATA 2.0 and ATI Radeon E2400 support the smooth play of movie with even heavy load so that it is appropriate for imaging system such as digital signage.

CPU and chipset are embedded type with which this product could be reliable to use because of stable supply.

This product is available in the following 3 models.

In addition, digital signage model is available.

- Base model with Intel Core-i7 Processor 620UE 1.06GHz
  BX-960D-DC7000 (Memory 4GB, without OS, without CFast)
- WES2009-installed model with Intel Core-i7 Processor 620UE 1.06GHz
  BX-960D-DC7311 (Memory 4GB, Windows Embedded Standard 2009 (Japanese version), CFast 4GB)
- WES7-installed model with Intel Core-i7 Processor 620UE 1.06GHz
  BX-960D-DC7312 (Memory 4GB, Windows Embedded Standard 7 (Japanese version), CFast 8GB)

Features

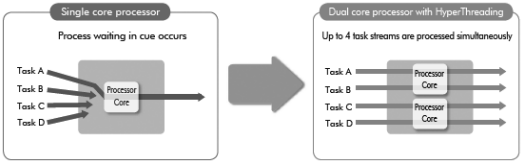
- Graphics with high-performance embedded GPU

ATI Radeon™ E2400 supports the smooth play of even fullHD movie. It supports dual-screen output with fullHD. It has 128MB graphic memory. It supports DirectX 10 / Shader Model 4.0. UVD(Universal Video Decoder) accelerates the play of H.264 or VC-1 type movie.

- Dual-core processor with HyperThreading Technology

Dual-core CPU and DDR3 SDRAM 4GB memory make it possible to process heavy applications.

It supports HyperThreading (2-cores and 4-threads) and contributes to stable multi-processing, such as parallel communications, controlling and HMI.



- Turbo boost function

CPU and BIOS support turbo boost function. When the load (voltage or temperature) of some cores is light, it boosts up the other core temporally and can provide speedy processing. It can process single task application with high efficiency, which can not be processed parallel.

- Contributes to compact device design. Space saving design with thickness 44mm.

Space saving design with thickness 44mm. It can be installed to limited area such as the back of monitor. Your system can be designded beautiful and smart. You can buy an attachment separately and install the main body to VESA-standard area 100x100mm or 200x200mm.

- Rapid storage
CFast card is adopted as storage. It is compact body and supports rapid transportation by SATA interface. It contributes to rapid transportation of data with heavy load, such as the read of high quality movie and the save of large data. Another CFast card slot is available than one for OS system. It can be used as removable drive to maintain the system or to log system data or any other data.

- Fanless design that reduces maintenance work
This product's fanless design eliminates CPU fan and adopts CFast card for the storage. The use of parts that degrade over time is minimized to facilitate maintenance.

- Remote power management function to reduce operation tasks
This product supports timed/automated system start-up (Resume By Alarm). For example, it enables unattended operation, such as starting to show information of an establishment in unison at opening time. Also, it supports system start-up externally via network (Wake On LAN) and modem (Power On by Ring). It encourages significant labor saving in operation.

- Major types of peripherals are supported with rich interfaces
It has a variety of extended interface such as DVI-I, DVI-D, 1000BASE-T x 2, USB2.0 x 4, serial (RS-232C). So it can be used for various purposes.

- Falling-off prevention tools and fixing clamps provided to avoid trouble caused by disconnected cable
This product stays trouble-free, being equipped with cable clamp for connectors with no locking mechanism, such as USB cable/Audio cable.

- Safety design required for embedded applications
For Windows Embedded Standard installed model, it is possible to use the EWF*1 function of OS. It is designed for safety required for embedding purpose, for example, prohibiting unwanted writing to the CFast card with EWF 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 specific to Windows Embedded Standard that protects the disk from being actually written by redirecting the writing to RAM.

Supported OS

- Windows Embedded Standard 2009
- Windows Embedded Standard 7

Customer Support

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

Web Site

Japanese	http://www.contec.co.jp/
English	http://www.contec.com/
Chinese	http://www.contec.com.cn/

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.

Limited One-Year Warranty

CONTEC products are warranted by CONTEC CO., LTD. to be free from defects in material and workmanship for up to one year from the date of purchase by the original purchaser.

Repair will be free of charge only when this device is returned freight prepaid with a copy of the original invoice and a Return Merchandise Authorization to the distributor or the CONTEC group office, from which it was purchased.

This warranty is not applicable for scratches or normal wear, but only for the electronic circuitry and original products. The warranty is not applicable if the device has been tampered with or damaged through abuse, mistreatment, neglect, or unreasonable use, or if the original invoice is not included, in which case repairs will be considered beyond the warranty policy.

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	DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING	WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or in property damage.

Caution on the BX-960 Series

Handling Precautions

⚠ DANGER

- This product supports +12VDC power supply ONLY. Never use the power supply with other voltage. It is very dangerous to input other voltage than its specification. If you did so, never power it on again and please contact your retailer.

⚠ 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.

⚠ 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 pealing 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 any recording media.
- Always disconnect the power cable from the receptacle before mounting or removing the expansion board, or before connecting or disconnecting any connector.
- 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.
- All specification of BX-960 can not be guaranteed if you use this product with any CFast, HDD or SSD except for our options. When you need any specification of BX-960, you should use our optional CFast, HDD and SSD only. All options are listed in chapter7.
- BIOS settings of CMOS of this product can not be cleared. If you change BIOS settings and PC becomes unable to boot up as a result, the product needs to be repaired. Don't change BIOS settings except when you understand them well. Expecially, you are recommended not to change the items noted "Please keep the default value" in chapter5.
- 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 ---The OS-installed model uses a CFast card in the OS storage area. Estimated failure rates: 60,000 rewrite cycles, 826,787 hours (4GB) 811,754hours (8GB) MTTF. For more details, refer to the user's guide of "CFS-4GB-A" (4GB) or "CFS-8GB-A" (8GB) from our website.
  * Replacement of expendables is handled as a repair (there will be a charge).
  * Component life is not guaranteed value but only referential value.

FCC PART 15 Class A Notice

NOTE

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

WARNING TO USER

Change or modifications not expressly approved the manufacturer can void the user's authority to operate this equipment.

2. System Reference

Specification

Table 2.1. Functional Specification (1/2)

Model			BX-960
CPU			Intel® Core™ i7 Processor 620UE 1.06GHz
Chipset			Intel® QM57
BIOS			Manufactured by Insyde
Memory			4GB, 204pin SO-DIMM socket x 2, PC3-6400(DDR3 800)DDR3 SDRAM
Graphics			
	Controller		ATI Radeon™ E2400
	Video RAM		128MB
	Video BIOS		64KB (C0000H-CFFFFH)
	System Resolution	DVI-D	640 x 480, 720 x 480, 800 x 480, 800 x 600, 1,024 x 600, 1,024 x 768, 1,152 x 648, 1,152 x 864, 1,280 x 720, 1,280 x 768, 1,280 x 800, 1,280 x 1,024, 1,360 x 768, 1,400 x 1,050, 1,600 x 1,200, 1,680 x 1,050, 1,776 x 1,000, 1,920 x 1,080, 1,920 x 1,200 (16,770,000 colors)
		Analog RGB	640 x 480, 800 x 600, 1,024 x 768, 1,152 x 864, 1,280 x 1,024, 1,400 x 1,050, 1,600 x 1,200, 1,792 x 1,344, 1,800 x 1,440, 1,920 x 1,440, 2,048 x 1,536 (16,770,000 colors)
Audio			HD Audio-compliant, Line-out x 1
LAN *2			LAN-A: Intel 82577LM Controller, LAN-B: Intel 82574L Controller 1000BASE-T/100BASE-TX/10BASE-T, Supports Wake On LAN
USB			USB 2.0-compliant
Serial			RS-232C (general-purpose): 1channel, Baud rate: 50 - 115,200bps
Hardware monitoring			Monitoring CPU temperature, board temperature, power voltage
Watch dog timer			Software programmable, 255 level (1sec - 255 sec) Causes a reset upon time-out.
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
Interface			
	Display		2 ports (29-pin DVI-I connector x 1, 25-pin DVI-D connector x 1), DVI-analogRGB conversion adapter is attached
	Audio		Line-out: 3.5 φ Stereo mini jack, Full-scale output level 1.2Vrms (Typ.)
	CFast card slot		2-slots (CFast1 / CFast 2), CFast CARD (Type I) x 2, bootable BX-960D-DCx000: None, BX-960D-DCx311: CFast1 is finished mounting CFast (4GB, 1 partition)*1, BX-960D-DCx312: CFast1 is finished mounting CFast (8GB, 1 partition)*1
	Serial ATA		1-slot, slot-in system, 2.5-inch SATA HDD, Corresponding to serial ATA 2.0 standard port BX-960D-DCxxxx: None
	LAN *2		2 ports (RJ-45 connector)
	USB		4 ports (TYPE-A connector x 4)
	RS-232C		1 port (9-pin D-SUB connector [male])

*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.

*2: If you use the 1000BASE-T, be careful of the operating temperature.
For more details on this, refer to chapter3, Installation Requirements.

Table 2.1. Functional Specification (2/2)

Model		BX-960
Power supply		
	Rated input voltage	12VDC *3
	Range of input voltage	10.8 - 13.2VDC
	Power consumption (Max.)	12V 5.0A
	External device power supply capacity	- CFast card slot +3.3V: 1A(500mA x 2) - USB I/F +5V: 2A (500mA x 4) - SATA slot +5V: 1A(1000mA x 1)
Physical dimensions (mm)		270(W) x 194(D) x 44(H) (No protrusions)
Weight		About 2.7kg

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

Table 2.2. Installation Environment Requirements

Model		BX-960
Operating temperature *4		(1) Vertical installation (where left surface is at bottom): 0 - 45°C (With 1000BASE-T: 0 - 40°C) (2) Installation other than above: 0 - 40℃(With 1000BASE-T: 0 - 35°C)
Storage temperature		-10 - 60℃
Humidity		10 - 90%RH (No condensation)
Floating dust particles		Not to be excessive
Corrosive gases		None
Noise resistance	Line noise	AC line / ±2kV *5, Signal line / ±1kV (IEC61000-4-4 Level 3, EN61000-4-4 Level 3)
	Static electricity resistance	Contact discharge / ±4kV (IEC61000-4-2 Level 2, EN61000-4-2 Level 2) Atmospheric discharge / ±8kV (IEC61000-4-2 Level 3, EN61000-4-2 Level 3)
Vibration resistance	Sweep resistance	10 - 57Hz/semi-amplitude 0.15 mm 57 - 500Hz/2.0G 40 min. each in x, y, and z directions (JIS C 60028-2-6-compliant, IEC 60068-2-6-compliant)
Impact resistance		10G, half-sine shock for 11 ms in x, y, and z directions (JIS C 60068-2-27-compliant, IEC 60068-2-27-compliant)
Grounding		Class D grounding (previous class 3 grounding), SG-FG / continuity

*4 : For more details on this, please refer to chapter 3, “Installation Requirements”.

*5 : When power supply “LDA100W-12” (mfd. by COSEL) is used.

Power Management Features

- Support both ACPI (Advanced Configuration and Power Interface) and legacy (APM) power management.
- ACPI v2.0 compliant
- APM v1.2 compliant
- Support 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 13.2 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:

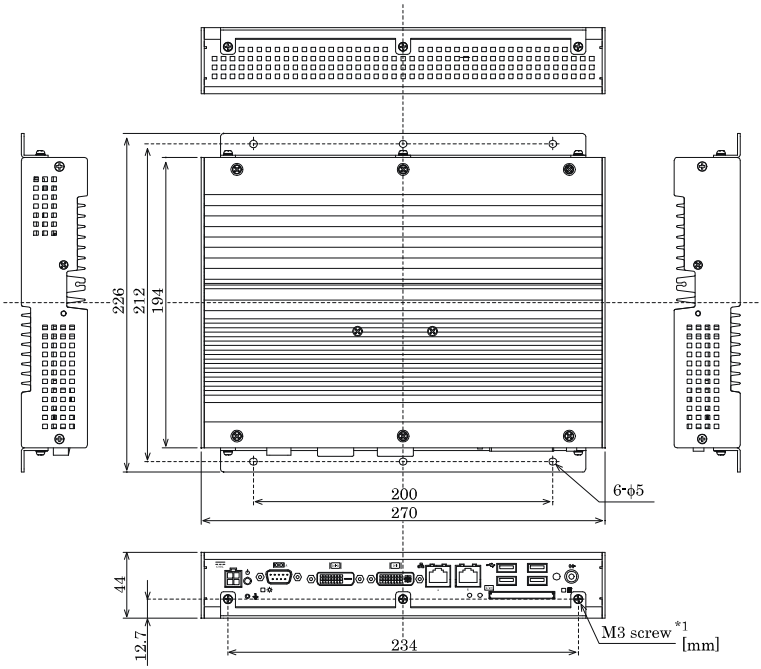
- Rise time for power supply: 2 ms - 30 ms

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

Table 2.3. DC voltage tolerance

DC Voltage	Acceptable Tolerance
+ 12V	+ 10.8V - 13.2V

Physical Dimensions



*1 : 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.

Figure 2.1. BX-960

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.
* This product supports +12VDC ONLY.

STEP4 Set up BIOS.
By referring to Chapter 5, set up BIOS. This setup requires a keyboard and a display.

* Before using this product, be sure to execute "LOAD SETUP DEFAULTS" to initialize the BIOS settings to their default values.
(See Chapter 5, "Main Menu.")

⚠ CAUTION

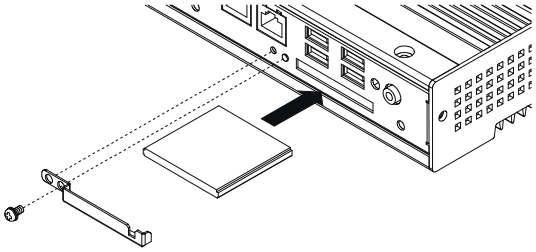
Be sure to connect the keyboard and mouse to it before turning the power on for the first time.

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.



* An attached screw (M3 x 8)

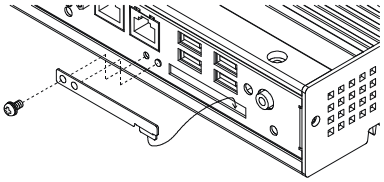
Figure 3.1. Attaching the CFast Attachment Fittings

⚠ 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 - 6kgf·cm.
- All specification is not guaranteed if you use any CFast except ones selected as our options. If you need any specification of BX-960, you should use CFast selected as our options.

If you want to close the hole of CFast Card without it, please install an attached cover as follows.

* Please fix it using the screw shown above.



* An attached screw (M3 x 8)

Figure 3.2. Attaching the CFast Cover

⚠ 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 an Inner CFast Card

(1) Remove a side panel. Install thermal sheets and metal plates on a CFast Card.

(2) Install the CFast Card to the main body.

(3) Fix the side panel using screws.

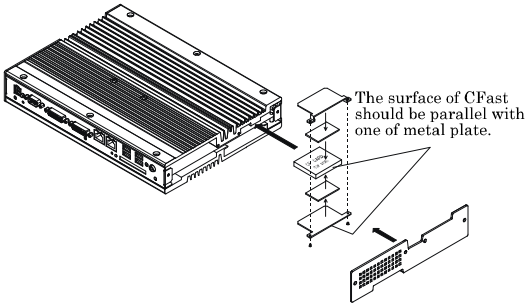


Figure 3.3. Attaching an Inner CFast Card

⚠ CAUTION

- All specification is not guaranteed if you use any CFast except ones selected as our options. If you need any specification of BX-960, you should use CFast selected as our options.

Attaching the Attachment Fittings

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

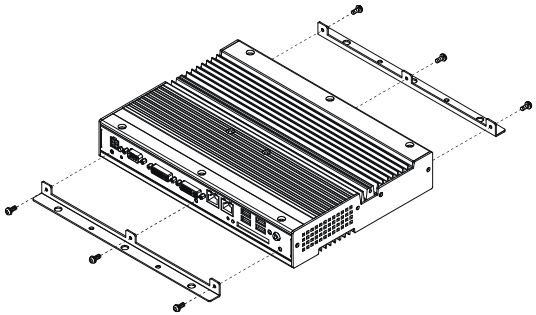


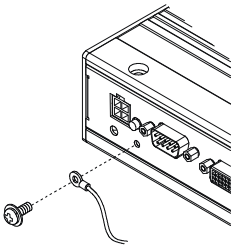
Figure 3.4. Attaching the Attachment Fittings

⚠ 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.



* Attached screw (M3 x 8)

Figure 3.5. 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. 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.

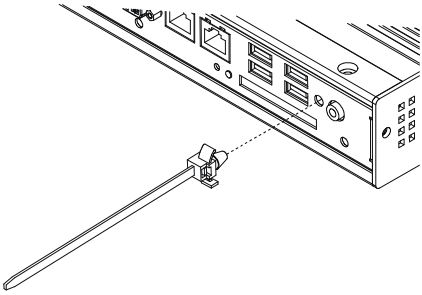


Figure 3.6. Attaching the cable clamp

(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 3.7. Using example of cable clamp

Attaching HDD/SSD

2.5-inch SATA HDD/SSD can be installed by slot-in method.

(1) Paste HDD/SSD protection seal and HDD/SSD removal seal on the HDD/SSD.

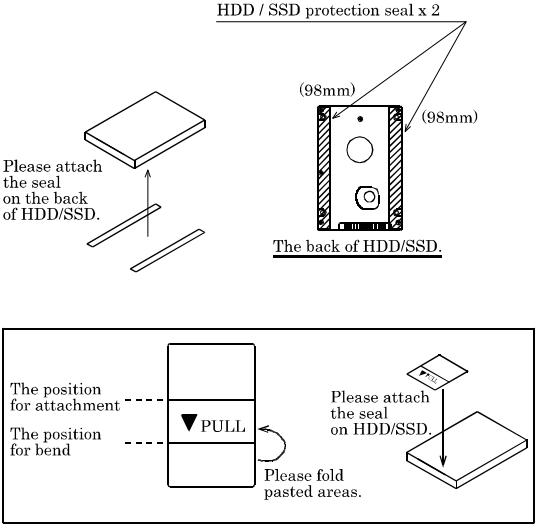


Figure 3.8. Pasting HDD/SSD protection seal and HDD/SSD removal seal

(2) Remove a side panel and install the HDD/SSD.

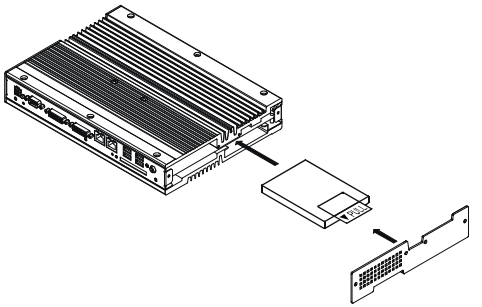


Figure 3.9. Installation of HDD/SSD

(3) Fix the side panel using screws.

⚠ CAUTION

- All specification is not guaranteed if you use any HDD/SSD except ones selected as our options. If you need any specification of BX-960, you should use HDD/SSD selected as our options.

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 metal fittings.

You can fix the main body to VESA holes with 100 x 100 pitch or 200 x 200 pitch using the VESA metal fittings below.

VESA metal fittings are our option. Please refer to chapter7 in order to know the model name.

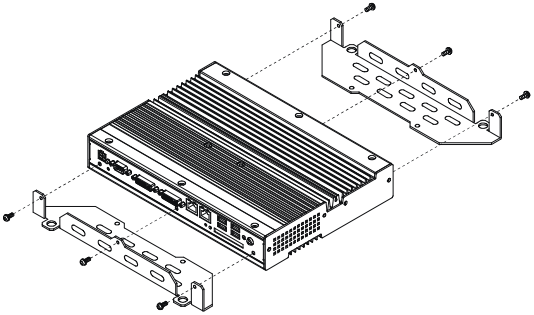


Figure 3.10. Installation of VESA metal fittings

⚠ 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.

Installation Requirements

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-960

Installable directions at operating temperature 0 - +45°C
: (1) Vertical installation (where left surface is at bottom)

Installable directions at operating temperature 0 - +40°C
: All type of installation other than above (including diagonal installation)

When using 1000BASE-T

Installable directions at operating temperature 0 - +40°C
: (1) Vertical installation (where left surface is at bottom)

Installable directions at operating temperature 0 - +35°C
: All type of installation other than above (including diagonal installation)

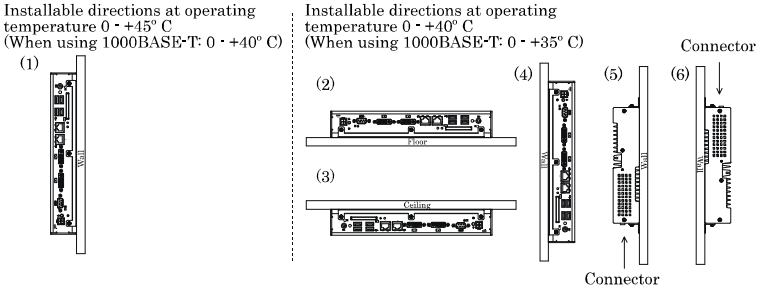


Figure 3.11. Installation Orientation (BX-960)

⚠ 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 (For your reference)

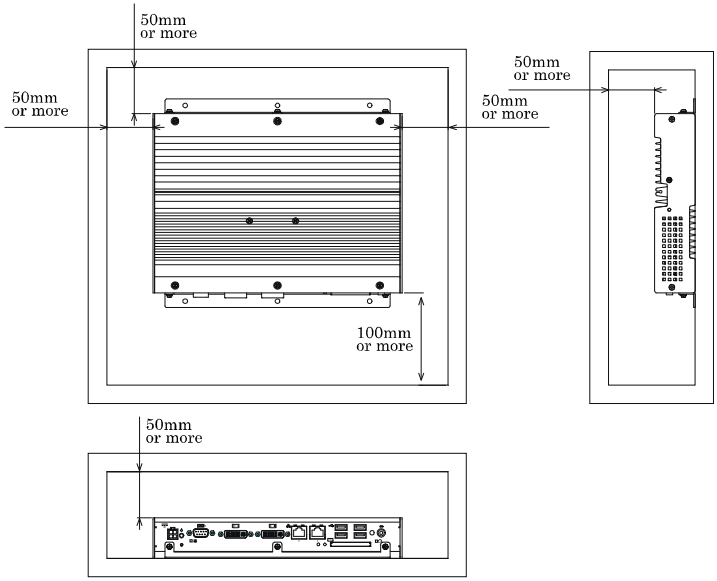


Figure 3.12. Distances between this product and its vicinity

⚠ CAUTION

Do not install this product into the fully-sealed space except the case in which the internal temperature is adjustable by equipment such as air conditioner. Troubles such as operational malfunctions could be occurred by the temperature increase caused by long-term usage.

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.

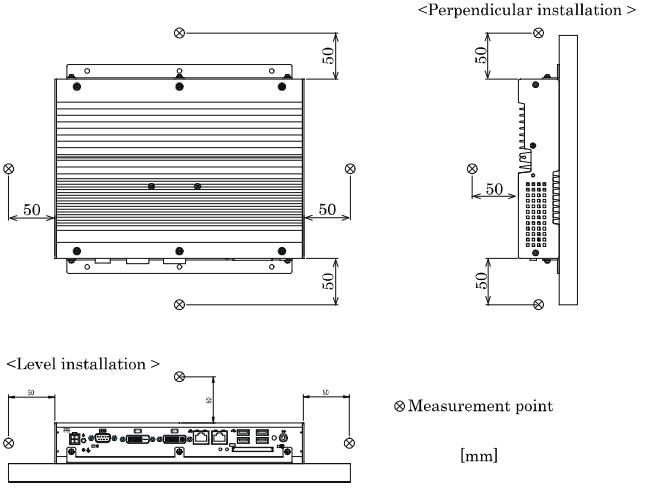
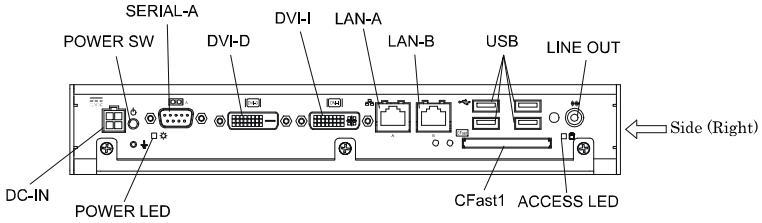


Figure 3.13. Operating temperature

4. Each Component Function

Component Name

Front View



Right side view

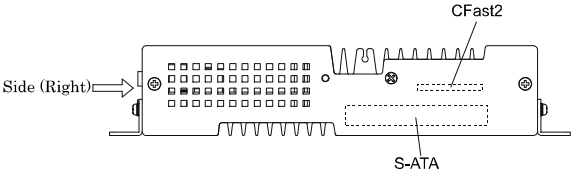


Figure 4.1. Component Name

Table 4.1. Component Function

Name	Function
POWER-SW	Power switch
POWER LED	Power ON display LED
ACCESS LED	Disk access display LED
DC-IN	DC power input connector
LINE OUT	Line out (3.5Φ PHONE JACK)
LAN-A	Ethernet 1000BASE-T/100BASE-TX/10BASE-T RJ-45 connector
LAN-B	Ethernet 1000BASE-T/100BASE-TX/10BASE-T RJ-45 connector
USB	USB port connector x 4
SERIAL-A	Serial port A connector (9pin D-SUB/male)
DVI-I	Display (29-pin DVI-I x 1)
DVI-D	Display (25-pin DVI-D x 1)
CFast1	CFast Card slot (S-ATA)
CFast2	CFast Card slot (S-ATA)
S-ATA	2.5-inch SATA HDD/SSD slot

System Configuration

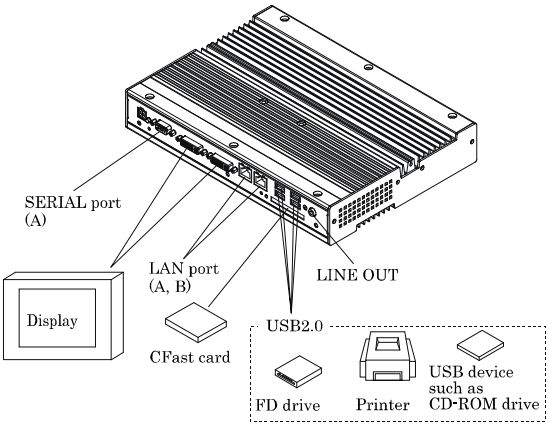


Figure 4.2. System Configuration

Component Function

LED: POWER, ACCESS

There are 2 LED in front of this product.

Table 4.2. Display Contents of LED

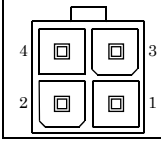
LED name	State	Display contents
POWER LED	OFF	Indicates that this product is switched off.
	ON (Green)	Indicates that this product is switched on.
ACCESS LED	ON (Orange)	Indicates that the disk device is being accessed.

DC Power Input Connector: DC-IN

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

Rated input voltage : 12VDC
Range of input voltage : 10.8 - 13.2VDC
Power capacity : 12V 5.0A or more

Table 4.3. DC Power Connector

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

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

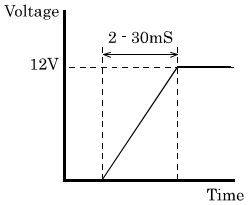


Figure 4.3. Graph of Rise Time of Power Supply

POWER SW

POWER SW is provided.

Line out Interface: LINE OUT

A line output connector is provided. You can plug a headphone or amplifier-integrated speakers into this connector.

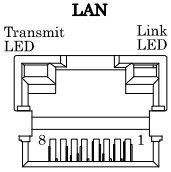
Giga bit-Ethernet: LAN A – B

This product is equipped with 2 ports for giga bit.

- Network type : 1000BASE-T/100BASE-TX/10BASE-T
- Transmission speed * : 1000M/100M/10M bps
- Max. network path length : 100m/segment
- Controller : Intel 82577LM (LAN-A), Intel 82574L (LAN-B)

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

Table 4.4. 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

LAN drivers

Install the appropriate audio driver for your OS from the CONTEC's Web site [IPC-SLIB-01].
(For information on the latest version of IPC-SLIB-01, check the CONTEC's web site.)

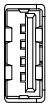
⚠ CAUTION

- 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 - 45°C.
- When using any OS other than pre-installed one, LAN-1 and LAN-2 may not be assigned to silk print "LAN-A" and "LAN-B" respectively.

USB Ports

This product is equipped with 4 channels for USB 2.0 interface.

Table 4.5. USB Connector



Pin No.	Function
1	USB_VCC
2	USB-
3	USB+
4	USB_GND

Serial Port Interface : SERIAL A

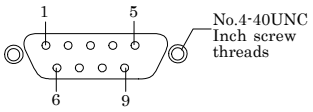
SERIAL A (RS-232C Ports)

The product has 1 channel 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 5 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.)
Please refer to “Chapter 6 I/O Port Addresses” for more information on I/O address and register function.

Table 4.6. SERIAL A I/O Addresses and Interrupts

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

Table 4.7. Serial Port Connector

Connector used on the product	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

Display Interface: DVI-I

Connector for DVI-I interface is provided. Our flat panel displays can be connected. Connector name is DVI-I (DVI-I 29-pin).

Table 4.8. DVI-I Connector

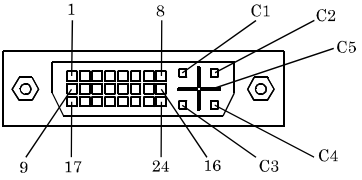
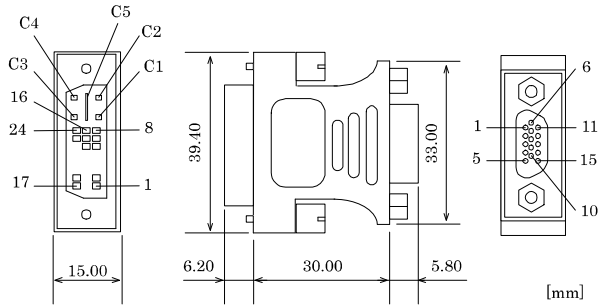
Connector type	DVI-I 29-pin				
					
Pin No.	Signal name	Pin No.	Signal name	Pin No.	Signal name
1	DATA2-	13	N.C.	C1	RED
2	DATA2+	14	+5V	C2	GREEN
3	DATA2 SHIELD	15	GND	C3	BLUE
4	N.C.	16	HPD	C4	HSYNC
5	N.C.	17	DATA0-	C5	GND
6	DDC CLK	18	DATA0+		
7	DDC DATA	19	DATA0 SHIELD		
8	VSYNC	20	N.C.		
9	DATA1-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

Table 4.9. DVI-analog RGB conversion adapter

Connector type	DVI-I 29-pin



Analog RGB Signal			
Pin No.	Signal name	Pin No.	Signal name
1	RED	9	+5V
2	GREEN	10	GND
3	BLUE	11	N.C.
4	N.C.	12	DDC DATA
5	GND	13	HSYNC
6	GND	14	VSYNC
7	GND	15	DDC CLK
8	GND		

For the LCDs that can be connected, please refer to “Chapter 7 List of Options”.

Display driver

Install the appropriate audio driver for your OS from the CONTEC’s Web site [IPC-SLIB-01].
(For information on the latest version of IPC-SLIB-01, check the CONTEC's web site.)

⚠ CAUTION

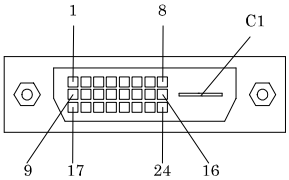
When the analog display is used, Windows MS-DOS may not be properly displayed in full-screen mode.
This is because the frequency and resolution of Windows and MS-DOS (full-screen display) are the same due to the screen settings while the display parameters are different.
For display, as only one parameter 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.

Display Interface: DVI-D

Connector for DVI-D interface is provided. Our flat panel displays can be connected. Connector name is DVI-D (DVI-D 25-pin).

Table 4.10. DVI-D Connector

Connector type	DVI-D 25-pin

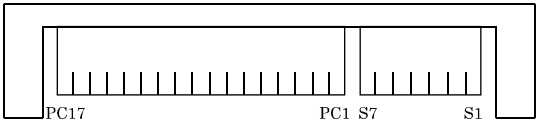


Pin No.	Signal name	Pin No.	Signal name	Pin No.	Signal name
1	DATA2-	13	N.C.	C1	N.C.
2	DATA2+	14	+5V		
3	DATA2 SHIELD	15	GND		
4	N.C.	16	HPD		
5	N.C.	17	DATA0-		
6	DDC CLK	18	DATA0+		
7	DDC DATA	19	DATA0 SHIELD		
8	VSYNC	20	N.C.		
9	DATA1-	21	N.C.		
10	DATA1+	22	DATA0 SHIELD		
11	DATA1 SHIELD	23	CLK+		
2	N.C.	24	CLK-		

CFast Card Connector (S-ATA Connection): CFast1 - 2

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

Table 4.11. CFast Card Connector

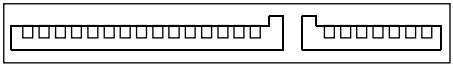
Connector type	CFast Connector		
			
Pin No.	Signal name	Pin No.	Signal name
PC1	CDI	S1	GND
PC2	GND	S2	TX+
PC3	N.C.	S3	TX-
PC4	N.C.	S4	GND
PC5	N.C.	S5	RX-
PC6	N.C.	S6	RX+
PC7	GND	S7	GND
PC8	LED		
PC9	N.C.		
PC10	N.C.		
PC11	N.C.		
PC12	N.C.		
PC13	+3.3V		
PC14	+3.3V		
PC15	GND		
PC16	GND		
PC17	CDO		

Serial-ATA: S-ATA

It has serial-ATA-2.0-compliant controller.

2.5-inch SATA HDD can be connected to an onboard connector.

Table 4.12. SATA Connector

Connector type	SATA Connector		
			
Pin No.	Signal name	Pin No.	Signal name
PC1	N.C.	S1	GND
PC2	N.C.	S2	TX+
PC3	N.C.	S3	TX-
PC4	GND	S4	GND
PC5	GND	S5	RX-
PC6	GND	S6	RX+
PC7	+5V	S7	GND
PC8	+5V.		
PC9	+5V.		
PC10	GND		
PC11	N.C.		
PC12	GND		
PC13	+12V		
PC14	+12V		
PC15	+12V		

5. BIOS Setup

Introduction

This chapter discusses Insyde's Setup program built into the FLASH ROM BIOS. The Setup program allows users to modify the basic system configuration. This special information is then stored in battery-backed RAM 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 Insyde BIOS is immediately activated when you first power on the computer. The BIOS reads the system information contained in the CMOS 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 <F2> immediately after switching the system on, or

2 By pressing the <F2> key when the following message appears briefly at the bottom of the screen during the POST (Power On Self-Test).

Press F2 go to Setup Utility

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. 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 F5 and F6 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 5.1. 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
F5 key	Increase the numeric value or make changes
F6 key	Decrease the numeric value or make changes
F1 key	General help on Setup navigation keys
F9 key	Load the optimized defaults
F10 key	Save all the CMOS changes and exit

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> key.

In Case of Problems

If, after making and saving system changes with Setup, you discover that your computer no longer is able to boot, we should repair it

The best advice is to only alter settings which you thoroughly understand. To this end, we strongly recommend that you avoid making any changes to the CPU defaults and the chipset defaults. These defaults have been carefully chosen by both Insyde and your systems manufacturer to provide the absolute maximum performance and reliability. Even a seemingly small change to them has the potential for causing you to be repaired.

A Final Note About Setup

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

Main Menu

Once you enter the Insyde BIOS CMOS Setup Utility, the Main Menu will appear on the screen. The Main Menu allows you to select from several setup functions. Use the arrow keys to select among the items and press <Enter> to accept and enter the sub-menu.

Setup Items

The main menu includes the following main setup categories.

- Main

Use this menu to check basic system configuration, and to change system date.

- Advanced

Use this menu to set detailed function available for your system.

- Security

Use this menu to change password to protect the security of your system.

- Power

Use this menu to specify your settings for power management.

- Boot

Use this menu to specify the boot settings.

- Exit

Use this menu to load / save the setting, or to exit the setup menu.

Main

You can check the basic configuration of your system. Following items are shown.

Table 5.2. Main Menu (Display only)

Item	General Description	Explanation
InsydeH20 Version	IQM57-MC5 BIOS V1.40 with M72	Shows BIOS version.
Processor Type	Intel(R) Core(TM) i7-620UE Processor 1.06GHz	Shows CPU information.
System Bus Speed	1066MHz	Shows system bus speed.
Cache RAM	256KB	Shows the capacity of cache RAM.
Total Memory	4096MB	Shows the total capacity of memory. In general, it is 4096MB.
Channel A SODIMM 0	[Not installed]	Shows the capacity of memory installed on the solder surface of M/B. In general, no memory is installed.
Channel B SODIMM 0	4096MB	Shows the capacity of memory installed on the top surface of M/B. In general, it is 4096MB.
Intel ME Version	6. 1. 1. 1045	Shows Intel ME version.

Following items are selectable.

Table 5.3. Main Menu

Item	Option	Explanation
Language	English	You can select “English” only.
System Time	Hour : Minute : Second	Set the system time.
System Date	Month / Day / Year	Set the system date.

Advanced

You can set the detailed function of system. Following items are available.

Boot Configuration
Use this menu to specify the boot configuration of system.

Peripheral Configuration
Use this menu to specify the peripheral configuration.

IDE Configuration
Use this menu to specify the IDE configuration.

Super I/O Configuration
Use this menu to specify super I/O configuration, or to check hardware monitor.

Boot Configuration

Table 5.4. Boot Configuraiton

Item	Option	Explanation
Numlock	Off [On]	Specify the Numlock condition when power gets ON.

Peripheral Configuration

Table 5.5. Peripheral Configuraiton

Item	Option	Explanation
Serial Port A	Disabled [Enabled]	Set the base address and IRQ of Serial A. If you want to disable Serial A, select "Disabled".
Base I/O Address	2E8 2F8 3E8 [3F8]	It will be shown only when the menu "Serial Port A" is set to "Enabled". Select base address.
Interrupt	IRQ3 [IRQ4]	It will be shown only when the menu "Serial Port A" is set to "Enabled". Select IRQ.
Serial Port B	Disabled [Enabled]	Serial B is an onboard connector. Usually it is not available.
Base I/O Address	2E8 [2F8] 3E8 3F8	It will be shown only when the menu "Serial Port B" is set to "Enabled". Select base address.
Interrupt	[IRQ3] IRQ4	It will be shown only when the menu "Serial Port B" is set to "Enabled". Select IRQ.
Azalia	Disabled [Enabled]	If you want to disable Azalia Audio, select "Disabled".
Intel GbE Lan	Disabled [Enabled]	If you want to disable LAN A, select "Disabled".
Intel 82574 Lan	Disabled [Enabled]	If you want to disable LAN B, select "Disabled".

IDE Configuration

Table 5.6. IDE Configuraiton

Item	Option	Explanation
HDC Configure As	[IDE] AHCI	Select the type of disk drive controller. In general, AHCI needs some drivers when you install OS.
> Serial ATA Port x (x = 0 – 4)	[HDD Name]	Shows the name of disk drive. SATA Port 0 is front CFast slot. Usually, it has some data. SATA Port 1 is right-side CFast slot. Usually, it has OS. SATA Port 4 is 2.5-inch SATA HDD slot. Usually, it has OS. SATA Port 2, 3 are onboard connectors. Usualy, they are not available.

Super I/O Configuration

Table 5.7. Super I/O Configuration

Item	Option	Explanation
Cpu Shut Down Temperature	[Disabled] 80 C 90 C	Select the temperature to shut down the system. Power will be lost on the selected temperature, so all running procedures can not be guaranteed.
> H/W Monitor	Check following sub-menu.	You can monitor following values.

Press Enter key on “H/W Monitor” menu to check following values.

Table 5.8. H/W Monitor

Item	Display (example)	Explanation
+12V	+11.985V	Shows the voltage of +12V.
5V	+5.145V	Shows the voltage of +5V.
CPU Vcore	+1.064V	Shows the voltage of CPU Vcore.
CPU Temperature	+34C	Shows CPU temperature.
System Temperature	+45C	Shows system temperature.

Security

You can specify system security as follows.

- Set Supervisor Password

Press Enter key to input password as follows.

Set Supervisor Password	
Please type in your new password	[****]
Please confirm your new password	[****]

Input password longer than one charactore twice.

If you want to disable password, enter the input menu of “Set Supervisor Password” again.

Set Supervisor Password	
Please type in your password	[****]
Please type in your new password	[ ]
Please confirm your new password	[ ]

If you input current password to the first form and input no characters to the second and the third form, password will be disabled.

After setting supervisor password, following items become available.

Table 5.9. Security

Item	Option	Explanation
Power on Password	Enabled [Disabled]	If you select “Enabled”, password will be requested on POST. If you select “Disabled”, password will be requested when you enter setup utility.
User Access Level	View Only Limited [Full]	Select user access level. Selecting “View Only” permit users to check the values of setup utility but not to change any values. Selecting “Limited” permits users to change limited values. Selecting “Full” permits users to change all values without supervisor password.

- Set User Password

After setting supervisor password, you can set user password. Press Enter key to input password as follows.

Set UserPassword	
Please type in your new password	[****]
Please confirm your new password	[****]

Input password longer than one character twice.

If you want to disable password, the procedure is equal to one for supervisor password.

Power

You can specify the setting for power management. Following items are available.

Table 5.10. Power

Item	Option	Explanation
> Advanced CPU Control	Refer to the sub-menu below.	Set CPU parameters according to the sub-menu below.
Wake on Modem Ring	Disabled [Enabled]	Select the operation when system is OFF and the modem connected to serial port rings.
Auto Wake on s5	[Disabled] By Every Day By Day of Month	Select auto wake on S5 state.
Wake on s5 Time	Hour : Minute : Second	This menu appears only when the menu "Auto Wake on s5" is not set to "Disabled". Select the time to wake up automatically.
Day of Month	Day	This menu appears only when the menu "Auto Wake on s5" is set to "By Day of Month". Select the date to wake up automatically.
Wake on Intel LAN A	[Disabled] Enabled	Enable Wake on LAN from LAN A port.
Wake on Intel LAN B	[Disabled] Enabled	Enable Wake on LAN from LAN B port.

Pressing Enter key on “Advanced CPU Control” provides you with following items to select.

Table 5.11. Advanced CPU Control

Item	Option	Explanation
P-State(IST)	Disabled [Enabled]	Select Enabled / Disabled of Processor Performance States. Please keep the default value, in general.
CMP Support	[Auto] Disabled	Select Enabled / Disabled of Core-Multi Processing. Please keep the default value, in general.
HT Support	[Auto] Disabled	Select Enabled / Disabled of Hyper Threading. Please keep the default value, in general.
Use XD Capability	[Disabled] Enabled	Select Enabled / Disabled of Processor XD Capability. Please keep the default value, in general.
VT Support	[Enabled] Disabled	Select Enabled / Disabled of Vandorpool Technology. Please keep the default value, in general.
C-States	Disabled [Enabled]	Select Enabled / Disabled of C-States (Processor idle power saving states). Please keep the default value, in general.
Enhanced C-States	Disabled [Enabled]	Select Enabled / Disabled of P-States Transition in combination with C-States. Please keep the default value, in general.
Enable C6	Disabled [Enabled]	Select Enabled / Disabled of C6. Please keep the default value, in general.
Interrupt Filtering	[Disabled] Enabled	If enabled, only the core set to the destination of interrupt on C3/C6 state will be moved to C0. If disabled, the destination of interrupt will be ignored and all the core on C3/C6 state will be moved to C0. Please keep the default value, in general.
Turbo Mode	Disabled [Enabled]	Select Enabled / Disabled of turbo mode of processor. Please keep the default value, in general.

Boot

Specify the setting about system boot. Following items are available.

Table 5.12. Boot

Item	Option	Explanation
Quick Boot	[Enabled] Disabled	If enabled, Insyde BIOS skips some tests on boot. It can shorten boot time.
Quiet Boot	Enabled [Disabled]	Select Enabled / Disabled of the boot on text mode.
PXE Boot to LAN A	Enabled [Disabled]	Select Enabled / Disabed of PXE boot from LAN A port.
PXE Boot to LAN B	Enabled [Disabled]	Select Enabled / Disabed of PXE boot from LAN B port.
USB Boot	[Enabled] Disabled	Select Enabled / Disabled of the boot from USB device.
> Legacy	Refer to the sub-menu blow.	Select the boot order of devices. This menu appears only when some boot devices are connected.

Press Enter key on “Legacy” to set following items.

Table 5.13. Boot Device Priority

Item	Option	Explanation
Normal Boot Menu	[Normal] Advance	Select “Normal” to select the boot order for device types and for disk drives separately. Select “Advanced” to select the boot order for all devices at the same time.
> Boot Type Order	Hard Disk Drive CD/DVD-ROM Drive USB Others	It appears only when “Normal” is selected on “Normal Boot Menu”. System boots up from the top boot type, and then from the next.
> Hard Disk Drive	[Shows disk drive name]	It appears only when “Normal” is selected on “Normal Boot Menu” and some boot devices are connected. System boots up from the top disk drive, and then from the next.
> USB	[Shows USB device name]	It appears only when “Normal” is selected on “Normal Boot Menu” and some USB boot devices are connected. System boots up from the top USB drive, and then from the next.
[Shows boot device name]	-	It appears only when “Advanced” is selected on “Normal Boot Menu” and some boot devices are connected. System boots up from the top boot drive, and then from the next.

Exit

Load / save your setting, or exit the setup menu from this menu. Following items are available.

- Exit Saving Changes

Pressing <Enter> key shows confirmation dialog box, and shows the message below.

Exit Saving Changes?
[Yes] [No]

Pressing [Yes] stores the selections made in the menus in CMOS – a special section of memory that stays on after you turn your system off. The next time you boot your computer, the BIOS configures your system according to the Setup selections stored in CMOS. After saving the values the system is restarted again.

Pressing [No] lets you go back to setup menu.

- Save Change Without Exit

Pressing <Enter> key shows confirmation dialog box, and shows the message below.

Save Change Without Exit?
[Yes] [No]

Pressing [Yes] stores the selections made in the menus in CMOS and lets you go back to setup menu.

Pressing [No] lets you go back to setup menu without storing it in CMOS.

- Load Optimal Defaults

Pressing <Enter> key shows confirmation dialog box, and shows the message below.

Load Optimal Defaults?
[Yes] [No]

Pressing [Yes] loads the default values that are factory settings for optimal performance system operations. This setting will not be stored in CMOS before saving it.

Pressing [No] lets you go back to setup menu without loading it.

POST Messages

During the Power On Self-Test (POST), if the BIOS detects an error requiring you to do something to fix, it will either sound a beep code or display a message.

POST Beep

POST Beep indicates that a video error has occurred, or that no memory is installed. It indicates the BIOS cannot initialize the video screen to display any additional information.

Error Messages

One or more of the following messages may be displayed if the BIOS detects an error during the POST.

Cmos defaults loaded

Press F1 to conitinue, F2 to enter setup

CMOS default value was loaded.
CMOS battery is no longer functional. It should be replaced.
Press F1 key to continue the process, or press F2 key to go to setup utility.

No bootable device -- Please restart system

It can not find any boot device. It indicates that any boot drives are not detected, or that the boot drive does not have correct system boot files. Check the connection and content of your boot drives.

Error loading operating system

Invalid System disk

It indicates that not BIOS but program of Boot Record in Disk fails to load OS and shows error. Check the content of your disk.

6. Appendix

Memory Map

Table 6.1. Memory Map

Memory Segments	Comments
00000h - 9FFFh	0 - 640K DOS Region
A0000h - BFFFFh	Video Buffer
B0000h - B7FFFh	Monochrome Adapter range
C0000h - CFFFFh	Video BIOS
D0000h - DFFFFh	Expansion Area
E0000h - EFFFFh	Extended System BIOS Area
F0000h - FFFFFh	System BIOS Area
100000h - FFFFFFFFh	Extended Memory Area
100000h - Top of Main Memory	Main DRAM Address Range
Top of Main Memory	Extended SMRAM Address Range
Top of Main Memory To 4GB	PCI Memory Address Range
FEC0000h - FECFFFFFh,	APIC configuration space
FEE00000h - FEEFFFFFh	MSI Interrupt Memory space
FFE00000h - FFFFFFFFh	High BIOS Area

I/O Port Addresses

Table 6.2. I/O Port Addresses

Address	Size	Explanation
0000 - 000F	16 bytes	DMA controller
0010 - 001F	16 bytes	Reserved
0020 - 0021	2 bytes	PIC interrupt controller
0022 - 003F	30 bytes	Reserved
0040 - 0043	4 bytes	System timer 1
0044 - 005F	24 bytes	Reserved
0060	1 byte	Keyboard controller
0061	1 byte	NMI, speaker controller
0062 - 0063	2 bytes	Reserved
0064	1 byte	Keyboard controller
0065 - 006F	11 bytes	Reserved
0070 - 0077	8 bytes	RTC real time clock
0078 - 0080	9 bytes	Reserved
0081 - 0091	17 bytes	DMA page register
00A0 - 00A1	2 bytes	Interrupt controller 2
00A2 - 00BF	28 bytes	Reserved
00C0 - 00DE	31 bytes	DMA controller 2
00E0 - 00EF	16 bytes	Reserved
00F0 - 00F0	1 byte	Arithmetic processor for numerical values
0274 - 0277	4 bytes	Reserved (ISA PnP)
0279 - 0279	1 byte	Reserved
0290 - 029F	16 bytes	Hardware monitor
02F8 - 02FF	8 bytes	SERIAL B
0388 - 038D	6 bytes	Reserved
03B0 - 03BB	12 bytes	Video (Monochrome)
03C0 - 03DF	32 bytes	Video (VGA)
03F8 - 03FF	8 bytes	SERIAL A
0400 – 047F	128 bytes	Reserved
04D0 - 04D1	2 bytes	Interrupt setting register (Edge/level triggered PIC)
0500 - 057F	128 bytes	Reserved
0680 - 069F	16 bytes	Reserved
0800 - 0813	20 bytes	Reserved
0A79 - 0A79	1 byte	Reserved
0CF8 - 0CFF	4 bytes	PCI configuration register
0CF9	1 byte	Turbo and reset control register
164E - 164F	2 bytes	Reserved
FFFF - FFFF	1 byte	Reserved

Interrupt Level List

Table 6.3. Hardware Interrupt Levels (Factory Settings)

Type	8259	Priority	Description	Vector
NMI		High	-I/O CHK	02H
IRQ0	MASTER	↑	Timer 0	08H
IRQ1	”		System reserved	09H
IRQ2	”		Interrupt controller 2 (slave)	0AH
IRQ8	SLAVE		Real-time clock	70H
IRQ9	”		System reserved	71H
IRQ10	”		Not in use (Available for users)	72H
IRQ11	”		Not in use (Available for users)	73H
IRQ12	”		Reserved	74H
IRQ13	”		Co-processor	75H
IRQ14	”		Not in use (Available for users)	76H
IRQ15	”		Not in use (Available for users)	77H
IRQ3	MASTER		Serial port B(SERIAL B)	0BH
IRQ4	”		Serial port A(SERIAL A)	0CH
IRQ5	”		Not in use (Available for users)	0DH
IRQ6	”	↓	Not in use (Available for users)	0EH
IRQ7	”	Low	Not in use (Available for users)	0FH

POST Codes

Table 6.4. POST Codes ***< 1 / 3 >***

POST (hex)	Explanation
< Security (SEC) phase >	
1h	Turns on CPU power and switches to protect mode.
2h	Patches Microcode of CPU.
3h	Sets cache as RAM.
4h	Initializes PCI-Express MMIO Base Address.
5h	Initializes CPU Generic MSR.
6h	Sets the speed of CPU.
7h	Tests RAM cache.
8h	Adjucts CPU frequency rate to the maximum.
9h	Sets BIOS ROM cache.
Ah	Switches to Boot Firmware Volume.
< Pre-EFI Initialization (PEI) phase >	
70h	Initializes Super I/O.
71h	Early initializes CPU.
72h	Early initializes Multi processor.
73h	Initializes Hyper Transport.
74h	Initializes PCI-Express MMIO Base Address.
75h	Early initializes North Bridge.
76h	Early initializes South Bridge.
77h	PCI-Express Training
78h	Initializes TPM.
79h	Early initializes SMBUS.
7Ah	Initializes Clock Generator.
7Bh	Early initializes inner Graphics device.
7Ch	Initializes HECI.
7Dh	Initializes Watchdog timer.
7Eh	Initializes memory for normal bootup.
7Fh	Initializes memory for recovery from crisis.
80h	Easily tests memory.
81h	Early initializes TXT function.
82h	Start the use of memory.
83h	Sets cache for physical memory.
84h	Initializes Recovery Device.
85h	Does the process when Recovery Image was found.
86h	Does the process when Recovery Image was not found.
87h	Recovery Image is completely loaded.
88h	Starts the Flash of BIOS by Recovery Image.
89h	Loads BIOS image to RAM.
8Ah	Loads DXE core.
8Bh	Switches to DXE core.
< Driver Execution Environment (DXE) phase >	
40h	Initializes TPM on DXE.
41h	Initializes South Bridge SPI.
42h	Sets Reset Service.
43h	Initializes South Bridge Serial GPIO.
44h	Sets SMM ACCESS Service.
45h	Half initializes North Bridge.
46h	Initializes Super I/O on DXE.

Table 6.4. POST Codes *< 2 / 3 >*

POST(hex)	Explanation
47h	Sets the service for legacy area.
48h	Half initializes South Bridge.
49h	Identifies Flash Device.
4Ah	Evaluates Fault Tolerant Write.
4Bh	Initializes Variable Service.
4Ch	Does the process when the initialization of Variable Service failed.
4Dh	Initializes MTC.
4Eh	Half initializes CPU.
4Fh	Half initializes Multi Processor.
50h	Initializes SMBUS Driver.
51h	Initializes 8259.
52h	Initializes RTC.
53h	Early initializes SATA Controller.
54h	Sets SMM Control Service.
55h	Sets legacy interrupt service.
56h	Re-assign SMM BASE.
57h	Tests SMI.
58h	Initializes VTD
59h	Initializes legacy BIOS.
5Ah	Initializes legacy interrupt function.
5Bh	Initializes ACPI table.
5Ch	Sets SB SMM Dispatcher Service.
5Dh	Sets SB IOTRAP Service.
5Eh	Constructs AMT table.
5Fh	Initializes PPM.
60h	Initializes HECIDRV.
61h	Does garbage collection of stored variables and requests them again.
62h	Not supported Flash parts.
< Boot Device Selection (BDS) phase >	
10h	Switches to BDS entry.
11h	Installs Hotkey Service.
12h	Initializes ASF.
13h	Starts to enumerate PCI.
14h	Completion of assign of PCI resource.
15h	Completes enumerating PCI.
16h	Initializes keyboard controller, keyboard and mouse.
17h	Initializes Video Device.
18h	Reports the error on device initialization.
19h	Initializes USB Host Controller.
1Ah	Initializes USB Bus Driver.
1Bh	Initializes USB Device Driver.
1Ch	Fails to initialize console devices.
1Dh	Shows logo or system information.
1Eh	Initializes IDE Controller.
1Fh	Initializes SATA Controller.
20h	Initializes SIO Controller.
21h	Initializes ISA BUS Driver.
22h	Initializes Floppy Device.
23h	Initializes Serial Device.
24h	Initializes IDE Device.
25h	Initializes AHCI Device.
26h	Dispatches Option ROM.
27h	Gets information about boot devices.
28h	Completes selecting boot devices.

Table 6.4. POST Codes ***< 3 / 3 >***

POST (hex)	Explanation
29h	Switches to Setup Menu.
2Ah	Switches to Boot Manager.
2Bh	Tries to boot up OS.
2Ch	Shadows various Option ROM.
2Dh	Stores necessary data to recover from S3 state.
2Eh	Finally initializes chipset before booting up OS.
2Fh	Starts the bootup of legacy OS.
30h	Starts the bootup of UEFI OS.
31h	Prepares to boot up legacy OS.
32h	Sends the completion message of POST from HECI to ME.
33h	Finally initializes chipset before booting up legacy OS.
34h	Waits for the bootup of legacy OS.
35h	Starts Flash of Recovery.
< Post Boot Device Selection (Post BDS) phase >	
F9h	No bootable device.
FBh	Starts the bootup of UEFI image.
FDh	Switches to the bootup from INT19h.
FEh	Tries the bootup from INT19h.
< SMM Function >	
A0h	Identifies Flash device in SMM.
A2h	Initializes SMM Service.
A6h	Starts the activation of ACPI.
A7h	Completes the activation of ACPI.
A1h	Switches to S1 state.
A3h	Switches to S3 state.
A4h	Switches to S4 state.
A5h	Switches to S5 state.
A8h	Starts the inactivation of ACPI.
A9h	Completes the inactivation of ACPI.
< S3 Function >	
C0h	Initializes memory to recover from S3 state.
C1h	Gets necessary data from memory to recover from S3 state.
C2h	Starts the use of memory on recoverying from S3 state.
C3h	Sets the cache for physical memory on recoverying from S3 state.
C4h	Starts the recovery of system settings.
C5h	The recovery of system settings (stage 1)
C6h	The recovery of system settings (stage 2)
C7h	Re-locates SMM_BASE on recoverying from S3 state.
C8h	Initializing Multi Processor on recoverying from S3 state.
C9h	Starts the recovery of system settings in SMM.
CAh	Completes the recovery of system settings in SMM.
CBh	Recovers to OS.
< ASL Function >	
51h	Prepares to switch to S1 state.
53h	Prepares to switch to S3 state.
54h	Prepares to switch to S4 state.
55h	Prepares to switch to S5 state.
E1h	Boots up from S1 state.
E3h	Boots up from S3 state.
E4h	Boots up from S4 state.
E5h	Boots up from S5 state.

SERIAL I/O Address and Register Function

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

Table 6.5. I/O Address

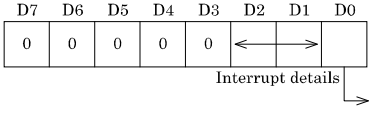
I/O address	DLAB	Read/Write	Register	
03F8H	0	W	Transmitter holding register	THR
		R	Receive buffer register	RBR
	1	W	Divisor latch register (LSB)	DLL
03F9H	1	W	Divisor latch register (MSB)	DLM
	0	W	Interrupt enable register	IER
03FAH	X	R	Interrupt ID register	IIR
03FBH	X	W	Line control register	LCR
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

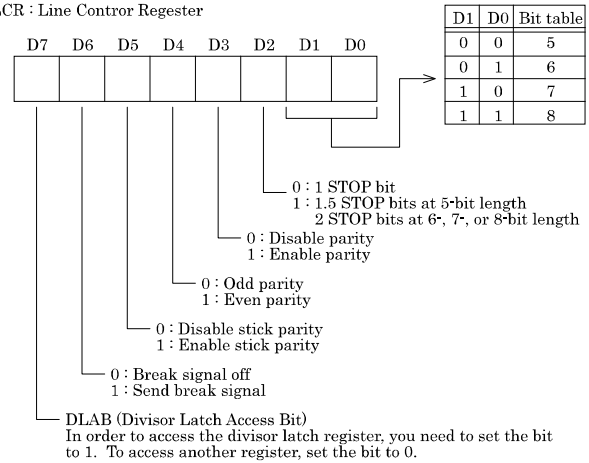
DLAB (Divisor Latch Access Bit) : The value in bit 7 of the line control register.

Table 6.6. Function of Each Register ***< 1 / 3 >***

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

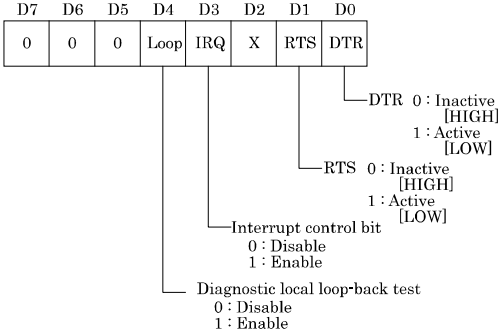
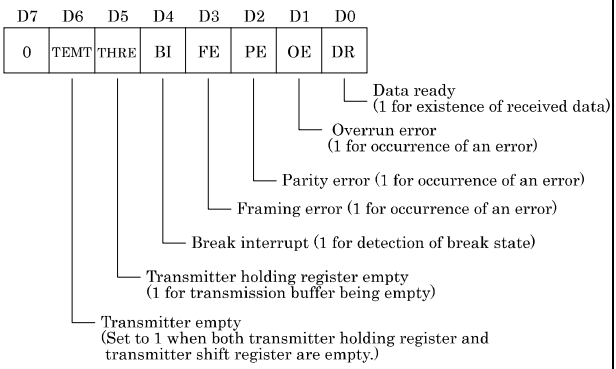
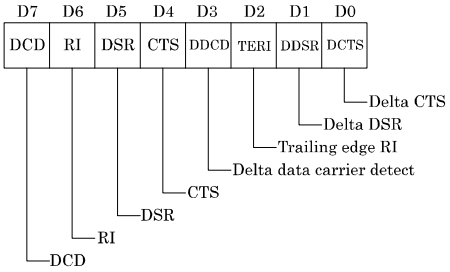
Table 6.6. Function of Each Register ***< 2 / 3 >***

<table>
<tr><th>I/O address</th><th>Description</th></tr>
<tr><td>03FAH</td><td>
IIR : Interrupt Identification Register


<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>
</td></tr>
<tr><td>03FBH</td><td>
LCR : Line Contror Regester


<table>
<tr><th>D1</th><th>D0</th><th>Bit table</th></tr>
<tr><td>0</td><td>0</td><td>5</td></tr>
<tr><td>0</td><td>1</td><td>6</td></tr>
<tr><td>1</td><td>0</td><td>7</td></tr>
<tr><td>1</td><td>1</td><td>8</td></tr>
</table>
</td></tr>
</table>

Table 6.6. Function of Each Register ***< 3 / 3 >***

I/O address	Description
03FCH	MCR: Modem Control Register 
03FDH	LSR: Line Status Regester 
03FEH	MSR : Modem Status Register 
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. 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 6.7. Baud Rate Settings

Baud rate to be set	SERIAL A 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.

This feature allows a running program to restart in an orderly way when a power glitch or any abnormal condition occurs.

The watchdog timer comes with 255-level time-out interval, 1 - 255 seconds per interval, which can be adjusted by software setting. There is a tolerance of 2 second for this time-out interval. To maintain the normal system operation, trigger the timer periodically by the user-created program in consideration of the tolerance.

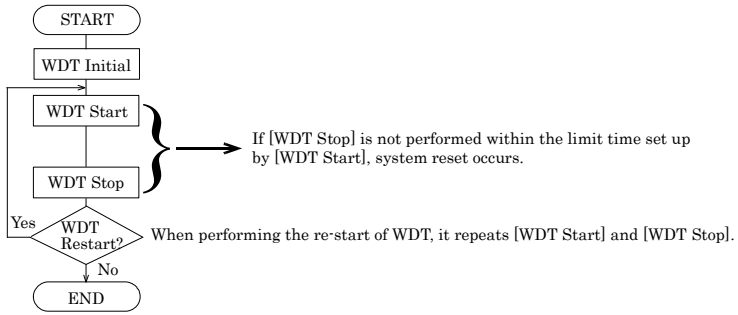
CONTEC's Web site [IPC-SLIB-01], which is bundled with this product, contains a sample program for the watchdog timer. To view the sample program for the watchdog timer, decompress "HWMandRTCut.zip", which is found under ¥RasUtility¥Samples¥Module.

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
;-----------------------------------
;Set WDT function at pin89
;-----------------------------------
MOV DX,2EH
MOV AL,2BH
OUT DX,AL
MOV DX,2FH
MOV AL,0DH
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,01H
OUT DX,AL
;-----------------------------------
;Set timer unit : second
;-----------------------------------
MOV DX,2EH
MOV AL,F5H
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,F6H
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,F6H
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 to dispose
Remove the battery according to the following figure when you dispose the main body.

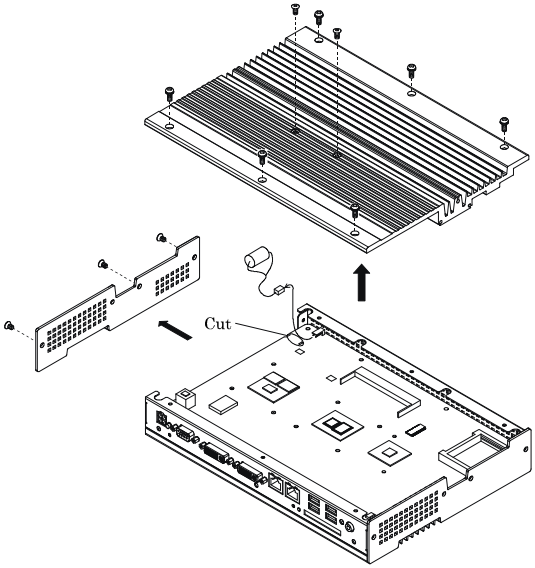


Figure 6.1. Removing the battery

- Disposing the battery

Dispose the removed battery properly as instructed by local government.

7. List of Options

Bracket

- BX-BKT-VESA03 Bracket for VESA ("100 x 100" - "200 x 200")

CFast Card

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

Hard Disk

- PC-HDD100S 2.5-inch SATA HDD 100GB

Silicon Disk

- PC-SSD2000S 2.5-inch SATA SSD 2GB
- PC-SSD4000S 2.5-inch SATA SSD 4GB
- PC-SSD8000S 2.5-inch SATA SSD 8GB

TFT color liquid-crystal display

<LVDS & DVI types>

- FPD-H71XT-DC1 *1*2 (15 inch 1024 x 768 dots, Panel mounted type)
- FPD-L71ST-DC1 *1*2 (12.1 inch 800 x 600 dots, Panel mounted type)
- FPD-S71VT-DC1 *1*2 (6.4 inch 640 x 480 dots, Panel mounted type)
- FPD-H75XT-DC1 *1*2 (15 inch 1024 x 768 dots, Embedded type)
- FPD-L75ST-DC1 *1*2 (12.1 inch 800 x 600 dots, Embedded type)
- FPD-M75VT-DC1 *1*2 (15 inch 640 x 480 dots, Embedded type)

*1 Please purchase the optional connection cable [IPC-DVI/D-020, IPC-DVI/D-050].

*2 When you want to use touchpanel function, please prepare USB cable separately. DVI connector of this product does not have touchpanel signal.

<Analog RGB types> [When using DVI-analogRGB conversion adapter]

- FPD-H21XT-AC (15 inch 1024 x 768 dots, Panel mounted type)
- FPD-L21ST-AC (12.1 inch 800 x 600 dots, Panel mounted type)
- FPD-M21VT-AC (10.4 inch 640 x 480 dots, Panel mounted type)

Display cable only for DVI input

- IPC-DVI/D-020 DVI-D Cable (2m)
- IPC-DVI/D-050 DVI-D Cable (5m)

Touch-panel cable for an analog RGB display [When using FPD21 series]

- IPC-CBL3-2 AT host Touch panel, COM cable (2m)
- IPC-CBL3-5 AT host Touch panel, COM cable (5m)

* Please check our website in order to know the latest information about our options.

BX960 Series

User's Manual

BX-960D-DCxxxx

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