

SUPER ●[®]

C9Z390-CG-IW

USER'S MANUAL

Revision 1.0a

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- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
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Manual Revision 1.0a

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Preface

This manual is written for system integrators, PC technicians, and knowledgeable PC users. It provides information for the installation and use of the **SUPER** C9Z390-CG-IW motherboard.

Manual Organization

Chapter 1 describes the features, specifications and performance of the motherboard, and provides detailed information on the Intel® Z390 chipset.

Chapter 2 provides hardware installation instructions. Read this chapter when installing the processor, memory modules and other hardware components into the system.

If you encounter any problems, see **Chapter 3**, which describes troubleshooting procedures for video, memory and system setup stored in the CMOS.

Chapter 4 includes an introduction to the BIOS, and provides detailed information on running the CMOS Setup utility.

Appendix A provides BIOS Error Beep Codes.

Appendix B lists software program installation instructions.

Appendix C contains UEFI BIOS Recovery instructions.

Checklist

Congratulations on purchasing your computer motherboard from an acknowledged leader in the industry. Supermicro boards are designed with the utmost attention to detail to provide you with the highest standards in quality and performance.

Please check that the following items have all been included with your motherboard. If anything listed here is damaged or missing, contact your retailer.

The following items are included in the retail box:

- One (1) Supermicro Motherboard
- Two (2) SATA cables
- One (1) I/O shield
- One (1) Quick Reference Guide
- One (1) Driver CD
- Two (2) WiFi Antennas

Conventions Used in the Manual

Special attention should be given to the following symbols for proper installation and to prevent damage done to the components or injury to yourself:



Attention! Critical information to prevent damage to the components or injury to yourself.



Important: Important information given to ensure proper system installation or to relay safety precautions.



Note: Additional Information given to differentiate various models or provides information for correct system setup.

Standardized Warning Statements

The following statements are industry-standard warnings, provided to warn the user of situations which have the potential for bodily injury. Should you have questions or experience difficulty, contact Supermicro's Technical Support department for assistance. Only certified technicians should attempt to install or configure components.

Read this section in its entirety before installing or configuring components in the Supermicro chassis.

Battery Handling



Warning!

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

電池の取り扱い

電池交換が正しく行われなかった場合、破裂の危険性があります。交換する電池はメーカーが推奨する型、または同等のものを使用下さい。使用済電池は製造元の指示に従って処分して下さい。

警告

電池更換不當會有爆炸危險。請只使用同類電池或製造商推薦的功能相當的電池更換原有電池。請按製造商的說明處理廢舊電池。

警告

電池更換不當會有爆炸危險。請使用製造商建議之相同或功能相當的電池更換原有電池。請按照製造商的說明指示處理廢棄舊電池。

Warnung

Bei Einsetzen einer falschen Batterie besteht Explosionsgefahr. Ersetzen Sie die Batterie nur durch den gleichen oder vom Hersteller empfohlenen Batterietyp. Entsorgen Sie die benutzten Batterien nach den Anweisungen des Herstellers.

Attention

Danger d'explosion si la pile n'est pas remplacée correctement. Ne la remplacer que par une pile de type semblable ou équivalent, recommandée par le fabricant. Jeter les piles usagées conformément aux instructions du fabricant.

¡Advertencia!

Existe peligro de explosión si la batería se reemplaza de manera incorrecta. Reemplazar la batería exclusivamente con el mismo tipo o el equivalente recomendado por el fabricante. Desechar las baterías gastadas según las instrucciones del fabricante.

אזהרה!

קיימת סכנת פיצוץ של הסוללה במידה והוחלפה בדרך לא תקינה. יש להחליף

את הסוללה בסוג התואם מחברת יצרן מומלצת.

סילוק הסוללות המשומשות יש לבצע לפי הוראות היצרן.

هناك خطر من انفجار في حالة اسبدال البطارية بطريقة غير صحيحة فعلي

اسبدال البطارية

فقط بنفس النوع أو ما يعادلها مما أوصت به الشركة المصنعة

جخلص من البطاريات المسحمة وفقا لعمليات الشركة الصانعة

경고!

배터리가 올바르게 교체되지 않으면 폭발의 위험이 있습니다. 기존 배터리와 동일하거나 제조사에서 권장하는 동등한 종류의 배터리로만 교체해야 합니다. 제조사의 안내에 따라 사용된 배터리를 처리하여 주십시오.

Waarschuwing

Er is ontploffingsgevaar indien de batterij verkeerd vervangen wordt. Vervang de batterij slechts met hetzelfde of een equivalent type die door de fabrikant aanbevolen wordt. Gebruikte batterijen dienen overeenkomstig fabrieksvoorschriften afgevoerd te worden.

Product Disposal



Warning!

Ultimate disposal of this product should be handled according to all national laws and regulations.

製品の廃棄

この製品を廃棄処分する場合、国の関係する全ての法律・条例に従い処理する必要があります。

警告

本产品的废弃处理应根据所有国家的法律和规章进行。

警告

本產品的廢棄處理應根據所有國家的法律和規章進行。

Warnung

Die Entsorgung dieses Produkts sollte gemäß allen Bestimmungen und Gesetzen des Landes erfolgen.

iAdvertencia!

Al deshacerse por completo de este producto debe seguir todas las leyes y reglamentos nacionales.

Attention

La mise au rebut ou le recyclage de ce produit sont généralement soumis à des lois et/ou directives de respect de l'environnement. Renseignez-vous auprès de l'organisme compétent.

סילוק המוצר

אזהרה!

סילוק סופי של מוצר זה חייב להיות בהתאם להנחיות וחוקי המדינה.

عند التخلص النهائي من هذا المنتج ينبغي التعامل معه وفقا لجميع القوانين واللوائح الوطنية

경고!

이 제품은 해당 국가의 관련 법규 및 규정에 따라 폐기되어야 합니다.

Waarschuwing

De uiteindelijke verwijdering van dit product dient te geschieden in overeenstemming met alle nationale wetten en reglementen.

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Where to Find More Information

For your system to work properly, please follow the links below to download all necessary drivers/utilities and the user's manual for your motherboard.

Supermicro product manuals: <http://www.supermicro.com/support/manuals/>

Product Drivers and utilities: <https://www.supermicro.com/wftp/driver/>

If you have any questions, please contact our support team at support@supermicro.com.

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Chapter 1

Introduction

1-1 Overview

About this Motherboard

The C9Z390-CG-IW motherboard supports a single 8th/9th Generation Intel® Core™ i9/i7/i5/i3/Pentium®/Celeron® processor in an LGA1151 socket. With the Intel® Z390 chipset built in, the C9Z390-CG-IW motherboard offers substantial system performance and storage capability for overclocking platforms in a sleek package. Please refer to our website (<http://www.supermicro.com/products/>) for processor and memory support updates.

1-2 Chipset Overview

Intel Z390 Express Chipset Features

- Direct Media Interface (up to 10 Gb/s transfer, Full Duplex)
- Intel Matrix Storage Technology and Intel Rapid Storage Technology
- Dual NAND Interface
- Intel I/O Virtualization (VT-d) Support
- Intel Trusted Execution Technology Support
- PCI-Express 3.0 Interface (up to 8 GT/s)
- SATA Controller (up to 6Gb/sec)
- Advanced Host Controller Interface (AHCI)

1-3 Motherboard Features

CPU	Single 8th/9th Gen Intel Core i9/i7/i5/i3/Pentium/Celeron processor in an LGA1151 H4 type socket (Up to 120W TDP)		
Memory	Two slots support up to 64GB (available only for selected 9th Gen processors) of unbuffered, non-ECC, DDR4 memory with speeds of 2666/2400 MHz (by CPU) or 4000+MHz (OC) DDR4 memory		
	Dual-channel memory		
	DIMM sizes		
	UDIMM	4GB/8GB/16GB; 32GB (available only for selected 9th Gen processors)	
Chipset	Intel Z390 chipset		
Expansion Slots	One (1) PCI-E 3.0 x16 slot		
	One (1) PCI-E x4 2280 M.2 (M-key)		
	One (1) PCI-E x4/SATA 2280 M.2 (M-key)		
	One (1) E-Key M.2 2230 (pre-installed WiFi module)		
Network Connections	Intel I219V Network Controller		
	One (1) RJ45 port with Link and Activity LEDs on the I/O back panel		
I/O Devices	Hard Drive Connections		
	SATA 3.0 (6Gb/s)	Four (4) SATA0~3 via Intel Z390	
		RAID 0, 1, 5, and 10	
	USB Devices		
	One (1) USB 3.1 Gen 2 Type C port on the I/O back panel		
	Three (3) USB 3.1 Gen 2 Type A ports on the I/O back panel		
	One (1) front accessible USB 3.1 Gen 2 Type C header		
	Two (2) USB 3.1 Gen 1 ports on the I/O back panel		
	Two (2) front accessible USB 3.1 Gen 1 connections via one header		
	Keyboard/Mouse		
One PS/2 Keyboard/Mouse port on the I/O back panel			
Other I/O Ports			
One (1) DisplayPort 1.2b port			
One (1) HDMI 2.0a port			

	<p style="text-align: center;">Audio</p> <p>One (1) High Definition Audio 7.1 channel connector supported by Realtek ALC1220 on the back panel</p> <p>One (1) Front Panel Audio header</p>
	<p style="text-align: center;">Super I/O</p> <p>Nuvoton NCT6792D-B</p>
BIOS	<p>128/256Mb AMI BIOS® SPI Flash BIOS</p> <p>DMI 2.8, PCI 3.0, ACPI 3.0, BIOS rescue hot-key, SPI dual/quad speed support, Overclock support</p>
Power Configuration	<p>ACPI Power Management (S3/S4/S5)</p> <p>Power Button Override Mechanism</p> <p>Power-on mode for AC power recovery</p>
Health Monitoring	<p style="text-align: center;">CPU Monitoring</p> <p>Onboard monitors: +1.8V, +3.3V, +5V, +/- 12V, +3.3V Stby, +5V Stby, VBAT, HT, Memory, PCH Temperature, System Temperature, Memory Temperature</p> <p>CPU/System overheat LED</p> <p>CPU Thermal Trip support</p> <p style="text-align: center;">Fan Control</p> <p>Two (2) 4-pin fan headers</p> <p>Multi-speed fan control via onboard Super I/O</p>
System Management	<p>PECI (Platform Environment Configuration Interface) 2.0 support</p> <p>System resource alert via SuperDoctor® 5</p> <p>SuperDoctor 5</p> <p>Chassis Intrusion header and detection</p>
CD Utilities	<p>BIOS flash upgrade utility</p> <p>Drivers and software for Intel Z390 chipset utilities</p>
LED Indicators	<p>Power/suspend state</p>
Dimensions	<p>Mini-ITX form factor (6.7" x 6.7") (170.18 mm x 170.18 mm)</p>

1-4 Special Features

Recovery from AC Power Loss

Basic I/O System (BIOS) provides a setting for you to determine how the system will respond when AC power is lost and then restored to the system. You can choose for the system to remain powered off, (in which case you must press the power switch to turn it back on), or for it to automatically return to a power-on state. See the Advanced BIOS Setup section to change this setting. The default setting is **Last State**.

1-5 PC Health Monitoring

This section describes the PC health monitoring features of the board. All have an onboard System Hardware Monitoring chip that supports PC health monitoring. An onboard voltage monitor will scan these onboard voltages continuously: +1.8V, +3.3V, +5V, +/- 12V, +3.3V Stby, +5V Stby, VBAT, HT, Memory, PCH Temperature, and System Temperature. Once a voltage becomes unstable, a warning is given, or an error message is sent to the screen. The user can adjust the voltage thresholds to define the sensitivity of the voltage monitor.

Fan Status Monitor with Firmware Control

PC health monitoring in the BIOS can check the RPM status of the cooling fans. The onboard CPU and chassis fans are controlled by Thermal Management via SIO.

Environmental Temperature Control

The thermal control sensor monitors the CPU temperature in real time and will turn on the thermal control fan whenever the CPU temperature exceeds a user-defined threshold. The overheat circuitry runs independently from the CPU. Once the thermal sensor detects that the CPU temperature is too high, it will automatically turn on the thermal fans to prevent the CPU from overheating. The onboard chassis thermal circuitry can monitor the overall system temperature and alert the user when the chassis temperature is too high.



Note: To avoid possible system overheating, please be sure to provide adequate airflow for your system.

System Resource Alert

This feature is available when the system is used with SuperDoctor 5 in the Windows and Linux operating systems. SuperDoctor is used to notify the user of certain system events. For example, you can also configure SuperDoctor to provide you with warnings when the system temperature, CPU temperatures, voltages, and fan speeds go beyond predefined thresholds.

1-6 ACPI Features

ACPI stands for Advanced Configuration and Power Interface. The ACPI specification defines a flexible and abstract hardware interface that provides a standard way to integrate power management features throughout a PC system, including its hardware, operating system and application software. This enables the system to automatically turn on and off peripherals such as CD-ROMs, network cards, hard disk drives and printers.

In addition to enabling operating system-directed power management, ACPI also provides a generic system event mechanism for Plug and Play, and an operating system-independent interface for configuration control. ACPI leverages the Plug and Play BIOS data structures, while providing a processor architecture-independent implementation that is compatible with Windows® 7, Windows 8, and Windows 2008 Operating Systems.

Slow Blinking LED for Suspend-State Indicator

When the CPU goes into a suspend state, the chassis power LED will start to blink to indicate that the CPU is in the suspend mode. When the user presses any key, the CPU will wake up, and the LED will automatically stop blinking and remain on.

1-7 Power Supply

As with all computer products, a stable power source is necessary for proper and reliable operation. It is even more important for processors that have high CPU clock rates or overclocked processors.

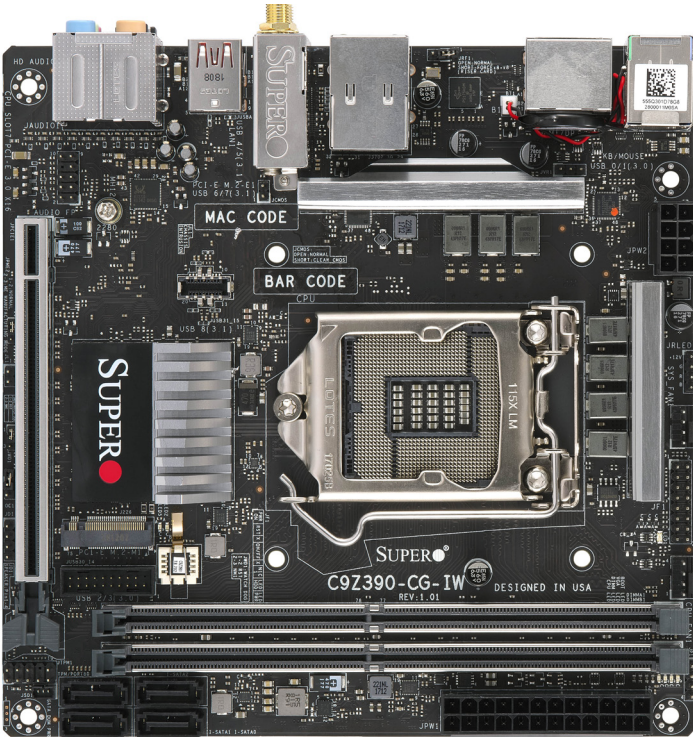
This motherboard accommodates a 24-pin ATX power supply. Although most power supplies generally meet the specifications required by the CPU, some are inadequate. In addition, the 12V 8-pin power connector located at JPW2 is also required to ensure adequate power supply to the system. Also your power supply must supply 1.5A for the Ethernet ports.

! Attention! To prevent damage to the power supply or motherboard, please use power supplies that contain 24-pin and 8-pin power connectors. Be sure to connect these connectors to the 24-pin (JPW1) and the 8-pin (JPW2) power connectors on the motherboard.

It is strongly recommended that you use a high quality power supply that meets ATX power supply Specification 2.02 or above. It must also be SSI compliant. (For more information, please refer to the website at <http://www.ssiforum.org/>). Additionally, in areas where noisy power transmission is present, you may choose to install a line filter to shield the computer from noise. It is recommended that you also install a power surge protector to help avoid problems caused by power surges.

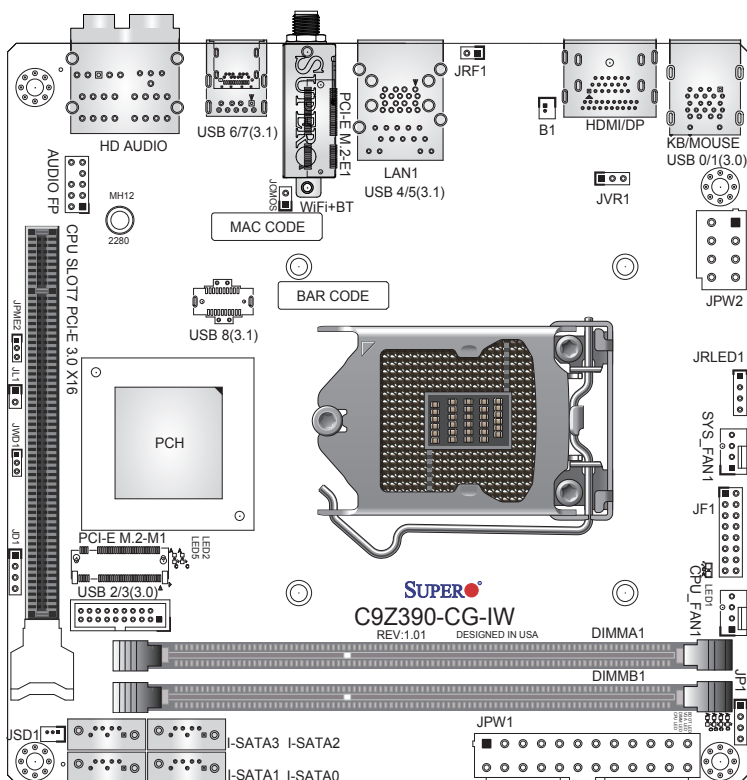
1-8 Super I/O

The Super I/O provides functions that comply with ACPI (Advanced Configuration and Power Interface), which includes support of legacy and ACPI power management through an SMI or SCI function pin. It also features auto power management to reduce power consumption.

C9Z390-CG-IW Motherboard Image

Note: All graphics shown in this manual were based upon the latest PCB Revision available at the time of publishing of the manual. The motherboard you've received may or may not look exactly the same as the graphics shown in this manual.

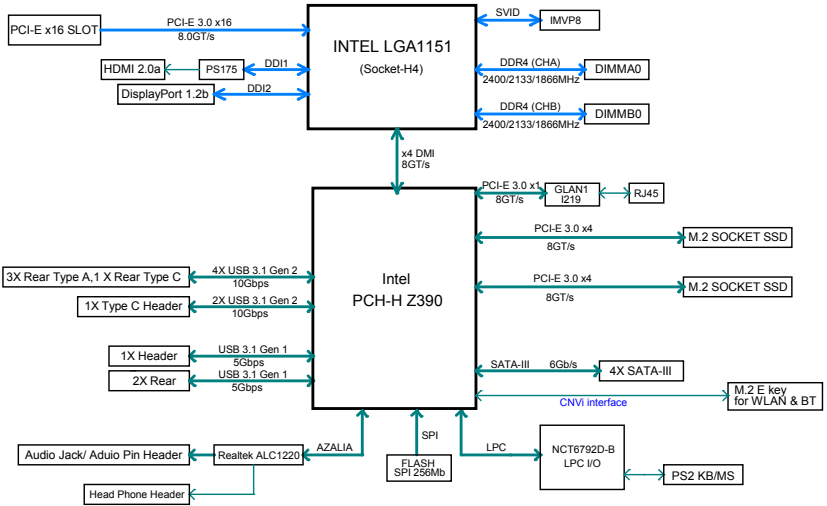
C9Z390-CG-IW Motherboard Layout



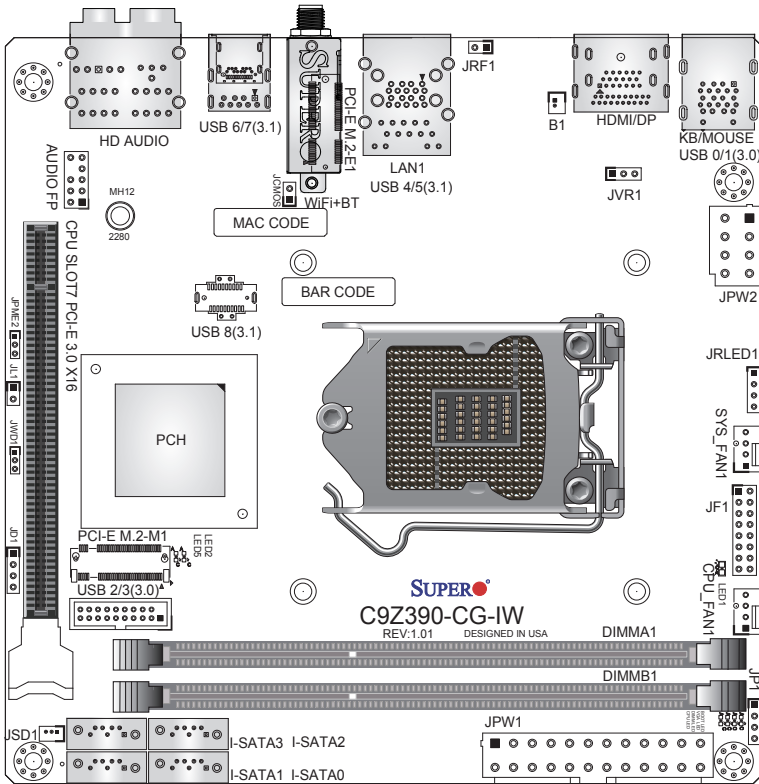
Important Notes to the User

- See Chapter 2 for detailed information on jumpers, I/O ports and JF1 front panel connections.
- "■" indicates the location of "Pin 1".
- Jumpers not indicated are for testing only.
- When LED1 (Onboard Power LED Indicator) is on, system power is on. Unplug the power cable before installing or removing any components.

C9Z390-CG-IW Block Diagram



C9Z390-CG-IW Quick Reference



Jumper	Description	Default
JCMOS	Clear CMOS	Open: Normal Short: Clear CMOS
JPME2	Intel Manufacturing Mode	Pins 1-2: Normal
JRF1	Force x8+x8 link (Riser Card)	Open: Normal Short: Enable
JWD1	Watch Dog Function Enable	Pins 1-2: RST

Connector	Description
AUDIO FP	Front Panel Audio Header
B1	RTC Battery
CPU_FAN1	CPU Fan Header
CPU SLOT7 PCI-E 3.0 x16	PCI-Express x16 Slot (PCI-E 3.0 x16 link)
DP	Back Panel DisplayPort 1.2b Port
HD AUDIO	Back Panel High Definition Audio Ports
HDMI	Back Panel HDMI 2.0a Port
I-SATA0~3	Intel Z390 SATA 3.0 Ports (6Gb/sec)
JD1	External Speaker Header
JF1	Front Control Panel Header
JL1	Chassis Intrusion Header
JPW1	24-pin ATX Main Power Connector (Required)
JPW2	+12V 8-pin CPU Power Connector (Required)
JRLED1	4-pin Header for 12V RGB LED Strip
JSD1	SATA DOM (Disk-On-Module) Power Connector
JVR1	Header for Manufacturing Purpose
KB/MOUSE	PS/2 Keyboard/Mouse Port
LAN1	RJ45 GbE LAN Port
PCI-E M.2-E1	PCI-E M.2 E-key Connector (Pre-installed Intel Wireless-AC 9560 WiFi module)
PCI-E M.2-M1/ M.2-M2	PCI-E M.2 Connectors (Small form factor devices and other portable devices for high speed NVMe SSDs *PCI-E M.2-M2 is on the bottom side of the motherboard. (Only PCI-E M.2-M2 supports both PCI-E and SATA.)
SYS_FAN1	System Fan Header

Connector	Description
USB 0/1	Back Panel USB 3.1 Gen 1 Ports (Blue)
USB 2/3	Front Accessible USB 3.1 Gen 1 Header (Black)
USB 4/5/6/7	Back Panel USB 3.1 Gen 2 Ports (Red)
USB 8	Front Accessible USB 3.1 Gen 2 Header (Type C)

LED	Description	Color/State
BOOT LED	Bootable Device POST (Power-On Self-Test) Status	Bootable Device POST: Red ON Bootable Device POST Completion: OFF
CPU LED	CPU POST (Power-On Self-Test) Status	CPU POST: Yellow ON CPU POST Completion: OFF
DIMM LED	DIMM POST (Power-On Self-Test) Status	DIMM POST: Blue ON DIMM POST Completion: OFF
LED1	Power On: Green On S3 (Suspend to RAM) LED	Power On: Green ON S3: Green Blinking
LED2	PCI-E M.2 Device LED	PCI-E Device Detected: Green ON Activity: Green Blinking
LED5	PCI-E/SATA M.2 LED	PCI-E/SATA Device Detected: Green ON Activity: Green Blinking
VGA LED	Onboard VGA POST (Power-On Self-Test) Status	Onboard VGA POST: Green ON Onboard VGA POST Completion: OFF

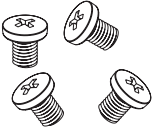
*Download the AMI status codes at https://ami.com/ami_downloads/Aptio_V_Status_Codes.pdf

Chapter 2

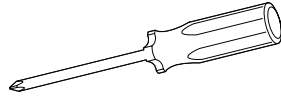
Installation

2-1 Installation Components and Tools Needed

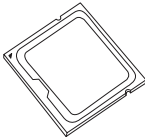
Screws



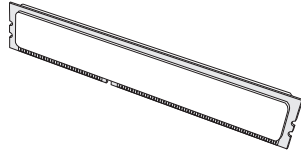
Phillips-Head Screwdriver



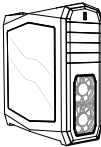
Intel LGA 1151 Processor



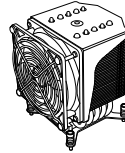
DDR4 DIMMs



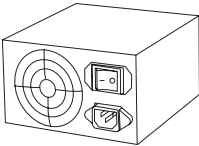
PC Chassis



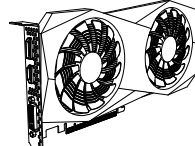
Heatsink with Fan



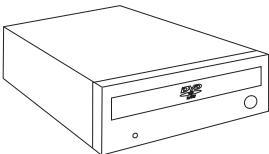
Power Supply



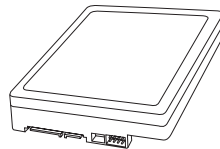
Video Card (Optional)



SATA/USB Optical Drive (Optional)



SATA Hard Disk Drive



2-2 Static-Sensitive Devices

Electrostatic-Discharge (ESD) can damage electronic components. To avoid damaging your system board, it is important to handle it very carefully. The following measures are generally sufficient to protect your equipment from ESD.

Precautions

- Use a grounded wrist strap designed to prevent static discharge.
- Touch a grounded metal object before removing the board from the antistatic bag.
- Handle the board by its edges only; do not touch its components, peripheral chips, memory modules or gold contacts.
- When handling chips or modules, avoid touching their pins.
- Put the motherboard and peripherals back into their antistatic bags when not in use.
- For grounding purposes, make sure your computer chassis provides excellent conductivity between the power supply, the case, the mounting fasteners and the motherboard.
- Use only the correct type of onboard CMOS battery. Do not install the onboard battery upside down to avoid possible explosion.

Unpacking

The motherboard is shipped in antistatic packaging to avoid static damage. When unpacking the board, make sure that the person handling it is static protected.

2-3 Processor and Heatsink Installation

! **Attention!** When handling the processor package, avoid placing direct pressure on the label area of the fan.

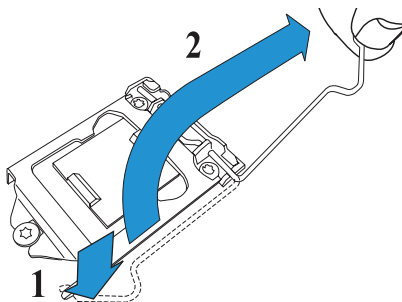


Important:

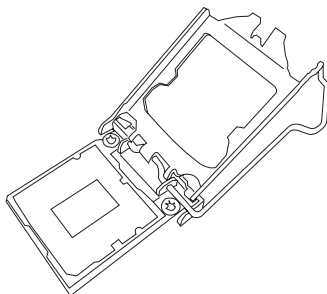
- Always connect the power cord last, and always remove it before adding, removing or changing any hardware components. Make sure that you install the processor into the CPU socket before you install the CPU heatsink.
- If you buy a CPU separately, make sure that you use an Intel-certified multi-directional heatsink only.
- Make sure to install the system board into the chassis before you install the CPU heatsink.
- When receiving a server board without a processor pre-installed, make sure that the plastic CPU socket cap is in place and none of the socket pins are bent; otherwise, contact your retailer immediately.
- Refer to the Supermicro website for updates on CPU support.

Installing the Processor

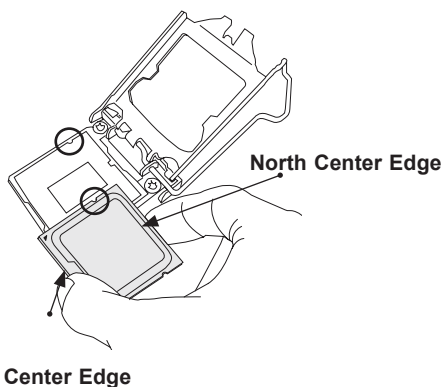
1. Remove the WARNING plastic cap from the socket.
2. Press and move the locking lever to the unlocked position.



3. With the locking lever unlocked, push it back to expose the socket plate.

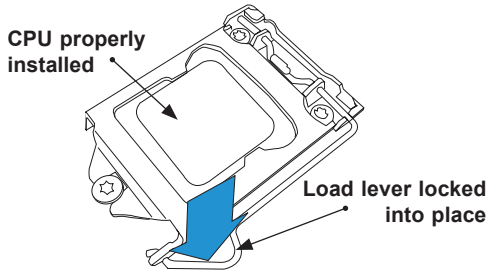


4. Use your thumb and index finger to hold the CPU on its edges. Align the CPU keys, which are semi-circle cutouts, against the socket keys.



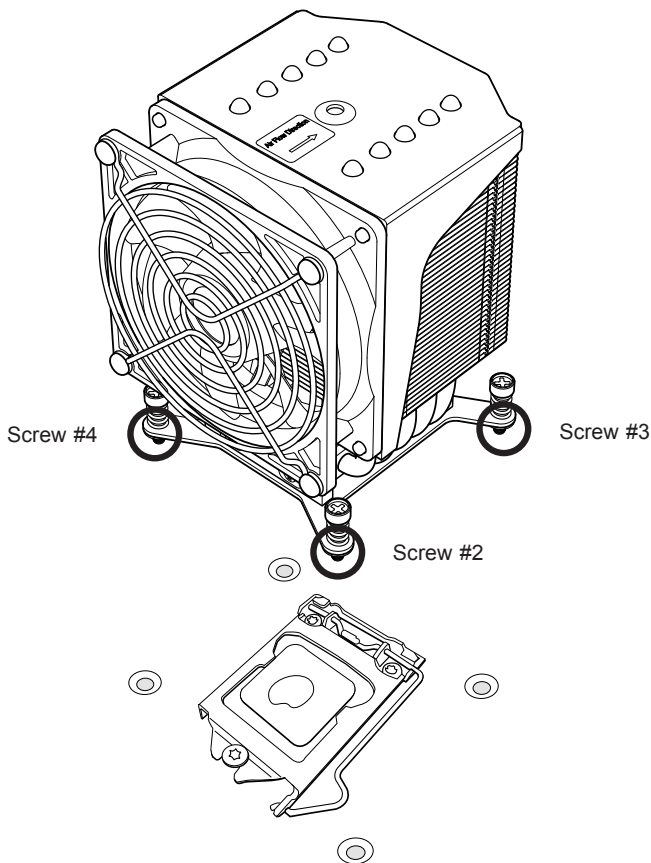
5. Once they are aligned, carefully lower the CPU straight down into the socket. To avoid damaging the CPU or socket, do not drop the CPU onto the socket, move it horizontally or vertically, or rub it against the socket pins.
6. With the CPU inside the socket, inspect the four corners of the CPU to make sure that the CPU is properly installed.

7. Close the load plate with the CPU inside the socket. Gently push the locking lever down to secure the CPU.



Installing a CPU Heatsink

1. Apply the proper amount of thermal grease to the heatsink.
2. Place the heatsink on top of the CPU so that the two mounting holes on the heatsink are aligned with those on the retention mechanism.
3. Tighten the screws in the following order:



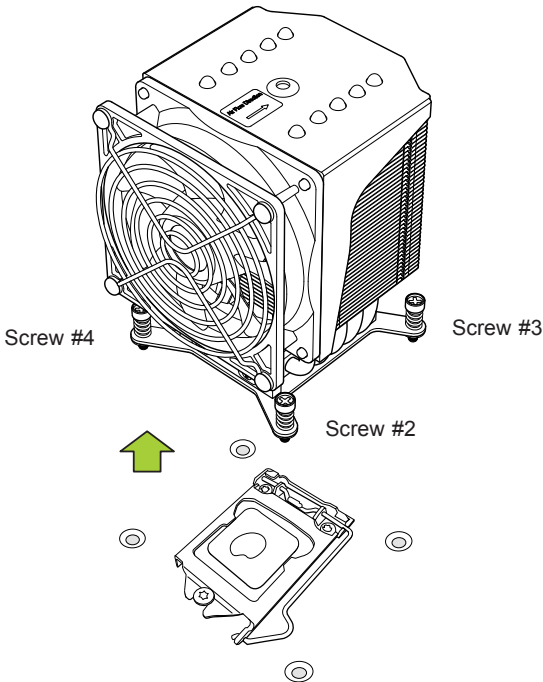
Note: Screw #1 is not shown in the illustration.

Note: Graphic drawings included in this manual are for reference only. They might look different from the components installed in your system.

Removing a Heatsink

Warning: We do not recommend that the CPU or the heatsink be removed. However, if you do need to remove the heatsink, please follow the instructions below to uninstall the heatsink to avoid damaging the CPU or other components.

1. Unplug the power cord from the power supply.
2. Loosen the screws in the order below.
3. Gently wiggle the heatsink to loosen it. Do not use excessive force when wiggling the heatsink.



4. Once the heatsink is loosened, remove it from the motherboard.



Note: Screw #1 is not shown in the illustration.

Note: Graphic drawings included in this manual are for reference only. They might look different from the components installed in your system.

2-4 Installing DDR4 Memory



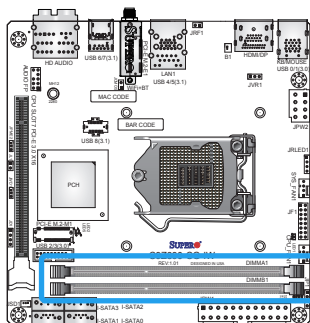
Note: Check the Supermicro website for recommended memory modules.



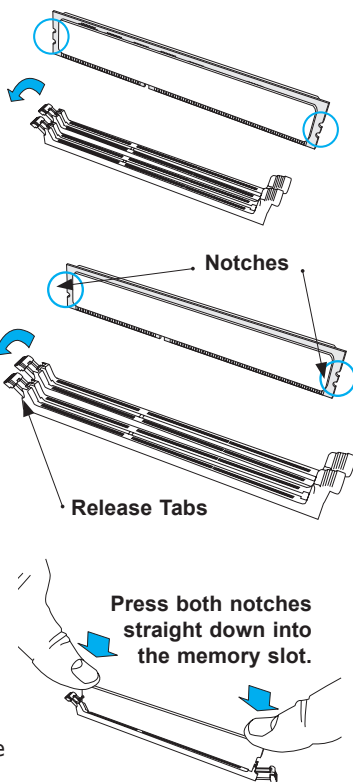
Attention! Exercise extreme care when installing or removing DIMM modules to prevent any possible damage.

DIMM Installation

1. Insert the desired number of DIMMs into the memory slots, starting with DIMMA1, and then DIMMB1. For the system to work properly, please use the memory modules of the same type and speed.



2. Push the release tab outwards on the end of the DIMM slot to unlock it.
3. Align the key of the DIMM module with the receptive point on the memory slot.
4. Align the notches on both ends of the module against the receptive points on the ends of the slot.
5. Use two thumbs together to press the notches on both ends of the module straight down into the slot until the module snaps into place.
6. Press the release tab to the lock position to secure the DIMM module into the slot.



Removing Memory Modules

Reverse the steps above to remove the DIMM modules from the motherboard.

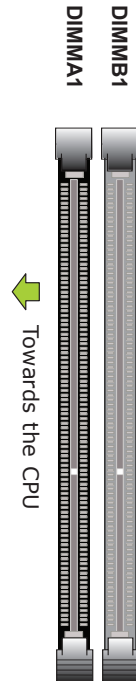
Memory Support

The C9Z390-CG-IW supports up to 64GB (available only for selected 9th Gen processors) of Unbuffered (UDIMM) non-ECC DDR4 memory with speeds of up to 4000+MHz (OC) in two 288-pin memory slots. Populating these DIMM modules with a pair of memory modules of the same type and size will result in interleaved memory, which will improve memory performance.

Memory Population Guidelines

When installing memory modules, the DIMM slots should be populated in the following order: DIMMA1 and then DIMMB1.

- Always use DDR4 DIMM modules of the same size and type.
- Mixed DIMM speeds can be installed. However, all DIMMs will run at the speed of the slowest DIMM.



Recommended
Population

One DIMM

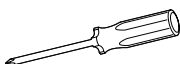


Two DIMM



2-5 Motherboard Installation

All motherboards have standard mounting holes to fit different types of chassis. Make sure that the locations of all the mounting holes for both motherboard and chassis match. Although a chassis may have both plastic and metal mounting fasteners, metal ones are highly recommended because they ground the motherboard to the chassis. Make sure that the metal standoffs click in or are screwed in tightly. Then use a screwdriver to secure the motherboard onto the motherboard tray.



Phillips Screwdriver (1)

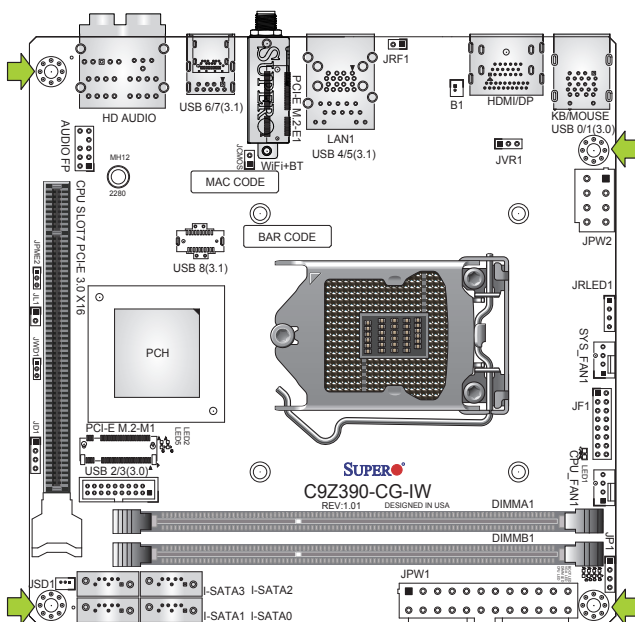


Phillips Screws (4)



Standoffs (4)
Only if Needed

Tools Needed

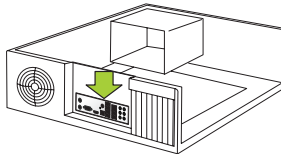


Location of Mounting Holes

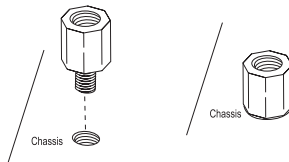
- ! Attention!** 1) To avoid damaging the motherboard and its components, please do not use a force greater than 8 lb/inch on each mounting screw during motherboard installation. 2) Some components are very close to the mounting holes. Please take precautionary measures to avoid damaging these components when installing the motherboard to the chassis.

Installing the Motherboard

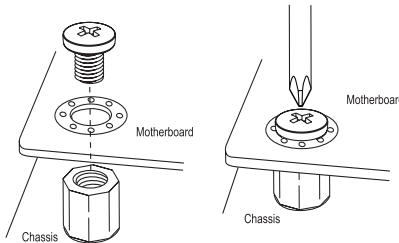
1. Install the I/O shield into the back of the chassis.



2. Locate the mounting holes on the motherboard. (See the previous page.)
3. Locate the matching mounting holes on the chassis. Align the mounting holes on the motherboard against the mounting holes on the chassis.



4. Install standoffs in the chassis as needed.
5. Install the motherboard into the chassis carefully to avoid damaging other motherboard components.



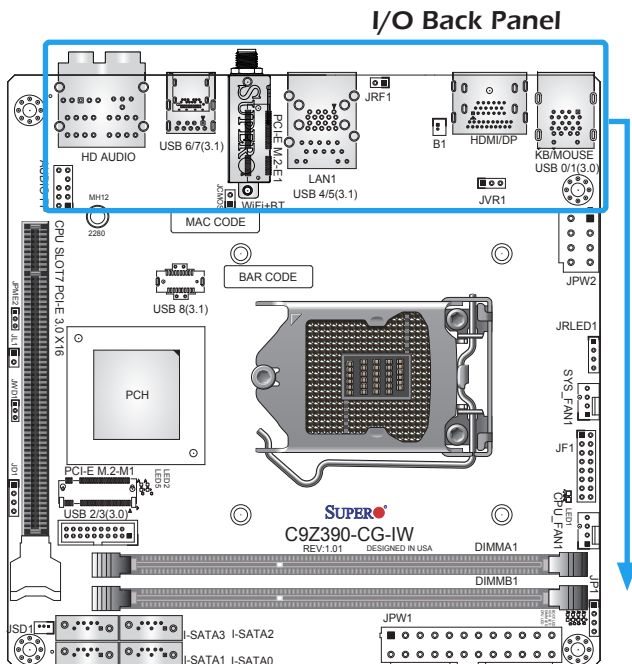
6. Using the Phillips screwdriver, insert a Phillips head #6 screw into a mounting hole on the motherboard and its matching mounting hole on the chassis.
7. Repeat Step 6 to insert screws into all mounting holes.
8. Make sure that the motherboard is securely placed in the chassis.



Note: Images displayed are for illustration only. Your chassis or components might look different from those shown in this manual.

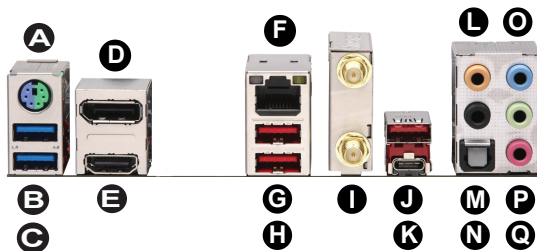
2-6 Connectors/IO Ports

The I/O ports are color coded in conformance with the industry standards. See the figure below for the colors and locations of the various I/O ports.



A	PS/2 Keyboard/Mouse Port	F	LAN1	K	USB 3.1 Gen 2 Port 7	P	Line Out
B	USB 3.1 Gen 1 Port 0	G	USB 3.1 Gen 2 Port 4	L	Center/LFE Out	Q	Mic In
C	USB 3.1 Gen 1 Port 1	H	USB 3.1 Gen 2 Port 5	M	Surround Out		
D	DisplayPort 1.2b Port	I	PCI-E M.2 E-Key	N	S/PDIF Out		
E	HDMI 2.0a Port	J	USB 3.1 Gen 2 Port 6	O	Line In		

C9Z390-CG-IW



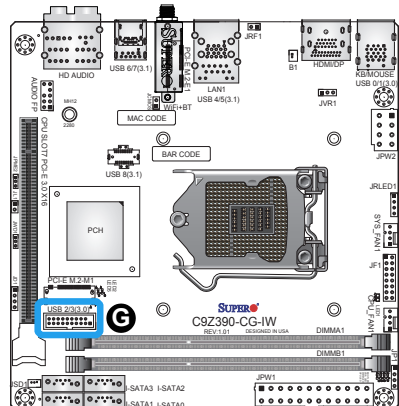
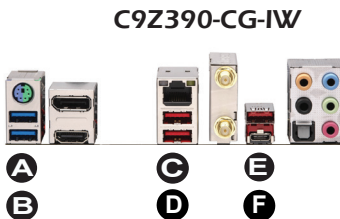
Universal Serial Bus (USB) Ports

Two USB 3.1 Gen 1 ports (USB 0/1), four USB 3.1 Gen 2 ports (USB 4/5, USB 6: Type A, USB 7: Type C) are on the I/O back panel. In addition, one USB 3.1 Gen 1 header (USB 2/3) and one USB 3.1 Gen 2 Type C header (USB 8) are located on the motherboard to provide front chassis access using USB cables (not included). Refer to the tables below for pin definitions.

Front Panel USB 2/3 (3.1 Gen 1) Pin Definitions			
Pin#	Pin#	Signal Name	Description
1	19	VBUS	Power
2	18	StdA_SSRX-	SuperSpeed Receiver
3	17	StdA_SSRX+	Differential Pari
4	16	Ground	Ground of PWR Return
5	15	StdA_SSTX-	SuperSpeed Transmitter
6	14	StdA_SSTX+	Differential Pair
7	13	GND_DRAIN	Ground for Signal Return
8	12	D-	USB 2.0 Differential Pair
9	11	D+	

Back Panel USB 0/1 (3.1 Gen 1), USB 4/5/6/7 (3.1 Gen 2) Pin Definitions			
Pin#	Definition	Pin#	Definition
1	+5V	5	+5V
2	USB_PN1	6	USB_PN0
3	USB_PP1	7	USB_PP0
4	Ground	8	Ground

- A. USB 0
- B. USB 1
- C. USB 4
- D. USB 5
- E. USB 6
- F. USB 7
- G. USB 2/3

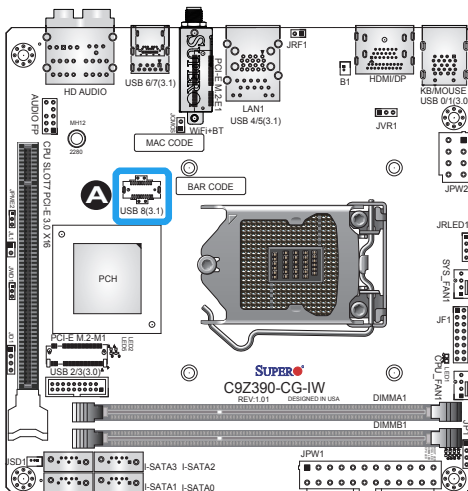


Universal Serial Bus (USB) Ports Continued

One USB 3.1 Gen 2 Type C header (USB 8) is located on the motherboard to provide front chassis access using USB cables (not included). Refer to the table below for pin definitions.

Front Panel USB 8 (3.1 Gen 2) Pin Definitions			
Pin#	Definition	Pin#	Definition
1	VBUS	11	VBUS
2	TX1+	12	TX2+
3	TX1-	13	TX2-
4	GND	14	GND
5	RX1+	15	RX2+
6	RX1-	16	RX2-
7	VBUS	17	GND
8	CC1	18	D-
9	SBU1	19	D+
10	SBU2	20	CC2

A. USB 8



ATX PS/2 Keyboard/Mouse Port

The ATX PS/2 keyboard and mouse port is located on the back panel above USB 0/1.

LAN1 Port

There is one Gigabit Ethernet port (LAN1) on the I/O back panel to provide network connections. These ports accept RJ45 type cables.



Note: Please refer to Section 2-9 for LAN LED information.

LAN1 Port Pin Definition			
Pin#	Definition	Pin#	Definition
1	P2V5SB	10	SGND
2	TD0+	11	Act LED
3	TD0-	12	P3V3SB
4	TD1+	13	Link 100 LED (Green, +3V3SB)
5	TD1-	14	Link 1000 LED (Yellow, +3V3SB)
6	TD2+	15	Ground
7	TD2-	16	Ground
8	TD3+	17	Ground
9	TD3-	18	Ground

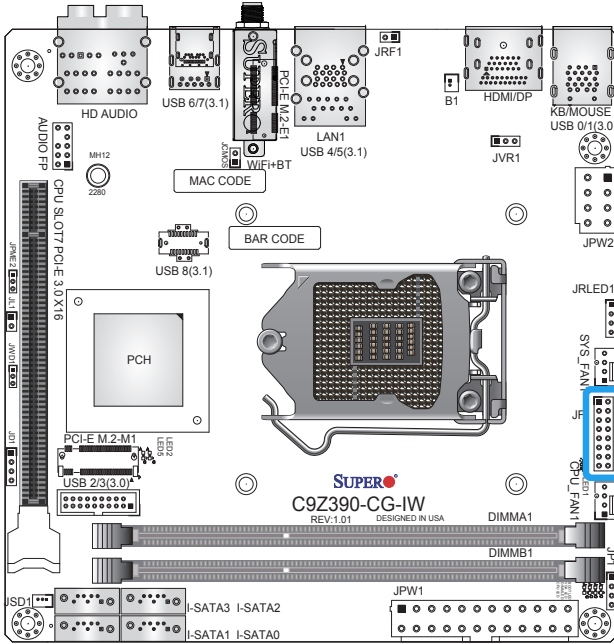
- A. PS/2 Keyboard/Mouse Port
- B. LAN1 Port

C9Z390-CG-IW

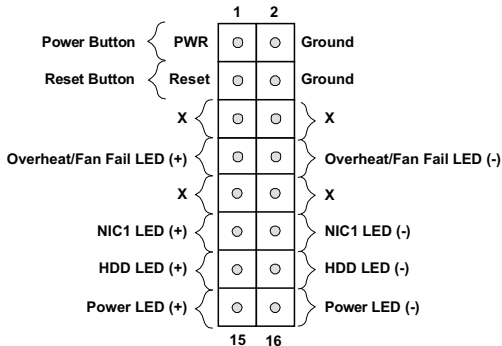


Front Control Panel

JF1 contains header pins for various buttons and indicators that are normally located on a control panel at the front of the chassis. These connectors are designed specifically to use with Supermicro chassis. See the figure below for the descriptions of the front control panel buttons and LED indicators. Refer to the following section for descriptions and pin definitions.



JF1 Header Pins



Front Control Panel Pin Definitions

Power LED

The Power LED connection is located on pins 15 and 16 of JF1. Refer to the table on the right for pin definitions.

Power LED Pin Definitions (JF1)	
Pin#	Definition
15	Vcc
16	PWR LED

HDD LED

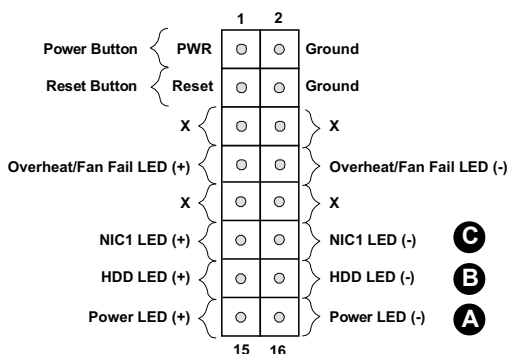
The HDD LED connection is located on pins 13 and 14 of JF1. Attach a cable here to indicate the status of HDD-related activities, including IDE and SATA activities. Refer to the table on the right for pin definitions.

HDD LED Pin Definitions (JF1)	
Pin#	Definition
13	Vcc
14	HD Active

NIC1 (LAN1) LED

The NIC (Network Interface Controller) LED connection for LAN1 is located on pins 11 and 12 of JF1. Attach NIC LED cables to the NIC1 LED indicator to display network activity. Refer to the table on the right for pin definitions.

NIC1 LED Pin Definitions (JF1)	
Pin#	Definition
11	Vcc
12	NIC1 LED



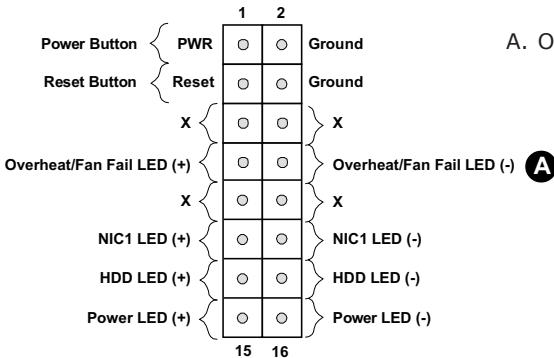
- A. Power LED
- B. HDD LED
- C. NIC1 LED

Overheat (OH)/Fan Fail LED

Connect an LED cable to OH/Fan Fail connections on pins 7 and 8 of JF1 to provide warnings for chassis overheat/fan failure. Refer to the tables on the right for pin definitions.

OH/Fan Fail LED Pin Definitions (JF1)	
Pin#	Definition
7	Vcc
8	OH/Fan Fail LED

OH/Fan Fail Indicator Status	
State	Definition
Off	Normal
On	Overheat
Flashing	Fan Fail



A. Overheat/Fan Fail LED

Power Button

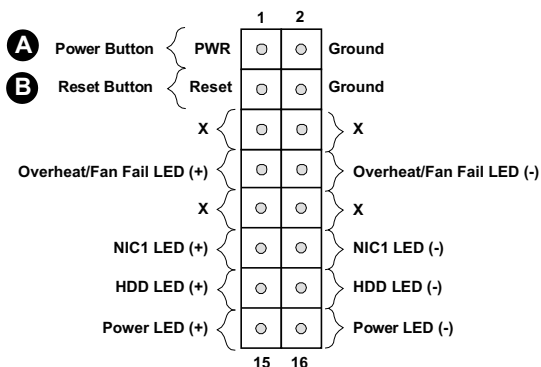
The Power Button connection is located on pins 1 and 2 of JF1. Momentarily contacting both pins will power on/off the system. This button can also be configured to function as a suspend button (with a setting in the BIOS - see Chapter 4). To turn off the power in the suspend mode, press the button for at least four seconds. Refer to the table on the right for pin definitions.

Power Button Pin Definitions (JF1)	
Pin#	Definition
1	Signal
2	Ground

Reset Button

The Reset Button connection is located on pins 3 and 4 of JF1. Attach it to a hardware reset switch on the computer case to reset the system. Refer to the table on the right for pin definitions.

Reset Button Pin Definitions (JF1)	
Pin#	Definition
3	Reset
4	Ground



A. Power Button
B. Reset Button

2-7 Connecting Cables

This section provides brief descriptions and pin-out definitions for on-board headers and connectors. Be sure to use the correct cable for each header or connector.

ATX Main PWR and CPU PWR Connectors

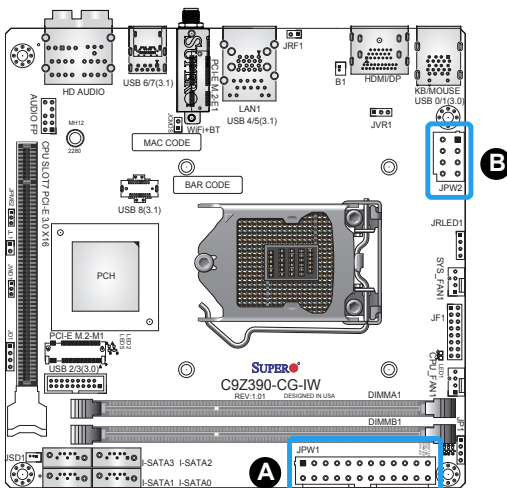
The 24-pin main power connector (JPW1) provides power for the motherboard. The 8-pin CPU PWR connector (JPW2) is also required for the processor. These power connectors meet the SSI EPS 12V specification. Refer to the tables on the right for pin definitions.

ATX Power 24-pin Connector Pin Definitions			
Pin#	Definition	Pin #	Definition
13	+3.3V	1	+3.3V
14	-12V	2	+3.3V
15	Ground	3	Ground
16	PS_ON	4	+5V
17	Ground	5	Ground
18	Ground	6	+5V
19	Ground	7	Ground
20	Res (NC)	8	PWR_OK
21	+5V	9	5VSB
22	+5V	10	+12V
23	+5V	11	+12V
24	Ground	12	+3.3V

- A. 24-Pin ATX Main PWR Connector
- B. 8-Pin PWR Connector

8-pin Power Connector Pin Definitions	
Pins	Definition
1-4	Ground
5-8	+12V

(Required)



Fan Headers

The motherboard has two 4-pin fan headers (CPU_FAN1, SYS_FAN1). Although pins 1-3 of the system fan headers are backward compatible with the traditional 3-pin fan headers, we recommend the use of 4-pin fan headers to take advantage of the fan speed control. This allows the fan speeds to be automatically adjusted based on the motherboard temperature. Refer to the table on the right for pin definitions.

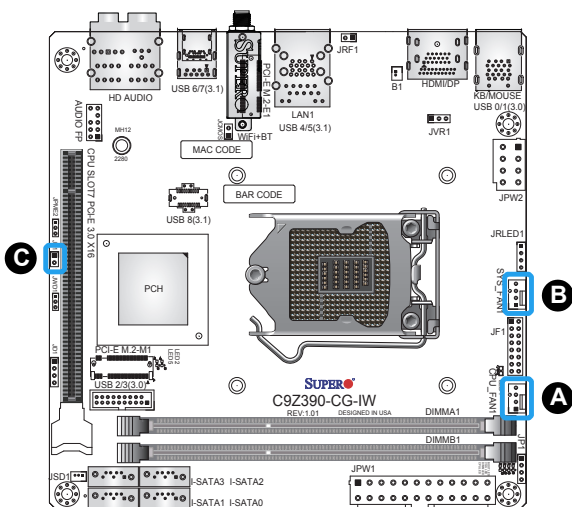
Fan Headers Pin Definitions	
Pin#	Definition
1	Ground (Black)
2	2A/+12V (Red)
3	Tachometer
4	PWM_Control

Chassis Intrusion Header

A Chassis Intrusion header is located at JL1 on the motherboard. Attach the appropriate cable from the chassis to inform you of a chassis intrusion when the chassis is opened.

Chassis Intrusion Header Pin Definitions	
Pin#	Definition
1	Intrusion Input
2	Ground

- A. CPU_FAN1
- B. SYS_FAN1
- C. Chassis Intrusion Header

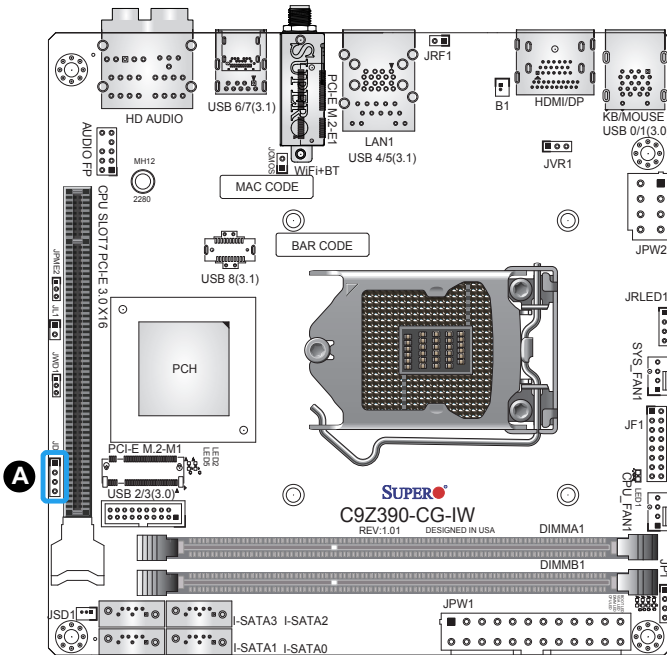


Speaker Header

On the JD1 header, if you wish to use an external speaker, close pins 1-4 with a cable. Refer to the table on the right for pin definitions.

Speaker Header Pin Definitions	
Pin Setting	Definition
Pins 1-4	External Speaker

A. Speaker Header

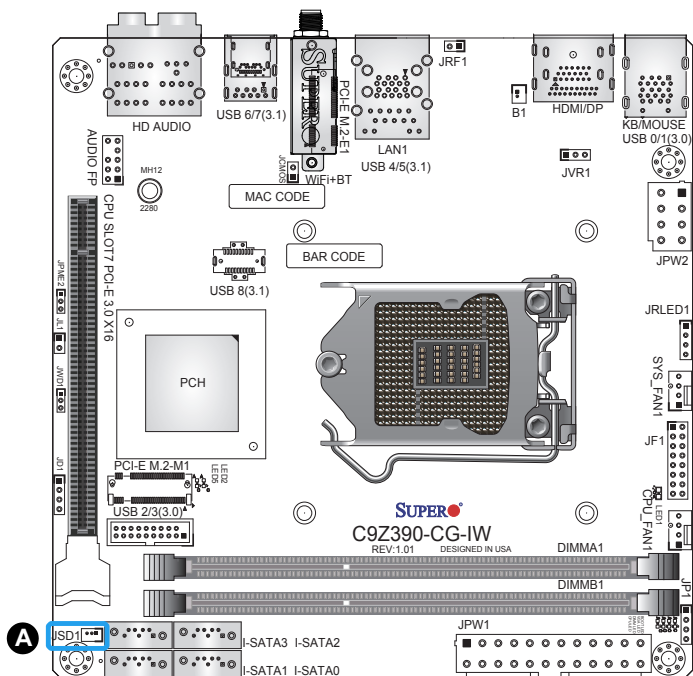


DOM PWR Connector

The Disk-On-Module (DOM) power connector, located at JSD1, provides 5V power to a solid state DOM storage device connected to one of the SATA ports. Refer to the table on the right for pin definitions.

DOM PWR Connector Pin Definitions	
Pin#	Definition
1	5V
2	Ground
3	Ground

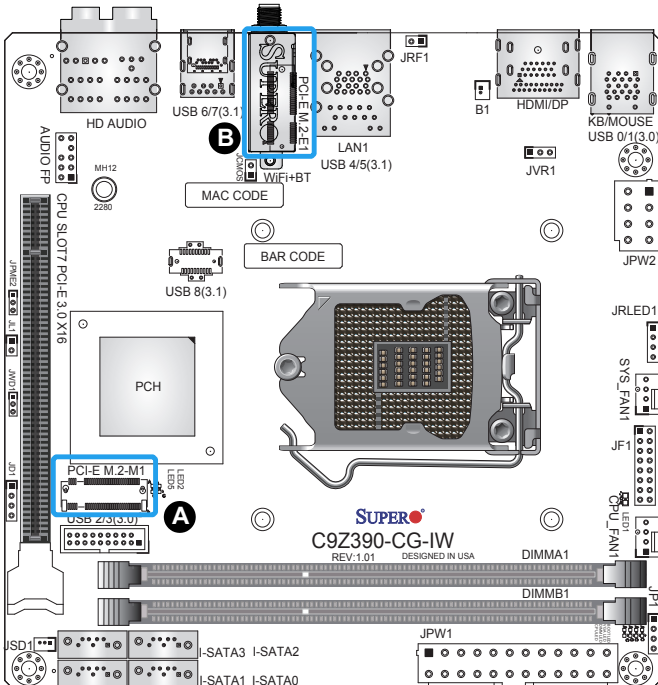
A. DOM PWR Connector



M.2 Connectors

M.2 is formerly known as Next Generation Form Factor (NGFF). The M.2 M-key (2280) connector is designed for internal mounting devices and provides support dedicated for SSD devices with the ultimate performance capability in a PCI-Express 3.0 interface for native PCI-E SSD support. M.2 SATA capability is also supported by PCI-E M.2-M2 (on the bottom side of motherboard). The M.2 E-key connector supports a pre-installed WiFi module.

- A. PCI-E M.2-M1
- B. PCI-E M.2-E1

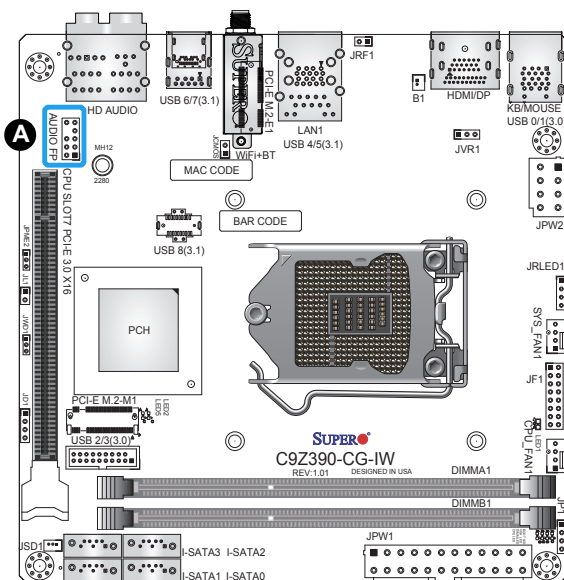


Front Panel Audio Header

A 10-pin Audio header at AUDIO FP is supported on the motherboard. This header allows you to connect the motherboard to a front panel audio control panel, if needed. Connect an audio cable to the audio header to use this feature (not supplied). Refer to the table on the right for pin definitions.

10-pin Audio Header Pin Definitions	
Pin#	Signal
1	Microphone_Left
2	Audio_Ground
3	Microphone_Right
4	Audio_Detect
5	Line_2_Right
6	Ground
7	Jack_Detect
8	Key
9	Line_2_Left
10	Ground

A. AUDIO FP



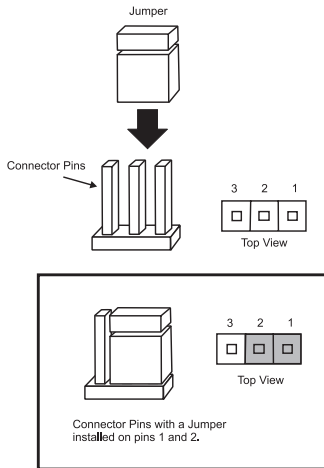
2-8 Jumper Settings

Explanation of Jumpers

To modify the operation of the motherboard, jumpers can be used to choose between optional settings. Jumpers create shorts between two pins to change the function of the connector. Pin 1 is identified with a square solder pad on the printed circuit board.



Note: On two-pin jumpers, Closed means the jumper is on, and Open means the jumper is off the pins.

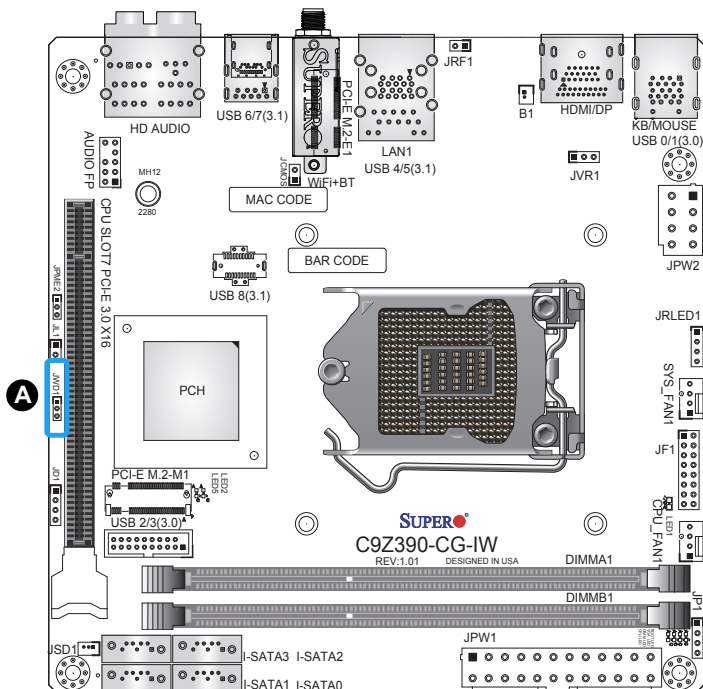


Watch Dog

Watch Dog (JWD1) is a system monitor that can reboot the system when a software application hangs. Close pins 1 and 2 to reset the system if an application hangs. Close pins 2 and 3 to generate a non-maskable interrupt signal for the application that hangs. Refer to the table on the right for jumper settings.

Watch Dog Jumper Settings	
Pin#	Definition
1-2	Reset (Default)
2-3	NMI
Open	Disabled

A. Watch Dog



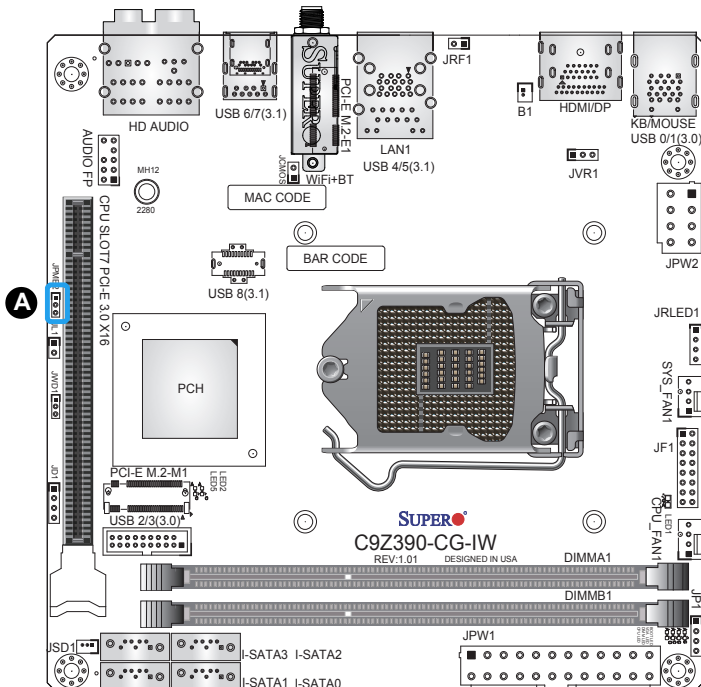
Manufacturing Mode

Close pins 2 and 3 of JPME2 to bypass SPI flash security and force the system to operate in Manufacturing Mode, allowing the user to flash the system firmware from a host server for system setting modifications. Refer to the table on the right for jumper settings.

Manufacturing Mode Jumper Settings

Pin#	Definition
1-2	Normal (Default)
2-3	Manufacturing Mode

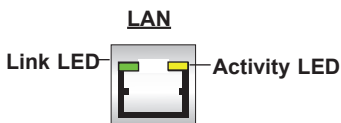
A. Manufacturing Mode



2-9 Onboard Indicators

LAN LEDs

LAN1 port is located on the I/O back panel. This Ethernet LAN port has two LEDs (Light Emitting Diode). The yellow LED indicates activity, while the Link LED may be green, amber, or off to indicate the speed of the connections. Refer to the tables on the right for more information.



GLAN Activity Indicator LED Settings		
Color	Status	Definition
Yellow	Flashing	Active

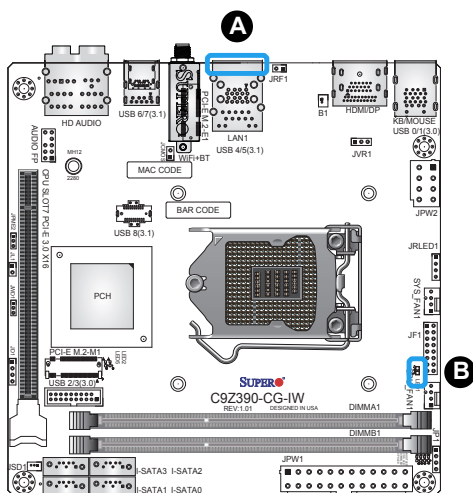
GLAN Link Indicator LED Settings	
Color	Definition
Off	No Connection/10 Mbps/100 Mbps
Amber	1 Gbps
Green	10 Gbps

Power LED

An Onboard Power LED is located at LED1. When this LED is on, the AC power cable is connected. Make sure to disconnect the power cable before removing or installing a component.

Power LED Indicator LED Status	
Status	Definition
Off	System Off
Solid Green	System on, or System off and PWR Cable Connected

- A. LAN LEDs
- B. Power LED



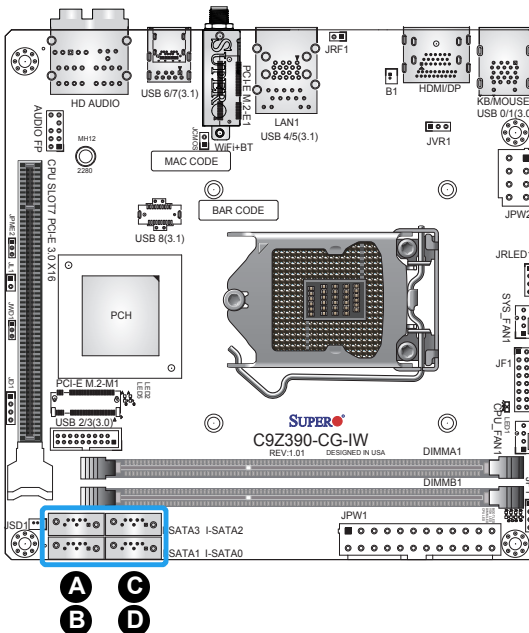
2-10 Hard Drive Connections

SATA Connections (I-SATA0~3)

Four Serial ATA (SATA) 3.0 connectors (I-SATA0~3) are supported by the Intel Z390 chip (supports RAID 0, 1, 5, and 10). Refer to the table on the right for pin definitions.

SATA 3.0 Connectors Pin Definitions	
Pin#	Signal
1	Ground
2	SATA_TXP
3	SATA_TXN
4	Ground
5	SATA_RXN
6	SATA_RXP
7	Ground

- A. I-SATA3
- B. I-SATA1
- C. I-SATA2
- D. I-SATA0



Notes

Chapter 3

Troubleshooting

3-1 Troubleshooting Procedures

Use the following procedures to troubleshoot your system. If you have followed all of the procedures below and still need assistance, refer to the 'Technical Support Procedures' and/or 'Returning Merchandise for Service' section(s) in this chapter. Always disconnect the AC power cord before adding, changing or installing any hardware components.

Before Power On

1. Make sure that the Standby PWR LED is not on. (**Note:** If it is on, the onboard power is on. Be sure to unplug the power cable before installing or removing the components.)
2. Make sure that there are no short circuits between the motherboard and chassis.
3. Disconnect all ribbon/wire cables from the motherboard, including those for the keyboard and mouse. Also, be sure to remove all add-on cards.
4. Install a CPU and heatsink (be sure that it is fully seated) and then connect the chassis speaker and the power LED to the motherboard. Check all jumper settings as well.

No Power

1. Make sure that there are no short circuits between the motherboard and chassis.
2. Make sure that all jumpers are set to their default positions.
3. Check if the 115V/230V switch on the power supply is properly set.
4. Turn the power switch on and off to test the system.
5. The battery on your motherboard may be old. Check to make sure that it still supplies ~3VDC. If it does not, replace it with a new one.

No Video

1. If the power is on, but you have no video--in this case, you will need to remove all the add-on cards and cables first.
2. Use the speaker to determine if any beep codes exist. (Refer to Appendix A for details on beep codes.)
3. Remove all memory modules and turn on the system. (If the alarm is on, check the specifications of memory modules, reset the memory or try a different one.)

Memory Errors

1. Make sure that the DIMM modules are properly installed and fully seated in the slots.
2. You should be using unbuffered Non-ECC DDR4 (up to 4000+ MHz if overclocked) memory recommended by the manufacturer. Also, it is recommended that you use the memory modules of the same type and speed for all DIMMs in the system. Do not use memory modules of different sizes, speeds, and types.
3. Check for bad DIMM modules or slots by swapping modules between slots to see if you can locate the faulty ones.
4. Check the switch of 115V/230V power supply.

When the System is Losing the Setup Configuration

1. Please be sure to use a high quality power supply. A poor quality power supply may cause the system to lose CMOS setup information. Refer to Section 1-7 for details on recommended power supplies.
2. The battery on your motherboard may be old. Check to verify that it still supplies ~3VDC. If it does not, replace it with a new one.
3. If the above steps do not fix the Setup Configuration problem, contact your vendor for repairs.

3-2 Technical Support Procedures

Before contacting Technical Support, please make sure that you have followed all the steps listed below. Also, note that as a motherboard manufacturer, Supermicro does not sell directly to end users, so it is best to first check with your distributor or reseller for troubleshooting services. They should know of any possible problem(s) with the specific system configuration that was sold to you.

1. Please go through the 'Troubleshooting Procedures' and 'Frequently Asked Question' (FAQ) sections in this chapter or see the FAQs on our website (<http://www.supermicro.com/support/faqs/>) before contacting Technical Support.
2. BIOS upgrades can be downloaded from our website at (<http://www.supermicro.com/support/bios/>).



Note: Not all BIOS can be flashed. Some cannot be flashed; it depends on the boot block code of the BIOS.

3. If you've followed the instructions above to troubleshoot your system, and still cannot resolve the problem, then contact Supermicro's technical support and provide them with the following information:
 - Motherboard model and PCB revision number
 - BIOS release date/version (this can be seen on the initial display when your system first boots up)
 - System configuration
 - An example of a Technical Support form is on our website at (<http://www.supermicro.com/support/contact.cfm>).
4. Distributors: For immediate assistance, please have your account number ready when placing a call to our technical support department. We can be reached by e-mail at support@supermicro.com, by phone at: (408) 503-8000, option 2, or by fax at (408)503-8019.

3-3 Frequently Asked Questions

Question: What type of memory does my motherboard support?

Answer: The C9Z390-CG-IW supports up to 64GB (available only for selected 9th Gen processors) of unbuffered Non-ECC U-DIMM DDR4. See Section 2-4 for details on installing memory.

Question: How do I update my BIOS?

Answer: We do NOT recommend that you upgrade your BIOS if you are not experiencing any problems with your system. Updated BIOS files are located on our website at <http://www.supermicro.com/support/bios/>. Please check our BIOS warning message and the information on how to update your BIOS on our website. Select your motherboard model and download the BIOS ROM file to your computer. Also, check the current BIOS revision to make sure that it is newer than your BIOS before downloading. You may choose the zip file or the .exe file. If you choose the zipped BIOS file, please unzip the BIOS file onto a bootable device or a USB pen/thumb drive. To flash the BIOS, run the batch file named "ami.bat" with the new BIOS ROM file from your bootable device or USB pen/thumb drive. Use the following format:

```
F:\> ami.bat BIOS-ROM-filename.xxx <Enter>
```



Note: Always use the file named "ami.bat" to update the BIOS, and insert a space between "ami.bat" and the filename. The BIOS-ROM-filename will bear the motherboard name (i.e., CZ390) and build version as the extension. For example, "C9Z390.115". When completed, your system will automatically reboot.

If you choose the .exe file, please run the .exe file under Windows to create the BIOS flash floppy disk. Insert the floppy disk into the system you wish to flash the BIOS. Then, boot the system to the floppy disk. The BIOS utility will automatically flash the BIOS without any prompts. Please note that this process may take a few minutes to complete. Do not be concerned if the screen is paused for a few minutes.

When the BIOS flashing screen is completed, the system will reboot and will show "Press F1 or F2". At this point, you will need to load the BIOS defaults. Press <F1> to go to the BIOS setup screen, and press <F9> to load the default settings. Next, press <F10> to save and exit. The system will then reboot.



Attention! Do not shut down or reset the system while updating the BIOS to prevent possible system boot failure!

Question: I think my BIOS is corrupted. How can I recover my BIOS?

Answer: Please see Appendix C - BIOS Recovery for detailed instructions.

3-4 Battery Removal and Installation

Battery Removal

To remove the onboard battery, follow the steps below:

1. Power off your system and unplug your power cable.
2. Locate the onboard battery connector (B1) on the motherboard.
3. Carefully remove the jumper from the connector.
4. Remove the battery.

Proper Battery Disposal



Attention! Please handle used batteries carefully. Do not damage the battery in any way; a damaged battery may release hazardous materials into the environment. Do not discard a used battery in the garbage or a public landfill. Please comply with the regulations set up by your local hazardous waste management agency to dispose of your used battery properly.

Battery Installation

1. To install an onboard battery, follow steps 1 and 2 above and continue below:
2. Connect the new battery's jumper to the B1 connector.



Attention! When replacing a battery, be sure to only replace it with the same type.

3-5 Returning Motherboard for Service

A receipt or copy of your invoice marked with the date of purchase is required before any warranty service will be rendered. You can obtain service by calling your vendor for a Returned Merchandise Authorization (RMA) number. For faster service, you may also obtain RMA authorizations online (<http://www.supermicro.com/RmaForm/>). When you return the motherboard to the manufacturer, the RMA number should be prominently displayed on the outside of the shipping carton, and mailed prepaid or hand-carried. Shipping and handling charges will be applied for all orders that must be mailed when service is complete.

This warranty only covers normal consumer use and does not cover damages incurred in shipping or from failure due to the alteration, misuse, abuse or improper maintenance of products.

During the warranty period, contact your distributor first for any product problems.

Chapter 4

UEFI BIOS

4-1 Introduction

This chapter describes the AMI BIOS Setup Utility for the C9Z390-CG-IW. The ROM BIOS is stored in a Flash EEPROM and can be easily updated. This chapter describes the basic navigation of the AMI BIOS Setup Utility setup screens.



Note: For AMI BIOS Recovery, please refer to the UEFI BIOS Recovery Instructions in Appendix C.

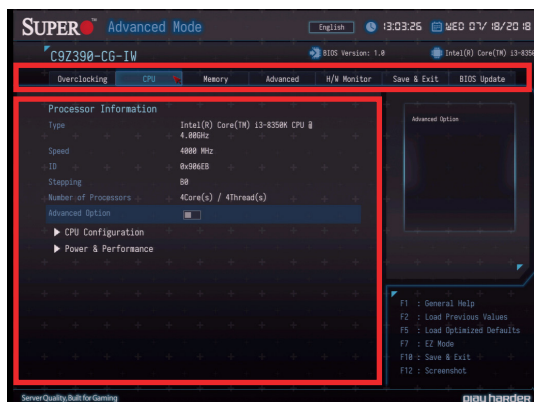
How To Change the Configuration Data

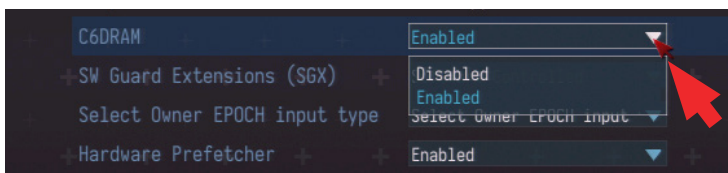
The configuration data that determines the system parameters may be changed by entering the AMI BIOS GUI Setup utility. This Setup utility can be accessed by pressing at the appropriate time during system boot.



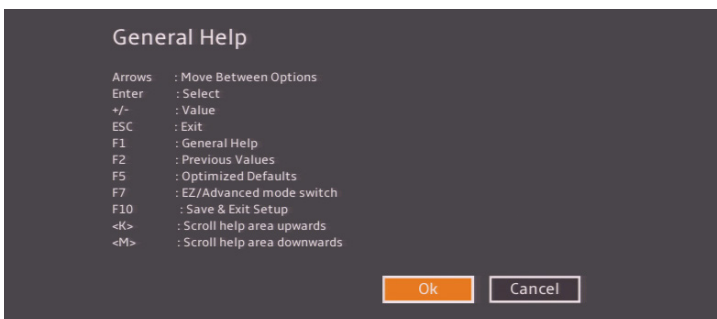
Note: For the purposes of this manual, options that are printed in **Bold** are default settings.

Each BIOS menu option is described in this manual. The Advanced Mode BIOS Setup screen has two main areas. The top area is the main Navigation, and the bottom area is for the Information Section. Icons that do not respond when the mouse pointer is hovering on top are not configurable.





The AMI BIOS GUI Setup Utility uses a mouse pointer navigation system similar to standard graphical user interfaces. Hover and click an icon to select a section, click a down arrow to select from an options list.



You may press the <F1> on any screen under the Setup Section to see a list of Hot Keys that are available. Press <F12> to print the screen.

The keyboard's Escape key <ESC> cancels the current screen and will return you back to the previous screen.

Changing Between EZ Mode and Advanced Mode

To change between EZ Mode and Advanced Mode, hit F7 on the keyboard. When in EZ Mode, select feature options and an overview of hardware status are displayed (see Section 4-2). When in Advanced Mode, all following configuration menus and their contents become available.

4-2 EZ Mode



While in EZ Mode, the following information will be displayed:

System Temp - Displays CPU and PCH temperatures

CPU Profile - Allows changing of the CPU profile by clicking the left or right arrows

DRAM Status - Status of all DIMM slots

SATA Info - Displays which SATA ports are connected to storage devices

Boot Priority - Allows changing of the boot order, or click a device to boot selected device



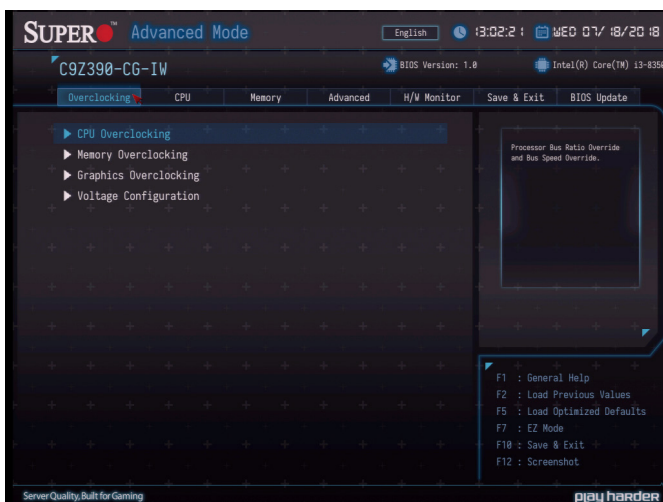
Note: Using this will reboot the computer.

X.M.P. - Allows changing the X.M.P. profile

Intel Rapid Storage Technology - Allows for enabling Intel Rapid Storage Technology

Fan Profile - Displays current fan speeds

4-3 Overclocking



► CPU Overclocking

CPU Profile

This feature allows for preset CPU overclocking profiles to be selected. The options are Stable, **Default**, and Performance.

Advanced CPU OC Setting

This feature controls the CPU overclocking settings. The options are **Manual**, 4.3GHz, 4.4GHz, 4.5GHz, 4.6GHz, 4.7GHz, 4.8GHz, 4.9GHz, 5.0GHz, 5.1GHz, 5.2GHz, 5.3GHz, 5.4GHz, and 5.5GHz.

1-Core ~ 4-Core Ratio Limit Override

Enter a value for each individual CPU core.

Active Processor Cores

Use this feature to select the number of active processor cores. The default option is **All**. These options depend on how many cores are supported by the CPU.

BCLK Clock Frequency(1/100 MHz)

Enter a value for the BCLK frequency. The default is **10000**.

Spread %

Enter a value (each whole number is equivalent to 0.01%) for the spread spectrum clocking to be applied to the base clock frequency. The default is **45**.

FCLK Frequency for Early Power On

Select the FCLK frequency for early power on. The options are Normal (800MHz), 1GHz, 400MHz, and **Auto**.

BCLK Aware Adaptive Voltage

This feature enables BCLK Aware Adaptive Voltage, which helps avoid high voltage overrides by forcing pcode to be aware of the BCLK frequency when making calculations. The options are Disabled and **Enabled**.

Core Max OC Ratio

This feature controls the general maximum overclocking ratio for the CPU cores and Ring. The default is **43**.

AVX Ratio Offset

Enter a value for AVX Ratio Offset. The default is **0**.

TjMax Offset

Enter a value to change the Tj-Max value. The default is **0**.

Power Limit 1 Override

This feature enables Power Limit 1 override. If this feature is set to Disabled, the BIOS will program a default power limit and power limit time window. If this feature is set to Enabled, the following two features will become available. The options are **Disabled** and Enabled.

Power Limit 1

Enter a value for Power Limit 1. The default is **160000**.

Power Limit 1 Time Window

This feature controls the time window for Power Limit 1. The default is **8**.

Power Limit 2 Override

This feature enables Power Limit 2 override. If this feature is set to Disabled, the BIOS will program a default power limit and power limit time window. The options are Disabled and **Enabled**.

Power Limit 2

Enter a value for Power Limit 2. The default is **113750**.

TVB Ratio Clipping

This feature enables CPU core frequency reduction for processors that implement Intel Thermal Velocity Boost (TVB). For overclocking, this feature *must* be **Disabled**.

TVB Voltage Optimizations

This feature enables thermal base voltage optimizations for processors that implement Intel Thermal Velocity Boost (TVB). The options are Disabled and **Enabled**.

►CPU feature

Hyper-Threading

This feature enables hyper-threading, which is a software method to control logical processor threads. The options are Disabled and **Enabled**.

Boot Performance Mode

This feature controls the performance state that the BIOS will set initially. The options are **Max Non-Turbo Performance** and Turbo Performance.

Intel(R) SpeedStep(tm)

Intel SpeedStep Technology allows the system to automatically adjust processor voltage and core frequency in an effort to reduce power consumption and heat dissipation. **Please refer to Intel's website for detailed information.** The options are Disabled and **Enabled**.

Race To Halt (RTH)

This feature enables Race To Halt, which dynamically increases CPU frequency in order to enter package C-State faster. This will reduce overall power consumption. The options are Disabled and **Enabled**.

Intel(R) Speed Shift Technology

This feature enables Intel® Speed Shift, which allows the operating system to hand control of CPU frequency and voltage to the processor. This increases P-state change speed and improves power efficiency. The options are Disabled and **Enabled**.

C states

C-State architecture, a processor power management platform developed by Intel, can further reduce power consumption from the basic C1 (Halt State) state that blocks clock cycles to the CPU. Select Enabled for CPU C-State support. The options are Disabled and **Enabled**.

Thermal Monitor

This feature enables the CPU thermal monitor. The options are Disabled and **Enabled**.

►Ring

Ring Max OC Ratio

Enter a value for the maximum overclock ratio for CPU Ring. The default is **0**.

Ring Down Bin

This feature enables Ring Down Bin. If this feature is set to Enabled, the maximum ring ratio will not be observed. The options are Disabled and **Enabled**.

Min Ring Ratio Limit

Enter a value for the minimum ratio limit for CPU Ring. The default is **0**.

Max Ring Ratio Limit

Enter a value for the maximum ratio limit for CPU Ring. The default is **0**.

►CPU VR Settings

VR Power Delivery Design

This feature is intended for motherboard validation purposes. The value specifies the motherboard design for VR settings override values. The default is **Auto**.

PSYS Slope

Enter a value for the PSYS Slope. The range is 0-200. The default is **0**.

PSYS Offset

Enter a value for the PSYS Offset. The range is 0-255. The default is **0**.

PSYS PMax Power

Enter a value for the PSYS PMax Power. The range is 0-8192. The default is **0**.

► Acoustic Noise Settings

Acoustic Noise Mitigation

This feature enables Acoustic Noise Mitigation, which mitigates acoustic noise on certain CPUs when they are in deep C-States. If this feature is set to Enabled, the following features may be configured:

Pre-Wake Time Ramp Up Time Ramp Down Time

Enter a value for the desired feature. The range is 0-255. The default is **0**.

Disable Fast PKG C State Ramp for IA Domain Disable Fast PKG C State Ramp for GT Domain Disable Fast PKG C State Ramp for SA Domain Disable Fast PKG C State Ramp for VccIn Domain

This feature disables fast package C-State ramping in a specific domain. If this feature is set to FALSE, the selected domain will continue to fast ramp. If this feature is set to TRUE, the selected domain will disable fast ramping. The options are TRUE and **FALSE**.

Slow Slew Rate for IA Domain Slow Slew Rate for GT Domain Slow Slew Rate for SA Domain Slow Slew Rate for VccIn Domain

This feature controls the slow slew rate for a specific domain. The options are **Fast/2**, Fast/4, Fast/8, and Fast/16.

► Core/IA VR Settings

VR Config Enable

This feature enables VR Config. The options are Disabled and **Enabled**.

AC Loadline

Enter a value for AC Loadline. The default is **0**.

DC Loadline

Enter a value for DC Loadline. The default is **0**.

PS Current Threshold1

Enter a value for PS Current Threshold1. The range is 0-512. The default is **80**.

PS Current Threshold2

Enter a value for PS Current Threshold2. The range is 0-512. The default is **20**.

PS Current Threshold3

Enter a value for PS Current Threshold3. The range is 0-512. The default is **4**.

PS3 Enable

This feature enables PS3. The options are Disabled and **Enabled**.

PS4 Enable

This feature enables PS4. The options are Disabled and **Enabled**.

IMON Slope

Enter a value for IMON Slope. The range is 0-200. The default is **0**.

IMON Offset

Enter a value for IMON Offset. The range is 0-63999. The default is **0**.

IMON Prefix

Use this feature to set the prefix value as a positive (+) or a negative (-). The options are "+" and "-".

VR Current Limit

Enter a value for the voltage regulator current limit, with each whole number equating to 1/4A (i.e., 400 = 100A). Enter 0 for Auto. The default is **1023**.

VR Voltage Limit

Enter a value (in mV) for the voltage regulator voltage limit. The range is 0-7999. Enter 0 for Auto. The default is **7999**.

TDC Enable

This feature enables TDC. The options are Disabled and **Enabled**.

TDC Current Limit

Enter a value for the TDC Current Limit, with each whole number equating to 1/8A (i.e., 1000 = 125A). The range is 0-32767. The default is **800**.

TDC Time Window

This feature controls the TDC Time Window. The options are **1 ms**, 2 ms, 3 ms, 4 ms, 5 ms, 6 ms, 7 ms, 8 ms, and 10 ms.

TDC Lock

This feature enables TDC Lock. The options are **Disabled** and Enabled.

►GT VR Settings

VR Config Enable

This feature enables VR Config. The options are Disabled and **Enabled**.

AC Loadline

Enter a value for AC Loadline. The default is **0**.

DC Loadline

Enter a value for DC Loadline. The default is **0**.

PS Current Threshold1

Enter a value for PS Current Threshold1. The range is 0-512. The default is **80**.

PS Current Threshold2

Enter a value for PS Current Threshold2. The range is 0-512. The default is **20**.

PS Current Threshold3

Enter a value for PS Current Threshold3. The range is 0-512. The default is **4**.

PS3 Enable

This feature enables PS3. The options are Disabled and **Enabled**.

PS4 Enable

This feature enables PS4. The options are Disabled and **Enabled**.

IMON Slope

Enter a value for IMON Slope. The range is 0-200. The default is **0**.

IMON Offset

Enter a value for IMON Offset. The range is 0-63999. The default is **0**.

IMON Prefix

Use this feature to set the prefix value as a positive (+) or a negative (-). The options are "+" and "-".

VR Current Limit

Enter a value for the voltage regulator current limit, with each whole number equating to 1/4A (i.e., 400 = 100A). Enter 0 for Auto. The default is **1023**.

VR Voltage Limit

Enter a value (in mV) for the voltage regulator voltage limit. The range is 0-7999. Enter 0 for Auto. The default is **7999**.

TDC Enable

This feature enables TDC. The options are Disabled and **Enabled**.

TDC Current Limit

Enter a value for the TDC Current Limit, with each whole number equating to 1/8A (i.e., 1000 = 125A). The range is 0-32767. The default is **800**.

TDC Time Window

This feature controls the TDC Time Window. The options are **1 ms**, 2 ms, 3 ms, 4 ms, 5 ms, 6 ms, 7 ms, 8 ms, and 10 ms.

TDC Lock

This feature enables TDC Lock. The options are **Disabled** and Enabled.

Intersil VR Command

This feature enables Intersil VR Command to fix VR C-state issues. The options are **Disabled**, Send for IA/GT rails, and Send for IA/GT/SA rails.

► Memory OverClocking

This section displays the following memory profile information for Default, Custom, XMP1, and XMP2 profiles:

tCK [MHz]
tCL
tRCD/tRP
tRAS
tCWL
tFAW
tREFI
tRFC
tRRD
tRTP
tWR
tWTR
NMode
VDD [mV]

Realtime Memory Timing

This feature enables realtime memory timing changes to be made after MRC_DONE. The options are **Disabled** and Enabled.

Memory profile

This feature controls the memory profile. The options are **Default profile**, Custom profile, and XMP profile 1.

**When Memory profile is set to "Custom profile", the following memory timing configurations will become available.*

Memory Reference Clock

This feature controls the memory reference clock, in MHz. The options are **133** and 100.

Memory Ratio

This feature controls the memory ratio. The memory frequency is equal to the memory ratio times the reference clock. The default is **DDR4-2133MHz**.

Memory Voltage

Enter a value for the memory voltage override. The default is **1200**.

QCLK Odd Ratio

Select Enabled to add the Memory Reference Clock amount to the QCLK frequency. The options are **Disabled** and Enabled.



Note: When Memory profile is set to "Custom profile," the following memory timings may be manually changed. The defaults are listed below.

tCL - 14
tRCD/tRP - 14
tRAS - 35
tCWL - 14
tFAW - 23
tREFI - 8316
tRFC - 278
tRRD - 4
tRTP - 8
tWR - 16
tWTR - 0
NMode - 2
tRRD_sg - 6
tRRD_dg - 4
tRDRD_sg - 6
tRDRD_dg - 4
tRDRD_dr - 6
tRDRD_dd - 7
tRDWR_sg - 9
tRDWR_dg - 9
tRDWR_dr - 9

tRDWR_dd - 10
tWRRD_sg - 28
tWRRD_dg - 23
tWRRD_dr - 7
tWRRD_dd - 7
tWRWR_sg - 6
tWRWR_dg - 4
tWRWR_dr - 7
tWRWR_dd - 7
tCKE - 6

ODT RTT WR(CHA)

This feature controls ODT RTT WR (CHA). The options are Auto, 0, 80, 120, 240, and 255.

ODT RTT PARK(CHA)

This feature controls ODT RTT PARK (CHA). The options are Auto, 0, 34, 40, 48, 60, 80, 120, and 240.

ODT RTT NOM(CHA)

This feature controls ODT RTT NOM (CHA). The options are Auto, 0, 34, 40, 48, 60, 80, 120, and 240.

ODT RTT WR(CHB)

This feature controls ODT RTT WR (CHB). The options are Auto, 0, 80, 120, 240, and 255.

ODT RTT PARK(CHB)

This feature controls ODT RTT PARK (CHB). The options are Auto, 0, 34, 40, 48, 60, 80, 120, and 240.

ODT RTT NOM(CHB)

This feature controls ODT RTT NOM (CHB). The options are Auto, 0, 34, 40, 48, 60, 80, 120, and 240.

RcompTarget[RdOdt] - 60
RcompTarget[WrDS] - 26
RcompTarget[WrDSCmd] - 20
RcompTarget[WrDSCtl] - 20
RcompTarget[WrDSClk] - 26
SCompDq StageDelayPS - 59
SCompCmd StageDelayPS - 89
SCompCtl StageDelayPS - 53
SCompClk StageDelayPS - 53
RTLatency_CH0_DIMM0 - 63
RTLatency_CH1_DIMM0 - 63
IOLatency_CH0_DIMM0 - 4

IOlatency_CH1_DIMM0 - 4
DIIBwEn[0] - 0
DIIBwEn[1] - 1
DIIBwEn[2] - 2
DIIBwEn[3] - 3

► Graphics OverClocking

RC6(Render Standby)

Use this feature to enable Render Standby support. The options are Disabled and **Enabled**.

GT OverClocking Frequency

Enter a value for the overclocked RP0 frequency (in multiples of 50 MHz) in the GT domain. The default is **0**.

GT Voltage Mode

This feature controls the voltage mode in the GT domain. The options are **Adaptive** and Override.

GT Extra Turbo Voltage

Enter a value for the extra turbo voltage (in mV) that will be applied while GT is operating in turbo mode. The default is **0**.

GT Voltage Offset

Enter a value for the offset voltage (in mV) that will be applied to the GT domain. The default is **0**.

Offset Prefix

Use this feature to set the prefix value as a positive (+) or a negative (-). The options are "+" and "-".

GT OverClocking Frequency

Enter a value for the overclocked RP0 frequency (in multiples of 50 MHz) in the GT Unslice domain. The default is **0**.

GT Voltage Mode

This feature controls the voltage mode in the GT Unslice domain. The options are **Adaptive** and Override.

GT Extra Turbo Voltage

Enter a value for the extra turbo voltage (in mV) that will be applied while GT is operating in turbo mode. The default is **0**.

GTU Voltage Offset

Enter a value for the offset voltage (in mV) that will be applied to the GT domain. The default is **0**.

Offset Prefix

Use this feature to set the prefix value as a positive (+) or a negative (-). The options are "+" and "-".

► Voltage Configuration

System Agent Voltage (mV)

Enter a value for the System Agent voltage (in mV). The default is **1056**.

Core Voltage Mode

This feature controls the core voltage mode. The options are **Adaptive** and **Override**.

SVID

This feature enables Serial Voltage Identification (SVID). The options are **Disabled** and **Enabled**.

Core Voltage Override

Enter a value for the Core Voltage Override (in mV). The default is **1350**.

Core Voltage Offset

Enter a value for the offset voltage (in mV) that will be applied to the IA Core domain. The default is **0**.

Offset Prefix

Use this feature to set the prefix value as a positive (+) or a negative (-). The options are "+" and "-".

PCH Voltage

Enter a value for the PCH voltage override. The default is **1010**.

CPU_IO Voltage

Enter a value for the CPU IO voltage override. The default is **936**.

Load Line Calibration

This feature controls the load line calibration. The options are **Disabled**, **Level 1**, **Level 2**, **Level 3**, **Level 4**, **Level 5**, **Level 6**, **Level 7**, and **Auto**.

► Uncore

Uncore Voltage Offset

Enter a value for the offset voltage (in mV) that will be applied to the Uncore domain. The default is **0**.

Offset Prefix

Use this feature to set the prefix value as a positive (+) or a negative (-). The options are "+" and "-".

► Voltage PLL Trim Controls

Core PLL Voltage Offset

Enter a value for the Core PLL voltage offset, with each whole number equating to 17.5 mV. The range is 0-63. The default is **0**.

GT PLL Voltage Offset

Enter a value for the GT PLL voltage offset, with each whole number equating to 17.5 mV. The range is 0-63. The default is **0**.

Ring PLL Voltage Offset

Enter a value for the Ring PLL voltage offset, with each whole number equating to 17.5 mV. The range is 0-63. The default is **0**.

System Agent PLL Voltage Offset

Enter a value for the System Agent PLL voltage offset, with each whole number equating to 17.5 mV. The range is 0-63. The default is **0**.

Memory Controller PLL Voltage Offset

Enter a value for the Memory Controller PLL voltage offset, with each whole number equating to 17.5 mV. The range is 0-63. The default is **0**.

4-4 CPU



The following information will be displayed:

- **Type** - the brand, model name, model number of the CPU and its rated clock speed
- **Speed** - the detected CPU speed
- **ID** - the unique CPU ID
- **Stepping** - the processor stepping
- **Number of Processors** - the number of cores detected
- **Microcode Revision** - the CPU's microcode patch version
- **GT Information** - the processor's GT Information
- **IGFX VBIOS Version** - the Integrated Graphics VBIOS version
- **IGFX GOP Version** - the Integrated Graphics VOP version
- **Memory RC Version** - the memory RC version

► CPU Configuration

The following information will be displayed:

- **Type** - the brand, model name, model number of the CPU and its rated clock speed
- **ID** - the unique CPU ID
- **Speed** - the detected CPU speed
- **L1 Data Cache** - displays if Level 1 cache is supported
- **L1 Instruction Cache** - displays if Level 1 instruction cache is supported
- **L2 Cache** - displays if Level 2 cache is supported
- **L3 Cache** - displays if Level 3 cache is supported
- **VMX** - displays if VMX is supported
- **SMX/TXT** - displays if SMX/TXT is supported

C6DRAM

This feature enables moving DRAM contents to PRM memory when the CPU is in a C6 state. The options are Disabled and **Enabled**.

SW Guard Extension (SGX)

Select Enabled to activate the Software Guard Extensions (SGX). The options are Enabled, Disabled, and **Software Controlled**.

Select Owner EPOCH input type

There are three Owner EPOCH modes (Each EPOCH is 64 bit). The options are **No Change in Owner EPOCHs**, Change to New Random Owner EPOCH, and Manual User Defined Owner EPOCHs.

Hardware Prefetcher

(Available when supported by the CPU)

If this feature is set to Enabled, the hardware prefetcher will prefetch streams of data and instructions from the main memory to the L2 cache to improve CPU performance. The options are Disabled and **Enabled**.

Adjacent Cache Line Prefetch

(Available when supported by the CPU)

Select Enabled for the CPU to prefetch both cache lines for 128 bytes as comprised. Select Disabled for the CPU to prefetch both cache lines for 64 bytes. The options are Disabled and **Enabled**.

Intel (VMX) Virtualization Technology

(Available when supported by the CPU)

Select Enabled to use the Intel Virtualization Technology to allow one platform to run multiple operating systems and applications in independent partitions, creating multiple "virtual" systems in one physical computer. The options are Disabled and **Enabled**.



Note: If there is any change to this setting, you will need to power off and reboot the system for the change to take effect. Please refer to Intel's website for detailed information.

Active Processor Cores

Use this feature to select the number of active processor cores. The options depend on how many cores are supported by the CPU. The default is **All**.

BIST

Select Enabled to activate the Built-In Self Test (BIST) on reset. The options are **Disabled** and Enabled.

AES

Select Enable for Intel CPU Advanced Encryption Standard (AES) Instructions support to enhance data integrity. The options are Disabled and **Enabled**.

Machine Check

Select Enable to activate Machine Check. The options are Disabled and **Enabled**.

MonitorMWait

Select Enable to activate MonitorMWait. The options are Disabled and **Enabled**.

FCLK Frequency for Early Power On

Select the FCLK frequency for early power on. The options are Normal (800MHz), **1GHz**, and 400MHz.

► Power & Performance

► CPU - Power Management Control

Boot Performance Mode

This feature enables the selection of the default CPU performance during system boot. The options are **Max Non-Turbo Performance**, Max Battery, and Turbo Performance.

Intel(R) SpeedStep(tm)

Intel SpeedStep Technology allows the system to automatically adjust processor voltage and core frequency in an effort to reduce power consumption and heat dissipation. **Please refer to Intel's website for detailed information.** The options are Disabled and **Enabled**.

C States

C-States architecture, a processor power management platform developed by Intel, can further reduce power consumption from the basic C1 (Halt State) state that blocks clock cycles to the CPU. Select Enabled for CPU C-State support. The options are **Disabled** and Enabled. If this feature is set to Enabled, the following features will display:

Enhanced C-states

(Available when "C-States" is set to Enabled)

Select Enabled to enable Enhanced C1 Power State to boost system performance. The options are Disabled and **Enabled**.

C-State Auto Demotion

When this feature is enabled, the CPU will conditionally demote C-State based on un-cored auto-demote information. The options are Disabled, C1, C3, and **C1 and C3**.

C-State Un-demotion

When this feature is enabled, the CPU will conditionally undemote from demoted C3 or C1. The options are Disabled, C1, C3, and **C1 and C3**.

Package C-State Demotion

This feature enables the Package C-State demotion. The options are **Disabled** and Enabled.

Package C-State Un-Demotion

When this feature is enabled, the CPU will conditionally undemote from demoted Packaged Package C-State Un-Demotion. The options are **Disabled** and Enabled.

C State Pre-Wake

This feature to enables C-State pre-wake. The options are Disabled and **Enabled**.

IO MWAIT Redirection

When enabled, this feature will map and send the IO read instructions to the IO registers. The options are **Disabled** and Enabled.

Package C State Limit

Select Auto for the AMI BIOS to automatically set the limit on the C-State package register. The options are C0, C2, C3, C6, C7, C7s, and **Auto**.

Package C State Workaround

This feature enables a workaround for Package C-State 6/7. The options are **Disabled** and Enabled.

►GT-Power Management

RC6(Render Standby)

Use this feature to enable Render Standby support. The options are Disabled and **Enabled**.

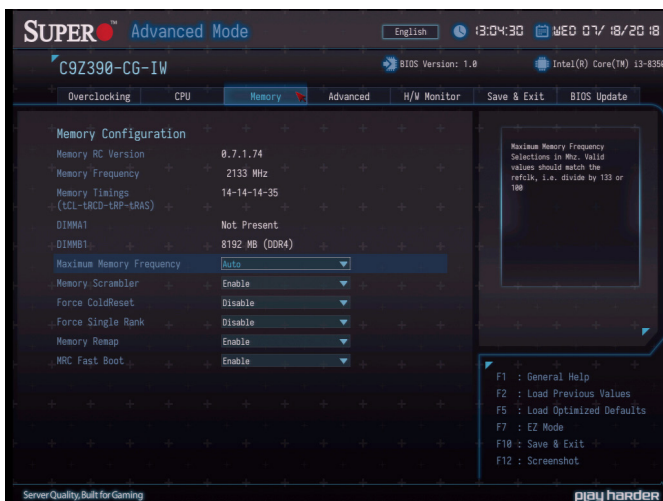
Maximum GT Frequency

This feature is the Maximum GT Frequency as defined by the user. Choose between 300MHz (RPN) and 1200MHz (RP0). Any value beyond this range will be clipped to its min/max supported by the CPU. The options are **Default Max Frequency** and 100MHz~1200MHz (in increments of 50MHz).

Disable Turbo GT frequency

This feature disables Turbo GT frequency. If this feature is set to Enabled, Turbo GT frequency will be disabled. If this feature is set to **Disabled**, GT frequency limiters will be removed.

4-5 Memory



The following information will be displayed:

- **Memory RC Version**
- **Memory Frequency**
- **Memory Timings (tCL-tRCD-tRP-tRAS)**
- **DIMM#A1, DIMM#B1**

Maximum Memory Frequency

This feature controls the speed of the memory installed. The options are 1333, 1600, 1867, 2133, 2400, 2667, 2933, and 3200. All values are in MHz. **Default speed is auto detected.**

Memory Scrambler

This feature enables memory scrambler support for memory error correction. The options are Disabled and **Enabled**.

Force ColdReset

Use this feature when ColdBoot is required during MRC execution. The options are **Disabled** and Enabled.

Force Single Rank

When enabled, only Rank0 will be use in each DIMM. The options are **Disabled** and Enabled.

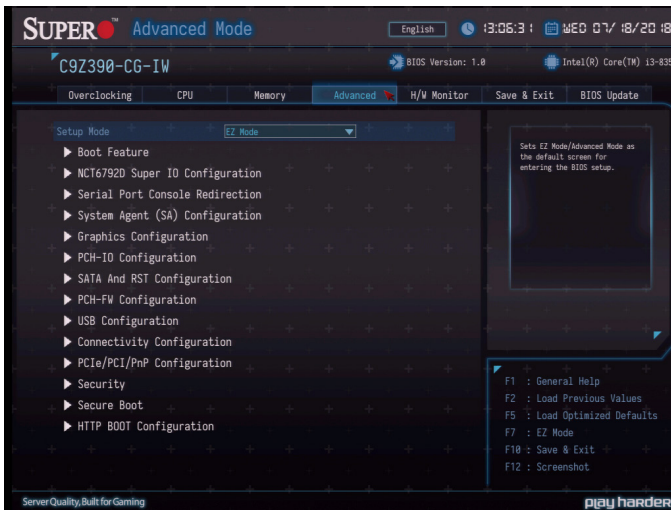
Memory Remap

PCI memory resources will overlap with the total physical memory if 4GB of memory or above is installed on the motherboard. When this occurs, enable this function to reallocate the overlapped physical memory to a location above the total physical memory to resolve the memory overlapping situation. The options are Disabled and **Enabled**.

MRC Fast Boot

This feature enables fast path through MRC. The options are Disabled and **Enabled**.

4-6 Advanced



Setup Mode

This feature sets the default screen that displays after entering Setup Mode. The options are **EZ Mode** and Advanced Mode.

► Boot Feature

Fast Boot

This feature enables the system to boot with a minimal set of required devices to launch. This has no effect on BBS boot options. The options are **Disabled** and Enabled.

Quiet Boot

Use this feature to enable quiet boot. The default is **Enabled**.

Bootup Num-Lock

Use this feature to set the Power-on state for the <Numlock> key. The options are Off and **On**.

Wait for "F1" If Error

Use this feature to force the system to wait until the "F1" key is pressed if an error occurs. The options are Disabled and **Enabled**.

Re-try Boot

If this feature is enabled, the BIOS will automatically reboot the system from a specified boot device after its initial boot failure. The options are **Disabled**, Legacy Boot, and EFI Boot.

Watch Dog Function

If enabled, the Watch Dog Timer will allow the system to reset or generate NMI based on jumper settings when it is expired for more than five minutes. The options are **Disabled** and Enabled.

AC Loss Policy Depend On

Use this feature to set the power state after a power outage. Select Stay Off for the system power to remain off after a power loss. Select Power On for the system power to be turned on after a power loss. Select Last State to allow the system to resume its last power state before a power loss. The options are Stay Off, Power On, and **Last State**.

Power Button Function

This feature controls how the system shuts down when the power button is pressed. Select 4 Seconds Override for the user to power off the system after pressing and holding the power button for four seconds or longer. Select Instant Off to instantly power off the system as soon as the user presses the power button. The options are **Instant Off** and 4 Seconds Override.

DeepSx Power Policies

Use this feature to configure the Advanced Configuration and Power Interface (ACPI) settings for the system. Enable S5 to power off the whole system except the power supply unit (PSU) and keep the power button "alive" so that the user can "wake up" the system by using a USB keyboard or mouse. The options are **Disabled** and Enabled.

Install Windows 7 USB Support

Enable this feature to use the USB keyboard and mouse during the Windows 7 installation since the native XHCI driver support is unavailable. Use a SATA optical drive as a USB drive. USB CD/DVD drives are not supported. Disable this feature after the XHCI driver has been installed in Windows. The options are **Disabled** and Enabled.

RGB Led Control

This feature enables RGB LED controls. The options are Disabled and **Enabled**.

► NCT6792D Super IO Configuration

► Serial Port 1 Configuration

Serial Port

This feature enables Serial Port 1 (COM1). Click the toggle box to enable or disable Serial Port 1. The default is **Enabled**.

Device Settings

This feature displays the current IRQ setting for Serial Port 1 (COM1). The default is **Auto**.

Change Settings

This feature configures the IRQ setting for Serial Port 1 (COM1).

The options for Serial Port 1 are **Auto**, "IO=3F8h; IRQ=4", "IO=3F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12", "IO=2F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12", "IO=3E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12", and "IO=2E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12".

► System Agent (SA) Configuration

The following information will be displayed:

- **SA PCIe Code Version**
- **VT-d Capability**

► PEG Port Configuration

CPU SLOT7 PCI-E 3.0 X16

Enable Root Port

Select Enable to activate the Root Port. The options are Disabled, Enabled, and **Auto**.

Max Link Speed

Select **Auto**, Gen1, Gen2, or Gen3 to set the PEG Max Link Speed.

VT-d

This feature enables VT-d. The options are Disabled and **Enabled**.

GNA Device (B0:D8:F0)

This feature enables the SA GNA device. The options are Disabled and **Enabled**.

X2APIC Opt Out

This feature enables X2APIC Opt Out. The options are **Disabled** and Enabled.

►Graphics Configuration**Graphics Turbo IMON Current**

Use this feature to set the limit on the current voltage regulator. Valid range is 14-31. Default is **31**.

Skip Scanning of External Gfx Card

Use this feature to scan for External Gfx Card on PEG and PCH PCI-E ports. If this feature is enabled, the system will not scan for a new card. The options are **Disabled** and Enabled.

Primary Display

Use this feature to select the graphics device to be used as the primary display. Select from IGFX/PEG/PCI or select SG for switchable GFX. The options are **Auto**, IGFX, PEG, PCIE, and SG.

►External Gfx Card Primary Display Configuration**Primary PEG**

This feature allows the user to select the primary PCI-Express Graphics (PEG) slot. The options are **Auto**, PEG11, and PEG12.

Primary PCIE

This feature allows the user to specify which graphics card to be used as the primary graphics card. The options are **Auto** and PCIE1 ~ PCIE19.

Internal Graphics

This feature keeps the Internal Graphics Device (IGD) enabled, based on setup options. The options are **Auto**, Enabled, and Disabled.

GTT Size

Use this feature to set the memory size to be used by the graphics translation table (GTT). The options are 2MB, 4MB, and **8MB**.

Aperture Size

Use this feature to set the Aperture size, which is the size of system memory reserved by the BIOS for graphics device use. The options are 128MB, **256MB**, 512MB, 1024MB, and 2048MB.

DVMT Pre-Allocated

Dynamic Video Memory Technology (DVMT) allows dynamic allocation of system memory to be used for video devices to ensure best use of available system memory based on the DVMT 5.0 platform. The options are 0M, **32M**, 64M, 4M, 8M, 12M, 16M, 20M, 24M, 28M, 32M/F7, 36M, 40M, 44M, 48M, 52M, 56M, and 60M.

DVMT Total Gfx Mem

Use this feature to set the total memory size to be used by internal graphics devices based on the DVMT 5.0 platform. The options are 128MB, **256MB**, and MAX.

VDD Enable

Activating this feature will force VDD in the BIOS. The options are Disabled and **Enabled**.

PM Support

This feature enables PM support. The options are Disabled and **Enabled**.

PAVP Enable

This feature enables PAVP support. The options are Disabled and **Enabled**.

Cdynmax Clamping Enable

This feature enables Cdynmax Clamping. The options are Disabled and **Enabled**.

Graphics Clock Frequency

This feature controls the graphics clock frequency. Select the highest clock frequency supported by the platform. The options are 337.5 Mhz, 450 Mhz, 540 Mhz, and **675 Mhz**.

Skip CD Clock Init in S3 resume

This feature enables skipping the full CD clock initialization. If this feature is set to Disabled, the full CD clock will initialize. The options are **Disabled** and Enabled.

►PCH-IO Configuration

HD Audio

Use this feature to detect an HD Audio device. The options are Disabled, Enabled, and **Auto**.

Wake on LAN Enable

Select Enabled to enable the capability to "wake up" the system through the Ethernet port. The options are Disabled and **Enabled**.

PCI-E PLL SSC

Use this feature to set the PCI-E PLL SSC percentage. Select **Auto** to keep the hardware default with no BIOS override. The range is from 0.0% to 2.0%.

DMI Link ASPM Control

Use this feature to set the ASPM (Active State Power Management) state on the SA (System Agent) side of the DMI Link. The options are Disabled and **Enabled**.

ASPM 5/7/8/9/10/11/16/18/19/20

Use this feature to set the Active State Power Management (ASPM) to power manage the PCI-E link during the various L states. The options are **Auto**, L0sL1, L1, L0s, and Disabled.

L1 Substates

Use this feature to define which L1 substate to use. The options are Disabled, L1.1, L1.2, and **L1.1&L1.2**.

►SATA and RST Configuration

SATA Controllers

Select Disabled to disable the onboard SATA Controllers. The options are Disabled and **Enabled**.

SATA Mode Selection

This feature selects the mode for the installed SATA drives. The options are **AHCI** and Intel RST Premium.

Aggressive LPM Support

This feature enables the PCH to aggressively enter link power state. The options are Disabled and **Enabled**.

Storage Option ROM/UEFI Driver

This feature controls the execution of UEFI and Legacy Storage OpROM. The options are Do not launch, UEFI, and **Legacy**.

Serial ATA Port0~5

This feature displays the detected SATA drives, if any.

Hot Plug

This feature designates the port specified for hot plugging. Set this feature to Enabled for hot-plugging support, which will allow the user to replace a SATA disk drive without shutting down the system. The options are **Disabled** and Enabled.

Spin Up Device

When this feature is disabled, all drives will spin up at boot. When this feature is enabled, it will perform Staggered Spin Up on any drive this feature is activated. The options are **Disabled** and Enabled.

SATA Device Type

Use this feature to identify the type of HDD that is connected to the SATA port. The options are **Hard Disk Drive** and Solid State Drive.

► PCH FW Configuration

The following information will be displayed:

- **ME Firmware Version**
- **ME Firmware Mode**
- **ME Firmware SKU**

ME FW Image Re-Flash

This feature will update the PCH Firmware from an image in a USB flash drive attached to a USB port. The options are **Disabled** and Enabled.

► USB Configuration

The following information will be displayed:

- **USB Module Version**
- **USB Controllers**
- **USB Devices**

Legacy USB Support

Select Enabled to support legacy USB devices. Select Auto to disable legacy support when legacy USB devices are not present. If Disable is selected, legacy USB devices will not be supported. The options are Disabled, **Enabled**, and Auto.

XHCI Hand-Off

This feature is a work-around solution for operating systems that do not support XHCI (Extensible Host Controller Interface) hand-off. The XHCI ownership change should be claimed by the XHCI driver. The options are Disabled and **Enabled**.

USB Mass Storage Driver Support

Set Enabled to enable USB mass storage driver support. The options are Disabled and **Enabled**.

Port 60/64 Emulation

This feature enables I/O port 60h/64h emulation for legacy USB keyboard support on non-USB aware operating systems. The options are Disabled and **Enabled**.

► Connectivity Configuration

CNVi WiFi&BT

This feature controls the connectivity mode. Selecting Enable enables WiFi and Bluetooth support. The options are Disabled and **Enabled**.

► PCIe/PCI/PnP Configuration

Video

This feature controls which option ROM to execute for the Video device. The options are Do Not Launch, UEFI, and **Legacy**.

Above 4GB MMIO BIOS Assignment

Select Enable for remapping of BIOS above 4GB. The options are **Disabled** and Enabled.

BME DMA Mitigation

This feature re-enables Bus Master Attribute. The options are **Disabled** and Enabled.

CPU SLOT7 PCI-E 3.0 X16 OPROM

PCI-E M.2-M1 OPROM

PCI-E M.2-M2 OPROM

Select Disabled to deactivate the selected slot, select Legacy to activate the slot in legacy mode, and select EFI to activate the slot in EFI mode. The options are Disabled, **Legacy**, and EFI.

Onboard LAN1 SUPPORT

Use this feature to enable the onboard LAN1 device. The options are Disabled and **Enabled**.

Onboard LAN Option ROM type

Use this feature to select the type of option ROM installed. The options are EFI and **Legacy**.

Onboard LAN1 Option ROM

Select PXE (Preboot Execution Environment) to boot the computer using a PXE device installed in a LAN port specified. Select Disabled to prevent system boot using a device installed in a LAN port. The options are Disabled and **PXE**.

Network Stack

Select Enabled to enable PXE (Preboot Execution Environment) or UEFI (Unified Extensible Firmware Interface) for network stack support. The options are **Disabled** and Enabled. If this feature is enabled, the two features below become available.

Ipv4 PXE Support

Select Enabled to enable IPv4 PXE (Preboot Execution Environment) for boot support. If this feature is set to Disabled, IPv4 PXE boot option will not be supported. The options are Disabled and **Enabled**.

Ipv4 HTTP Support

Use this feature to enable IPv4 HTTP boot support. The options are **Disabled** and Enabled.

Ipv6 PXE Support

Select Enabled to enable IPv6 PXE (Preboot Execution Environment) for boot support. If this feature is set to Disabled, IPv6 PXE boot option will not be supported. The options are Disabled and **Enabled**.

Ipv6 HTTP Support

Use this feature to enable IPv6 HTTP boot support. The options are **Disabled** and Enabled.

IPSEC Certificate

This feature enables IPSEC certificate for Ikev. The options are Disabled and **Enabled**.

PXE boot wait time

Enter a value for the wait time (in seconds) to press the ESC key to abort the PXE boot. The default is **0**.

Media detect count

Enter a value for the number of times the presence of media will be checked. The default is **1**.

► Security

Use this submenu to create Administrator and User passwords. Using ONLY an Administrator password limits access to BIOS setup. Using ONLY a User password will lock unauthorized users from booting the system and/or entering BIOS setup.

► Secure Boot

The following information will be displayed:

- **System Mode**
- **Secure Boot**
- **Vendor Keys**

Attempt Secure Boot

Select Enabled for Secure Boot flow control. This feature is available when the platform key (PK) is pre-registered, the platform operates in the user mode, and CSM Support is disabled in the BIOS Setup utility. The options are **Disabled** and Enabled.

Secure Boot Mode

This feature allows selection of the Secure Boot Mode between Standard and Custom. Selecting Custom enables users to change the Image Execution Policy and manage Secure Boot Keys. The options are **Customized** and Standard.

CSM Support

Select enabled to support the Compatibility Support Module (CSM), which provides compatibility support for traditional legacy BIOS for system boot. The options are Disabled and **Enabled**.

►Key Management

Install Factory Default Keys

This feature forces the system to install the factory default keys. Click Yes or No.

Reset to Setup Mode

This feature resets the system to Setup Mode.

Save All Secure Boot Variables

This feature saves all revised Secure Boot settings.

Enroll Efi Image

This feature allows the image to run in Secure Boot Mode. Enroll SHA256 Hash Certificate of the image into the Authorized Signature Database.

Remove 'UEFI CA' from DB

This feature removes UEFI CA from the database.

Restore DB defaults

This feature restores database variables to factory defaults.

Platform Key (PK)

This feature uploads and installs a secure Platform Key. You may insert a factory default key or load from a file. When prompted, select "Yes" to load factory defaults or "No" to load from a file.

Key Exchange Keys

This feature uploads and installs a Key Exchange Key. You may insert a factory default key or load from a file. When prompted, select "Yes" to load factory defaults or "No" to load from a file.

Authorized Signatures

This feature uploads and installs an Authorized Signature . You may insert a factory default key or load from a file. When prompted, select "Yes" to load factory defaults or "No" to load from a file.

Forbidden Signatures

This feature uploads and installs a Forbidden Signature. You may insert a factory default key or load from a file. When prompted, select "Yes" to load factory defaults or "No" to load from a file.

Authorized TimeStamps

This feature uploads and installs an Authorized Time Stamp. You may insert a factory default key or load from a file. When prompted, select "Yes" to load factory defaults or "No" to load from a file.

OsRecovery Signatures

This feature uploads and installs an OSRecovery Signature. You may insert a factory default key or load from a file. When prompted, select "Yes" to load factory defaults or "No" to load from a file.

► HTTP BOOT Configuration

Http Boot One Time

This feature enables HTTP Boot, which is a client-server communication based application for system deployment and configuration over a network. The options are **Disabled** and Enabled.

Input the description

Enter a name for Http boot option.

Boot URI

Enter a value for a new Boot Option to be created according to this Boot URI. The default is **0**.

4-7 H/W Monitor



System Temperature

The following information will be displayed:

- **CPU Temperature** - the CPU temperature detected by PECI
- **System Temperature** - the system internal temperature
- **Peripheral Temperature** - the detected peripheral device temperature
- **PCH Temperature** - the detected PCH chip temperature

System Health

The following information will be displayed:

- **VCPU**
- **12V**
- **VCCSA**
- **5VCC**
- **VDIMM**

- **VCPU_IO**
- **VDIMM_2.5**
- **PCH 1.0V**
- **3.3V_DL**
- **USB**
- **3.3VCC**
- **VBAT**
- **VCPU_STPLL**

► Fan Control

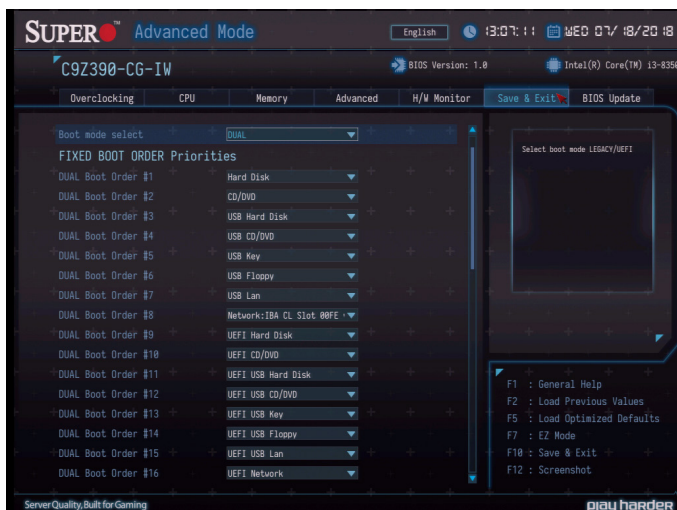
Fan Speed Control Mode

This feature allows the user to decide how the system controls the speeds of the onboard fans. The CPU temperature and the fan speed are correlative. When the CPU on-die temperature increases, the fan speed will also increase for effective system cooling. Select "Full Speed" to allow the onboard fans to run at full speed (of 100% Pulse Width Modulation Duty Cycle) for maximum cooling. This setting is recommended for special system configuration or debugging. Select "Stable" for the onboard fans to run at 50% of the Initial PWM Cycle in order to balance the needs between system cooling and power saving. This setting is recommended for regular systems with normal hardware configurations. Select "Quiet" to optimize for minimal fan noise and Custom to enter user-specific settings. The options are **Quiet**, **Stable**, **Full Speed**, and **Customize**.



Note: When "Customize" is selected above, the settings for **CPU_FAN1 Control** and **SYS_FAN1 Control** will appear and can be configured.

4-8 Save & Exit



Boot mode select

Use this feature to select the type of device to be used for system boot. The options are Legacy, UEFI, and **Dual**.

FIXED BOOT Order Priorities

This feature prioritizes the order of bootable devices from which the system will boot. Choose an entry from top to bottom to select devices.

Delete Boot Option

This feature removes an EFI boot option from the boot order. Select which EFI boot option to remove from the drop-down menu.

UEFI Application Boot Priorities

This feature controls the Boot Device Priority sequence from available UEFI Applications.

NETWORK Drive BBS Priorities

Specify the Boot Device Priority sequence from available Network Drives.

Boot Override

Save the specified boot override and resets the system, i.e., **IBA CL Slot 00FE v0110**. Select OK to activate, otherwise, click Cancel.

Save Options

The Save Options section includes the following features:

Save Changes and Reset (Will restart the system)

Discard Changes and Reset (Will restart the system)

Save Changes

Discard Changes

Default Options

The Default Options sections includes the following features:

Restore Defaults

Save as User Defaults

Restore User Defaults

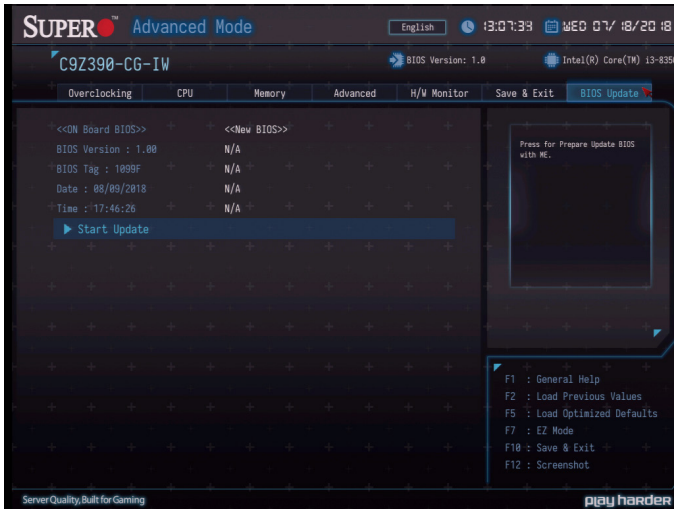
Save Profile 1

Save Profile 2

Load Profile 1

Load Profile 2

4-9 BIOS Update



The following information will be displayed:

BIOS Version
BIOS Tag
Date
Time

Start Update

Use this utility to prepare BIOS Update with ME.

1. Click "Start Update" to enter the SuperFlash utility.
2. At the prompt, select "Yes" to reboot and configure the system to Flash mode. Select "No" to cancel and view the BIOS information.
3. After the system reboots to the flash mode, the system is ready to flash the BIOS. At the prompt, select "OK" to continue.
4. Select "Select File" and then in the pop-up menu select "General USB Flash Disk 1.00."
5. Select the filename (i.e., "C9Z390-CG-IW") in the pop-up menu.

6. Select "Start Flash" to flash the BIOS. A pop-up message will appear to show the progress of the BIOS flash.

7. If the flash is successful, a pop-up message will indicate the result. Select "OK" to complete the BIOS flash and to reboot the system. Check the System Information section of the BIOS Setup to check for the correct BIOS version.

Notes

Appendix A

BIOS Error Beep Codes

During the POST (Power-On Self-Test) routines, which are performed each time the system is powered on, errors may occur.

Non-fatal errors are those which, in most cases, allow the system to continue with bootup. The error messages normally appear on the screen.

Fatal errors will not allow the system to continue to bootup. If a fatal error occurs, you should consult with your system manufacturer for possible repairs.

These fatal errors are usually communicated through a series of audible beeps. The numbers on the fatal error list correspond to the number of beeps for the corresponding error.

A-1 BIOS Error Beep Codes



Note: An external speaker must be connected to the motherboard in order to hear the BIOS Error Beep Codes.

BIOS Error Beep Codes		
Beep Code/LED	Error Message	Description
1 beep	Refresh	Circuits have been reset. (Ready to power up)
5 short beeps + 1 long beep	Memory error	No memory detected in the system
5 short beeps	Display error	System display error
OH LED On	System OH	System Overheat

Notes

Appendix B

Software Installation Instructions

B-1 Installing Drivers

After you've installed the Windows operating system, a screen as shown below will appear. You are ready to install software programs and drivers that have not yet been installed. To install these software programs and drivers, click the icons to the right of these items. (**Note:** To install the Windows operating system, please refer to the instructions posted on our website at <http://www.supermicro.com/support/manuals/>.)



Driver/Tool Installation Display Screen



Note 1: Click the icons showing a hand writing on the paper to view the readme files for each item. Click on a computer icon to the right of an item to install this item (from top to bottom), one at a time. After installing each item, you must reboot the system before proceeding with the next item on the list. The bottom icon with a CD on it allows you to view the entire contents of the CD.

Note 2: When making a storage disk by booting into a Driver CD, please set the SATA Configuration to "Compatible Mode" and configure SATA as IDE in the BIOS Setup. After making the disk, be sure to change the SATA settings back to your original settings.

B-2 Configuring SuperDoctor® 5

The Supermicro SuperDoctor 5 is a hardware monitoring program that functions in a command-line or web-based interface in Windows and Linux operating systems. The program monitors system health information such as CPU temperature, system voltages, system power consumption, fan speed, and provides alerts via email or Simple Network Management Protocol (SNMP).

SuperDoctor 5 comes in local and remote management versions and can be used with Nagios to maximize your system monitoring needs. With SuperDoctor 5 Management Server (SSM Server), you can remotely control power on/off and reset chassis intrusion for multiple systems with SuperDoctor 5 or IPMI. SD5 Management Server monitors HTTP and SMTP services to optimize the efficiency of your operation.



Note: The default Username and Password for SuperDoctor 5 is admin / admin. The SuperDoctor 5 program and user's manual can be downloaded from the Supermicro website at http://www.supermicro.com/products/nfo/sms_sd5.cfm.



SuperDoctor 5 Interface Display Screen-1 (Health Information)

Appendix C

UEFI BIOS Recovery Instructions

! **Attention!** Do not upgrade the BIOS unless your system has a BIOS-related issue. Flashing the wrong BIOS can cause irreparable damage to the system. In no event shall Supermicro be liable for direct, indirect, special, incidental, or consequential damages arising from a BIOS update. If you need to update the BIOS, do not shut down or reset the system while the BIOS is updating to avoid possible boot failure.

C-1 An Overview to the UEFI BIOS

The Unified Extensible Firmware Interface (UEFI) specification provides a software-based interface between the operating system and the platform firmware in the pre-boot environment. The UEFI specification supports an architecture-independent mechanism for add-on card initialization to allow the UEFI OS loader, which is stored in the add-on card, to boot up the system. UEFI offers a clean, hands-off control to a computer system at bootup.

C-2 How to Recover the UEFI BIOS Image (the Main BIOS Block)

A UEFI BIOS flash chip consists of a recovery BIOS block, comprised of two boot blocks and a main BIOS block (a main BIOS image). The boot block contains critical BIOS codes, including memory detection and recovery codes for the user to flash a new BIOS image if the original main BIOS image is corrupted. When the system power is on, the boot block codes execute first. Once that is completed, the main BIOS code will continue with system initialization and bootup.



Note: Follow the BIOS Recovery instructions below for BIOS recovery when the main BIOS boot crashes. However, when the BIOS boot block crashes, you will need to follow the procedures in Appendix D.

C-3 To Recover the Main BIOS Block Using a USB-Attached Device

This feature allows the user to recover a BIOS image using a USB-attached device without additional utilities used. A USB flash device such as a USB Flash Drive, or a USB CD/DVD ROM/RW device can be used for this purpose. However, a USB Hard Disk drive cannot be used for BIOS recovery at this time.

To perform UEFI BIOS recovery using a USB-attached device, follow the instructions below.

1. Using a different machine, copy the "Super.ROM" binary image file into the disc Root "\ " Directory of a USB device or a writeable CD/DVD.



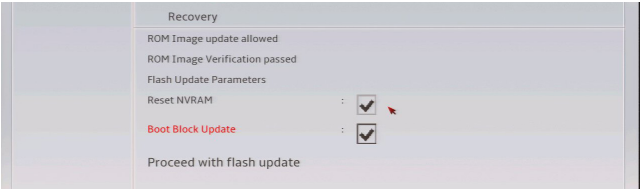
Note: If you cannot locate the "SUPER.ROM" file in your driver disk, visit our website at www.supermicro.com to download the BIOS image into a USB flash device (save in the root folder) and rename it "SUPER.ROM" for BIOS recovery use.


2. Insert the USB device that contains the new BIOS image ("SUPER.ROM") into any available USB port. Be sure the file is saved in the very top (root) folder.
3. With the USB device inserted, power on the system. If the screen appears as below, press to continue.

```
Version 2.20.1271. Copyright (C) 2018 American Megatrends, Inc.  
  
Supermicro C9Z390-CG-IW BIOS Date:06/12/2018 Rev:T20180612114708  
  
CPU : Intel(R) Core(TM) i3-8350K CPU @ 4.00GHz  
Speed : 4.00 GHz  
The IMC is operating with DDR4 2133 MHz
```

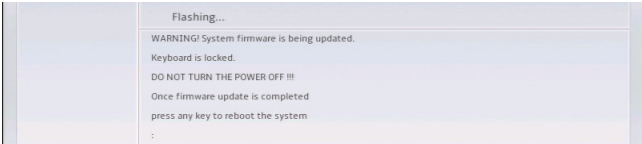
```
Press DEL to run Setup  
Press F11 to invoke Boot Menu  
Press F12 to boot from PXE/LAN
```


- 4. After locating the new BIOS binary image, the system will enter the BIOS Recovery menu as shown below.



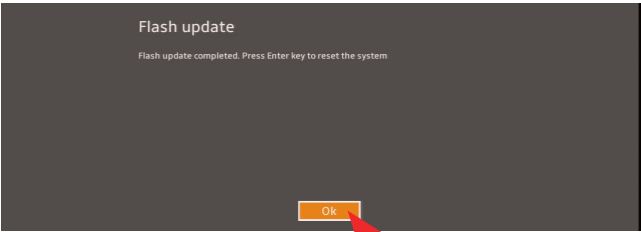
 **Note:** At this point, you may decide if you want to start with BIOS Recovery. If you decide to proceed with BIOS Recovery, follow the procedures below.

- 5. To continue with BIOS Recovery, select the item "Proceed with flash update." You will see the progress of BIOS Recovery as shown on the screens below.



 **Note:** Do not interrupt the BIOS programming until it is completed.

- 6. After the BIOS Recovery process is complete, click OK to reboot the system.



Notes

(Disclaimer Continued)

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