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User manual GIGABYTE GA-Z170M-D3H

User guide GIGABYTE GA-Z170M-D3H

Operating instructions GIGABYTE GA-Z170M-D3H

Instructions for use GIGABYTE GA-Z170M-D3H

Instruction manual GIGABYTE GA-Z170M-D3H



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Manual abstract:

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... 11 Installing the Memory..

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..... 11 Installing an Expansion Card.

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... 12 Back Panel Connectors.....

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. 12 Internal Connectors....

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limitation, when more than 4 GB of physical memory is installed, the actual memory size displayed will be less than the size of the physical memory installed.
Chipset Memoryj □□ □□ □□ □□ □□ Memoryk Dual channel memory architecture Support for DDR4 2133 MHz memory modules Support for ECC UDIMM
1Rx8/2Rx8 memory modules (operate in non-ECC mode) Support for non-ECC UDIMM 1Rx8/2Rx8/1Rx16 memory modules Support for Extreme Memory
Profile (XMP) memory modules (Go to GIGABYTE's website for the latest supported memory speeds and memory modules.) □□ 4 x DDR3 DIMM sockets
supporting up to 32 GB of system memory □□ □□ □□ □□ □□ Onboard Graphics □□ □□ □□ □□ □□ □□ Audio Dual channel memory architecture
Support for DDR3 1600/1333 MHz memory modules Support for ECC UDIMM 1Rx8/2Rx8 memory modules (operate in non-ECC mode) Support for non-
ECC UDIMM 1Rx8/2Rx8 memory modules Support for Extreme Memory Profile (XMP) memory modules (Go to GIGABYTE's website for the latest supported
memory speeds and memory modules.) Integrated Graphics Processor-Intel® HD Graphics support - 1 x D-Sub port, supporting a maximum resolution of
1920x1200@60 Hz - 1 x DVI-D port, supporting a maximum resolution of 1920x1200@60 Hz * The DVI-D port does not support D-Sub connection by
adapter.



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- 1 x HDMI port, supporting a maximum resolution of 4096x2160@24 Hz 1 * 1 support for HDMI 1.4 version. S Support for up to 3 displays at the same time
Maximum shared memory of 512 MB Realtek® ALC892 codec High Definition Audio 2/4/5.1/7.1-channel Support for S/PDIF Out * 1 Due to a Windows
32-bit operating system limitation, when more than 4 GB of physical memory is installed, the actual memory size displayed will be less than the size of the
physical memory installed.

LAN 1 Intel® GbE LAN chip (10/100/1000 Mbit) MM Only for GA-Z170M-D3H. NN Only for GA-Z170M-D3H DDR3. -8- Expansion Slots 1 x PCI
Express x16 slot, running at x16 (PCIEX16) Multi-Graphics 1 Technology Storage Interface 1 1 x PCI Express x16 slot, running at x4 (PCIEX4) (All
of the PCI Express slots conform to PCI Express 3.0 standard.) 2 x PCI slots Support for 2-Way AMD CrossFire™ technology Chipset: - 1 x M.2 Socket 3
connector - 1 x SATA Express connectors 3 - 1 x SATA 6Gb/s connectors 6 - 1 Support for RAID 0, RAID 1, RAID 5, and RAID 10 * 1 optimum
performance, if only one PCI Express graphics card is to be installed, For be sure to install it in the PCIEX16 slot. * 1 Refer to "1-7 Internal Connectors,"
for the supported configurations with the M.2, SATA Express, and SATA connectors. USB Internal Connectors Back Panel Connectors 1 Chipset: - 1 x USB
3.0/2.

0 ports (4 ports on the back panel, 4 ports available through 8 the internal USB headers) - 1 x USB 2.0/1.1 ports (2 ports on the back panel, 4 ports available
through 6 the internal USB headers) 1 1 x 24-pin ATX main power connector 1 1 x 8-pin ATX 12V power connector 1 1 x M.2 Socket 3 connector 1 3
x SATA Express connectors 1 6 x SATA 6Gb/s connectors 1 1 x CPU fan header 1 3 x system fan headers 1 1 x front panel header 1 1 x front panel
audio header 1 1 x S/PDIF Out header 1 2 x USB 3.0/2.0 headers 1 2 x USB 2.0/1.1 headers 1 1 x Trusted Platform Module (TPM) header 1 1 x
Thunderbolt™ add-in card connector 1 1 x serial port header 1 1 x parallel port header 1 1 x Clear CMOS jumper 1 1 x PS/2 keyboard/mouse port
1 1 x D-Sub port 1 1 x DVI-D port 1 1 x HDMI port 1 4 x USB 3.0/2.0 ports 1 2 x USB 2.

0/1.1 ports 1 1 x RJ-45 port 1 6 x audio jacks (Center memory, switch the direction. Dual Channel Memory Configuration This motherboard provides
four memory sockets and supports Dual Channel Technology. After the memory is installed, the BIOS will automatically detect the specifications and capacity
of the memory. Enabling Dual Channel memory mode will double the original memory bandwidth.

Please visit GIGABYTE's website for details on hardware installation. - 11 - The four memory sockets are divided into two channels and each channel has two
memory sockets as followingj: 1 Channel A: DDR4_2, DDR4_4 1 Channel B: DDR4_1, DDR4_3 1 The four memorbull: • When removing the cable
connected to a back panel connector, first remove the cable from your device and then remove it from the motherboard. • When removing the cable, pull it
straight out from the connector. Do not rock it side to side to prevent an electrical short inside the cable connector. - 13 - 1-7 Internal Connectors 4 1 7 3 4 2

11 6 18 17 10 5 6 5 4 9 13 14 15 12 8 16 1) 2) 3) 4) 5) 6) 7) 8) 9) ATX_12V_2X4 ATX_CPU_FAN SYS_FAN1/2/3 SATA EXPRESS SATA3 0/1/2/3/4/5 M.
2 F_PANEL F_AUDIO 10) 11) 12) 13) 14) 15) 16) 17) 18) SPDIF_O F_USB30_1/F_USB30_2 F_USB1/F_USB2 COM LPT TPM CLR_CMOS THB_C BAT
Read the following guidelines before connecting external devices: • First make sure your devices are compliant with the connectors you wish to connect. •

Before installing the devices, be sure to turn off the devices and your computer. Unplug the power cord from the power outlet to prevent damage to the
devices. • After installing the device and before turning on the computer, make sure the device cable has been securely attached to the connector on the
motherboard. - 14 - 1/2) ATX_12V_2X4/ATX (2x4 12V Power Connector and 2x12 Main Power Connector) With the use of the power connector, the power
supply can supply enough stable power to all the components on the motherboard. Before connecting the power connector, first make sure the power supply is
turned off and all devices are properly installed. The power connector possesses a foolproof design. Connect the power supply cable to the power connector
in the correct orientation. The 12V power connector mainly supplies power to the CPU. If the 12V power connector is not connected, the computer will not
start.

To meet expansion requirements, it is recommended that a power supply that can withstand high power consumption be used (500W or greater). If a power
supply is used that does not provide the required power, the result can lead to an unstable or unbootable system. ATX_12V_2X4: 5 1 ATX_12V_2X4 8 4 Pin
No. Definition Pin No. 1 GND (Only for 2x4-pin 5 12V) 2 GND (Only for 2x4-pin 6 12V) 3 GND 7 4 GND 8 ATX: Definition +12V (Only for 2x4-pin 12V)
+12V (Only for 2x4-pin 12V) +12V +12V Definition 3.3V -12V GND PS_ON (soft On/Off) GND GND GND -5V +5V +5V +5V (Only for 2x12-pin ATX)
GND (Only for 2x12-pin ATX) 12 24 1 ATX 13 Pin No. 1 2 3 4 5 6 7 8 9 10 11 12 Definition Pin No. 3.3V 13 3.3V 14 GND 15 +5V 16 GND 17 +5V 18 GND
19 Power Good 20 5VSB (stand by +5V) 21 +12V 22 +12V (Only for 2x12-pin 23 ATX) 3.

3V (Only for 2x12-pin 24 ATX) 3/4) CPU_FAN/SYS_FAN1/SYS_FAN2/SYS_FAN3 (Fan Headers) All fan headers on this motherboard are 4-pin. Most fan
headers possess a foolproof insertion design. When connecting a fan cable, be sure to connect it in the correct orientation (the black connector wire is the
ground wire). The speed control function requires the use of a fan with fan speed control design. For optimum heat dissipation, it is recommended that a
system fan be installed inside the chassis.

CPU_FAN: SYS_FAN1/2/3: 1 CPU_FAN Pin No. 1 2 3 4 Definition GND +12V Sense Speed Control 1 SYS_FAN1 1 SYS_FAN2 1 SYS_FAN3 Pin No. 1 2 3 4
Definition GND +12V/Speed Control Sense VCC • Be sure to connect fan cables to the fan headers to prevent your CPU and system from overheating.
Overheating may result in damage to the CPU or the system may hang. • These fan headers are not configuration jumper blocks.

Do not place a jumper cap on the headers. - 15 - 1 2 3 S B_ S 3 B SS S U _ _ _ 3 5) SATA EXPRESS (SATA Express Connector) S_ S 3 S_ B SS Each SATA
Express connector supports a single SATA Express device. S_ S F S_ U _ _ 3 S 6) SATA3 0/1/2/3/4/5 (SATA 6Gb/s Connectors) S S U B_ 1 2 3 S_ The SATA
connectors conform to SATA 6Gb/s standard and are compatible with SATA 3Gb/s and SATA 1.5Gb/s standard. Each SATA connector supports a single SATA
device. The Intel® Chipset supports RAID 0, RAID 1, RAID 5, and RAID 10. Refer to Chapter 3, "Configuring a RAID Set," for instructions on configuring a
RAID array.



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S _ S 7 7 _ SATA3 5 4 1 0 1 B_ SATA3 3 2 1 F _ _ S _ Pin No. 1 _ 2 3 4 5 6 7 Definition GND TXP TXN GND RXN RXP GND B S_ B To enable hot-plugging for the SATA ports, refer to Chapter 2, "BIOS Setup," "Peripherals\SATA Configuration," for more information. S _ 7) M.

2 (M.2 Socket 3 Connector) The M.2 connector supports M.2 SATA SSDs and M.2 PCIe SSDs and support RAID configuration through the Intel® Chipset. Please note that an M.2 PCIe SSD cannot be used to create a RAID set either with an M.2 SATA SSD or a SATA hard drive and can only be used to build a RAID set with UEFI. Refer to Chapter 3, "Configuring S a RAID Set," for instructions on configuring a RAID array. S S 80 _ 60 42 Follow the steps below to correctly install an M.

2 SSD in the M.2 connector. Step 1: Use a screw driver to unfasten the screw and nut from the motherboard. Locate the proper mounting hole for the M.2 SSD to be installed and then screw the nut first.

Step 2: F Slide the M.2 SSD into the connector at an angle. Step 3: Press the M.2 SSD down and then secure it with the screw. On the motherboard there are three length adjustment holes for the M.

2 SSD. Select the proper hole for the M.2 SSD to be installed and refasten the screw and nut. _0 - 16 - _ F □□ hen installing different types of M.2 SSDs (including SATA SSDs, PCIe x4 SSDs, and PCIe x2 SSDs), be □W sure to refer to the supported configurations in the tables below according to the operating mode of your SATA controller (AHCI mode or RAID mode). •• AHCI mode: Connector Type of SSD SATA SSD SATA3_0 SATA3_1 SATA Express r a a a a PCIe x4 SSD a a a PCIe x2 SSD a a: Supported, r: Not supported. SATA3_2 SATA3_3 SATA Express a a a a a a a SATA3_4 SATA3_5 SATA Express a a a a a a a •• RAID mode: Connector Type of SSD SATA SSD SATA3_0 SATA3_1 SATA Express r a a a a PCIe x4 SSD a a a PCIe x2 SSD a a a No SSDs Installed a a: Supported, r: Not supported. SATA3_2 SATA3_3 SATA Express a a a a a a a a a a a SATA3_4 SATA3_5 SATA Express a a a r a r a r a a - 17 - 8) F_PANEL (Front Panel Header) Connect the power switch, reset switch, speaker, chassis intrusion switch/sensor and system status indicator on the chassis to this header according to the pin assignments below. Note the positive and negative pins before connecting the cables. •• PLED/PWR_LED (Power LED, Yellow/Purple): Power LED Power Switch Speaker PLED+ PLEDPW+ PW- •• PW (Power Switch, Red): Connects to the power switch on the chassis front panel.

You may configure the way to turn off your system using the power switch (refer to Chapter 2, "BIOS Setup," "Power Management," for more information). •• SPEAK (Speaker, Orange): Hard Drive Reset Power LED Connects to the speaker on the chassis front panel. The system reports Activity LED Switch Chassis system startup status by issuing a beep code. One single short beep Intrusion Header will be heard if no problem is detected at system startup. •• HD (Hard Drive Activity LED, Blue): Connects to the hard drive activity LED on the chassis front panel. The LED is on when the hard drive is reading or writing data.

•• RES (Reset Switch, Green): Connects to the reset switch on the chassis front panel. Press the reset switch to restart the computer if the computer freezes and fails to perform a normal restart. •• CI (Chassis Intrusion Header, Gray): Connects to the chassis intrusion switch/sensor on the chassis that can detect if the chassis cover has been removed. This function requires a chassis with a chassis intrusion switch/sensor.

•• NC (Orange): No Connection. The front panel design may differ by chassis. A front panel module mainly consists of power switch, reset switch, power LED, hard drive activity LED, speaker and etc. When connecting your chassis front panel module to this header, make sure the wire assignments and the pin assignments are matched correctly. HD+ HDRESRES+ CICI+ 2 1 SPEAK+ NC NC SPEAK- System Status LED S0 On S3/S4/S5 Off 20 19 Connects to the power status indicator on the chassis front panel.

The LED is on when the system is operating. The LED is off when the system is in S3/S4 sleep state or powered off (S5). 9) F_AUDIO (Front Panel Audio Header) The front panel audio header supports Intel High Definition audio (HD) and AC'97 audio. You may connect your chassis front panel audio module to this header. Make sure the wire assignments of the module connector match the pin assignments of the motherboard header.

Incorrect connection between the module connector and the motherboard header will make the device unable to work or even damage it. 9 1 U 10 2 B SS •• The front panel audio header supports HD audio by default. •• Audio signals will be present on both of the front and back panel audio connections simultaneously. •• Some chassis provide a front panel audio module that has separated connectors on each wire instead of a single plug. For information about connecting the front panel audio module that has different wire assignments, please contact the chassis manufacturer. 1 1 - 18 _ S _ B S_ B B 1 2 3 For HD Front Panel Audio: Pin No. Definition Pin No. 1 MIC2_L 6 F _ 2 GND 7 3 MIC2_R 8 4 -ACZ_DET 9 5 LINE2_R 10 PWR_LED+ PWR_LED- PWR_LED-

Definition Sense FAUDIO_JD No Pin LINE2_L Sense For AC'97 Front Panel Audio: Pin No. Definition Pin No. 1 MIC 6 F _ 2 GND 7 3 MIC Power 8 4 NC 9 5 Line Out (R) 10 Definition NC NC No Pin Line Out (L) NC S S U 1 1 10) SPDIF_O (S/PDIF Out Header) This header supports digital S/PDIF Out and connects a S/PDIF digital audio cable (provided by expansion cards) for digital audio output from your motherboard to certain expansion cards like graphics cards and sound cards.

For example, some graphics cards may require you to use a S/PDIF digital audio cable for digital audio output from your motherboard to your graphics card if you wish to connect an HDMI display to the graphics card and have digital audio output from the HDMI display at the same time. For information about connecting the S/PDIF digital audio cable, carefully read the manual for your expansion card. 1 Pin No. 1 2 F _ U Definition SPDIF0 GND F _ F_USB30 11) F_USB30_1/F_USB30_2 (USB 3.0/2.0 Headers) F_ The headers conform to USB 3.0/2.0 specification and each header can provide two USB ports. For purchasing the optional 3.5" front panel that provides two USB 3.

0/2.0 ports, please contact the local dealer. Pin No. 1 2 3 4 5 B_ 6 7 8 9 10 Definition VBUS SSRX1SSRX1+ GND SSTX1SSTX1+ GND D1D1+ NC Pin No. 11 12 13 14 B 15 16 17 18 19 20 Definition D2+ D2GND SSTX2+ SS SSTX2GND SSRX2+ SSRX2VBUS No Pin 1 20 1 S 12) F_USB1/F_USB2 (USB 2.

0/1.1 Headers) S The headers conform to USB 2.0/1.1 specification. Each USB header can provide two USB ports via an optional USB bracket. For purchasing the optional USB bracket, please contact the local dealer. 1 2 3 1 2 3 1 2 3 9 10 1 2 Pin No.



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1 2 3 4 5 Definition Power (5V) Power (5V) USB DX USB DY USB DX+ Pin No. 6 7 8 9 10 Definition USB DY+ GND GND No Pin NC S •• Do not plug the IEEE 1394 bracket (2x5-pin) cable into the USB 2.0/1.1 header. •• Prior to installing the USB bracket, be sure to turn off your computer and unplug the power cord U B SS S 3 __ 3 from the power outlet to prevent damage to the USB bracket. S _ S F - 19 - _ B _ 1 2 3 1 11 10 1 _ S 1 S F_USB 13) COM (Serial Port Header) The COM header can provide one serial port via an optional COM port cable. For purchasing the optional COM port cable, please contact the local dealer. Pin No.

1 2 3 4 5 Definition NDC DNS IN NS OUT ND TR GND Pin No. 6 7 8 9 10 Definition NDS RN RTS NCTS NR INo Pin 9 10 1 2 14) LPT (Parallel Port Header) The LPT header can provide one parallel port via an optional LPT port cable. For purchasing the optional LPT port cable, please contact the local dealer. Pin No. 1 2 3 4 F _ U 5 6 7 8 9 10 11 12 13 B _ 25 F _ USB30 26 1 2 Definition STBA FDPD0 ERRPD1 INITPD2 SLINPD3 GND PD4 GND PD5 Pin No. 14 15 16 17 18 19 20 21 22 23 24 25 26 Definition GND PD6 GND PD7 GND ACKGND BUSY GND PE No Pin SLCT GND B SS 1 1 F _ 15) TPM (Trusted Platform Module Header) Pin No. 1 2 3 4 5 6 7 8 9 10 19 1 Definition LCLK GND LFRAME No Pin LRESET NC S LAD3 LAD2 VCC3 LAD1 Pin No. 11 12 13 14 15 16 17 18 19 20 Definition LAD0 S GND NC NC SB3V 1 2 3 SERIRQ GND NC NC SUSCLK 20 2 1 2 3 - 20 - S 3 B SS S U 1 2 3 1 1 You may connect a TPM (Trusted Platform Module) to this header. _ S 1 2 3 __ 3 1 2 3 1 2 3 S S B _ B 16) CLR_CMOS (Clear CMOS Jumper) _ S S _ Use this jumper to clear the BIOS configuration and reset the CMOS values to factory defaults. To clear _ the CMOS values, use a metal object like a screwdriver to touch the two pins for a few seconds.

B Open: Normal S 3 B SS Short: Clear CMOS Values S U __ 3 _ U _ B •• Always turn off your computer and unplug the power cord from the power outlet before clearing F _ USB3 the CMOS values. •• After system restart, go to BIOS Setup to load factory defaults (select Load Optimized Defaults) or S F manually configure the BIOS settings (refer to Chapter 2, "BIOS Setup," for BIOS configurations). _ F 17) THB_C (Thunderbolt™ Add-in Card Connector) B _ 1 This connector is for a GIGABYTE Thunderbolt™ add-in card. Pin No. _ Definition 1 GPIOA 2 GPIOB 3 N _ -SLP_S3 4 N _ -S4_S5 5 GND Supports a Thunderbolt™ add-in card.

18) BAT (Battery) The battery provides power to keep the values (such as BIOS configurations, date, and time information) in the CMOS when the computer is turned off. Replace the battery when the battery voltage drops to a low level, or the CMOS values may not be accurate or may be lost. You may clear the CMOS values by removing the battery: 1. Turn off your computer and unplug the power cord. 2.

Gently remove the battery from the battery holder and wait for one minute. (Or use a metal object like a screwdriver to touch the positive and negative terminals of the battery holder, making them short for 5 seconds.) 3. Replace the battery. 4. Plug in the power cord and restart your computer. •• Always turn off your computer and unplug the power cord before replacing the battery. •• Replace the battery with an equivalent one. Danger of explosion if the battery is replaced with an incorrect model. •• Contact the place of purchase or local dealer if you are not able to replace the battery by yourself or uncertain about the battery model.

•• When installing the battery, note the orientation of the positive side (+) and the negative side (-) of the battery (the positive side should face up). •• Used batteries must be handled in accordance with local environmental regulations. - 21 - Chapter 2 BIOS Setup BIOS (Basic Input and Output System) records hardware parameters of the system in the CMOS on the motherboard. Its major functions include conducting the Power-On Self-Test (POST) during system startup, saving system parameters and loading operating system, etc. BIOS includes a BIOS Setup program that allows the user to modify basic system configuration settings or to activate certain system features. When the power is turned off, the battery on the motherboard supplies the necessary power to the CMOS to keep the configuration values in the CMOS. To access the BIOS Setup program, press the <Delete> key during the POST when the power is turned on. To upgrade the BIOS, use either the GIGABYTE Q-Flash or @BIOS utility. •• Q-Flash allows the user to quickly and easily upgrade or back up BIOS without entering the operating system. •• @BIOS is a Windows-based utility that searches and downloads the latest version of BIOS from the Internet and updates the BIOS.

•• Because BIOS flashing is potentially risky, if you do not encounter problems using the current version of BIOS, it is recommended that you not flash the BIOS. To flash the BIOS, do it with caution. Inadequate BIOS flashing may result in system malfunction. •• It is recommended that you not alter the default settings (unless you need to) to prevent system instability or other unexpected results. Inadequately altering the settings may result in system's failure to boot.

If this occurs, try to clear the CMOS values and reset the board to default values. (Refer to the "Load Optimized Defaults" section in this chapter or introductions of the battery/clear CMOS jumper in Chapter 1 for how to clear the CMOS values.) 2-1 Startup Screen The following startup Logo screen will appear when the computer boots. (Sample BIOS Version: F1a) Function Keys •• When the system is not stable as usual, select the Load Optimized Defaults item to set your system to its defaults. •• The BIOS Setup menus described in this chapter are for reference only and may differ by BIOS version.

- 22 - 2-2 M.I.T. This section provides information on the BIOS version, CPU base clock, CPU frequency, memory frequency, total memory size, CPU temperature and CPU voltage, etc. Whether the system will work stably with the overclock/overvoltage settings you made is dependent on your overall system configurations. Incorrectly doing overclock/overvoltage may result in damage to CPU, chipset, or memory and reduce the useful life of these components.

This page is for advanced users only and we recommend you not to alter the default settings to prevent system instability or other unexpected results. (Inadequately altering the settings may result in system's failure to boot. If this occurs, clear the CMOS values and reset the board to default values.) ``M.

I.T. Current Status This screen provides information on CPU/memory frequencies/parameters. ``Advanced Frequency Settings && Performance Upgrade (Note) Provides you with five different overclocking configurations. Options are: 20% Upgrade, 40% Upgrade, 60% Upgrade, 80% Upgrade, 100% Upgrade.



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(Default: Auto) Allows you to manually set the CPU base clock in 0.01 MHz increments. (Default: Auto) Important: It is highly recommended that the CPU frequency be set in accordance with the CPU specifications. This value changes with the CPU Base Clock setting. && CPU Base Clock && Host Clock Value && CPU Upgrade (Note) Allows you to set the CPU frequency.

Options may vary depending on the CPU being used. (Default: Auto) && CPU Clock Ratio Allows you to alter the clock ratio for the installed CPU. The adjustable range is dependent on the CPU being installed. This item is present only when you install a CPU that supports this feature. @@- 23 - (Note) && CPU Frequency Displays the current operating CPU frequency.

``Advanced CPU Core Settings && CPU Clock Ratio, CPU Frequency The settings above are synchronous to those under the same items on the Advanced Frequency Settings menu. Allows you to set the CPU Uncore ratio. The adjustable range is dependent on the CPU being used. Displays the current CPU Uncore frequency. && Uncore Ratio && Uncore Frequency && Intel(R) Turbo Boost Technology (Note) && Turbo Ratio (Note) Allows you to determine whether to enable the Intel CPU Turbo Boost technology.

Auto lets the BIOS automatically configure this setting. (Default: Auto) Allows you to set the CPU Turbo ratios for different number of active cores. Auto sets the CPU Turbo ratios according to the CPU specifications. (Default: Auto) Allows you to set the power limit for CPU Turbo mode and how long it takes to operate at the specified power limit. If the specified value is exceeded, the CPU will automatically reduce the core frequency in order to reduce the power. Auto sets the current limit according to the CPU specifications. (Default: Auto) Allows you to set a current limit for CPU Turbo mode. When the CPU current exceeds the specified current limit, the CPU will automatically reduce the core frequency in order to reduce the current. Auto sets the power limit according to the CPU specifications. (Default: Auto) Allows you to select the number of CPU cores to enable in an Intel® multi-core CPU (the number of CPU cores may vary by CPU).

Auto lets the BIOS automatically configure this setting. (Default: Auto) Allows you to determine whether to enable multi-threading technology when using an Intel® CPU that supports this function. This feature only works for operating systems that support multi-processor mode. Auto lets the BIOS automatically configure this setting. (Default: Auto) Enables or disables Intel® CPU Enhanced Halt (C1E) function, a CPU power-saving function in system halt state.

When enabled, the CPU core frequency and voltage will be reduced during system halt state to decrease power consumption. Auto lets the BIOS automatically configure this setting. (Default: Auto) Allows you to determine whether to let the CPU enter C3 mode in system halt state. When enabled, the CPU core frequency and voltage will be reduced during system halt state to decrease power consumption. The C3 state is a more enhanced power-saving state than C1.

Auto lets the BIOS automatically configure this setting. (Default: Auto) && Power Limit TDP (Watts) / Power Limit Time && Core Current Limit (Amps) && No. of CPU Cores Enabled (Note) && Hyper-Threading Technology (Note) && CPU Enhanced Halt (C1E) (Note) && C3 State Support (Note) (Note) This item is present only when you install a CPU that supports this feature. @@- 24 - && C6/C7 State Support (Note 1) Allows you to determine whether to let the CPU enter C6/C7 mode in system halt state. When enabled, the CPU core frequency and voltage will be reduced during system halt state to decrease power consumption.

The C6/C7 state is a more enhanced power-saving state than C3. Auto lets the BIOS automatically configure this setting. (Default: Auto) Allows you to determine whether to let the CPU enter C8 mode in system halt state. When enabled, the CPU core frequency and voltage will be reduced during system halt state to decrease power consumption. The C8 state is a more enhanced power-saving state than C6/C7.

Auto lets the BIOS automatically configure this setting. (Default: Auto) Allows you to specify the C-state limit for the processor. Auto lets the BIOS automatically configure this setting. (Default: Auto) Enables or disables Intel® Thermal Monitor function, a CPU overheating protection function. When enabled, the CPU core frequency and voltage will be reduced when the CPU is overheated. Auto lets the BIOS automatically configure this setting. (Default: Auto) Enables or disables Enhanced Intel® Speed Step Technology (EIST). @@Auto lets the BIOS automatically configure this setting. @@Disabled Disables this function. (Default) Profile1 Uses Profile 1 settings.

Profile2 (Note 2) Uses Profile 2 settings. Allows you to set the system memory multiplier. Auto sets memory multiplier according to memory SPD data. @@Provides memory detection and training methods. Auto Lets the BIOS automatically configure this setting. @@Disable Fast Boot Detect and train memory at every single boot. @@@@Options are: Auto (default), Manual, Advanced Manual. @@@Provides different levels of memory auto-tuning. (Default: Auto) && Memory Timing Mode && Profile DDR Voltage && Memory Multiplier Tweaker && Channel Interleaving Enables or disables memory channel interleaving. Enabled allows the system to simultaneously access different channels of the memory to increase memory performance and stability.

Auto lets the BIOS automatically configure this setting. (Default: Auto) Enables or disables memory rank interleaving. Enabled allows the system to simultaneously access different ranks of the memory to increase memory performance and stability. Auto lets the BIOS automatically configure this setting. (Default: Auto) && Rank Interleaving ``Channel A/B Memory Sub Timings This sub-menu provides memory timing settings for each channel of memory.

This sub-menu provides memory timing settings for each channel of memory. The respective timing setting screens are configurable only when Memory Timing Mode is set to Manual or Advanced Manual. @@@@When temperature exceeds the threshold, BIOS will emit warning sound. @@Check the fan condition or fan connection when this occurs. @@@@ (Default) Silent Allows the fan to run at slow speeds.

@@Full Speed Allows the fan to run at full speeds. Allows you to control the fan speed. @@Options are: 0.75 PWM value /oC ~ 2.50 PWM value /oC. @@@@ (Default) Silent Allows the fan to run at slow speeds. Manual Allows you to control the fan speed under the Fan Speed Percentage item. Full Speed Allows the fan to run at full speeds. Allows you to control the fan speed. This item is configurable only when 1st System Fan Speed Control is set to Manual.



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&& Administrator Password Allows you to configure an administrator password. Press <Enter> on this item, type the password, and then press <Enter>. You will be requested to confirm the password.

Type the password again and press <Enter>. You must enter the administrator password (or user password) at system startup and when entering BIOS Setup. Differing from the user password, the administrator password allows you to make changes to all BIOS settings. Allows you to configure a user password. Press <Enter> on this item, type the password, and then press <Enter>. You will be requested to confirm the password. Type the password again and press <Enter>. You must enter the administrator password (or user password) at system startup and when entering BIOS Setup. However, the user password only allows you to make changes to certain BIOS settings but not all. To cancel the password, press <Enter> on the password item and when requested for the password, enter the correct one first.

When prompted for a new password, press <Enter> without entering any password. Press <Enter> again when prompted to confirm. NOTE: Before setting the User Password, be sure to set the Administrator Password first. && User Password - 32 - 2-5 Peripherals && Intel Platform Trust Technology (PTT) Enables or disables Intel® PTT Technology. (Default: Disabled) Specifies the first initiation of the monitor display from the installed PCI Express graphics card or the onboard graphics.

IGFX Sets the onboard graphics as the first display. PCIe 1 Slot Sets the graphics card on the PCIEX16 slot as the first display. (Default) PCIe 2 Slot Sets the graphics card on the PCIEX4 slot as the first display. Enables or disables the onboard audio LED function. Off Disables this function. On Enables this function. (Default) Allows USB keyboard/mouse to be used in MS-DOS. (Default: Enabled) && Initial Display Output && Audio LED && Legacy USB Support && XHCI Hand-off Determines whether to enable XHCI Hand-off feature for an operating system without XHCI Hand-off support. (Default: Disabled) Enables or disables support for USB storage devices. (Default: Enabled) && USB Mass Storage Driver Support && USB Storage Devices Displays a list of connected USB mass storage devices. This item appears only when a USB storage device is installed. OffBoard SATA Controller Configuration Displays information on your M.2 PCIe SSD if installed. - 33 - Trusted Computing 2.0 This sub-menu appears only when Intel Platform Trust Technology is set to Enabled.

&& Security Device Support && TPM 20 InterfaceType Enables or disables Trusted Platform Module (TPM). (Default: Enable) Allows you to select the communication interface for the TPM 2.0 device. Set to External TPM2.0 if you install an Infineon TPM 2.0 module (optional). (Default: PTT) Allows you to select whether to support TPM 1.2 or TPM 2.0 device. Auto lets the BIOS automatically configure this setting.

(Default: Auto) && Device Select Super IO Configuration This section provides information on the super I/O chip and allows you to configure the serial port and parallel port. Enables or disables the onboard serial port. (Default: Enabled) Enables or disables the onboard parallel port. (Default: Enabled) Enables or disables the Intel® BIOS Guard feature, which protects the BIOS from malicious attacks. && Serial Port 1 && Parallel Port Intel(R) Bios Guard Technology SATA Configuration && SATA Controller(s) Enables or disables the integrated SATA controllers.

(Default: Enabled) && SATA Mode Selection Enables or disables RAID for the SATA controllers integrated in the Chipset or configures the SATA controllers to AHCI mode. RAID Enables RAID for the SATA controller. AHCI Configures the SATA controllers to AHCI mode. Advanced Host Controller Interface (AHCI) is an interface specification that allows the storage driver to enable advanced Serial ATA features such as Native Command Queuing and hot plug. (Default) Enables or disables the power saving feature, ALPM (Aggressive Link Power Management), for the Chipset SATA controllers.

(Default: Enabled) Enables or disables each SATA port. (Default: Enabled) Enables or disable the hot plug capability for each SATA port. (Default: Disabled) Enables or disables support for external SATA devices. (Default: Disabled) && Aggressive LPM Support && Port 0/1/2/3/4/5 && Hot plug && External SATA NVMe Configuration Displays information on your M.2 NVMe PCIe SSD if installed. This sub-menu provides information on LAN configuration and related configuration options. - 34 - Intel(R) Ethernet Network Connection 2-6 Chipset && VT-d (Note) Enables or disables Intel® Virtualization Technology for Directed I/O. (Default: Disabled) Enables or disables the onboard graphics function. (Default: Enabled) Allows you to set the onboard graphics memory size. Options are: 32M~512M.

(Default: 64M) && Internal Graphics && DVMT Pre-Allocated && DVMT Total Gfx Mem && Audio Controller Allows you to allocate the DVMT memory size of the onboard graphics. Options are: 128M, 256M, MAX. (Default: 256M) Enables or disables the onboard audio function. (Default: Enabled) If you wish to install a 3rd party add-in audio card instead of using the onboard audio, set this item to Disabled. Enables or disables the DSP functionality of the PCH audio unit. (Default: Disabled) && Audio DSP && PCH LAN Controller Enables or disables the onboard LAN function. (Default: Enabled) If you wish to install a 3rd party add-in network card instead of using the onboard LAN, set this item to Disabled. Enables or disables the wake on LAN function. (Default: Enabled) Enables or disables High Precision Event Timer (HPET) in the operating system. (Default: Enabled) This item is present only when you install a CPU that supports this feature.

@@ - 35 - && Wake on LAN && High Precision Timer (Note) 2-7 Power Management && AC BACK Determines the state of the system after the return of power from an AC power loss. Always Off system stays off upon the return of the AC power. (Default) The Always On The system is turned on upon the return of the AC power. Memory The system returns to its last known awake state upon the return of the AC power. Allows the system to be turned on by a PS/2 keyboard wake-up event.

Note: To use this function, you need an ATX power supply providing at least 1A on the +5VSB lead. Disabled Disables this function. (Default) Password Set a password with 1~5 characters to turn on the system. Keyboard 98 Press POWER button on the Windows 98 keyboard to turn on the system.



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Any Key Press any key to turn on the system.

Set the password when Power On By Keyboard is set to Password. Press <Enter> on this item and set a password with up to 5 characters and then press <Enter> to accept. To turn on the system, enter the password and press <Enter>. Note: To cancel the password, press <Enter> on this item. When prompted for the password, press <Enter> again without entering the password to clear the password settings. Allows the system to be turned on by a PS/2 mouse wake-up event. Note: To use this function, you need an ATX power supply providing at least 1A on the +5VSB lead. Disabled Disables this function. (Default) Move Move the mouse to turn on the system. Double Click Double click on left button on the mouse to turn on the system.

&& Power On By Keyboard && Power On Password && Power On By Mouse - 36 - && ErP Determines whether to let the system consume least power in S5 (shutdown) state. (Default: Disabled) Note: When this item is set to Enabled, the following functions will become unavailable: Resume by Alarm, PME event wake up, power on by mouse, power on by keyboard, and wake on LAN. Configures the way to turn off the computer in MS-DOS mode using the power button. Instant-Off Press the power button and then the system will be turned off instantly. (Default) Delay 4 Sec. Press and hold the power button for 4 seconds to turn off the system. If the power button is pressed for less than 4 seconds, the system will enter suspend mode. Enables or disables dummy load. When the power supply is at low load, a self-protection will activate causing it to shutdown or fail. If this occurs, please set to Enabled.

Auto lets the BIOS automatically configure this setting. (Default: Auto) Determines whether to power on the system at a desired time. (Default: Disabled) If enabled, set the date and time as following: Wake up day: Turn on the system at a specific time on each day or on a specific day in a month. Wake up hour/minute/second: Set the time at which the system will be powered on automatically. Note: When using this function, avoid inadequate shutdown from the operating system or removal of the AC power, or the settings may not be effective.

Allows you to determine whether to let the onboard graphics enter standby mode to decrease power consumption. (Default: Enabled) && Soft-Off by PWR-BTTN && Power Loading && Resume by Alarm && RC6(Render Standby) && Platform Power Management Enables or disables the Active State Power Management function (ASPM). (Default: Disabled) && PEG ASPM && PCH ASPM Allows you to configure the ASPM mode for the device connected to the CPU PEG bus. This item is configurable only when Platform Power Management is set to Enabled. (Default: Enabled) Allows you to configure the ASPM mode for the device connected to Chipset's PCI Express bus.

This item is configurable only when Platform Power Management is set to Enabled. (Default: Enabled) Allows you to configure the ASPM mode for both CPU side and Chipset side of the DMI link. This item is configurable only when Platform Power Management is set to Enabled. (Default: Enabled) && DMI Link ASPM Control - 37 - 2-8 Save & Exit && Save & Exit Setup Press <Enter> on this item and select Yes. This saves the changes to the CMOS and exits the BIOS Setup program. Select No or press <Esc> to return to the BIOS Setup Main Menu. Press <Enter> on this item and select Yes. This exits the BIOS Setup without saving the changes made in BIOS Setup to the CMOS. Select No or press <Esc> to return to the BIOS Setup Main Menu. Press <Enter> on this item and select Yes to load the optimal BIOS default settings.

The BIOS defaults settings help the system to operate in optimum state. Always load the Optimized defaults after updating the BIOS or after clearing the CMOS values. Allows you to select a device to boot immediately. Press <Enter> on the device you select and select Yes to confirm. Your system will restart automatically and boot from that device. This function allows you to save the current BIOS settings to a profile. You can create up to 8 profiles and save as Setup Profile 1~ Setup Profile 8. Press <Enter> to complete. Or you can select Select File in HDD/FDD/USB to save the profile to your storage device. If your system becomes unstable and you have loaded the BIOS default settings, you can use this function to load the BIOS settings from a profile created before, without the hassles of reconfiguring the BIOS settings.

First select the profile you wish to load and then press <Enter> to complete. You can select Select File in HDD/FDD/USB to input the profile previously created from your storage device or load the profile automatically created by the BIOS, such as reverting the BIOS settings to the last settings that worked properly (last known good record). && Exit Without Saving && Load Optimized Defaults && Boot Override && Save Profiles && Load Profiles - 38 - Chapter 3 Appendix 3-1 Configuring a RAID Set RAID Levels Minimum Number of Hard Drives Array Capacity Fault Tolerance RAID 0 ≥ 2 Number of hard drives * Size of the smallest drive No RAID 1 2 Size of the smallest drive Yes RAID 5 ≥ 3 (Number of hard drives - 1) * Size of the smallest drive Yes RAID 10 ≥ 4 (Number of hard drives/2) * Size of the smallest drive Yes Before you begin, please prepare the following items: •• At least two SATA hard drives or M.2 SSDs (Note 1) (to ensure optimal performance, it is recommended that you use two hard drives with identical model and capacity). (Note 2) •• Windows setup

disk. •• Motherboard driver disk. •• A USB thumb drive. Configuring the Onboard SATA Controller A. Installing SATA hard drive(s) in your computer Connect the SATA signal cables to SATA hard drives and the SATA ports on the motherboard. Then connect the power connectors from your power supply to the hard drives.

Or install your M.2 SSD(s) in the M.2 connector(s) on the motherboard. B. Configuring SATA controller mode in BIOS Setup Make sure to configure the SATA controller mode correctly in system BIOS Setup. For the BIOS Setup menus, refer to Chapter 2, "BIOS Setup," "Integrated Peripherals." Steps: 1. Turn on your computer and press <Delete> to enter BIOS Setup during the POST (Power-On Self-Test). Go to Peripherals\SATA Configuration, make sure SATA Controller(s) is enabled. To create RAID, set SATA Mode Selection to RAID.

2. If you want to configure UEFI RAID, follow the steps in "C-1." To enter the legacy RAID ROM, save the settings and exit BIOS Setup. Refer to "C-2" for more information. The BIOS Setup menus described in this section may differ from the exact settings for your motherboard.



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The actual BIOS Setup menu options you will see shall depend on the motherboard you have and the BIOS version. C-1. UEFI RAID Configuration Only
Windows 10/8.1 64-bit supports UEFI RAID configuration. Steps: 1.

In BIOS Setup, go to BIOS Features and set Windows 8/10 Features to Windows 8/10 and CSM Support to Disabled. Save the changes and exit BIOS Setup. 2.

After the system reboot, enter BIOS Setup again. Then enter the Peripherals/Intel(R) Rapid Storage Technology sub-menu.

3. On the Intel(R) Rapid Storage Technology menu, press <Enter> on Create RAID Volume to enter the Create RAID Volume screen. Enter a volume name with 1~16 letters (letters cannot be special characters) under the Name item and press <Enter>. Then, select a RAID level. RAID levels supported include RAID 0, RAID 1, Recovery, RAID 10, and RAID 5 (the selections available depend on the number of the hard drives being installed).

Next, use the down arrow key to move to Select Disks. (Note 1) An M.2 PCIe SSD cannot be used to set up a RAID set either with an M.2 SATA SSD or a SATA hard drive. (Note 2) Refer to Chapter 1, "Internal Connectors," "M.2 Socket 3 Connector," for the configuration tables of SATA hard drives and M.2 SSDs. - 39 - 4. Under Select Disks item, select the hard drives to be included in the RAID array. Press the <Space> key on the hard drives to be selected (selected hard drives are marked with "X").

Then set the stripe block size. The stripe block size can be set from 4 KB to 128 KB. Once you have selected the stripe block size, set the volume capacity. 5.

After setting the capacity, move to Create Volume and press <Enter> to begin. 6. After completing, you'll be brought back to the Intel(R) Rapid Storage Technology screen. Under RAID Volumes you can see the new RAID volume. To see more detailed information, press <Enter> on the volume to check for information on RAID level, stripe block size, array name, and array capacity, etc. C-2.

Configuring Legacy RAID ROM Enter the Intel® legacy RAID BIOS setup utility to configure a RAID array. Skip this step and proceed with the installation of Windows operating system for a non-RAID configuration. Steps: 1. After the POST memory test begins and before the operating system boot begins, look for a message which says "Press <Ctrl-I> to enter Configuration Utility". Press <Ctrl> + <I> to enter the RAID Configuration Utility.

2. After you press <Ctrl> + <I>, the MAIN MENU screen will appear. If you want to create a RAID array, select Create RAID Volume in MAIN MENU and press <Enter>. 3. After entering the CREATE VOLUME MENU screen, enter a volume name with 1~16 letters (letters cannot be special characters) under the Name item and press <Enter>.

Then, select a RAID level. RAID levels supported include RAID 0, RAID 1, Recovery, RAID 10, and RAID 5 (the selections available depend on the number of the hard drives being installed). Press <Enter> to proceed. 4. Under Disks item, select the hard drives to be included in the RAID array. If only two hard drives are installed, they will be automatically assigned to the array. Set the stripe block size if necessary. The stripe block size can be set from 4 KB to 128 KB. Once you have selected the stripe block size, press <Enter>. 5.

Enter the array capacity and press <Enter>. Finally press <Enter> on the Create Volume item to begin creating the RAID array. When prompted to confirm whether to create this volume, press <Y> to confirm or <N> to cancel. 6. When completed, you can see detailed information about the RAID array in the DISK/VOLUME INFORMATION section, including the RAID level, stripe block size, array name, and array capacity, etc. To exit the RAID BIOS utility, press <Esc> or select 6. Exit in MAIN MENU. Installing the SATA RAID/AHCI Driver and Operating System With the correct BIOS settings, you are ready to install the operating system. Installing the Operating System As some operating systems already include Intel® SATA RAID/AHCI driver, you do not need to install separate RAID/AHCI driver during the Windows installation process. After the operating system is installed, we recommend that you install all required drivers from the motherboard driver disk using "Xpress Install" to ensure system performance and compatibility.

If the operating system to be installed requires that you provide additional SATA RAID/AHCI driver during the OS installation process, please refer to the steps below: 1. Copy the IRST-x64 or IRST-x86 folder (depending on your OS version) under the Boot folder in the driver disk to your USB thumb drive. 2.

Boot from the Windows setup disk and perform standard OS installation steps. When the screen requesting you to load the driver appears, select Browse.

3. Insert the USB thumb drive and then browse to the folder (IRST-x64 or IRST-x86) that you previously copied. 4. When a screen as shown, select Intel Chipset SATA RAID Controller and click Next to load the driver and continue the OS installation. Please visit GIGABYTE's website for details on configuring a RAID array.

- 40 - 3-2 Drivers Installation • Before installing the drivers, first install the operating system. @@@@- 41 - Regulatory Statements Regulatory Notices This document must not be copied without our written permission, and the contents there of must not be imparted to a third party nor be used for any unauthorized purpose. Contravention will be prosecuted. We believe that the information contained herein was accurate in all respects at the time of printing.

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The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local government office, your household waste disposal service or where you purchased the product for details of environmentally safe recycling.



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