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You can read the recommendations in the user guide, the technical guide or the installation guide for GIGABYTE GA-H170-D3HP. You'll find the answers to all your questions on the GIGABYTE GA-H170-D3HP in the user manual (information, specifications, safety advice, size, accessories, etc.). Detailed instructions for use are in the User's Guide.

User manual GIGABYTE GA-H170-D3HP

User guide GIGABYTE GA-H170-D3HP

Operating instructions GIGABYTE GA-H170-D3HP

Instructions for use GIGABYTE GA-H170-D3HP

Instruction manual GIGABYTE GA-H170-D3HP



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Manual abstract:

© 2015 Aug. 3, 2015 Copyright © 2015 GIGA-BYTE TECHNOLOGY CO., LTD. All rights reserved. No part of this manual may be reproduced, copied, translated, transmitted, or published in any form or by any means without GIGABYTE's prior written permission. In order to assist in the use of this product, carefully read the User's Manual. For product-related information, check on our website at: <http://www.gigabyte.com> Identifying Your Motherboard Revision The revision number on your motherboard looks like this: "REV: X.X."

For example, "REV: 1.0" means the revision of the motherboard is 1.0. Check your motherboard revision before updating motherboard BIOS, drivers, or when looking for technical information. Installing an Expansion Card.

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..... 10 Back Panel Connectors..

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. 10 Internal Connectors.....

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.....

.....

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12 Chapter 2 BIOS Setup.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....19 2-1 Startup Screen.

.....

.....
.....
.....

.....
.....
.....
.....

.....
.....
.....
.....

..... 20 2-2 M.I.T..

.....
.....
.....

.....
.....
.....
.....

.....
.....
.....
.....

.....
.....
.....

..... 20 2-3 System Information.

.....
.....
.....
.....

.....
.....
.....
.....

.....
.....
.....

..... 26 2-4 BIOS Features..

.....
.....
.....
.....

.....
.....
.....
.....

.....
.....
.....
.....

.... 27 2-5 Peripherals.....

.....
.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

. 30 2-6 Chipset....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.... 32 2-7 Power Management.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.. 33 2-8 Save & Exit.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.... 35 Chapter 3 Appendix.

.....

.....

.....
.....
.....
.....

.....
.....
.....
.....

.....
.....
.....
.....

.....36 3-1 3-2 *Configuring a RAID Set...*

.....
.....
.....
.....

.....
.....
.....
.....

.....
.....
.....
.....

36 Drivers Installation.....

.....
.....
.....
.....

.....
.....
.....
.....

.....
.....
.....
.....

. 38 Regulatory Statements.....

.....
.....
.....
.....

.....
.....
.....
.....

.....
.....
.....
.....

..... *39 Contact Us....*

.....
.....
.....
.....

.....
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.....
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.....
.....
.....
.....
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.... 44 -3- GA-H170-D3HP Motherboard Layout SYS_FAN3 ATX DDR4_4 DDR4_2 DDR4_3 DDR4_1 SATA3 3 2 1 0 Intel® H170 BAT PCIEX4 SATA3 5 4 CLR_CMOS F_PANEL CODEC PCI2 PCI3 F_AUDIO PCIe to PCI Bridge M_BIOS B_BIOS SYS_FAN2 COMA THB_C TPM F_USB2 F_USB1 F_USB30_2 F_USB30_1 SATA EXPRESS KB_MS_USB ATX_12V CPU_FAN CPU_OPT DVI VGA LGA1151 TYPEC R_USB30 HDMI USB30_LAN SYS_FAN1 80A 60A 42A AUDIO M2A_32G PCIEX1_1 Intel® GbE LAN PCIEX16 GA-H170-D3HP PCII iTE® Super I/O PCIEX1_2 SPDIF_O Box Contents 55 GA-H170-D3HP motherboard 55 Motherboard driver disk 55 User's Manual 55 Two SATA cables 55 I/O Shield 55 One G Connector The box contents above are for reference only and the actual items shall depend on the product package you obtain.

The box contents are subject to change without notice. -4- Chapter 1 Hardware Installation 1-1 Installation Precautions The motherboard contains numerous delicate electronic circuits and components which can become damaged as a result of electrostatic discharge (ESD). Prior to installation, carefully read the user's manual and follow these procedures: • Prior to installation, make sure the chassis is suitable for the motherboard. • Prior to installation, do not remove or break motherboard S/N (Serial Number) sticker or warranty sticker provided by your dealer. These stickers are required for warranty validation. • Always remove the AC power by unplugging the power cord from the power outlet before installing or removing the motherboard or other hardware components. • When connecting hardware components to the internal connectors on the motherboard, make sure they are connected tightly and securely. • When handling the motherboard, avoid touching any metal leads or connectors. • It is best to wear an electrostatic discharge (ESD) wrist strap when handling electronic components such as a motherboard, CPU or memory. If you do not have an ESD wrist strap, keep your hands dry and first touch a metal object to eliminate static electricity.

• Prior to installing the motherboard, please have it on top of an antistatic pad or within an electrostatic shielding container. • Before connecting or unplugging the power supply cable from the motherboard, make sure the power supply has been turned off. • Before turning on the power, make sure the power supply voltage has been set according to the local voltage standard. • Before using the product, please verify that all cables and power connectors of your hardware components are connected. • To prevent damage to the motherboard, do not allow screws to come in contact with the motherboard circuit or its components. • Make sure there are no leftover screws or metal components placed on the motherboard or within the computer casing. • Do not place the computer system on an uneven surface. • Do not place the computer system in a high-temperature or wet environment. • Turning on the computer power during the installation process can lead to damage to system components as well as physical harm to the user. • If you are uncertain about any installation steps or have a problem related to the use of the product, please consult a certified computer technician.

• If you use an adapter, extension power cable, or power strip, ensure to consult with its installation and/or grounding instructions. -5- 1-2 Product Specifications CPU □□ Support for Intel® Core™ i7 processors/Intel® Core™ i5 processors/ Intel® Core™ i3 processors/Intel® Pentium® processors/ Intel® Celeron® processors in the LGA1151 package (Go to GIGABYTE's website for the latest CPU support list.) □□ L3 cache varies with CPU □□ Intel® H170 Express Chipset □□ 4 x DDR4 DIMM sockets supporting up to 64 GB of system memory * □□ 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. Chipset Memory □□ □□ □□ □□ Onboard Graphics 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 (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 - □ x HDMI port, supporting a maximum resolution of 4096x2160@24 Hz 1 □□ □□ □□ □□ □□ □□ Support for up to 3 displays at the same time Maximum shared memory of 512 MB Realtek® ALC1150 codec High Definition Audio 2/4/5.

1/7.1-channel Support for S/PDIF Out * Support for HDMI 1.4 version. * The DVI-D port does not support D-Sub connection by adapter. Audio LAN □□ Intel® GbE LAN chip (10/100/1000 Mbit) * □ optimum performance, if only one PCI Express graphics card is to be installed, For be sure to install it in the PCIEX16 slot.

Expansion Slots □□ 1 x PCI Express x16 slot, running at x16 (PCIEX16) Multi-Graphics □□ Support for 2-Way AMD CrossFire™ technology Technology Storage Interface □□ Chipset: - 1 x M.2 Socket 3 connector - 2 x SATA Express connectors - 6 x SATA 6Gb/s connectors - Support for RAID 0, RAID 1, RAID 5, and RAID 10 □□ 1 x PCI Express x16 slot, running at x4 (PCIEX4) □□ 2 x PCI Express x1 slots (All of the PCI Express slots conform to PCI Express 3.0 standard.) □□ 3 x PCI slots * □ refer to "1-7 Internal Connectors," for the supported configurations with the M.



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2, R SATA Express, and SATA connectors. -6- USB Internal Connectors Back Panel Connectors □□ Chipset: - □ x USB 3.0/2.0 ports (3 ports on the back panel, 4 ports available through 7 the internal USB headers) - □ x USB 2.0/1.1 ports (2 ports on the back panel, 4 ports available through 6 the internal USB headers) □□ Chipset+Intel® Thunderbolt™ 3 Controller: - □ x USB Type-C™ port on the back panel, with USB 3.

1 support 1 - □ x USB 3.1 port on the back panel 1 □□ 1 x 24-pin ATX main power connector □□ 1 x 8-pin ATX 12V power connector □□ 1 x M.2 Socket 3 connector □□ 2 x SATA Express connectors □□ 6 x SATA 6Gb/s connectors □□ 1 x CPU fan header □□ 1 x water cooling fan header (CPU_OPT) □□ 3 x system fan headers □□ 1 x front panel header □□ 1 x front panel audio header □□ 1 x S/PDIF Out header □□ 2 x USB 3.0/2.0 headers □□ 2 x USB 2.0/1.1 headers □□ 1 x Trusted Platform Module (TPM) header □□ 1 x Thunderbolt™ add-in card connector □□ 1 x serial port header □□ 1 x Clear CMOS jumper □□ 1 x PS/2 keyboard/mouse port □□ 1 x D-Sub port □□ 1 x DVI-D port □□ 1 x HDMI port □□ 1 x USB Type-C™ port, with USB 3.1 support □□ 1 x USB 3.1 port □□ 3 x USB 3.0/2.

0 ports □□ 2 x USB 2.0/1.1 ports □□ 1 x RJ-45 port □□ □ x audio jacks (Center/Subwoofer Speaker Out, Rear Speaker Out, Side Speaker 6 Out, Line In, Line Out, Mic In) □□ iTE® I/O Controller Chip □□ □□ □□ □□ □□ System voltage detection CPU/System temperature detection CPU/CPU OPT/System fan speed detection CPU/System overheating warning CPU/CPU OPT/System fan fail warning CPU/CPU OPT/System fan speed control I/O Controller Hardware Monitor * □ Whether the fan speed control function is supported will depend on the cooler you install. -7- BIOS □□ □□ □□ □□ Unique Features □□ 2 x 128 Mbit flash Use of licensed AMI UEFI BIOS Support for DualBIOS™ PnP 1.0a, DMI 2.

7, WfM 2.0, SM BIOS 2.7, ACPI 5.0 Support for APP Center - 3D OSD - @BIOS - Ambient LED - AutoGreen - Cloud Station - EasyTune - Easy RAID - Fast Boot - Smart TimeLock - Smart Keyboard - Smart Backup - System Information Viewer - USB Blocker Support for Q-Flash Support for Smart Switch Support for Xpress Install Norton® Internet Security (OEM version) Intel® Smart Response Technology Intel® Small Business Advantage cFosSpeed * □ available applications in APP Center may vary by motherboard model. Supported A functions of each application may also vary depending on motherboard specifications.

Bundled Software Operating System Form Factor □□ □□ □□ □□ □□ □□ Support for Windows 10/8.1/7 □□ ATX Form Factor; 30.5cm x 22.5cm * □ IGABYTE reserves the right to make any changes to the product specifications and product-related information without G prior notice. Please visit GIGABYTE's website for support lists of CPU, memory modules, SSDs, anUSB 2.0/1.1 Port The USB port supports the USB 2.0/1.1 specification. Use this port for USB devices.

PS/2 Keyboard/Mouse Port D-Sub Port Use this port to connect a PS/2 mouse or keyboard. The D-Sub port supports a 15-pin D-Sub connector and supports a maximum resolution of 1920x1200@60 Hz (the actual resolutions supported depend on the monitor being used). Connect a monitor that supports D-Sub connection to this port. DVI-D Port (Note) The DVI-D port conforms to the DVI-D specification and supports a maximum resolution of 1920x1200@60 Hz (the actual resolutions supported depend on the moning 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.

8 4 ATX_12V: 5 ATX_12V 1 Pin No. 1 2 3 4 ATX: Definition Pin No. GND (Only for 2x4-pin 12V) 5 GND (Only for 2x4-pin 12V) 6 GND 7 GND 8 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) 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 Pin No. 1 2 3 4 5 6 7 8 9 10 11 12 1 ATX 13 3/4) CPU_FAN/SYS_FAN1/2/3 (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: 1 1 SYS_FAN1/2/3: CPU_FAN Pin No. 1 2 3 4 Definition GND +12V Sense Speed Control SYS_FAN1 1 SYS_FAN2 1 SYS_FAN3 Pin No. 1 2 3 4 Definition GND 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. - 13 - B_1 B SS S 1 2 3 1 1 1 2 3 5) CPU_OPT (Water Cooling CPU Fan Header) S 1 2 3 The fan header is 4-pin and possesses a foolproof insertion design.

When connecting a fan cable, be sure to S 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. 1 2 3 1 2 3 1 Pin No. 1 S 2 3 4 3 B SS Definition GND Speed Control Sense VCC S 1 2 3 S U 6) SATA EXPRESS (SATA Express Connectors) Each SATA Express connector supports a single SATA Express device. S _ S 3 B SS S F S _ U 7) SATA3S0/1/2/3/4/5 (SATA 6Gb/s Connectors) S U 1 2 3 S _ B _ _ 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. SATA3 5 4 7 7 S _ SATA3 3 2 1 0 1 1 S F S _ Pin No. 1 B_ 2 3 4 5 6 7 Definition GND TXP TXN GND RXN RXP GND B _ B To enable hot-plugging for the SATA ports, refer to Chapter 2, "BIOS Setup," "Peripherals\SATA Configuration," for more information. S _ 8) M2A_32G (M.2 Socket 3 Connector) The M.2 connector supports M.2 SATA SSDs and M.



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S_ S F - 17 - _ B_ 1 2 3 1 11 10 1 _ S 1 S F_ USB 1 1 2 3 1 2 3 S B_ B SS 1 1 S B_ B 14) TPM (Trusted Platform Module Header) Pin No. 1 2 3 4 5 6 7 8 9 _ 10 19 1 Definition LCLK GND LFRAME U No Pin LRESET NC S LAD3 LAD2 VCC3 LAD1 Pin No. Definition S 3 20 B SS S 2 1 2 3 S F 15) THB_C (Thunderbolt™ Add-in Card Connector) B_ 1 S 3 This connector is for a GIGABYTE Thunderbolt™ add-in card. Pin No. 1 2 3 4 5 Definition GPIOA S B SS GPIOB N_ SLP_ S3 N_ S4_ S5 GND S F U Supports a Thunderbolt™ add-in card. S_ 16) COMA (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. Definition 1 NDCD2 NSIN B_ 3 NSOUT 4 NDTR5 GND Pin No. 6 7 8 9 10 Definition NDSRNRTS NCTS NRINo Pin 9 10 1 2 S _ 17) CLR_CMOS (Clear CMOS Jumper) 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.

Open: Normal Short: Clear CMOS Values •• Always turn off your computer and unplug the power cord from the power outlet before clearing the CMOS values. •• After system restart, go to BIOS Setup to load factory defaults (select Load Optimized Defaults) or manually configure the BIOS settings (refer to Chapter 2, "BIOS Setup," for BIOS configurations). S_ - 18 - 1 2 3 11 LAD0 S 12 GND 13 NC 14 _ _ NC 3 15 SB3V 1 2 3 16 SERIRQ 17 GND 18 NC 19 NC 20 SUSCLK 1 1 You may connect a TPM (Trusted Platform Module) to this header. _ S _ S _ B _ U _ B 1 2 3 F_ USB3 F _ _ 3 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.

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.) - 19 - 2-1 Startup Screen The following startup Logo screen will appear when the computer boots. (Sample BIOS Version: F1d) 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. 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.) - 20 - ``M.I.T.

Current Status This screen provides information on CPU/memory frequencies/parameters. ``Advanced Frequency Settings && CPU Clock Ratio && CPU Frequency Allows you to alter the clock ratio for the installed CPU. The adjustable range is dependent on the CPU being installed. Displays the current operating CPU frequency. ``Advanced CPU Core Settings && CPU Clock Ratio, CPU Frequency && Uncore Ratio 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 Frequency && CPU Flex Ratio Override && CPU Flex Ratio Settings Enables or disables the CPU Flex Ratio. The maximum CPU clock ratio will be based on the CPU Flex Ratio Settings value if CPU Clock Ratio is set to Auto.

(Default: Disabled) Allows you to set the CPU Flex Ratio. The adjustable range may vary by CPU.



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(Default: 20) && 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 power 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) && Power Limit TDP (Watts) / Power Limit Time && Core Current Limit (Amps) && No. of CPU Cores Enabled (Note) && Hyper-Threading Technology (Note) (Note) This item is present only when you install a CPU that supports this feature. For more information about Intel® CPUs' unique features, please visit Intel's website.

- 21 - && CPU Enhanced Halt (C1E) (Note 1) && C3 State Support (Note 1) 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) 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). Depending on CPU loading, Intel EIST technology can dynamically and effectively lower the CPU voltage and core frequency to decrease average power consumption and heat production. Auto lets the BIOS automatically configure this setting. (Default: Auto) Allows you to set the system memory multiplier. Auto sets memory multiplier according to memory SPD data. (Default:

Auto) The first memory frequency value is the normal operating frequency of the memory being used; the second is the memory frequency that is automatically adjusted according to the System Memory Multiplier settings. && C6/C7 State Support (Note 1) && C8 State Support (Note 1) && Package C State Limit (Note 1) && CPU Thermal Monitor (Note 1) && CPU EIST Function (Note 1) && System Memory Multiplier && Memory Frequency (MHz) `` Advanced Memory Settings && System Memory Multiplier, Memory Frequency(MHz) && Memory Boot Mode (Note 2) The settings above are synchronous to those under the same items on the Advanced Frequency Settings menu. Provides memory detection and training methods. Auto Lets the BIOS automatically configure this setting. (Default) (Note 1) This item is present only when you install a CPU that supports this feature.

For more information about Intel® CPUs' unique features, please visit Intel's website. (Note 2) This item is present only when you install a CPU and a memory module that support this feature. - 22 - Enable Fast Boot Disable Fast Boot S kip memory detection and training in some specific criteria for faster memory boot. Detect and train memory at every single boot. && Memory Enhancement Settings && Memory Timing Mode Provides several memory performance enhancement settings: Normal (basic performance), Relax OC, Enhanced Stability, and Enhanced Performance.

(Default: Normal) Manual and Advanced Manual allows the Memory Multiplier Tweaker, Channel Interleaving, Rank Interleaving, and memory timing settings below to be configurable. Options are: Auto (default), Manual, Advanced Manual. Displays the memory voltage. && Profile DDR Voltage && Memory Multiplier Tweaker && Channel Interleaving Provides different levels of memory auto-tuning. (Default: Auto) && Rank 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. @@Auto lets the BIOS automatically configure this setting. @@@@ (Default: Auto) ``CPU Core Voltage Control ``Chipset Voltage Control ``DRAM Voltage Control This section provides CPU voltage control options. This section provides Chipset voltage control options. This section provides memory voltage control options. - 23 - ``PC Health Status && Reset Case Open Status && Case Open Disabled Keeps or clears the record of previous chassis intrusion status. (Default) Enabled Clears the record of previous chassis intrusion status and the Case Open field will show "No" at next boot.



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Displays the detection status of the chassis intrusion detection device attached to the motherboard CI header.

@@@ 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. @@ 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. @@ Full Speed Allows the fan to run at full speeds. Allows you to control the fan speed.

This item is configurable only when 2nd System Fan Speed Control is set to Manual. Options are: 0.75 PWM value /oC ~ 2.50 PWM value /oC. @@ (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. This item is configurable only when 3rd System Fan Speed Control is set to Manual. Options are: 0.75 PWM value /oC ~ 2.

50 PWM value /oC. && Fan Speed Percentage && 3rd System Fan Speed Control (SYS_FAN3 Connector) && Fan Speed Percentage ``Miscellaneous Settings && Max Link Speed && 3DMark01 Enhancement Allows you to set the operation mode of the PCI Express slots to Gen 1, Gen 2, or Gen 3. Actual operation mode is subject to the hardware specification of each slot. Auto lets the BIOS automatically configure this setting. (Default: Auto) Allows you to determine whether to enhance some legacy benchmark performance. (Default: Disabled) - 25 - 2-3 System Information This section provides information on your motherboard model and BIOS version. You can also select the default language used by the BIOS and manually set the system time. && System Language && System Date Selects the default language used by the BIOS. && System Time Sets the system date. The date format is week (read-only), month, date, and year.

Use <Enter> to switch between the Month, Date, and Year fields and use the <Page Up> or <Page Down> key to set the desired value. && Access Level Sets the system time. The time format is hour, minute, and second. For example, 1 p.m.

is 13:00:00. Use <Enter> to switch between the Hour, Minute, and Second fields and use the <Page Up> or <Page Down> key to set the desired value.

Displays the current access level depending on the type of password protection used. (If no password is set, the default will display as Administrator.) The Administrator level allows you to make changes to all BIOS settings; the User level only allows you to make changes to certain BIOS settings but not all.

- 26 - 2-4 BIOS Features && Boot Option Priorities && Hard Drive/CD/DVD ROM Drive/Floppy Drive/Network Device BBS Priorities Specifies the overall boot order from the available devices. Removable storage devices that support GPT format will be prefixed with "UEFI:" string on the boot device list. To boot from an operating system that supports GPT partitioning, select the device prefixed with "UEFI:" string. Or if you want to install an operating system that supports GPT partitioning such as Windows 7 64-bit, select the optical drive that contains the Windows 7 64-bit installation disk and is prefixed with "UEFI:" string. Specifies the boot order for a specific device type, such as hard drives, optical drives, floppy disk drives, and devices that support Boot from LAN function, etc. Press <Enter> on this item to enter the submenu that presents the devices of the same type that are connected. This item is present only if at least one device for this type is installed. Enables or disables Numlock feature on the numeric keypad of the keyboard after the POST.

@@@ Disabled skips the GIGABYTE Logo when the system starts up. @@ Ultra Fast provides the fastest bootup speed.

@@@ Allows you to select which type of operating system to boot. Auto Enables legacy option ROM only. EFI Driver Enables EFI option ROM. (Default) @@ Full Initial All USB devices are functional in the operating system and during the POST. Partial Initial Part of the USB devices are disabled before the OS boot process completes. (Default) This item is configurable only when Fast Boot is set to Enabled. This function is disabled when Fast Boot is set to Ultra Fast. Disabled All PS/2 devices are disabled before the OS boot process completes. Enabled PS/2 devices are functional in the operating system and during the POST. All (Default) This item is configurable only when Fast Boot is set to Enabled.

This function is disabled when Fast Boot is set to Ultra Fast. Disabled Disables booting from the network. (Default) Enabled Enables booting from the network. @@ Normal Boot Enables normal bootup upon the return of the AC power. (Default) Fast Boot Keeps the Fast Boot settings upon the return of the AC power.

@@ Allows you to select the operating system to be installed. (Default: Other OS) && USB Support && PS2 Devices Support && NetWork Stack Driver Support && Next Boot After AC Power Loss && Windows 8/10 Features && CSM Support && LAN PXE Boot Option ROM Enables or disables UEFI CSM (Compatibility Support Module) to support a legacy PC boot process. Enabled Enables UEFI CSM. (Default) Disabled Disables UEFI CSM and supports UEFI BIOS boot process only. This item is configurable only when Windows 8/10 Features is set to Windows 8/10 or Windows 8/10 WHQL.

Allows you to select whether to enable the legacy option ROM for the LAN controller. (Default: Disabled) This item is configurable only when CSM Support is set to Enabled. && Storage Boot Option Control Allows you to select whether to enable the UEFI or legacy option ROM for the storage device controller. Disabled Disables option ROM. Legacy Only Enables legacy option ROM only. (Default) UEFI Only Enables UEFI option ROM only. This item is configurable only when CSM Support is set to Enabled. - 28 - && Other PCI Device ROM Priority && Network Stack Allows you to select whether to enable the UEFI or Legacy option ROM for the PCI device controller other than the LAN, storage device, and graphics controllers. Disabled Disables option ROM. Legacy Only Enables legacy option ROM only.

UEFI Only Enables UEFI option ROM only. (Default) This item is configurable only when CSM Support is set to Enabled. Disables or enables booting from the network to install a GPT format OS, such as installing the OS from the Windows Deployment Services server.



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(Default: Disabled) Enables or disables IPv4 PXE Support. This item is configurable only when Network Stack is enabled. && Ipv4 PXE Support && Ipv6 PXE Support Enables or disables IPv6 PXE Support. This item is configurable only when Network Stack is enabled. && Administrator Password && User 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. - 29 - 2-5 Peripherals && Intel Platform Trust Technology (PTT) Enables or disables Intel® PTT Technology. (Default: Disabled) && Initial Display Output && Audio LED 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 PCIe16 slot as the first display. (Default) PCIe 2 Slot Sets the graphics card on the PCIe4 slot as the first display. Enables or disables the onboard audio LED function. Off Disables this function.

Still Mode The LEDs stay constantly on. (Default) Beat Mode The brightness of the LED changes according to the music rhythm. Pulse Mode The brightness of the LED changes slowly and smoothly like breath. Allows USB keyboard/mouse to be used in MS-DOS. (Default: Enabled) && Legacy USB Support && XHCI Hand-off && USB Mass Storage Driver Support && USB Storage Devices 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) Displays a list of connected USB mass storage devices. This item appears only when a USB storage device is installed. Displays information on your M.2 PCIe SSD if installed.

OffBoard SATA Controller Configuration - 30 - Trusted Computing 2.0 && Security Device Support && Pending operation This sub-menu appears only when Intel Platform Trust Technology is set to Enabled. Enables or disables Trusted Platform Module (TPM). (Default: Enabled) To clear TPM related settings, set this item to TPM Clear. (Default: None) && TPM 20 InterfaceType && Device Select 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) Super IO Configuration && Serial Port 1 Enables or disables the onboard serial port. (Default: Enabled) Enables or disables the Intel® BIOS Guard feature, which protects the BIOS from malicious attacks. Intel(R) Bios Guard Technology SATA Configuration && SATA Controller(s) && SATA Mode Selection Enables or disables the integrated SATA controllers. (Default: Enabled) && Aggressive LPM Support 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 C 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) Displays information on your M.2 NVMe PCIe SSD if installed. This sub-menu provides information on LAN configuration and related configuration options. && Port 0/1/2/3/4/5 && Hot plug && External SATA NVMe Configuration Intel(R) Ethernet Network Connection - 31 - 2-6 Chipset && VT-d (Note) && Internal Graphics Enables or disables Intel® Virtualization Technology for Directed I/O. (Default: Disabled) Enables or disables the onboard graphics function. (Default: Auto) Allows you to set the onboard graphics memory size. Options are: 32M~512M. (Default: 64M) && 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 && Wake on LAN 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) && High Precision Timer (Note) This item is present only when you install a CPU that supports this feature. For more information about Intel® CPUs' unique features, please visit Intel's website. - 32 - 2-7 Power Management && AC BACK && Power On By Keyboard 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.

(Default: Enabled) && High Precision Timer (Note) This item is present only when you install a CPU that supports this feature. For more information about Intel® CPUs' unique features, please visit Intel's website. - 32 - 2-7 Power Management && AC BACK && Power On By Keyboard 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.



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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) Any Key Press any key to turn on the system.

Keyboard 98 Press POWER button on the Windows 98 keyboard to turn on the system. Password Set a password with 1~5 characters 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. 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. && Power On Password && Power On By Mouse && ErP - 33 - && Soft-Off by PWR-BTTN && Power Loading 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) Enables or disables the Active State Power Management function (ASPM). (Default: Disabled) && Resume by Alarm && RC6(Render Standby) && Platform Power Management && 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 - 34 - 2-8 Save & Exit && Save & Exit Setup && Exit Without Saving 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 default 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). && Load Optimized Defaults && Boot Override && Save Profiles && Load Profiles - 35 - 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 flash 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).



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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. 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. (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. - 36 - 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.

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 appears, select Intel Chipset SATA RAID Controller and click Next to load the driver and continue the OS installation. - 37 - 3-2 Drivers Installation • Before installing the drivers, first install the operating system. @@@@ - 38 - 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.

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Under the Directive, used equipment must be marked, collected separately, and disposed of properly. WEEE Symbol Statement The symbol shown below is on the product or on its packaging, which indicates that this product must not be disposed of with other waste.

Instead, the device should be taken to the waste collection centers for activation of the treatment, collection, recycling and disposal procedure.



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