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You can read the recommendations in the user guide, the technical guide or the installation guide for GIGABYTE GA-Z97X-UD7 TH. You'll find the answers to all your questions on the GIGABYTE GA-Z97X-UD7 TH 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-Z97X-UD7 TH
User guide GIGABYTE GA-Z97X-UD7 TH
Operating instructions GIGABYTE GA-Z97X-UD7 TH
Instructions for use GIGABYTE GA-Z97X-UD7 TH
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GA-Z97X-UD7 TH

User's Manual
Rev. 1001
12ME-Z97XUD7-1001R



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Manual abstract:

© 2014 May. 2, 2014 Copyright © 2014 GIGA-BYTE TECHNOLOGY CO., LTD. All rights reserved. For detailed product information, 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. Example: Table of Contents Box Contents..

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12CF1-3SATPW-4*R) □□ 3.5" Front Panel with 2 USB 3.0/2.0 ports (Part No. 12CR1-FPX582-2*R) □□ HDMI-to-DVI adapter (Part No. 12CT2-HDMI01-1*R) □□ COM port cable (Part No. 12CF1-1CM001-3*R) -6- GA-Z97X-UD7 TH Motherboard Layout PW_SW CMOS_SW KB_MS_USB3 MDP2 R_USB30 MDP1 HDMI_SPDIF ATX_12V_2X4 Renesas® uPD720210 LGA1150 Intel® DSL5520 CPU_FAN CPU_OPT SB BIOS_SW RST_SW DVI VGA Debug LED (Note) ATX USB30_LAN GA-Z97X-UD7 TH AUDIO PCIEX1_1 DDR3_4 DDR3_2 DDR3_3 SYS_FAN1 BAT PCIEX1_2 PLX® PEX8605 Intel® Z97 Marvell® 88SE9172 ATX4P GSATA3 7 6 SATA_EXPRESS SATA3 2 4 3 5 PCIEX8 PCIEX1_3 M_BIOS B_BIOS MBIOS_LED BBIOS_LED Intel® GbE LAN PCIEX16 CODEC iTE® Super I/O DDR3_1 F_USB30 SYS_FAN4 PCIEX4 F_AUDIO SATA3 1 0 CLR_CMOS SPDIF_O SYS_FAN2 TPM COMA F_USB3 F_USB2 F_USB1 F_PANEL SYS_FAN3 (Note) For debug code information, please refer to Chapter 6. -7- GA-Z97X-UD7 TH Motherboard Block Diagram 2 PCI Express x8 2 PCI Express x4+1 PCI Express x8 1 PCI Express x16 CPU CLK+/- (100 MHz) DDR3 1600/1333 MHz Dual Channel Memory PCIe CLK (100 MHz) or or LGA1150 CPU HDMI Switch x16 x16 Switch PCI Express Bus D-Sub Dual BIOS 3 PCI Express x1 PCIe CLK (100 MHz) x1 x1 x1 PLX® PEX8605 PCI Express Bus LAN RJ45 Intel® GbE LAN x1 Intel® Z97 PCI Express Bus x4 Switch DVI-D or Thunderbolt (MDP2) Thunderbolt (MDP1) x16 DMI 2.0 Intel DSL5520 ® FDI or SATA Express 2 SATA 6Gb/s 4 SATA 6Gb/s Marvell® 88SE9172 Renesas uPD720210 Hub ® 2 SATA 6Gb/s 4 USB 3.0/2.

0 4 USB 3.0/2.0 6 USB 2.0/1.1 LPC Bus iTE® Super I/O COM CODEC Rear Speaker Out Center/Subwoofer Speaker Out Side Speaker Out S/SPDIF Out MIC Line Out Line In PS/2 KB/Mouse For detailed product information/limitation(s), refer to "1-2 Product Specifications.

" -8- 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 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 nly be used one at a time.) - Support for RAID 0, RAID 1, RAID 5, and RAID 10 Marvell® 88SE9172 chip: - 2 x SATA 6Gb/s connectors (GSATA3 6~7) - Support for RAID 0 and RAID 1 Chipset: - □ x USB 3.



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If the push pin is inserted as the picture above shows, the installation is complete. Step 6: Finally, attach the power connector of the CPU cooler to the CPU fan header (CPU_FAN) on the motherboard.

Use extreme care when removing the CPU cooler because the thermal grease/tape between the CPU cooler and CPU may adhere to the CPU. Inadequately removing the CPU cooler may damage the CPU. - 15 Hardware Installation 1-4 Installing the Memory Read the following guidelines before you begin to install the memory: •• Make sure that the motherboard supports the memory. It is recommended that memory of the same capacity, brand, speed, and chips be used. (Go to GIGABYTE's website for the latest supported memory speeds and memory modules.

) •• Always turn off the computer and unplug the power cord from the power outlet before installing the memory to prevent hardware damage. •• Memory modules have a foolproof design. A memory module can be installed in only one direction. If you are unable to insert the memory, switch the direction. 1-4-1 Dual Channel Memory Configuration This motherboard provides four DDR3 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. The four DDR3 memory sockets are divided into two channels and each channel has two memory sockets as following: □ Channel A: DDR3_2, DDR3_4 □ □ Channel B: DDR3_1, DDR3_3 □ □ □ □ Dual Channel Memory Configurations Table Two Modules DDR3_4 DDR3_2 DDR3_3 -DS/SS -DS/SS -DS/SS Four Modules DS/SS DS/SS DS/SS (SS=Single-Sided, DS=Double-Sided, "- "=No Memory) DDR3_1 DS/SS -DS/SS Due to CPU limitations, read the following guidelines before installing the memory in Dual Channel mode. 1. Dual Channel mode cannot be enabled if only one DDR3 memory module is installed. 2. When enabling Dual Channel mode with two or four memory modules, it is recommended that memory of the same capacity, brand, speed, and chips be used and installed in the same colored DDR3 sockets. For optimum performance, when enabling Dual Channel mode with two memory modules, we recommend that you install them in the DDR3_1 and DDR3_2 sockets. Hardware Installation DDR3_4 DDR3_2 DDR3_3 DDR3_1 - 16 - 1-4-2 Installing a Memory Before installing a memory module, make sure to turn off the computer and unplug the power cord from the power outlet to prevent damage to the memory module. DDR3 and DDR2 DIMMs are not compatible to each other or DDR DIMMs.

Be sure to install DDR3 DIMMs on this motherboard. Notch DDR3 DIMM A DDR3 memory module has a notch, so it can only fit in one direction. Follow the steps below to correctly install your memory modules in the memory sockets. Step 1: Note the orientation of the memory module. Spread the retaining clips at both ends of the memory socket. Place the memory module on the socket. As indicated in the picture on the left, place your fingers on the top edge of the memory, push down on the memory and insert it vertically into the memory socket. Step 2: The clips at both ends of the socket will snap into place when the memory module is securely inserted. - 17 - Hardware Installation 1-5 Installing an Expansion Card Read the following guidelines before you begin to install an expansion card: •• Make sure the motherboard supports the expansion card. Carefully read the manual that came with your expansion card.

•• Always turn off the computer and unplug the power cord from the power outlet before installing an expansion card to prevent hardware damage. PCI Express x1 Slot PCI Express x16 Slot Follow the steps below to correctly install your expansion card in the expansion slot. 1. Locate an expansion slot that supports your card. Remove the metal slot cover from the chassis back panel.

2. Align the card with the slot, and press down on the card until it is fully seated in the slot. 3. Make sure the metal contacts on the card are completely inserted into the slot. 4.

Secure the card's metal bracket to the chassis back panel with a screw. 5. After installing all expansion cards, replace the chassis cover(s). 6. Turn on your computer. If necessary, go to BIOS Setup to make any required BIOS changes for your expansion card(s). 7. Install the driver provided with the expansion card in your operating system. Example: Installing and Removing a PCI Express Graphics Card: •• Installing a Graphics Card: Gently push down on the top edge of the card until it is fully inserted into the PCI Express slot. Make sure the card is securely seated in the slot and does not rock.

•• Removing the Card: Gently push back on the lever on the slot and then lift the card straight out from the slot. Hardware Installation - 18 - 1-6 Setting up AMD CrossFire™/NVIDIA® SLI™ Configuration A. System Requirements -- Windows 8.1/8/7 operating system -- A CrossFire/SLI-supported motherboard with two or more PCI Express x16 slots and correct driver -- CrossFire/SLI-ready graphics cards of identical brand and chip and correct driver (Current GPUs that support 3-Way CrossFire technology include the ATI Radeon™ HD 3800, HD 4800, HD 5800 series, and AMD Radeon™ HD 6800, HD 6900, HD 7800, and HD 7900 series. For the latest GPU support information, please refer to the AMD website.) -- CrossFire(Note)/SLI bridge connectors -- A power supply with sufficient power is recommended (Refer to the manual of your graphics cards for the power requirement) B. Connecting the Graphics Cards Step 1: Observe the steps in "1-5 Installing an Expansion Card" and install CrossFireX/SLI graphics cards on the PCI Express x16 slots. (To set up a 2-Way configuration, we recommend installing the graphics cards on the PCIEX16 and PCIEX8 slots.) Step 2: Insert the CrossFire(Note)/SLI bridge connectors in the CrossFire/SLI gold edge connectors on top of the cards. Step 3: Plug the display cable into the graphics card on the PCIEX16 slot. C. Configuring the Graphics Card Driver C-1. To Enable CrossFire Function After installing the graphics card driver in the operating system, go to the Catalyst Control Center. Browse to Performance\AMD CrossFireX™ and ensure the Enable AMD CrossFireX check box is selected. If your system have more than two CrossFire cards, select the GPU combination you want to use and click Apply.

(Available combination options are dependent on the number of graphics cards.) C-2. To Enable SLI Function After installing the graphics card driver in the operating system, go to the NVIDIA Control Panel. Browse to the Configure SLI, Surround, Physx screen and ensure Maximize 3D performance is enabled.

(Note) The bridge connector(s) may be needed or not depending on your graphics cards.

•• Procedure and driver screen for enabling CrossFire/SLI technology may differ by graphics cards and driver version.



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Refer to the manual that came with your graphics cards for more information about enabling CrossFire/SLI technology. •• When two or more graphics cards are installed, we recommend that you connect the SATA power cable from the power supply to the ATX4P connector to ensure system stability. - 19 Hardware Installation 1-7 Back Panel Connectors PS/2 Keyboard/Mouse Port USB 3.0/2.0 Port Use this port to connect a PS/2 mouse or keyboard. The USB 3.0 port supports the USB 3.0 specification and is compatible to the USB 2.0/1.

1 specification. Use this port for USB devices such as a USB keyboard/mouse, USB printer, USB flash drive and etc. Thunderbolt Port (Note) Use this port for Thunderbolt devices or Mini-DisplayPort monitors. Because of the limited I/O resources of the PC architecture, the number of Thunderbolt devices that can be used is dependent on the number of the PCI Express and PCI devices being installed. Each Thunderbolt port can daisy chain around three devices. To connect more Thunderbolt devices, adjust the Reserved IO for Thunderbolt setting under Peripherals\Intel(R) Thunderbolt in BIOS Setup. The two Thunderbolt ports support two DisplayPort monitors in total. The two DisplayPort monitors that are daisy chained to the same port must be separated by a Thunderbolt device. The maximum supported resolution is 3840x2160@60Hz, but the actual resolutions supported are dependent on the monitor being used.

After installing the DisplayPort device, make sure the default device for sound playback is the DisplayPort device.

(The item name may differ from operating system. For example, in Windows 7, go to Start>Control Panel>Hardware and Sound>Sound>Playback and set the DisplayPort device as the default playback device. Refer to the HDMI settings information on the configuration dialog box.) Optical S/PDIF Out Connector HDMI Port This connector provides digital audio out to an external audio system that supports digital optical audio. Before using this feature, ensure that your audio system provides an optical digital audio in connector.

The HDMI port is HDCP compliant and supports Dolby True HD and DTS HD Master Audio formats. It also supports up to 192KHz/24bit 8-channel LPCM audio output. You can use this port to connect your HDMI-supported monitor. The maximum supported resolution is 4096x2160@24Hz or 2560x1600@60Hz, but the actual resolutions supported are dependent on the monitor being used. After installing the HDMI device, make sure to set the default sound playback device to HDMI.

(The item name may differ depending on your operating system. The screenshot below is from Windows 8.1.) (Note) If a monitor is connected to the MDP2

Thunderbolt port, the DVI port will become unavailable. - 20 - Hardware Installation In Windows 8.1, select Apps>Control Panel>Hardware and Sound>Sound>Playback, set Intel(R) Display Audio to the default playback device. Triple-Display Configurations for the Onboard Graphics: Triple-display configurations are supported after you install motherboard drivers in OS. Only dual-display configurations are supported during the BIOS Setup or POST process. D-Sub Port The D-Sub port supports a 15-pin D-Sub connector and supports a maximum resolution of 1920x1200@60Hz (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@60Hz (the actual resolutions supported depend on the monitor being used). Connect a monitor that supports DVI-D connection to this port. RJ-45 LAN Port The Gigabit Ethernet LAN port provides Internet connection at up to 1 Gbps data rate. The following describes the states of the LAN port LEDs. Connection/ Speed LED Activity LED

Connection/Speed LED: State Orange Green Off Description 1 Gbps data rate 100 Mbps data rate 10 Mbps data rate Activity LED: State Blinking On Description Data transmission or receiving is occurring No data transmission or receiving is occurring LAN Port Center/Subwoofer Speaker Out Jack (Orange) Use this audio jack to connect center/subwoofer speakers in a 5.1/7.1-channel audio configuration. Rear Speaker Out Jack (Black) Side Speaker Out Jack (Gray) Line In Jack (Blue) This jack can be used to connect front speakers in a 4/5.1/7.1-channel audio configuration.

Use this audio jack to connect side speakers in a 7.1-channel audio configuration. The line in jack. Use this audio jack for line in devices such as an optical drive, walkman, etc. (Note) The DVI-D port does not support D-Sub connection by adapter.

- 21 Hardware Installation Line Out Jack (Green) The line out jack. This jack supports audio amplifying function. For better sound quality, it is recommended that you connect your headphone/speaker to this jack (actual effects may vary by the device being used). Use this audio jack for a headphone or 2-channel speaker. This jack can be used to connect front speakers in a 4/5.

1/7.1-channel audio configuration. Mic In Jack (Pink) The Mic in jack. Microphones must be connected to this jack. The audio jacks can be reconfigured to perform different functions via the audio software (supported functions may vary based on hardware specification). Only microphones still MUST be connected to the default Mic in jack. Refer to the instructions on setting up a 2/4/5.1/7.1-channel audio configuration in Chapter 6, "Configuring 2/4/5.1/7.

1-Channel Audio." •• 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. Hardware Installation - 22 - BIOS Switches and BIOS LED Indicators The BIOS switch (BIOS_SW) allows users to easily select a different BIOS for boot up or overclocking, helping to reduce BIOS failure during overclocking. The SB switch allows enabling or disabling of the Dual BIOS function. The LED indicator (M BIOS_LED/BBIOS_LED) shows which BIOS is active. SB BIOS_SW 2 1 1: Main BIOS (Boot from the main BIOS) 2: Backup BIOS (Boot from the backup BIOS) S 3 B SS SB 2 1 1: Dual BIOS 2: Single BIOS B SS B SS BIOS LED Indicators: M BIOS_LED (The main BIOS is active) B BIOS_LED (The backup BIOS is active) S M BIOS_LED B BIOS_LED This motherboard has 3 quick buttons: power button, reset button and clear CMOS button. The power button and reset button allow users to quickly turn on/off or reset the computer in an open-case environment when they want to change hardware components or conduct hardware testing. Use this button to clear the BIOS configuration and reset the CMOS values to factory defaults when needed.

11 22 33 11 22 33 PW_SW CMOS_SW RST_SW 1 1 1 2 3 1 2 3 PW_SW: Power button RST_SW: Reset button CMOS_SW: Clear CMOS Button B_B_11 11 1 1 - 23 - Hardware Installation F_USB30 F_USB30 F_USB30 •• Always turn off your computer and unplug the power cord from the power outlet before using the clear CMOS button.



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5Gb/s standard. Each SATA connector supports a single SATA device. The Marvell® chip supports RAID 0 and RAID 1. Refer to Chapter 3, "Configuring SATA Hard Drive(s)," for instructions on configuring a RAID array. GSATA3 7 7 7 6 1 1 Pin No. 1 2 3 4 5 6 7 Definition GND TXP TXN GND RXN RXP GND UG T •• A RAID 0 or RAID 1 configuration requires at least two hard drives.

If more than two hard drives are to be used, the total number of hard drives must be an even number. •• A RAID 5 configuration requires at least three hard drives. (The total number of hard drives does not have to be an even number.) •• A RAID 10 configuration requires four hard drives. •• To enable hot-plugging for the SATA ports, refer to Chapter 2, "BIOS Setup," "Peripherals\SATA Configuration," for more information.

•• SATA Express and SATA3 4/5 connectors can only be used one at a time. - 29 Hardware Installation 10) 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. Power LED Power Switch Speaker PLED+ PLEDPW+ PW- SPEAK+ 2 1 HD+ HDRESRES+ CICI+ PWR_LED+ PWR_LEDPWR_LED Power LED Chassis Intrusion Header SPEAK20 19 Hard Drive Activity LED Reset Switch •• PLED/PWR_LED (Power LED, Yellow/Purple): System Status LED S0 On S3/S4/S5 Off 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). •• 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): Connects to the speaker on the chassis front panel. The system reports system startup status by issuing a beep code. One single short beep will be heard if no problem is detected at system startup. If a problem is detected, the BIOS may issue beeps in different patterns to indicate the problem. •• 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. 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. Hardware Installation - 30 - 11) 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.

For HD Front Panel Audio: Pin No. Definition 1 MIC2_L 2 F_GND 3 MIC2_R 4 -ACZ_DET 5 LINE2_R 6 GND 7 FAUDIO_JD 8 No Pin 9 LINE2_L 10 GND For AC'97 Front Panel Audio: Pin No. Definition 1 MIC 2 GND 3 MIC Power 4 NC 5 Line Out (R) 6 NC 7 NC 8 No Pin 9 Line Out (L) 10 NC 9 F_U 10 1 F_2 B_ •• The front panel audio header supports HD audio by default. If your chassis provides an AC'97 front panel audio module, refer to the instructions on how to activate AC'97 functionality via the audio software in Chapter 6, "Configuring 2/4/5.1/7.

1-Channel Audio." •• Audio signals will be present on both of the front and back panel audio connections simultaneously. If you want to mute the back panel audio (only supported when using an HD front panel audio module), refer to Chapter 6, "Configuring 2/4/5.1/7.1-Channel Audio.

•• Some chassis provide a front panel audio module that has separated connectors on each wire S 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 B SS 12) SPDIF_O (S/PDIF Out Header) 1 2 3 This header supports digital S/PDIF Out and connects a S/PDIF digital audio cable (provided by expansion S 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 2 3 S 3 B SS S 1 U S _ S F - 31 - 1 2 3 1 1 _ B 1 2 3 S B _ S _ _ B Pin No. 1 2 Definition SPDIF0 GND _ _ 3 _ U _ B F_USB3 F Hardware Installation 13) F_USB30 (USB 3.0/2.0 Header) The header conforms to USB 3.0/2.

0 specification and 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. F_USB30 20 1 11 10 Pin No. 1 2 3 4 5 6 7 8 9 10 Definition VBUS SSRX1SSRX1+ GND SSTX1SSTX1+ GND D1D1+ NC Pin No. 11 12 13 14 15 16 17 18 19 20 Definition D2+ D2GND SSTX2+ SSTX2GND SSRX2+ SSRX2VBUS No Pin F_U 14) F_USB1/F_USB2/F_USB3 (USB 2.0/1.1 Headers) B SS 1 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 B _ S 1 2 3 1 2 3 Hardware Installation 1 1 1 2 3 1 2 3 9 10 1 2 Pin No.

1 2 3 4 5 6 7 8 9 10 Definition Power (5V) Power (5V) USB DX USB DY USB DX+ USB DY+ GND GND No Pin NC F _ _ 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 from the power outlet to prevent damage to the USB bracket. F _ S B _ B _ B - 32 - 15) 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.



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Pin No. 1 2 3 4 5 6 7 8 9 10 Definition NDCDNSIN NSOUT NDTRGND NDSRNRTSNCSTNRIF_ U No Pin 9 10 1 2 F_USB30 B_ B SS I You may connect a TPM (Trusted Platform Module) to this header. 19 1 S 20 2 Pin No. 1 2 3 4 5 6 7 8 9 10 Definition LCLK GND LFRAME No Pin LRESET NC LAD3 LAD2 VCC3 LAD1 Pin No. 11 12 13 14 15 16 17 18 19 20 S 3 Definition LAD0 GND NC ID SB3V SERIRQ GND NC NC SUSCLK S B SS S S - 33 - _ Hardware Installation S F 1 16) TPM (Trusted Platform Module Header) 1 2 3 1 17) 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. 18) 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). Hardware Installation - 34 - 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. For instructions on using the Q-Flash and @BIOS utilities, refer to Chapter 5, "BIOS Update Utilities." •• 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/button in Chapter 1 for how to clear the CMOS values.) - 35 - BIOS Setup 2-1 Startup Screen The following startup Logo screen will appear when the computer boots. Function Keys Function Keys: : BIOS SETUP/Q-FLASH Press the <Delete> key to enter BIOS Setup or to access the Q-Flash utility in BIOS Setup. <F9>: SYSTEM INFORMATION Press the <F9> key to display your system information. <F12>: BOOT MENU Boot Menu allows you to set the first boot device without entering BIOS Setup. In Boot Menu, use the up arrow key <h> or the down arrow key <i> to select the first boot device, then press <Enter> to accept. The system will boot from the device immediately. Note: The setting in Boot Menu is effective for one time only. After system restart, the device boot order will still be based on BIOS Setup settings.

<END>: Q-FLASH Press the <End> key to access the Q-Flash utility directly without having to enter BIOS Setup first. BIOS Setup - 36 - 2-2 The Main Menu A. Startup Guide (Default) The Startup Guide screen simplifies conventional complicated BIOS setup menus and presents only the most frequently used options in the easy-to-use interface. It helps first-time users to perform basic system setups more quickly and easily. B.

ST Mode (Smart Tweak Mode) Differing from traditional UEFI interface, the ST Mode provides a fancy and user-friendly BIOS environment where users can easily point and click through various settings and make adjustments for optimum performance. In ST Mode, you can use your mouse to move through the option menus for quick configuration or press <F2> to switch to the traditional BIOS Setup screen. •• 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. - 37 BIOS Setup C.

Classic Setup Classic Setup is the conventional BIOS Setup interface where you can press the arrow keys on your keyboard to move among the items and press <Enter> to accept or enter a sub-menu. Or you can use your mouse to select the item you want. (Sample BIOS Version: D16) Setup Menu Switch to ST Mode Enter Q-Flash Select Default Language Help Function Keys Configuration Items Current Settings Classic Setup Function Keys <f><g> <h><i> <Enter> <+>/<Page Up> <->/<Page Down> <F2> <F5> <F7> <F8> <F9> <F10> <F12> <Esc> Move the selection bar to select a setup menu Move the selection bar to select an configuration item on a menu Execute command or enter a menu Increase the numeric value or make changes Decrease the numeric value or make changes Switch to ST Mode or Startup Guide screen Restore the previous BIOS settings for the current submenus Load the Optimized BIOS default settings for the current submenus Access the Q-Flash utility Display system information Save all the changes and exit the BIOS Setup program Capture the current screen as an image and save it to your USB drive Main Menu: Exit the BIOS Setup program Submenus: Exit current submenu BIOS Setup - 38 - BIOS Setup Menus □□ M.



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I.T. Use this menu to configure the clock, frequency, and voltages of your CPU and memory, etc. Or check the system/CPU temperatures, voltages, and fan speeds. Use this menu to configure the default language used by the BIOS and system time and date. Use this menu to configure the device boot order and advanced features available on the CPU. □□ System Information □□ BIOS Features □□ Peripherals Use this menu to configure all peripheral devices, such as SATA, USB, integrated audio, and integrated LAN, etc.

Use this menu to configure all the power-saving functions. □□ Power Management □□ Save & Exit Save all the changes made in the BIOS Setup program to the CMOS and exit BIOS Setup. You can save the current BIOS settings to a profile or load optimized defaults for optimal-performance system operations. - 39 - BIOS Setup 2-3 M.I.T. 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.) This section provides information on the BIOS version, CPU base clock, CPU frequency, memory frequency, total memory size, CPU temperature, Vcore, and memory voltage. BIOS Setup - 40 - ``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.

(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. Allows you to manually set the host clock frequency (which controls CPU, PCIe, and memory frequencies) in 0.01 MHz increments. This item is configurable only when CPU Base Clock is set to Manual. Allows you to configure the Processor Base Clock by multiplying the Host/PCIe Clock Frequency by several preset host clock multipliers. This item is configurable only when CPU Base Clock is set to Manual. Enables or disables CPU/PCIe Spread Spectrum. (Default: Auto) && CPU Base Clock && Host/PCIe Clock Frequency (Note) && Processor Base Clock (Gear Ratio) (Note) && Spread Spectrum Control (Note) && Host Clock Value This value is determined by multiplying the Host/PCIe Clock Frequency value by the Processor Base Clock (Gear Ratio) value. && Processor Graphics Clock Allows you to set the onboard graphics clock. The adjustable range is from 400 MHz to 4000 MHz.

(Default: Auto) 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. - 41 BIOS Setup (Note) && 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. Displays the current operating CPU frequency. && 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 for increased performance by using certain CPUs. (Default: Auto) Allows you to set the CPU PLL.

Auto lets the BIOS automatically configure this setting. (Default: Auto) Allows you to set the Filter PLL. Auto lets the BIOS automatically configure this setting. (Default: Auto) Allows you to set the CPU Uncore ratio. The adjustable range is dependent on the CPU being used.

Displays the current CPU Uncore frequency. && K OC (Note) && CPU PLL Selection && Filter PLL Level && Uncore Ratio && Uncore Frequency && Intel(R) Turbo Boost Technology (Note) Allows you to determine whether to enable the Intel CPU Turbo Boost technology. Auto lets the BIOS automatically configure this setting. (Default: Auto) 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.

- 42 - (Note) BIOS Setup && Turbo Ratio (1-Core Active~4-Core Active) (Note) 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 a power limit for CPU Turbo mode. When the CPU power consumption exceeds the specified power limit, 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) 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.



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(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) && Turbo Power Limit (Watts) && Core Current Limit (Amps) && No. of CPU Cores Enabled (Note) && Hyper-Threading Technology (Note) && CPU Enhanced Halt (C1E) (Note) && C3 State Support (Note) && C6/C7 State Support (Note) && CPU Thermal Monitor (Note) && CPU EIST Function (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. - 43 BIOS Setup && Extreme Memory Profile (X.M.P.) (Note) Allows the BIOS to read the SPD data on XMP memory module(s) to enhance memory performance when enabled. Disabled Disables this function. (Default) Profile1 Uses Profile 1 settings. Profile2 (Note) Uses Profile 2 settings.

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. && System Memory Multiplier && Memory Frequency (MHz) ``Advanced Memory Settings && Extreme Memory Profile (X.M.P.) (Note), System Memory Multiplier, Memory Frequency(MHz) The settings above are synchronous to those under the same items on the Advanced Frequency Settings menu. Allows you to set the memory frequency. Options may vary depending on the memory being used. (Default: Disabled) Provides memory detection and training methods.

Auto Lets the BIOS automatically configure this setting. (Default) Enable Fast Boot kip memory detection and training in some specific criteria for faster memory S boot. Disable Fast Boot Detect and train memory at every single boot. This item is present only when you install a CPU and a memory module that support this feature. - 44 - && Memory Overclocking Profiles (Note) && Memory Boot Mode (Note) BIOS Setup && Memory Enhancement Settings Provides three different memory performance enhancement settings: Normal (basic performance), Enhanced Stability, and Enhanced Performance. (Default: Normal) Manual and Advanced Manual allows the Channel Interleaving, Rank Interleaving, and memory timing settings below to be configurable.

Options are: Auto (default), Manual, Advanced Manual. When using a non-XMP memory module or Extreme Memory Profile (X.M.P.)

) is set to Disabled, the value is displayed according to your memory specification. When Extreme Memory Profile (X.M.P.) is set to Profile1 or Profile2, the value is displayed according to the SPD data on the XMP memory. 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) Channel A/B Memory Sub Timings && Memory Timing Mode && Profile DDR Voltage && Channel Interleaving && Rank Interleaving ``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. Note: Your system may become unstable or fail to boot after you make changes on the memory timings. If this occurs, please reset the board to default values by loading optimized defaults or clearing the CMOS values. - 45 - BIOS Setup ``Advanced Voltage Settings ``Advanced Power Settings && CPU VRIN Loadline Calibration Allows you to set the Load-Line Calibration level for the CPU VRIN. The levels are (from highest to lowest): Extreme, Turbo, High, Medium, Low, and Standard. Selecting a higher level keeps the Vcore more consistent with what is set in BIOS under heavy load. Auto lets the BIOS automatically configure this setting and sets the voltage following Intel's specifications.

(Default: Auto) BIOS Setup - 46 - && CPU VRIN Protection Allows you to set the voltage limit on the CPU VRIN voltage for over-voltage protection. The adjustable range is from 150.0mV to 500.0mV. Auto lets the BIOS automatically configure this setting.

(Default: Auto) Allows you to set the voltage limit on Channel A and Channel B memory voltage for over-voltage protection. The adjustable range is from 150.0mV to 300.0mV. Auto lets the BIOS automatically configure this setting.

(Default: Auto) Allows you to set the over-current protection level for the CPU VRIN voltage. Auto Lets the BIOS automatically configure this setting.

(Default) Standard~Extreme elects Standard, Low, Medium, High, Turbo, or Extreme which represents different S level of over-current protection for the Vcore. Allows you to set the over-current protection level for the memory voltage. Auto Lets the BIOS automatically configure this setting. (Default)

Standard~Extreme elects Standard, Low, Medium, High, Turbo, or Extreme which represents different S level of over-current protection for the memory voltage. Displays the PWM thermal protection threshold for the CPU VRIN area. Displays the PWM thermal protection threshold for the Channel A and Channel B memory area. Displays the CPU VRIN PWM frequency. Displays the current operating PWM frequency for Channel A and Channel B memory.

&& DDR CH(A/B) Voltage Protection && CPU VRIN Current Protection && DDR CH(A/B) Current Protection && CPU VRIN PWM Thermal Protection && DDR CH(A/B) PWM Thermal Protection && CPU VRIN PWM Switch Rate && DDR CH(A/B) PWM Switch Rate && PWM Phase Control Allows you to automatically change the PWM phase according to the CPU load. The power-saving levels are (from lowest to highest): eXm Perf (Extreme Performance), High Perf (High Performance), Perf (Performance), Balanced, Mid PWR (Mid Power), and Lite PWR (Light Power).



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