

User Manual

AFE-R770

AMR Controller



Attention!

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Product Warranty (2 Years)

Advantech warrants the original purchaser that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products that have been repaired or altered by persons other than repair personnel authorized by Advantech, or products that have been subject to misuse, abuse, accident, or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

Because of Advantech's high quality-control standards and rigorous testing, most customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced free of charge during the warranty period. For out-of-warranty repairs, customers will be billed according to the cost of replacement mate-rials, service time, and freight. Please consult your dealer for more details.

If you believe your product to be defective, follow the steps outlined below.

- 1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any onscreen messages displayed when the problem occurs.
- 2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
- If your product is diagnosed as defective, obtain a return merchandise authorization (RMA) number from your dealer. This allows us to process your return more quickly.
- 4. Carefully pack the defective product, a completed Repair and Replacement Order Card, and a proof of purchase date (such as a photocopy of your sales receipt) into a shippable container. Products returned without a proof of purchase date are not eligible for warranty service.
- 5. Write the RMA number clearly on the outside of the package and ship the package prepaid to your dealer.

Declaration of Conformity

FCC Class B

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for assistance.

Technical Support and Assistance

- 1. Visit the Advantech website at www.advantech.com/support to obtain the latest product information.
- 2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before calling:
 - Product name and serial number
 - Description of your peripheral attachments
 - Description of your software (operating system, version, application software, etc.)
 - A complete description of the problem
 - The exact wording of any error messages

Warnings, Cautions and Notes



Warning! Warnings indicate conditions that if not observed can cause personal injury!



Caution! Cautions are included to help prevent hardware damage and data losses. For example,

> "Batteries are at risk of exploding if incorrectly installed. Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type as recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions."



Notes provide additional optional information.

Packing List

Before setting up the system, check that the items listed below are included and in good condition. If any item does not accord with the table, please contact your dealer immediately.

- 1 x AFE-R770 Unit
- 1 x User Manual (Simplified Chinese)
- 1 x China RoHS
- 1 x Mounting kit

Ordering Information

Part No.	CPU	DDR5	Gbe	HDMI	CAN Bus	RS-232/ 422/485	USB	M.2 B- Key	SIM	M.2 E- Key	M.2 M- Key	DIO	Country of Origin
AFE-R770- 00A1	LGA1700 Socket Type	Up to 64GB	4	1	2	4	4	1	1	1	1	1-bit	China
AFE-R770- 00A1U	LGA1700 Socket Type	Up to 64GB	4	1	2	4	4	1	1	1	1	16-bit	Taiwan

Note! CPU/Memory/Storage and operating system included by request.

Optional Items for Default SKU

Part Number	Description
96PSA-A150W24T2-4	AC to DC adapter, DC 24V 150W, 0 ~ 40°C
1702002600	Power cable 3-pin 183 cm (6 ft), USA type
1702002605	Power cable 3-pin 183 cm (6 ft), EU type
1702031801	Power cable 3-pin 183 cm (6 ft), UK type
1700000237	Power cable 3-Pin 183 cm (6 ft), PSE type

Safety Instructions

- 1. Read these safety instructions carefully.
- 2. Retain this user manual for future reference.
- 3. Disconnect the equipment from all power outlets before cleaning. Use only a damp cloth for cleaning. Do not use liquid or spray detergents.
- 4. For pluggable equipment, the power outlet socket must be located near the equipment and easily accessible.
- 5. Protect the equipment from humidity.
- 6. Place the equipment on a reliable surface during installation. Dropping or letting the equipment fall may cause damage.
- 7. The power outlet sockets should have grounded connections.
- 8. Position the power cord away from high-traffic areas. Do not place anything over the power cord.
- 9. All cautions and warnings on the equipment should be noted.
- 10. If the equipment is not used for a long time, disconnect it from the power source to avoid damage from transient overvoltage.
- 11. Never pour liquid into an opening. This may cause fire or electrical shock.
- 12. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
- 13. If any of the following occurs, have the equipment checked by service personnel:
 - The power cord or plug is damaged.
 - Liquid has penetrated the equipment.
 - The equipment has been exposed to moisture.

- The equipment is malfunctioning, or does not operate according to the user manual.
- The equipment has been dropped and damaged.
- The equipment shows obvious signs of breakage.
- 14. Do not leave the equipment in an environment with a storage temperature of below -40°C (-40°F) or above 85°C (185°F) as this may damage the components. The equipment should be kept in a controlled environment.
- 15. Any unverified components may cause unexpected damage. To ensure correct installation, always use the components (e.g., screws) provided in the accessory box.
- 16. CAUTION: Batteries are at risk of exploding if incorrectly replaced. Replace only with the same or equivalent type as recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.
- 17. Always disconnect the power cord from the chassis before manually handling the hardware. Do not implement connections or configuration changes while the device is powered on. Sudden power surges may damage sensitive electronic components.
- 18. In accordance with IEC 704-1:1982 specifications, the sound pressure level at the operator's position does not exceed 70 dB (A).
- 19. DISCLAIMER: These instructions are provided according to IEC 704-1 standards.

Advantech disclaims all responsibility for the accuracy of any statements contained herein.

- 20. Use a power cord connected to a socket-outlet with a grounded connection.
- 21. 21. This product is intended to be supplied by a UL-Listed power supply suitable for use at minimum Tma 65°C (149°F) whose output meets ES1 (or SELV) and output is rated: 9-36 Vdc, 16.6-4.16 A. Please contact Advantech for further informa- tion.
- 22. RESTRICTED ACCESS AREA: The equipment should only be installed in a Restricted Access Area.

Consignes de Sécurité

- 1. Veuillez lire attentivement ces instructions de sécurité.
- 2. Veuillez conserver ce manuel de l'utilisateur pour référence ultérieure.
- 3. Veuillez débrancher cet équipement de la prise secteur avant le nettoyage. Utilisez un chiffon humide. Ne pas utiliser de détergent liquide ou pulvérisé pour le nettoyage. Utilisez une feuille ou un chiffon humide pour le nettoyage.
- 4. Pour les équipements enfichables, la prise de courant doit être à proximité de l'équipement et doit être facilement accessible.
- 5. S'il vous plaît garder cet équipement de l'humidité.
- 6. Posez cet équipement sur une surface fiable lors de l'installation. Une chute ou une chute pourrait causer des blessures.
- 7. La prise de courant doit avoir une connexion mise à la terre.
- 8. Placez le cordon d'alimentation de sorte que personne ne puisse marcher dessus.

Ne placez rien sur le cordon d'alimentation.

- 9. Tous les avertissements et mises en garde sur l'équipement doivent être notés.
- 10. Si l'appareil n'est pas utilisé pendant une longue période, débranchez-le du secteur pour ne pas être endommagé par une surtension transitoire.
- 11. Ne jamais verser de liquide dans les ouvertures de ventilation; Cela pourrait provoquer un incendie ou un choc électrique.

- 12. N'ouvrez jamais l'équipement. Pour des raisons de sécurité, seul le personnel de maintenance qualifié doit ouvrir l'équipement.
- 13. Si l'une des situations suivantes se présente, faites vérifier le matériel par le personnel de service:
 - Le cordon d'alimentation ou la fiche est endommagé.
 - Un liquide a pénétré dans l'appareil.
 - L'équipement a été exposé à l'humidité.
 - L'équipement ne fonctionne pas bien ou vous ne pouvez pas le faire. fonctionner conformément au manuel d'utilisation.
 - Equipment L'équipement est tombé et a été endommagé.
 - Equipment L'équipement présente des signes évidents de rupture.
- 14. Ne laissez pas cet équipement dans un environnement où la température de stockage peut être inférieure à -40°C (-40°F) ou supérieure à 85°C (185°F). Cela pourrait endommager l'équipement. L'équipement doit être dans un environnement contrôlé.
- 15. Tout composant non vérifié peut causer des dommages inattendus. Pour garantir une installation correcte, veuillez toujours utiliser les composants (ex. Vis) fournis avec la boîte d'accessoires.
- 16. ATTENTION: L'ordinateur est équipé d'un circuit d'horloge temps réel alimenté par batterie. Il y a un risque d'explosion si la batterie est remplacée de manière incorrecte. Remplacez uniquement avec le même type ou un type équivalent recommandé par le fabricant. Jetez les piles usagées conformément aux instructions du fabricant.
- 17. Débranchez toujours complètement le cordon d'alimentation de votre châssis lorsque vous utilisez du matériel. Ne faites pas de connexion quand l'appareil est sous tension. Les composants électroniques sensibles peuvent être endommagés par des surtensions soudaines.
- 18. Niveau de pression acoustique au poste de l'opérateur selon la norme CEI 704-1: 1982 n'est pas supérieur à 70 dB (A).
- 19. AVERTISSEMENT: Cet ensemble d'instructions est donné conformément à la norme CEI 704-1. Advantech décline toute responsabilité quant à l'exactitude des déclarations contenues dans ce.
- 20. Au moyen d'un cordon d'alimentation connecté à une prise de courant avec mise à la terre.
- 21. Ce produit est destiné à être alimenté par un bloc d'alimentation homologué UL adapté à une utilisation à Tma 65 degrés C min. dont la sortie est conforme à ES1 (ou SELV) et dont la sortie est nominale: 9-36Vdc, 16.6-4.16A, si besoin d'aide supplémentaire, veuillez contacter Advantech pour plus d'informations.
- 22. ZONE D'ACCÈS RESTREINT: L'équipement ne doit être installé que dans une zone d'accès restreint.

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General Introduction

This chapter details background information on the AFE-R770 series.

1.1 Introduction

Advantech's AFE-R770 is an intelligent, high-performance, fanless desktop system powered by 12/13/14th Gen Intel® Core™ i3/i5/i7/i9 (LGA1700 socket) 35W processors. AFE-R770 supports a maximum 35W processor and broad temperature ranges (-20 ~ 65°C / -4 ~ 149°F).

Rugged Multi-Functional Design

AFE-R770 adopts an advanced thermal design for its desktop processor solution. All models are fanless and feature various unique features. These include wide operating temperature ranges (-20 ~ 65°C / -4 ~ 149°F), diverse expandability options, and structural strengthening. It supports diverse I/O interfaces — up to 4 x Intel® GbE, 4 x USB 3.2 (2 x Gen2 + 2 x Gen1), 2 x CAN bus, 1 x IMU socket (optional), 1 x M.2 B-Key (PCIex2/SATA/USB, selectable in BIOS), 1 x M.2 M-Key (PCIe x4 / SATA), 1 x M.2 E-Key (PCIe x1 / USB 2.0), 4 x COM (RS-232/422/485), 1 x HDMI, and 16-bit DIO.

Built-In Intelligent Management Tools — Advantech SUSI API and WISE-DeviceOn

The Advantech SUSI API offers a range of programmable APIs including multi-level watchdog, hardware monitoring, and other user-friendly interfaces.

SUSI API is an intelligent self-management cross-platform tool that monitors the system's status for problems and takes action in the event of abnormalities. It ensures reliable system boot-up in critical, low-temperature environments, so systems can automatically recover when voltages dip.

By integrating SUSI API, AFE-R770 enhances system reliability and intelligence. Additionally, AFE-R770 supports Advantech's WISE-DeviceOn for effortless remote management, enabling users to monitor, configure, and control a large number of terminals, simplifying maintenance and system recovery processes.

1.2 Product Features

1.2.1 General

- CPU: 12th/13th/14th Gen Intel® Core™ i3/i5/i7 (LGA1700) desktop processor (up to 35W)
- System Chipset: Intel® R680E& H601E
- BIOS: AMI EFI 256Mbit
- System Memory: DDR5 4800MHz up to 64GB
- Watchdog Timer: Single chip watchdog 255-level interval timer, set up by software
- I/O Interface: 4 x COM (RS-232/422/485)
- **USB:** 4 x USB 3.2 (2 x Gen2 + 2 x Gen1)
- Audio: High Definition Audio (HD), Line-out/Mic-in
- Storage: 1 x M.2 M-Key (PCle x4 / SATA), 1 x M.2 B-Key (PCle x2 / SATA / USB)
- Expansion Interface:
 - 1 x M.2 with SIM holder (B-Key for NVME, SATA, LTE/5G modules)
 - 1 x M.2 (E-Key for Wi-Fi, suggested installation at Advantech manufacturing)
- **TPM:** TPM 2.0, dTPM by default (Infineon SLB9672XU2.0)

1.2.2 Display

Controller: According to CPU selection

Resolution:

- HDMI: supports HDMI 1.4, 4096 x 2160 @ 24Hz

1.2.3 Ethernet

- Chipset: LAN1/2/3/4 Intel® i226-LM, supporting Wake-on-LAN
- **Speed:** LAN1/2/3/4 10/100/1000/2500 Mbps

1.3 Chipset

1.3.1 Functional Specifications

1.3.1.1 Processor

Table 1.1:	Processor
Processor	Supports 12th/13th/14th Gen Intel® (LGA1700) processor (up to $35W$)
Memory	Supports DDR5 4800 MHz up to 64GB (2 x 262-pin SODIMM socket type)

1.3.1.2 Chipset

Internal Graphics Features

- DirectX 12, OpenGL 4.5
- 1 x HDMI

Video Accelerator

- HW accelerated Media Decoding: H.265/HEVC, H.264/MPEG-4 AVC, MPEG-2, VC-1/WMV9, JPEG/MJPEG, VP8 and VP9
- HW accelerated Media Encoding: H. 265/HEVC, H.264/MPEG-4 AVC, MPEG-2, JPEG/MJPEG and VP8

USB Interface

- 1 x XHCI Host Controller, supporting SuperSpeed USB 3.2 Gen1/Gen2
- Supports wake-up from sleep states S3
- USB 1/2 Maximum 1.5A, USB 3/4 Maximum 0.9A

Power Management

- Supports ACPI
- ACPI-defined power states (processor-driven C states)
- ACPI power management timer

1.3.1.3 Others

Serial Ports

- Up to 4 x serial ports
- Supports IRQ sharing among serial ports under Microsoft
- COM1, COM2, COM3, COM4: RS-232/422/485

Ethernet

LAN1/2/3/4 Intel i226LM

- I226LM supports up to 10/100/1000/2500Mbps
- LAN connectors: phone Jack RJ-45 8P 90D (F)

Audio

Audio Codec: ALC888S-VD2-GR

Compliant with HD Audio specifications

- Supports 16-/20-/24-bit DAC and 16-/20-/24-bit ADC resolution
- Supports: Line-out, Mic-in
- Audio Connectors: 1 x headphone jack, 1 x microphone jack *

Battery Backup

Battery 3V/550mAh with WIRE x 1

TPM 2.0

TPM 2.0, dTPM by default (Infineon SLB9672XU2.0)

1.3.2 SUSI 5.0

- SUSI API
- Watchdog timer multi-level WDT
- Hardware monitor CPU temperature / input voltage
- 2 x CAN bus ports supported by SUSI API

1.4 Mechanical Specifications

1.4.1 **Dimensions**

With wallmount:

230 x 55 x 215 mm / 9.06 x 2.17 x 8.46 in (W x H x D)





W/O wallmount: 200 x 55 x 215 mm / 7.87 x 2.17 x 8.46 in (W x H x D)



Figure 1.1 AFE-R770 Mechanical Dimensions

1.4.2 Weight

Net weight: 2.7 kg (6 lb)

1.5 Power Requirements

1.5.1 System Power

- Power Input Range: 9 ~ 36 V_{DC}
- **Optional Adapter:** 150W @19V/7.89A power adapter (optional)

1.6 Operating Environment Specifications

1.6.1 Operating Temperature

With extended peripherals: -20 ~ 65°C (-4 ~ 149°F) with 0.7 m/s airflow

1.6.2 Relative Humidity

- 95% @ 40°C (104°F) (non-condensing)
- 1.6.3 Storage Temperature
 - -40 ~ 85°C (-4 ~ 185°F)
- 1.6.4 Safety
 - CB, CCC, BSMI, UL
- 1.6.5 EMC
 - CE/FCC Class B, CCC, BSMI

AFE-R770 User Manual



Hardware Configuration

2.1 Introduction

The following sections show the internal jumper settings and the external connector pin assignments for different applications.

2.2 Jumpers

2.2.1 Jumper Description

You may configure AFE-R770 to match the needs of your application by setting jumpers. A jumper is a metal bridge used to close an electric circuit. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To close a jumper, you connect the pins with the clip. To open a jumper, remove the clip. Sometimes a jumper will have three pins, labeled 1, 2, and 3. In this case you would connect either pins 1 and 2, or 2 and 3.



The jumper settings are schematically depicted in this manual as follows.



A pair of needle-nose pliers may be helpful when working with jumpers. If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any changes. Generally, you simply need a standard cable to make most connections.

2.2.2 Jumper List

Table 2.1: Jumper I	_ist
PSON1	Auto Power On Setting
CLCMOS1	Clear CMOS
JSETCOM2_V1	COM2 RI power setting
COM3_SEL	COM3 mode setting
ERP1	ERP Mode setting
SW_422_1~4	Termination resistor setting

2.2.3 Jumper Locations





Figure 2.1 Jumper Layout

2.2.4 Jumper Settings

2.2.4.1 AT/ATX Mode Jumper (PSON1)

Table 2.2: PSON1 A	Auto Power On Setting
Part Number	1653004101
Description	Pin Header 4x1P 2.0mm 180D(M) DIP 21N12050
Setting	Function
(1-2)	Power Button for Power On (default)
(3-4)	Auto Power On



2.2.4.2 Clear CMOS Setting (CLCMOS1)

Table 2.3: CLC	MOS1 Clear CMOS Setting	
Part Number	1653003101-03	
Description	Pin Header 1X3P 2.00mm 180D(M) DIP 1140-000-03S	
Setting	Function	
(1-2)	Normal Operation (default)	
(2-3)	Clear CMOS	



2.2.4.3 COM2 RI Power Setting (JSETCOM2_V1) (Adjusted with Tweezers)

Table 2.4: JSETCO	M2_V1 COM1 RI Power Setting
Part Number	1653003201
Description	Pin Header 3x2P 2.0mm 180D(M) DIP 21N22050
Setting	Function
(1-2)	Normal (default)
(3-4)	+5V
(5-6)	+12V



2.2.4.4 COM3 RS232/485/422 Selection (COM3_SEL)

Table 2.5: CON	13 RS232/485/422 selection	
Part Number	1653003260	
Description	Pin Header 3x2P 2.0mm 180D(M) DIP 21N22050	
Setting	Function	
(1-3) (4-6)	RS232 (default)	
(1-3) (4-6) (1-3) (2-4)	RS232 (default) RS422	



Note!

Settings also need to be configured in the BIOS menu.

2.2.4.5 ERP Power Saving Mode Setting (ERP1)

Table 2.6: ERP Power Saving Mode Setting		
Part Number	1653000014	
Description	Pin Header 2x2P 2.00mm 180D(M) SMD 21N22050	
Setting	Function	
(1-2)	Normal operation (default)	
(3-4)	ERP Power saving mode	



2.2.4.6 COM1~4 Port Failsafe Setting(SW_422_1/SW_422_2/SW_422_3/SW_422_4)

Table 2.7: COM Port Failsafe Setting		
Part Number	160000402	
Description	DIP SW SMD 8P SPST P=1.27mm W=5.4mm KHS42E	
Setting	Function	
Switch Off	Normal operation (default)	
Switch ON	Enable safe and termination resistor	



2.3 Connectors

2.3.1 AFE-R770 External I/O Locations

- 1. LAN 1/2/3/4 up to 10/100/1000/2500Mbps
- USB 3.2 Gen2: USB1~2 USB 3.2 Gen1: USB3~4 RS-232/422/485: COM1/2/3/4





Figure 2.2 AFE-R770 Front and Rear I/O Connector Diagram

2.3.1.1 COM Connector

AFE-R770 provides up to eight D-sub 9-pin connectors, which offer RS-232/422/485 serial communication interface ports. The default setting is RS-232, and the RS-422/485 can be supported via the BIOS settings. Only COM3 supports RI/+5V/+12V; the other COM support RI.



Figure 2.3 COM Connector

Table	Table 2.8: COM Connector Pin Assignments		
	RS-232	RS-422	RS-485
Pin	Signal Name	Signal Name	Signal Name
1	DCD	Tx-	DATA-
2	RxD	Tx+	DATA+
3	TxD	Rx+	NC
4	DTR	Rx-	NC
5	GND	GND	GND
6	DSR	NC	NC
7	RTS	NC	NC
8	CTS	NC	NC
9	RI/+5V/+12V	NC	NC



NC represents "No Connection". NC représente "No Connection".

2.3.1.2 Ethernet Connector (LAN)

AFE-R770 is equipped with up to 4 x Ethernet controllers. These Ethernet ports provide a standard RJ-45 jack connector with LED indicators on the front side to show Active/ Link status (Green LED) and Speed status (LED Yellow:1G /Green:2.5G).



Figure 2.4 Ethernet Connector

Table 2.9: Ethernet Connector Pin Assignments	
Pin	10/100/1000/2500 BaseT Signal Name
1	TX+
2	TX-
3	RX+
4	MDI2+
5	MDI2-
6	RX-
7	MDI3+
8	MDI3-

2.3.1.3 Power On/Off Button

AFE-R770 has a Power On/Off button with LED indicators on the front side that show "On" (Green LED) and "Off/Suspend" status (Orange LED). The Power button supports dual functions: Soft Power-On/Off (Instant off or Delay 4 Seconds then off), and Suspend.



Figure 2.5 Power ON/OFF Button

2.3.1.4 Audio Connector

AFE-R770 features one phone jack connector that supports stereo Line-Out or Mic-In audio ports. The audio chip is controlled by ALC888S and compliant with the Azalea standard.



Figure 2.6 Audio Connector

2.3.1.5 HDMI Connector

An integrated, 19-pin receptacle connector HDMI Type A Interface is provided. The HDMI link supports resolutions up to 4096 x 2160 @ 24 Hz.



Figure 2.7 HDMI Receptacle Connector

Table 2.10: HDMI Connector Pin Assignments			
Pin	Signal Name	Pin	Signal Name
1	TMDS Data 2+	2	TMDS Data 2 shield
3	TMDS Data 2-	4	TMDS Data 1+
5	TMDS Data 1 shield	6	TMDS Data 1-
7	TMDS Data 0+	8	TMDS Data 0 shield
9	TMDS Data 0-	10	TMDS clock+
11	TMDS clock shield	12	TMDS clock-
13	CEC	14	Reserved
15	SCL	16	SDA
17	DDC/CEC Ground	18	+5V
19	Hot Plug Detect		

Chapter 2 Hardware Configuration

2.3.1.6 USB 3.2 - Gen2 and Gen1

AFE-R770 supports 2 x USB 3.2 (Gen2, 10G), and 2 x USB 3.2 (Gen1, 5G). The USB interfaces comply with USB UHCI, Rev. 3.0 standards. Please refer to Table 2.10 for its pin assignments.



Figure 2.8 USB 3.2 Connector

Table 2.11: USB 3.2 Gen1/2 Connector Pin Assignments				
Pin	Signal Name	Pin	Signal Name	
1	+5V	2	USB_data-	
3	USB_data+	4	GND	
5	SSRX-	6	SSRX+	
7	GND	8	SSTX-	
9	SSTX+			

2.3.1.7 DIO Connector

DO1~8 output type: OD



Figure 2.9 DIO Connector

Table 2.12: DIO Connector Pin Assignment					
Pin	Signal Name	SUSI API	Pin	Signal Name	SUSI API
1	GND		2	GND	
3	DI1	GPIO0	4	DO1	GPIO8
5	DI2	GPIO1	6	DO2	GPIO9
7	DI3	GPIO2	8	DO3	GPIO10
9	DI4	GPIO3	10	DO4	GPIO11
11	GND		12	GND	
13	DI5	GPIO4	14	DO5	GPIO12
15	DI6	GPIO5	16	DO6	GPIO13
17	DI7	GPIO6	18	DO7	GPIO14
19	DI8	GPIO7	20	DO8	GPIO15

2.3.1.8 LED& Remote Switch Connector

AFE-R770 provides the remote switch connector for power on/off, power LED, and SATA LED with an external cable. When WDT is enabled, this pin will go low for 1 second.



Figure 2.10 LED & Remote Switch Connector

Table 2.13: Remote control Connector Pin Assignment			
Pin	Signal Name	Pin	Signal Name
1	Power LED-	2	WDT
3	Power LED+	4	Power Button
5	SATA LED-	6	GND
7	SATA LED+	8	Reset Button

2.3.1.9 Phoenix Terminal Connector

AFE-R770 supports one 3-pin Phoenix terminal power input connector. Connect the positive and negative power cables to the terminals in the power distribution connector correctly at the same time.



Figure 2.11 Phoenix Terminal Connector

- Note!1.For supply connections use wires suitable for at least 105°C.Pour les connexions d'alimentation, utilisez des fils adaptés à une
température d'au moins 105°C.
 - 2. The terminal block is suitable for 14 AWG. Torque value is 7 lb-in. User copper conductors only. It must be installed by skilled person. Le bornier est adapté à un calibre de 14 AWG. Le couple de serrage est de 7 lb-in. Conducteurs en cuivre pour l'utilisateur uniquement. Il doit être installé par une personne qualifiée
 - 3. The terminal block uses two sets of interfaces to be installed at the same time to make it split to meet the maximum current limit, and a single pin will be limited below 16 A.

Le bornier utilise deux jeux d'interfaces à installer en même temps pour le diviser afin de respecter la limite de courant maximale, et une seule broche sera limitée à moins de 16 A.

Table 2.14: Phoenix Terminal Connector	
Pin	Signal Name
-	GND
+	V-in (9-36 V)
IGN	Ignition (for vehicle mode)

2.3.1.10 CAN Bus



Figure 2.12 CAN Bus Connector

Table 2.15: CAN Bus Connector	
Pin	Signal Name
1	CAN1_DN
2	CAN2_DP
3	GND
4	GND
5	CAN1_DP
6	CAN2_DN

2.3.1.11 FAN Connector



Figure 2.13 FAN Connector

Table 2.16: FAN Connector	
Pin	Signal Name
1	GND
2	+12V
3	FAN_TACH
4	FAN_PWM

2.3.1.12 PC/Vehicle Mode Switch





Figure 2.14 P/V Mode Switch

Table 2.17: P/V Mode Switch	
Pin	Function
Switch to P	Operate in PC mode (default)
Switch to V	Operate in vehicle mode

2.4 Installation

2.4.1 CPU/Memory Installation

- 1. Unscrew the 4 spring screws and 4 hex head screws on the top cover, and remove the top cover.
- 2. Install the CPU (LGA1700) and memory into the system.
- 3. Replace the top cover.



2.4.2 Remove the Bottom Cover

Unscrew the 8 screws on the bottom cover.



2.4.3 M.2 Module Installation

- 1. Remove the bottom cover (2.4.2).
- 2. Install the M.2 module with 1 screw (per socket).
- 3. Replace the bottom cover and fix it in place with 8 screws.



2.4.4 Mounting Kit Installation

- 1. Take out the mounting kit and 4 screws (M3x6L) from the accessory box. Retirez le kit de montage et les 4 vis (M3x6L) de la boîte d'accessoires.
- Screw 2 of the screws (M3x6L) into each side to attach the system horizontally. Vissez chaque 2 vis (M3x6L) sur les côtés gauche et droit et fixez le système horizontalement.



2.4.5 Wide Operating Temperature Support

To make sure the system works well under 0°C (32°F) or over 40°C (104°F), please ensure your peripherals are I-grade. These support wide temperature operation.

AFE-R770 User Manual


BIOS Settings

3.1 Introduction

AMIBIOS has been integrated into motherboards for over two decades. With the AMIBIOS Setup program, users can modify BIOS settings and control various system features. This chapter describes the basic navigation of the AFE-R770 BIOS setup screens.

Main Advanced Chipset	Aptio Setup – AMI Security Boot Save & Exit NVMe RPM	B Key Migration MEBx
BIOS Information BIOS Vendor Core Version Compliancy Project Version Build Date and Time Access Level Project Board Version Power Type	American Megatrends 5.0.2.7 0.19 x64 UEFI 2.8; PI 1.7 R770000R060X011 03/29/2024 10:13:59 Administrator AFE-R770 ATX	Set the Date. Use Tab to switch between Date elements. Default Ranges: Year: 1998–9999 Months: 1–12 Days: Dependent on month Range of Years may vary.
Memory Information Total Memory Memory Frequency System Date System Time	16384 MB 4800 MHz [Fri 03/29/2024] [12:20:15]	<pre>++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
	Version 2.22.1290 Copyright (C) 2024	AMI

AMI's BIOS ROM has a built-in setup program that allows users to modify the basic system configuration. This information is stored in flash ROM so it retains the setup information when the power is turned off.

3.2 Entering Setup

Turn on the computer and check for the patch code. If there is a number assigned to the patch code, it means the BIOS supports your CPU. If there is no number assigned to the patch code, please contact an Advantech application engineer to obtain an up-to-date patch code file. This will ensure that your CPU's system status is valid. After ensuring that you have a number assigned to the patch code, press and you will immediately be allowed to enter Setup.

3.2.1 Main Setup

When users first enter the BIOS Setup Utility, they will enter the Main setup screen. Users can always return to the Main setup screen by selecting the Main tab. There are two Main Setup options. They are described in this section. The Main BIOS Setup screen is shown below.

BIOS Information BIOS Vendor American Meg Core Version 5.0.2.7 0. Compliancy UEFI 2.8; Pi Project Version R770000R060 Build Date and Time 03/29/2024 2 Access Level Administrato Project Board Version AFE-R770 Power Type ATX	Set the Date. Use Tab to switch between Date elements. .19 x64 Default Ranges: I 1.7 Year: 1998–9999 X011 Months: 1–12 10:13:59 Days: Dependent on month or Range of Years may vary.
Total Memory 16384 MB	
Memory Frequency 4800 MHz System Date [Fri 03/29/2 System Time [12:20:15]	<pre>**: Select Screen 2024] tl: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>

The Main BIOS setup screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured; options in blue can. The right frame displays the key legend.

Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

System Time / System Date

Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time must be entered in HH:MM:SS format.

3.2.2 Advanced BIOS Features Setup

Select the Advanced tab from the AFE-R770 setup screen to enter the Advanced BIOS Setup screen. Users can select any item in the left frame of the screen, such as CPU Configuration, to go to the sub-menu for that item. Users can display an Advanced BIOS Setup option by highlighting it using the <Arrow> keys. All Advanced BIOS Setup options are described in this section. The Advanced BIOS Setup screens are shown below. The sub-menus are described on the following pages.

3.2.2.1 CPU Configuration



Advanced	Aptio Setup – AMI	
CPU Configuration		Displays the P-core Information
▶ Performance-core Information		
ID	0xB06F2	
Brand String	13th Gen Intel(R)	
	Core(TM) i5–13500TE	
Microcode Revision	32	
VMX	Supported	
SMX/TXT	Supported	
IXI Urash Code	0x0000000	
IXI SPHU Root Cuand Status	0x9040000000000000	
Boot Guard ACM Policy Status	0×0000000000000000000000000000000000000	++ Select Screen
Boot Guard SACM Information	0x000000000000000000	11: Select Item
		Enter: Select
C6DRAM	[Enabled]	+/-: Change Opt.
CPU Flex Ratio Override	[Disabled]	F1: General Help
CPU Flex Ratio Settings	13	F2: Previous Values
Hardware Prefetcher	[Enabled]	F3: Optimized Defaults
Adjacent Cache Line Prefetch	[Enabled]	F4: Save & Exit
Intel (VMX) Virtualization	[Enabled]	ESC: Exit
Technology		
PECI	[Enabled]	
AVX	[Enabled]	· · · · · · · · · · · · · · · · · · ·
Versio	n 2 22 1290 Conuright (P) 2	2024 AMT
101310		

Advanced	Aptio Setup – AMI	
C6DRAM CPU Flex Ratio Override CPU Flex Ratio Settings Hardware Prefetcher Adjacent Cache Line Prefetch Intel (VMX) Virtualization Technology PECI AVX Active Performance-cores Active Efficient-cores	[Enabled] [Disabled] 13 [Enabled] [Enabled] [Enabled] [Enabled] [Enabled] [All] [All]	Enable/Disable the Avx 2 Instructions. This is applicable for Performance-core only
Agger-Inreading BIST AP threads Idle Manner AES MachineCheck MonitorMWait Intel Trusted Execution Technology Alias Check Request DPR Memory Size (MB) Reset AUX Content CPU SMM Enhancement Total Memory Encryption Legacy Game Compatibility Mode	[Disabled] [Disabled] [Enabled] [Enabled] [Enabled] [Disabled] [Disabled] 4 [Disabled] [Disabled] [Disabled]	<pre>++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>

Performance-core Information Displays the Displays the

Displays the P-core Information.

C6DRAM

Enable/Disable moving of DRAM contents to PRM memory when the CPU is in C6 state.

- CPU Flex Ratio Override Enable/Disable CPU Flex Ratio Programming.
- CPU Flex Ratio Settings

This value must be between the Max Efficiency Ratio (LFM) and the Maximum non-turbo ratio set by hardware (HFM).

- Hardware Prefetcher
 To turn on/off the MLC streamer prefetcher.
- Adjacent Cache Line Prefetch To turn on/off prefetching of adjacent cache lines.

 Intel (VMX) Virtualization Technology
 When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.

PECI

Enable/Disable PECI.

AVX

Enable/Disable the Avx 2 Instructions. This is applicable for Performance-core only.

Active Performance-Cores

Number of cores to enable in each processor package.

Active Efficient-cores

Enable/Disable Per Core Disable. When Per Core Disable Configuration is enabled, selection of Active Cores and Active Efficient-cores will be disabled.

Hyper-Threading

Enable or Disable Hyper-Threading Technology.

BIST

Enable/Disable BIST (Built-in Self Test) on reset.

AP threads Idle Manner

AP threads Idle Manner for waiting signal to run.

AES

Enable/Disable AES. (Advanced Encryption Standard).

MachineCheck

Enable/Disable Machine Check.

- MonitorMWait Enable/Disable MonitorMWait. If Disabled, the AP threads Idle Manner should
- not be set to MWAIT Loop.
 Intel Trusted Execution Technology
 Enables utilization of additional bardware canabilities provided by

Enables utilization of additional hardware capabilities provided by Intel® Trusted Execution Technology.

Alias Check Request

Enables Txt Alias Checking capability.

DPR memory size (MB)

Reserve DPR memory size (0-255) MB.

Reset AUX Content

Reset TPM Aux content. Txt may not functional after AUX content gets reset.

Total Memory Encryption

Configure Total Memory Encryption (TME) to protect DRAM data from physical attacks.

Legacy Game Compatibility Mode

When enabled, pressing the scroll lock key will toggle the Efficient-cores between being parked when Scroll Lock LED is on and un-parked when the LED is off.

Advanced	Aptio Setup – AMI	
Huvanceu		
		CPU SMM Enhancement
C6DRAM	[Enabled]	
CPU Flex Ratio Override	[Disabled]	
CPU Flex Ratio Settings	13	
Hardware Prefetcher	[Enabled]	
Adjacent Cache Line Prefetch	[Enabled]	
Intel (VMX) Virtualization	[Enabled]	
Technology		
PECI	[Enabled]	
AVX	[Enabled]	87
Active Performance-cores	[A11]	
Active Efficient-cores	[A11]	
Hyper-Threading	[Enabled]	
BIST	[Disabled]	↔: Select Screen
AP threads Idle Manner	[MWAIT Loop]	↑↓: Select Item
AES	[Enabled]	Enter: Select
MachineCheck	[Enabled]	+/-: Change Opt.
MonitorMWait	[Enabled]	F1: General Help
Intel Trusted Execution Technology	[Disabled]	F2: Previous Values
Alias Check Request	[Disabled]	F3: Optimized Defaults
DPR Memory Size (MB)	4	F4: Save & Exit
Reset AUX Content	[no]	ESC: Exit
CPU SMM Enhancement		
Total Memory Encryption	[Disabled]	
Legacy Game Compatibility Mode	[Disabled]	*

Advanced	Aptio Setup – AMI	
CPU SMM Enhancement SMM Use Delay Indication SMM Use Block Indication SMM Use SMM en-US Indication	[Enabled] [Enabled] [Enabled]	Enable/Disable usage of SMM_DELAYED MSR for MP sync in SMI
		++: Select Screen fl: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
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- SMM Use Delay Indication Enable/Disable usage of SMM_DELAYED MSR for MP sync in SMI.
 SMM Use Block Indication
 - Enable/Disable usage of SMM_BLOCKED MSR for MP sync in SMI.
- SMM Use en-US Indication Enable/Disable usage of SMM_ENABLE MSR for MP sync in SMI.

3.2.2.2 Power and Performance – CPU Power Management Control

Noin Advanced Chinest Coounity F	Aptio Setup – AMI
Main Advanced Chipset Security E CPU Configuration Power & Performance PCH-FW Configuration Intel(R) Time Coordinated Computing Trusted Computing ACPI Settings Manager Configuration SS RTC Wake Settings Serial Port Console Redirection	Aptio Setup – AMI oot Save & Exit NVMe RPMB Key Migration MEBx Power & Performance Options
 PCI Subsystem Settings USB Configuration Network Stack Configuration CSM Configuration NVMe Configuration 	<pre>++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
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Main Advanced Chipset Securit	Aptio Setup – AMI y Boot Save & Exit NVMe RP	MB Key Migration MEBx
BIOS Information BIOS Vendor Core Version Compliancy Project Version Build Date and Time Access Level Project Board Version Power Type Memory Information Total Memory	American Megatrends 5.0.2.7 0.19 x64 UEFI 2.8; PI 1.7 R770000R060X011 03/29/2024 10:13:59 Administrator AFE-R770 ATX	Set the Date. Use Tab to switch between Date elements. Default Ranges: Year: 1998–9999 Months: 1–12 Days: Dependent on month Range of Years may vary.
Memory Frequency System Date System Time	4800 MH2 [Fri 03/29/2024] [12:20:15]	<pre>++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
Versio	n 2.22.1290 Copyright (C) 202	4 AMI

CPU – Power Management Control		
Root performance mode		View/Configure Turbo Options
Intel(R) SpeedStep(tm) Race To Halt (RTH) Intel(R) Speed Shift Technology Per Core P State OS control mode HwP Autonomous Per Core P State HwP Autonomous EPP Grouping EPB override over PECI HwP Lock HDC Control	[Turbo Performance] [Enabled] [Enabled] [Enabled] [Enabled] [Enabled] [Disabled] [Enabled] [Enabled]	
 View/Configure Turbo Options ATX Telemetry Unit Power Limit 4 Override Power Limit 4 Power Limit 4 Lock C states Thermal Monitor Interrupt Redirection Mode Selection Timed MWAIT Custom P-state Table Energy Performance Gain 	[Enabled] [Watts] [Enabled] 70000 [Disabled] [Disabled] [Fixed Priority] [Disabled] [Disabled]	<pre>++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>

Boot Performance

Select the performance state that the BIOS will set before OS hand-off.

■ Intel® Speedstep™

Allows more than two frequency ranges to be supported.

Race to Halt (RTH)

Enable/Disable the Race To Halt feature. RTH will dynamically increase CPU frequency in order to enter pkg C-State faster to reduce overall power. (RTH is controlled through MSR 1FC bit 20)

■ Intel® Speed Shift Technology

Enable/Disable Intel® Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware controlled P-states.

Per core P state OS control mode

Enable/Disable Per Core P state OS control mode. Disabling will set Bit 31 = 1 command 0x06. When set, the highest core request is used for all other core requests.

Hwp Autonomous Per core P state

Disable Autonomous PCPS (Bit 30 = 1, command 0x11) Autonomous will request the same value for all cores all the time. Enable PCPS (default Bit 30 = 0, command 0x11)

Hwp Autonomous EPP grouping

Enable EPP grouping (default Bit 29 =0, command 0x11) Autonomous will request the same values for all cores with the same EPP. Disable EPP grouping (Bit 29 =1, command 0x11) autonomous will not necessarily request the same values for all cores with the same EPP.

EPB override over PECI

Enable/Disable EPB override over PECI. Enable by sending pcode command 0x2b, subcommand 0x3 to 1. This will allow OOB EPB PECI override control.

HWP Lock

Enable/Disable HWP Lock support in Misc Power Management MSR.

HDC Control

This option allows HDC configuration.

Turbo Mode

Enable/Disable processor Turbo Mode (requires Intel Speed Step or Intel Speed Shift to be available and enabled).

Power Limit 4 Override

Enable/Disable Power Limit 4 override.

Power Limit 4 Power Limit 4 in milliwatts.

Power Limit 4 Lock

Power Limit 4 MSR 601h Lock. When enabled PL4 configurations are locked during OS. When disabled PL4 configuration can be changed during OS.

- C states Enable/Disable CPU Power Management.
 Thermal Manitar
- Thermal Monitor Enable/Disable Thermal Monitor.
- Interrupt Redirection Mode Selection Interrupt Redirection Mode Select for Logical Interrupts.
- Timed MWAIT
 Enable/Disable Timed MWAIT Support.

Energy Performance Gain

Enable/disable Energy Performance Gain.

Advanced	Aptio Setup – AMI	
Current Turbo Settings		View/Configure Turbo Ratio
Max Turbo Power Limit Min Turbo Power Limit Package TDP Limit Power Limit 1 Power Limit 2	4095.875 0.0 35.0 35.0 45.0	
 Turbo Ratio Limit Options Energy Efficient P-state Package Power Limit MSR Lock Power Limit 1 Override Power Limit 1 Power Limit 2 Override Power Limit 2 Energy Efficient Turbo 	[Enabled] [Disabled] [Enabled] 35000 [0] [Enabled] 45000 [Enabled]	<pre>++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
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Energy Efficient P-state

Enable/Disable Energy Efficient P-state feature.

- Package Power Limit MSR Lock
 Enable/Disable locking of Package Power Limit settings.
- Power Limit 1 Override Enable/Disable Power Limit 1 override.

- Power Limit 1 Power Limit 1 in milliwatts.
- Power Limit 1 Time Window
 Power Limit 1 Time Window value in seconds.
- Power Limit 2 Override Enable/Disable Power Limit 2 override.
- Power Limit 2 Power Limit 2 value in milliwatts.
- Energy Efficient Turbo

Enable/Disable Energy Efficient Turbo Feature. This feature will opportunistically lower the turbo frequency to increase efficiency.

Advanced	Aptio Setup – AMI	
CPU – Power Management Control		Add Custom P-state Table
Boot performance mode Intel(R) SpeedStep(tm) Race To Halt (RTH) Intel(R) Speed Shift Technology Per Core P State OS control mode HwP Autonomous Per Core P State HwP Autonomous EPP Grouping EPB override over PECI HwP Lock HDC Control Turbo Mode View/Configure Turbo Options ATX Telemetry Unit Power Limit 4 Override Power Limit 4 Lock C states Thermal Monitor Interrupt Redirection Mode Selection Timed MNAIT Custom P-state Table Energy Performance Gain	[Turbo Performance] [Enabled] [Enabled] [Enabled] [Enabled] [Enabled] [Enabled] [Enabled] [Enabled] [Enabled] [Enabled] [Disabled] [Disabled] [Disabled] [Disabled] [Fixed Priority] [Disabled]	<pre>**: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>

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Number of P states

Sets the number of custom P-states. At least 2 states must be present.

Advanced	Aptio Setup – AMI	
Intel(R) Speed Shift Technology Per Core P State OS control mode HwP Autonomous Per Core P State HwP Autonomous EPP Grouping EPB override over PECI HwP Lock HDC Control Turbo Mode ▶ View/Configure Turbo Options ATX Telemetry Unit Power Limit 4 Override Power Limit 4 Lock	[Enabled] [Enabled] [Enabled] [Enabled] [Disabled] [Enabled] [Enabled] [Enabled] [Watts] [Enabled] 70000 [Disabled]	► Power Limit 3 Settings
C states Thermal Monitor Interrupt Redirection Mode Selection Timed MWAIT	[Disabled] [Enabled] [Fixed Priority] [Disabled]	++: Select Screen †↓: Select Item Enter: Select +/-: Change Opt. F1: General Help
 Custom P-state Table Energy Performance Gain EPG DIMM Idd3N EPG DIMM Idd3P Bound Limit 2 Softings 	[Disabled] 26 11	F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
 Power Limit 3 Settings CPU Lock Configuration Dual Tau Boost 	[Disabled]	•
Version 2.22.1290 Copyright (C) 2024 AMI		

Advanced	Aptio Setup – AMI	
Power Limit 3 Override Power Limit 3 Power Limit 3 Time Window Power Limit 3 Duty Cycle Response Mode Power Limit 3 Lock	[Enabled] 46000 [0] 0 [Gradual power reduction] [Disabled]	Enable/DisablePower Limit 3 override. If this option is disabled, BIOS will leave the hardware default values for Power Limit 3 and Power Limit 3 Time Window.
		<pre>++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
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- Power Limit 3 Override
 Enable/Disable Power Limit 3 override.
- Power Limit 3 Power Limit 3 in milliwatts.

- Power Limit 3 Time Window
 Power Limit 3 Time Window value in milliseconds.
- Power Limit 3 Duty Cycle Specify the duty cycle in percentage that the CPU is required to maintain over the configured time window. The range is 0-100.

Power Limit 3 Lock Power Limit 3 MSR 615h Lock. When enabled, PL3 configurations are locked when the OS is running. When disabled, PL3 configuration can be changed when the OS is running.

Intel(R) Speed Shift Technology [Enabled] CPU Per Core P State OS control mode [Enabled] HwP Autonomous Per Core P State [Enabled] HwP Autonomous EPP Grouping [Enabled]	Lock Configuration
EPB override over PECI[Disabled]HwP Lock[Enabled]HDC Control[Enabled]Turbo Mode[Enabled]View/Configure Turbo OptionsATX Telemetry Unit[Watts]Power Limit 4 Override[Enabled]Power Limit 4 Lock[Disabled]C states[Disabled]Thermal Monitor[Enabled]Interrupt Redirection Mode[Fixed Priority]Selection+/-:Timed MWAIT[Disabled]C custom P-state TableF2:Energy Performance Gain[Disabled]EPG DIMM Idd3N26EPG DIMM Idd3P11Power Limit 3 SettingsCustom P-state TableCPU Lock Configuration[Fixed Priority]	Select Screen Select Item r: Select Change Opt. General Help Previous Values Optimized Defaults Save & Exit Exit
Dual Tau Boost [Disabled]	



- CFG Lock Configure MSR 0xE2[15], CFG Lock bit.
- Overclocking Lock Enable/Disable Overclocking Lock (BIT 20) in FLEX_RATIO(194) MSR.

Aptio Setup -	AMI
Power & Performance ▶ CPU – Power Management Control ▶ GT – Power Management Control	GT – Power Management Control Options
	<pre> ++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
Version 2.22.1290 Copyri	ght (C) 2024 AMI

Advanced	Aptio Setup – AMI	
GT – Power Management Control RC6(Render Standby) Maximum GT frequency Disable Turbo GT frequency	[Enabled] [Default Max Frequency] [Disabled]	Check to enable render standby support.
		<pre>++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
Version 2	.22.1290 Copyright (C) 2024	AMI

- RC6 (Render Standby) Check to enable render standby support.
- Maximum GT frequency
 Maximum GT frequency limited by the user.
- Disable Turbo GT frequency Enabled: Disables Turbo GT frequency. Disabled: GT frequency is not limited.

3.2.2.3 PCH-FW Configuration

Aptio Setup — AMI			
Main Advanced Chipset Security Bo	t Save & Exit NVMe RPMB Key Migration MEBx		
 CPU Configuration Power & Performance PCH-Fk Configuration Intel(R) Time Coordinated Computing ACPI Settings iManager Configuration S5 RTC Wake Settings Serial Port Console Redirection PCI Subsystem Settings USB Configuration Network Stack Configuration POW Configuration 	Configure Management Engine Technology Parameters		
 NVMe Configuration 	++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit		
Version 2.2	.1290 Copyright (C) 2024 AMI		

Advanced	Aptio Setup — AMI	
ME Firmware Version ME Firmware Mode ME Firmware SKU ME Firmware Status 1 ME Firmware Status 2 ME Firmware Status 3 ME Firmware Status 5 ME Firmware Status 5 ME Firmware Status 6	16.1.30.2269 Normal Mode Corporate SKU 0×90000255 0×39858106 0×00000030 0×00004000 0×0000103 0×80400002	Local Platform Erase configuration menu
ME State Manageability Features State AMT BIOS Features Local Platform Erase Configuration ME Unconfig on RTC Clear Comms Hub Support JHI Support Core Bios Done Message CSE Data Resilience Support	[Enabled] [Enabled] [Enabled] [Disabled] [Disabled] [Enabled] [Enabled] [Enabled]	++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Ontimized Defaults
 Firmware Update Configuration PTT Configuration Anti-Rollback SVN Configuration OEM Key Revocation Configuration Extend CSME Measurement to TPM-PCR 	[Disabled]	F4: Save & Exit ESC: Exit
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- ME State
 - When Disabled, ME will be put into ME Temporarily Disabled Mode.

Manageability Features State

Enable/Disable Intel Manageability features.

AMT BIOS Features

When disabled, AMT BIOS Features are no longer supported and the user is no longer able to access MEBx Setup.

- ME Unconfig on RTC Clear When Disabled, ME will not be unconfigured on RTC Clear.
- Comms hub support Enables/Disables support for Comms Hub.
- JHI support Enable/Disable Intel® DAL Host Interface Service (JHI).
- Core BIOS Done Message Enable/Disable Core BIOS Done message sent to ME.

Aptio Setup - AMI Advanced				
ME Firmware Version ME Firmware Mode ME Firmware SKU ME Firmware Status 1 ME Firmware Status 2 ME Firmware Status 3 ME Firmware Status 4 ME Firmware Status 5 ME Firmware Status 6	16.1.30.2269 Normal Mode Corporate SKU 0×39000255 0×39858106 0×00000030 0×00004000 0×0000103 0×80400002	Configure Management Engine Technology Parameters		
ME State Manageability Features State AMT BIOS Features Local Platform Erase Configuration ME Unconfig on RTC Clear Comms Hub Support JHI Support Core Bios Done Message CSE Data Resilience Support Firmware Update Configuration PTT Configuration Anti-Rollback SVN Configuration DEM Key Revocation Configuration Extend CSME Measurement to TPM-PCR	[Enabled] [Enabled] [Enabled] [Disabled] [Disabled] [Enabled] [Enabled] [Enabled]	<pre>++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>		

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Advanced	Aptio Setup – AMI	
Advanced Me FW Image Re-Flash FW Update	[Disabled] [Enabled]	Enable/Disable Me FW Image Re-Flash function. ++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help
		F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
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ME FW Image Re-Flash Enable/Disable ME FW Image Re-Flash function.

FW Update Enable/Disable ME FW Update function.

Advanced	Aptio Setup — AMI		
ME Firmware Version ME Firmware Mode ME Firmware SKU ME Firmware Status 1 ME Firmware Status 2 ME Firmware Status 3 ME Firmware Status 4 ME Firmware Status 5 ME Firmware Status 6	16.1.30.2269 Normal Mode Corporate SKU 0x90000255 0x39858106 0x00000030 0x00004000 0x00004000 0x0000103 0x80400002	Configure PTT	
ME State Manageability Features State AMT BIOS Features Local Platform Erase Configuration ME Unconfig on RTC Clear Comms Hub Support JHI Support JHI Support Core Bios Done Message CSE Data Resilience Support	[Enabled] [Enabled] [Enabled] [Disabled] [Disabled] [Enabled] [Enabled]	<pre>++: Select Screen fl: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults</pre>	
 Firmware Update Configuration PTT Configuration Anti-Rollback SVN Configuration OEM Key Revocation Configuration Extend CSME Measurement to TPM-PCR 	[Disabled]	F4: Save & Exit ESC: Exit	
Version 2.22.1290 Copyright (C) 2024 AMI			

Advanced	Aptio Setup — AMI	
PTT Capability / State	1 / 0	
TPM Device Selection		++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
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TPM Device Selection Configure TPM device.

Advanced	Aptio Setup – AMI	
ME Firmware Version ME Firmware Mode ME Firmware SKU ME Firmware Status 1 ME Firmware Status 2 ME Firmware Status 3 ME Firmware Status 4 ME Firmware Status 5 ME Firmware Status 6	16.1.30.2269 Normal Mode Corporate SKU 0x90000255 0x39858106 0x00000030 0x00004000 0x0000103 0x80400002	Configure Anti–Rollback SVN
ME State Manageability Features State AMT BIOS Features Local Platform Erase Configuration ME Unconfig on RTC Clear Comms Hub Support JHI Support Core Bios Done Message CSE Data Resilience Support Firmware Update Configuration PTT Configuration	[Enabled] [Enabled] [Enabled] [Disabled] [Disabled] [Enabled] [Enabled]	++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit FSC: Exit
Anti-Rollback SVN Configuration DEM Key Revocation Configuration Extend CSME Measurement to TPM-PCR	[Disabled]	



Automatic HW-Enforced Anti-Rollback SVN

When enabled, the hardware-enforced Anti-Rollback mechanism is automatically activated: once ME FW was successfully run on a platform, FW with lower ARB-SVN will be blocked from execution.

Set HW-Enforced Anti-Rollback for Current SVN Enable the hardware-enforced Anti-Rollback mechanism for current ARB-SVN value. FW with lower ARB-SVN will be blocked from execution. The value will be restored to disable after the command is sent.

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Advanced	Aptio Setup – AMI	
Huvanced		
ME Eirmware Version	16 1 30 2269	Configure OEM Key Revocation
ME Firmware Mode	Normal Mode	bonnigare ben key kevbeation
ME Firmware SKU	Corporate SKII	
ME Firmware Status 1	0x90000255	
ME Firmware Status 2	0x39858106	
ME Firmware Status 3	0x00000030	
ME Firmware Status 4	0x00004000	
ME Firmware Status 5	0x00000103	
ME Firmware Status 6	0x80400002	
ME State	[Enabled]	
Manageability Features State	[Enabled]	
AMT BIOS Features	[Enabled]	
▶ Local Platform Erase Configuration		↔+: Select Screen
ME Unconfig on RTC Clear	[Enabled]	↑↓: Select Item
Comms Hub Support	[Disabled]	Enter: Select
JHI Support	[Disabled]	+/-: Change Opt.
Core Bios Done Message	[Enabled]	F1: General Help
CSE Data Resilience Support	[Enabled]	F2: Previous Values
		F3: Optimized Defaults
Firmware Update Configuration		F4: Save & Exit
PTT Configuration		ESC: Exit
Anti-Rollback SVN Configuration		
▶ OEM Key Revocation Configuration		
Extend CSME Measurement to TPM-PCR	[Disabled]	
Version 2	.22.1290 Copyright (C) 202	4 AMI

Advanced	Aptio Setup – AMI	
Automatic OEM Key Revocation Invoke OEM Key Revocation	[Disabled] [Disabled]	When enabled, BIOS will automatically send HECI command to revoke OEM keys.
		<pre>++: Select Screen f1: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
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- Automatic OEM Key Revocation When enabled, the BIOS will automatically send HECI command to revoke OEM keys.
- Invoke OEM Key Revocation A Heci command will be send to revoke the OEM key.

Extend CSME Measurement to TPM-PCR Enable/Disable Extend CSME Measurement to TPM-PCR[0] and AMT Config to TPM-PCR[1].

3.2.2.4 Intel(R) Time Coordinated Computing

Main Advanced Chipset Security	Apti Boot	io Setup – AM: Save & Exit	I NVMe RPME	8 Key Migration MEBx
CPU Configuration Power & Performance PCH-FW Configuration Intel(R) Time Coordinated Computing Trusted Computing ACPI Settings IManager Configuration S5 RTC Wake Settings Serial Port Console Redirection PCI Subsystem Settings USB Configuration Network Stack Configuration				Intel(R) Time Coordinated Computing (Intel(R) TCC) options
LSM Lonfiguration NVMe Configuration				<pre>++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>

Advanced	Aptio Setup – AMI	
Intel(R) Time Coordinated Computing	(Intel(R) TCC)	Enable or Disable Alignment
#AC Split Lock #GP Fault UC Lock	[Disabled]	enabled, this will assert an
► Intel(R) TCC Authentication Menu	[01300100]	has an operand that crosses
Intel(R) TCC Mode	[Disabled]	two cache lines.
Intel(R) TCC Mode Affected		
L2 QOS Enumeration	[Disabled]	
IO Fabric Low Latency	[Disabled]	
GT CLUS	[D1Sabled]	
		++: Select Screen
		I∔: Select Item Enter: Select
		+/-: Change Opt.
		F1: General Help F2: Previous Values
		F3: Optimized Defaults
		F4: Save & Exit
		LSC. EXIT
Version 2.22.1290 Copyright (C) 2024 AMI		

#AC Split Lock

Enable or Disable Alignment Check Exception (#AC). When enabled, this will

assert an #AC when any atomic operation has an operand that crosses two cache lines.

#GP Fault UC Lock

Enable or Disable GP Fault Exception (GP#). When enabled, this will assert an GP# when encountering a Lock to un-cacheable memory before the bus is locked.

L2 QOS Enumeration

Enable or Disable L2 QOS Enumerate. When Enable CPUID Enumeration for L2 QOS gets enabled.

IO Fabric Low Latency

Enable or Disable IO Fabric Low Latency. This will turn off some power management in the PCH IO fabric. This option provides the most aggressive IO Fabric performance setting. S3 state is NOT supported.

GT CLOS

Enable or Disable Graphics Technology (GT) Class of Service. Enable will reduce Gfx LLC allocation to minimize impact of Gfx workload on LLC.

Advanced	Aptio Setup – AMI		
Intel(R) Time Coordinated Computing	(Intel(R) TCC)	Intel(R) TCC Authentication	
#AC Split Lock #GP Fault UC Lock ▶ Intel(R) ICC Authentication Menu	[Disabled] [Disabled]	nena oprions	
Intel(R) TCC Mode	[Disabled]		
Intel(R) TCC Mode Affected			
L2 QOS Enumeration IO Fabric Low Latency GT CLOS	[Disabled] [Disabled] [Disabled]		
		<pre>++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>	
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Intel(R) TCC Authentication

Intel(R) TCC Authentication determines the key to be used. An OEM Enrolled Key is built in by OEM. A non-OEM Enrolled Key can be added by the user.

3.2.2.5 Trusted Computing

Advanced	Aptio Setup — AMI	
Intel(R) TCC Authenticatio	n [DEM Enrolled Key]	Intel(R) TCC Authentication determines the key to be used. OEM Enrolled Key is built in by OEM. Non-OEM Enrolled Key can be add by user.
		<pre> ++: Select Screen fl: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
	Version 2.22.1290 Copyright (C) 2024	AMI

Main Advanced Chipset Security	Apt Boot	io Setup – AM: Save & Exit	I NVMe	RPMB Key Migration MEBx
 CPU Configuration Power & Performance PCH-FW Configuration Intel(R) Time Coordinated Computing ACPI Settings iManager Configuration S5 RTC Wake Settings Serial Port Console Redirection PCI Subsystem Settings USB Configuration Network Stack Configuration CSM Configuration NVMe Configuration 				Trusted Computing Settings ++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Version	2.22.1	L290 Copyright	(C) 2	024 AMI

Security Device Support

Enables or Disables BIOS support for security device. The OS will not show the Security Device. TCG EFI protocol and INT1A interface will not be available.

SHA256 PCR Bank Enable or Disable SHA256 PCR Bank.

- SHA384 PCR Bank Enable or Disable SHA384 PCR Bank.
- Pending operation Schedule an Operation for the Security Device. NOTE: Your Computer will reboot during restart in order to change State of Security Device.
- Platform Hierarchy Enable or Disable Platform Hierarchy.
- Storage Hierarchy Enable or Disable Storage Hierarchy.
- Endorsement Hierarchy
 Enable or Disable Endorsement Hierarchy.
- Physical Presence Spec Version Select to Tell O.S. to support PPI Spec Version 1.2 or 1.3. Note some HCK tests might not support 1.3.
- Device Select

TPM 1.2 will restrict support to TPM 1.2 devices; TPM 2.0 will restrict support to TPM 2.0 devices; Auto will support both with the default set to TPM 2.0 devices if not found; TPM 1.2 devices will be enumerated.

3.2.2.6 ACPI Settings

Wain Aduanced Chincet Coounity	Aptio	Setup – AMI		Rou Nignotion NERv
Main Advanced Chipset Security CPU Configuration Power & Performance PCH-FW Configuration Intel(R) Time Coordinated Computing Trusted Computing ACPI Settings iManager Configuration	Boot Sa	ave & Exit	NVMe RPME	3 Key Migration MEBx System ACPI Parameters.
 S5 RTC Wake Settings Serial Port Console Redirection PCI Subsystem Settings USB Configuration Network Stack Configuration CSM Configuration NVMe Configuration 				++: Select Screen
				<pre>It: Select item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
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Enable ACPI Auto Configuration Enables or Disables BIOS ACPI Auto Configuration. Enable Hibernation Enables or Disables the system's ability to hibernate (OS/S4 Sleep State).

ACPI Sleep State

Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.

Chapter 3 BIOS Settings

3.2.2.7 iManager Configuration

Main Advanced Chipset Security	Aptio Setup – AMI oot Save & Exit NVMe RPMB Key Migration MEBx
 CPU Configuration Power & Performance PCH-FW Configuration Intel(R) Time Coordinated Computing ACPI Settings IManager Configuration S5 RTC Wake Settings Serial Port Console Redirection PCI Subsystem Settings USB Configuration Network Stack Configuration CSM Configuration NVMe Configuration 	<pre>iManager Parameters. ++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
Version 2	22.1230 COPYEISHE (C) 2024 AMI

Advanced	Aptio Setup – AMI	
iManager Configuration		Set Parameters of Serial Port
iManager Chipset Firmware Version OEM Group GPIO Number Available	EID-201 x00010001 0	1 (COMA)
 Serial Port 1 Configuration Serial Port 2 Configuration Serial Port 3 Configuration Serial Port 4 Configuration Hardware Monitor Match Dog Timer Configuration 		
 ACPI Report Method Configuration Digital I/O Configuration 		<pre>++: Select Screen tl: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
Version 2	.22.1290 Copyright (C) 2024	AMI

- Serial Port 1~4 Configuration Set Parameters of Serial Port 1~4.
- Hardware Monitor Monitor hardware status.

- Watch Dog Timer Configuration Watch Dog Timer Configuration page.
- ACPI Report Method Configuration Select ACPI Reporting Method for EC Devices.
- Digital I/O Configuration Configure the digital I/O pins.

3.2.2.8 S5 RTC Wake Settings



Advanced	Aptio Setup – AMI	
Wake system from S5	[Disabled]	Enable or disable System wake on alarm event. Select FixedTime, system will wake on the hr::min::sec specified. Select DynamicTime , System will wake on the current time + Increase minute(s)
		<pre>++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
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Wake system from S5 Enable or disable system wake on alarm event.

3.2.2.9 Serial Port Console Redirection

Main Advanced Chipset Security E	Aptio Setup – AMI Noot Save & Exit NVMe RPMB Key Migration MEBx
 CPU Configuration Power & Performance PCH-FW Configuration Intel(R) Time Coordinated Computing ACPI Settings iManager Configuration S5 RTC Wake Settings Serial Port Console Redirection PCI Subsystem Settings USB Configuration Network Stack Configuration CSM Configuration NVMe Configuration 	Serial Port Console Redirection ++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
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- Console Redirection Enable or Disable.
- Legacy Console Redirection Settings Legacy Console Redirection Settings.
- Console Redirection EMS Console Redirection Enable or Disable.

Chapter 3 BIOS Settings

3.2.2.10 PCI Subsystem Settings

Main Advanced Chipset Security	A ptio Setup – AMI ot Save & Exit NVMe RPMB Key Migration MEBx
 CPU Configuration Power & Performance PCH-FW Configuration Intel(R) Time Coordinated Computing Trusted Computing ACPI Settings IManager Configuration S5 RTC Wake Settings Serial Port Console Redirection PCI Subsystem Settings USB Configuration Network Stack Configuration CSM Configuration NVMe Configuration 	PCI Subsystem Settings ++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Version 2	2.1290 Copyright (C) 2024 AMI

Advanced	Aptio Setup – AMI	
AMI PCI Driver Version : A5.01.29 PCI Settings Common for all Devices: Above 4G Decoding Re-Size BAR Support BME DMA Mitigation Change Settings of the Following PCI WARNING: Changing PCI Device(s) setti have unwanted side effects! System ma PROCEED WITH CAUTION.	[Enabled] [Enabled] [Disabled] Devices: .ngs may ng HANG!	Globally Enables or Disables 64bit capable Devices to be Decoded in Above 4G Address Space (Only if System Supports 64 bit PCI Decoding).
		<pre>++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
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Above 4G Decoding

Globally Enables or Disables 64-bit capable devices to be decoded in Above 4G Address Space (only if the system supports 64-bit PCI decoding).

Re-Size BAR Support

If the system has Resizable BAR capable PCIe Devices, this option Enables or Disables Resizable BAR Support.

BME DMA Mitigation

Re-enable Bus Master Attribute disabled during Pci enumeration for PCI Bridges after SMM is Locked.

3.2.2.11 USB Configuration



Advanced	Aptio Setup – AMI	
USB Configuration		Enables Legacy USB support.
USB Module Version	31	support if no USB devices are connected. DISABLE option will
USB Controllers: 1 XHCI		keep USB devices available only for EFI applications.
USB Devices: 1 Drive, 1 Keyboard, 1 Mouse,	1 Hub	
Legacy USB Support	[Enabled]	
XHCI Hand-off USB Mass Storage Driver Support	[Enabled] [Enabled]	
USB hardware delays and time-outs:		↔: Select Screen
USB transfer time–out	[20 sec]	†↓: Select Item
Device reset time-out	[20 sec]	Enter: Select
Device power-up delay	[Auto]	+/−: Change Opt.
		F1: General Help
Mass Storage Devices:	Tout-1	F2: Previous values
JETF18SN1S4GJEV30 8.07	[AUTO]	F3: Uptimized Defaults
		F4: Save & EXIL
		ESC. EXIT
Version 2	.22.1290 Conuright (C) 2024	АМТ.
	12211200 000030 18iic (0) 2021	1112

- Legacy USB Support Enables Legacy USB support.
- XHCI Hand-off This is a workaround for OS without XHCI hand-off support.
- USB Mass Storage Device Configuration Configure the USB Mass Storage Devices.
- USB transfer time-out The time-out value for Control, Bulk, and Interrupt transfers.
- Device reset time-out USB mass storage device Start Unit command time-out.

Device power-up delay Maximum time the device will take before it properly reports itself to the Host Controller.

3.2.2.12 Network Stack Configuration

Main Advanced Chipset Security	Aptio Setup – AMI Boot Save & Exit NVMe RPMB Key Migration MEBx
 CPU Configuration Power & Performance PCH-FW Configuration Intel(R) Time Coordinated Computing Trusted Computing ACPI Settings iManager Configuration SS RTC Wake Settings Serial Port Console Redirection PCI Subsystem Settings USB Configuration Network Stack Configuration CSM Configuration NVMe Configuration 	<pre>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>></pre>
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Advanced	Aptio Setup – AMI	
Network Stack	[Disabled]	Enable/Disable UEFI Network Stack ++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
	Version 2.22.1290 Copyright (C)	2024 AMI

Network Stack

Enable/Disable UEFI Network Stack.

Chapter 3 BIOS Settings

3.2.2.13 CSM Configuration

Aptio Setup - AMI Main Advanced Chinset Security Root Save & Evit	NVMe RPMR Key Migration MERy
 CPU Configuration Power & Performance PCH-FW Configuration Intel(R) Time Coordinated Computing Trusted Computing ACPI Settings iManager Configuration S5 RTC Wake Settings Serial Port Console Redirection PCI Subsystem Settings USB Configuration Network Stack Configuration 	CSM configuration: Enable/Disable, Option ROM execution settings, etc.
▶ NVMe Configuration	<pre>++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
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Advanced	Aptio Setup – AMI	
Compatibility Support Mod	ule Configuration	Enable/Disable CSM Support.
CSM Support	[Disabled]	++: Select Screen 14: Select Item
		<pre>+/-: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
	Version 2.22.1290 Copyright (C	:) 2024 AMI

CSM Support

Enable/Disable CSM Support.

3.2.2.14 NVMe Configuration

	Aptio Setup - AMI
Main Advanced Chipset Security	Boot Save & Exit NVMe RPMB Key Migration MEBx
 CPU Configuration Power & Performance PCH-FW Configuration Intel(R) Time Coordinated Computing Trusted Computing ACPI Settings iManager Configuration S5 RTC Wake Settings Serial Port Console Redirection PCI Subsystem Settings USB Configuration Network Stack Configuration CSM Configuration NVMe Configuration 	NVMe Device Options Settings ++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
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Aptio Setup – AMI Advanced	
Advanced NVMe Configuration No NVME Device Found	
	<pre>++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
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Chapter 3 BIOS Settings

3.2.3 Chipset Configuration

Select the Chipset tab from the AFE-R770 setup screen to enter the Chipset BIOS Setup screen. You can display a Chipset BIOS Setup option by highlighting it using the <Arrow> keys. All Plug-and-Play BIOS Setup options are described in this section. The Plug-and-Play BIOS Setup screen is shown below.

3.2.3.1 System Agent Configuration

Main Advanced Chipset Security	Apt Boot	io Setup – AM: Save & Exit	I NVMe RPM	B Key Migration MEBx
Main Advanced Chipset Security System Agent (SA) Configuration PCH-ID Configuration	BOOT	Save & Exit		<pre>System Agent (SA) Parameters System Agent (SA) Parameters ++: Select Screen fl: Select Item Enter: Select +/-: Change Opt. F1: General Help</pre>
Vansion	2 92 1	1290 Popue inte	(P) 2024	F1: Beneral Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Version	2.22.1	ιΖΑΟ Copyright	(6) 2024	- HMI

Memory Configuration Options

Chipset	Aptio Setup — AMI	
System Agent (SA) Configuration		Memory Configuration Parameters
VT-d	Supported	
 Memory Configuration Graphics Configuration DMI/OPI Configuration VMD setup menu 		
VT-d Control Iommu Pre-boot Behavior Above 4GB MMIO BIOS assignment Program Grant Count	[Enabled] [Disable IOMMU] [Enabled] [Disabled]	<pre>++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
Version	2.22.1290 Copyright (C) 2024	AMI

- VT-d
 - VT-d capability.
- Control Iommu Pre-boot Behavior
- Above 4GB MMIO BIOS assignment Enable/Disable above 4GB Memory Mapped I/O BIOS assignment. This is enabled automatically when Aperture Size is set to 2048MB.
- Program Grant Count
 Enable/Disable Programming Of Grant Count.

Chipset	Aptio Setup — AMI	
▶ Memory Thermal Configuration Memory Configuration		Memory Thermal Configuration Options
Memory RC Version Memory Frequency tCL-tRCD-tRP-tRAS SODIMM_A1 Size Number of Ranks Manufacturer SODIMM_B1	0.0.4.199 4800 MHz 40-39-39-77 Populated & Enabled 16384 MB (DDR5) 1 Advantech Co Ltd Not Populated / Disabled	
SAM Overlaoding	[Disabled]	<pre> ++: Select Screen f↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
Version	2 22 1290 Conucidat (C) 2024	AMT

SAM Overloading
 Enable/Disable SAM Overloading.

Memory Thermal Configuration



- Memory Thermal Management
 Enable/Disable Memory Thermal Management.
- PECI Injected Temperature Enable/Disable memory temperatures to be injected to the processor via PECI.
- EXTTS# via TS-on-Board Enable/Disable routing TS-on-Board's ALERT# and THERM# to EXTTS# pins on the PCH.
- EXTTS# via TS-on-DIMM
 Enable/Disable routing TS-on-DIMM's ALERT# to EXTTS# pin on the PCH.
- Virtual Temperature Sensor (VTS)
 Enable/Disable Virtual Temperature Sensor (VTS).

Memory Power and Thermal Throttling

Chipset	Aptio Setup – AMI	
Memory Power and Thermal Throttling DDR PowerDown and idle counter For LPDDR Only: DDR PowerDown and idle counter REFRESH_2X_MODE SelfRefresh Enable SelfRefresh IdleTimer Throttler CKEMin Defeature Throttler CKEMin Timer Allow Opp Ref Below Write Threbold	[810S] [810S] [Disabled] [Enabled] 512 [Enabled] 0 [Disabled]	BIOS: BIOS is in control of DDR CKE mode and idle timer value. PCODE: pcode will manage the modes.
Write Threshold	0	<pre>++: Select Screen f↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
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DDR PowerDown and idle counter

BIOS: BIOS is in control of DDR CKE mode and idle timer value. PCODE: pcode will manage the modes.

- For LPDDR only: DDR PowerDown and idle counter
 For LPDDR Only: BIOS: BIOS is in control of DDR CKE mode and idle timer value. PCODE: pcode will manage the modes.
- REFRESH_2X_MODE
 0- Disabled 1-iMC enables 2xRef when Warm and Hot 2- iMC enables 2xRef when Hot.
- SelfRefresh Enable
 Enable, Disable(Enable= Def)
- SelfRefresh IdleTimer
 Range [64K-1;512]in DLCK800s, (512= Def)
- **Throttler CKEMin Defeature** On, Off.
- Throttler CKEMin Timer
 Timer value for CKEMin, range[255;0]. Req'd min of SC_ROUND_T +
 BYTE_LENGTH (4).
- Allow Opp Ref Below Write Threshold
 Allow opportunistic refreshes while not exiting power down.
- Write Threshold Number of writes that can be accumulated while CKE is low before CKE is asserted.

Graphics Configuration

Chipset	Aptio Setup — AMI	
System Agent (SA) Configuration		Graphics Configuration
VT-d	Supported	
 Memory Configuration Graphics Configuration DMI/OPI Configuration VMD setup menu 		
VT-d Control Iommu Pre-boot Behavior Above 4GB MMIO BIOS assignment Program Grant Count	[Enabled] [Disable IOMMU] [Enabled] [Disabled]	<pre>++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
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Chipset	Aptio Setup – AMI	
Chipset Graphics Configuration Graphics Turbo IMON Current Skip Scaning of External Gfx Card Primary Display External Gfx Card Primary Display Con Internal Graphics GTT Size Aperture Size DVMT Pre-Allocated DVMT Total Gfx Mem Intel Graphics Pei Display Peim VDD Enable Configure GT for use RC1p Support PAVP Enable	Aptio Setup - AMI 81 [Disabled] [Auto] nfiguration [Enabled] [8MB] [256MB] [60M] [256M] [Disabled] [Enabled] [Enabled] [Disabled] [Enabled]	Graphics turbo IMON current values supported (14–31) +t: Select Screen fl: Select Item Enter: Select +/-: Change Opt.
Cdynmax Clamping Enable Cd Clock Frequency	[Disabled] [Max CdClock freq based on Reference Clk]	F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit

- Graphics Turbo IMON current
 Graphics turbo IMON current values supported (14-31).
- Skip Scanning of External Gfx Card
 If Enabled, it will not scan for an External Gfx Card on PEG and PCH PCIE
 Ports.

- Primary Display

Select from IGFX/PEG/PCI which graphics device should be the Primary Display or select SG for Switchable Gfx.

- External Gfx Card Primary Display Configuration Select the card used on the platform.
- Internal Graphics
 Keep IGFX enabled based on the setup options.
- GTT Size Select the GTT Size.
- Aperture Size Select the Aperture Size.
- PSMI SUPPORT
 PSMI Enable/Disable.
 DVMT Pre-Allocated
 Select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device.
- Intel Graphics Pei Display Peim
 Enable/Disable Pei (Early) Display.
- VDD Enable Enable/Disable forcing of VDD in the BIOS.
- Configure GT for use Enable/Disable GT configuration in BIOS.
- RC1p Support Enable/Disable RC1p support. If RC1p is enabled, send a RC1p frequency request to PMA based other conditions being met.
- PAVP Enable

Enable/Disable PAVP.

- Cdynmax Clamping Enable
 Enable/Disable Cdynmax Clamping.
- Cd Clock Frequency
 Select the highest Cd Clock frequency supported by the platform.

DMI/OPI Configuration

Chipset	Aptio Setup — AMI	
System Agent (SA) Configuration		Control various DMI functions.
VT-d	Supported	
 Memory Configuration Graphics Configuration DMI/OPI Configuration VMD setup menu 		
VT-d Control Iommu Pre-boot Behavior Above 4GB MMIO BIOS assignment Program Grant Count	[Enabled] [Disable IOMMU] [Enabled] [Disabled]	<pre>++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
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Chipset	Aptio Setup – AMI	
DMI/OPI Configuration		Set DMI Speed Gen1/Gen2/Gen3
DMI	X8 Gen4	
DMI Max Link Speed CDR Relock for CPU DMI DMI ASPM DMI Gen3 L1 Exit Latency New FOM for CPU DMI ▶ DMI Advanced Menu	[Gen4] [Disabled] [ASPM L1] 4 [Disabled]	<pre>++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
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- DMI Max Link Speed
 Set DMI Speed Gen1/Gen2/Gen3.
- CDR Relock for CPU DMI Enable/Disable CDR Relock.

- DMI ASPM
 DMI ASPM Support.
- DMI Gen3 L1 Latency
 DMI Gen3 L1 Exit Latency.
- New FOM for CPU DMI Enable/Disable New FOM.

Chinset	Aptio Setup – AMI	
DMI Advanced Menu		▲ DMI Gen4 EQ Mode
DMI Gen4 EQ Mode DMI Gen4 RTCO Cpre Lane0 DMI Gen4 RTCO Cpost Lane0 DMI Gen4 RTCO Cpost Lane1 DMI Gen4 RTCO Cpost Lane1 DMI Gen4 RTCO Cpre Lane2 DMI Gen4 RTCO Cpre Lane2 DMI Gen4 RTCO Cpost Lane3 DMI Gen4 RTCO Cpost Lane3 DMI Gen4 RTCO Cpre Lane4 DMI Gen4 RTCO Cpre Lane5 DMI Gen4 RTCO Cpre Lane5 DMI Gen4 RTCO Cpost Lane6 DMI Gen4 RTCO Cpost Lane7 DMI Gen3 RTCO Cpre Lane0 DMI Gen3 RTCO Cpre Lane1 DMI Gen3 RTCO Cpost Lane0 DMI Gen3 RTCO Cpost Lane1 DMI Gen3 RTCO Cpost Lane1 DMI Gen3 RTCO Cpost Lane2 DMI Gen3 RTCO Cpost Lane2	[Fixed EQ] 0 10 6 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	<pre>**: Select Screen fl: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
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Chipset	Aptio Setup – Ak	MI
DMI Gen4 RTCO Cpost Lane3 DMI Gen4 RTCO Cpost Lane4 DMI Gen4 RTCO Cpost Lane4 DMI Gen4 RTCO Cpost Lane5 DMI Gen4 RTCO Cpost Lane5 DMI Gen4 RTCO Cpost Lane6 DMI Gen4 RTCO Cpost Lane6 DMI Gen4 RTCO Cpost Lane7 DMI Gen4 RTCO Cpost Lane7 DMI Gen3 RTCO Cpre Lane0	0 0 0 0 0 0 0 0 0 0 5	▲ DMI Gen3 Lane Transmitter Pre/Post-Cursor Coefficient values.
DMI Gen3 RTC0 Cpost Lane0 DMI Gen3 RTC0 Cpre Lane1 DMI Gen3 RTC0 Cpre Lane1 DMI Gen3 RTC0 Cpost Lane2 DMI Gen3 RTC0 Cpre Lane2 DMI Gen3 RTC0 Cpre Lane3 DMI Gen3 RTC0 Cpre Lane4 DMI Gen3 RTC0 Cpre Lane4 DMI Gen3 RTC0 Cpre Lane5 DMI Gen3 RTC0 Cpre Lane5 DMI Gen3 RTC0 Cpre Lane6 DMI Gen3 RTC0 Cpre Lane6 DMI Gen3 RTC0 Cpre Lane6 DMI Gen3 RTC0 Cpre Lane6 DMI Gen3 RTC0 Cpre Lane7 DMI Gen3 RTC0 Cpre Lane7	5 5 5 5 5 5 5 3 3 5 5 5 3 3 5 5 5 5 5	<pre>++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
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VMD Setup Menu

Chipset	Aptio Setup — AMI	
System Agent (SA) Configuration		VMD Configuration settings
VT-d	Supported	
 Memory Configuration Graphics Configuration DMI/OPI Configuration VMD setup menu 		
VT-d Control Iommu Pre-boot Behavior Above 4GB MMIO BIOS assignment Program Grant Count	[Enabled] [Disable IOMMU] [Enabled] [Disabled]	<pre>++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
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Chipset	Aptio Setup – AMI	
VMD Configuration		Enable/Disable to VMD
Enable VMD controller	[Disabled]	Controller
		++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
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- Enable VMD Controller

Enable/Disable to VMD controller.

3.2.3.2 PCH-IO Configuration

	Aptio Setup – AMI
Main Advanced Chipset Security	Boot Save & Exit NVMe RPMB Key Migration MEBx
 System Agent (SA) Configuration PCH-IO Configuration 	PCH Parameters
	++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
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Chipset	Aptio Setup - AMI	
PCH-IO Configuration PCI Express Configuration		 PCI Express Configuration settings
 USB Configuration Security Configuration HD Audio Configuration 		
Windows SMI LAN1 Controller	[Disable SMI and Enable SMI Lock] [Enabled]	
LAN1 PXE OpROM	[Disabled] [Enabled]	
LAN2 PXE OpROM	[Disabled]	↔: Select Screen
LANS Controller	[Enabled]	↑↓: Select Item
LAN4 Controller	[Disabled]	+/-: Change Opt.
LAN4 PXE OpROM	[Disabled]	F1: General Help F2: Previous Values
PCIE Wake	[Disabled]	F3: Optimized Defaults
Restore AC Power Loss	[Power Off]	F4: Save & Exit
PCIE Device Initial Delay	U [Disabled]	ESU: EXIT
Flash Protection Range Registers (FPRR)	[Disabled]	
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Chipset	Aptio Setup – AMI	
 PCI Express Configuration SATA Configuration USB Configuration Security Configuration HD Audio Configuration 		▲ M.2 Key B function select
Windows SMI LAN1 Controller LAN1 PXE OpROM LAN2 Controller LAN2 PXE OpROM LAN3 Controller LAN3 PXE OpROM LAN4 Controller LAN4 PXE OpROM PCIE Wake Restore AC Power Loss PCIE Device Initial Delay Legacy IO Low Latency Flash Protection Range Registers (FPRR)	[Disable SMI and Enable SMI Lock] [Enabled] [Disabled] [Enabled] [Disabled] [Enabled] [Disabled] [Disabled] [Power Off] 0 [Disabled] [Disabled] [Disabled]	++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
SPD Write Disable M.2 Key B function select	(TRUE) [PCIe x2]	▼ ▼
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LAN1~4 Controller Enable/Disable onboard NIC.

LAN1~4 PXE OpROM Enable or disable boot option for LAN1 Controller.

Wake on LAN Enable Enable/Disable integrated LAN to wake the system.

PCIE Wake Enable or disable PCIE to wake the system from S5.

Restore AC Power Loss

Specify what state to go to when power is re-applied after a power failure (G3 state).

PCIE Device Initial Delay

The PCIE device initial delay 0~30 seconds.

Legacy IO Low Latency

Set to enable low latency of legacy IO. Some systems require lower IO latency irrespective of power. This is a tradeoff between power and IO latency.

Flash Protection Range Registers (FPRR) Enable Flash Protection Range Registers.

SPD Write Disable

Enable/Disable setting SPD Write Disable. For security recommendations, SPD write disable bit must be set.

M.2 Key B function select

M.2 Key B function select.

PCI Express Configuration

Chipset	Aptio Setup – AMI	
PCH-IO Configuration		PCI Express Configuration
 PCI Express Configuration SATA Configuration USB Configuration Security Configuration HD Audio Configuration 		Settings
Windows SMI	[Disable SMI and Enable SMI Lock]	
LAN1 Controller LAN1 PXE OpROM LAN2 Controller LAN2 PXE OpROM LAN3 Controller LAN3 PXE OpROM	[Enable SHI LOCK] [Enabled] [Enabled] [Disabled] [Enabled] [Disabled] [Enabled]	++: Select Screen 1↓: Select Item Enter: Select +/-: Change Ont
LAN4 PXE OpROM	[Disabled]	F1: General Help F2: Previous Values
PCIE Wake Restore AC Power Loss PCIE Device Initial Delay Legacy IO Low Latency Flash Protection Range Registers (FPRR)	[Disabled] [Power Off] O [Disabled] [Disabled]	F3: Optimized Defaults F4: Save & Exit ESC: Exit

Chipset	Aptio Setup – AMI	
PCI Express Configuration		The control of Active State
DMI Link ASPM Control PCIe function swap PCH PCIE Clock Gating PCH PCIE Power Gating ▶ PCIE EQ settings	[L1] [Enabled] [Enabled] [Enabled]	Link.
M.2 B-Key		
		<pre>++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
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- DMI Link ASPM Control The control of Active State Power Management of the DMI Link.
- PCle function swap
 Enable/Disable PCle function swap.



Chipset	Aptio Setup – AMI	
PCIe EQ override	[Disabled]	Choose your own PCIe EQ settings, only for users who have a thorough understanding of equalization process
		<pre>++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
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- PCIe EQ override

Choose your own PCIe EQ settings, only for users who have a thorough understanding of the equalization process.

M.2 B-Key

Chipset	Aptio Setup – AMI	
PCI Express Configuration		PCI Express Root Port Settings.
DMI Link ASPM Control PCIe function swap PCH PCIE Clock Gating PCH PCIE Power Gating PCIe EQ settings	[L1] [Enabled] [Enabled] [Enabled]	
▶ M.2 B-Key ▶ M.2 E-Key		
		<pre>++: Select Screen fl: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults</pre>
		F4: Save & Exit ESC: Exit
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- ASPM
 - PCI Express Active State Power Management settings.
- PCle Speed
 Configure PCle Speed.
- Detect Non-Compliance Device
 Detect Non-Compliance PCI Express Device. If enabled, it will take more time during POST.

M.2 E-Key

Chipset	Aptio Setup — AMI	
PCI Express Configuration		PCI Express Root Port Settings.
DMI Link ASPM Control PCIe function swap PCH PCIE Clock Gating PCH PCIE Power Gating ▶ PCIE EQ settings	[L1] [Enabled] [Enabled] [Enabled]	
▶ M.2 B-Key ▶ M.2 E-Key		
		<pre>++: Select Screen f1: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
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Chipset	Aptio Setup — AMI	
M.2 E-Key ASPM PCIe Speed Detect Non-Compliance Device	[Enabled] [Disabled] [Auto] [Disabled]	Control the PCI Express Root Port. ++: Select Screen fl: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
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SATA Configuration

Chipset	Aptio Setup – AMI	
PCH-IO Configuration		SATA Device Options Settings
 PCI Express Configuration SATA Configuration USB Configuration Security Configuration HD Audio Configuration 		
Windows SMI LAN1 Controller LAN1 PXE OpROM LAN2 Controller LAN2 PXE OpROM LAN3 Controller LAN3 PXE OpROM LAN4 Controller LAN4 PXE OpROM	[Disable SMI and Enable SMI Lock] [Enabled] [Disabled] [Disabled] [Enabled] [Disabled] [Enabled] [Disabled] [Disabled]	++: Select Screen fl: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values E3: Ontimized Defaults
Restore AC Power Loss PCIE Device Initial Delay Legacy IO Low Latency Flash Protection Range Registers (FPRR)	[Pisabled] [Power Off] 0 [Disabled] [Disabled]	F4: Save & Exit ESC: Exit

Aptio Setup - AMI Chipset SATA Configuration SATA Controller(s) [Enabled] SATA Mode Selection [AHCI] Aggressive LPM Support [Enabled] SATA Controller Speed [Default] SATA Controller Speed [Default] SATA Controller Speed [Default] SATA Port 1 Empty Software Preserve Unknown Port 1 [Enabled] Configured as eSATA Hot Plug supported SATA Port 2 Empty Software Preserve Unknown Port 2 [Enabled] Configured as eSATA Hot Plug supported SATA Port 2 [Enabled] Configured as eSATA Hot Plug supported SATA Port 2 DevSlp [Disabled] F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit			
SATA Configuration Enabled] SATA Controller(s) [Enabled] SATA Mode Selection [AHCI] Aggressive LPM Support [Enabled] SATA Controller Speed [Default] SATA Controller Speed [Default] SATA Port 1 Empty Software Preserve Unknown Port 1 [Enabled] Configured as eSATA Hot Plug supported SATA Port 1 Empty Software Preserve Unknown Port 2 Empty Software Preserve Unknown Port 2 Empty Configured as eSATA Hot Plug supported Fort 2 [Enabled] Configured as eSATA Hot Plug supported SATA Port 2 DevSlp [Disabled] Hot Plug supported F1: Select Screen SATA Port 2 DevSlp [Disabled] F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit ESC: Exit ESC: Exit	Object	Aptio Setup — AMI	
SATA Configuration Enabled] SATA Controller(s) [Enabled] SATA Mode Selection [AHCI] Aggressive LPM Support [Enabled] SATA Controller Speed [Default] SATA Controller Speed [Default] SATA Port 1 Empty Software Preserve Unknown Port 1 [Enabled] Configured as eSATA Hot Plug supported SATA Port 2 Empty Software Preserve Unknown Port 2 [Enabled] Configured as eSATA Hot Plug supported SATA Port 2 Empty Software Preserve Unknown Port 2 [Enabled] Configured as eSATA Hot Plug supported SATA Port 2 DevSlp [Disabled] #1: Select Item Enter: Select SATA Port 2 DevSlp [Disabled] F4: Save & Exit ESC: Exit ESC: Exit ESC: Exit			
SATA Controller(s) [Enabled] SATA Mode Selection [AHCI] Aggressive LPM Support [Enabled] SATA Controller Speed [Default] SATA Port 1 Empty Software Preserve Unknown Port 1 [Enabled] Configured as eSATA Hot Plug supported SATA Port 2 Empty Sattware Preserve Unknown Port 2 Empty Software Preserve Unknown Port 2 Enabled] Configured as eSATA Hot Plug supported SATA Port 2 Enabled] Configured as eSATA Hot Plug supported SATA Port 2 DevSlp [Disabled] Hot Plug supported F1: General Help F2: Previous Values F3: Optimized Defaults F3: Optimized Defaults F4: Save & Exit ESC: Exit ESC: Exit	SATA Configuration		Enable/Disable SATA Device.
	SATA Controller(s) SATA Mode Selection Aggressive LPM Support SATA Controller Speed SATA Port 1 Software Preserve Port 1 Configured as eSATA SATA Port 1 DevSlp SATA Port 2 Software Preserve Port 2 Configured as eSATA SATA Port 2 DevSlp	[Enabled] [AHCI] [Enabled] [Default] Empty Unknown [Enabled] Hot Plug supported [Disabled] Empty Unknown [Enabled] Hot Plug supported [Disabled]	<pre>++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
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- SATA Controller(s)
 Enable/Disable SATA Device.
- SATA Mode Selection
 Determines how SATA controller(s) operate.

- Aggressive LPM Support
 Enable PCH to aggressively enter link power state.
- SATA Controller Speed Indicates the maximum speed the SATA controller can support.
- SATA Port 1~2 Enable or Disable SATA Port.
- SATA Port 1 DevSlp

Enable/Disable SATA Port 1 DevSlp. For DevSlp to work, both the hard drive and SATA port need to support the DevSlp function; otherwise, an unexpected behavior might occur. Please check the board design before enabling it.

USB Configuration

PCH-ID Configuration	
	USB Configuration settings
 PCI Express Configuration SATA Configuration USB Configuration Security Configuration HD Audio Configuration 	
Windows SMI [Disab Enable	e SMI and SMI Lock1
LAN1 Controller [Enabl LAN1 PXE OpROM [Disab LAN2 Controller [Enabl LAN2 PXE OpROM [Disab LAN3 Controller [Enabl	d] ed] d] ++: Select Screen d] ++: Select Item
LAN4 Controller [Enabl LAN4 PXE OpROM [Disab	d] +/-: Change Opt. ed] F1: General Help E2: Previous Values
PCIE Wake [Disab Restore AC Power Loss [Power PCIE Device Initial Delay 0 Legacy IO Low Latency [Disab Flash Protection Range Registers [Disab (FPRR)	ed] F3: Optimized Defaults Off] F4: Save & Exit ESC: Exit ed] ed]

Chipset	Aptio Setup – AMI	
USB Configuration		Select 'Disabled' for pin-based debug. If pin-based debug is enabled but USB
USB Overcurrent USB Overcurrent Lock	[Enabled] [Enabled]	overcurrent is not disabled, USB DbC does not work.
USB Port Disable Override	[Disabled]	
		↔: Select Screen t∔: Select Item
		Enter: Select +/−: Change Opt. F1: General Help
		F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Evit
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- USB Overcurrent

Select 'Disabled' for pin-based debug. If pin-based debug is enabled but USB overcurrent is not disabled, USB DbC will not work.

USB Overcurrent Lock Select 'Enabled' if Overcurrent functionality is used. Enabling this will make the xHCI controller consume the Overcurrent mapping data.

- USB Port Disable Override

Selectively Enable/Disable the corresponding USB port from reporting a Device Connection to the controller.

Security Configuration

Chipset	Aptio Setup – AMI	
PCH-IO Configuration		Security Configuration settings
 PCI Express Configuration SATA Configuration USB Configuration Security Configuration HD Audio Configuration 		
Windows SMI LAN1 Controller	[Disable SMI and Enable SMI Lock] [Enabled]	
LAN1 PXE OpROM LAN2 Controller LAN2 PXE OpROM	[Disabled] [Enabled] [Disabled]	→+: Select Screen
LAN3 Controller LAN3 PXE OpROM	[Enabled] [Disabled]	↑↓: Select Item Enter: Select
LAN4 Controller LAN4 PXE OpROM	[Enabled] [Disabled]	+/-: Change Upt. F1: General Help F2: Previous Values
PCIE Wake Restore AC Power Loss PCIE Device Initial Delay Legacy IO Low Latency Flash Protection Range Registers (FPRR)	[Disabled] [Power Off] O [Disabled] [Disabled]	F3: Optimized Defaults F4: Save & Exit ESC: Exit
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– RTC Memory Lock

Enable will lock bytes 38h-3Fh in the lower/upper 128-byte bank of RTC RAM.

- BIOS Lock

Enable/Disable the PCH BIOS Lock Enable feature. It is required to be enabled to ensure SMM protection of flash.

Force unlock on all GPIO pads
 If enabled, the BIOS will force all GPIO pads to be in the unlocked state.

HD Audio Configuration

Chipset	Aptio Setup – AMI		
PCH-IO Configuration > PCI Express Configuration > SATA Configuration > USB Configuration - Configuration		▲ HD Audio Subsystem Configuration Settings	
 Security Configuration HD Audio Configuration Windows SMI LAN1 Controller LAN1 PXE OOROM 	[Disable SMI and Enable SMI Lock] [Enabled] [Disabled]		
LAN2 Controller LAN2 PXE OpROM LAN3 Controller LAN3 PXE OpROM LAN4 Controller LAN4 PXE OpROM	[Enabled] [Disabled] [Enabled] [Disabled] [Enabled] [Disabled]	++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help E2: Previous Values	
PCIE Wake Restore AC Power Loss PCIE Device Initial Delay Legacy IO Low Latency Flash Protection Range Registers (FPRR)	[Disabled] [Power Off] O [Disabled] [Disabled]	F3: Optimized Defaults F4: Save & Exit ESC: Exit	
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- HD Audio

Control Detection of the HD-Audio device.

Chapter 3 BIOS Settings

3.2.4 Security

Antin Setun – AMI		
Main Advanced Chipset Security Boot Save & Exit NVMe RPMB Key Migration MEBx		
Password Description		Set Administrator Password
If ONLY the Administrator then this only limits acce only asked for when enter: If ONLY the User's passwor is a power on password and boot or enter Setup. In Se have Administrator rights. The password length must b in the following range: Minimum length	s password is set, ess to Setup and is ng Setup. d is set, then this f must be entered to etup the User will pe	
Maximum length	20	++: Select Screen
Administrator Password		Enter: Select
User Password		+/−: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit
▶ Secure Boot		ESC: Exit
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- Administrator Password Set Administrator Password.
- User Password Set User Password.

Aptio Setup – AMI Main Advanced Chipset <mark>Security</mark> Boot Save & Exit NVMe RPMB Key Migration MEBx		
Password Description		Secure Boot configuration
If ONLY the Administrator's password is set, then this only limits access to Setup and is only asked for when entering Setup. If ONLY the User's password is set, then this is a power on password and must be entered to boot or enter Setup. In Setup the User will have Administrator rights. The password length must be in the following range:		
Minimum length Maximum length	3 20	++: Select Screen
		↑↓: Select Item
Administrator Password		Enter: Select
User Password		+/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit
▶ Secure Boot		ESC: Exit
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Secure Boot

The Secure Boot feature is Active if Secure Boot is Enabled, Platform Key (PK) is enrolled, and the System is in User mode. The mode change requires a platform reset.

Secure Boot Mode Secure Boot mode options: Standard or Custom.

3.2.5 Boot



Setup Prompt Timeout

Number of seconds to wait for setup activation key. 65535 (0xFFFF) means indefinite waiting.

- Bootup NumLock State Select the keyboard NumLock state.
- Quiet Boot Enables or disables the Quiet Boot option.

3.2.6 Save & Exit

Aptio Setup – AMI Main Advanced Chipset Security Boot Save & Exit NVMe RPME	3 Key Migration MEBx
Save Options Save Changes and Exit Discard Changes and Exit Save Changes and Reset Discard Changes and Reset Save Changes Discard Changes Default Options Restore Defaults Save as User Defaults Restore User Defaults	Exit system setup after saving the changes. ++ : Select Screen
Boot Override UEFI: JetFlashTS4GJFV30 8.07, Partition 1 (JetFlashTS4GJFV30 8.07)	<pre>T4: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
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- Save Changes and Exit Exit system setup after saving the changes.
- Discard Changes and Exit Exit system setup without saving any changes.
 Save Changes and Reset
- Reset the system after saving the changes.
- Discard Changes and Reset Reset system setup without saving any changes.
- Save Changes
 Save changes done so far to any of the setup options.
- Discard Changes Discard changes done so far to any of the setup options
- Restore Defaults Restore/Load default values for all the setup options.
- Save as User Defaults
 Save the changes done so far as user defaults.
- Restore User Defaults Restore the user defaults to all the setup options.



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