

User Manual

MIC-770

Compact Fanless System with 8th/9th Gen Intel[®] Core[™] i CPU Socket (LGA 1151)





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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.

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- 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 A

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. 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. Operation of this equipment in a residential area is likely to cause harmful interference. In this event, users are required to correct the interference at their own expense.

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.



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 openings on the enclosure are for air convection. Protect the equipment from overheating. Do not cover the openings.
- 8. Ensure that the voltage of the power source is correct before connecting the equipment to a power outlet.
- 9. Position the power cord away from high-traffic areas. Do not place anything over the power cord.
- 10. All cautions and warnings on the equipment should be noted.
- 11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage from transient overvoltage.
- 12. Never pour liquid into an opening. This may cause fire or electrical shock.
- 13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
- 14. 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.
- 15. 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.
- 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. In accordance with IEC 704-1:1982 specifications, the sound pressure level at the operator's position shall not exceed 70 dB (A).
- 18. RESTRICTED ACCESS AREA: The equipment should only be installed in a Restricted Access Area.

DISCLAIMER: These instructions are provided according to IEC 704-1 standards. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

Packing List

Before installation, please ensure the following items have been shipped:

- 1 x MIC-770 bare-bone system
- 1 x MIC-770 Startup Manual
- 4-pin Phoenix connector
- 2 x mounting bracket
- 1 x SATA cable
- 1 x SATA power cable
- Thermal pad for memory
- Thermal grease for the CPU

P/N: 2041077001

P/N: 1652003234

- P/N: 1960070543T00A
- P/N: 1700013095-01
- P/N: 1700024372-01
- P/N: 1990019498N000
- P/N: 2170000093-01

Ordering Information

Module Number	РСН	VGA	HDMI	2.5" HDD/ SSD	USB 3.1/3.0/ 2.0	GbE	сом	PCle / PCl Exp	Power
MIC-770Q-00A2	Q370	1	1	1	2/6/0	/	2, up to 6 via cable	i-module (Optional)	DC9~36V
MIC-770H-00A2	H310	1	1	1	0/4/4	2	2, up to 6 via cable	i-module (Optional)	DC9~36V

Optional i-Module

Module Number	Description						
4-slot expansion mod	4-slot expansion module						
MIC-75M13-00A2	1 x PCle x16 + 3 x PCl slot i-module						
MIC-75M40-00A2**	1 x PCle x8 + 3 x PCle x4 slot i-module						
2-slot expansion mod	ule						
MIC-75M20-00C1	1 x PCle x16 + 1 x PCle x4 slot i-module						
MIC-75M20-01A2	2 x PCle x8 slot i-module						
MIC-75M11-00A2**	1 x PCle x16 + 1 x PCl slot i-module						
1-slot expansion mod	ule						
MIC-75M10-00A2	1 x PCle x16 slot						
Featured expansion n	nodule						
MIC-75S00-00A1	2 x removable storage						
MIC-75S20-00A2	1 x PCle x16 + 1 x PCle x4 slot + 2 x 2.5" swappable HDD/SSD						
MIC-75G20-10B1	1 x PCIe x16 (Double Deck) + 1 x PCIe x4 + 2 x 2.5" hot-swap HDD/ SSD GPU slot i-module						
MIC-75G30-00B1**	2 x PCle x8 + 1 x PCle x4 slot + 2 x 2.5" swappable HDD/SSD						
MIC-75GF10-00A1	MIC-75GF10 MXM i-module, 1 x PCle x16 + 1 x PCle x4						
98R17520301	2 x 3.5" HDD kit						

* Please refer to the i-Module datasheet for more details.

** Q370 SKU only.

Optional Accessories

Part Number	Description
96PSA-A230W24P4-3*	ADP A/D 100-240V 230W 24V C14 TERMINAL BLOCK 4P
96PSA-A150W19P4-4	ADP A/D 100-240V 150W 19V C14 TERMINAL BLOCK 4P
1702002600	Power cord (USA) UL/CSA, 3-pin, 10A, 125V, 1.83M, 180 D
1700022940-01	Power cord PSE, 3-pin, 7A, 125V, 3M, DAC-ST01
1702002605	Power cord (EU), 3-pin, 10A, 250V 1.83M, 90D
96PSD-A240W24-MN	A/D 100-240V 240W 24V NDR DIN RAIL
1700031170-01	DC-DC power cord, A cable TEM*4/TEM*4 UL2464 18AWG 150cm
1700029720-01	AC-DC power cord (US), M cable AC CONN 3P 183cm
1700030520-01	AC-DC power cord (CN), M cable conn 3P CCC 10A 250V 150cm
1700031408-01	AC-DC power cord (EU), M cable conn 3P/G-TEM*3 80 cm
AIIS-DIO32-00A1E	AIIS 32-bit GPIO module
PCA-TPM-00B1E	TPM 2.0 module
98R17500001	MIC DVI FIO
98R17500101	MIC HDMI/Remote power on/off FIO
98R17500301	MIC HDMI kit FIO
98R17500401	MIC Remote power on/off FIO
98R17500601	MIC COMport kit FIO
98R17500701	MIC Remote power on/off kit for SFIO
98R17500801	MIC Reset/Remote power on/off/5VDC kit FIO
98R17500901	MIC GPIO kit
98R17501001	MIC DisplayPort kit
98R17501101	MIC COM and HDMI kit
98910770301***	MIC NVMe + 4 LAN Advanced FIO
98910770401***	MIC NVMe Advanced FIO
98910770501***	MIC 4 PoE Advanced FIO
98R1752010E	2nd 2.5" HDD/SSD kit (used in 2-slot i-Module)
98R1752020E	MIC Dual SSD kit
98R17500201	MIC DIN-Rail Mounting kit (90/180)
98R17500210	MIC DIN-Rail Mounting kit (180)
98R17500501	MIC Wall Mount kit
i-Door Module (MOS series module)	Supports i-Door module (MOS series), except PoE Please refer to the Advantech website below or search "iDoor Mod- ule Mini PCIe Expansion Kit". http://www.advantech.com.tw/products/idoor-module-mini-pcie- expansion-kit/sub_bc858a7f-a52b-441b-a59c-f511289f98bc
i-Door Module (PCM series module)	Supports i-Door module (PCM series) except PoE Please refer to the Advantech website below: http://www.advantech.com/products/idoor-technology-mini-pcieex- pansion-kit/sub_efdb96af-a8f7-4cde-9592-dbf5c9794d16 Note: A bracket is required to fix the PCM series i-door module in place. Please refer to P/N: 1960065854N001 i-Door_bracket

i-Module Optional Accessories

Part Number	Description
98R1751300E	1 x 8 cm FAN module (for MIC-75M13/75M40/75S20)
98R1752000E	2 x 4 cm FAN module (for MIC-75M20/MIC-75M11)

Please refer to the Flex I/O datasheet for more details.

* Please use the 230W adapter when i-Module is added.

** AIIS-DIO32 requires a DB37 bracket (P/N: 1960068787N002).

*** Q370 SKU only.

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General Introduction

This chapter gives background information on MIC-770.

1.1 Introduction

MIC-770 is a compact, fanless system incorporating the latest generation Intel[®] 14nm platform with the new PCH Q370/H310 on a proprietary form factor motherboard. The MIC-770 system design concept focuses on "expansion slot modules" so different applications can integrate the MIC-770 system to form a complete industrial computer.

MIC-770 can also serve as an independent, fanless, compact embedded box computer and accepts a wide range of DC power inputs. The rugged aluminum case not only provides a great thermal solution but also resists high EMI/shock/vibration. MIC-770 is equipped with an 8th Gen Intel® Core™ i desktop CPU featuring 6 cores, making it highly suitable for embedded and industrial PC applications requiring high processor performance within a limited space. It features powerful I/O interfaces, including Ethernet, USB 3.0, serial port, and two Mini PCIe slots.

1.2 Product Features

1.2.1 General

- **CPU:** 8th Gen Intel[®] Core[™] i CPU socket (LGA1151)
- **PCH:** Intel[®] Q370/H310
- System Memory: Dual-channel DDR4 2133/2400/2666 MHz (without ECC), up to 32GB
- Storage Devices: Supports 1 drive bay space for SATA 2.5" HDD/SSD
- **mSATA:** Supports 1 x mSATA via Mini PCIe slot
- Graphics: VGA + HDMI
- Ethernet Ports: 2 x RJ-45
- Watchdog Timer: Single chip watchdog 255-level interval timer, setup by software
- I/O Interface: 2 x RS-232/422/485 supports auto flow control; 4 x RS-232 via optional cable
- USB:
 - Q370: 2 x USB 3.1, 6 x USB 3.0 and 1 x internal USB 2.0
 - H310: 4 x USB 3.0 and 4 x USB 2.0
- Audio: High Definition Audio (HD), Line-out, Mic-in
- Expansion interface:
 - Q370: 1 x Mini PCIe (via USIM), 1 x Mini PCIe/ mSATA
 - H310: 1 x Mini PCIe (via USIM), 1 x mSATA

1.2.2 Display

- Chipset:
 - Q370: Intel[®] HD Graphics 630, supports DirectX 12
 - H310: Intel[®] HD Graphics 610, supports DirectX 12
- Graphics Video Max Memory: 1.7 GB

Resolution:

- VGA: Supports up to 2048 x 1152 @ 60 Hz
- HDMI: Supports up to 3840 x 2160 @ 30Hz

1.2.3 Ethernet

- Chipset:
 - Q370 LAN1: Intel[®] I219LM, LAN2: Intel[®] i210IT
 - H310 LAN1: Intel[®] I219V, LAN2: Intel[®] i210IT
- **Speed:** 10/100/1000 Mbps
- Interface: 2 x RJ-45
- **Standard:** Compliant with IEEE 802.3, IEEE802.3u, IEEE 802.ab.

1.3 Chipset

1.3.1 Functional Specifications

1.3.1.1 Processor

Processor 8th Gen Intel[®] Core[™] i CPU socket (LGA1151)

1.3.1.2 Chipset

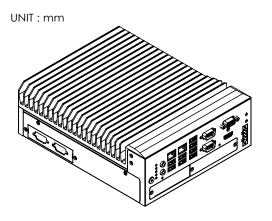
РСН	Intel [®] Q370/H310 chipset
Memory	Supports DDR4 2133/2400/2666MHz (without ECC) SODIMM Socket: — 260-pin SODIMM socket*2 (up to 16GB per socket)
Chipset Integrated Intel® HD Graphics	 Intel[®] HD Graphics 630/610 Supports DirectX 12 Supports OpenGL 4.4 Supports Intel[®] Quick Sync Video I/O interface VGA: Supports resolutions up to 2048 x 1152 @ 60 Hz (VGA connector: On-board D-SUB 15P) HDMI: Supports resolution up to 3840 × 2160 @ 30Hz (HDMI Connector: On-board HDMI)
SATA Interface	3 x SATA 3.0 (Q SKU), 1 x SATA 3.0 (H SKU) Legacy IED (Including IRQ) / Native AHCI appearance to OS Partial/slumber power management modes with wake Capable of 6 Gbit/s transfer rate
USB Interface	Q370: 2 x USB 3.1, 6 x USB 3.0 and 1 x internal USB 2.0 H310: 4 x USB 3.0 and 4 x USB 2.0 Supports high-speed, full-speed, and low-speed Supports legacy keyboard/mouse software
Power Management	Supports ACPI 5.0 ACPI Power Management Logic supported Power Connector: plug-in block 4Px1
BIOS	AMI 256Mb Flash BIOS via SPI

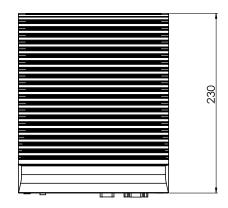
1.3.1.3 Others

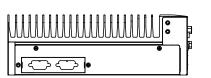
Serial ports	 Nuvoton NCT 6106D supported Up to 6 serial ports by Nuvoton NCT6106D supported High speed NS16C550A compatible UARTs with data rates to 115200 bps Supports IRQ sharing among serial port COM1/2: Supports RS-232/422/485 and setting mode by BIOS and supports auto flow control COM 3~6: Support for RS-232, via optional cable Serial port connectors: D-SUB CON.9P
LAN	 Q370 LAN1: Intel® I219LM, LAN2: Intel® i210IT H310 LAN1: Intel® I219V, LAN2: Intel® i210IT Compliant with IEEE 802.3, IEEE 802.3u, IEEE 802.ab. Supports 10/100/1000 Mbps Supports Wake-on-LAN
Audio	 Audio Codec: Realtek ALC888: Compliant with HD Audio specifications Supports to 16/20/24-bit DAC and 16/20/24-bit ADC resolution Supports: Line-out, Mic-in DAC supports 16/20/24-bit PCM format, multiple stereo recording
Battery backup	BR2032 3 V/190mAh

1.4 Mechanical Specifications

1.4.1 Dimensions







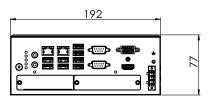


Figure 1.1 MIC-770 Physical Dimensions

1.4.2 Weight

2.8 kg (6.17 lb)

1.5 Power Requirements

1.5.1 System Power

 Minimum power input: DC 12V (-25%) -30V (+20%), Absolute Maximum Voltage Rating is 9V - 36V

1.5.2 RTC Battery

BR2032 3 V / 190 mAh

1.6 Environmental Specifications

1.6.1 Operating Temperature

-10 ~ 40 °C (65W CPU) & -10 ~ 50 °C (35W CPU) with 0.7m/sec airflow: with 1 x Industrial SSD without PC expansion boards

1.6.2 System Safety Certification Test Temperature

■ 0 ~ 40 °C with 2.5" HDD

1.6.3 Relative Humidity

■ 95% @ 40°C (non-condensing)

1.6.4 Storage Temperature

■ -40 ~ 85 °C (-40 ~ 185 °F)

1.6.5 Vibration During Operation

- When the system is equipped with SSD only: 3 Grms, IEC 60068-2-64, random, 5 ~ 500 Hz, 1 Oct/min., 1 hr/axis, x,y,z 3 axes.
- When the system is equipped with a 2.5" HDD: 1 Grms, IEC 60068-2-64, random, 5 ~ 500 Hz, 1 Oct/min., 1 hr/axis, x,y,z 3 axes.

1.6.6 Shock During Operation

When the system is equipped with SSD only: 20 G, IEC 60068-2-27, half sine, 11 ms duration.

1.6.7 Safety

UL/CB, CCC, BSMI

1.6.8 EMC

CE, FCC, CCC, BSMI

MIC-770 User Manual



H/W Installation

This chapter introduces external I/O and the installation of the MIC-770 hardware.

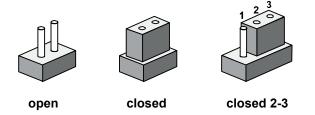
2.1 Introduction

The following sections show the internal jumper settings and the external connectors and pin assignments.

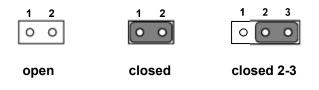
2.2 Jumpers & Slide Switches

2.2.1 Jumper Description

You may configure MIC-770 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, you 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 List				
Label	Function			
JCMOS1	Clear CMOS			
PSON1	System AT/ATX mode option			
JME1	ME jumper mode option			
JWDT1_JOBS1	Watchdog mode option			

2.2.2.1 Clear CMOS

The MIC-770 single board computer contains a jumper that can erase CMOS data and reset the system BIOS information. Normally this jumper should be set with pins 1-2 closed. If you want to reset the CMOS data, set CMOS1 to 2-3 closed for just a few seconds, and then move the jumper back to 1-2 closed. This procedure will reset the CMOS to its default setting.

CMOS1	Clear CMOS
Footprint	3x1 Pins
Setting	Function
(1-2)	Normal (default)
(2-3)	Clear CMOS

2.2.2.2 System AT/ATX Mode Function Option

MIC-770 supports AT or ATX mode and the default is the ATX module. If you want to change to AT mode, you can find the AT/ATX mode jumper on the motherboard.

PSON1	System AT/ATX mode option	
Footprint	3x1 Pins	
Setting	Function	
(1-2)	AT module	
(2-3)	ATX module	

2.2.2.3 System ME Mode Function Option

MIC-770 supports ME Enable & Disable and the default is "Disable". If you want to change the ME mode, you can set the ME mode jumper on the motherboard.

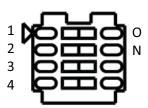
JME1	System ME mode option	
Footprint	3x1 Pins	
Setting	Function	
(1-2)	ME Enable (Default)	
(1-2) (2-3)	ME Disable	

2.2.2.4 System Watch-Dog Mode Function Option

The MIC-770 single board computer contains a jumper that can set Watchdog mode.

JWDT1_JOBS1	Watchdog mode function option
Footprint	5x1 Pins
Setting	Function
(2-3)	Watchdog
(4-5)	ERR_BEEP

2.2.2.5 USB Standby Power & the VGA always on Setting (DIP Switch)



DIP Switch (SW5)

Switch State Setting		
SW5-1	1 (default)	USB3C1 does not provide standby charging
300-1	On	USB3C1 provides standby charging
SIME 0	2 (default)	USB3C2 does not provide standby charging
SW5-2	On	USB3C2 provides standby charging
0) 1/5 0	3 (default)	USB3C3 does not provide standby charging
SW5-3	On	USB3C3 provides standby charging
SW5-4	4 (default)	VGA is always on
	On	VGA will be ON if cable is detected

2.3 Connectors

2.3.1 MIC-770 External I/O Connectors

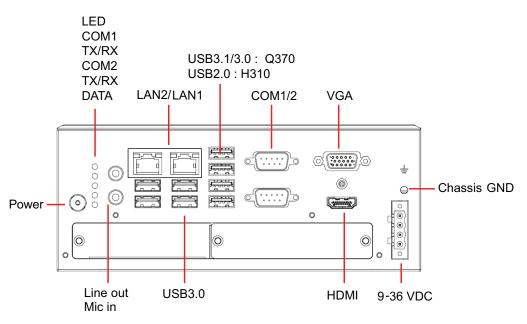


Figure 2.1 MIC-770 Front View

2.3.1.1 COM Connector

MIC-770 provides four 9-pin D-sub connectors, two of which offer RS-232/422/485, and the other two offer RS-232 serial communication interface ports. The default setting is RS-232, but this can be modified by the BIOS setting. You can find detailed setting instructions in Chapter 3.

Table 2.2: 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	NC	NC



NC represents "No Connection".

2.3.1.2 Ethernet Connector (LAN)

MIC-770 is equipped with two Ethernet controllers that are fully compliant with IEEE 802.3u 10/100/1000 Mbps CSMA/CD standards. LAN1 is equipped with Intel® i219 and LAN2 is equipped with Intel® i210. The Ethernet port provides a standard RJ-45 jack connector with LED indicators on the front side to show its Active/Link status and Speed status.



Figure 2.2 Ethernet Connector

Table 2.3: Ethernet Connector Pin Assignments		
Pin	n 10/100/1000 Base-T Signal Name	
1	TX+	
2	TX-	
3	RX+	
4	MDI2+	
5	MDI2-	
6	RX-	
7	MDI3+	
8	MDI3-	

2.3.1.3 Audio Connector

MIC-770 has two stereo audio ports with phone jack connectors, one Line_Out, and one Mic_In. The audio chip is controlled by ACL892 and is compliant with the Intel® High Definition Audio (IHDA, formerly Azalia) standard.



Figure 2.3 Audio Connectors

Table 2.4: Audio Connector Pin Assignments		
Pin	Audio Signal Name	
1	Line_Out	
2 Mic_In		

2.3.1.4 USB 3.0 Connectors

MIC-770 provides USB 3.1/3.0 interface connectors, which provide complete plug & play and hot swapping for up to 127 external devices. The USB interface complies with USB XHCI, Rev. 3.0. Please refer to the table below for pin assignments.

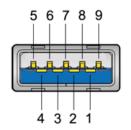


Figure 2.4 USB 3.0 Connector

Table 2.5: USB 3.0 Connector Pin Assignments		
Pin 1	+5V	
Pin 2	USB Data -	
Pin 3	USB Data +	
Pin 4	GND	
Pin 5	SSRX-	
Pin 6	SSRX+	
Pin 7	GND	
Pin 8	SSTX-	
Pin 9	SSTX+	

Chapter 2 H/W Installation

2.3.1.5 VGA Connector

The MIC-770 provides a high-resolution VGA interface with a 15-pin D-sub connector to support a VGA CRT monitor. It supports display resolution of up to 2048 x 1152 @ 60 Hz.

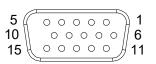


Figure 2.5 VGA Connector

Table	Table 2.6: VGA Connector Pin Assignments				
Pin	Signal Name	Pin	Signal Name		
1	Red	2	Green		
3	Blue	4	NC		
5	GND	6	GND		
7	GND	8	GND		
9	+5V	10	GND		
11	NC	12	DDC_DAT		
13	H-SYNC	14	V-SYNC		
15	DDC_CLK				

2.3.1.6 HDMI Connector

An integrated 19-pin receptacle connector HDMI Type-A Interface is provided. The HDMI link supports resolutions up to 2560 x 1600 @ 60Hz; 3840 x 2160 @ 30Hz.

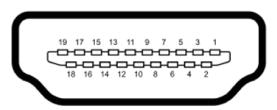


Figure 2.6 HDMI Receptacle Connector

Table 2.7: 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		

2.3.1.7 Power Input Connector

MIC-770 comes with a four-pin header as default that carries 9VDC - 36VDC external power input.

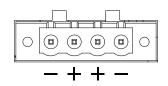


Figure 2.7 4-Pin Header

Table 2.8: Pin Assignments for the Power Connector Pin Header		
Pin	Signal Name	
1	GND	
2	+9 V _{DC} ~ 36 V _{DC}	
3	+9 V _{DC} ~ 36 V _{DC}	
4	GND	

2.3.1.8 Power ON/OFF Button

MIC-770 comes with a Power On/Off button with LED indicators on the front side to show its On status (Green LED) and Off/Suspend status (RED LED) that supports dual functions of Soft Power-On/Off (instant off or delay 4 seconds) and suspend.



Figure 2.8 Power Button

2.3.1.9 LED Indicators

MIC-770 provides COM1 & COM2 TX/RX LED for data transmission status monitoring.

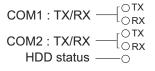
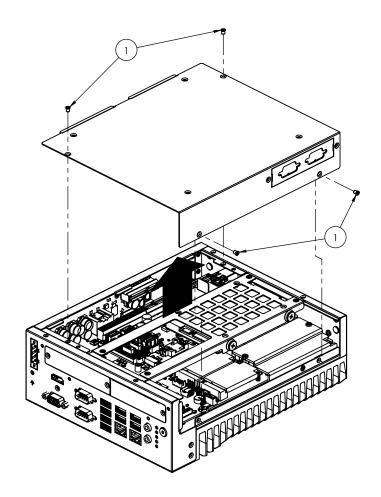


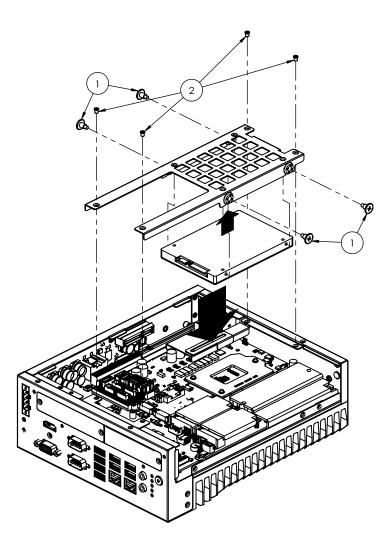
Figure 2.9 LED Indicators

2.4 Installation

2.4.1 HDD Installation

- 1. Undo the 4 screws to remove the bottom cover
- 2. Undo the 4 screws to remove the HDD tray.





- 3. Secure the HDD with 4 x HDD screws (P/N:1930002235).
- 4. Assemble the SATA cable/power cable and replace the HDD tray. Secure with 4 screws.
- 5. Replace the bottom cover.

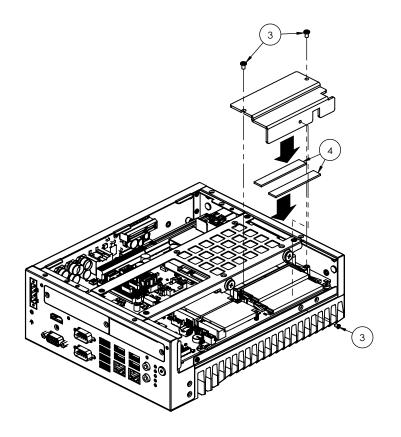
Note! Please refer to the *i*-Module Manual for *i*-Module assembly.



Chapter 2 H/W Installation

2.4.2 Memory Installation

- 1. Undo the 4 screws to remove the bottom cover.
- 2. Undo the 4 screws to remove the HDD tray.



- 3. Undo 3 screws to remove the thermal memory cover.
- 4. Affix the thermal pad (P/N: 1990019498N000) on the memory and reassemble the memory.



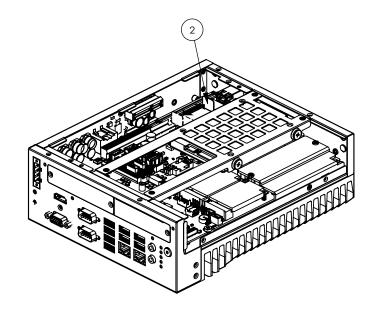
The thermal pad and thermal memory cover must be completely covered and secured.

2.4.3 m-SATA / Mini PCIe Installation

- Q370: 1x Mini PCIe (via USIM), 1x Mini PCIe / mSATA
- H310: 1x Mini PCIe (via USIM), 1x mSATA
- 1. Undo the 4 screws and remove the bottom cover.
- 2. Install the module in Mini PCIe socket 1, or m-SATA in Mini PCIe socket 2 and secure with screws.
- 3. Replace the bottom cover and secure with screws.

2.4.4 Internal USB 2.0 Installation (Q SKU Only)

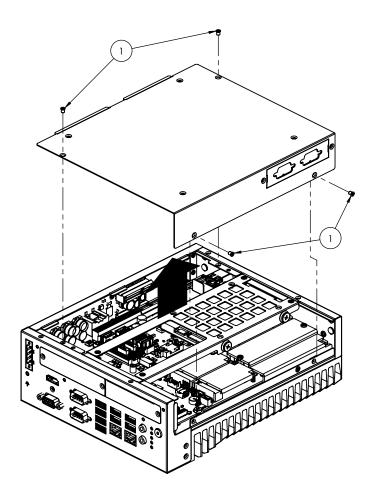
- 1. Undo the 4 screws and remove the bottom cover.
- 2. Loosen the screws and adjust the bracket size in accordance with the USB dongle size.
- 3. Replace the bottom cover and secure with the screws.



2.4.5 COM 3/4/5/6 Port Installation

MIC-770 supports two standard RS-232/422/485 serial ports. If more serial ports are needed, MIC-770 can expand to up to four serial ports by cable (RS-232 only). Please order P/N 98R17500601.

- 1. Undo the 4 screws and remove the bottom cover.
- 2. Replace the baffle plate for COM 3/4 and COM5/6.
- 3. Remove the HDD tray.
- 4. Assemble the DP9 connector for the baffle, and install the cable for the COM3/4 and COM5/6 connectors.
- 5. Secure the COM module in the system and replace the HDD tray/bottom cover.



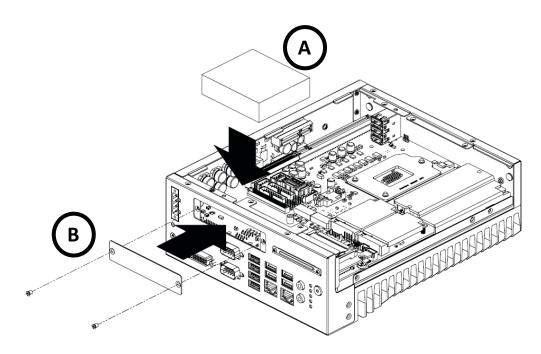
2.4.6 Expansion Module Installation (Optional)

MIC-770 supports the below optional modules for different applications. **A: Expansion module:**

- 1. 32-bit GPIO module, P/N: AIIS-DIO32-00A1E
- 2. Secondary DVI module, P/N: 98R1750000E
- 3. HDMI/Remote power module, P/N: 98R1750010E
- 4. HDMI module, P/N: 98R1750030E
- 5. Remote power module: 98R1750040E
- 6. Dual LAN module, P/N: 98R1790040E (MIC-770Q only)

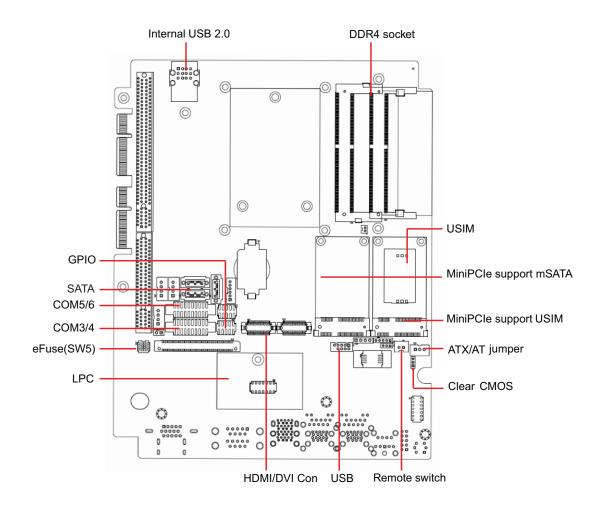
B: Bracket for expansion module

- 1. Undo the 4 screws and remove the bottom cover.
- 2. Undo the HDD tray & expansion module baffle.



- 3. Remove the COM cable and undo the baffle cover.
- 4. Assemble the module on the motherboard. (Note: Optional expansion modules need to be connected with a cable. Please refer to the M/B internal I/O connector specifications on the I/O connector page for the GPIO connector.)
- 5. Assemble the module baffle with screws.
- 6. Replace the bottom cover and secure with the screws.

2.4.7 MIC-770 MB I/O Connector





BIOS Operation

3.1 Introduction

With the AMI BIOS Setup Utility, you can modify BIOS settings and control the specific features of your computer. The Setup Utility uses a number of menus for making changes and turning specific features on or off. This chapter describes the basic navigation of the MIC-770 setup screens.

Aptio Setup Utility – Copyright (C) 2018 American Megatrends, Inc. Main Advanced Chipset Security Boot Save & Exit		
BIOS Information BIOS Vendor Core Version Compliancy Project Version Build Date and Time Access Level Main Board	American Megatrends 5.0.1.3 0.22 x64 UEFI 2.7; PI 1.6 M770Q000060X010 12/19/2018 13:28:30 Administrator MIC-770	Set the Date. Use Tab to switch between Date elements. Default Ranges: Year: 2005–2099 Months: 1–12 Days: dependent on month
System Date System Time Power Type	[Thu 12/27/2018] [15:36:47] ATX	<pre>++: Select Screen fl: Select Item Enter: Select +/-: Change Opt. Fl: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
Version 2.20.1271. Copyright (C) 2018 American Megatrends, Inc.		

Figure 3.1 Main Setup Screen

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

3.2 Entering BIOS Setup

Press to enter the AMI BIOS Setup Utility. The Main menu will appear on the screen. Use the arrow keys to select among the items and press <Enter> to accept or enter the sub-menu.

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 be. The right frame displays the key legend.

The key legend above 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.

Aptio Setup Utility Main Advanced Chipset Security	– Copyright (C) 2018 Americar Boot Save & Exit) Megatrends, Inc.
BIOS Information BIOS Vendor Core Version Compliancy Project Version Build Date and Time Access Level Main Board	American Megatrends 5.0.1.3 0.22 x64 UEFI 2.7; PI 1.6 M770Q000060X010 12/19/2018 13:28:30 Administrator MIC-770	Set the Date. Use Tab to switch between Date elements. Default Ranges: Year: 2005–2099 Months: 1–12 Days: dependent on month
System Date System Time Power Type	[Thu 12/27/2018] [15:36:47] ATX	<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>

3.2.1 Main Menu

When users first enter the BIOS Setup Utility, they 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 described in this section. The Main BIOS Setup screen is shown below.

Aptio Setup Utilit Main Advanced Chipset Securi	<mark>y – Copyright (C) 2018 Americ</mark> ty Boot Save & Exit	can Megatrends, Inc.
BIOS Information BIOS Vendor Core Version Compliancy Project Version Build Date and Time Access Level Main Board	American Megatrends 5.0.1.3 0.22 x64 UEFI 2.7; PI 1.6 M770Q000060X010 12/19/2018 13:28:30 Administrator MIC-770	Set the Date. Use Tab to switch between Date elements. Default Ranges: Year: 2005–2099 Months: 1–12 Days: dependent on month
System Date System Time Power Type	[Thu 12/27/2018] [15:36:47] ATX	<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>
Wersion 2 20 1271	. Copyright (C) 2018 Americar	A Megatrends Inc

Figure 3.2 Main Setup Screen

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.

Chapter 3 BIOS Operation

3.2.2 Advanced BIOS Features Setup

Select the Advanced tab from the MIC-770 setup screen to enter the Advanced BIOS setup screen. You can select any of the items in the left frame of the screen, such as CPU configuration, to go to the sub-menu for that item. You 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.

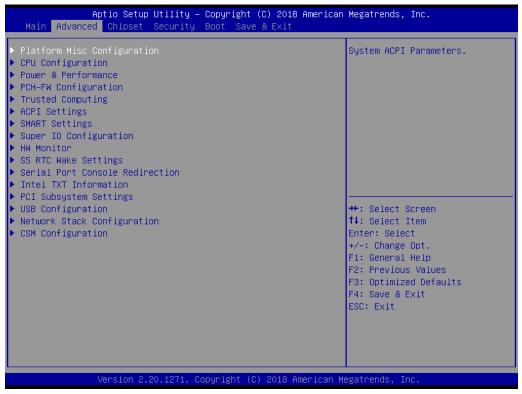


Figure 3.3 Advanced BIOS Features Setup Screen

3.2.2.1 Platform Misc Configuration

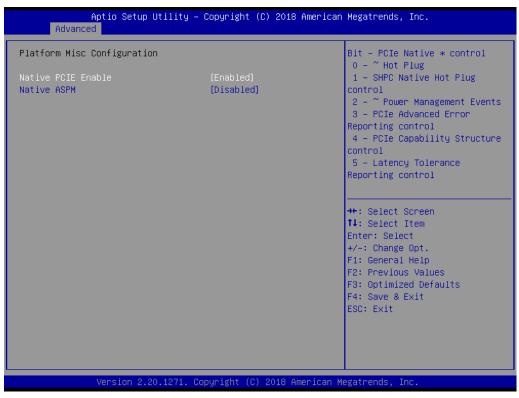


Figure 3.4 Platform Misc Configuration

Platform Misc Configuration

- Native PCIE Enable

PCI Express Native Support Enable/Disable. This is only available in Vista.

Native ASPM

When Enabled, Vista will control the ASPM support for the device. If Disabled, the BIOS will.

3.2.2.2 CPU Configuration

CPU Configuration		To turn on/off the MLC
Туре	Intel(R) Core(TM)	streamer prefetcher.
TD	i5-8500 CPU @ 3.00GHz	
ID Speed	0x906EA 3000 MHz	
L1 Data Cache	32 KB x 6	
L1 Instruction Cache	32 KB X 6	
L2 Cache	256 KB x 6	
L3 Cache	9 MB	
L4 Cache	NZA	
VMX	Supported	
SMX/TXT	Supported	
		++: Select Screen
Hardware Prefetcher	[Enabled]	↑↓: Select Item
Adjacent Cache Line Prefetch	[Enabled]	Enter: Select
Intel (VMX) Virtualization	[Enabled]	+/-: Change Opt.
Technology Active Processor Cores	[A11]	F1: General Help F2: Previous Values
AES	[HII] [Enabled]	F3: Optimized Defaults
Intel Trusted Execution Technology	[Disabled]	F4: Save & Exit
Alias Check Request	[Disabled]	ESC: Exit
DPR Memory Size (MB)	4	
Reset AUX Content	[no]	

Figure 3.5 CPU Configuration

Hardware Prefetcher

Hardware prefetch is a technique that fetches instructions and/or data from memory into the CPU cache memory well before the CPU needs it to improve the load-to-use latency. You may choose to Enable or Disable it.

Adjacent Cache Line Prefetch

The Adjacent Cache-Line Prefetch mechanism, like automatic hardware prefetch, operates without programmer intervention. When it is enabled through the BIOS, two 64-byte cache lines are fetched into a 128-byte sector, regardless of whether the additional cache line has been requested or not. You may choose to Enable or Disable it.

Intel® Virtualization Technology

This feature is used to Enable or Disable the Intel® Virtualization Technology (IVT) extension. It allows multiple operating systems to run simultaneously on the same system by creating virtual machines, each running its own x86 operating system.

Active Processor Core

Use this item to select the number of processor cores you want to activate when you are using a dual or quad-core processor.

AES

Enable or Disable CPA advanced encryption standard instruction.

Intel® Trusted Execution Technology

Enable or Disable utilization of additional hardware capabilities provided by Intel® Trusted Execution Technology. Changes require a full power cycle to take effect.

Rest AUX Content

Reset TPM AUX content. TXT may not be functional after AUX content gets reset.

3.2.2.3 Power & Performance

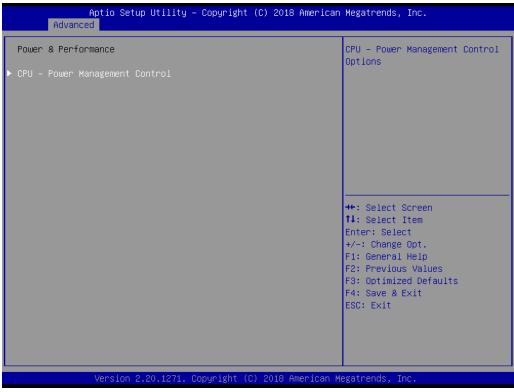


Figure 3.6 Power & Performance



Figure 3.7 CPU Power Management Control

- Boot Performance
 - Select the performance state that the BIOS will set before OS handoff.
- Intel® SpeedStep™ Allows more than two frequency ranges to be supported.

Turbo Mode

Turbo mode.

C-States

Intel® C-states setting for power saving.

3.2.2.4 PCH-FW Configuration

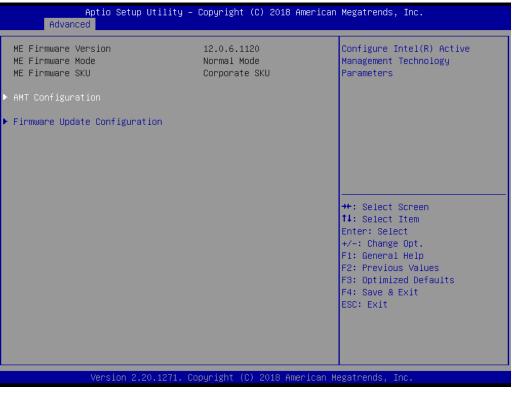


Figure 3.8 PCH-FW Configuration

PCH-FW Version

The PCH-FW page shows Intel® ME FW information.

AMT Configuration

Aptio Setup Util Advanced	ity – Copyright (C) 2018 Am	erican Megatrends, Inc.
ASF support	[Enabled]	Enable/Disable Alert Standard Format support.
USB Provisioning of AMT CIRA Configuration ASF Configuration Secure Erase Configuration OEM Flags Settings MEBx Resolution Settings	[Disabled]	
		++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Version 2.20.12	71. Copyright (C) 2018 Amer	ican Megatrends, Inc.

Figure 3.9 AMT Configuration

CIRA Configuration

Aptio Setup Utility - Advanced	Copyright (C) 2018 American	Megatrends, Inc.
Activate Remote Assistance Process CIRA Timeout	[Disabled] O	Trigger CIRA boot Note: Network Access must be activated first from MEBx Setup.
		<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 2.20.1271. Co	pyright (C) 2018 American M	egatrends, Inc.
Figure 3	8 10 CIRA Configura	tion

Figure 3.10 CIRA Configuration

- Activate Remote Assistance Process Triggers CIRA boot.

Chapter 3 BIOS Operation

ASF Configuration

Aptio Setu Advanced	o Utility – Copyright (C) 2018 A	merican Megatrends, Inc.
PET Progress WatchDog OS Timer BIOS Timer	[Enabled] [Disabled] O O	Enable/Disable PET Events Progress to receive PET Events.
		++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit

Figure 3.11 ASF Configuration

- PET Progress

Enable or Disable PET Progress to receive PET events.

WatchDog
 Enable or Disable the watchdog Timer.

Secure Erase Configuration

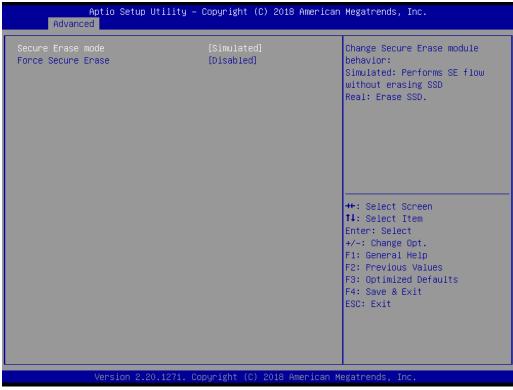


Figure 3.12 Secure Erase Configuration

- Secure Erase mode

Change Secure Erase module behavior to "Simulated" or "Real".

Force Secure Erase
 Enable or Disable to force Secure Erase on the next boot.

OEM Flag Settings

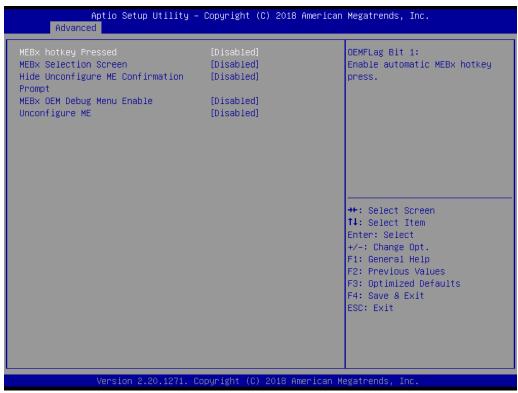


Figure 3.13 OEM Flag Settings

- BIOS Hotkey Pressed
 Enable or Disable BIOS Hotkey press.
- MEBx Selection Screen
 Enable or Disable the MEBx Selection screen.
- Hide Un-Configure ME Confirmation Prompt
 Hide Un-Configure ME without password confirmation prompt.
- MEBx OEM Debug Menu Enable
 Enable or Disable the OEM debug menu in MEBx.
- Unconfigure ME
 Un-Configure ME without a password.

MEBx Resolution Settings



Figure 3.14 MEBx Resolution Settings

- Non-UI Mode Resolution
 Set resolution for non-UI text mode.
- UI Mode Resolution
 Set resolution for UI text mode.
- **Graphics Mode Resolution** Set resolution for graphics mode.

3.2.2.5 Trusted Computing

Configuration		Enables or Disables BIOS
Security Device Support NO Security Device Found	[Disable]	support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
		<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>

Figure 3.15 TPM Settings

TPM Support

Enable or Disable TPM Support. You can purchase the Advantech LPC TPM module to enable the TPM function. P/N: PCA-TPM-00B1E.

3.2.2.6 ACPI Settings

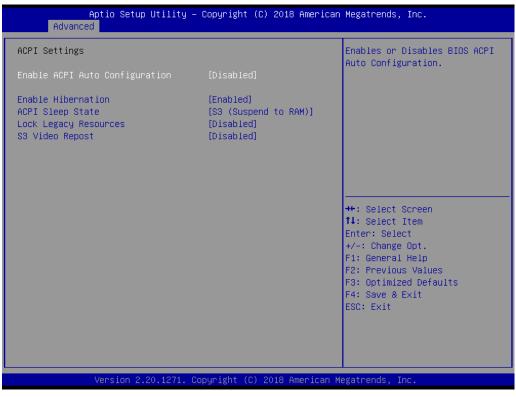


Figure 3.16 ACPI Settings

- Enable Hibernation
 Enable or Disable Hibernation (OS/S4 Sleep State). This option may not be applied in some OS.
 ACPI Sleep State
 - Auto, S1 only, or S3 only ACPI Sleep State.
- Lock Legacy Resources Enable or Disable Lock Legacy Resources.
- S3 Video Repost
 Enable or Disable S3 Video Repost.

3.2.2.7 SMART Settings

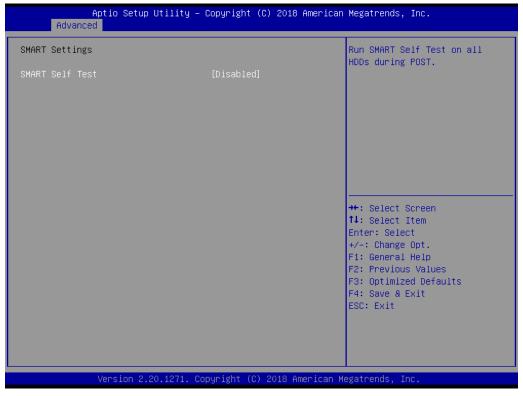


Figure 3.17 SMART Settings

SMART Self Test

Enable or Disable SMART Self Test on all HDDs during POST.

3.2.2.8 Super IO Configuration

MIC-770 supports 2 x RS-232/422/485 on the front side. MIC-770 has 4 more RS-232 (Serial Ports 3, 4, 5, 6) via 2 x DB9 cables in the accessory box.

Aptio Setup Utility – Advanced	Copyright (C) 2018 American) Megatrends, Inc.
Super IO Configuration Super IO Chip	NCT6106D	Set Parameters of Serial Port 1 (COMA)
 Serial Port 1 Configuration Serial Port 2 Configuration Serial Port 3 Configuration Serial Port 4 Configuration Serial Port 5 Configuration Serial Port 6 Configuration 		
		<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 2.20.1271. C	opyright (C) 2018 American M	legatrends, Inc.

Figure 3.18 Super IO Configuration



Figure 3.19 Serial Port 1 Configuration

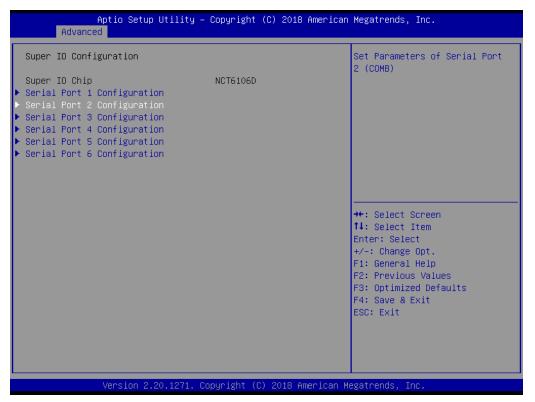


Figure 3.20 Serial Port 2 Configuration

Aptio Setup Utility - Advanced	- Copyright (C) 2018 America	n Megatrends, Inc.
Serial Port 3 Configuration		Enable or Disable Serial Port (COM)
Serial Port Device Settings	(Enabled) IO=3E8h; IRQ=7;	(001)
Change Settings	[Auto]	
		↔: Select Screen t∔: Select Item
		Enter: Select +/−: Change Opt. F1: General Help
		F2: Previous Values F3: Optimized Defaults
		F4: Save & Exit ESC: Exit
Version 2.20.1271. 0	Copyright (C) 2018 American (Megatrends, Inc.

Figure 3.21 Serial Port 3 Configuration

Aptio Setup Utility - Advanced	- Copyright	(C) 2018 American	Megatrends, Inc.
Serial Port 4 Configuration			Enable or Disable Serial Port (COM)
Serial Port Device Settings	[Enabled] IO=2E8h;		((()))
Change Settings	[Auto]		
			<pre>++: Select Screen 1↓: Select Item</pre>
			Enter: Select +/−: Change Opt. F1: General Help
			F2: Previous Values F3: Optimized Defaults
			F4: Save & Exit ESC: Exit
Version 2.20.1271. C	Copyright (C) 2018 American Me	egatrends, Inc.

Figure 3.22 Serial Port 4 Configuration

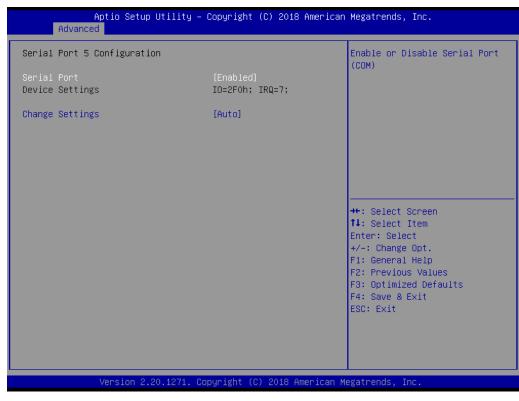


Figure 3.23 Serial Port 5 Configuration

Aptio Setup Utility – (Advanced	Copyright (C) 2018 American	Megatrends, Inc.
Serial Port 6 Configuration		Enable or Disable Serial Port (COM)
Serial Port Device Settings	[Enabled] IO=2EOh; IRQ=7;	
Change Settings	[Auto]	
		↔: Select Screen †↓: Select Item
		Enter: Select +/−: Change Opt. F1: General Help
		F2: Previous Values F3: Optimized Defaults
		F4: Save & Exit ESC: Exit
Version 2.20.1271. Co	oyright (C) 2018 American Mu	egatrends, Inc.

Figure 3.24 Serial Port 6 Configuration

Serial Port 1 Configuration

Serial Port

This item allows users to enable or disable the serial port.

- Change Settings

This item allows users to change the settings of the serial port. The default setting is Auto.

Device Mode

This item allows users to set the mode of serial ports. The default setting is RS-232. When Serial Port 1 (COM1) is set to RS-485 mode, this item should be selected as "RS-485 (Half Duplex)" and further set the Auto Direction (Flow) Control setting to "On (enable)" or "Off (disable)". The default for this Device Mode is "RS-232".

Serial Port 2 Configuration

Serial Port

This item allows users to enable or disable the serial port.

Change Settings

This item allows users to change settings of the serial port. The default setting is Auto.

Device Mode

This item allows users to set the mode of the serial ports. The default setting is RS-232. When Serial Port 2 (COM2) is set to RS-485 mode, this item should be selected as "RS-485 (Half Duplex)" and further set the Auto Direction (Flow) Control setting to "On (enable)" or "Off (disable)". The default for this Device Mode is "RS-232".

Serial Port 3 Configuration

- Serial Port

This item allows users to Disable or Enable the serial port.

- Change Settings

This item allows users to change settings of the serial port. The default setting is Auto.

Serial Port 4 Configuration

- Serial Port
 - This item allows users to Disable or Enable the serial port.

- Change Settings

This item allows users to change settings of the serial port. The default setting is Auto.

Serial Port 5 Configuration

- Serial Port

This item allows users to Disable or Enable the serial port.

- Change Settings

This item allows users to change settings of the serial port. The default setting is Auto.

Serial Port 6 Configuration

- Serial Port

This item allows users to Disable or Enable the serial port.

- Change Settings

This item allows users to change settings of the serial port. The default setting is Auto.

3.2.2.9 H/W Monitor

Aptio Setup Utility - Advanced	Copyright (C) 2018 American	Megatrends, Inc.
	: +36°C : N/A : +70°C : +41°C : N/A : +12.091 V : +4.992 V : +2.960 V [Disabled] [Disabled]	<pre>Hegatrends, Inc. Fan Configuration Parameters. ++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults</pre>
Version 2.20.1271. C	opyright (C) 2018 American M	F4: Save & Exit ESC: Exit egatrends, Inc.

Figure 3.25 PC Health Status

Fan Configuration

To select Manual Mode or SmartFan Mode of the I-module FAN.

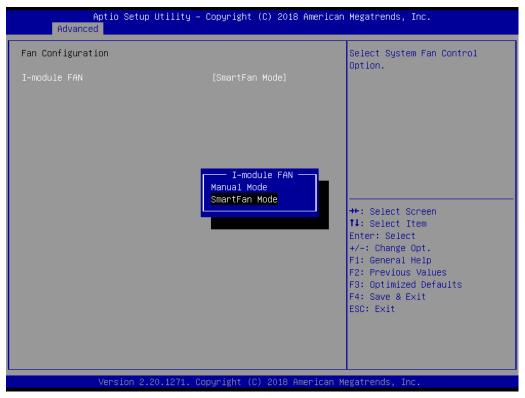


Figure 3.26 Fan Configuration

Case Open Warning

This setting will Enable or Disable the chassis intrusion monitoring function. When it is enabled and the case is opened, the speaker beeps.

■ CPU (PECI) Warning Temperature

Use this item to set the CPU warning temperature. When the system reaches the warning temperature, the speaker will beep.

CPU (PECI) ACPI Shutdown

Use this item to set the ACPI shutdown temperature. When the system reaches the shutdown temperature, it will be automatically shut down by the ACPI OS to protect the system from overheating damage.

Watchdog Timer

This setting will Enable or Disable the watchdog timer.

3.2.2.10 S5 RTC Wake Settings

Aptio Setup U Advanced	tility – Copyright (C) 2018 Ame	erican Megatrends, Inc.
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) ++: Select Screen 11: Select Item Enter: Select +/-: Change Opt.
		F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Version 2.20	.1271. Copyright (C) 2018 Amer.	ican Megatrends, Inc.

Figure 3.27 S5 RTC Wake Settings

Wake system at a Fixed Time

To Enable or Disable system wake on an alarm event. The system will wake on the hr:min:sec as specified.

3.2.2.11 Serial Port Console Redirection

Aptio Setup Utility – (Advanced	Copyright (C) 2018 American	Megatrends, Inc.
 Console Redirection Settings COM1(Pci Bus0,Dev0,Func0) (Disabled) Console Redirection Legacy Console Redirection 	(Disabled) Port Is Disabled	Console Redirection Enable or Disable.
 Legacy Console Redirection Settings Serial Port for Out-of-Band Management Windows Emergency Management Service: Console Redirection Console Redirection 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 2.20.1271. Co	oyright (C) 2018 American Me	egatrends, Inc.

Figure 3.28 Serial Port Console Redirection

- COM1
 - Console Redirection Settings
 Console Redirection Enable or Disable.
- Legacy Console Redirection
 - Legacy Console Redirection Settings
 Legacy Console Redirection Settings.
- Serial Port for Out-of-Band Management / Windows Emergency Management services (EMS)
 - Console Redirection
 Console Redirection Enable or Disable.

Chapter 3 BIOS Operation

3.2.2.12 Intel® TXT Information

Aptio Setup Advanced	Utility – Copyright (C) 2018 American	Megatrends, Inc.
Intel TXT Information		
Chipset BiosAcm Chipset Txt Cpu Txt Error Code Class Code Major Code Minor Code	Production Fused Production Fused Supported None None None None None	<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.	20.1271. Copyright (C) 2018 American M	egatrends, Inc.

Figure 3.29 Intel® TXT Information

3.2.2.13 PCI Subsystem Settings

Aptio Setup Utility – Copyright (C) 2018 A Advanced	merican Megatrends, Inc.
AMI PCI Driver Version : A5.01.17	Globally Enables or Disables Hot-Plug support for the
PCI Settings Common for all Devices: Hot–Plug Support [Enabled]	entire System. If System has Hot-Plug capable Slots and this option set to Enabled, it
Change Settings of the Following PCI Devices:	provides a Setup screen for selecting PCI resource padding
WARNING: Changing PCI Device(s) settings may have unwanted side effects! System may HANG! PROCEED WITH CAUTION.	for Hot-Plug.
	<pre>++: Select Screen f↓: Select Item Enter: Select</pre>
	+/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults
	F4: Save & Exit ESC: Exit
Version 2.20.1271. Copyright (C) 2018 Ame	rican Megatrends, Inc.

Figure 3.30 PCI Subsystem Settings

PCI Settings Common for all Devices

- Hot-Plug Support

Enable or Disable PCI hot-plug support for the entire system.

3.2.2.14 CSM Configuration



Figure 3.31 CSM Configuration

Compatibility Support Module Configuration

- CSM Support

Enable/Disable CSM Support.

CSM16 Module Version

- GateA20 Active

Upon Request - GA20 can be disabled using BIOS services. Do not allow disabling GA20; this option is useful when any RT code is executed above 1MB.

- Option ROM Message

Set display mode for Option ROM.

- INT19 Trap Response

BIOS reaction on INT19 trapping by Option ROM: Immediate - execute the trap right away; Postponed - execute the trap during legacy boot.

Boot option filter

This option controls Legacy/UEFI ROM Priority.

Option ROM execution

- Network

Controls the execution of UEFI and Legacy PXE OpROM.

- Storage

Controls the execution of UEFI and Legacy Storage OpROM.

- Video

Controls the execution of UEFI and Legacy Video OpROM.

- Other PCI devices

Determines the OpROM execution policy for devices other than Network, Storage, or Video.

3.2.2.15 USB Configuration

Aptio Setup Utility – Advanced	Copyright (C) 2018 Americar) Megatrends, Inc.
USB Configuration		Enables Legacy USB support. AUTO option disables legacy
USB Module Version	21	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		only for the applications.
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 Device reset time-out	[20 sec] [20 sec]	↑↓: Select Item Enter: Select
Device power-up delay	[Auto]	+/-: Change Opt.
Mass Storage Devices:		F1: General Help F2: Previous Values
ADATA USB Flash Drive 1100	[Auto]	F3: Optimized Defaults
		F4: Save & Exit ESC: Exit
		Loor Lait
Version 2.20.1271. Cc	opyright (C) 2018American ⊧	legatrends, Inc.
Figure	3.32 USB Configura	tion

Legacy USB support

This is to support USB devices under legacy OS such as DOS. When choosing Auto, the system will automatically detect if any USB devices are plugged into the computer and enable USB legacy mode when a USB device is plugged in and disable USB legacy mode when no USB device is plugged in.

XHCI hand-off

This is a workaround for OS without XHCI hand-off support. The XHCI ownership change should be claimed by the XHCI driver.

USB mass storage driver support

Enable or Disable USB Mass Storage driver support.

USB transfer time-out

Allows you to select the USB transfer time-out value. [1, 5, 10, 20 sec]

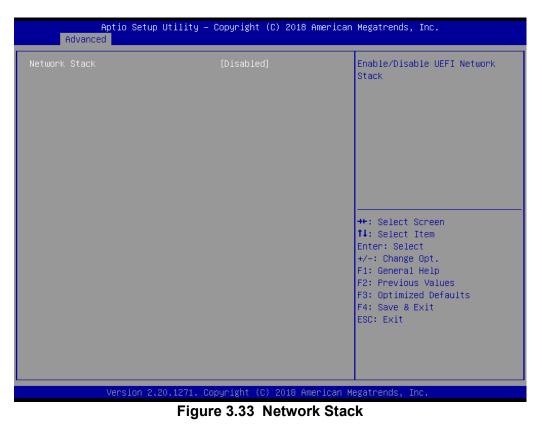
Device reset time-out

Allows you to select the USB device reset time-out value. [10, 20, 30, 40 sec]

Device power-up delay

Maximum time the device will take before it properly reports itself to the Host Controller. Auto uses the default value: for a Root port it is 100 ms, for a Hub port the delay is taken from the Hub descriptor.

3.2.2.16 USB Network Stack Configuration

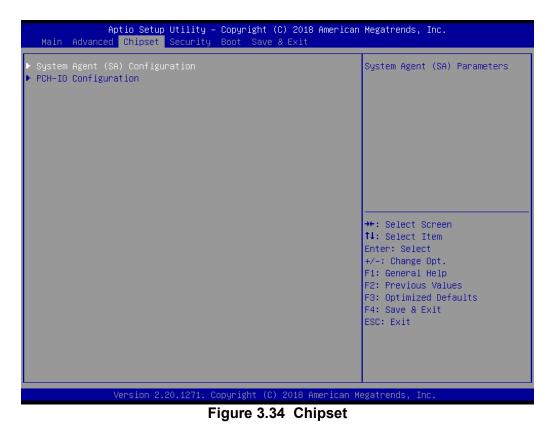


Network Stack

Enable or Disable the UEFI Network Stack.

Chapter 3 BIOS Operation

3.2.3 Chipset



This page provides information for the chipset on MIC-770.

3.2.3.1 System Agent (SA) Configuration

Aptio Setup Utility - Chipset	Copyright (C) 2018 American	Megatrends, Inc.
System Agent (SA) Configuration		Memory Configuration Parameters
SA PCIe Code Version VT-d	7.0.53.66 Supported	
 Memory Configuration Graphics Configuration PEG Port Configuration 		
VT-d Above 4GB MMIO BIOS assignment	[Enabled] [Disabled]	
		<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 2.20.1271. C	opyright (C) 2018 American M	egatrends, Inc.



3.2.3.2 Graphics Configuration

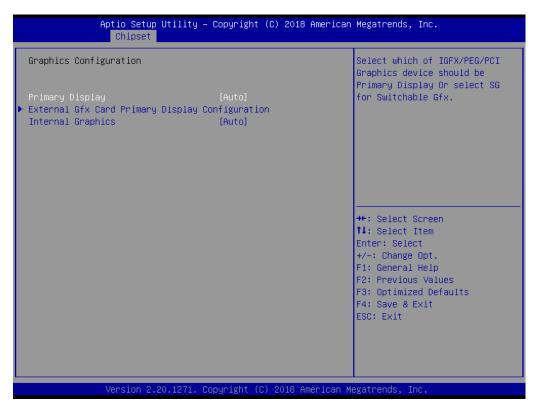




Figure 3.36 Graphics Configuration

Primary Display
Set Primary Display to "Auto", "IGFX", "PEG", "PCI", or "SG".
Primary Display
Select PEG0/PEG1/PEG2/PEG3 graphics device as Primary PEG.

- External Gfx Card Primary Display Configuration
- Primary PEG
 Select Auto/PEG11/PEG12.
- Primary PCIE Select Auto/PCIE1~PCIE19.
- Internal Graphics
 Auto, Disable, or Enable Internal Graphics.

3.2.3.3 PEG Port Configuration

PEG Port Configuration Enable or Disable the Research of the present of the pres	Aptio Setup Util Chipset	ity – Copyright (C) 2018 A	imerican Megatrends, Inc.
Enable Root Port [Auto] Max Link Speed [Auto] PEG 0:1:1 Not Present Enable Root Port [Auto] Max Link Speed [Auto] PEG 0:1:2 Not Present Enable Root Port [Auto] Max Link Speed [Auto] > PEG Port Feature Configuration ++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit	PEG Port Configuration		Enable or Disable the Root Port
++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit	Enable Root Port Max Link Speed PEG 0:1:1 Enable Root Port Max Link Speed PEG 0:1:2 Enable Root Port	[Auto] [Auto] Not Present [Auto] [Auto] Not Present [Auto]	
	▶ PEG Port Feature Configuration		<pre>fl: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit</pre>

Figure 3.37 PEG Port Configuration

Enable Root Port

Enable or Disable the root port.

Max Link Speed

Configure PEG 0:1:0 max speed.



Figure 3.38 PEG Port Feature Configuration

PEG Port Feature Configuration

 Detect Non-Compliance Device
 Detects a non-compliance PCI Express device in PEG. If enabled, it will take more time during the POST phase.

Chapter 3 BIOS Operation

3.2.3.4 Memory Configuration

Aptio Setup Utility - Chipset	Copyright (C) 2018 American	Megatrends, Inc.
Memory Configuration		Maximum Memory Frequency Selections in Mhz. Valid
Memory RC Version Memory Frequency Memory Timings (tCL-tRCD-tRP-tRAS) Total Memory	0.7.1.71 2400 MHz 17-17-17-39 8192 MB	values should match the refclk, i.e. divide by 133 or 100
DIMMA1 DIMMB1 Size Number of Ranks Manufacturer	Not Populated / Disabled Populated & Enabled 8192 MB (DDR4) 1 ADATA	
Maximum Memory Frequency	[Auto]	<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 2.20.1271. C	opyright (C) 2018 American M	egatrends, Inc.

Figure 3.39 Memory Configuration

Maximum Memory Frequency

Maximum memory frequency selections in MHz.

3.2.3.5 PCH-IO Configuration

Aptio Setup Ut Chipset	ility – Copyright (C) 2018 Amer	rican Megatrends, Inc.
<pre>PCH-IO Configuration > PCI Express Configuration > SATA And RST Configuration > USB Configuration > Security Configuration > HD Audio Configuration LAN1 Controller LAN1 Option-ROM LAN2 Controller LAN2 Option-ROM PCIE Wake PowerOn by Modem Restore AC Power loss</pre>	[Enabled] [Disabled] [Enabled] [Disabled] [Disabled] [Disabled] [S5 State]	PCI Express Configuration 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 2.20.	1271. Copyright (C) 2018 Ameri	can Megatrends, Inc.

Figure 3.40 PCH-IO Configuration

LAN1 Controller

Enable or Disable the LAN1 controller.

LAN 1 Option-ROM

Enable or Disable the LAN 1 boot option for legacy network devices.

LAN2 Controller

Enable or Disable the LAN2 controller.

LAN 2 Option-ROM

Enable or Disable the LAN 2 boot option for legacy network devices.

PCIE Wake

Enable or Disable PCIE to wake the system from S5.

PowerOn by Modem

Enable and Disable PowerOn by Modem.

Restore AC Power Loss

Behavior when recovering from AC power loss: "S0" (power on), "S5" (power off or Last State).

Chapter 3 BIOS Operation

3.2.3.6 PCI Express Configuration

PCI Express Root Port 6 Shadowed by x2/x4 port PCI Express Root Port 7 Shadowed by x2/x4 port PCI Express Root Port 8 Shadowed by x2/x4 port PCI Express Root Port 9 Reserved for ethernet PCI Express Root Port 11 Reserved for ethernet PCI Express Root Port 12 Lane configured as PCI Express Root Port 13 Lane configured as USB/SATA USB/SATA PCI Express Root Port 15 Lane configured as USB/SATA USB/SATA PCI Express Root Port 16 Lane configured as PCI Express Root Port 17 Lane configured as USB/SATA USB/SATA PCI Express Root Port 16 Lane configured as PCI Express Root Port 17 Lane configured as USB/SATA USB/SATA PCI Express Root Port 19 Lane configured as USB/SATA USB/SATA PCI Express Root Port 19 Lane configured as USB/SATA USB/SATA PCI Express Root Port 19 Lane configured as USB/SATA USB/SATA PCI Express Root Port 20 Poil Express Root Port 21 PCI Express Root Port 22 <		Aptio S Chip		– Copyright (C) 2018 An	merican Megatrends, Inc.
PCI Express Root Port 8 Shadowed by x2/x4 port PCI Express Root Port 10 PCI Express Root Port 11 PCI Express Root Port 11 PCI Express Root Port 12 PCI Express Root Port 13 Lane configured as USB/SATA PCI Express Root Port 14 Lane configured as USB/SATA PCI Express Root Port 15 Lane configured as USB/SATA PCI Express Root Port 16 PCI Express Root Port 17 Lane configured as USB/SATA PCI Express Root Port 18 Lane configured as USB/SATA PCI Express Root Port 19 PCI Express Root Port 20 PCI Express Root Port 21 PCI Express Root Port 22 Shadowed by x2/x4 port PCI Express Root Port 23 Shadowed by x2/x4 port PCI Express Root Port 3 PCI Express Root Port 4	PCI Express	Root Port	6	Shadowed by x2/x4 po	ort 🔺 PCI Express Root Port Setting
PCI Express Root Port 9 Reserved for ethernet PCI Express Root Port 10 PCI Express Root Port 11 PCI Express Root Port 13 USB/SATA PCI Express Root Port 14 Lane configured as USB/SATA PCI Express Root Port 15 Lane configured as USB/SATA PCI Express Root Port 16 PCI Express Root Port 17 Lane configured as USB/SATA PCI Express Root Port 18 USB/SATA PCI Express Root Port 19 PCI Express Root Port 10 PCI Express Root Port 20 PCI Express Root Port 21 PCI Express Root Port 22 Shadowed by x2/x4 port PCI Express Root Port 23 Shadowed by x2/x4 port PCI Express Root Port 3 PCI Express Root Port	PCI Express	Root Port	7	Shadowed by x2/x4 po	ort
PCI Express Root Port 10 PCI Express Root Port 11 PCI Express Root Port 12 PCI Express Root Port 13 USB/SATA PCI Express Root Port 14 Lane configured as USB/SATA PCI Express Root Port 15 Lane configured as USB/SATA PCI Express Root Port 16 PCI Express Root Port 17 PCI Express Root Port 18 PCI Express Root Port 18 PCI Express Root Port 19 PCI Express Root Port 19 PCI Express Root Port 20 PCI Express Root Port 22 PCI Express Root Port 23 PCI Express Root Port 23 PCI Express Root Port 23 PCI Express Root Port 24 PCI Express Root Port 23 PCI Express Root Port 24 PCI Express Root Port 23 PCI Express Root Port 24 PCI Express Root Port 3 PCI Express PCI Express Root Port 3 PCI Express PCI Express Root Port 3 PCI Express PCI Expres	PCI Express	Root Port	8	Shadowed by x2/x4 po	ort
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PCI Express Root Port 16 WSB/SATA PCI Express Root Port 16 USB/SATA PCI Express Root Port 17 Lane configured as USB/SATA PCI Express Root Port 18 Lane configured as USB/SATA PCI Express Root Port 19 USB/SATA PCI Express Root Port 19 USB/SATA PCI Express Root Port 20 USB/SATA PCI Express Root Port 21 PCI Express Root Port 23 PCI Express Root Port 23 Shadowed by x2/x4 port PCI Express Root Port 24 Shadowed by x2/x4 port PCI Express Root Port 23 Shadowed by x2/x4 port PCI Express Root Port 24 Shadowed by x2/x4 port PCI Express Root Port 23 Shadowed by x2/x4 port PCI Express Root Port 24 Shadowed by x2/x4 port PCI Express Root Port 3 [Enabled] PCI Express Root Port 3 [Enabled] PCI Express Root Port 3 [Auto]	PCI Express	Root Port	14	-	
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PCI Express Root Port 19 F1: General Help PCI Express Root Port 20 F2: Previous Values PCI Express Root Port 21 Shadowed by x2/x4 port PCI Express Root Port 22 Shadowed by x2/x4 port PCI Express Root Port 23 Shadowed by x2/x4 port PCI Express Root Port 24 Shadowed by x2/x4 port PCI Express Root Port 23 Shadowed by x2/x4 port PCI Express Root Port 24 Shadowed by x2/x4 port Version 2.20.1271. Copyright (C) 2018 American Megatrends, Inc. Chipset Megatrends, Inc. PCI Express Root Port 3 [Enabled] PCI Express Root Port 3 [Auto]	PCI Express	Root Port	17		
PCI Express Root Port 20 PCI Express Root Port 21 PCI Express Root Port 22 PCI Express Root Port 24 PCI Express Root Port 24 Shadowed by x2/x4 port F3: Optimized Defaults F4: Save & Exit ESC: Exit Version 2.20.1271. Copyright (C) 2018 American Megatrends, Inc. Chipset Version 2.20.1271. Copyright (C) 2018 American Megatrends, Inc. PCI Express Root Port 3 PCI Express Root Port 3	PCI Express	Root Port	18		
PCI Express Root Port 21 Shadowed by x2/x4 port F4: Save & Exit PCI Express Root Port 23 Shadowed by x2/x4 port ESC: Exit PCI Express Root Port 24 Shadowed by x2/x4 port F4: Save & Exit Version 2.20.1271. Copyright (C) 2018 American Megatrends, Inc. Chipset Optio Setup Utility - Copyright (C) 2018 American Megatrends, Inc. Chipset POI Express Root Port 3 PCI Express Root Port 3 [Enabled] PCI Express Root Port 3 [Enabled] PCI Express Root Port 3 [Auto] Optio Setup Utility - Copyright (C) 2018 American Megatrends, Inc. Chipset PCI Express Root Port 3 PCI Express Root Port 3 PCI Express Root Port 3 [Auto] Control the PCI Express Root Port. Port.	PCI Express	Root Port	19		F2: Previous Values
PCI Express Root Port 22 PCI Express Root Port 23 Shadowed by x2/x4 port ESC: Exit Version 2.20.1271. Copyright (C) 2018 American Megatrends, Inc. Version 2.20.1271. Copyright (C) 2018 American Megatrends, Inc. Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc. Control the PCI Express Root Port 3 [Enabled] PCI Express Root Port 3 PCI Express Root Port 3 Port. Control the PCI Express Root Port. PCI Express Root Port 3 PCI Express Ro	PCI Express	Root Port	20		F3: Optimized Defaults
PCI Express Root Port 23 Shadowed by x2/x4 port PCI Express Root Port 24 Shadowed by x2/x4 port Version 2.20.1271. Copyright (C) 2018 American Megatrends, Inc. Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc. Chipset PCI Express Root Port 3 [Enabled] PCIE Speed [Auto] Control the PCI Express Root Port. Port. ++: Select Screen ++: Select Item Enter: Select	PCI Express		21		F4: Save & Exit
PCI Express Root Port 24 Shadowed by x2/x4 port Version 2.20.1271. Copyright (C) 2018 American Megatrends, Inc. Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc. Chipset PCI Express Root Port 3 [Enabled] PCIe Speed [Auto] Control the PCI Express Root Port. +*: Select Screen 1: Select Item Enter: Select	PCI Express	Root Port	22	Shadowed by x2/x4 po	ort ESC: Exit
Version 2.20.1271. Copyright (C) 2018 American Megatrends, Inc. Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc. Chipset PCIE Express Root Port 3 [Enabled] PCIE Speed Control the PCI Express Root Port. ++: Select Screen 14: Select Item Enter: Select	PCI Express	Root Port	23	Shadowed by x2/x4 p	ort
Chipset PCI Express Root Port 3 [Enabled] PCIe Speed [Auto] Control the PCI Express Root Port. Port. Press Root Port 3 [Auto] Port. Port. <t< th=""><th></th><th>Versio</th><th>n 2.20.1271.</th><th>Copyright (C) 2018 Amer</th><th>rican Megatrends, Inc.</th></t<>		Versio	n 2.20.1271.	Copyright (C) 2018 Amer	rican Megatrends, Inc.
PCIe Speed [Auto] Port. ++: Select Screen 14: Select Item Enter: Select				– Copyright (C) 2018 An	merican Megatrends, Inc.
↑↓: Select Item Enter: Select		Root Port	3		
↑↓: Select Item Enter: Select					
↑↓: Select Item Enter: Select					
↑↓: Select Item Enter: Select					
↑↓: Select Item Enter: Select					
Enter: Select					
+/-: Change Ont.					
					↑↓: Select Item

Figure 3.41 PCI Express Root Port Setting

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PCI Express Root Port 1

Enable or Disable PCI Express Root Port.

 PCle Speed Select "Auto, Gen1, Gen2, Gen3" for PCle Speed.

F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit

3.2.3.7 SATA and RST Configuration

Aptio Setup Uti Chipset	lity – Copyright (C) 2018 Amer	rican Megatrends, Inc.
SATA And RST Configuration		▲ Enable/Disable SATA Device.
SATA Controller(s)	[Enabled]	
SATA Mode Selection	[AHCI]	
SATA Controller Speed	[Default]	
Serial ATA Port O	Empty	
Software Preserve	Unknown	
Port 0	[Enabled]	
Hot Plug Configured as eSATA	[Enabled] Hot Plug supported	
Spin Up Device	[Disabled]	
SATA Device Type	[Hard Disk Drive]	
Serial ATA Port 1	Empty	↔: Select Screen
Software Preserve	Unknown	↑↓: Select Item
Port 1	[Enabled]	Enter: Select
Hot Plug	[Enabled]	+/-: Change Opt.
Configured as eSATA	Hot Plug supported	F1: General Help
Spin Up Device	[Disabled]	F2: Previous Values
SATA Device Type Serial ATA Port 2	[Hard Disk Drive] Empty	F3: Optimized Defaults F4: Save & Exit
Software Preserve	Unknown	ESC: Exit
Port 2	[Enabled]	
Hot Plug	[Enabled]	
Configured as eSATA	Hot Plug supported	▼
	271 Conuright (C) 2018 Americ	can Megatrends Inc
	271. Copyright (C) 2018 Americ	can Megatrends, Inc.
Version 2.20.1 Aptio Setup Uti	271. Copyright (C) 2018 Americ lity – Copyright (C) 2018 Amer	
Version 2.20.1 Aptio Setup Uti Chipset	lity – Copyright (C) 2018 Amer	rican Megatrends, Inc.
Version 2.20.1 Aptio Setup Uti Chipset Hot Plug	lity – Copyright (C) 2018 Amer [Enabled]	rican Megatrends, Inc.
Version 2.20.1 Aptio Setup Uti Chipset Hot Plug Configured as eSATA	lity – Copyright (C) 2018 Amer [Enabled] Hot Plug supported	rican Megatrends, Inc. ▲ Identify the SATA port is ■ connected to Solid State Drive
Version 2.20.1 Aptio Setup Uti Chipset Hot Plug Configured as eSATA Spin Up Device	lity – Copyright (C) 2018 Amer [Enabled] Hot Plug supported [Disabled]	rican Megatrends, Inc.
Version 2.20.1 Aptio Setup Uti Chipset Hot Plug Configured as eSATA Spin Up Device SATA Device Type	lity – Copyright (C) 2018 Amer [Enabled] Hot Plug supported [Disabled] [Hard Disk Drive]	rican Megatrends, Inc. ▲ Identify the SATA port is ■ connected to Solid State Drive
Version 2.20.1 Aptio Setup Uti Chipset Hot Plug Configured as eSATA Spin Up Device	lity – Copyright (C) 2018 Amer [Enabled] Hot Plug supported [Disabled]	rican Megatrends, Inc. ▲ Identify the SATA port is ■ connected to Solid State Drive
Version 2.20.1 Aptio Setup Uti Chipset Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 3	lity – Copyright (C) 2018 Amer [Enabled] Hot Plug supported [Disabled] [Hard Disk Drive] Empty	rican Megatrends, Inc. ▲ Identify the SATA port is ■ connected to Solid State Drive
Version 2.20.1 Aptio Setup Uti Chipset Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 3 Software Preserve Port 3 Hot Plug	lity - Copyright (C) 2018 Amer [Enabled] Hot Plug supported [Disabled] [Hard Disk Drive] Empty Unknown [Enabled] [Enabled]	rican Megatrends, Inc. ▲ Identify the SATA port is ■ connected to Solid State Drive
Version 2.20.1 Aptio Setup Uti Chipset Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 3 Software Preserve Port 3 Hot Plug Configured as eSATA	lity - Copyright (C) 2018 Amer [Enabled] Hot Plug supported [Disabled] [Hard Disk Drive] Empty Unknown [Enabled] [Enabled] Hot Plug supported	rican Megatrends, Inc. ▲ Identify the SATA port is ■ connected to Solid State Drive
Version 2.20.1 Aptio Setup Uti Chipset Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 3 Software Preserve Port 3 Hot Plug Configured as eSATA Spin Up Device	lity - Copyright (C) 2018 Amer [Enabled] Hot Plug supported [Disabled] [Hard Disk Drive] Empty Unknown [Enabled] [Enabled] Hot Plug supported [Disabled]	rican Megatrends, Inc. ▲ Identify the SATA port is ■ connected to Solid State Drive
Version 2.20.1 Aptio Setup Uti Chipset Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 3 Software Preserve Port 3 Hot Plug Configured as eSATA Spin Up Device SATA Device Type	lity - Copyright (C) 2018 Amer [Enabled] Hot Plug supported [Disabled] [Hard Disk Drive] Empty Unknown [Enabled] [Enabled] Hot Plug supported [Disabled] [Hard Disk Drive]	rican Megatrends, Inc. ▲ Identify the SATA port is ■ connected to Solid State Drive
Version 2.20.1 Aptio Setup Uti Chipset Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 3 Software Preserve Port 3 Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 4	lity - Copyright (C) 2018 Amer [Enabled] Hot Plug supported [Disabled] [Hard Disk Drive] Empty Unknown [Enabled] [Enabled] Hot Plug supported [Disabled] [Hard Disk Drive] Empty	rican Megatrends, Inc. ▲ Identify the SATA port is ■ connected to Solid State Drive
Version 2.20.1 Aptio Setup Uti Chipset Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 3 Software Preserve Port 3 Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 4 Software Preserve	lity - Copyright (C) 2018 Amer [Enabled] Hot Plug supported [Disabled] [Hard Disk Drive] Empty Unknown [Enabled] [Enabled] Hot Plug supported [Disabled] [Hard Disk Drive]	 A Identify the SATA port is connected to Solid State Drive or Hard Disk Drive
Version 2.20.1 Aptio Setup Uti Chipset Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 3 Software Preserve Port 3 Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 4	lity - Copyright (C) 2018 Amer [Enabled] Hot Plug supported [Disabled] [Hard Disk Drive] Empty Unknown [Enabled] Hot Plug supported [Disabled] [Hard Disk Drive] Empty Unknown	rican Megatrends, Inc. ▲ Identify the SATA port is ■ connected to Solid State Drive
Version 2.20.1 Aptio Setup Uti Chipset Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 3 Software Preserve Port 3 Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 4 Software Preserve Port 4	lity - Copyright (C) 2018 Amer [Enabled] Hot Plug supported [Disabled] [Hard Disk Drive] Empty Unknown [Enabled] Hot Plug supported [Disabled] [Hard Disk Drive] Empty Unknown [Enabled]	 Identify the SATA port is connected to Solid State Drive or Hard Disk Drive ++: Select Screen
Version 2.20.1 Aptio Setup Uti Chipset Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 3 Software Preserve Port 3 Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 4 Software Preserve Port 4 Hot Plug	lity - Copyright (C) 2018 Amer [Enabled] Hot Plug supported [Disabled] [Hard Disk Drive] Empty Unknown [Enabled] Hot Plug supported [Disabled] [Hard Disk Drive] Empty Unknown [Enabled] [Enabled] [Enabled] Hot Plug supported [Disabled]	 Identify the SATA port is connected to Solid State Drive or Hard Disk Drive ++: Select Screen 11: Select Item Enter: Select +/-: Change Opt.
Version 2.20.1 Aptio Setup Uti Chipset Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 3 Software Preserve Port 3 Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 4 Software Preserve Port 4 Hot Plug Configured as eSATA Spin Up Device SATA Device Type	lity - Copyright (C) 2018 Amer [Enabled] Hot Plug supported [Disabled] [Hard Disk Drive] Empty Unknown [Enabled] Hot Plug supported [Disabled] [Hard Disk Drive] Empty Unknown [Enabled] [Enabled] [Enabled] Hot Plug supported [Disabled] Hot Plug supported [Disabled] [Hard Disk Drive]	 A Identify the SATA port is connected to Solid State Drive or Hard Disk Drive ++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help
Version 2.20.1 Aptio Setup Uti Chipset Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 3 Software Preserve Port 3 Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 4 Software Preserve Port 4 Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 5	lity - Copyright (C) 2018 Amer [Enabled] Hot Plug supported [Disabled] [Hard Disk Drive] Empty Unknown [Enabled] Hot Plug supported [Disabled] [Hard Disk Drive] Empty Unknown [Enabled] [Enabled] Hot Plug supported [Disabled] [Hard Disk Drive] Empty Empty Empty	 A Identify the SATA port is connected to Solid State Drive or Hard Disk Drive ++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values
Version 2.20.1 Aptio Setup Uti Chipset Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 3 Software Preserve Port 3 Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 4 Software Preserve Port 4 Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 5 Software Preserve	lity - Copyright (C) 2018 Amer [Enabled] Hot Plug supported [Disabled] [Hard Disk Drive] Empty Unknown [Enabled] Hot Plug supported [Disabled] [Hard Disk Drive] Empty Unknown [Enabled] [Enabled] Hot Plug supported [Disabled] Hot Plug supported [Disabled] Hot Plug supported [Disabled] Hard Disk Drive] Empty Unknown	 Pican Megatrends, Inc. Identify the SATA port is connected to Solid State Drive or Hard Disk Drive ++: Select Screen ++: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults
Version 2.20.1 Aptio Setup Uti Chipset Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 3 Software Preserve Port 3 Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 4 Software Preserve Port 4 Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 5 Software Preserve Port 5	lity - Copyright (C) 2018 Amer [Enabled] Hot Plug supported [Disabled] [Hard Disk Drive] Empty Unknown [Enabled] [Enabled] Hot Plug supported [Disabled] [Hard Disk Drive] Empty Unknown [Enabled] Hot Plug supported [Disabled] Hot Plug supported [Disabled] [Hard Disk Drive] Empty Unknown [Enabled]	 A Identify the SATA port is connected to Solid State Drive or Hard Disk Drive ++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit
Version 2.20.1 Aptio Setup Uti Chipset Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 3 Software Preserve Port 3 Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 4 Software Preserve Port 4 Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 5 Software Preserve Port 5 Hot Plug	lity - Copyright (C) 2018 Amer [Enabled] Hot Plug supported [Disabled] [Hard Disk Drive] Empty Unknown [Enabled] Hot Plug supported [Disabled] [Hard Disk Drive] Empty Unknown [Enabled] Hot Plug supported [Disabled] Hard Disk Drive] Empty Unknown [Enabled] [Hard Disk Drive] Empty Unknown [Enabled] [Hard Disk Drive] Empty Unknown [Enabled] [Enabled] [Enabled] [Enabled] [Enabled] [Enabled]	 Pican Megatrends, Inc. Identify the SATA port is connected to Solid State Drive or Hard Disk Drive ++: Select Screen ++: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults
Version 2.20.1 Aptio Setup Uti Chipset Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 3 Software Preserve Port 3 Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 4 Software Preserve Port 4 Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 5 Software Preserve Port 5 Hot Plug Configured as eSATA	lity - Copyright (C) 2018 Amer [Enabled] Hot Plug supported [Disabled] [Hard Disk Drive] Empty Unknown [Enabled] Hot Plug supported [Disabled] [Hard Disk Drive] Empty Unknown [Enabled] [Enabled] Hot Plug supported [Disabled] [Hard Disk Drive] Empty Unknown [Enabled] [Hard Disk Drive] Empty Unknown [Enabled] [Hard Disk Drive] Empty Unknown [Enabled] [Enabled] [Enabled] [Enabled] [Enabled] Hot Plug supported	 Identify the SATA port is connected to Solid State Drive or Hard Disk Drive ++: Select Screen ti Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit
Version 2.20.1 Aptio Setup Uti Chipset Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 3 Software Preserve Port 3 Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 4 Software Preserve Port 4 Hot Plug Configured as eSATA Spin Up Device SATA Device Type Serial ATA Port 5 Software Preserve Port 5 Hot Plug	lity - Copyright (C) 2018 Amer [Enabled] Hot Plug supported [Disabled] [Hard Disk Drive] Empty Unknown [Enabled] Hot Plug supported [Disabled] [Hard Disk Drive] Empty Unknown [Enabled] Hot Plug supported [Disabled] Hard Disk Drive] Empty Unknown [Enabled] [Hard Disk Drive] Empty Unknown [Enabled] [Hard Disk Drive] Empty Unknown [Enabled] [Enabled] [Enabled] [Enabled] [Enabled] [Enabled]	 Identify the SATA port is connected to Solid State Drive or Hard Disk Drive ++: Select Screen ti Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit

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Figure 3.42 SATA Configuration

SATA Controller(s)
Enable or Disable the SATA Controller.

SATA Mode Selection
 This can be configured as RAID or AHCI.

SATA Controller Speed

Indicates the maximum speed the SATA controller can support by selecting Default, Gen1, Gen2, Gen3.

- Port 0~5
 Enable or Disable SATA port 0~5.
- Hot Plug Enable or Disable SATA Hot-Plug.
- Spin up Device Enable or Disable spin up device.
- SATA Device Type To identify the SATA that is connected to a Solid State or Hard Disk Drive.

3.2.3.8 USB Configuration

Aptio Setup U Chipset	tility – Copyright (C) 2018 Am	merican Megatrends, Inc.
USB Configuration		Option to enable Compliance Mode. Default is to disable
XHCI Compliance Mode	[Disabled]	Compliance Mode. Change to enabled for Compliance Mode testing.
		++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Version 2.20.1271. Copyright (C) 2018 American Megatrends, Inc.		

Figure 3.43 USB Configuration

XHCI Compliance mode

There is an option to Enable or Disable XHCI compliance mode. The default is to disable compliance mode.

3.2.3.9 HD Audio Configuration



Figure 3.44 HD Audio Configuration

HD Audio

Control detection of the HD-Audio device. Disable = HDA will be unconditionally disabled. Enable = HDA will be unconditionally enabled.

3.2.3.10 Security Configuration



Figure 3.45 Security Configuration

RTC Memory Lock

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

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

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

3.2.4 Security

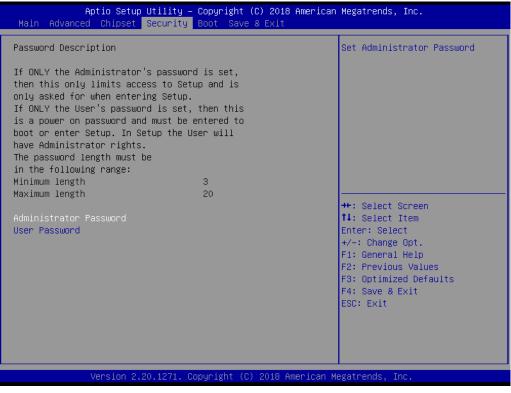


Figure 3.46 Security

Select Security Setup from the MIC-770 Main BIOS setup menu. All security setup options, such as password protection, are described in this section. To access the sub-menu for the following items, select the item and press <Enter>.

Note!

If only the user's password is set, the user will have administrator rights. Setting an administrator password is strongly recommended if you have security concerns.

Chapter 3 BIOS Operation

3.2.5 Boot

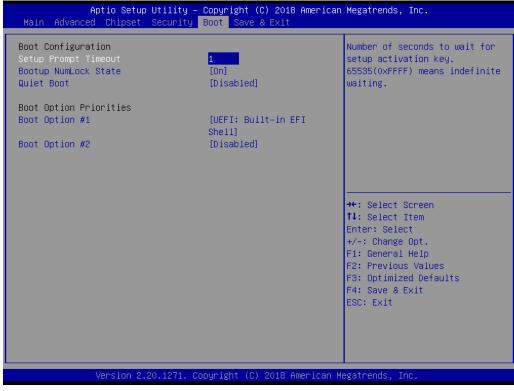


Figure 3.47 Boot

Setup Prompt Timeout

Use the <+> and <-> keys to adjust the number of seconds to wait for the setup activation key.

- Bootup NumLock State
 On or Off power-on state for the NumLock.
- Quiet Boot
 Enable or Disable the Quiet Boot option.
- Boot Option Priorities Sets the boot order.

Hard Drive BBS Priorities Sets the order of the legacy devices on this

Sets the order of the legacy devices on this group.

3.2.6 Save & Exit

Aptio Setup Utility – Copyright (C) 2018 Ame Main Advanced Chipset Security Boot <mark>Save & Exit</mark>	erican Megatrends, Inc.		
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	Exit system setup after saving the changes.		
Save as User Defaults Restore User Defaults Boot Override UEFI: Built-in EFI Shell	<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 2.20.1271. Copyright (C) 2018 American Megatrends, Inc.			
Figure 2 48 Save 8 Exit			

Figure 3.48 Save & Exit

Save Changes and Exit

When you complete system configuration, select this option to save your changes, exit BIOS setup, and reboot the computer so the new system configuration parameters can take effect.

1. Select Exit Saving Changes from the Exit menu and press <Enter>. The following message appears:

Save Configuration Changes and Exit Now?

[Yes] [No]

2. Select Yes or No.

Discard changes and Exit

Select this option to quit Setup without making any permanent changes to the system configuration.

1. Select Exit Discarding Changes from the Exit menu and press <Enter>. The following message appears:

Quit without saving?

[Yes] [No]

2. Select Yes to discard changes and exit.

Discard Changes

Select Discard Changes from the Exit menu and press <Enter>.



Software Installation

This chapter introduces driver installation.

4.1 Before you Begin

To facilitate the installation of the enhanced display drivers and utility software, read the instructions in this chapter carefully. The drivers for the MIC-770 are located on the software installation CD.



For system stability, installing the drivers in the following sequence is highly recommended:

- Chipset
- Graphics
- ME
- Other drivers

Before you begin, it is important to note that most display drivers need to have the relevant software application already installed in the system prior to installing the enhanced display drivers. In addition, many of the installation procedures assume that you are familiar with both the relevant software applications and operating system commands. Review the relevant operating system commands and the pertinent sections of your application software's user manual before performing the installation.

4.2 Introduction

The Intel® Chipset Software Installation (CSI) utility installs the Windows INF files that outline to the operating system how the chipset components will be configured. This is needed for the proper functioning of the following features:

- Core PCI PnP services
- Serial ATA interface support
- Identification of Intel chipset components in the Device Manager.



The chipset driver is used for the following versions of Windows, and it has to be installed before installing all the other drivers:



Windows 10 (64-bit)

4.3 Windows Driver Setup

Enter the Advantech support website, then search for MIC-770. There you can find the MIC-770 drivers.



Programming the Watchdog Timer

A.1 Programming the Watchdog Timer

The MIC-770 watchdog timer can be used to monitor system software operation and take corrective action if the software fails to function within the programmed period. This section describes the operation of the watchdog timer and how to program it.

A.1.1 Watchdog Timer Overview

The watchdog timer is built into the super I/O controller NCT6106D. It provides the following user-programmable functions:

- It can be enabled and disabled by the user.
- The timer can be set from 1 to 255 seconds or 1 to 255 minutes.
- It generates an interrupt or resets the signal if the software fails to reset the timer before time-out.

A.1.2 Programming the Watchdog Timer

The I/O port address of the watchdog timer is 2E (hex) and 2F (hex). 2E (hex) is the address port. 2F (hex) is the data port. You must first assign the address of register by writing an address value into address port 2E (hex), then write/read data to/from the assigned register through data port 2F (hex).

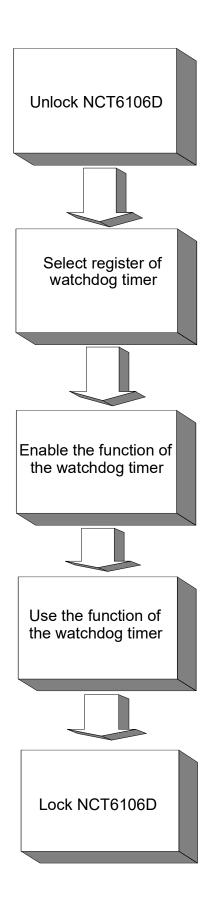


Table A.1: Watchdog	Timer Regi	sters
Address of Register (2E)	Attribute	
Read/Write	Value (2F) & Description	
87 (hex)		Write this address to I/O address port 2E (hex) twice to unlock the NCT6106D.
07 (hex)	write	Write 08 (hex) to select the register of the watch- dog timer.
30 (hex)	write	Write 01 (hex) to enable the function of the watch- dog timer. Disabled is set as default.
F0 (hex)	write	Set seconds or minutes as units for the timer. Write 0 to bit 3: set seconds as the counting unit. [default] Write 1 to bit 3: set minutes as the counting unit.
F1 (hex)	write	0: stop timer [default] 01~FF (hex): The amount of the count, in seconds or minutes, depends on the value set in register F5 (hex). This number decides how long the watch- dog timer waits for the strobe before generating an interrupt or reset signal. Writing a new value to this register can reset the timer to count with the new value.
F2 (hex)	read/write	Bit 7: Write 1 to enable the mouse to reset the timer, 0 to disable [default]. Bit 6: Write 1 to enable the keyboard to reset the timer, 0 to disable [default]. Bit 5: Write 1 to generate a timeout signal immedi- ately and automatically return to 0 [default=0]. Bit 4: Read status of the watchdog timer, 1 means the timer is "timeout".
AA (hex)		Write this address to I/O port 2E (hex) to lock watchdog timer 2.

A.1.3 Example Program

1. Enable the watchdog timer and set 10 seconds as the timeout interval

:-----Mov dx,2eh ; Unlock NCT6106D Mov al,87h Out dx,al Out dx,al :-----Mov al,07h ; Select registers of the watchdog timer Out dx,al Inc dx Mov al,08h Out dx.al ;-----Dec dx ; Enable the function of the watchdog timer Mov al,30h Out dx,al Inc dx Mov al.01h Out dx,al ;-----Dec dx ; Set seconds as the counting unit Mov al,0f0h Out dx,al Inc dx In al,dx And al,not 08h Out dx.al :-----Dec dx ; Set timeout interval as 10 seconds and start counting Mov al,0f1h Out dx.al Inc dx Mov al,10 Out dx.al ;-----Dec dx ; Lock NCT6106D Mov al,0aah Out dx,al 2. Enable the watchdog timer and set 5 minutes as the timeout interval ·-----Mov dx,2eh ; Unlock NCT6106D Mov al,87h Out dx,al

Out dx,al :-----Mov al,07h ; Select registers of the watchdog timer Out dx,al Inc dx Mov al,08h Out dx,al :-----Dec dx ; Enable the function of the watchdog timer Mov al.30h Out dx,al Inc dx Mov al.01h Out dx,al :-----Dec dx ; Set minutes as the counting unit Mov al,0f0h Out dx,al Inc dx In al,dx Or al,08h Out dx,al :-----Dec dx ; Set timeout interval as 5 minutes and start counting Mov al,0f1h Out dx,al Inc dx Mov al,5 Out dx,al ;-----Dec dx ; Lock NCT6106D Mov al,0aah Out dx,al 3. Enable the watchdog timer to be reset by mouse :-----Mov dx,2eh ; Unlock NCT6106D Mov al,87h Out dx,al Out dx.al ;-----Mov al,07h ; Select registers of the watchdog timer Out dx,al Inc dx Mov al,08h Out dx,al

_____ Dec dx ; Enable the function of the watchdog timer Mov al,30h Out dx,al Inc dx Mov al,01h Out dx,al ·-----Dec dx; Enable the watchdog timer to be reset by mouse Mov al.0f2h Out dx,al Inc dx In al.dx Or al,80h Out dx,al ;-----Dec dx ; Lock NCT6106D Mov al,0aah Out dx,al Enable the watchdog timer to be reset by keyboard 4. :-----Mov dx,2eh ; Unlock NCT6106D Mov al,87h Out dx,al Out dx.al :-----Mov al,07h ; Select registers of the watchdog timer Out dx,al Inc dx Mov al,08h Out dx,al :-----Dec dx ; Enable the function of watchdog timer Mov al,30h Out dx,al Inc dx Mov al,01h Out dx,al ;-----Dec dx ; Enable the watchdog timer to be strobe reset by keyboard Mov al,0f2h Out dx,al Inc dx In al,dx Or al,40h

Out dx,al :-----Dec dx ; Lock NCT6106D Mov al,0aah Out dx,al 5. Generate a time-out signal without the timer counting ;-----Mov dx,2eh ; Unlock NCT6106D Mov al,87h Out dx,al Out dx,al ;-----Mov al,07h ; Select registers of the watchdog timer Out dx,al Inc dx Mov al,08h Out dx,al ;-----Dec dx ; Enable the function of the watchdog timer Mov al,30h Out dx,al Inc dx Mov al,01h Out dx,al ;-----Dec dx ; Generate a time-out signal Mov al,0f2h Out dx,al ;Write 1 to bit 5 of F7 register Inc dx In al,dx Or al,20h Out dx,al ;<u>------</u> Dec dx ; Lock NCT6106D Mov al,0aah Out dx,al



Programming the GPIO

B.1 Supported GPIO Register

Below is a detailed description of the GPIO addresses and a programming sample.

B.1.1 GPIO Registers

GPIO 1

CRF0 (GP10-GP17 I/O selection register. Default 0xFF)

When set to '1', the respective GPIO port is programmed as an input port. When set to '0', the respective GPIO port is programmed as an output port.

CRF1 (GP10-GP17 data register. Default 0x00)

If a port is programmed to be an output port, then its respective bit can be read/written.

If a port is programmed to be an input port, then its respective bit can only be read.

CRF2 (GP10-GP17 inversion register. Default 0x00)

When set to '1', the incoming/outgoing port value is inverted. When set to '0', the incoming/outgoing port value is the same as in the data register.

GPIO 0

CREC (GP00-GP07 I/O selection register. Default 0xFF)

When set to '1', the respective GPIO port is programmed as an input port. When set to '0', the respective GPIO port is programmed as an output port.

CRED (GP00-GP07 data register. Default 0xFF)

If a port is programmed to be an output port, then its respective bit can be read/written.

If a port is programmed to be an input port, then its respective bit can only be read.

CREE (GP00-GP07 inversion register. Default 0x00)

When set to '1', the incoming/outgoing port value is inverted. When set to '0', the incoming/outgoing port value is the same as in the data register.

Extended Function Index Registers (EFIRs)

The EFIRs are write-only registers with port address 2Eh or 4Eh on PC/AT systems.

Extended Function Data Registers (EFDRs)

The EFDRs are read/write registers with port address 2Fh or 4Fh on PC/AT systems.

B.1.2 GPIO Example Program

Enter the extended function mode, interruptible double-write

MOV DX, 2EH MOV AL, 87H OUT DX, AL OUT DX, AL _____ Configure logical device 7(GP10~GP17), configuration register CRE4,CRE5,CRE6 -----MOV DX, 2EH MOV AL, 07H; Point to Logical Device Number Reg. OUT DX, AL MOV DX, 2FH MOV AL, 07H ; Select logical device 7 OUT DX, AL -----Configure GPIO1 I/O Register _____ MOV DX, 2EH MOV AL, EC OUT DX, AL MOV DX, 2FH MOV AL, ??H ; 0: The respective GPIO1 PIN is programmed as an output port ;1: The respective GPIO1 PIN is programmed as an input port. OUT DX, AL Configure GPIO1 Inversion Register MOV DX, 2EH MOV AL, EE OUT DX, AL MOV DX, 2FH MOV AL, 00H ; Set GPIO is normal not inverter OUT DX, AL Configure GPIO1 Data Register _____ MOV DX, 2EH MOV AL, ED OUT DX, AL

MOV DX, 2FH MOV AL, ??H ; Put the output value into AL

OUT DX, AL

Exit extended function mode |

MOV DX, 2EH MOV AL, AAH OUT DX, AL _____



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