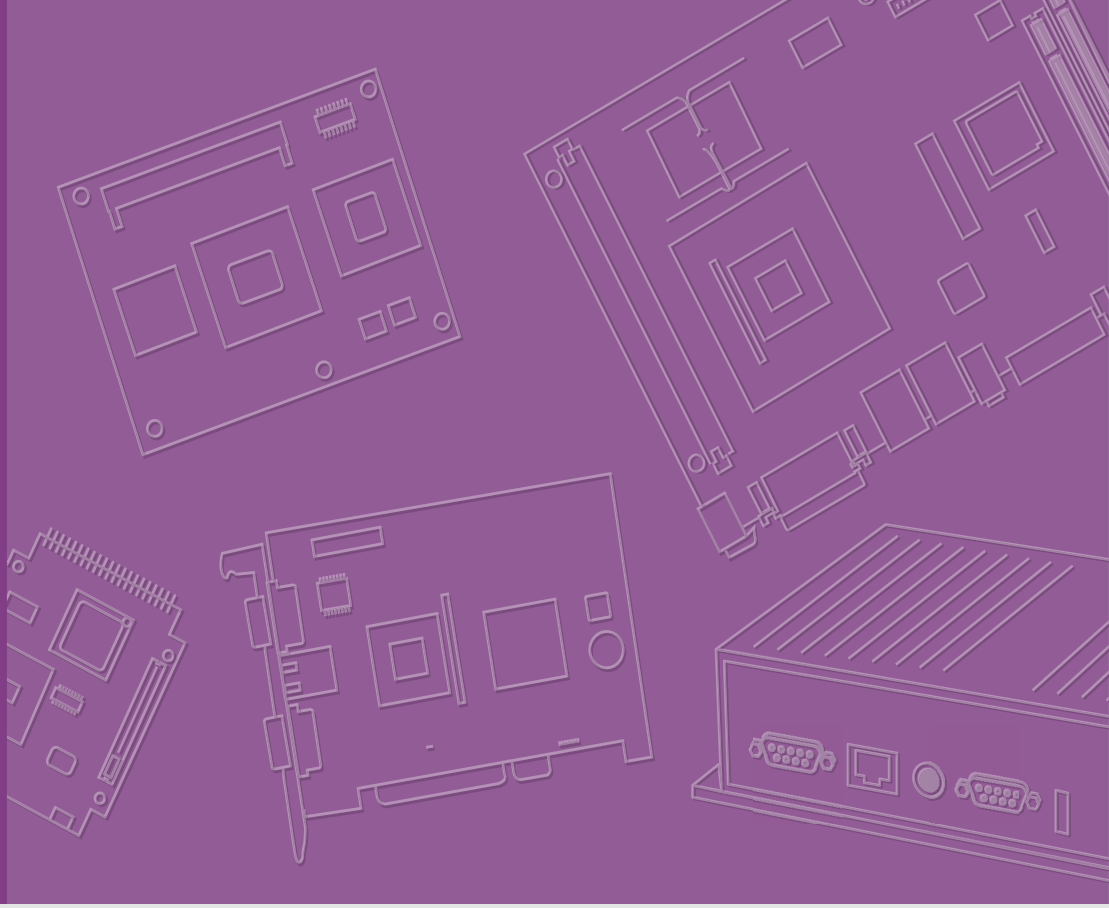

User Manual

MIC-770

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

Trusted ePlatform Services

ADVANTECH

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Part No. Edition 2

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Product Warranty (2 years)

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

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

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

Declaration of Conformity

FCC Class 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."

Note! *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	P/N: 2041077001
■ 4-pin Phoenix connector	P/N: 1652003234
■ 2 x mounting bracket	P/N: 1960070543T00A
■ 1 x SATA cable	P/N: 1700013095-01
■ 1 x SATA power cable	P/N: 1700024372-01
■ Thermal pad for memory	P/N: 1990019498N000
■ Thermal grease for the CPU	P/N: 2170000093-01

Ordering Information

Module Number	PCH	VGA	HDMI	2.5" HDD/ SSD	USB 3.1/3.0/ 2.0	GbE	COM	PCIe / PCI Exp	Power
MIC-770Q-00A2	Q370	1	1	1	2/6/0	2	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 module	
MIC-75M13-00A2	1 x PCIe x16 + 3 x PCI slot i-module
MIC-75M40-00A2**	1 x PCIe x8 + 3 x PCIe x4 slot i-module
2-slot expansion module	
MIC-75M20-00C1	1 x PCIe x16 + 1 x PCIe x4 slot i-module
MIC-75M20-01A2	2 x PCIe x8 slot i-module
MIC-75M11-00A2**	1 x PCIe x16 + 1 x PCI slot i-module
1-slot expansion module	
MIC-75M10-00A2	1 x PCIe x16 slot
Featured expansion module	
MIC-75S00-00A1	2 x removable storage
MIC-75S20-00A2	1 x PCIe x16 + 1 x PCIe 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 PCIe x8 + 1 x PCIe x4 slot + 2 x 2.5" swappable HDD/SSD
MIC-75GF10-00A1	MIC-75GF10 MXM i-module, 1 x PCIe x16 + 1 x PCIe 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 Module 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.

Contents

Chapter 1

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

PCH	■ 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

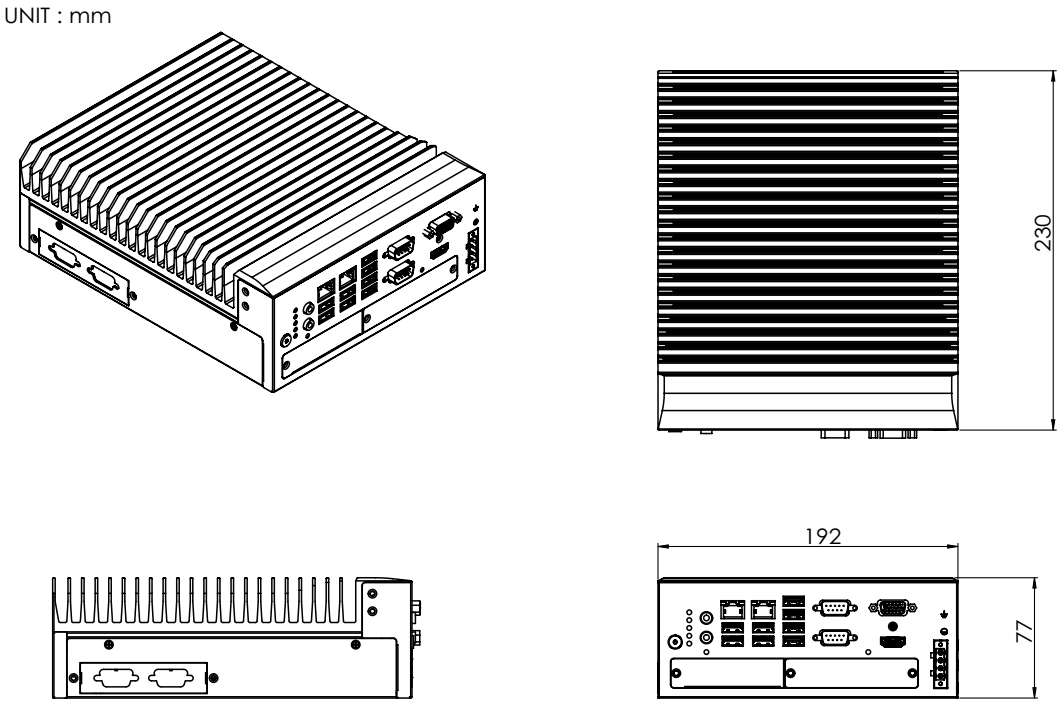


Figure 1.1 MIC-770 Physical Dimensions

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

Chapter 2

H/W Installation

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

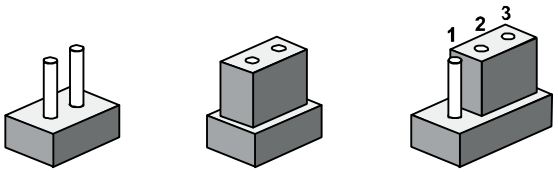
2.1 Introduction

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

2.2 Jumpers & Slide Switches

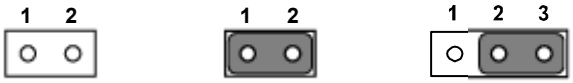
2.2.1 Jumper Description

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.



open **closed** **closed 2-3**

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



open **closed** **closed 2-3**

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.

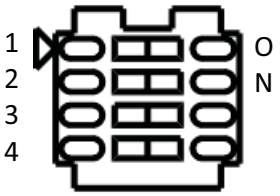
JME1	**System ME mode option**
Footprint	**3x1 Pins**
Setting	**Function**
(1-2)	ME Enable (Default)
(2-3)	ME Disable

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
	On	USB3C1 provides standby charging
SW5-2	2 (default)	USB3C2 does not provide standby charging
	On	USB3C2 provides standby charging
SW5-3	3 (default)	USB3C3 does not provide standby charging
	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

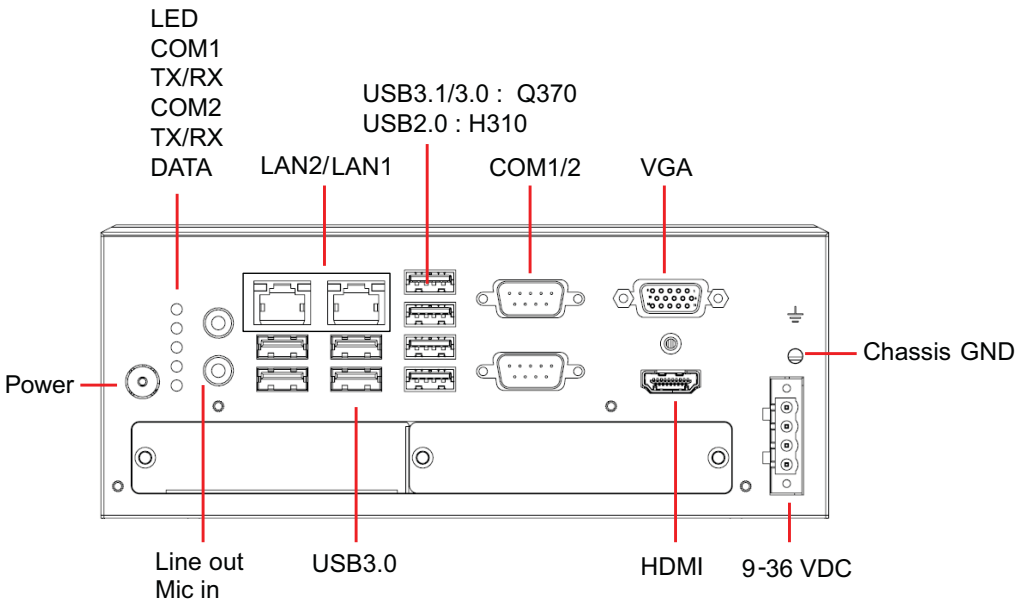


Figure 2.1 MIC-770 Front View

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

Note! *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.

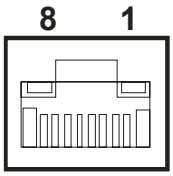


Figure 2.2 Ethernet Connector

Table 2.3: Ethernet Connector Pin Assignments

Pin	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.

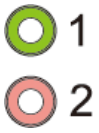


Figure 2.3 Audio Connectors

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.

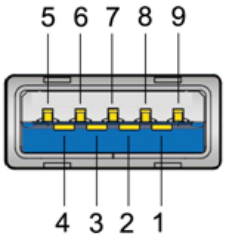


Figure 2.4 USB 3.0 Connector

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+

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.

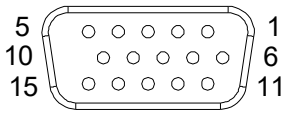


Figure 2.5 VGA Connector

Table 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.

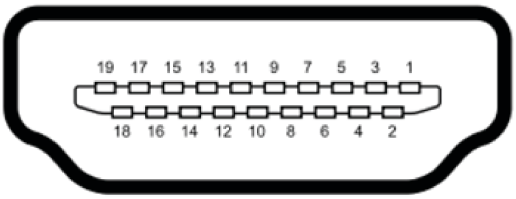


Figure 2.6 HDMI Receptacle Connector

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.

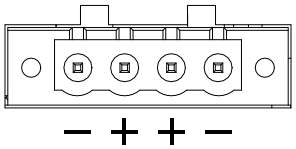


Figure 2.7 4-Pin Header

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.

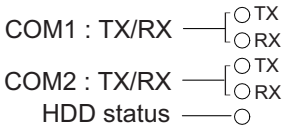
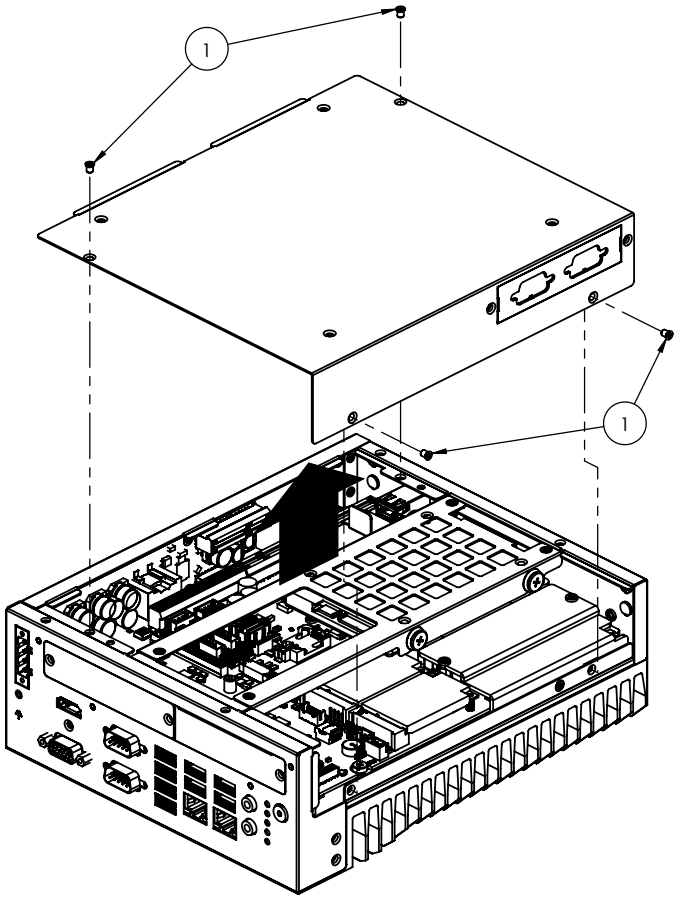


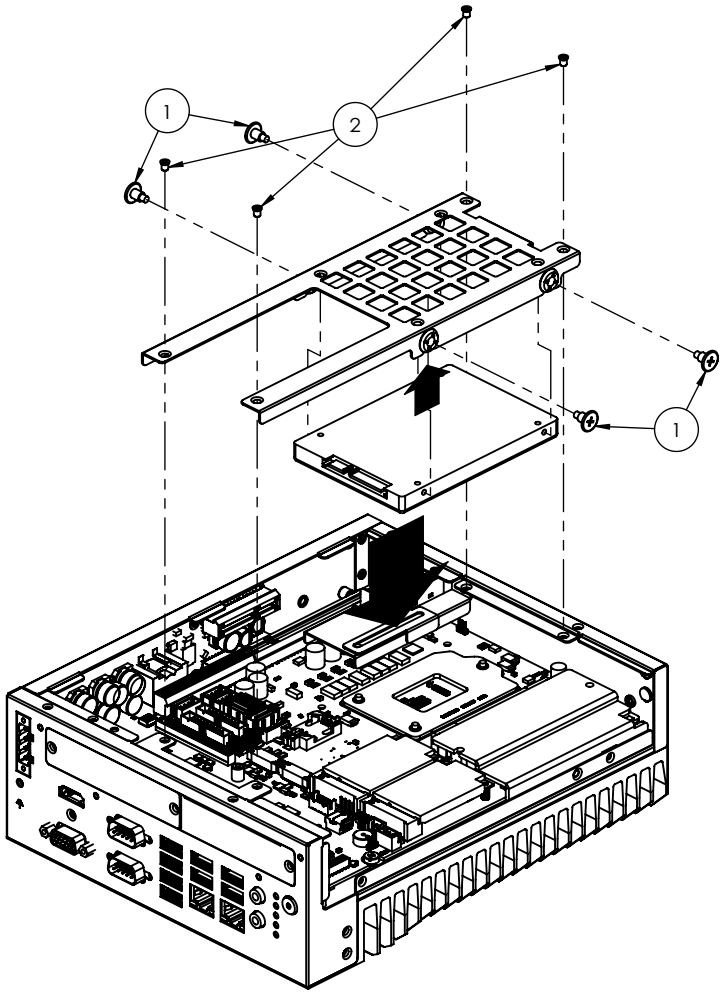
Figure 2.9 LED Indicators

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.



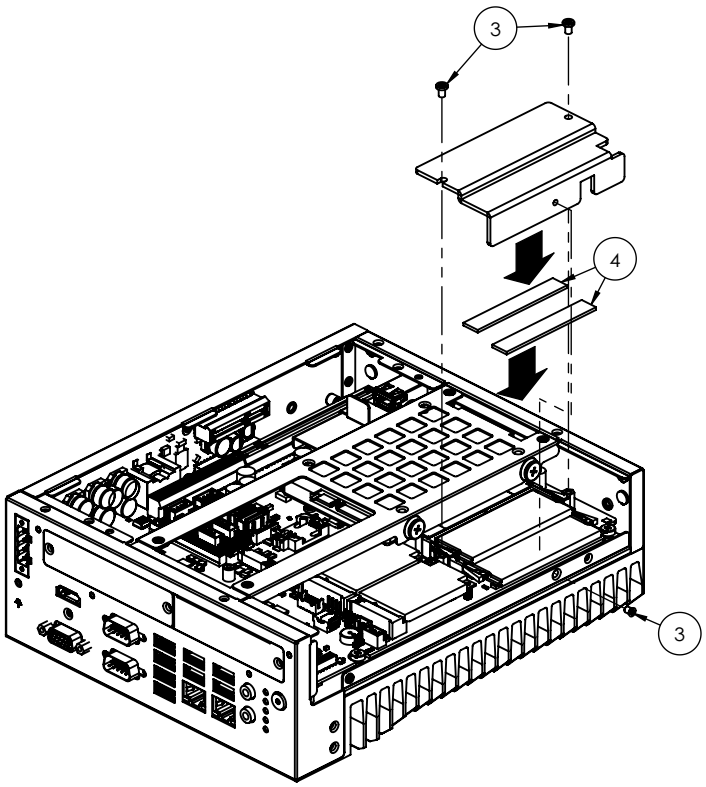


3. Secure the HDD with 4 x HDD screws (P/N:1930002235).
4. Assemble the SATA cable/power cable and replace the HDD tray. Secure with 4 screws.
5. Replace the bottom cover.

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

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.

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

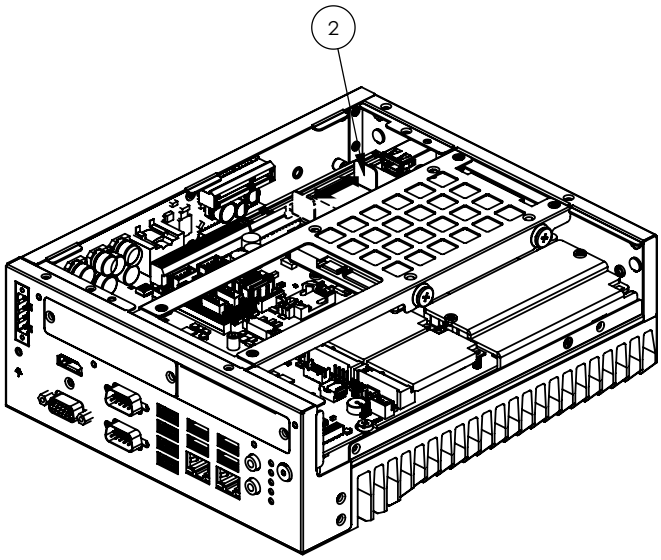
2.4.3 m-SATA / Mini PCIe Installation

- 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)

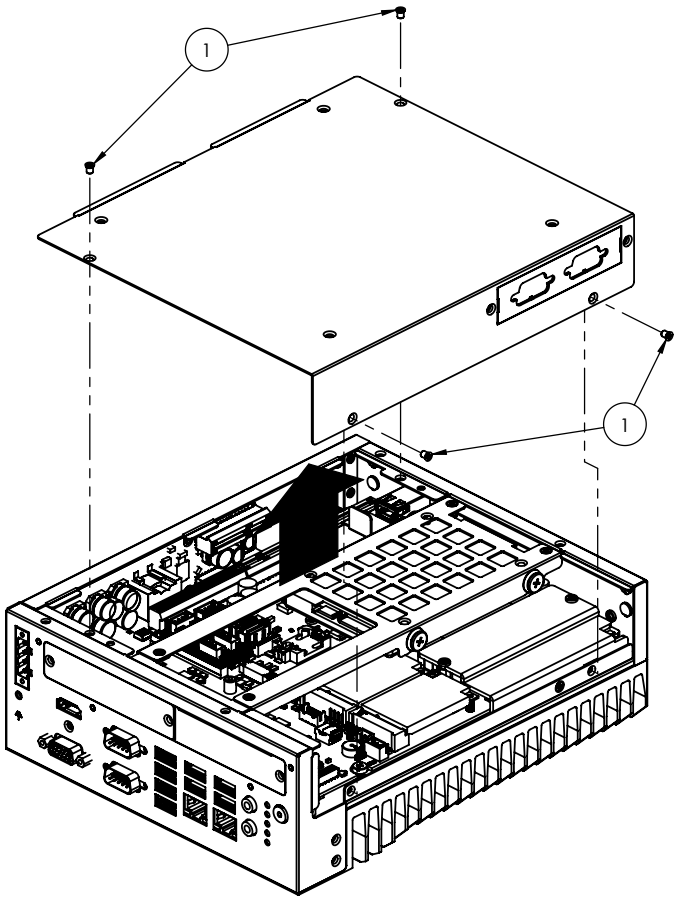
1. Undo the 4 screws and remove the bottom cover.
2. Loosen the screws and adjust the bracket size in accordance with the USB dongle size.
3. Replace the bottom cover and secure with the screws.



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)

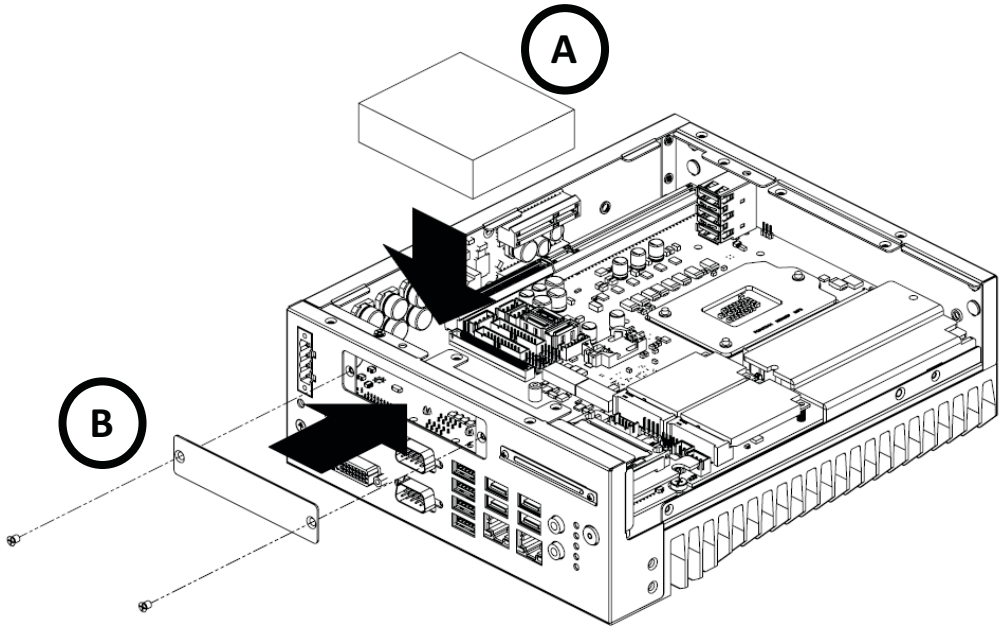
MIC-770 supports the below optional modules for different applications.

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)

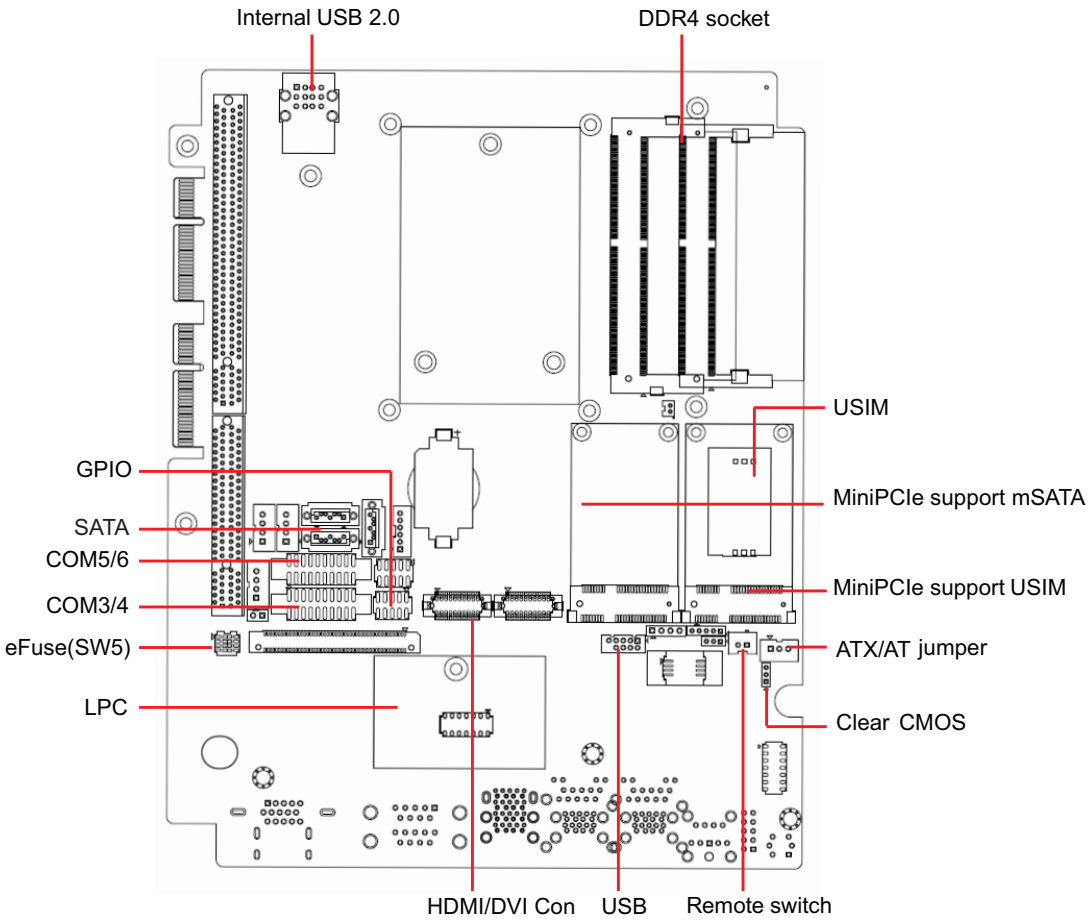
B: Bracket for expansion module

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



Chapter 3

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.

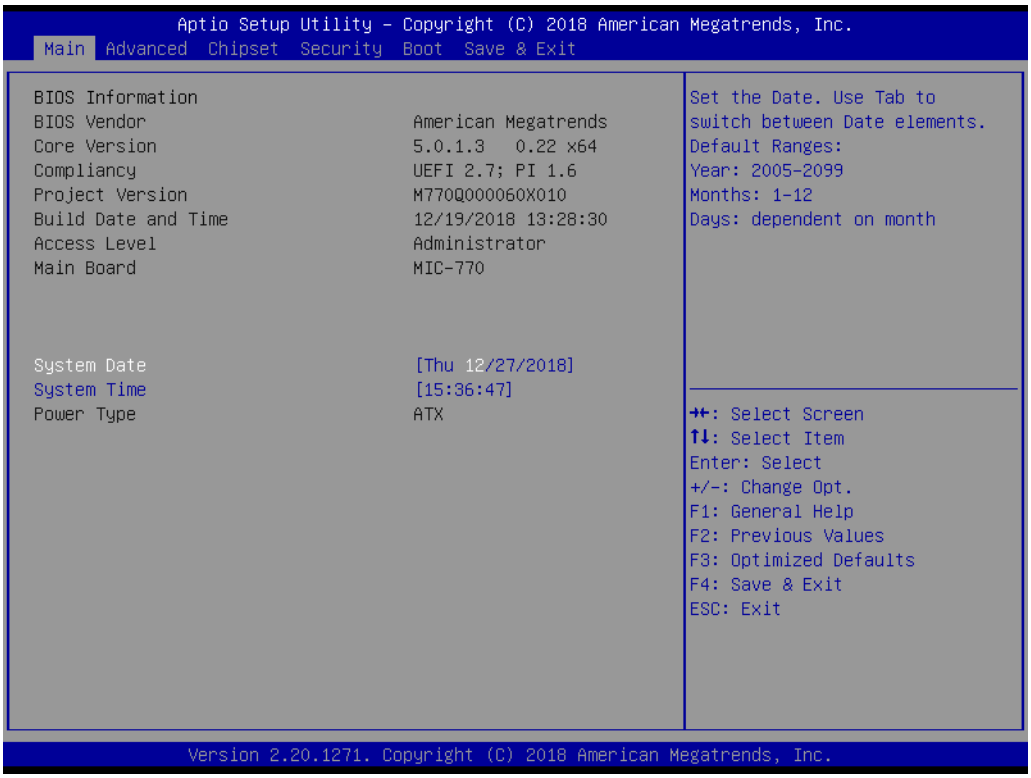


Figure 3.1 Main Setup Screen

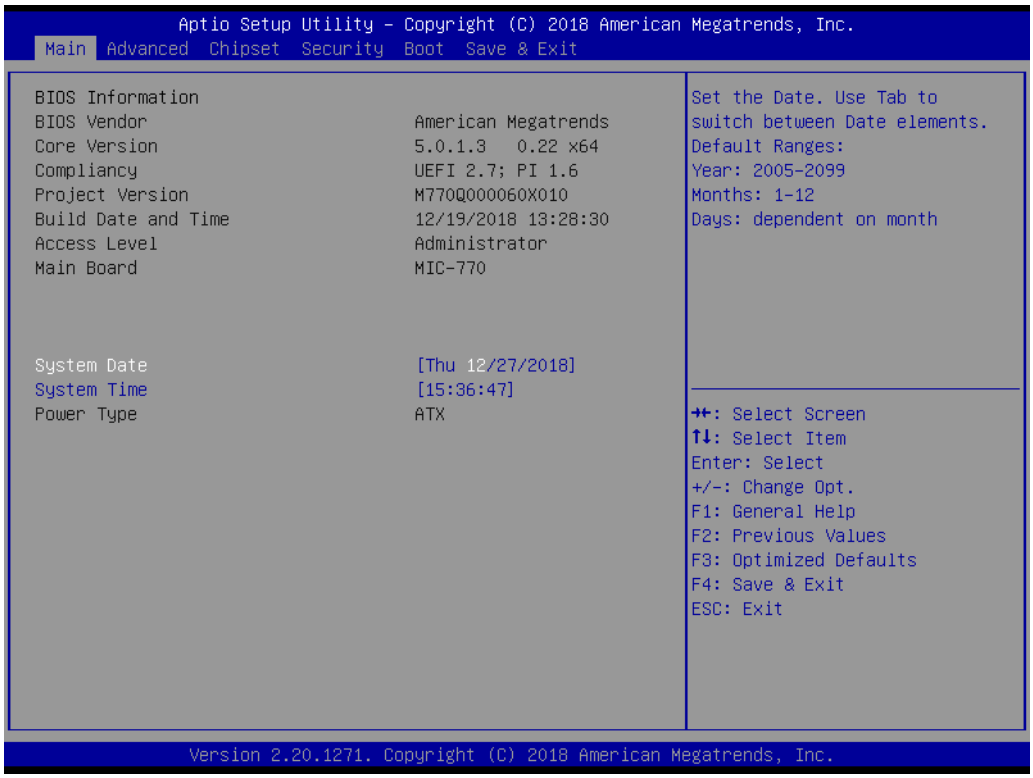
AMI's BIOS ROM has a built-in setup program that allows users to modify the basic system configuration. This information is stored in the NVRAM area so it retains the setup information when the power is turned off.

3.2 Entering BIOS Setup

Press <Del> 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.



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.

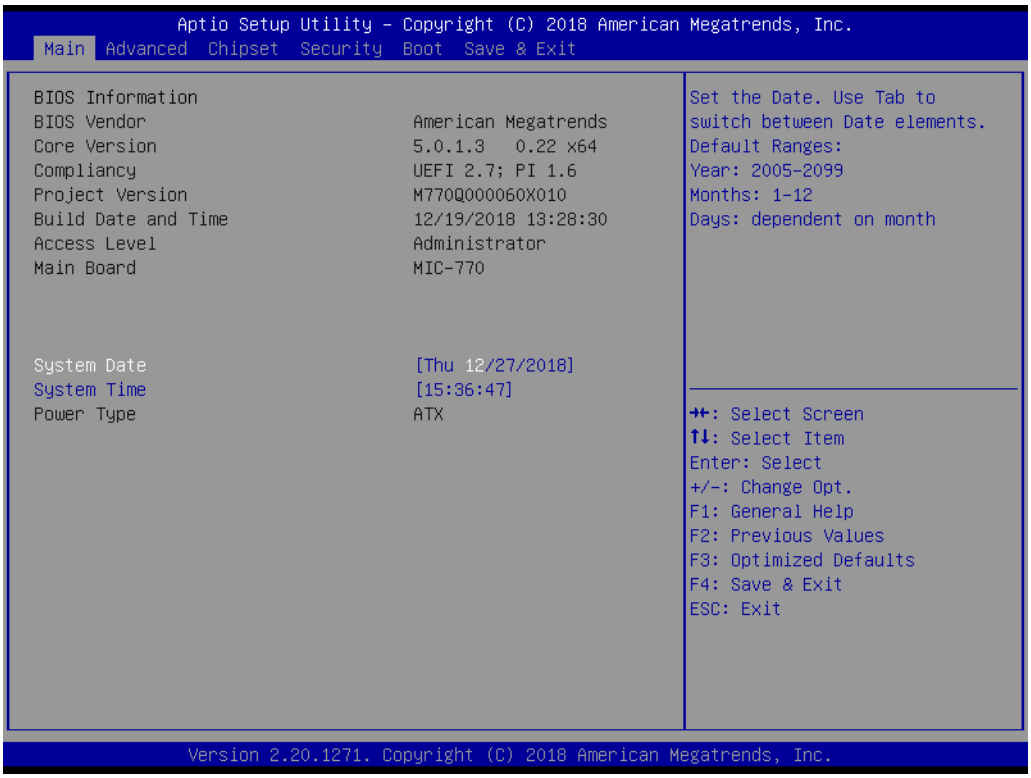


Figure 3.2 Main Setup Screen

- **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.

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.

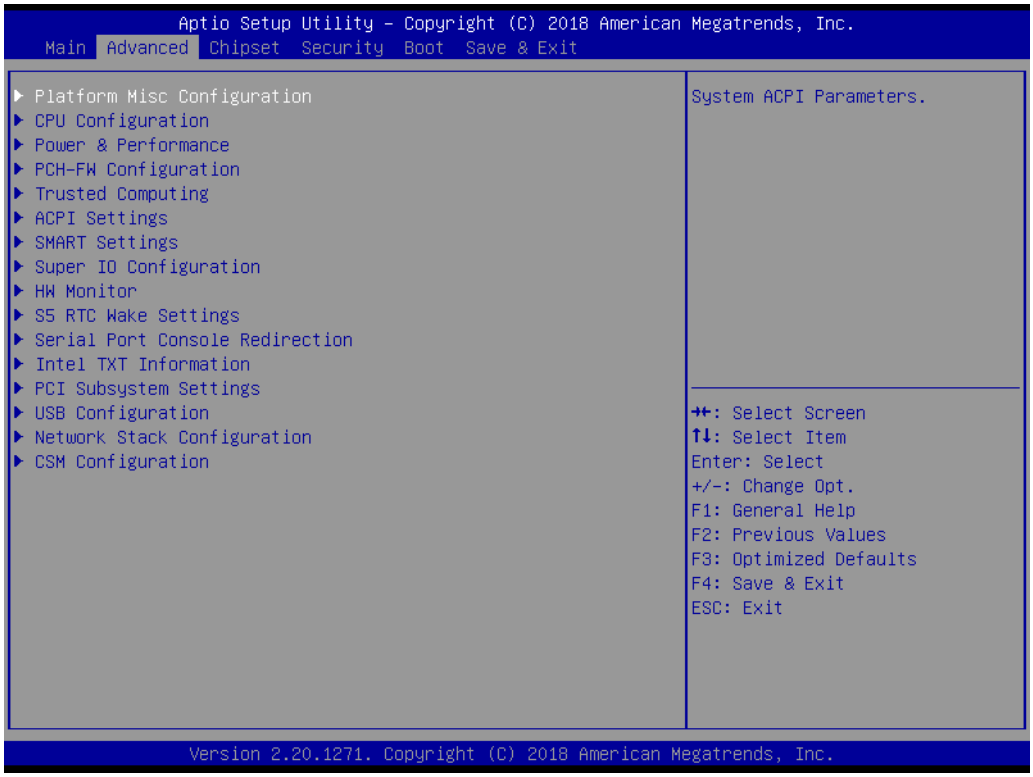


Figure 3.3 Advanced BIOS Features Setup Screen

3.2.2.1 Platform Misc Configuration

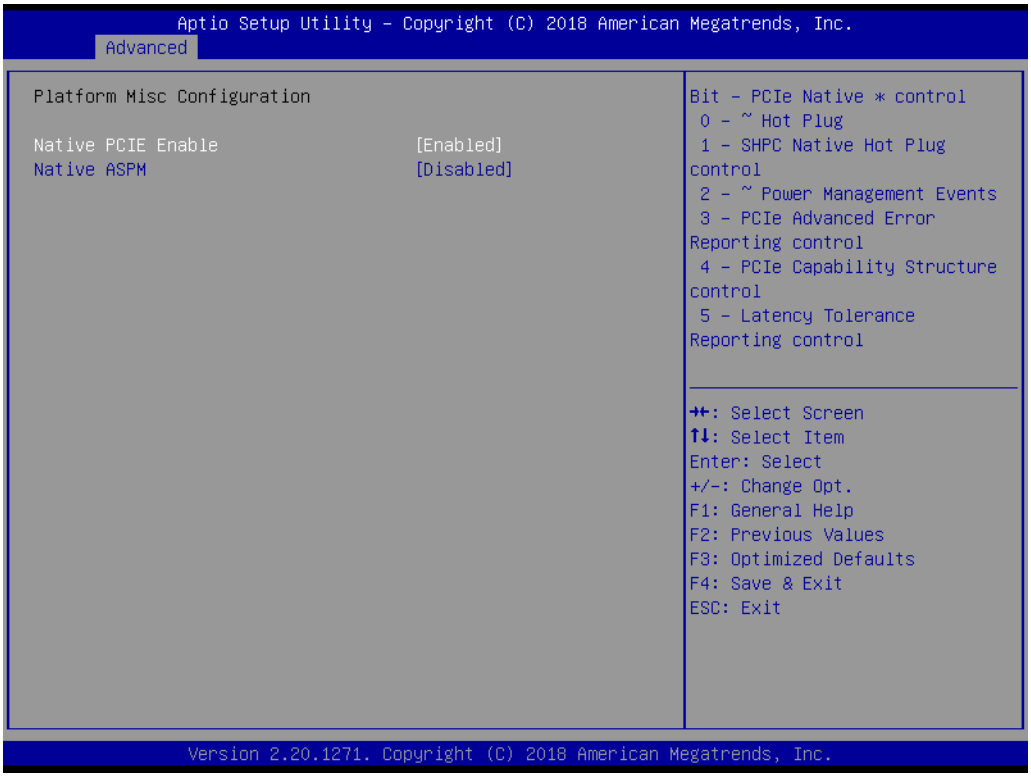


Figure 3.4 Platform Misc Configuration

- **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

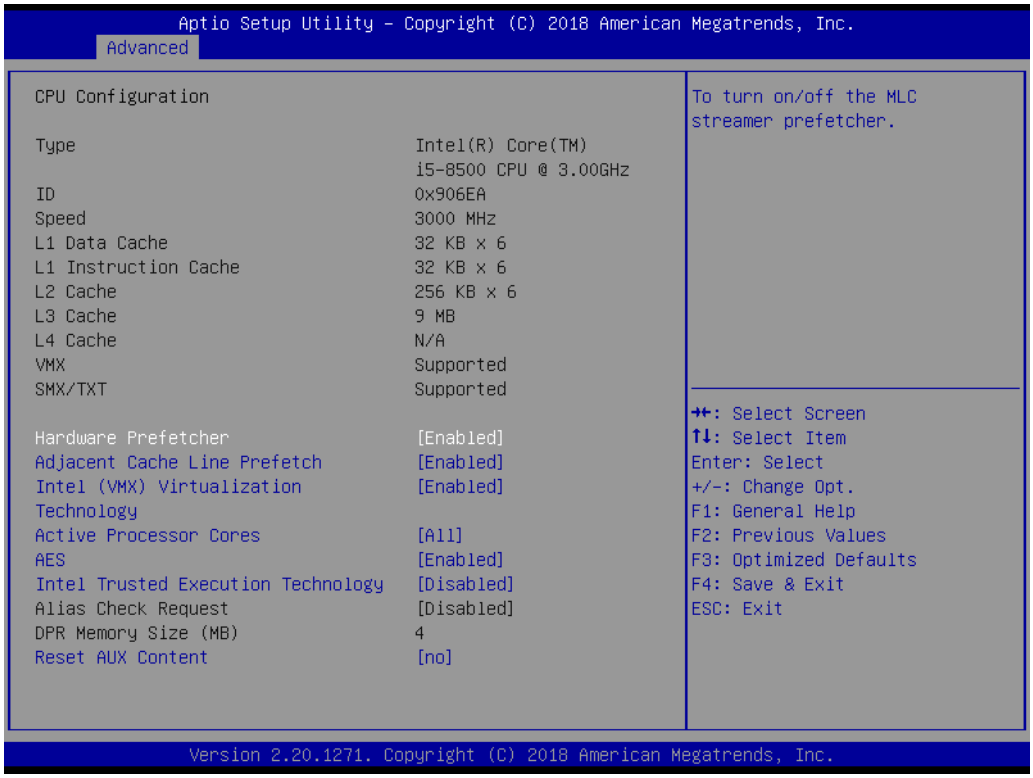


Figure 3.5 CPU Configuration

- **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

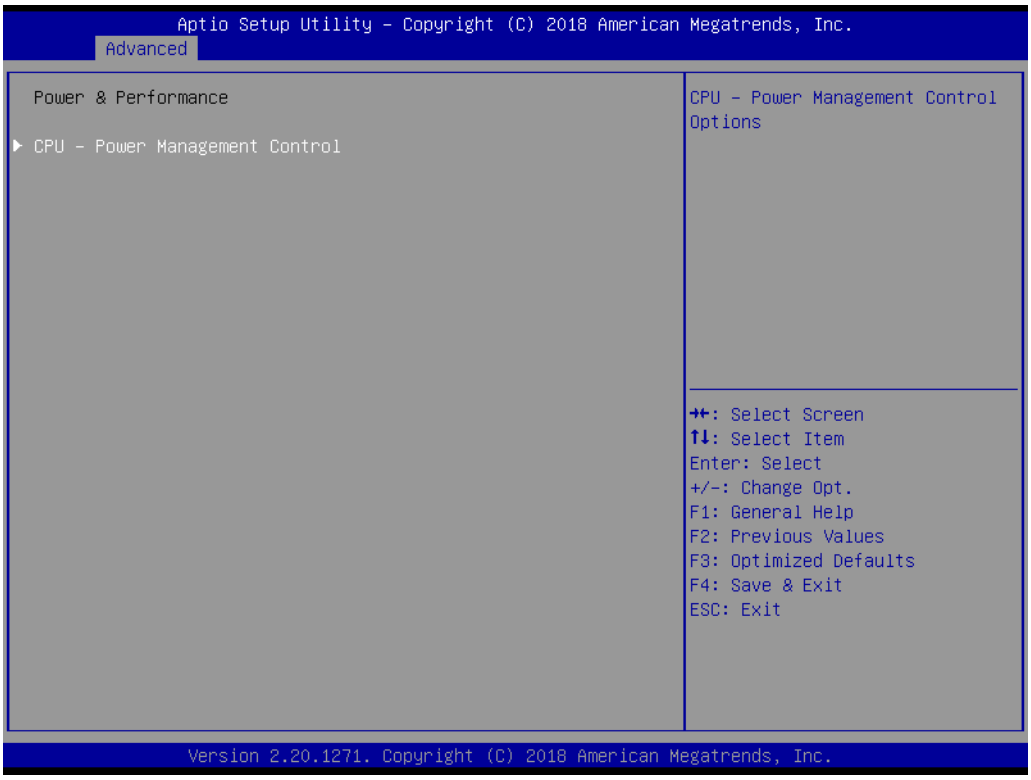


Figure 3.6 Power & Performance

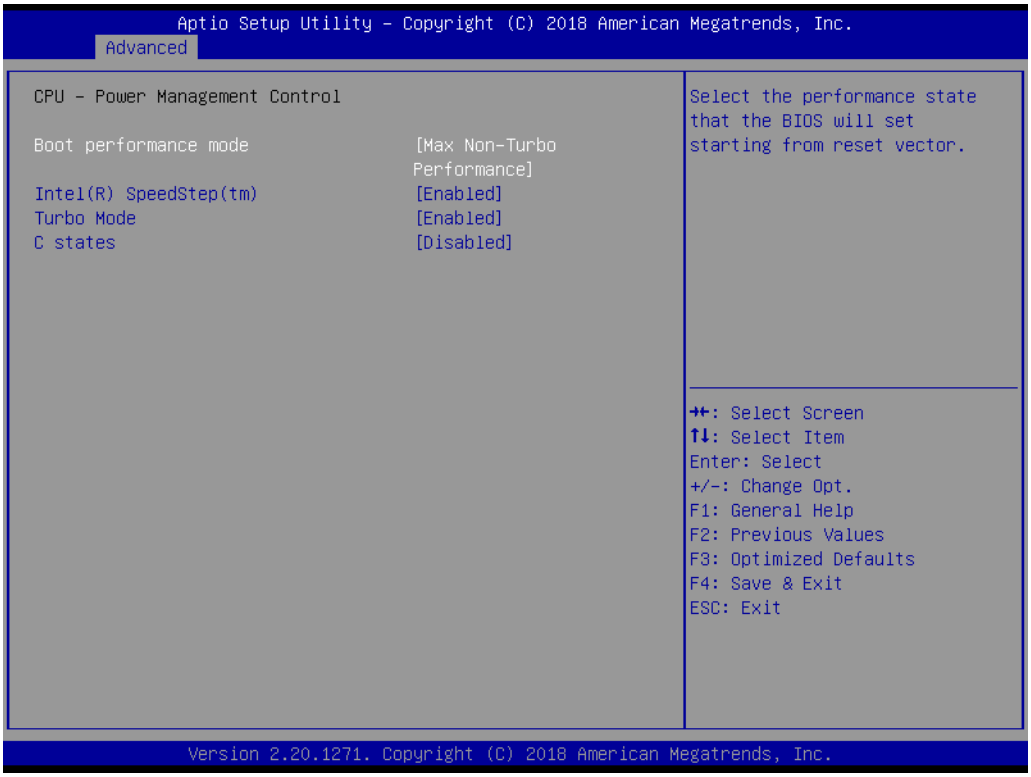


Figure 3.7 CPU Power Management Control

- **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

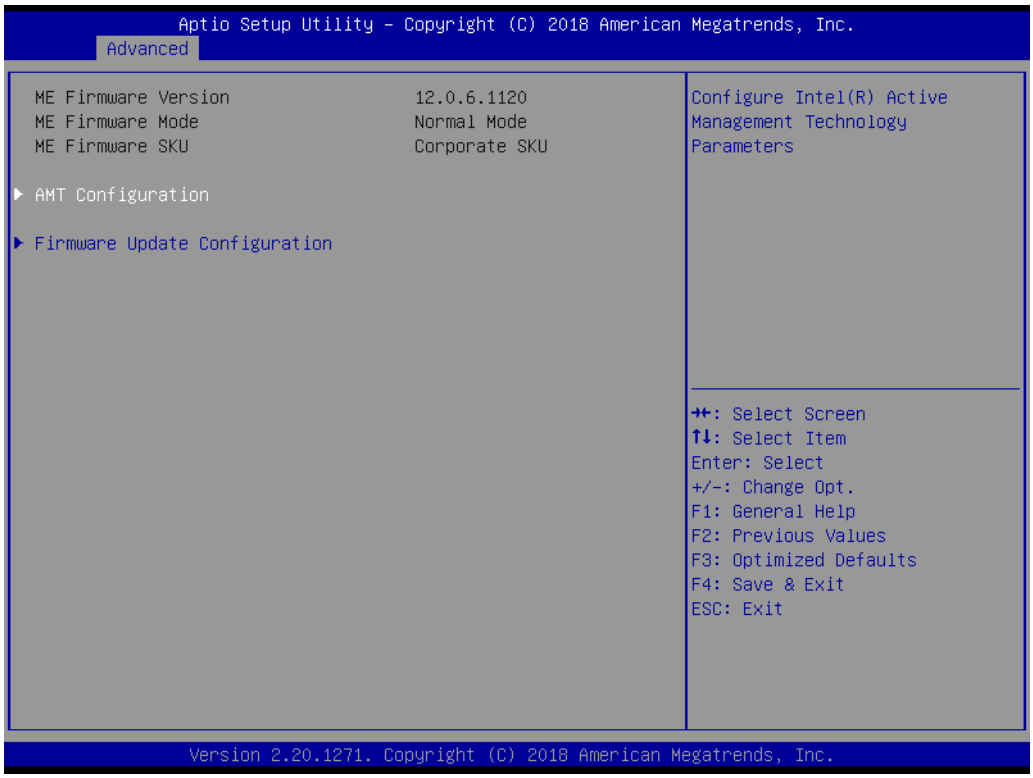


Figure 3.8 PCH-FW Configuration

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

AMT Configuration

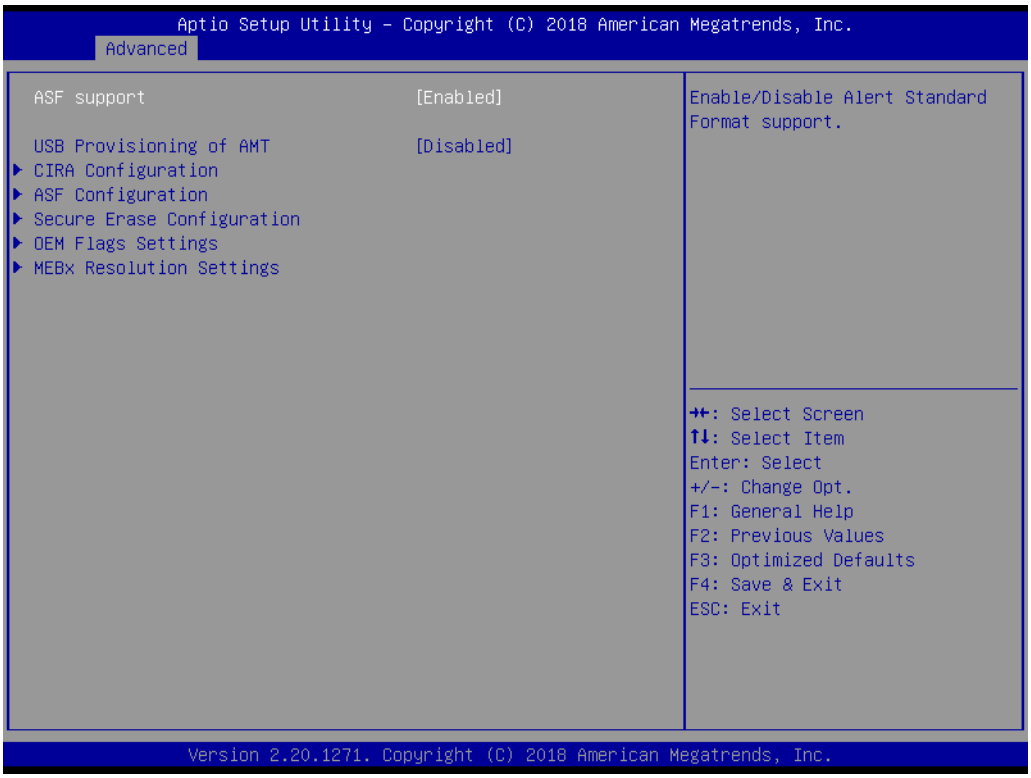


Figure 3.9 AMT Configuration

CIRA Configuration

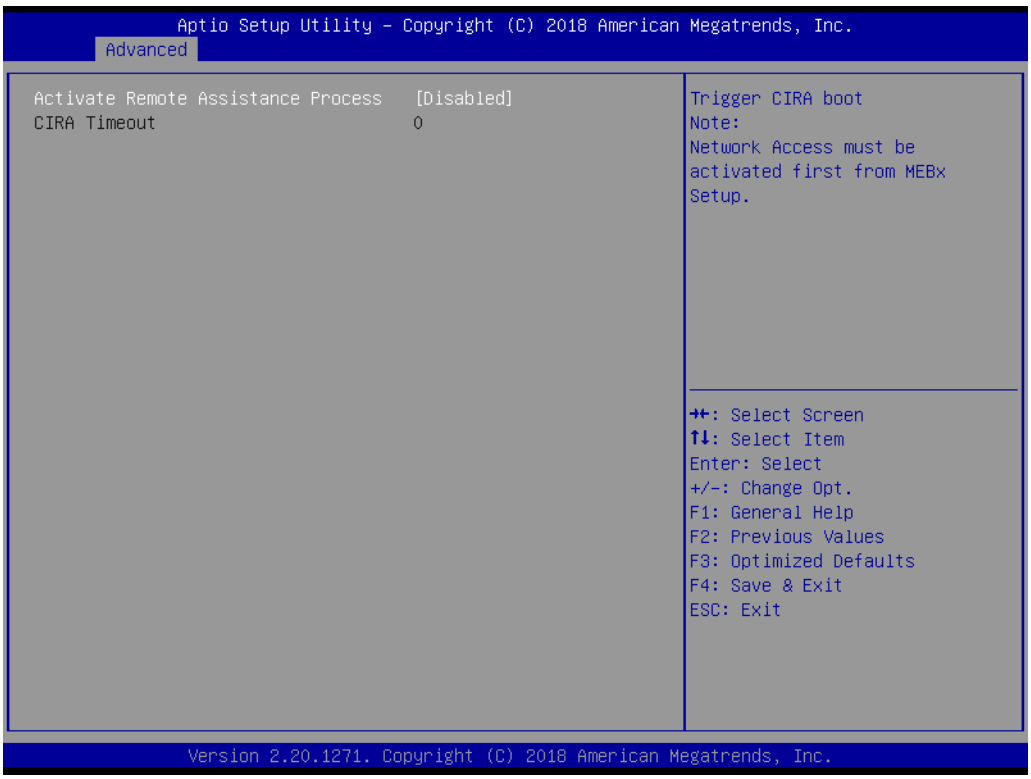


Figure 3.10 CIRA Configuration

– **Activate Remote Assistance Process**
Triggers CIRA boot.

ASF Configuration

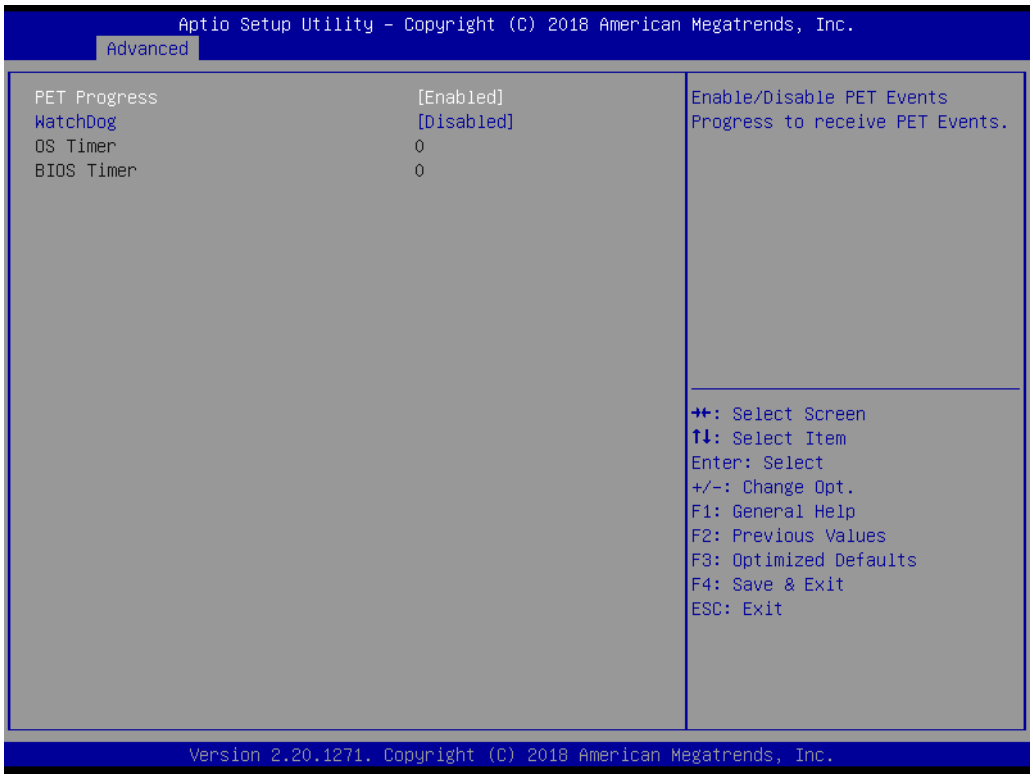


Figure 3.11 ASF Configuration

- **PET Progress**
  Enable or Disable PET Progress to receive PET events.
- **WatchDog**
  Enable or Disable the watchdog Timer.

Secure Erase Configuration

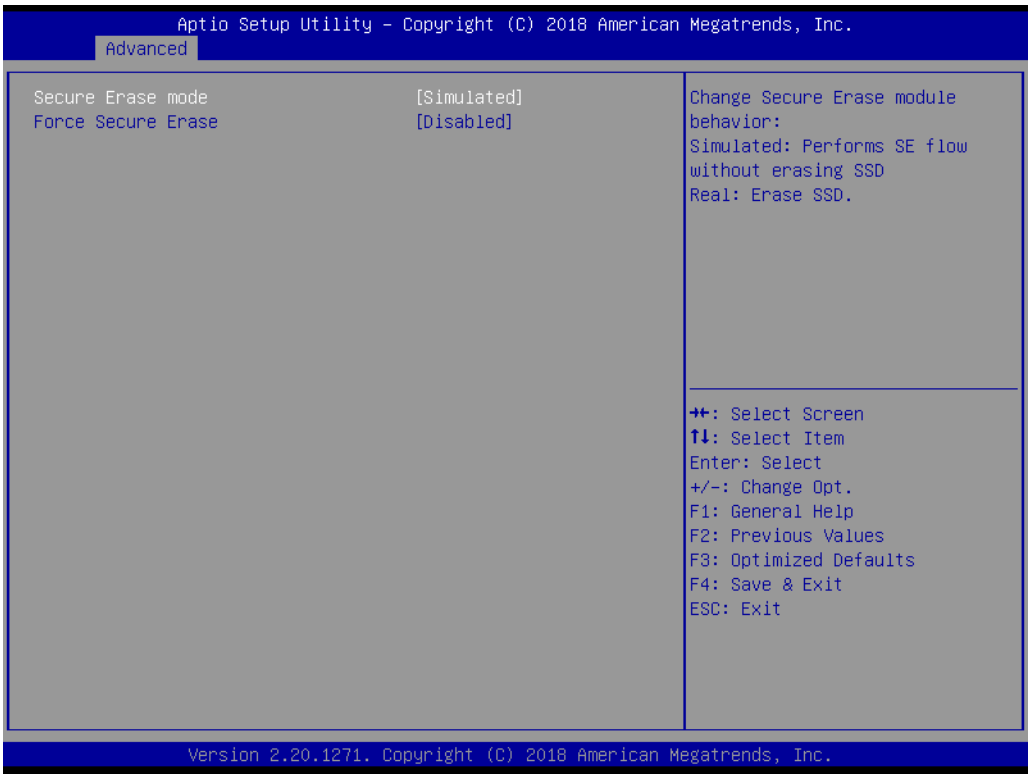


Figure 3.12 Secure Erase Configuration

- **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

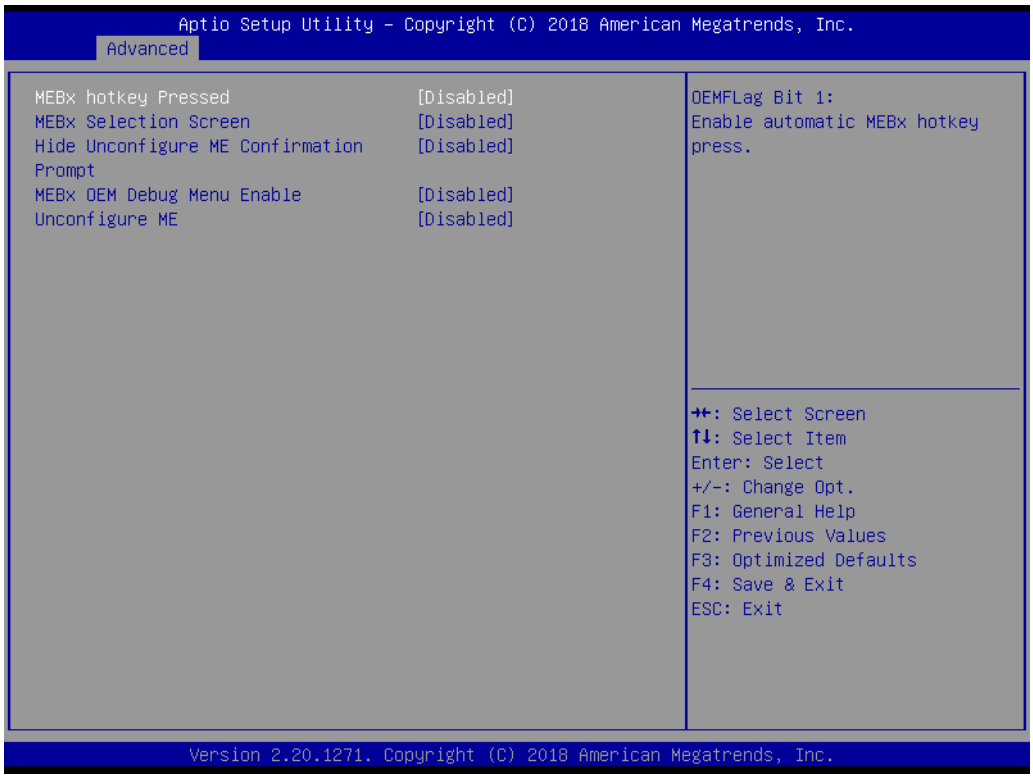


Figure 3.13 OEM Flag Settings

- **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

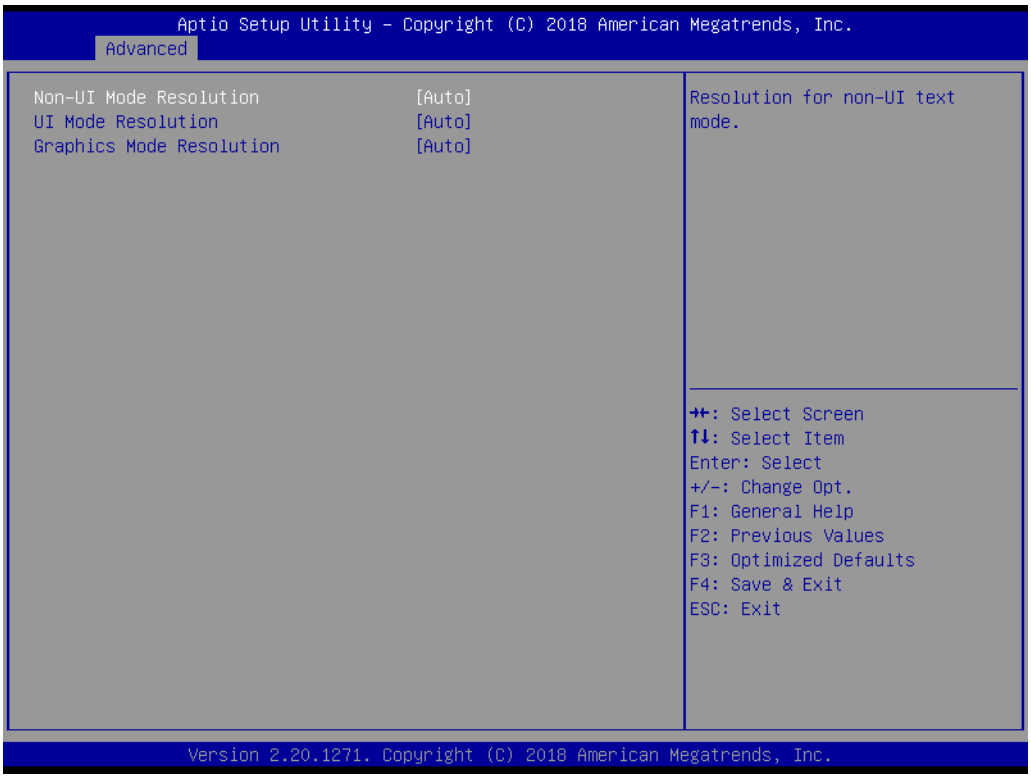


Figure 3.14 MEBx Resolution Settings

- **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

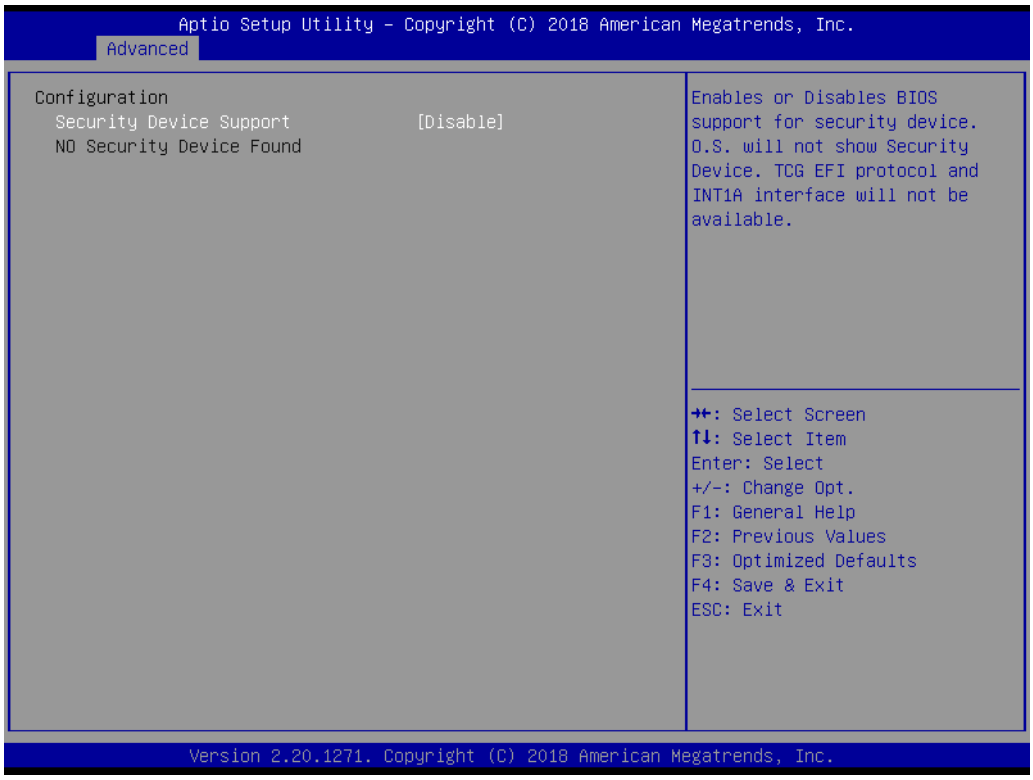


Figure 3.15 TPM Settings

- **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

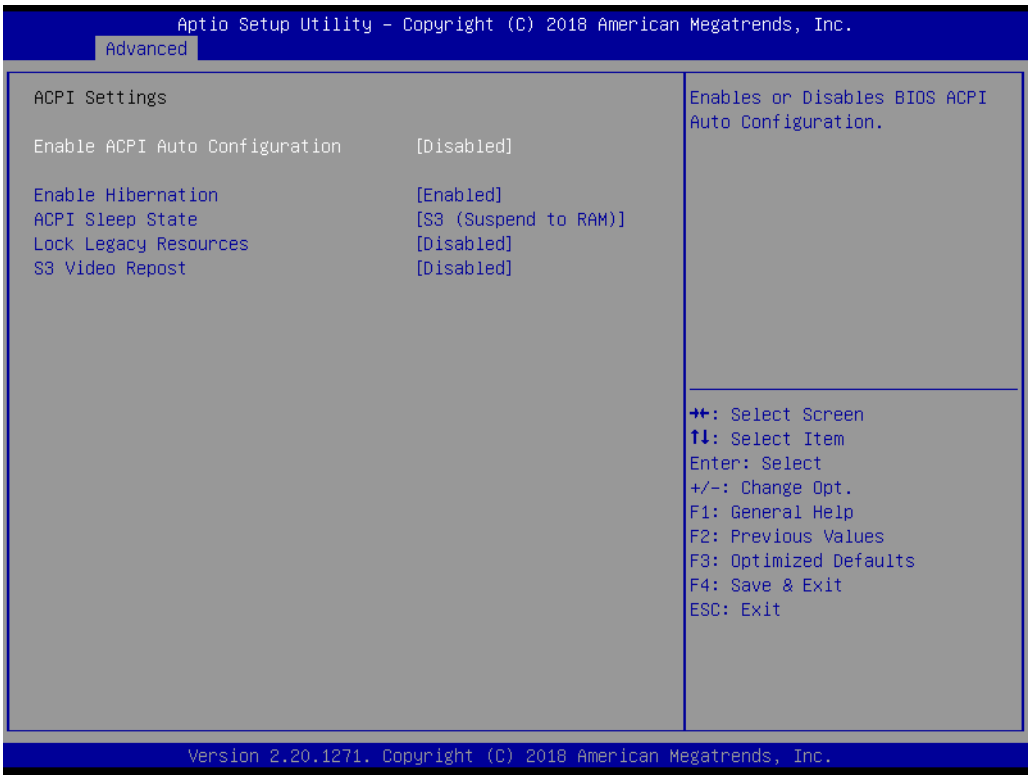


Figure 3.16 ACPI Settings

- **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

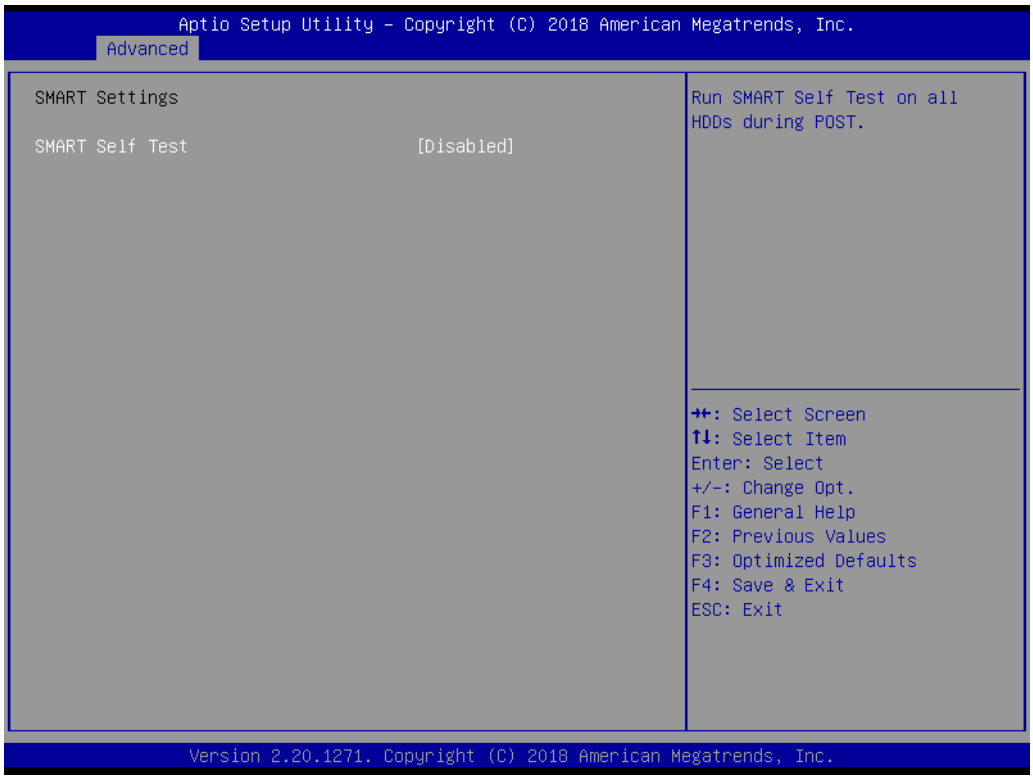


Figure 3.17 SMART Settings

- **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.

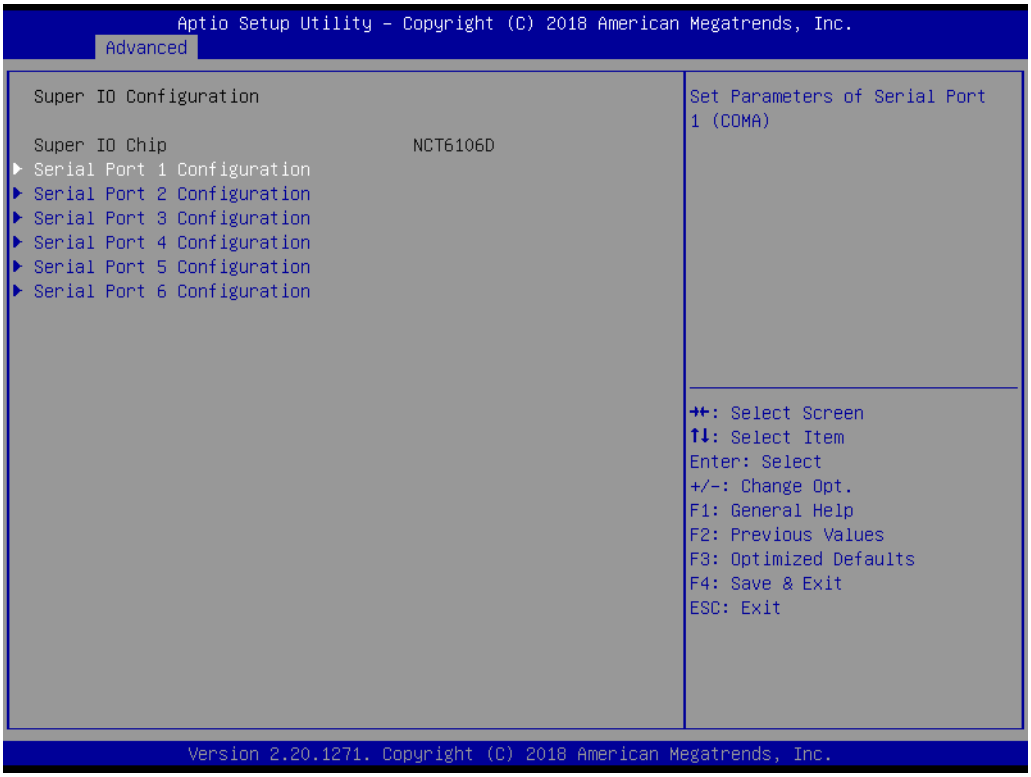


Figure 3.18 Super IO Configuration

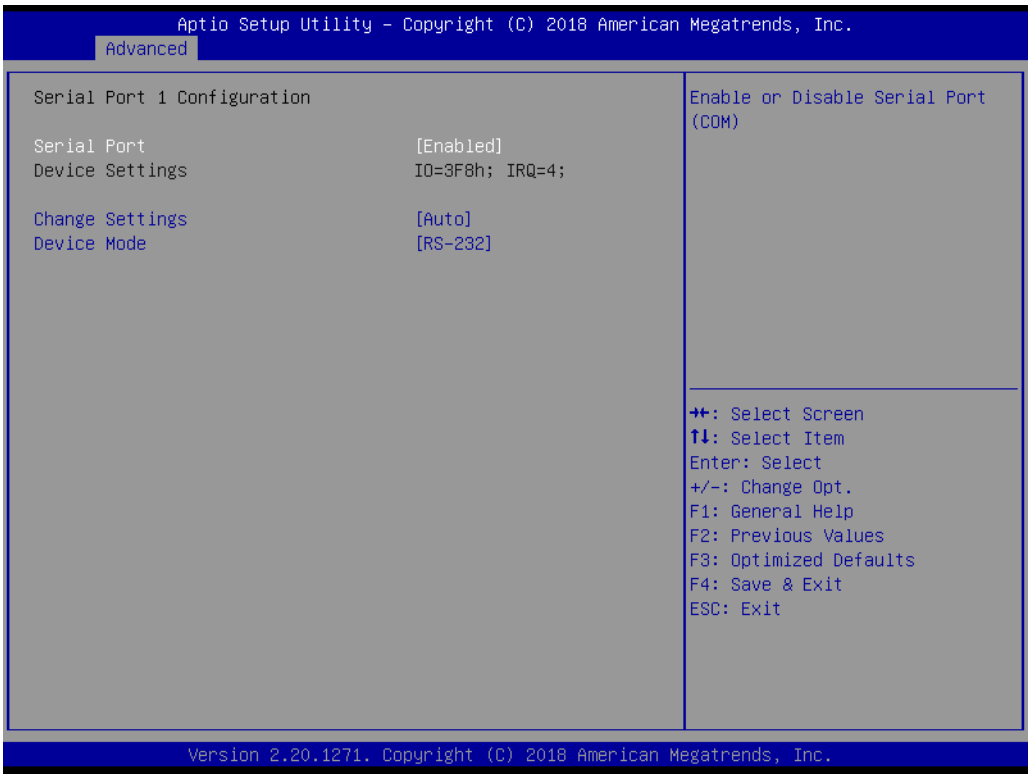


Figure 3.19 Serial Port 1 Configuration

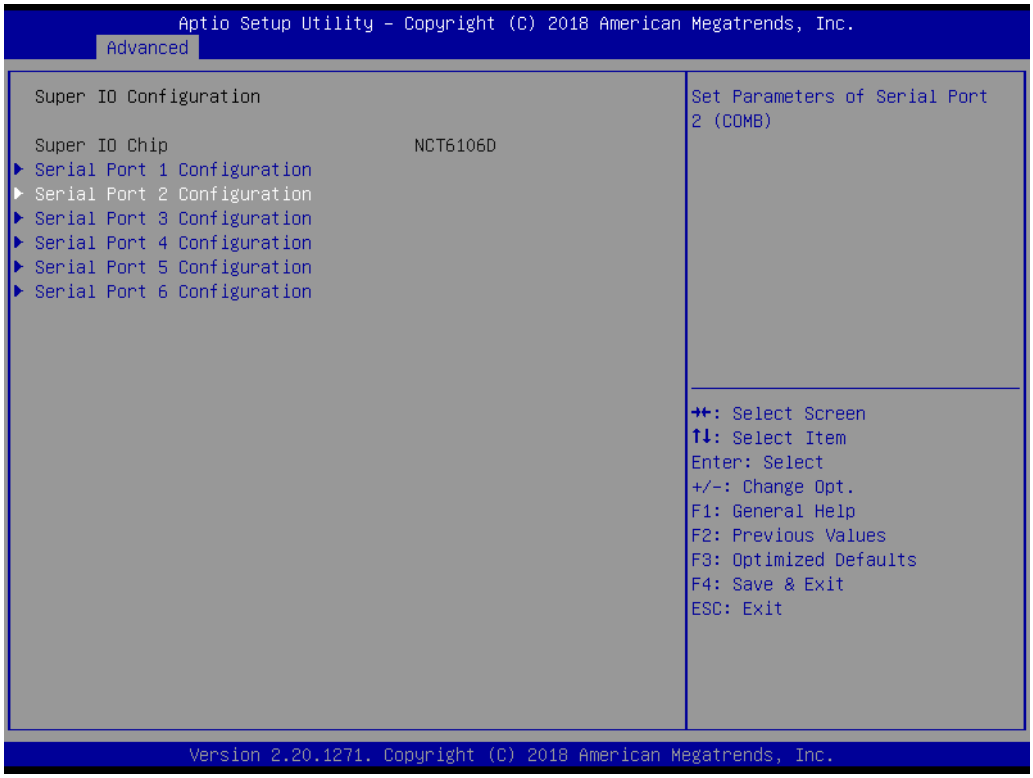


Figure 3.20 Serial Port 2 Configuration

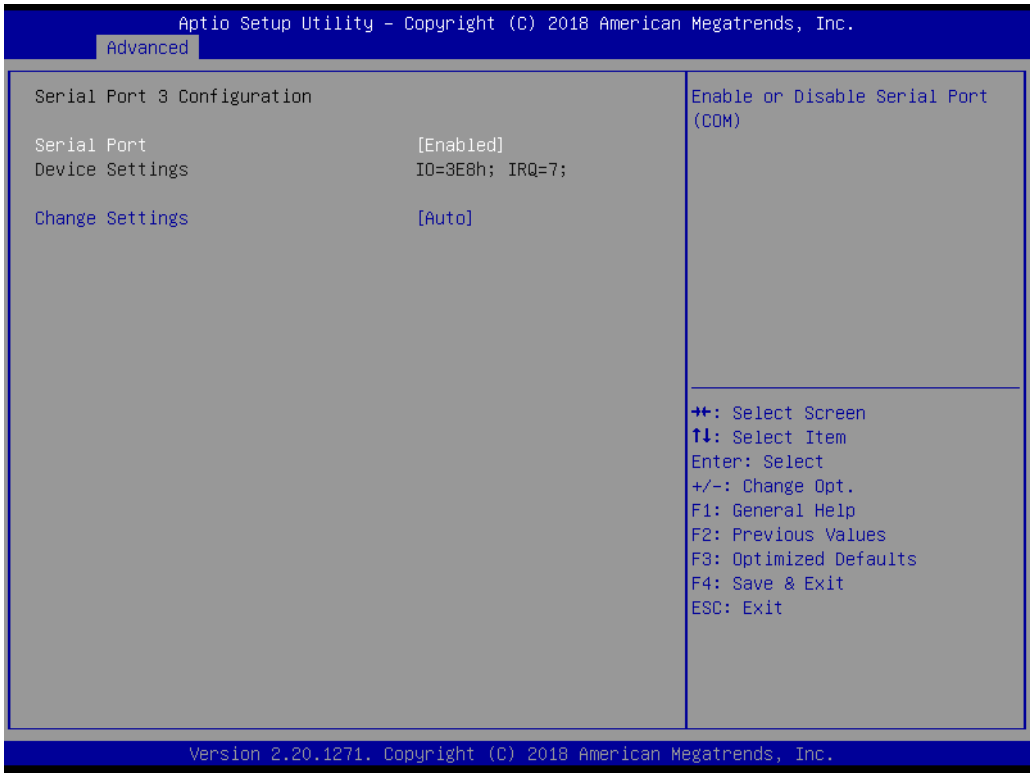


Figure 3.21 Serial Port 3 Configuration

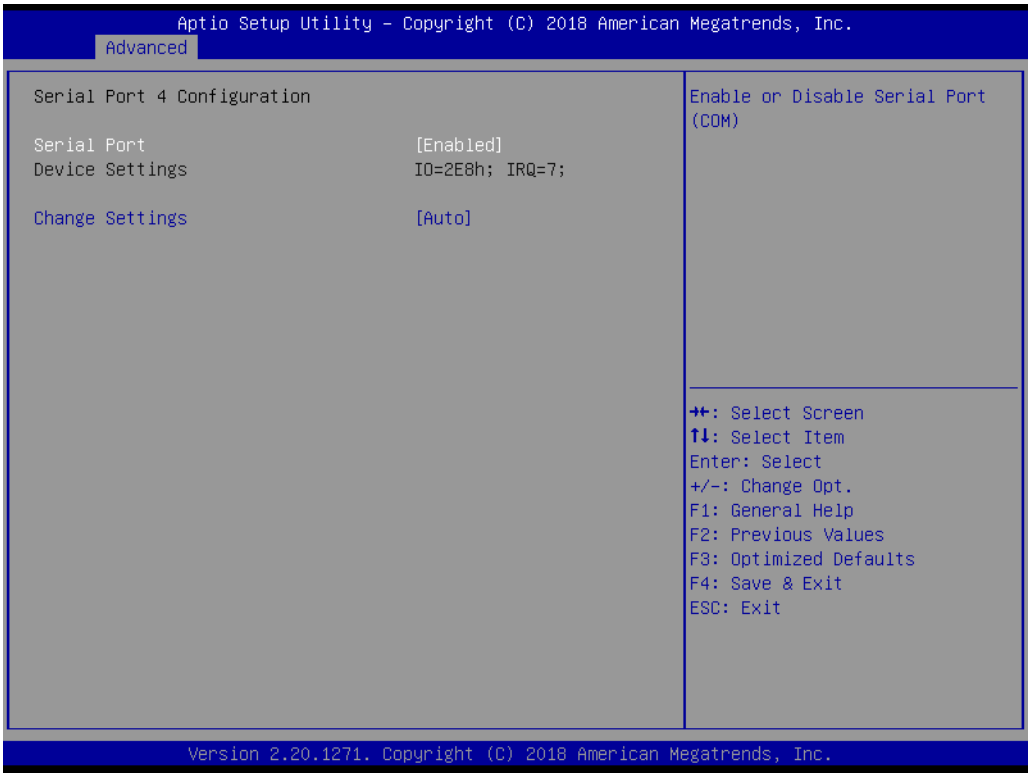


Figure 3.22 Serial Port 4 Configuration

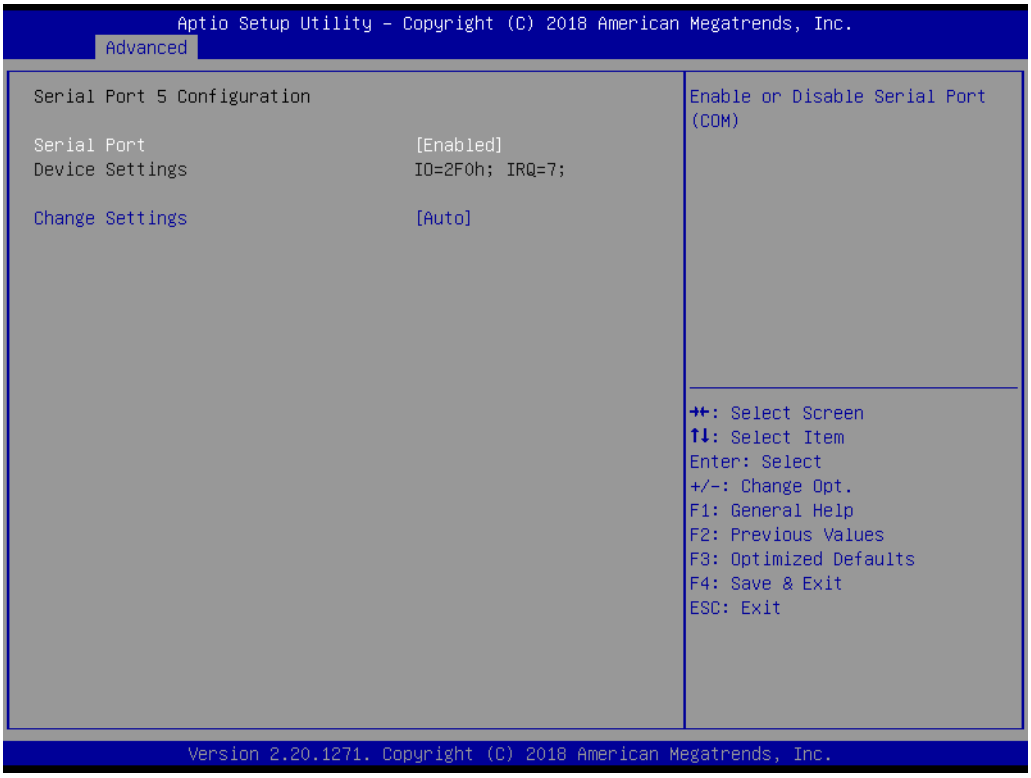


Figure 3.23 Serial Port 5 Configuration

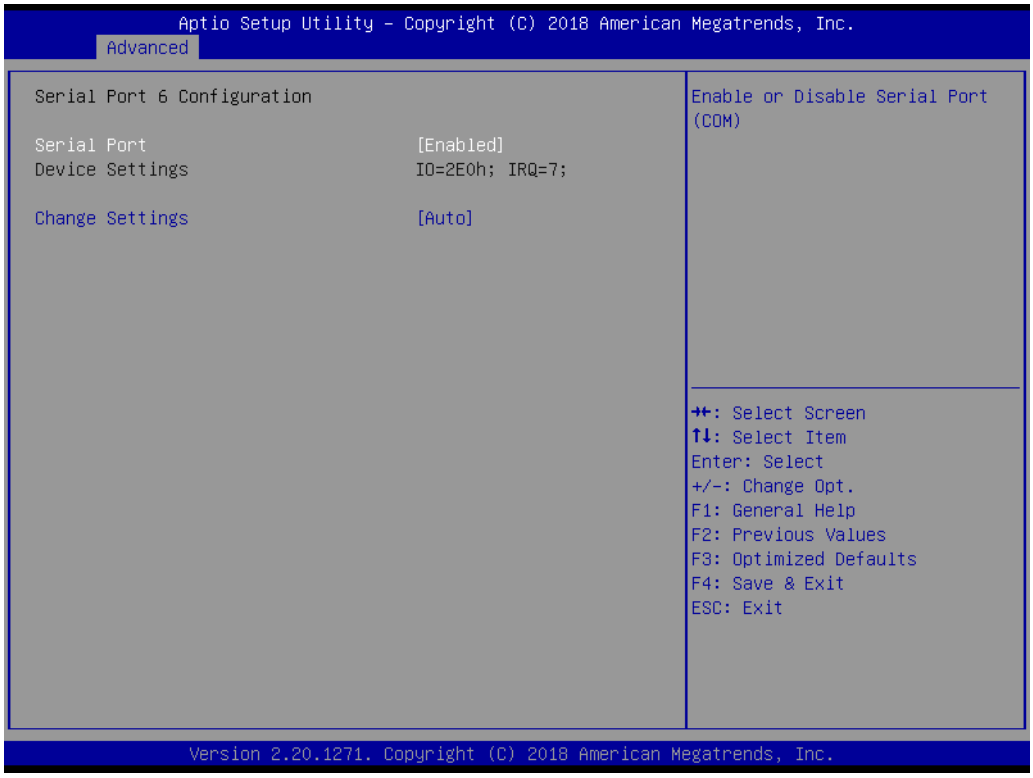


Figure 3.24 Serial Port 6 Configuration

- **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

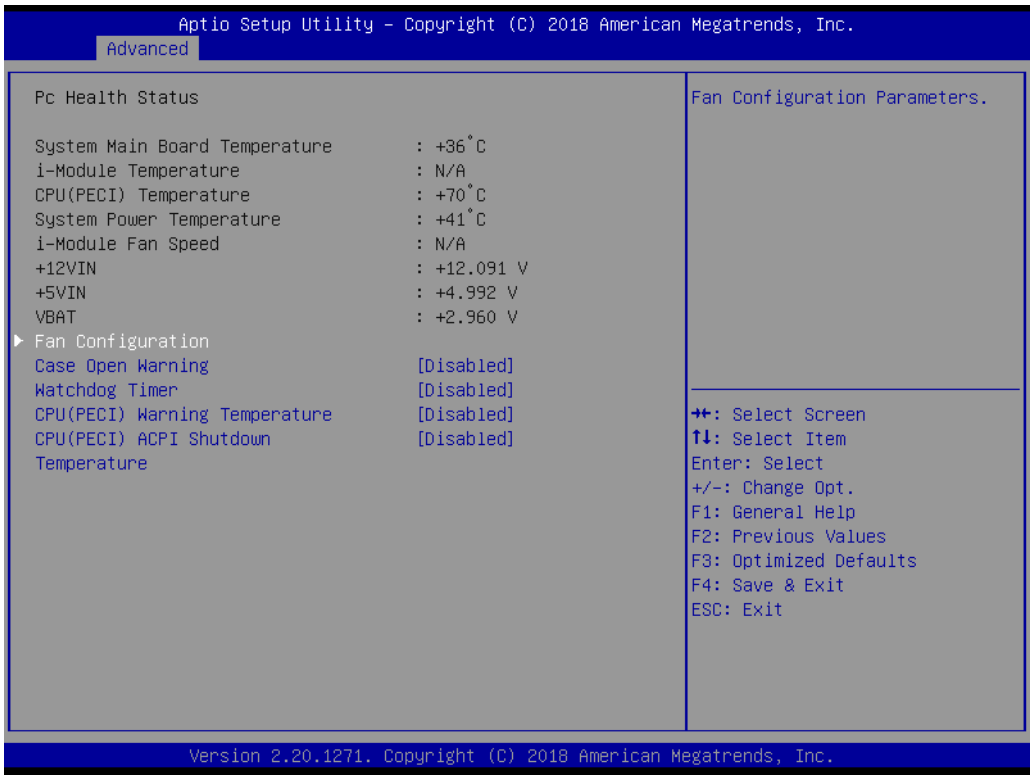


Figure 3.25 PC Health Status

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

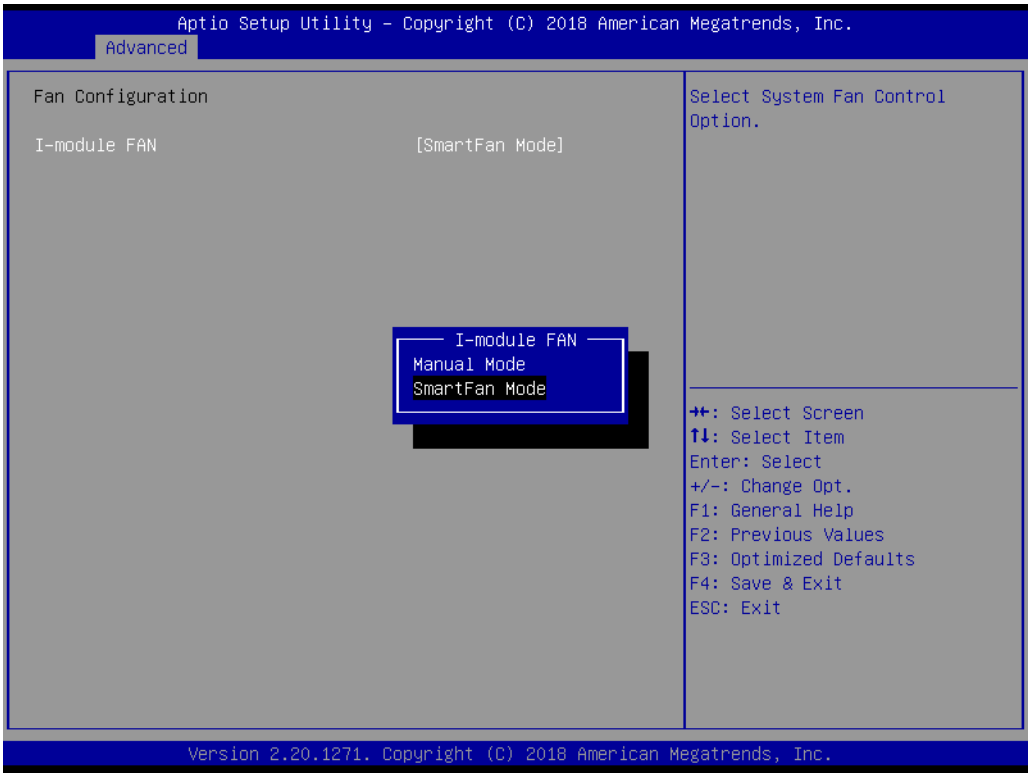


Figure 3.26 Fan Configuration

- **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

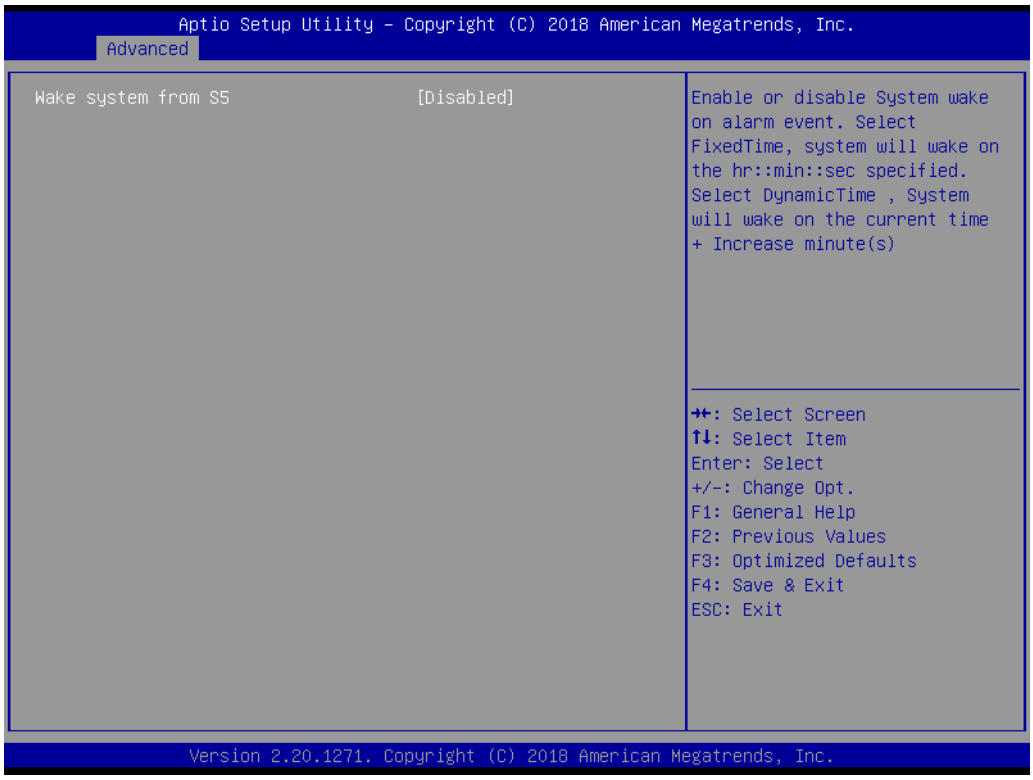


Figure 3.27 S5 RTC Wake Settings

- **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

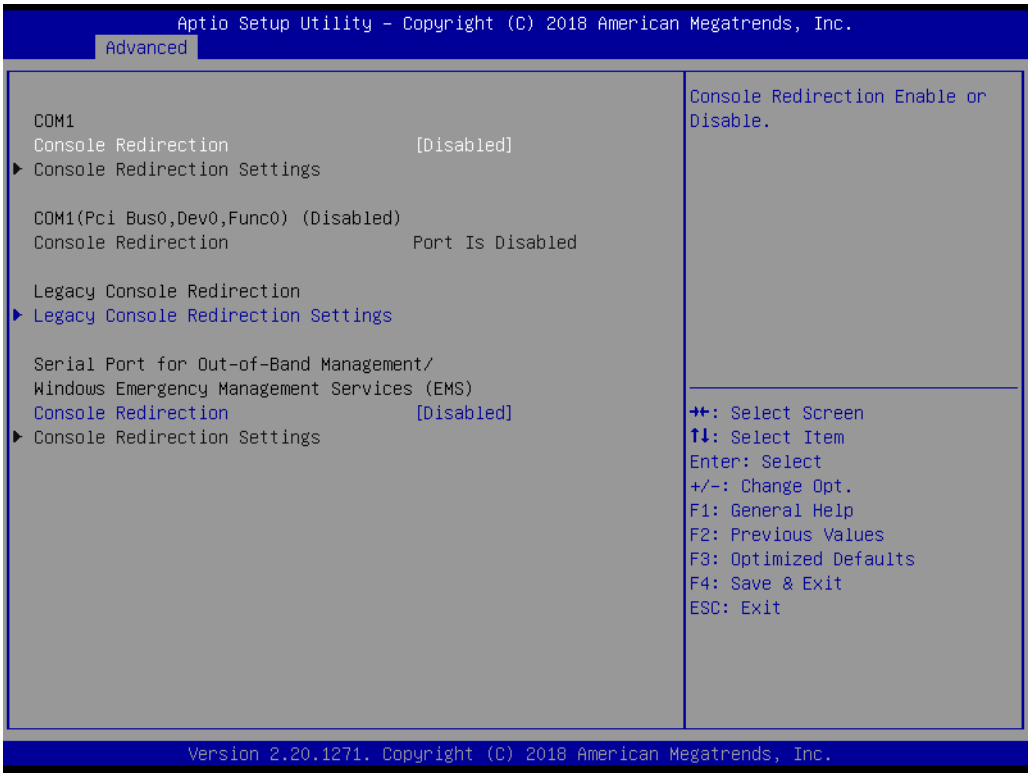


Figure 3.28 Serial Port Console Redirection

- **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.

3.2.2.12 Intel® TXT Information

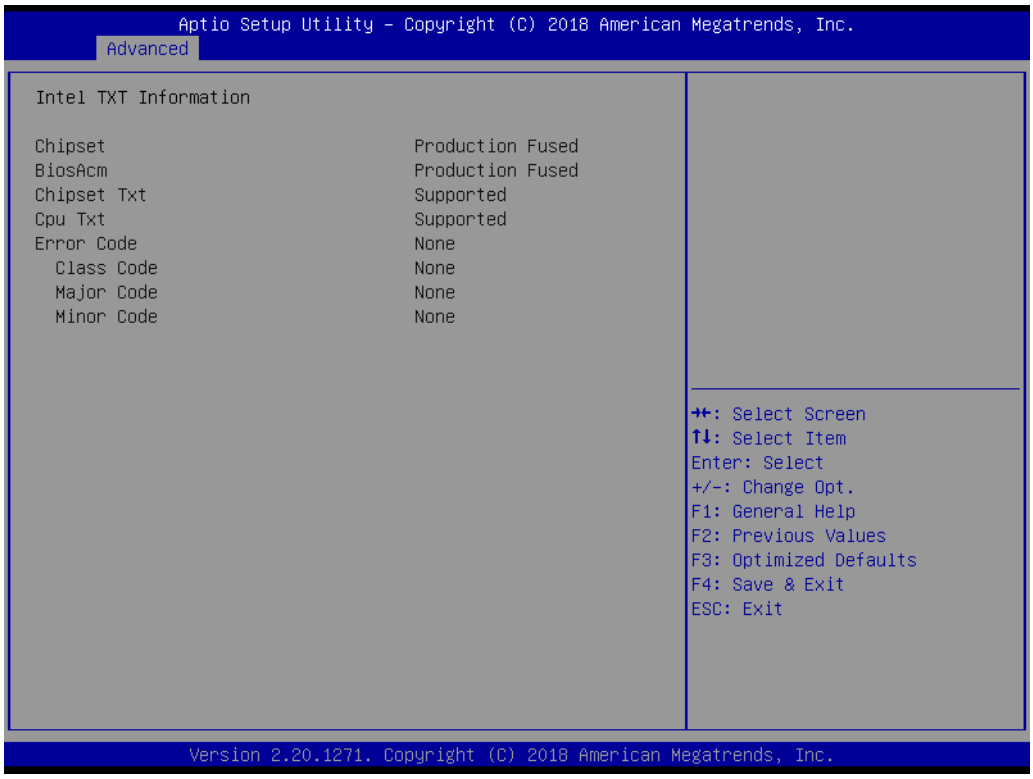


Figure 3.29 Intel® TXT Information

3.2.2.13 PCI Subsystem Settings

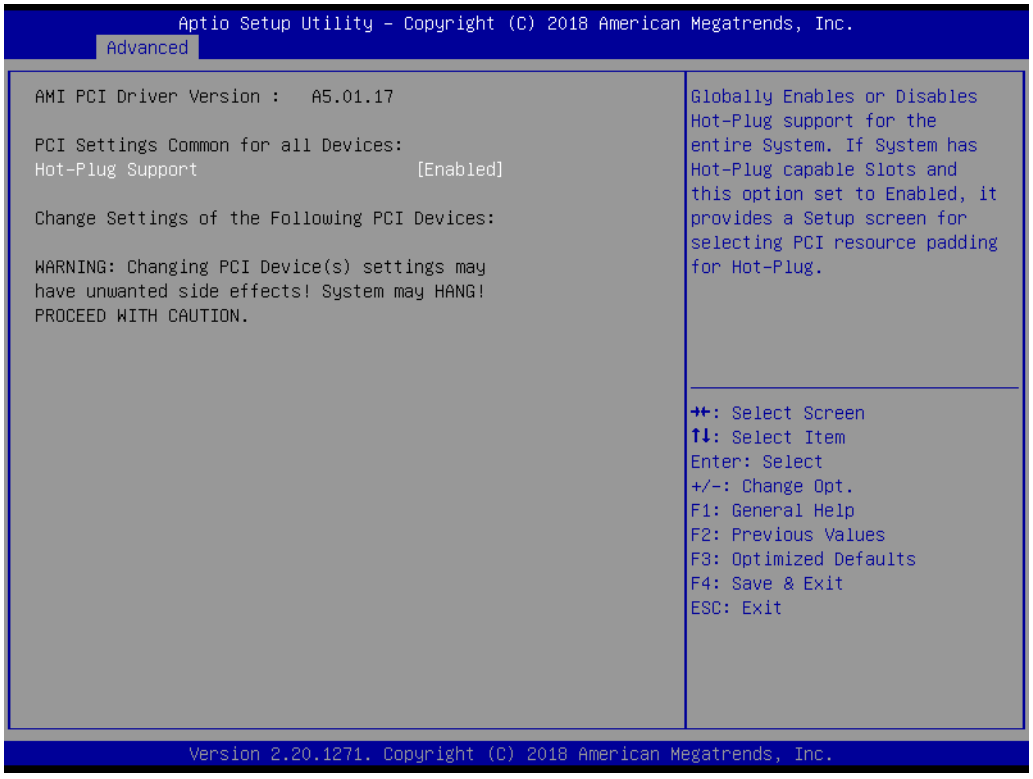


Figure 3.30 PCI Subsystem Settings

- **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

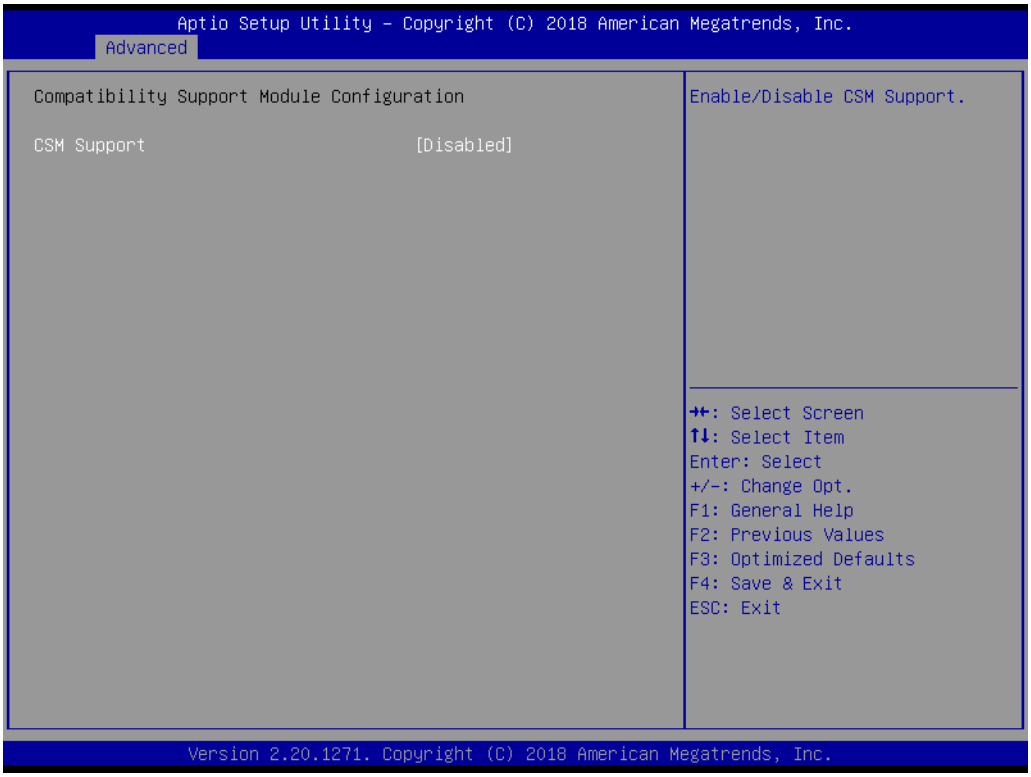


Figure 3.31 CSM Configuration

- **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

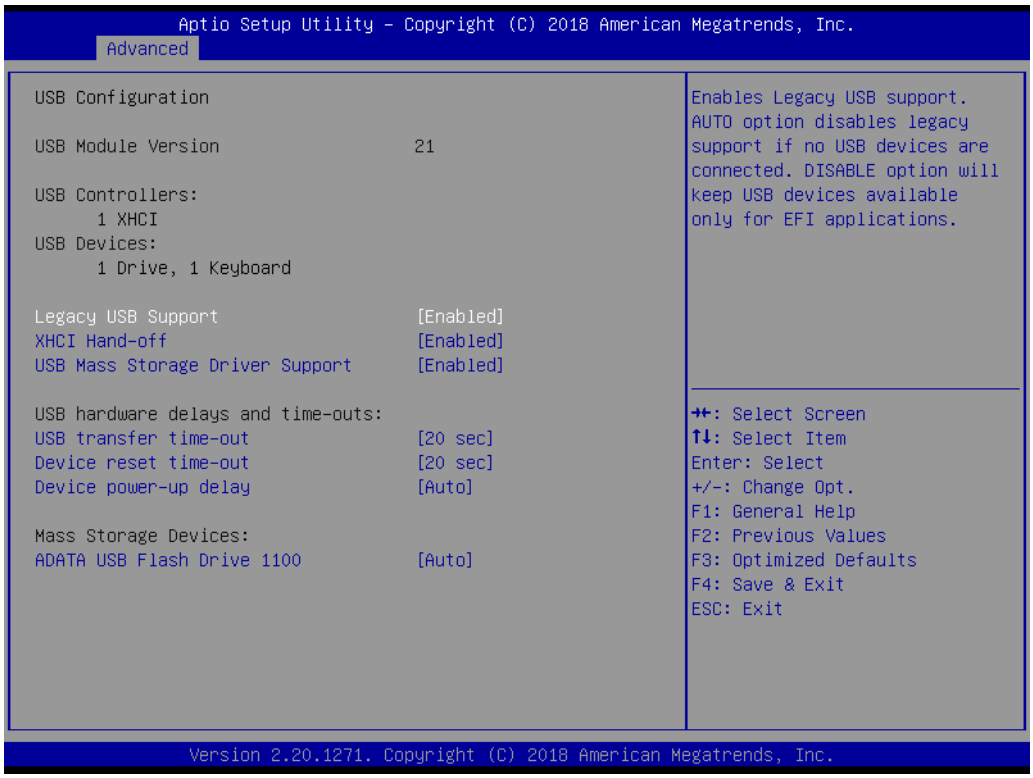


Figure 3.32 USB Configuration

- **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

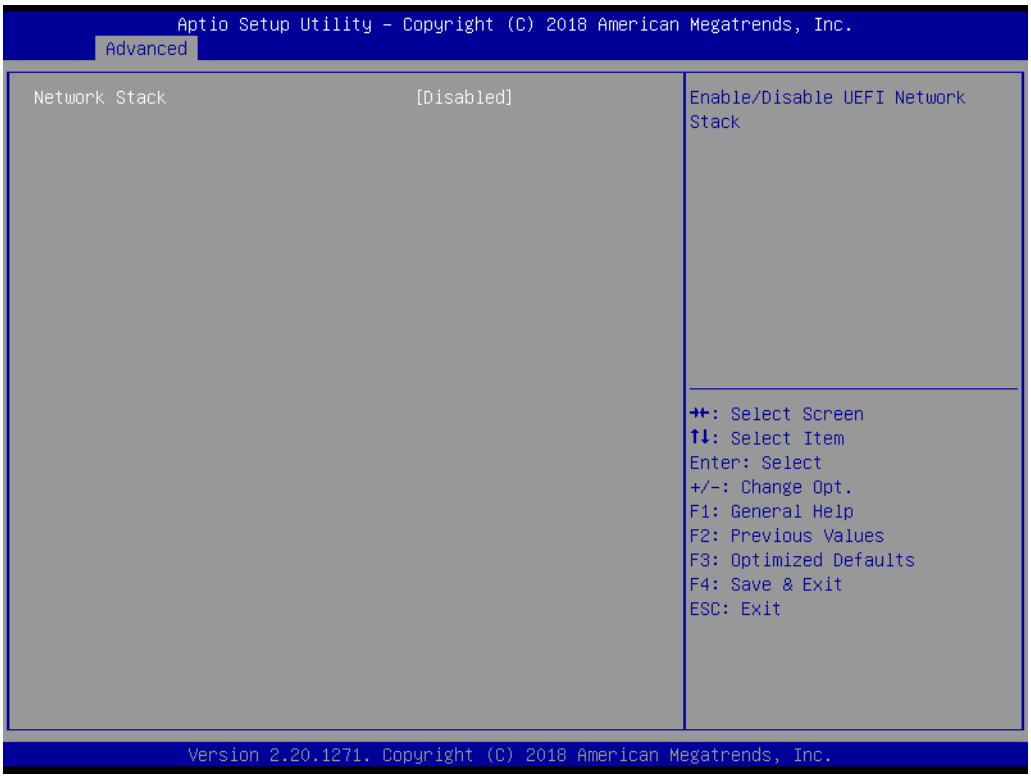


Figure 3.33 Network Stack

- **Network Stack**
  Enable or Disable the UEFI Network Stack.

3.2.3 Chipset

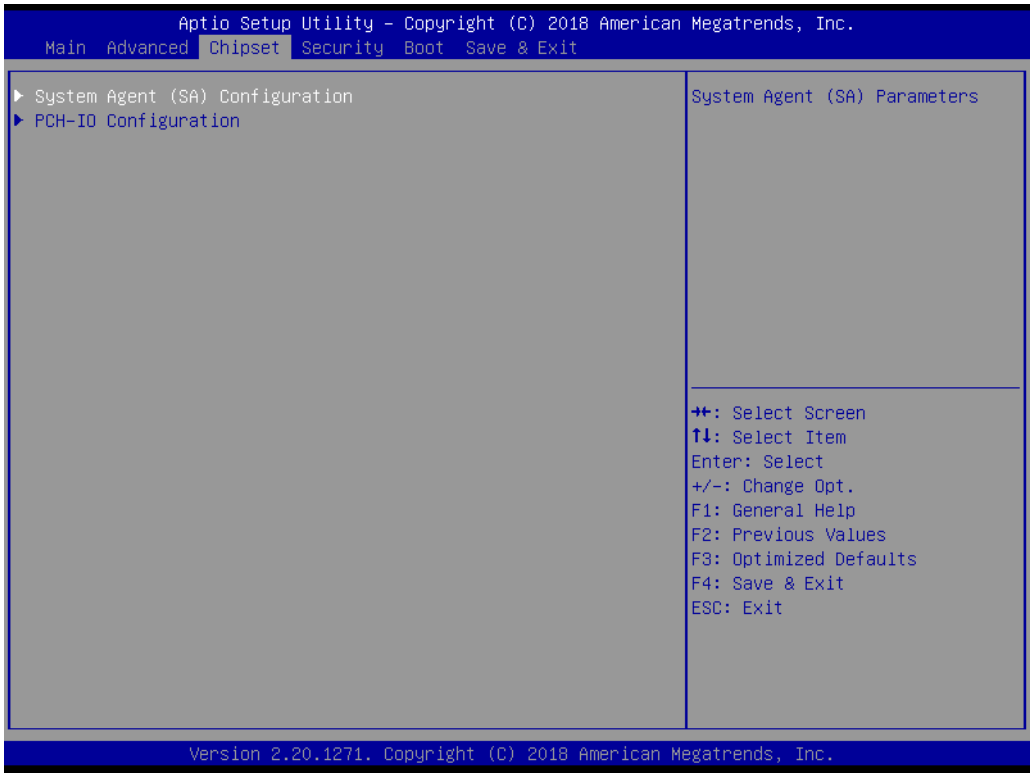


Figure 3.34 Chipset

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

3.2.3.1 System Agent (SA) Configuration

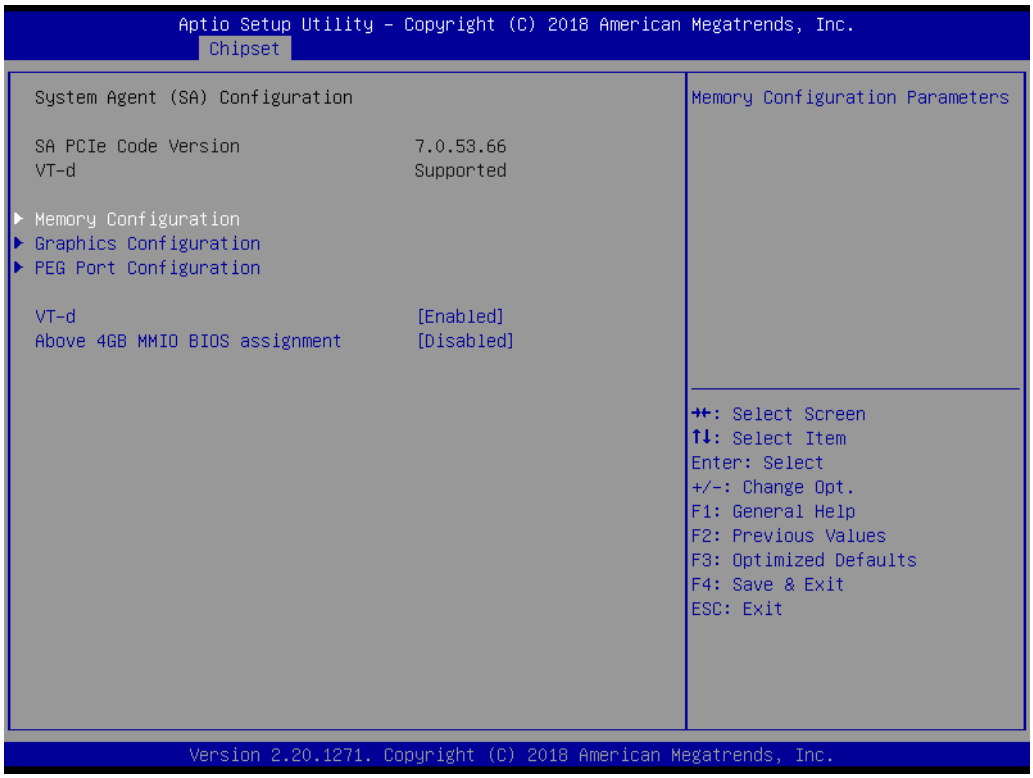
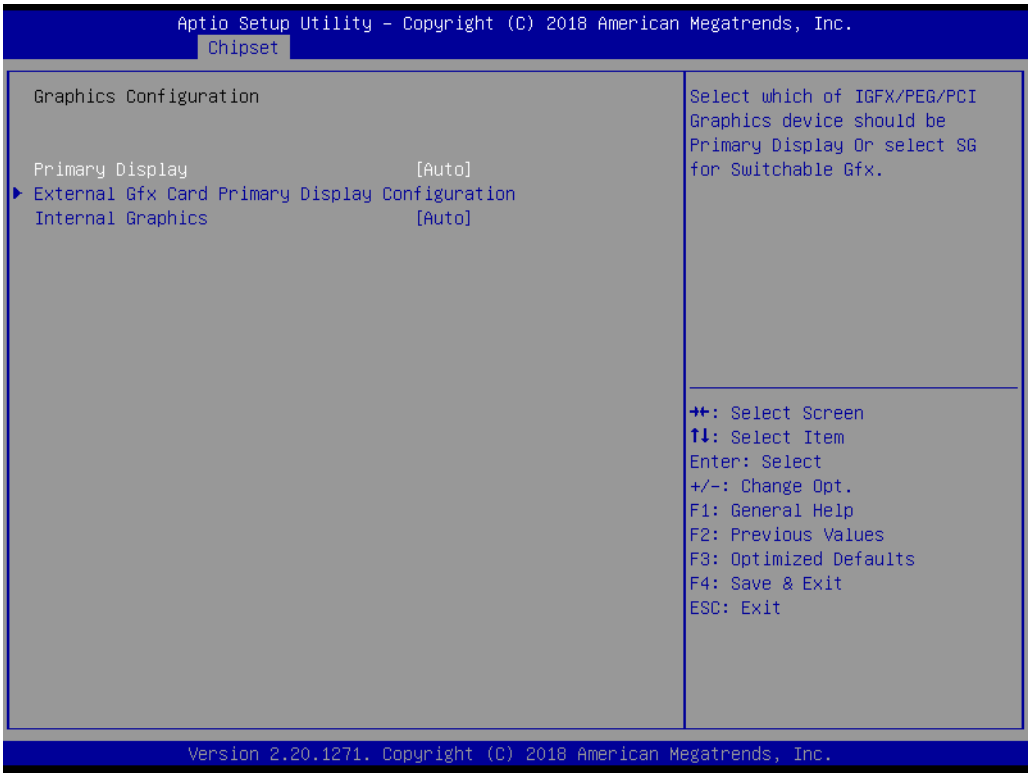


Figure 3.35 System Agent (SA) Configuration

3.2.3.2 Graphics Configuration



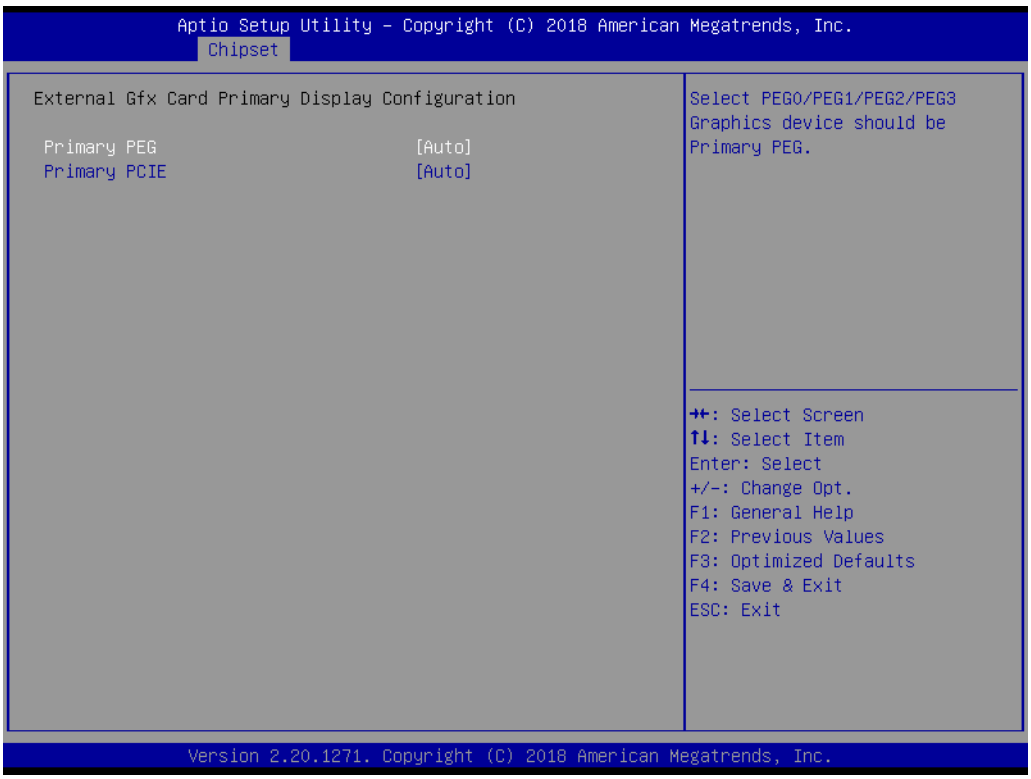


Figure 3.36 Graphics Configuration

- **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

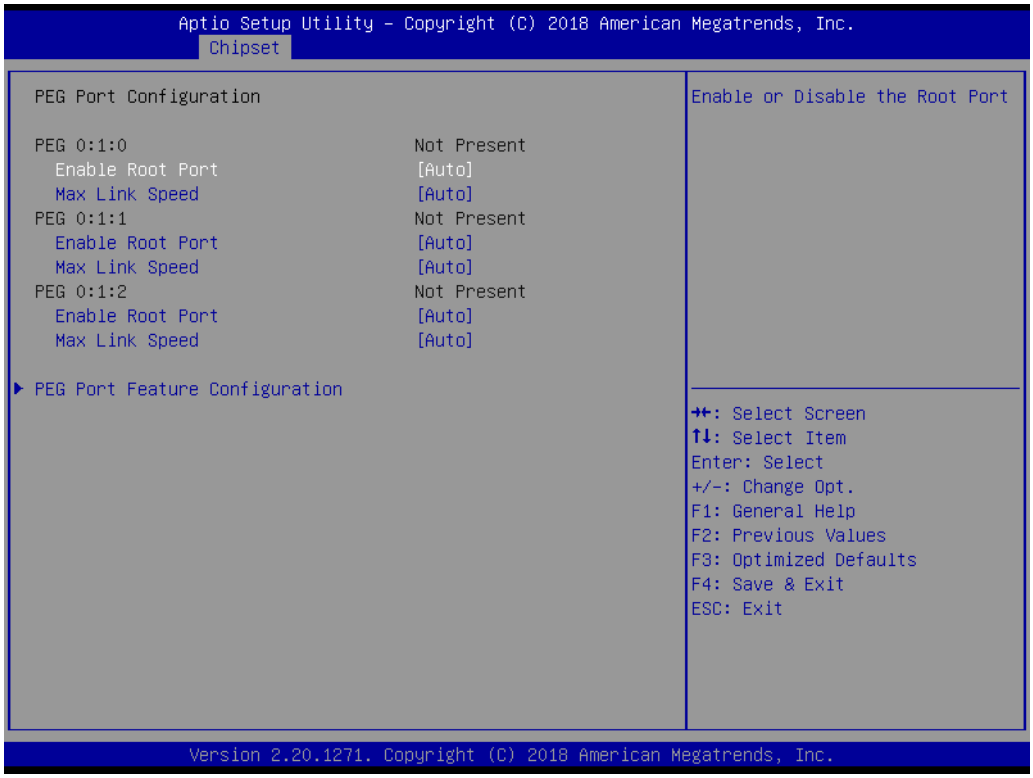


Figure 3.37 PEG Port Configuration

- **Enable Root Port**
  Enable or Disable the root port.
- **Max Link Speed**
  Configure PEG 0:1:0 max speed.

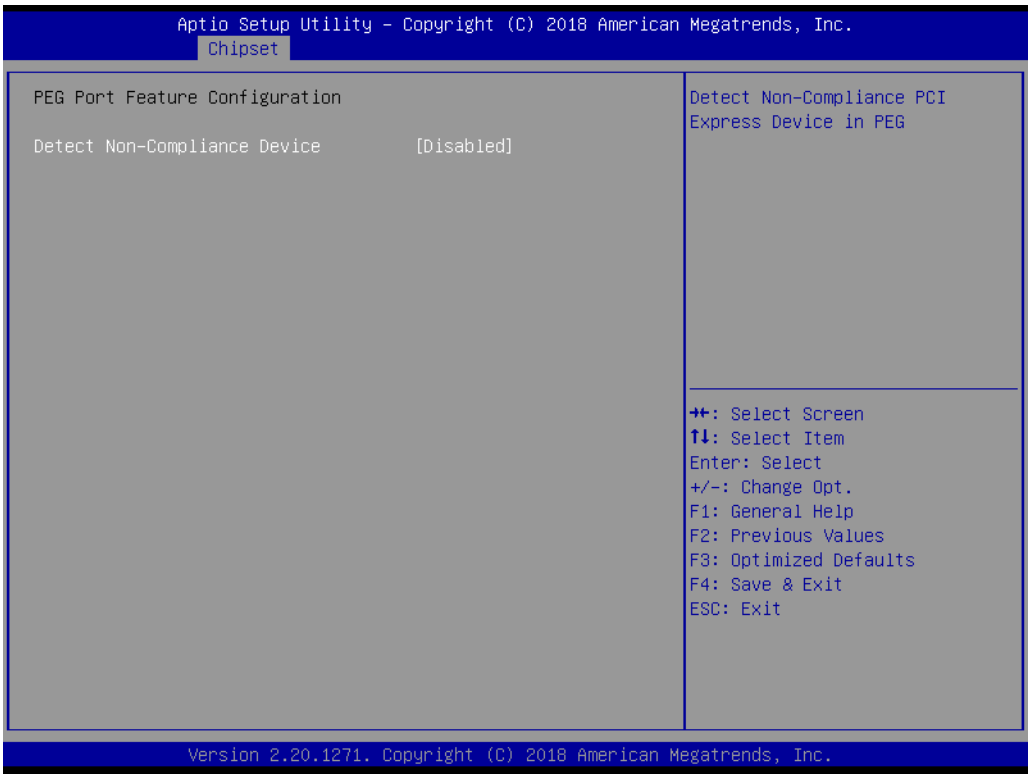


Figure 3.38 PEG Port Feature Configuration

- **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.

3.2.3.4 Memory Configuration

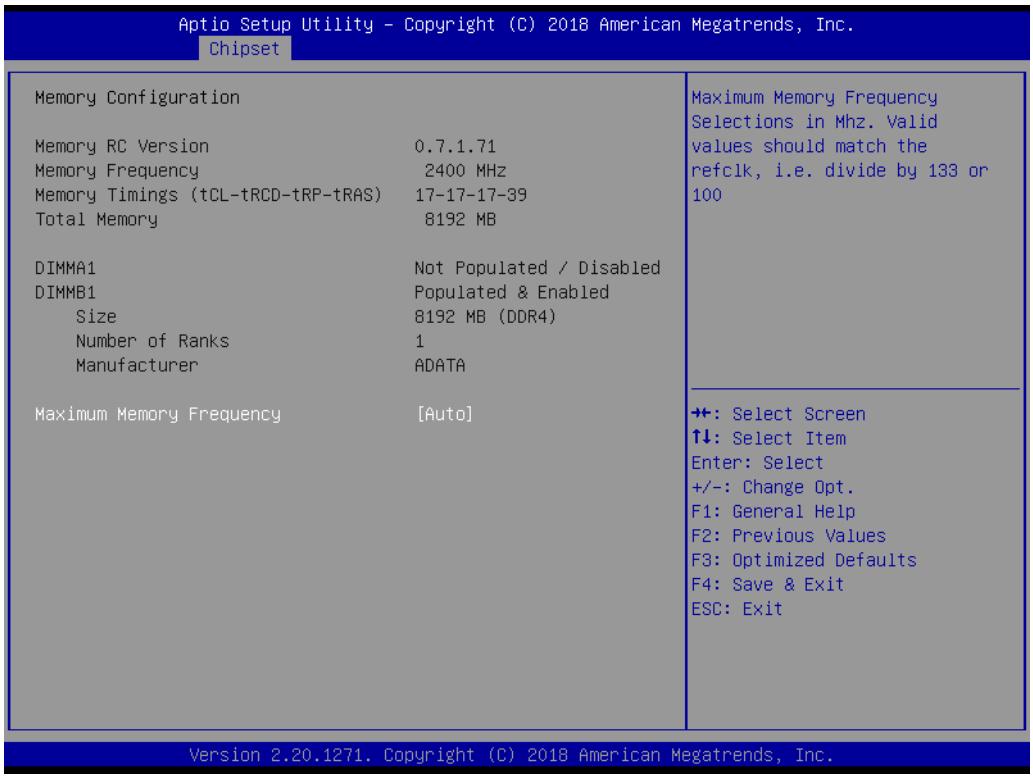


Figure 3.39 Memory Configuration

- **Maximum Memory Frequency**
  Maximum memory frequency selections in MHz.

3.2.3.5 PCH-IO Configuration

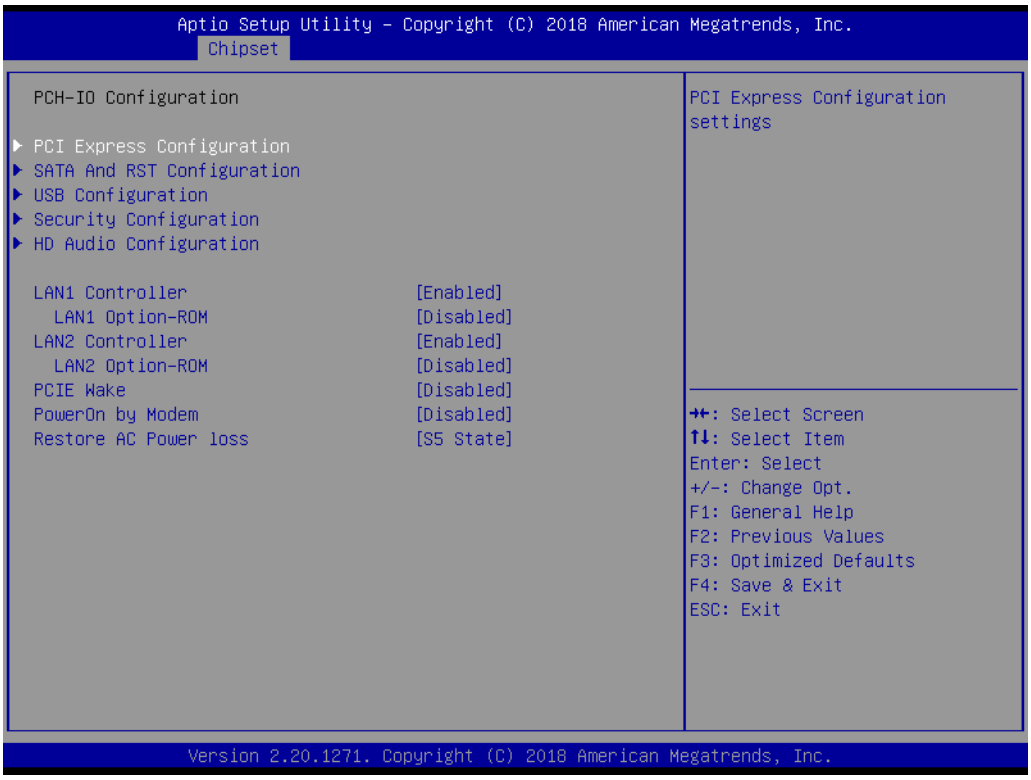
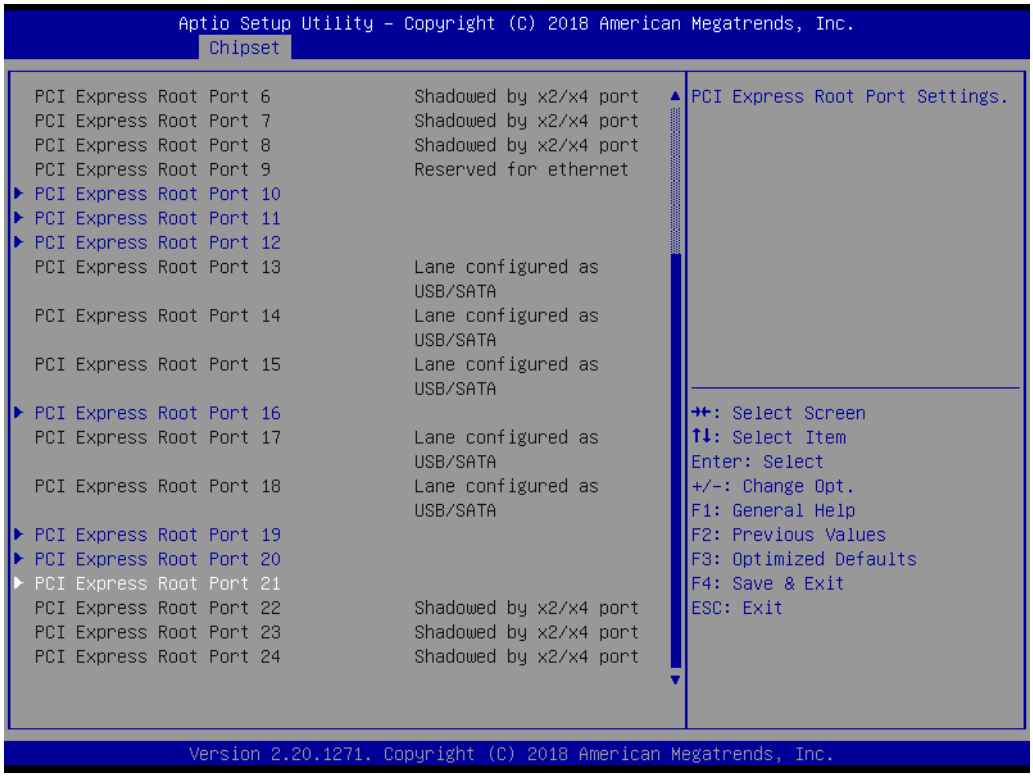


Figure 3.40 PCH-IO Configuration

- **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).

3.2.3.6 PCI Express Configuration



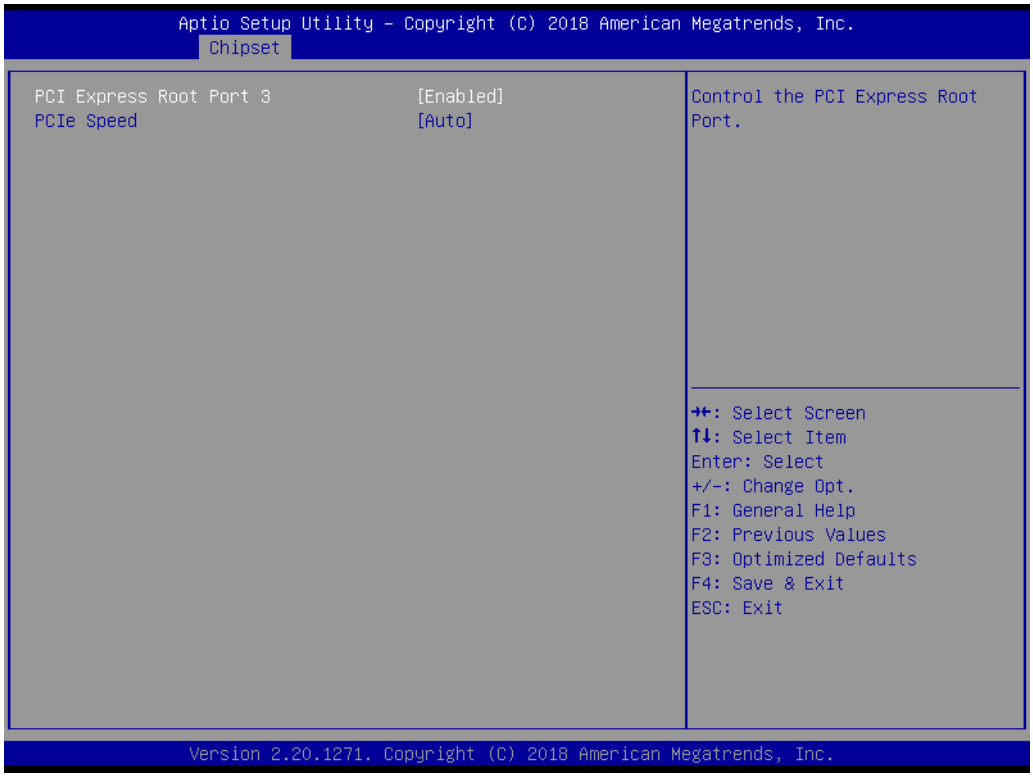
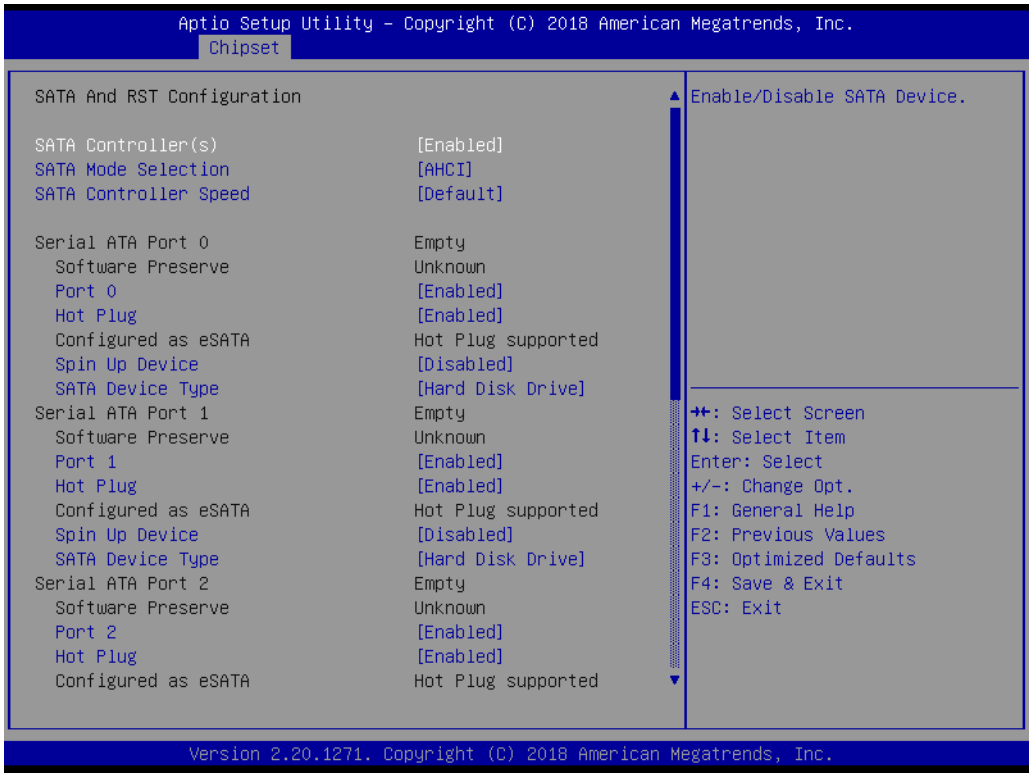


Figure 3.41 PCI Express Root Port Setting

- **PCI Express Root Port 1**
  Enable or Disable PCI Express Root Port.
- **PCIe Speed**
  Select "Auto, Gen1, Gen2, Gen3" for PCIe Speed.

3.2.3.7 SATA and RST Configuration



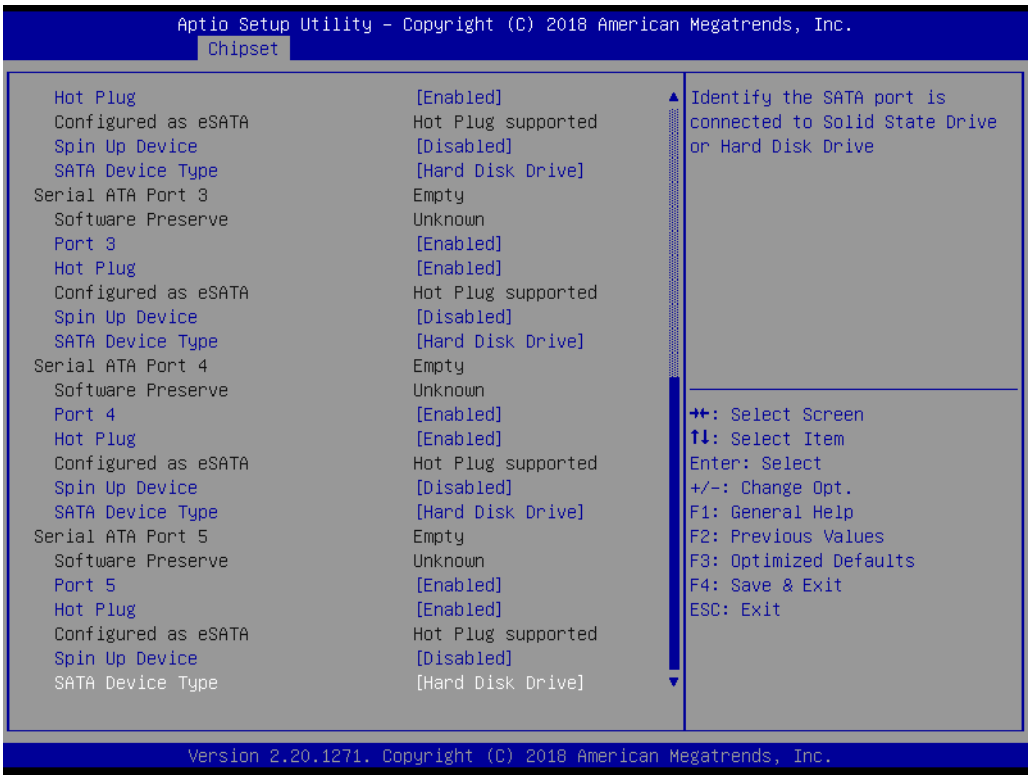


Figure 3.42 SATA Configuration

- **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

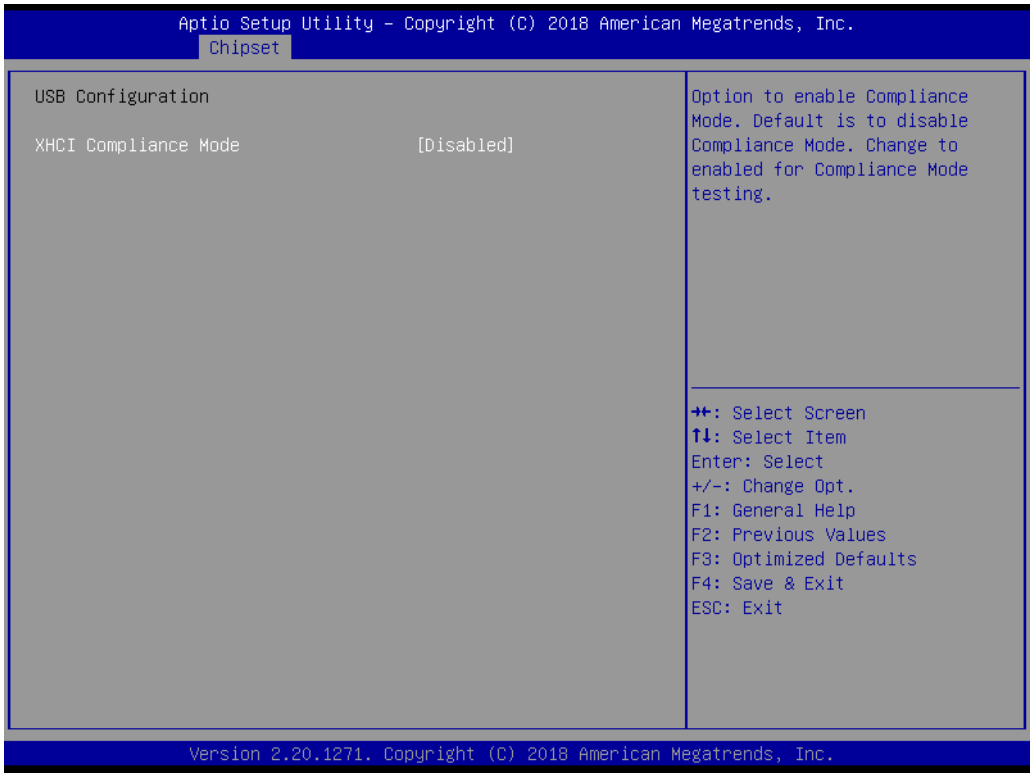


Figure 3.43 USB Configuration

- **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

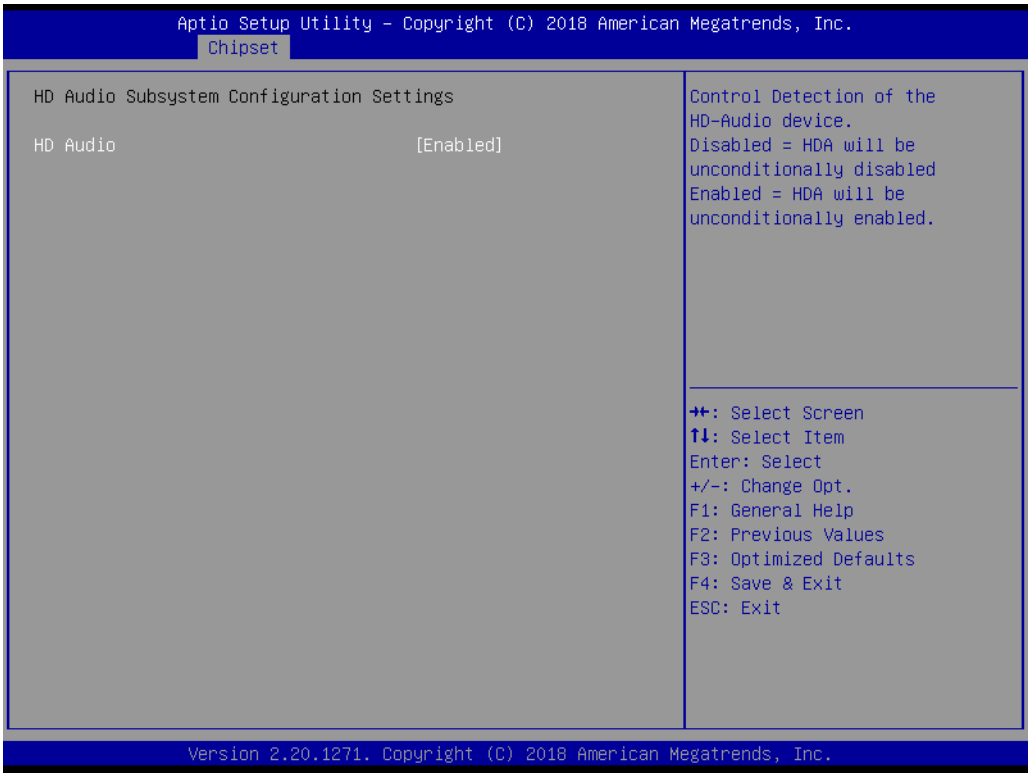


Figure 3.44 HD Audio Configuration

- **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

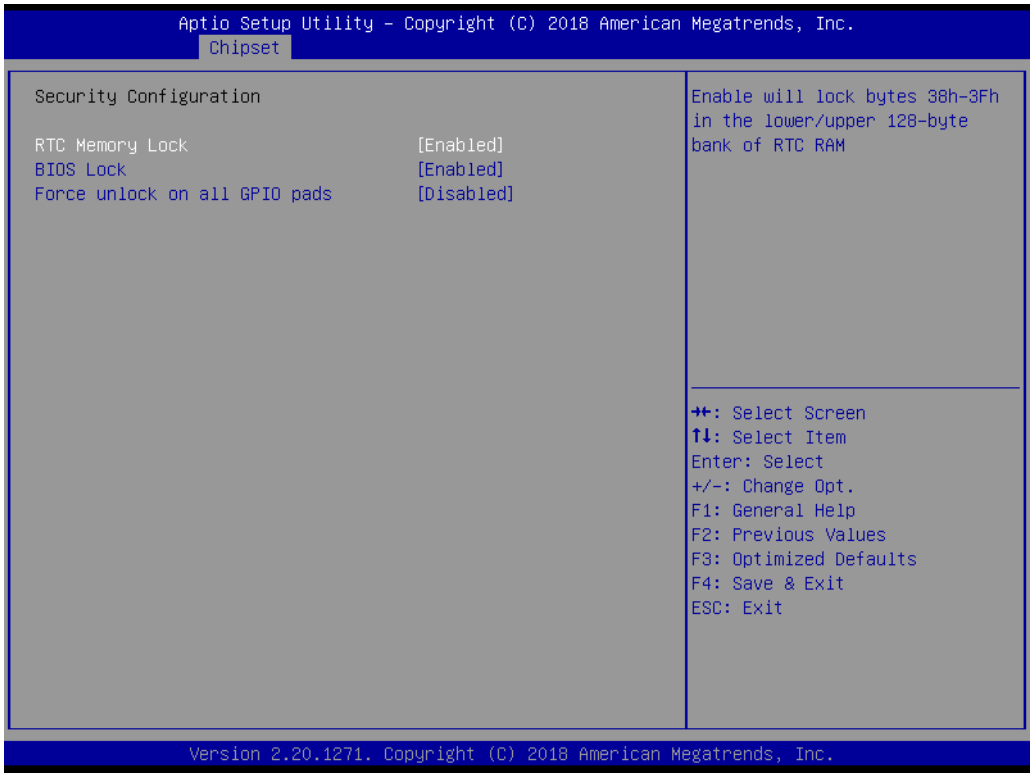


Figure 3.45 Security Configuration

- **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

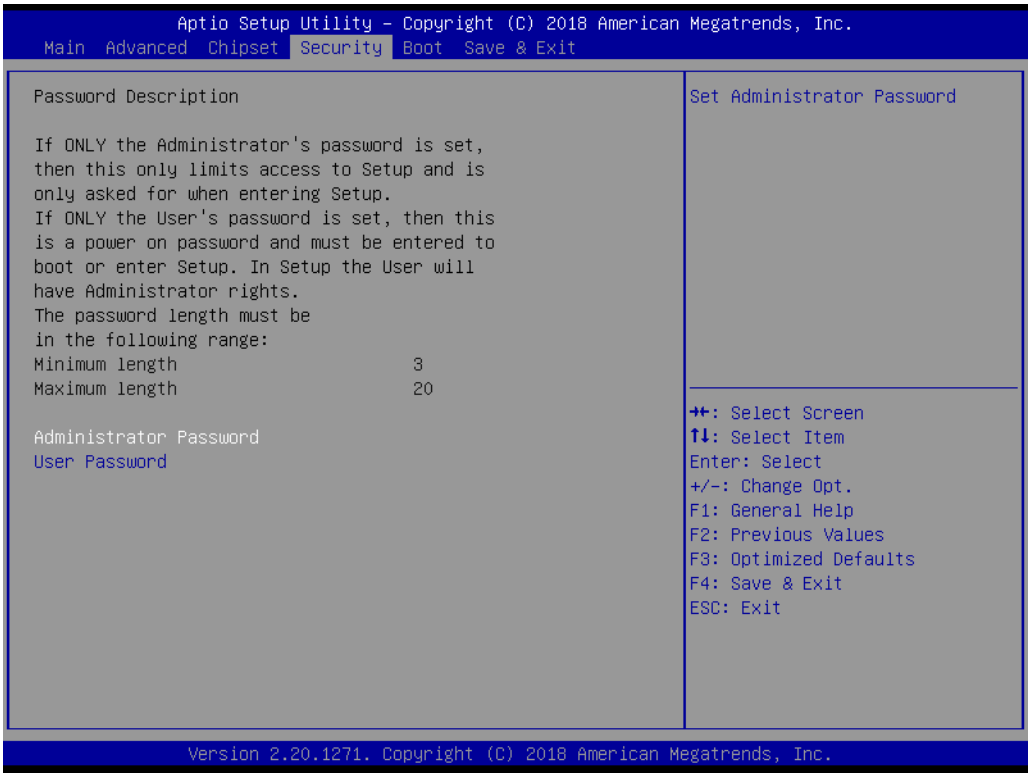


Figure 3.46 Security

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.*

3.2.5 Boot

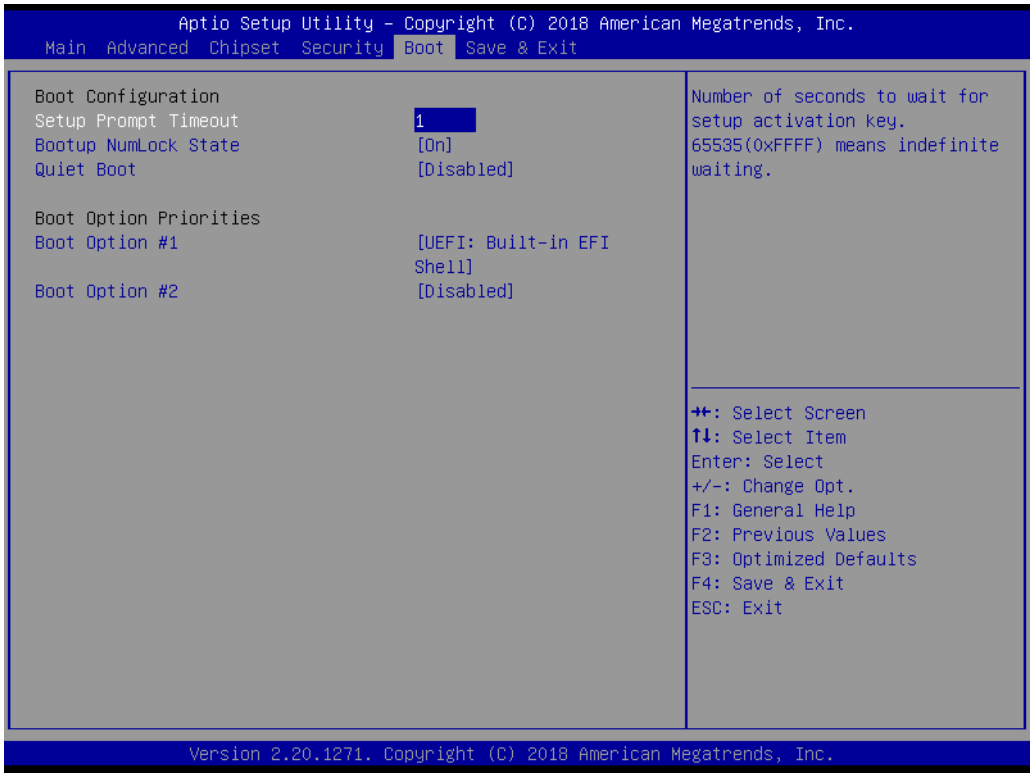


Figure 3.47 Boot

- **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 group.

3.2.6 Save & Exit

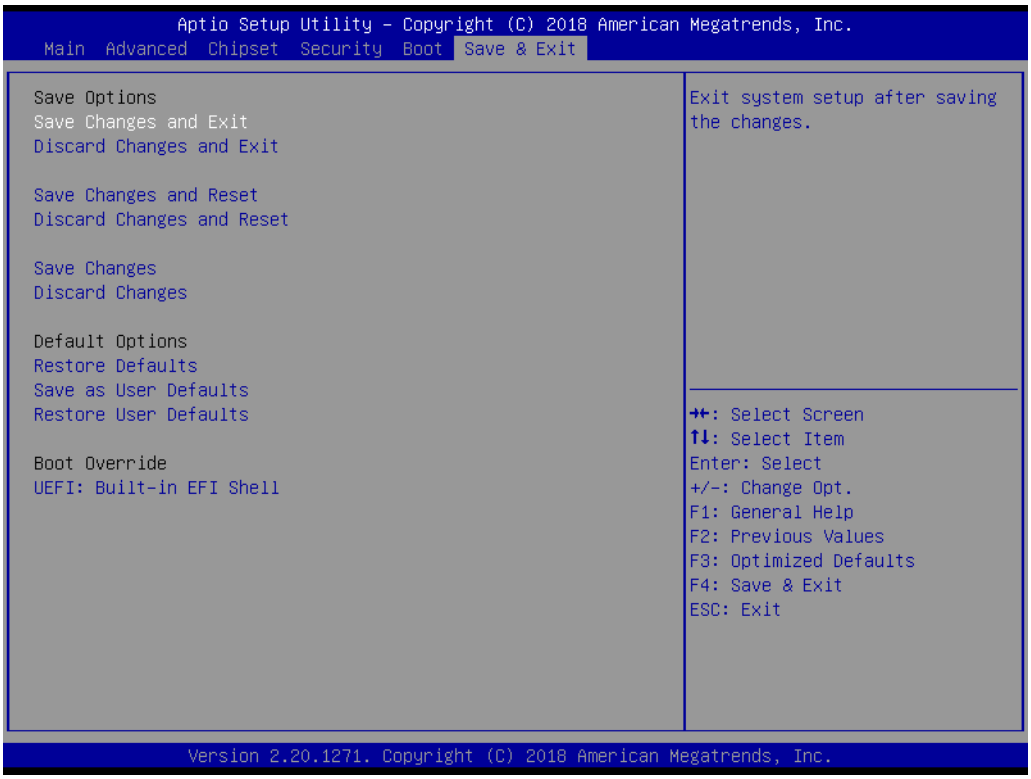


Figure 3.48 Save & Exit

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>.

Chapter 4

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.

Note! *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.

Note! *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.

Appendix A

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).

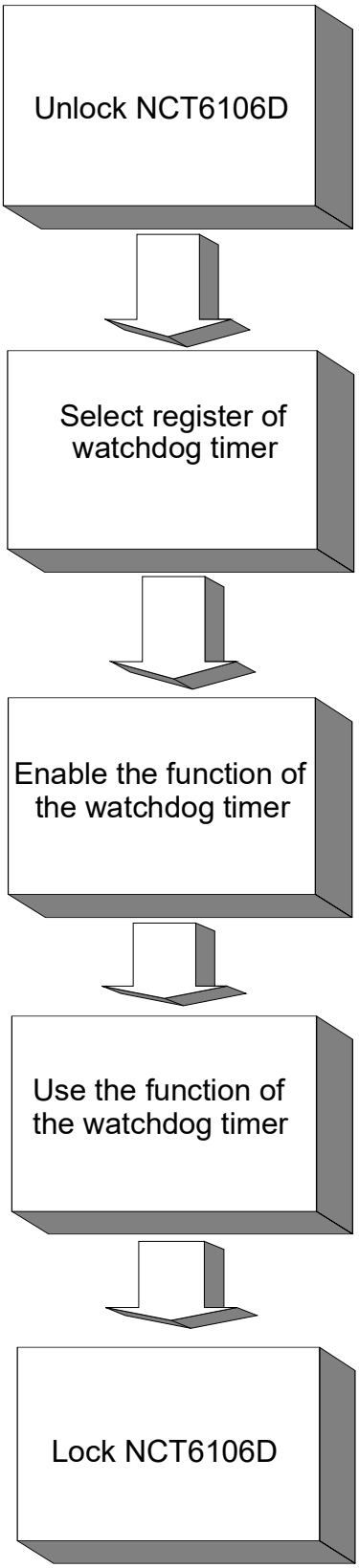

Unlock NCT6106D
Select register of watchdog timer
Enable the function of the watchdog timer
Use the function of the watchdog timer
Lock NCT6106D

Table A.1: Watchdog Timer Registers		
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 watchdog timer.
30 (hex)	write	Write 01 (hex) to enable the function of the watchdog 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 watchdog 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 immediately 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
```

4. Enable the watchdog timer to be reset by keyboard

```
;--------------------------------------------------------
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
;--------------------------------------------------------
Dec dx ; Lock NCT6106D
Mov al,0aah
Out dx,al
```

Appendix B

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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All product specifications are subject to change without notice.