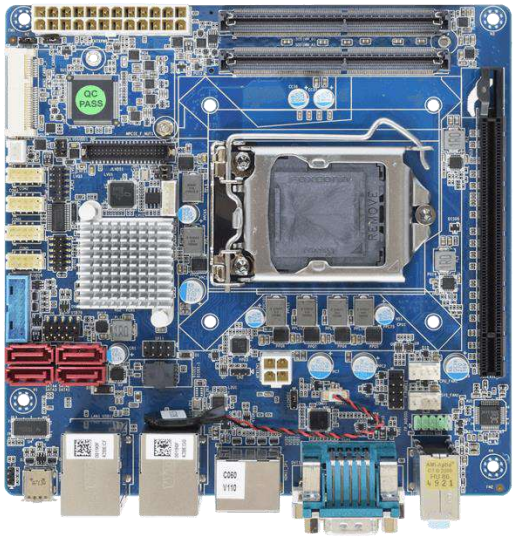
C&T SOLUTION INC.

USER'S MANUAL



CT-XCL01 Series

Mini-ITX Industrial Motherboard

Table of Contents

Prefaces

Revision

Revision	Description	Date
1.0	Manual Released	2023/07/14

Disclaimer

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Environmental Protection Announcement

Do not dispose this electronic device into the trash while discarding. Please recycle to minimize pollution and ensure environment protection.

Safety Precautions

Before installing and using the equipment, please read the following precautions:

- Put this equipment on a reliable surface during installation. Dropping it or letting it fall could cause damage.
- The power outlet shall be installed near the equipment and shall be easily accessible.
- Turn off the system power and disconnect the power cord from its source before making any installation. Be sure both the system and the external devices are turned OFF. Sudden surge
- of power could ruin sensitive components. Make sure the equipment is properly grounded.
- When the power is connected, never open the equipment. The equipment should be opened only by qualified service personnel.
- Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
- Disconnect this equipment from the power before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
- Avoid the dusty, humidity and temperature extremes.
- Do not place heavy objects on the equipment.
- If the equipment is not used for long time, disconnect it from the power to avoid being damaged by transient over-voltage.
- The storage temperature shall be above -40°C and below 80°C.
- The computer is provided with a battery-powered real-time clock circuit. There is a danger of explosion if incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer.
- If one of the following situation arises, get the equipment checked be service personnel:
    - The power cord or plug is damaged.
    - Liquid has penetrated into the equipment.
    - The equipment has been exposed to moisture.
    - The equipment does not work well or it cannot work according the user's manual.
    - The equipment has been dropped and damaged.
    - The equipment has obvious signs of breakage.

Technical Support and Assistance

1. Visit the C&T Solution Inc website at www.candtsolution.com where you can find the latest information about the product.
2. Contact your distributor, our technical support team or sales representative for technical support if you need additional assistance. Please have following information ready before you call:
   - Model 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

Conventions Used in this Manual

WARNING This indication alerts operators to an operation that, if not strictly observed, may result in severe injury.

CAUTION This indication alerts operators to an operation that, if not strictly observed, may result in safety hazards to personnel or damage to equipment.

NOTE This indication provides additional information to complete a task easily.

Package Contents

Before installation, please ensure all the items listed in the following table are included in the package.

Item	Description	Qty
1	CT-XCL01 Mini-ITX Industrial Motherboard	1
2	I/O shield	1
3	SATA Cable	1

Ordering Information

Model No.	Product Description
CT-XCL01	Mini-ITX Industrial Motherboard with LGA 1151 Socket supporting 8th/9th Gen Intel® Core™ i3/i5/i7 Processor, Q370

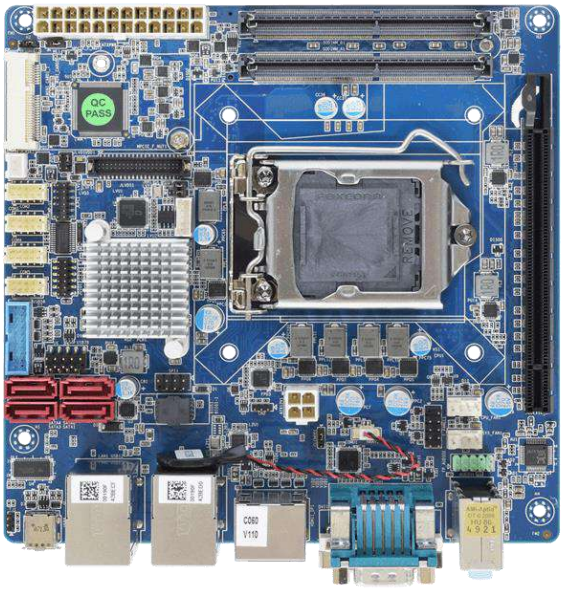
Chapter 1

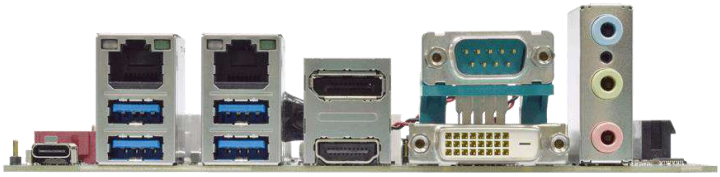
Product Introductions

1.1 Overview

CT-XCL01 is a mini-ITX industrial motherboard with LGA1151 socket to support Intel 8th/9th Generation Core i7/i5/i3, and Pentium Processor. Two DDR4 SODIMM memory sockets enables a maximum of 32GB. The integrated Intel® UHD Graphics 610/630 with the processor supports three independent displays from the DVI, DisplayPort, HDMI, or LVDS onboard.

The I/O interface of the board gives the users rich connectivity. It supports 2x Gigabit Ethernet, USB3.0 with optional 1x Type-C port, COM, GPIO, SATA, mSATA, and M.2 for various applications. The mini PCIe and PCIex16 slots also enables flexibility and expandability.





1.1.1 Key Features

- Intel® 8th/9th Gen. Core™ i7 / i5/ i3 Processor (LGA1151) with Q370 PCH
- 2x DDR4 SO-DIMM support up to 32GB
- 2x Realtek RTL8111G GbE LAN
- Triple displays from DVI / DisplayPort / HDMI / LVDS
- 1x PCIe x16, 1x Mini PCIe
- 1x SATA (shared by 1x M.2) and 4x SATA 3.0Gb/s
- Up to 5x COM port, 6x USB 3.0, 2x USB 2.0
- 1x 8-bit GPIO (4-in / 4-out)
- Optional 1x USB 3.1 Type-C
- Optional TPM 2.0

1.2 Hardware Specification

System

- Processor: LGA 1151 socket supporting 8th/9th Gen Intel® Core™ i3/i5/i7 Desktop Processor
  - Intel® Core™ i7-9700E, i7-9700TE, i7-8700T, i7-8700
  - Intel® Core™ i5-9500E, i5-9500TE, i5-8500T, i5-8500
  - Intel® Core™ i3-9100E, i3-9100TE, i3-8100T, i3-8100
  - Intel® Pentium® G5400T, G5400 System Chipset: Intel® Q370 PCH
- LAN Chipset: 2x Realtek RTL8111G GbE LAN (Support Wake-on-LAN and PXE)
- Audio Codec: Realtek ALC888S
- Memory: 2x 260-Pin DDR4 2133/2400/2666MHz SODIMM Max. Size: 32GB
- BIOS: AMI 256Mbit SPI BIOS
- Watchdog:
  - Software Programmable Supports 1~255 sec. System Reset
- TPM: TPM 2.0 supported (optional)

Display

- Graphics: Intel® UHD Graphics 610/630
- 1x DVI-D, 1x LVDS,
  1x DisplayPort 1.2, 1x HDMI 1.4
- Multiple Display: Triple Display

Storage

- SATA: 4 x SATA 3.0Gb/s, Support RAID 0, 1, 5, 10
- M.2: 1x M.2 (M-Key, Type: 2280, SATA)

Expansion

- Mini PCI Express: 1x Full-size Mini PCIe
- PCI Express: 1x PCIe x16 (Gen3)

Rear I/O

- Display: 1x DVI-D, 1x DisplayPort, 1x HDMI
- COM: 1x RS-232/422/485
- USB: 4x USB 3.2 Gen 1
- LAN: 2x RJ45
- Audio: 1x Line-out, 1x Mic-in
- 1x Optional USB 3.2 Gen 1 Type-C

Internal I/O

- Display: 1x 2-ch 24-bit LVDS
- COM: 4x RS-232
- USB: 2x USB 3.2 Gen 1, 2x USB 2.0
- SATA: 4 x SATA 3.0Gb/s
- Audio: 1x Front panel audio
- GPIO: 1x 8-bit GPIO (4-in/4-out)
- Others:
  - 1x LPC
  - 1x Front panel
  - 1x SPI
  - 2x PWM fan

Operating System

- Windows: Windows 10
- Linux: Linux kernel 5.X

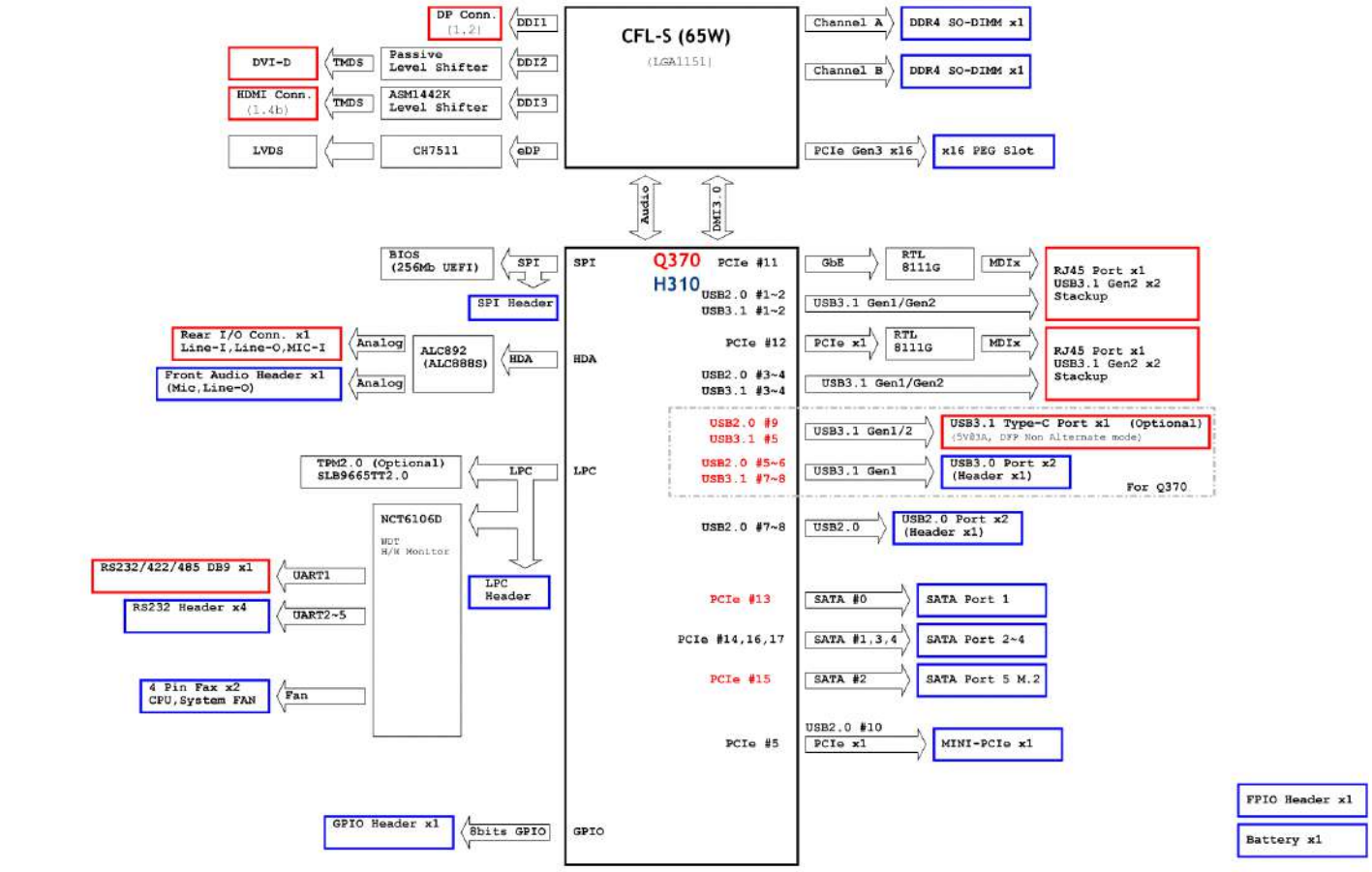
Power

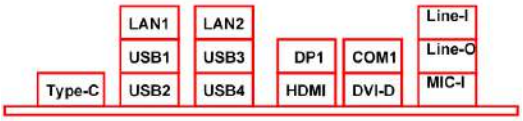
- Power Connector: 2x12-pin and 2x2-pin power connector
- Power Input: ATX power
- Management: ACPI

Mechanical & Environment

- Form Factor: Mini-ITX
- Dimension: 170mm x 170mm
- Operating Temp.: 0°C ~ 60°C
- Storage Temp.: -40°C ~ 90°C
- Relative humidity: 10% ~ 90% relative humidity, non-condensing

1.3 Block Diagram





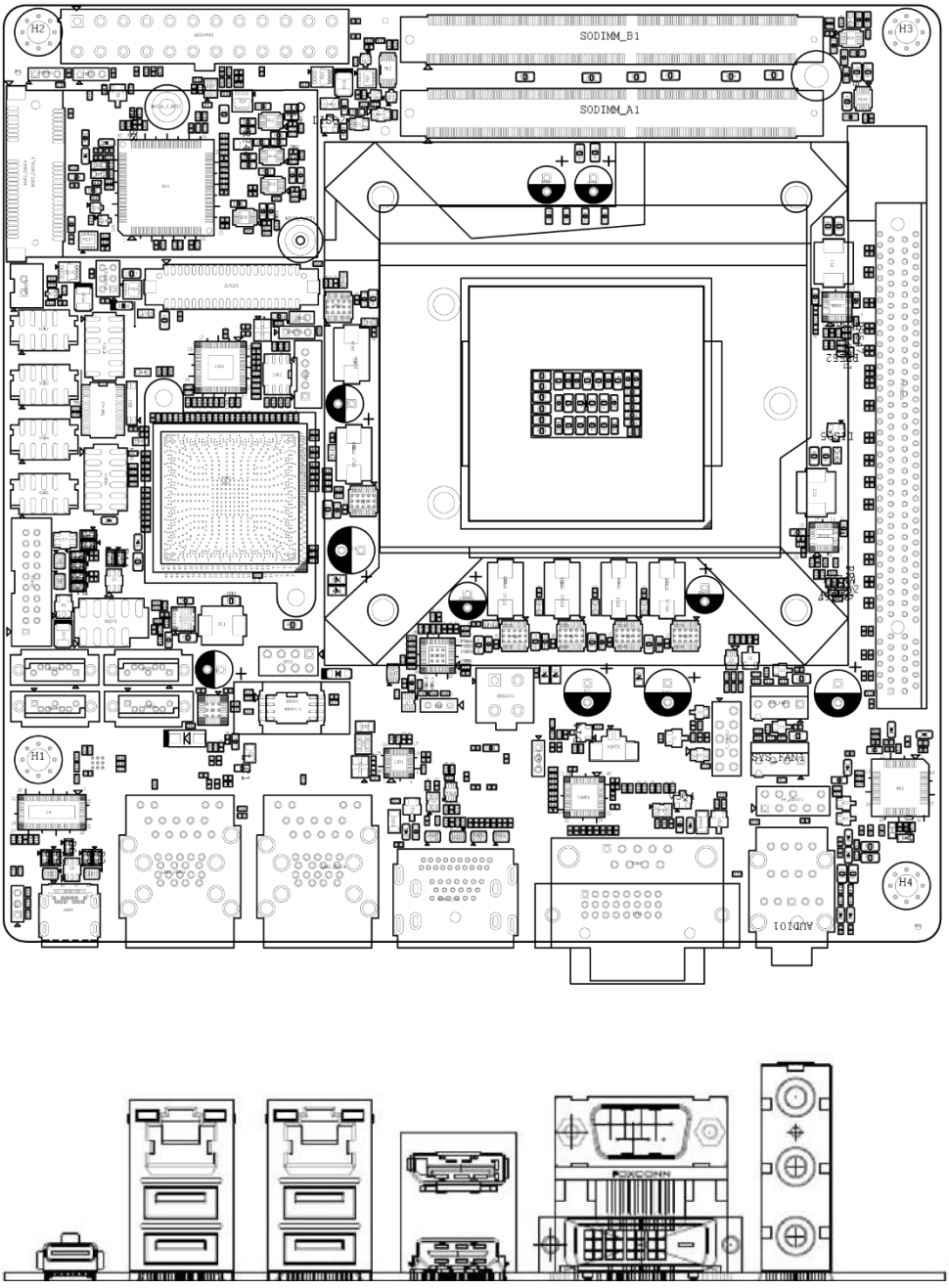
USB3.1 Type-C for Q370

1.4 Board Dimensions

Unit: mm

170mm

170mm

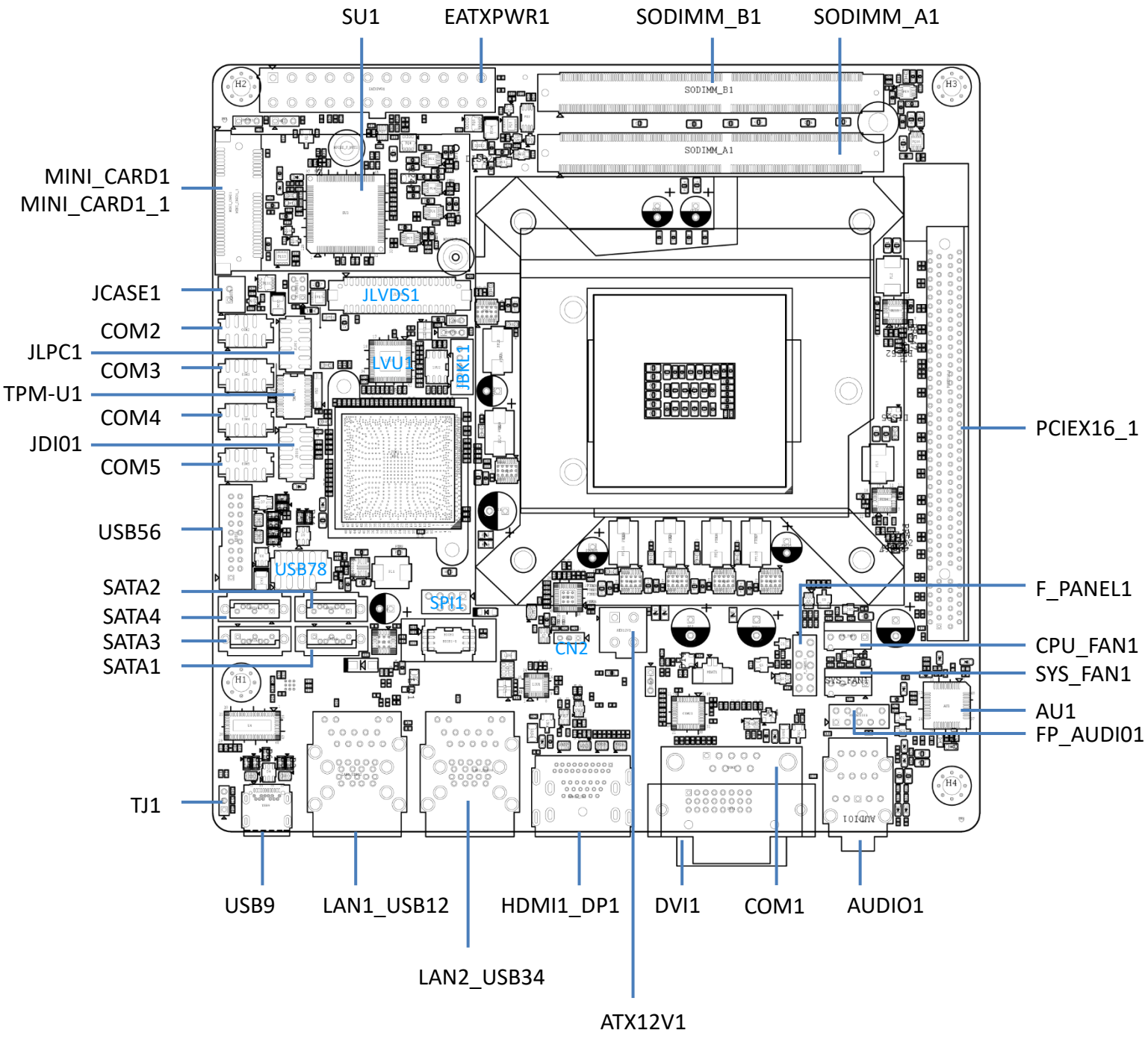


Chapter 2

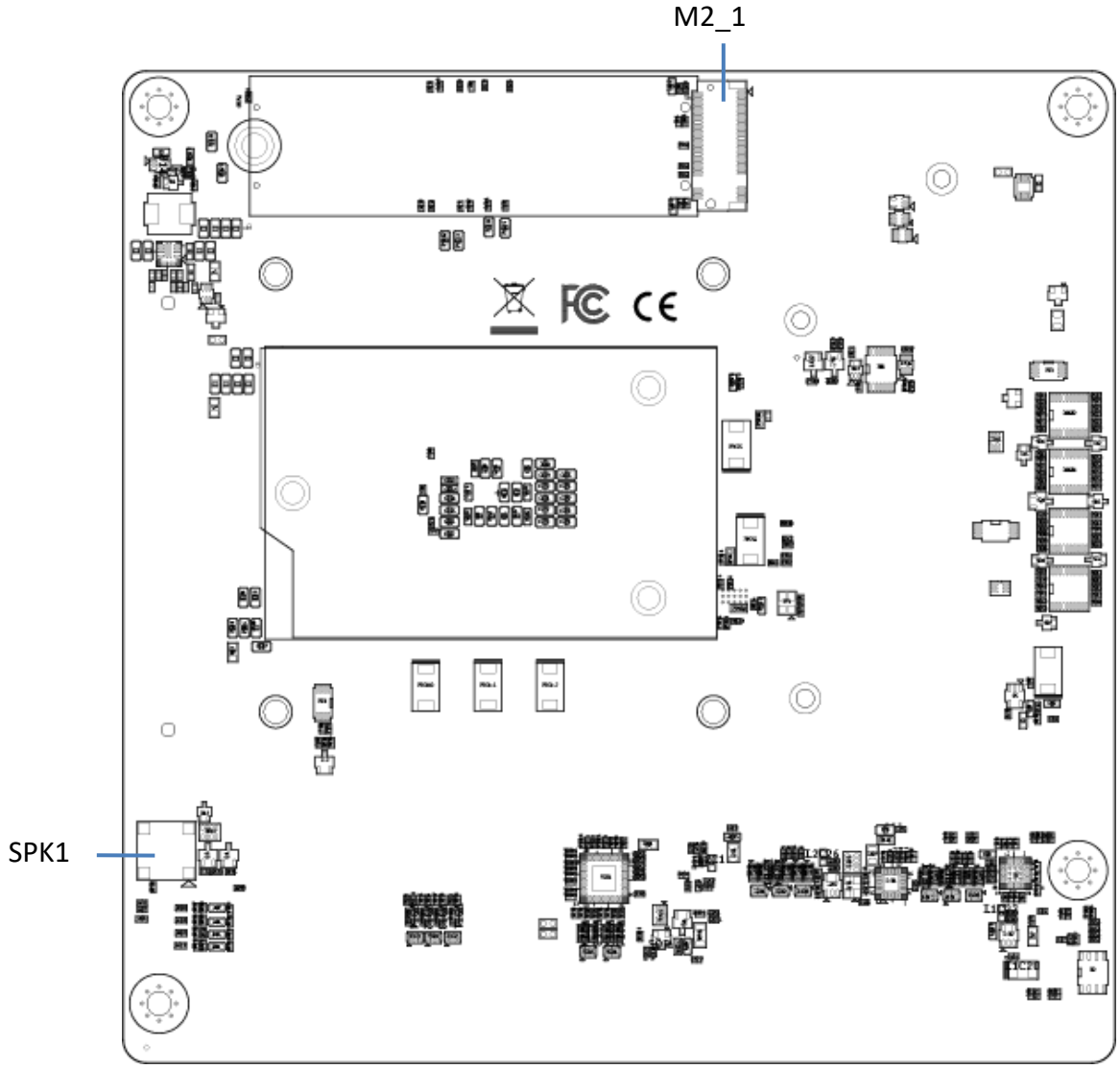
Jumper and Connectors

2.1 Switch & Connector Locations

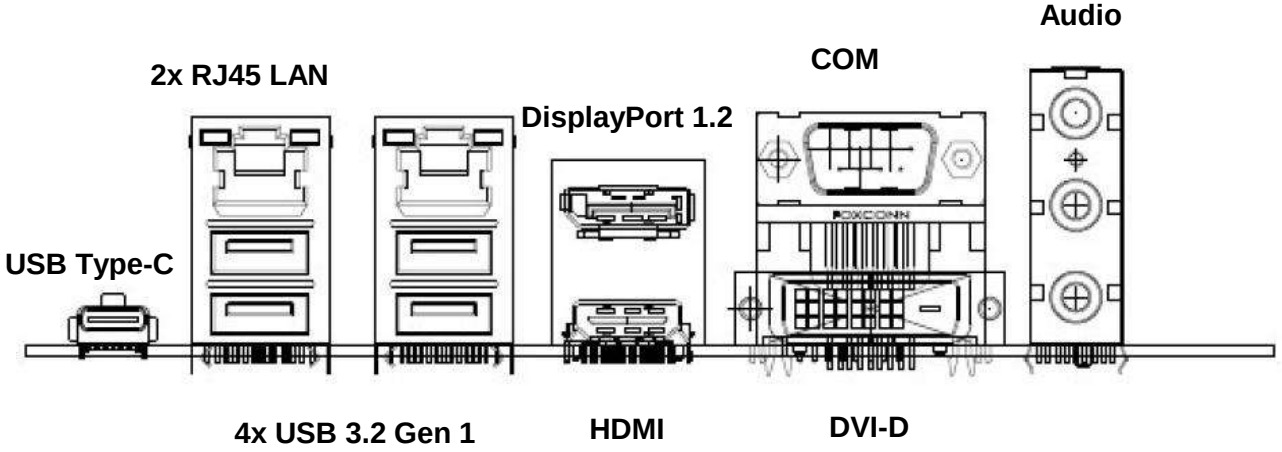
2.1.1 Top View



2.1.2 Bottom View



2.1.3 Back Panel View



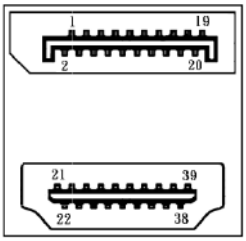
2.2 Connectors Definition

List of Connectors

Connectors Location	Definition
HDMI1_DP1	HDMI and DisplayPort Ports
DVI-D1	DVI-D Connector
COM1	Serial Port
LAN1_USB12	LAN1 and USB3.0 Ports
LAN2_USB34	LAN2 and USB3.0 Ports
AUDIO1	Line-out and Microphone in
PCIEX16_1	PCI-Express X16 Slot
JLVDS1	LVDS Connector
JBKL1	Panel Power Connector
USB78	Front Panel USB2.0 Header
SATA1, SATA2, SATA3, SATA4	SATA Connector
COM2, COM3, COM4, COM5	Serial Port Connector
FP_AUDIO1	Front Panel Audio Header
CPU_FAN1, SYS_FAN1	FAN Connector
F_PANEL1	Front Panel Header
EATXPWR1	Main Power Supply Connector
ATX12V1	Processor Power Supply Connector
JLPC1	Debug Header
SPI1	SPI Header
JDIO1	GPIO Connector
TPM1	TPM Header
MINI_CARD1_1	Mini PCI-Express
NGFF1	M.2 Socket
USB56	USB3.0 Connector

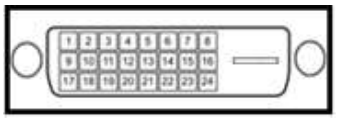
HDMI1_DP1: HDMI and DisplayPort Ports

Pin	Definition	Pin	Definition
1	DP_DP0	21	HDMI_DP2
2	GND	22	GND
3	DP_DN0	23	HDMI_DN2
4	DP_DP1	24	HDMI_DP1
5	GND	25	GND
6	DP_DN1	26	HDMI_DN1
7	DP_DP2	27	HDMI_DP0
8	GND	28	GND
9	DP_DN2	29	HDMI_DN0
10	DP_DP3	30	HDMI_CKP
11	GND	31	GND
12	DP_DN3	32	HDMI_CKN
13	DP / HDMI Singnal Switch	33	NC
14	GND	34	NC
15	DP_AUXP	35	HDMI_DDC_CLK
16	GND	36	HDMI_DDC_DATA
17	DP_AUXN	37	GND
18	DP_Hot Plug	38	HDMI_PWR
19	GND	39	HDMI_Hot Plug
20	DP_PWR		



DVI-D1: DVI-D Connector

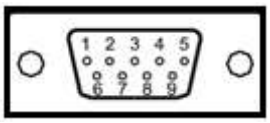
Pin	Definition	Pin	Definition
1	DVI_TX2-	16	DVI Hot Plug
2	DVI_TX2+	17	DVI_TX0-
3	GND	18	DVI_TX0+
4	NC	19	GND
5	NC	20	NC
6	DVI_DDC_CLOCK	21	NC
7	DVI_DDC_DATA	22	GND
8	NC	23	DVI_CLK+
9	DVI_TX1-	24	DVI_CLK-
10	DVI_TX1+	C1	NC
11	GND	C2	NC
12	NC	C3	NC
13	NC	C4	NC
14	+5V	C5	GND
15	GND		

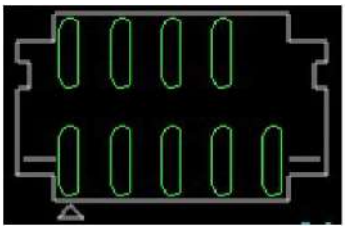


COM1: Serial Port

Connector Type: 9-pin D-Sub

Pin	Definition
1	DCD1
2	RXD1
3	TXD1
4	DTR1
5	GND
6	DSR1
7	RTS1
8	CTS1
9	RI1
10	KEY (No Pin)



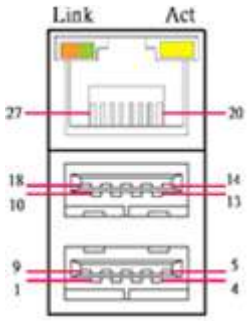


*Serial Port is over-current protected

LAN1_USB12: LAN1 and USB3.0 Ports

Connector Type: RJ45 port with LEDs and dual USB3.0 ports

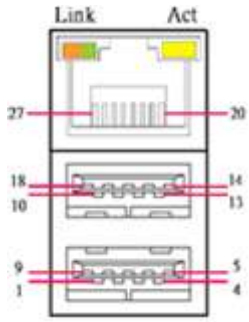
Pin	Definition	Pin	Definition	Pin	Definition
1	+5V	10	+5V	20	LAN1_MDI0P
2	USB2_D1-	11	USB2_D2-	21	LAN1_MDI0N
3	USB2_D1+	12	USB2_D2+	22	LAN1_MDI1P
4	GND	13	GND	23	LAN1_MDI2P
5	USB3_RX1-	14	USB3_RX2-	24	LAN1_MDI2N
6	USB3_RX1+	15	USB3_RX2+	25	LAN1_MDI1N
7	GND	16	GND	26	LAN1_MDI3P
8	USB3_TX1-	17	USB3_TX2-	27	LAN1_MDI3N
9	USB3_TX1+	18	USB3_TX2+		



LAN2_USB34: LAN2 and USB3.0 Ports

Connector Type: RJ45 port with LEDs and dual USB3.0 ports

Pin	Definition	Pin	Definition	Pin	Definition
1	+5V	10	+5V	20	LAN2_MDI0P
2	USB2_D3-	11	USB2_D4-	21	LAN2_MDI0N
3	USB2_D3+	12	USB2_D4+	22	LAN2_MDI1P
4	GND	13	GND	23	LAN2_MDI2P
5	USB3_RX3-	14	USB3_RX4-	24	LAN2_MDI2N
6	USB3_RX3+	15	USB3_RX4+	25	LAN2_MDI1N
7	GND	16	GND	26	LAN2_MDI3P
8	USB3_TX3-	17	USB3_TX4-	27	LAN2_MDI3N
9	USB3_TX3+	18	USB3_TX4+		



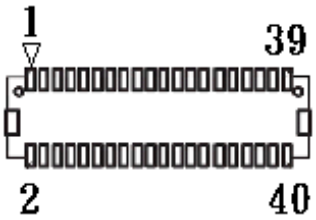
PCIEX16_1: PCI-Express X16 Socket
Connector Type: PCI-Express X16 Slot

Pin	Definition	Pin	Definition	Pin	Definition	Pin	Definition
A1	PRSNT#1	A42	GND	B1	+12v	B42	HSOn(6)
A2	+12v	A43	HSIp(6)	B2	+12v	B43	GND
A3	+12v	A44	HSIn(6)	B3	+12v	B44	GND
A4	GND	A45	GND	B4	GND	B45	HSOp(7)
A5	JTAG2	A46	GND	B5	SMCLK	B46	HSOn(7)
A6	JTAG3	A47	HSIp(7)	B6	SMDAT	B47	GND
A7	JTAG4	A48	HSIn(7)	B7	GND	B48	PRSNT#2
A8	JTAG5	A49	GND	B8	+3.3v	B49	GND
A9	+3.3v	A50	RSVD	B9	JTAG1	B50	HSOp(8)
A10	+3.3v	A51	GND	B10	3.3Vaux	B51	HSOn(8)
A11	PWRGD	A52	HSIp(8)	B11	WAKE#	B52	GND
A12	GND	A53	HSIn(8)	B12	RSVD	B53	GND
A13	REFCLK+	A54	GND	B13	GND	B54	HSOp(9)
A14	REFCLK-	A55	GND	B14	HSOp(0)	B55	HSOn(9)
A15	GND	A56	HSIp(9)	B15	HSOn(0)	A56	GND
A16	HSIp(0)	A57	HSIn(9)	B16	GND	B57	GND
A17	HSIn(0)	A58	GND	B17	PRSNT#2	B58	HSOp(10)
A18	GND	A59	GND	B18	GND	B59	HSOn(10)
A19	RSVD	A60	HSIp(10)	B19	HSOp(1)	B60	GND
A20	GND	A61	HSIn(10)	B20	HSOn(1)	B61	GND
A21	HSIp(1)	A62	GND	B21	GND	B62	HSOp(11)
A22	HSIn(1)	A63	GND	B22	GND	B63	HSOn(11)
A23	GND	A64	HSIp(11)	B23	HSOp(2)	B64	GND
A24	GND	A65	HSIn(11)	B24	HSOn(2)	B65	GND
A25	HSIp(2)	A66	GND	B25	GND	B66	HSOp(12)
A26	HSIn(2)	A67	GND	B26	GND	B67	HSOn(12)
A27	GND	A68	HSIp(12)	B27	HSOp(3)	B68	GND
A28	GND	A69	HSIn(12)	B28	HSOn(3)	B69	GND
A29	HSIp(3)	A70	GND	B29	GND	B70	HSOp(13)
A30	HSIn(3)	A71	GND	B30	RSVD	B71	HSOn(13)
A31	GND	A72	HSIp(13)	B31	PRSNT#2	B72	GND
A32	RSVD	A73	HSIn(13)	B32	GND	B73	GND
A33	RSVD	A74	GND	B33	HSOp(4)	B74	HSOp(14)
A34	GND	A75	GND	B34	HSOn(4)	B75	HSOn(14)
A35	HSIp(4)	A76	HSIp(14)	B35	GND	B76	GND
A36	HSIn(4)	A77	HSIn(14)	B36	GND	B77	GND
A37	GND	A78	GND	B37	HSOp(5)	B78	HSOp(15)
A38	GND	A79	GND	B38	HSOn(5)	B79	HSOn(15)
A39	HSIp(5)	A80	HSIp(15)	B39	GND	B80	GND
A40	HSIn(5)	A81	HSIn(15)	B40	GND	B81	PRSNT#2
A41	GND	A82	GND	B41	HSOp(6)	B82	RSVD#2

JLVDS1: LVDS Connector

Connector Type: 2x20-pin pitch1.25mm LVDS connector

Pin	Definition	Pin	Definition
1	VDD_LVDS	2	VDD_LVDS
3	GND	4	GND
5	VDD_LVDS	6	VDD_LVDS
7	LVDS_A0-	8	LVDS_B0-
9	LVDS_A0+	10	LVDS_B0+
11	GND	12	GND
13	LVDS_A1-	14	LVDS_B1-
15	LVDS_A1+	16	LVDS_B1+
17	GND	18	GND
19	LVDS_A2-	20	LVDS_B2-
21	LVDS_A2+	22	LVDS_B2+
23	GND	24	GND
25	LVDS_A_CLK-	26	LVDS_B_CLK-
27	LVDS_A_CLK+	28	LVDS_B_CLK+
29	GND	30	GND
31	DDC_CLK	32	DDC_DATA
33	GND	34	GND
35	LVDS_A3-	36	LVDS_B3-
37	LVDS_A3+	38	LVDS_B3+
39	LCDS_VDD_EN	40	NC



JBKL1: Panel Power Connector

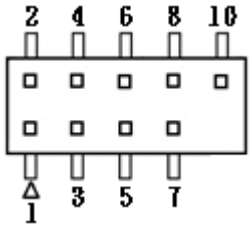
Connector Type: 1X8-pin Wafer, 2.0mm pitch

Pin	Definition	Pin	Definition
1	Backlight Enable	6	GND
2	Backlight Control	7	GND
3	Backlight Power	8	Brightness UP
4	Backlight Power	9	Brightness Down

USB78: Front Panel USB2.0 Header

Pin Header Type: 2X5-pin header, 2.54mm pitch

Pin	Definition	Pin	Definition
1	+5 VDC	2	+5 VDC
3	D -	4	D -
5	D +	6	D +
7	GND	8	GND
9	NC	10	GND



*The +5 VDC power on the USB headers is fused

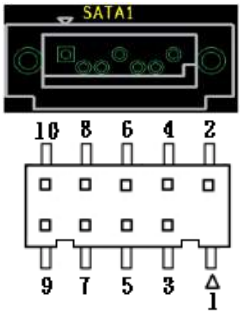
SATA1, SATA2, SATA3, SATA4: SATA Connector

Pin	SATA1 Definition	Pin	SATA2 Definition	Pin	SATA3 Definition	Pin	SATA4 Definition
1	GND	1	GND	1	GND	1	GND
2	SATA_TXP0	2	SATA_TXP1	2	SATA_TXP2	2	SATA_TXP3
3	SATA_TXN0	3	SATA_TXN1	3	SATA_TXN2	3	SATA_TXN3
4	GND	4	GND	4	GND	4	GND
5	SATA_RXN0	5	SATA_RXN1	5	SATA_RXN2	5	SATA_RXN3
6	SATA_RXP0	6	SATA_RXP1	6	SATA_RXP2	6	SATA_RXP3
7	GND	7	GND	7	GND	7	GND

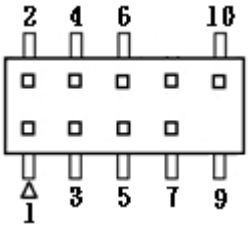
COM2, COM3, COM4, COM5: Serial Port Connector

Connector Type: Connector Type: 2X5-pin Wafer, 2.0mm pitch

Pin	COM2 Definition	Pin	COM3 Definition	Pin	COM4 Definition	Pin	COM5 Definition
1	DCD2	1	DCD3	1	DCD4	1	DCD5
2	DSR2	2	DSR3	2	DSR4	2	DSR5
3	RXD2	3	RXD3	3	RXD4	3	RXD5
4	RTS2	4	RTS3	4	RTS4	4	RTS5
5	TXD2	5	TXD3	5	TXD4	5	TXD5
6	CTS2	6	CTS3	6	CTS4	6	CTS5
7	DTR2	7	DTR3	7	DTR4	7	DTR5
8	RI2	8	RI3	8	RI4	8	RI5
9	GND2	9	GND3	9	GND4	9	GND5
10	NC		NC		NC		NC

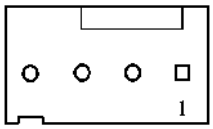


Pin	Definition	Pin	Definition
1	MIC2-IN_L	2	GND
3	MIC2-IN_R	4	PRESENCE# (Dongle present)
5	LINE2-IN_R	6	MIC2-IN SENSE_RETURN
7	Jack Detect	8	NC
9	LINE2-IN_L	10	LINE2-IN SENSE_RETURN



CPU_FAN1, SYS_FAN1: FAN Connector

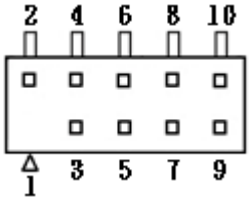
Pin	Definition
1	GND
2	+12V
3	FAN Tachometer
4	FAN PWM



F_PANEL1: Front Panel Header

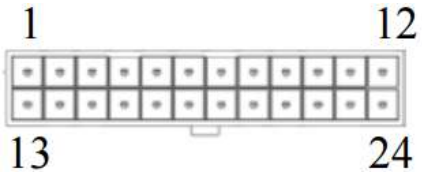
Pin Header Type: 2X5-pin header, 2.54mm pitch

Pin	Definition	Pin	Definition
1	NC	2	NC
3	GND	4	RESET
5	POWER SWITCH	6	GND
7	SUSPEND LED -	8	HDD LED -
9	POWER LED +	10	HDD LED +



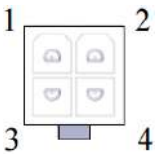
EATXPWR1: Main Power Supply Connector (24pin)

Pin	Definition	Pin	Definition
1	+3.3V	13	+3.3V
2	+3.3V	14	-12V
3	GND	15	GND
4	+5V	16	PS-ON
5	GND	17	GND
6	+5V	18	GND
7	GND	19	GND
8	PWRGD	20	-5V
9	+5VSB	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	+3.3V	24	GND



ATX12V1: Processor Power Supply Connector (4pin)

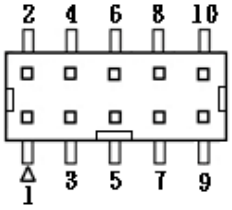
Pin	Definition
1	GND
2	GND
3	+12V / 16~24 VDC
4	+12V / 16~24 VDC



JLPC1: Debug Header

Pin Header Type: 2X5-pin header, 2.0mm pitch

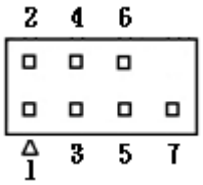
Pin	Definition	Pin	Definition
1	GND	2	+3.3V
3	LPC_AD3	4	NC
5	LPC_AD2	6	RESET
7	LPC_AD1	8	CLK_24MHz
9	LPC_AD0	10	LPC_FRAME#



SPI1: SPI Header

Pin Header Type: 2X4-pin header, 2.0mm pitch

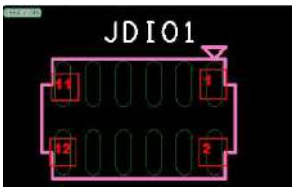
Pin	Definition	Pin	Definition
1	+3.3V	2	GND
3	SPI_CS#	4	SPI_CLK
5	SPI_MISO	6	SPI_MOSI
7	HOLD#	8	NC

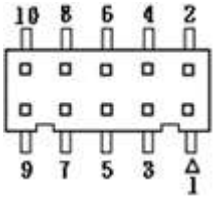


JDIO1: GPIO Connector (8 bits)

Connector Type: Connector Type: 2X5-pin Wafer, 2.0mm pitch

Pin	Definition	Pin	Definition
1	GPIO0	2	GPIO4
3	GPIO1	4	GPIO5
5	GPIO2	6	GPIO6
7	GPIO3	8	GPIO7
9	SMBCLK	10	SMBDATA
11	GND	12	+3.3VDC

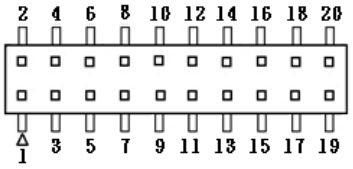




TPM1: TPM Header

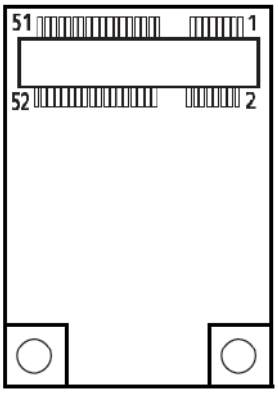
Pin Header Type: 2X10-pin header, 2.0mm pitch

Pin	Definition	Pin	Definition
1	CLK_24MHz	2	GND
3	LPC_FRAME#	4	NC
5	RESET	6	NC
7	LPC_AD3	8	LPC_AD2
9	+3.3V	10	LPC_AD1
11	LPC_AD0	12	GND
13	NC	14	NC
15	+3.3V_DUAL	16	SERIRQ
17	GND	18	GND
19	LPC_PD#	20	NC



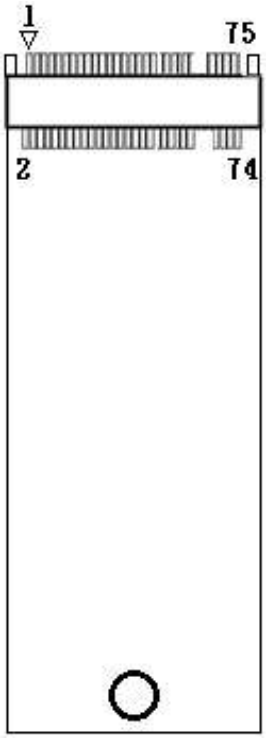
MINI_CARD1_1: Mini PCI-Express

Pin	Definition	Pin	Definition
1	Reserved	27	GND
2	3.3V	28	1.5V
3	Reserved	29	GND
4	GND	30	SMB_CLK
5	Reserved	31	A-
6	1.5V	32	SMB_DATA
7	Reserved	33	A+
8	Reserved	34	GND
9	GND	35	GND
10	Reserved	36	Reserved
11	Reserved	37	Reserved
12	Reserved	38	Reserved
13	Reserved	39	3.3V
14	Reserved	40	GND
15	GND	41	3.3V
16	Reserved	42	Reserved
17	Reserved	43	Device Type
18	GND	44	Reserved
19	Reserved	45	Vendor
20	Reserved	46	Reserved
21	GND	47	Vendor
22	Reserved	48	1.5V
23	B+	49	DA/DSS
24	3.3V	50	GND
25	B-	51	Presence Detection
26	GND	52	3.3V



NGFF1: M.2 Socket

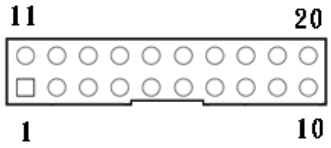
Pin	Definition	Pin	Definition
1	GND	2	+3.3V
3	GND	4	+3.3V
5	NC	6	NC
7	NC	8	NC
9	GND	10	NC
11	NC	12	+3.3V
13	NC	14	+3.3V
15	GND	16	+3.3V
17	NC	18	+3.3V
19	NC	20	NC
21	GND	22	NC
23	NC	24	NC
25	NC	26	NC
27	GND	28	NC
29	NC	30	NC
31	NC	32	NC
33	GND	34	NC
35	NC	36	NC
37	NC	38	SATA_DEVSLP
39	GND	40	NC
41	SATA_RXP5	42	NC
43	SATA_RXN5	44	NC
45	GND	46	NC
47	SATA_TXN5	48	NC
49	SATA_TXP5	50	RESET
51	GND	52	M2_CLKREQ#
53	M2_CLKN	54	WAKE#
55	M2_CLKP	56	NC
57	GND	58	NC
59	NC	60	NC
61	NC	62	NC
63	NC	64	NC
65	NC	66	NC
67	NC	68	PCH_SUSCLK
69	SATA/PCIE_Detection	70	+3.3V
71	GND	72	+3.3V
73	GND	74	+3.3V
75	GND	76	



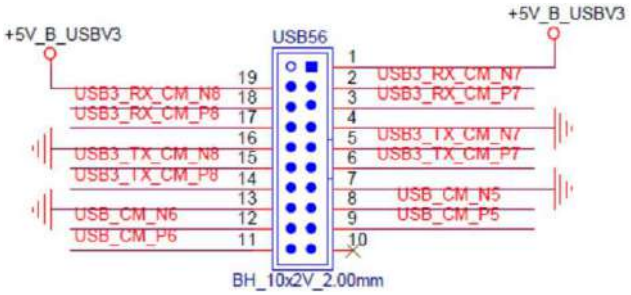
USB56: USB3.0 Connector

Connector Type: 2X10 20-pin box header, 2.0mm pitch

Pin	Definition	Pin	Definition
1	+5 VDC	11	USB_P6
2	USB3_RX_N7	12	USB_N6
3	USB3_RX_P7	13	GND
4	GND	14	USB3_TX_P8
5	USB3_TX_N7	15	USB3_TX_N8
6	USB3_TX_P7	16	GND
7	GND	17	USB3_RX_P8
8	USB_N5	18	USB3_RX_N8
9	USB_P5	19	+5 VDC
10	NC	20	NC



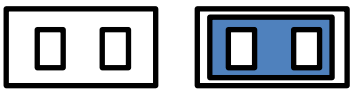
*The +5 VDC power on the USB headers is fused



2.3 Jumpers Definition

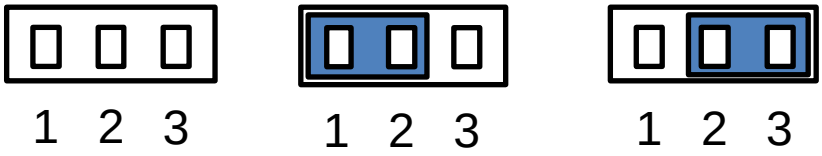
When setting the jumpers, ensure that the jumper caps are placed on the correct pins. When the jumper cap is placed on both pins, the jumper is **short**. If you remove the jumper cap, or place the jumper cap on just one pin, the jumper is **open**. Refer to below for examples of the 2-pin and 3-pin jumpers when they are short (on) and open (off).

Two-Pin Jumpers



Open | Short

Three-Pin Jumpers



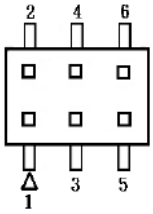
All pins are open | Pins 1 and 2 are short | Pins 2 and 3 are short

List of Jumpers

Connectors Location	Definition
JLVDS2	Backlight Power Select Header
JPSON1	AT / ATX Mode Select Header
CLCMOS1	Clear CMOS Select Header
JSATA1	Mini PCI-Express / mSATA Select Header

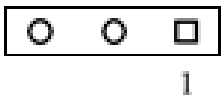
JLVDS2: Backlight Power Select Header
Pin Header Type: 2X3-pin header, 2.0mm pitch

Pin	Definition
1-3 (Short)	+5V
3-5 (Short)	+3.3V
3-4 (Short)	+12V



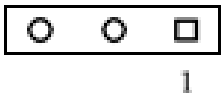
JPSON1: AT / ATX Mode Select Header
Pin Header Type: 1X3-pin header, 2.54mm pitch

Pin	Definition
1-2 (Short)	ATX Mode
2-3 (Short)	AT Mode



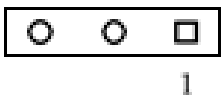
CLCMOS1: Clear CMOS Select Header
Pin Header Type: 1X3-pin header, 2.0mm pitch

Pin	Definition
1-2 (Short)	Normal
2-3 (Short)	Clear CMOS



JSATA1: Mini PCI-Express / mSATA Select Header
Pin Header Type: 1X3-pin header, 2.0mm pitch

Pin	Definition
1-2 (Short)	Auto
2-3 (Short)	mSATA
NC	Mini PCI-Express



Chapter 3

Features & Interface

3.1 General Purpose Input Output (GPIO)

GPI and GPO pins may be implemented as GPIO. GPI and GPO pins may be implemented as SDIO.

Signal	I/O	Description
GPO[0:3]	O	General purpose output pins. Upon a hardware reset, these outputs should be low.
GPI[0:3]	I	General purpose input pins. Pulled high internally on the Module.

3.1.1 GPIO Configuration

Board Design

Pin#	GPIO#	Default Configuration
1	—	+5V
2	—	GND
3	SIO_OUT0	GPO0
4	SIO_IN0	GPI0
5	SIO_OUT1	GPO1
6	SIO_IN1	GPI1
7	SIO_OUT2	GPO2
8	SIO_IN2	GPI2
9	SIO_OUT3	GPO3
10	SIO_IN3	GPI3

Notes

1. Output pin default setting is "**HIGH**"

The GPIO function is provided by Nuvoton NCT6106D, and it can be accessed through its GPIO index/data port. To access the GPIO register, write index to the index port, and then read/write from/to data port. The configuration on the CT-XCL01 is described as below.

SIO_CONFIG_INDEX_PORT	0x2Eh
SIO_CONFIG_DATA_PORT	0x2Fh

Registers Description

GPIO I/O Select

I/O Register: 0xEC

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
GPO3	GPO2	GPO1	GPO0	GPI3	GPI2	GPI1	GPI0

Note.

Bit X = 0 means Input Mode

Bit X = 1 means Output Mode

The GPIO function is provided by Nuvoton NCT6106D, and it can be accessed through its GPIO index/data port. To access the GPIO register, write index to the index port, and then read/write from/to data port. The configuration on the CT-XCL01 is described as below.

GPIO I/O Select

Data Register: 0xED

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
GPO3	GPO2	GPO1	GPO0	GPI3	GPI2	GPI1	GPI0

Note.

Bit X = 0 outputs 0 when in output mode

Bit X = 1 outputs 1 when in output mode

3.2 Watchdog Timer

3.2.1 Board Design

The Watchdog Timer (WDT) is implemented by Nuvoton NCT6106D.

Register	Address
WDT Base Address	0xF0h

3.2.2 Psuedo Code

■ Enter_Config

```
Step1: outportb(0x2e, 0x87);
Step2: outportb(0x2e, 0x87);
```

■ Select Logical Device: 8

```
Step1: outportb(0x2e, 0x07);
Step2: outportb(0x2e, 0x07);
```

■ Set WDT Time Unit (Second Unit)

```
Step1: outportb(0x2e, 0xf0);
Step2: buf2 = inportb(0x2f) & 0xf4;     //clear "Select Watchdog Timer I count mode"
Step3: buf2 |= 0x02;                    //Enable the Watchdog Timer I output low pulse to
                                        the KBRST# pin
Step4: // buf2 |= 0x08;                 //Bit3 = (1:Minute Mode/0:Second Mode)
Step5: outportb (0x2f, buf2);           //Write back
```

■ Set WDT Time Value

```
Step1: outportb (0x2e, 0xf1)        //Set watch dog time value
Step2: outportb (0x2f, Time)        //Set watch dog time value
```

■ Exit_Config

```
Step1: outportb(0x2e, 0xaa);
```

Watchdog Timer:

Logical Device: 8

CR F0h. Watchdog Timer I (WDT1) and KBC P20 Control Mode Register

Location: Address F0h
Attribute: Read/Write
Power Well: VCC
Reset by: LRESET# or PWROK
Default: 00h
Size: 8 bits

BIT	READ / WRITE	DESCRIPTION
7/5	Reserved.	
4	R/W	Watchdog Timer	count mode is 1000 times faster. 0: Disable. 1: Enable. (If bit-3 is 0, the count mode is 1/1000 second mode.) (If bit-3 is 1, the count mode is 1/1000 minutes mode.)
3	R/W	Select Watchdog Timer	count mode. 0: Second Mode. 1: Minute Mode.
2	R/W	Enable the rising edge of KBC reset (P20) to issue a time-out event. 0: Disable. 1: Enable.
1	R/W	Disable / Enable the Watchdog Timer	output low pulse to the KBRST# pin (PIN59) 0: Disable. 1: Enable.
0	Reserved.	

CR F1h. Watchdog Timer I (WDT1) Counter Register

Location: Address F1h
Attribute: Read/Write
Power Well: VCC
Reset by: LRESET# or PWROK
Default: 04h
Size: 8 bits

BIT	READ / WRITE	DESCRIPTION
7/0	R/W	Watchdog Timer I Time-out value. Writing a non-zero value to this register causes the counter to load the value into the Watch Dog Counter and start counting down. If CR F2h, bits 7 and 6 are set, any Mouse Interrupt or Keyboard Interrupt event causes the previously-loaded, non-zero value to be reloaded to the Watch Dog Counter and the count down resumes. Reading this register returns the current value in the Watch Dot Counter, not the Watch Dog Timer Time-out value. 00h: Time-out Disable 01h: Time-out occurs after 5.03×10^7 CLKIN cycle time, by analogy. (5.03×10^7 x (1/48MHz) = 1.046s)

Chapter 4

BIOS Setup

4.1 BIOS Introduction

The system BIOS software is stored on EEPROM. The BIOS provides an interface to modify the configuration. When the battery is removed, all the parameters will be reset.

BIOS Setup

Power on the embedded system and by pressing <Del> or <F2> immediately allows you to enter the setup screens. If the message disappears before you respond and you still wish to enter the Setup, restart the system by turning it OFF and ON or pressing the RESET button.
You may also restart the system by simultaneously pressing <Ctrl>, <Alt>, and <Delete> keys.

Control Keys	
<←> <→>	Select Screen
<↑> <↓>	Select Item
<Enter>	Select
<Page Up/+>	Increases the numeric value or makes changes
<Page Down/->	Decreases the numeric value or makes changes
<F1>	General Help
<F2>	Previous Value
<F3>	Load Optimized Defaults
<F4>	Save Configuration and Exit
<Tab>	Select Setup Fields
<Esc>	Exit BIOS Setup

Main Setup

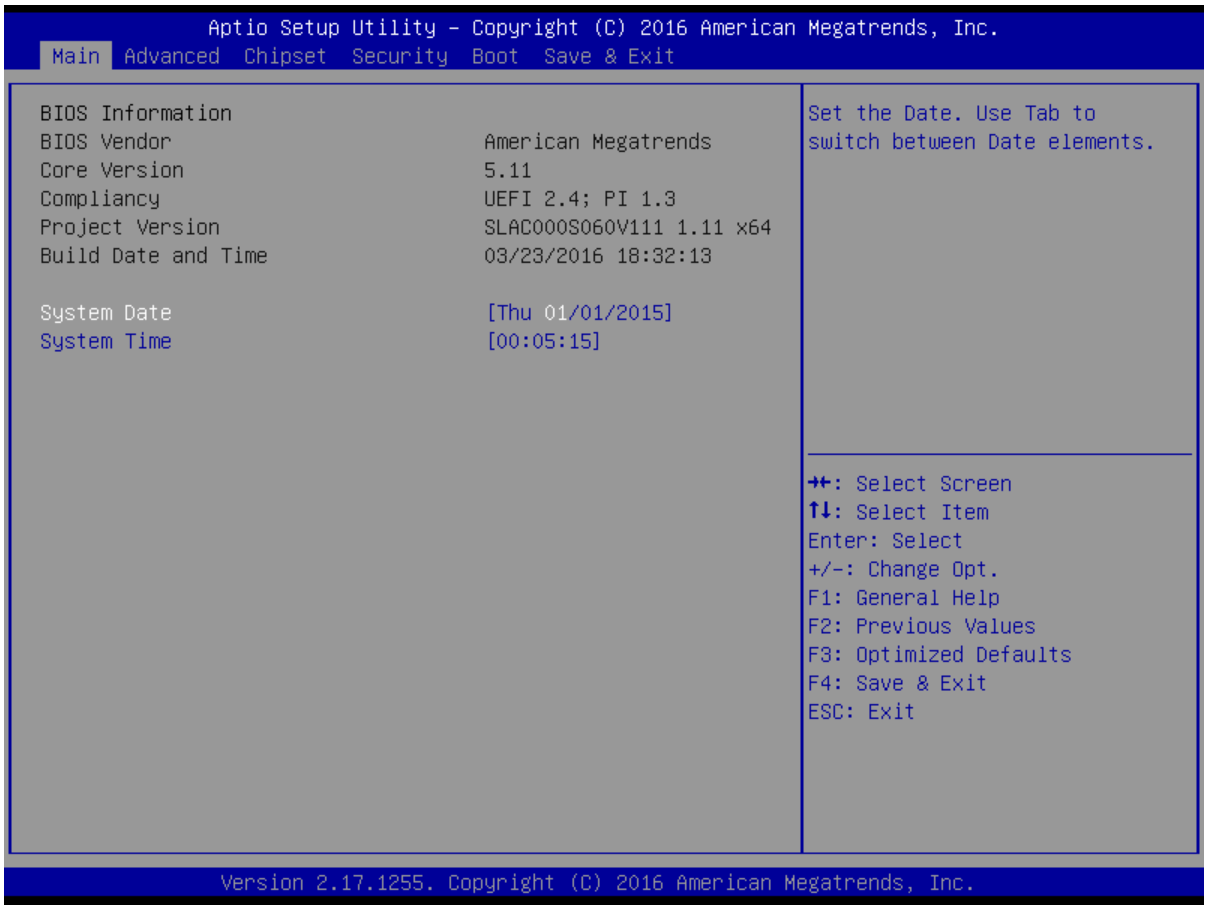
The main menu lists the setup functions you can make changes to. You can use the arrow keys (↑↓) to select the item. The on-line description of the highlighted setup function is displayed at the bottom of the screen.

General Help <F1>

The BIOS setup program provides a General Help screen. You can call up this screen from any menu by simply pressing <F1>. The Help screen lists the appropriate keys to use and the possible selections for the highlighted item. Press <Esc> to exit the Help screen.

4.2 Main Setup

Press <Del> to enter BIOS CMOS Setup Utility. The Main setup screen is showed as following when the setup utility is entered. System Date/Time is set up in the Main Menu.



4.2.1 System Date

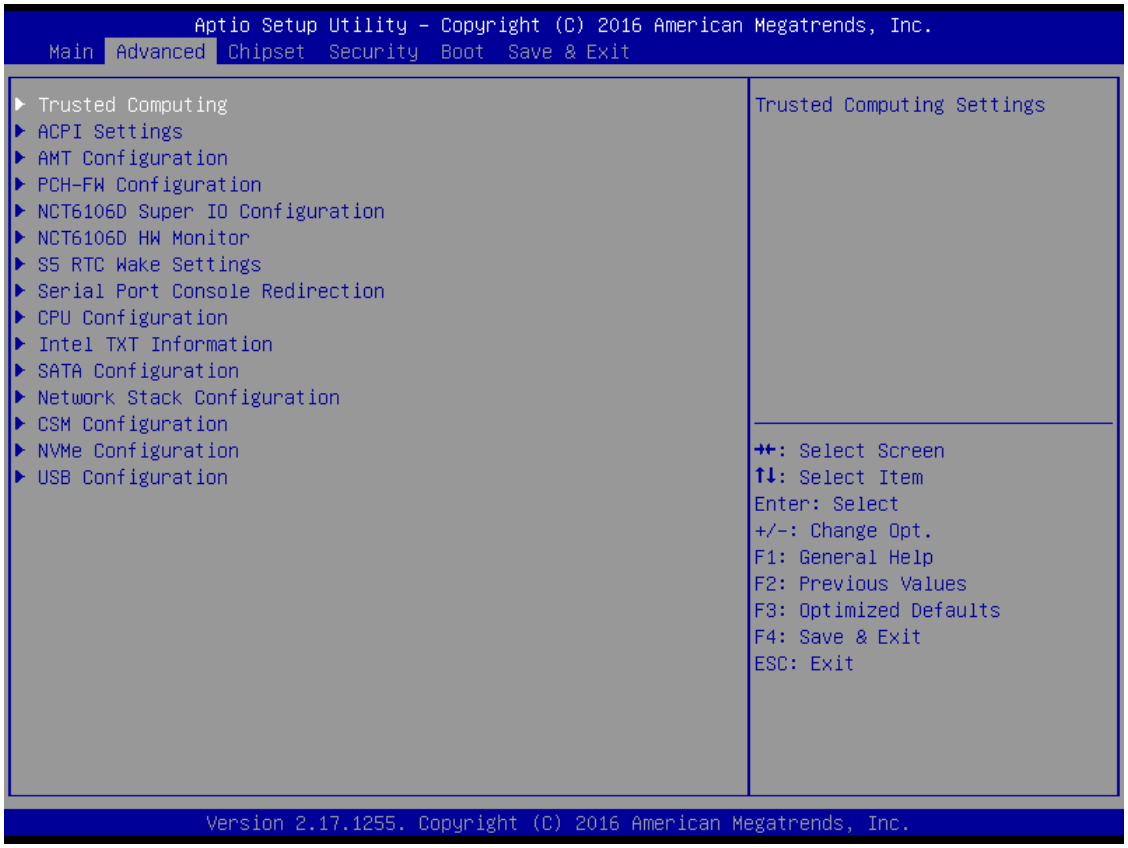
Set the system date. Please use <Tab> to switch between data elements.

4.2.2 System Time

Set the system time. Please use <Tab> to switch between time elements.

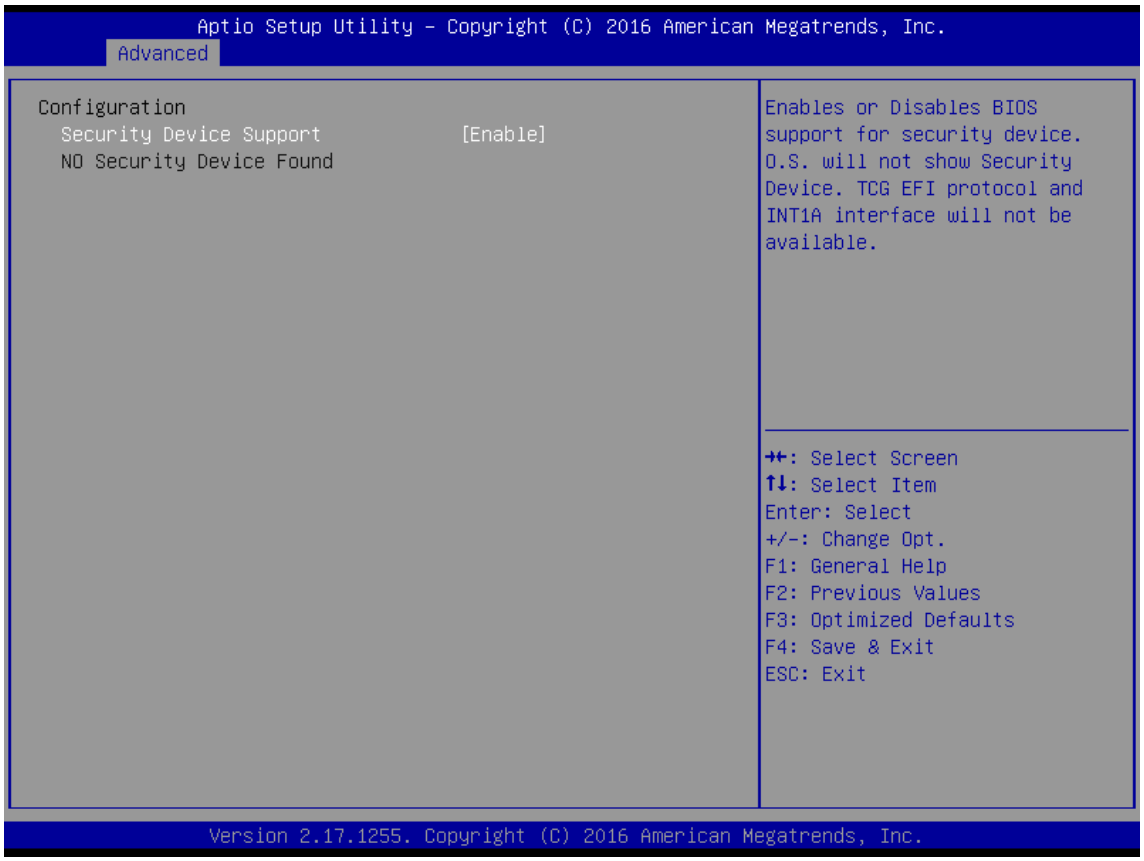
4.3 Advanced Setup

Select the Advanced tab from the 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 Chipset 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 screen is shown below. The sub menus are described on the following pages.



Take caution when changing the settings of the Advanced menu items. Incorrect field values can cause the system to malfunction.

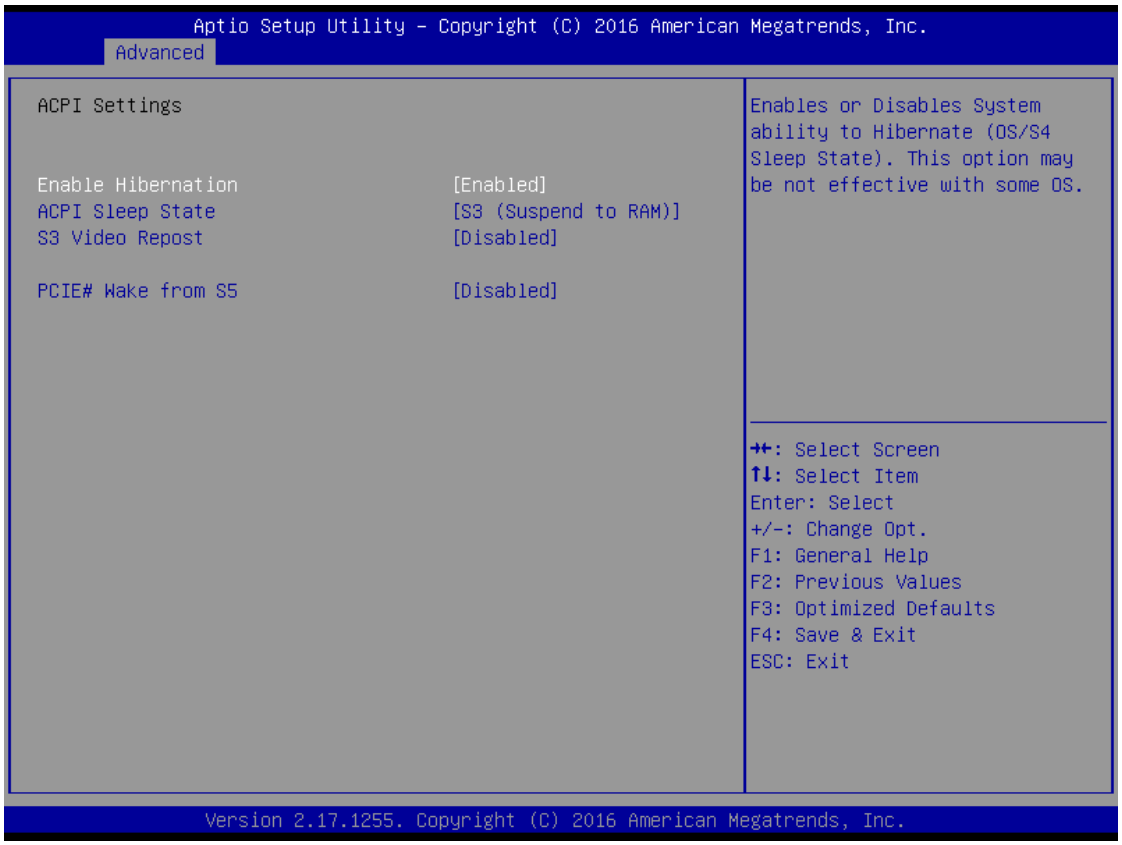
4.3.1 Trusted Computing



■ **Security Device Support**

This item allows you to enable or disable BIOS support for security device.

4.3.2 ACPI Settings



■ Enable Hibernation

Enable or Disable system ability to Hibernation.

Configuration options: [Enable] [Disable]

■ ACPI Sleep State

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

Configuration options: [Suspend Disable] [S3 only(suspend to RAM)]

■ S3 Video Repost

Enable or disable S3 video repost

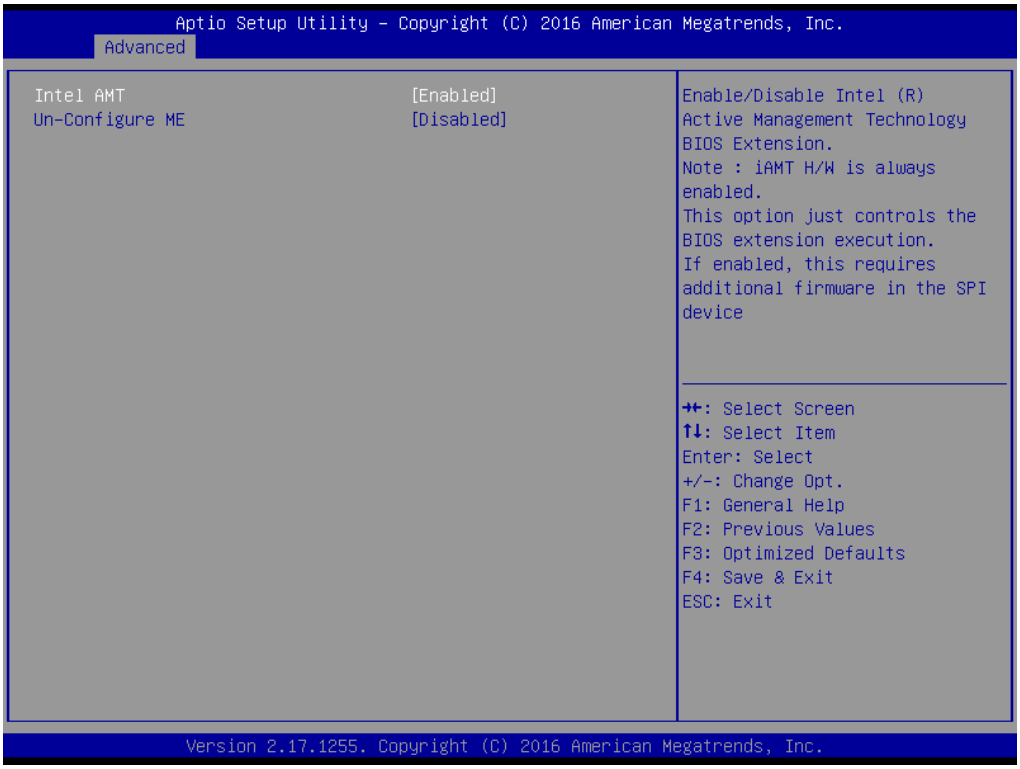
Configuration options: [Disabled] [Enabled]

■ PCIE# Wake from S5

Enable or disable PCIE wake the system from S5.

Configuration options: [Disabled] [Enabled]

4.3.3 AMT Configuration



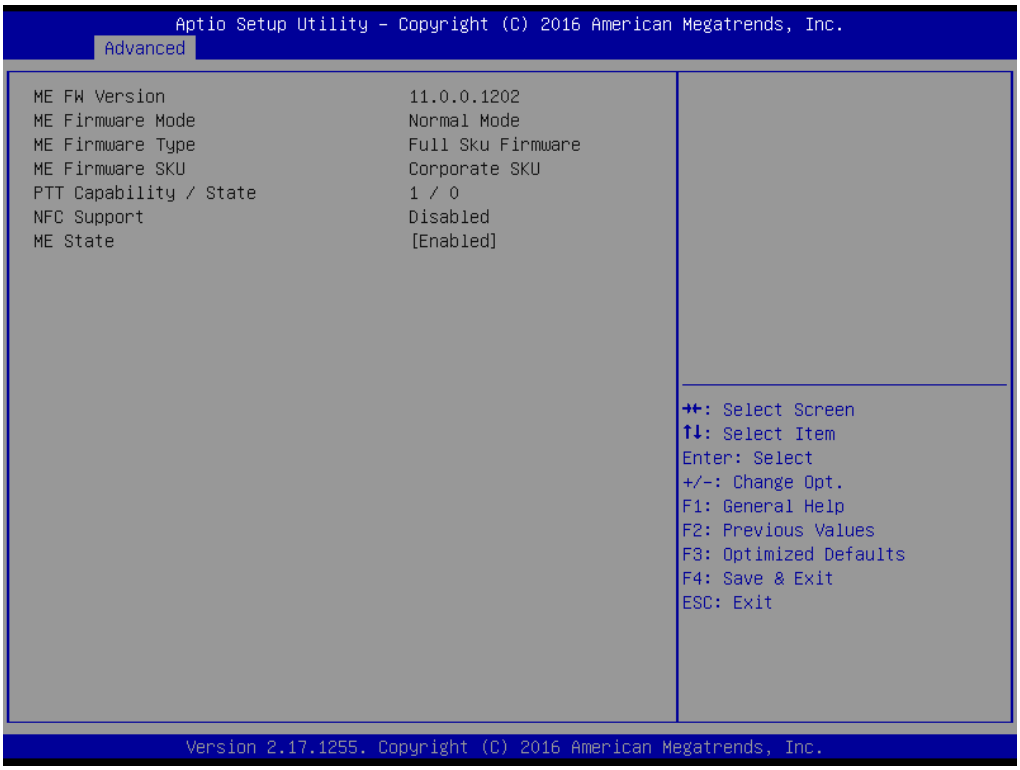
■ Intel AMT

Enable or Disable Intel AMT BIOS extension
Configuration options: [Disabled] [Enabled]

■ Un-configure ME

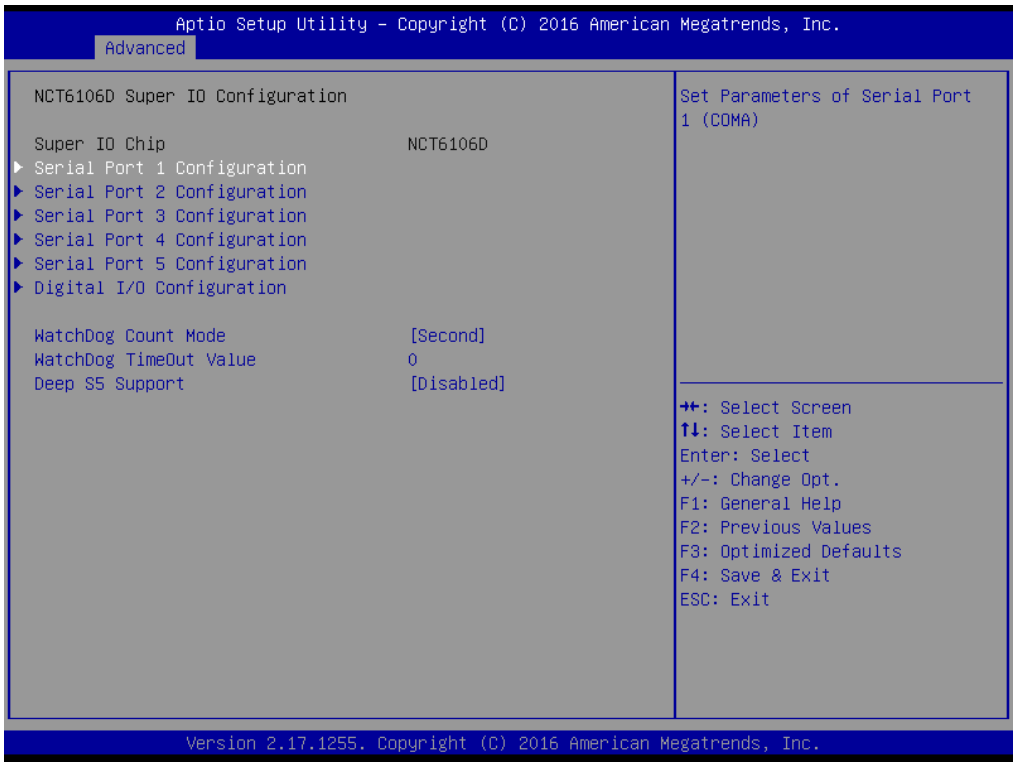
Un-configure ME with Password
Configuration options: [Disabled] [Enabled]

4.3.4 PCH FW Configuration



4.3.5 Super IO Configuration

This setting allows you to select options for the NCT6106D Super IO Configuration, and change the value of the selected option.



■ Serial Port 1 Configuration

❑ **Serial Port**

This item allows you to enable or disable serial port.

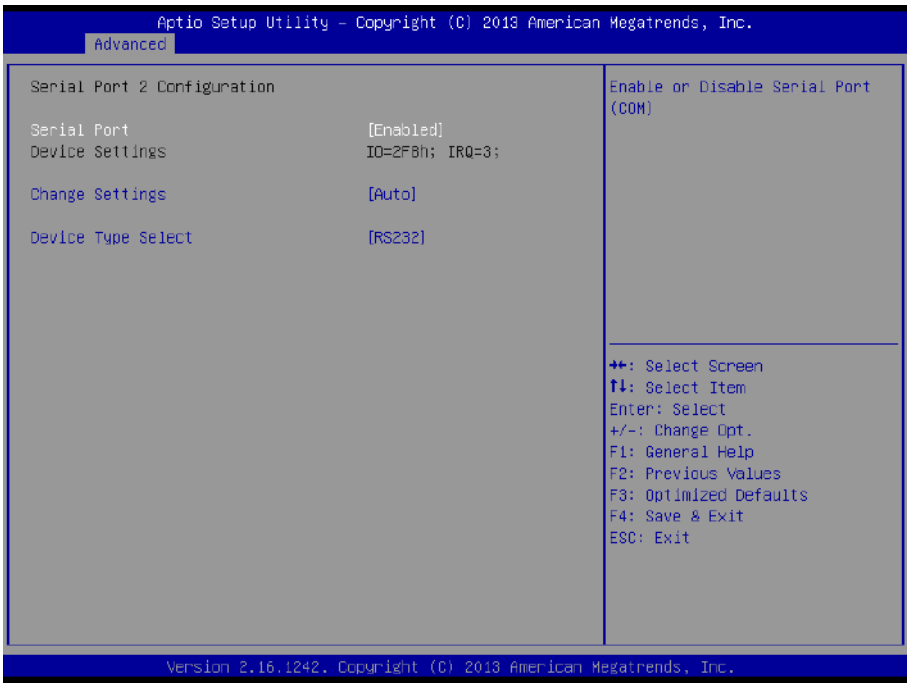
❑ **Change Settings**

This item allows you to change the address & IRQ settings of the specified serial port.

❑ **Device Type Select**

Change the Serial interface. Select <RS232> ,<RS422 Full Duplex> or <RS485 Half Duplex> interface.

Serial Port 2 Configuration

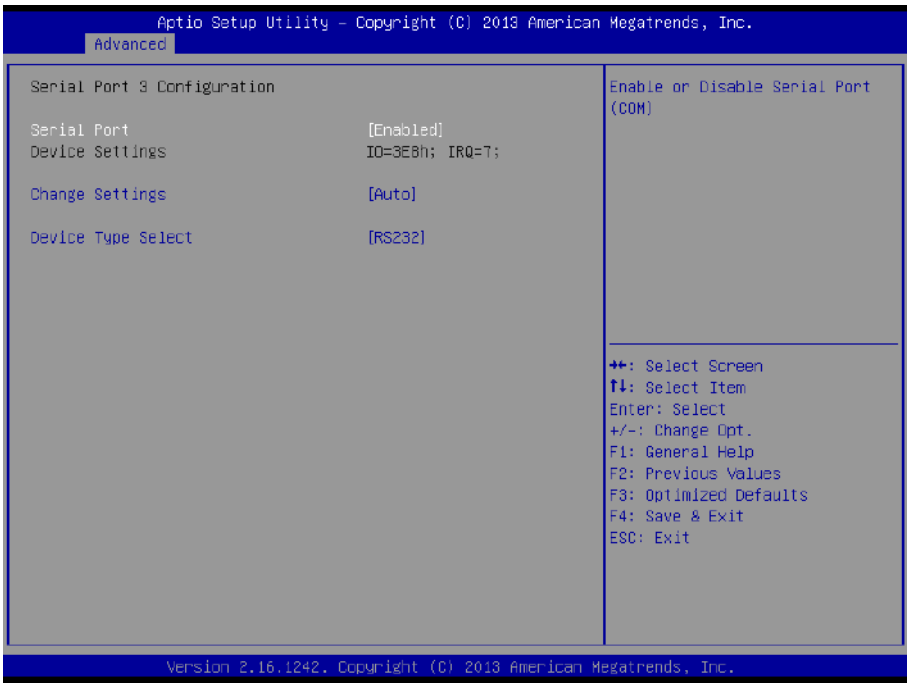


❑ **Serial Port**
This item allows you to enable or disable serial port.

❑ **Change Settings**
This item allows you to change the address & IRQ settings of the specified serial port.

❑ **Device Type Select**
Change the Serial interface. Select <RS232> ,<RS422 Full Duplex> or <RS485 Half Duplex> interface.

Serial Port 3 Configuration

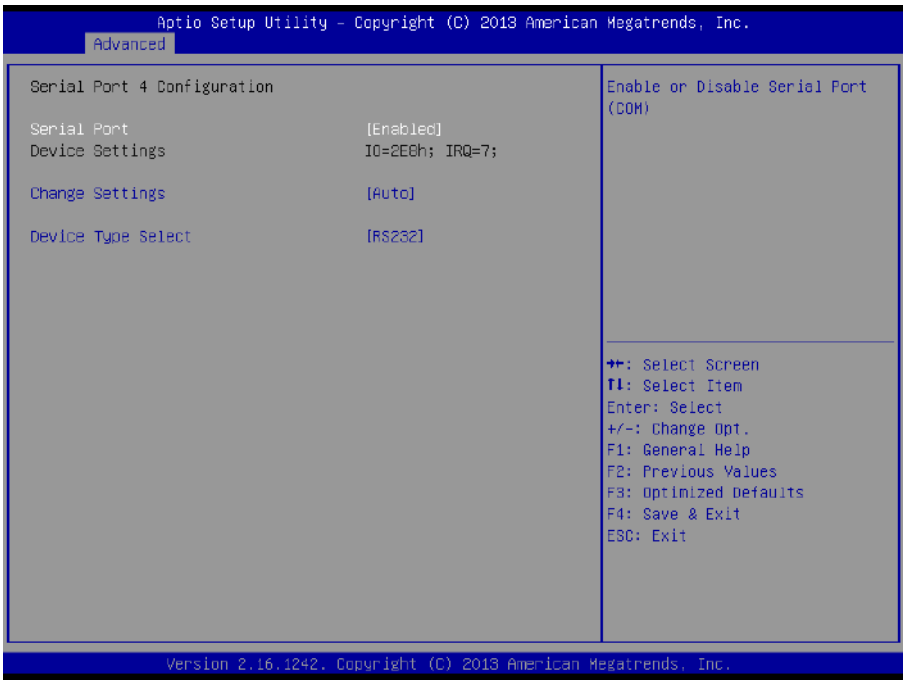


❑ **Serial Port**
This item allows you to enable or disable serial port.

❑ **Change Settings**
This item allows you to change the address & IRQ settings of the specified serial port.

❑ **Device Type Select**
Change the Serial interface. Select <RS232> ,<RS422 Full Duplex> or <RS485 Half Duplex> interface.

Serial Port 4 Configuration

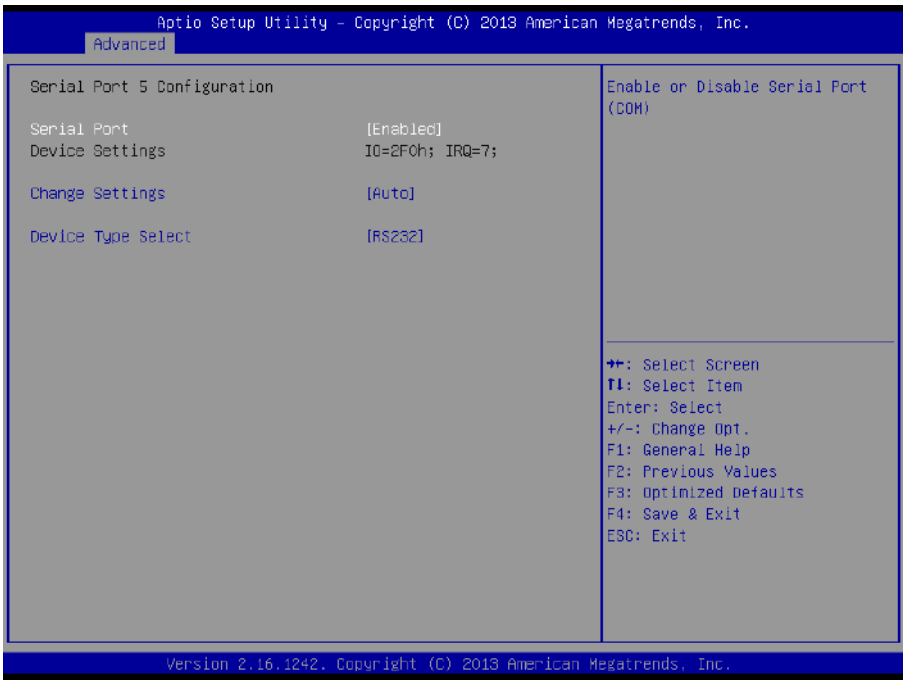


❑ **Serial Port**
This item allows you to enable or disable serial port.

❑ **Change Settings**
This item allows you to change the address & IRQ settings of the specified serial port.

❑ **Device Type Select**
Change the Serial interface. Select <RS232> ,<RS422 Full Duplex> or <RS485 Half Duplex> interface.

Serial Port 5 Configuration



❑ **Serial Port**
This item allows you to enable or disable serial port.

❑ **Change Settings**
This item allows you to change the address & IRQ settings of the specified serial port.

❑ **Device Type Select**
Change the Serial interface. Select <RS232> ,<RS422 Full Duplex> or <RS485 Half Duplex> interface.

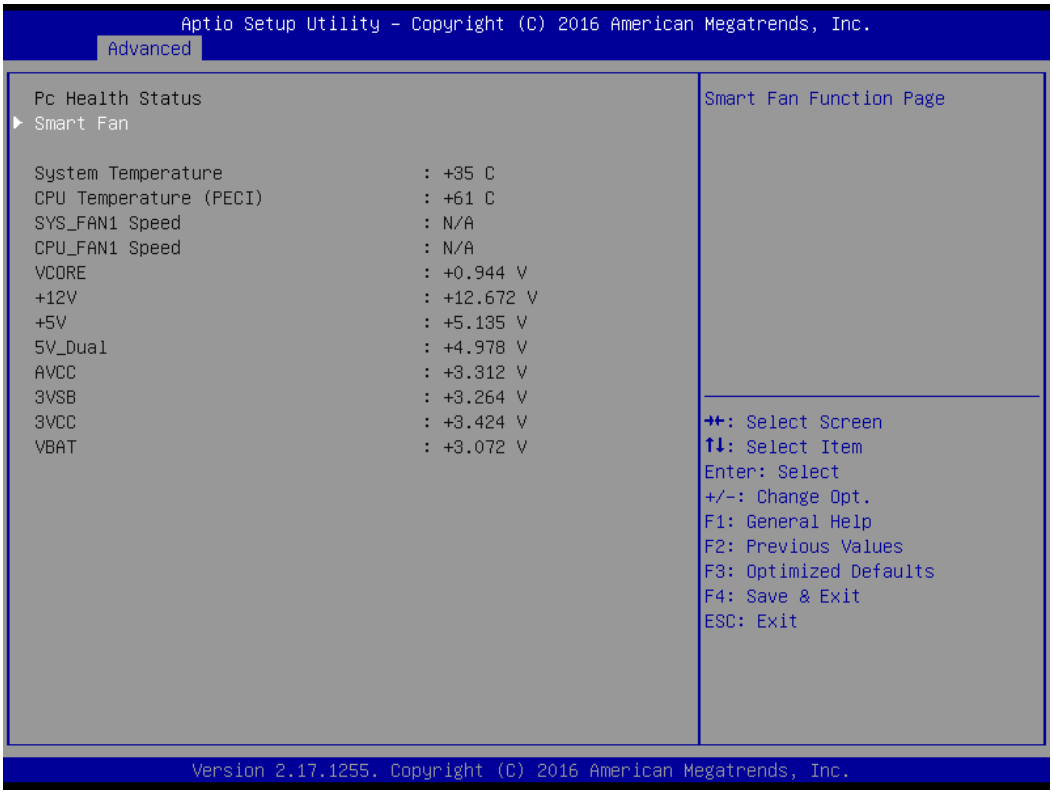
Watch Dog Function

This setting allows you to setup the system watch-dog timer, a hardware timer that generates a reset when the software that it monitors does not respond as expected each time the watch dog polls it.

- **Watch Dog Timer Count Mode**
  Change the Watch dog mode. Select <Second Mode> or <Minute Mode> mode.
- **Watch Dog Timer Time Out Value**
  User can set a value in the range of 0 to 255.

4.3.6 Hardware Monitor

These items display the current status of all monitored hardware devices/ components such as voltages and temperatures.

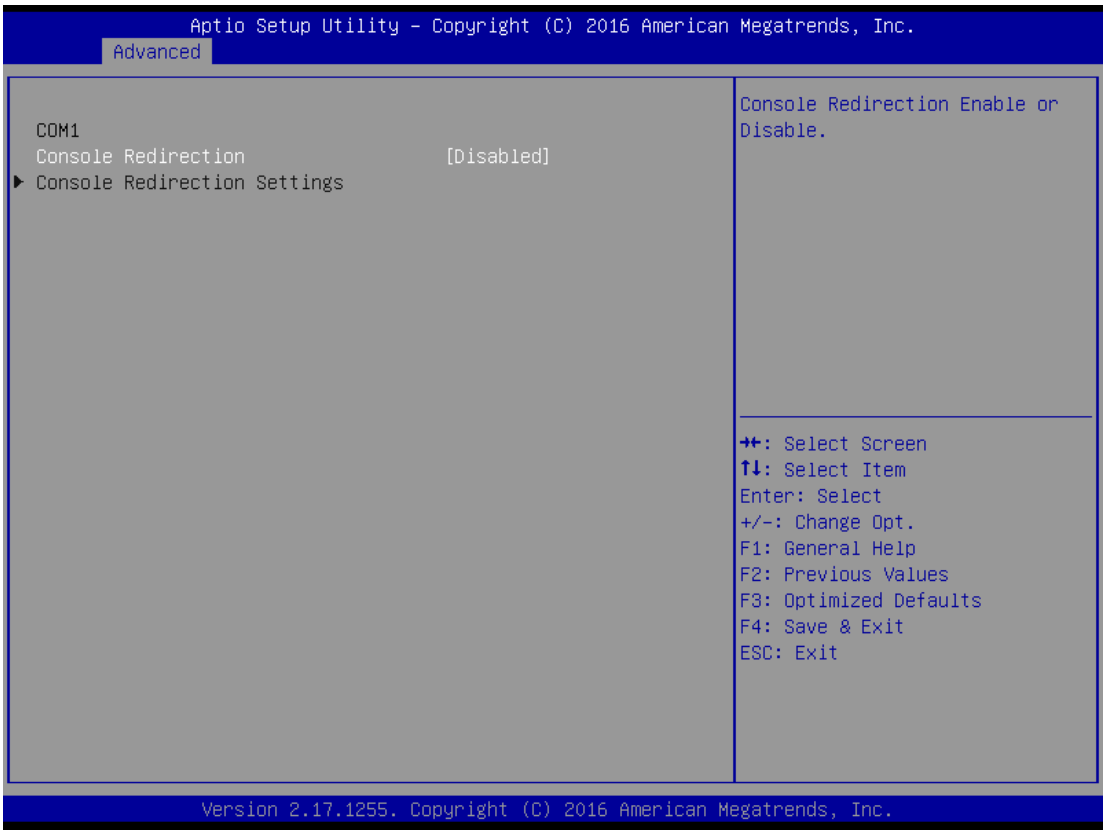


Smart Fan

This setting allows you to setup the system watch-dog timer, a hardware timer that generates a reset when the software that it monitors does not respond as expected each time the watch dog polls it.

- **Watch Dog Timer Count Mode**
  Change the Watch dog mode. Select <Second Mode> or <Minute Mode> mode.
- **Watch Dog Timer Time Out Value**
  User can set a value in the range of 0 to 255.

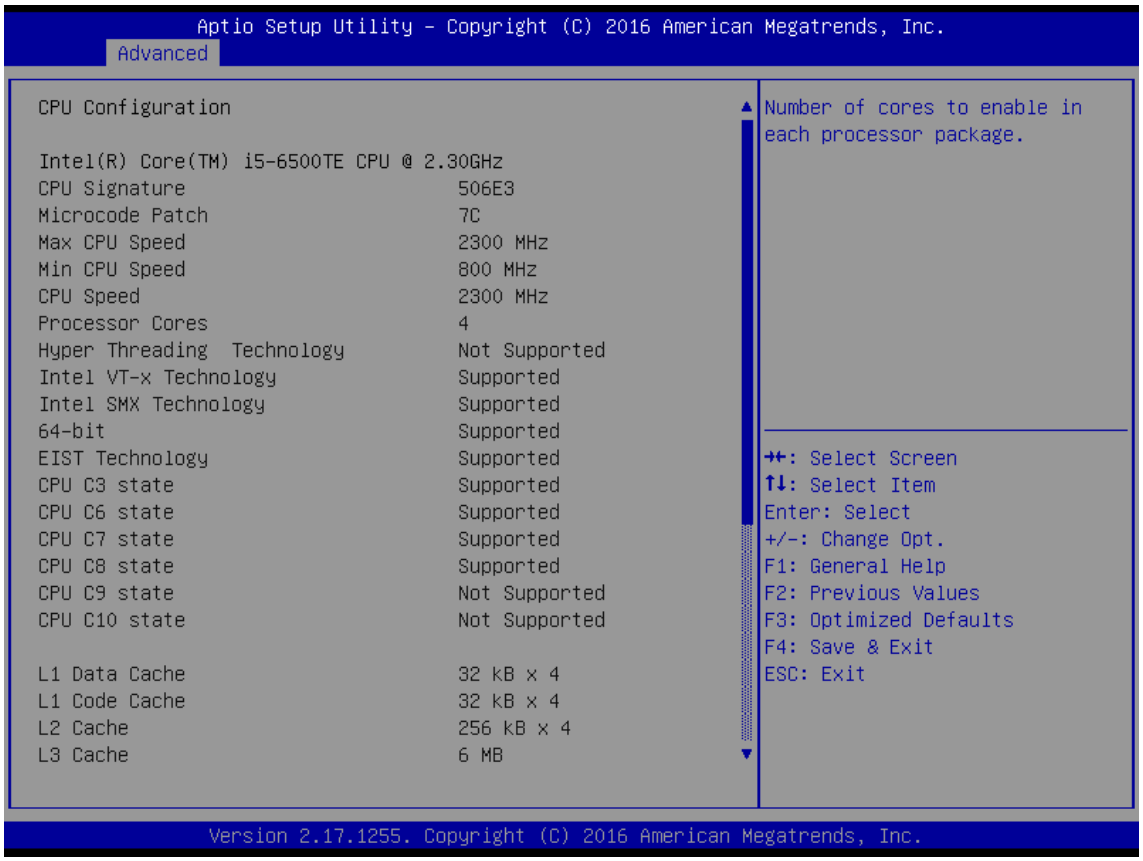
4.3.7 Serial Port Console Redirection



■ Console Redirection

These items allows you to enable or disable COM1~COM5 console redirection.

4.3.8 CPU Configuration



■ **Hyper-Threading [Enabled]**
Enabled or Disabled the hyper threading of Intel CPU
Configuration options: [Disabled][Enabled]
This depends on CPU sku.

■ **Active Processor Core [All]**
Number of Cores to enable in each processor package
Configuration options: [all] [1][2][3][4]
This depends on CPU sku.

■ **Intel Virtualization Technology [Enabled]**
When enabled, a VWM can utilize the additional hardware capabilities provided by vanderpool Technology
Configuration options: [Disabled][Enabled]

■ **Intel® SpeedStep™ [Enabled]**
Allow more than two frequency ranges to be supported.
Configuration options: [Disabled][Enabled]

■ **Turbo mode [Enabled]**
Enable or disable Turbo mode
Configuration options: [Enabled] [Disabled]

■ **CPU C states [Enabled]**
Enable or disable CPU C states
Configuration options: [Enabled] [Disabled]

■ **Enhanced C-states [Enabled]**
Enable or disable C1E. When enabled, CPU will switch to minimum speed when all cores enter C-state.
Configuration options: [Enabled] [Disabled]

■ **Package C state limit [Auto]**
Package C state limit
Configuration options: [C0/C1][C2][C3][C6][C7][C7s][C8][Auto]

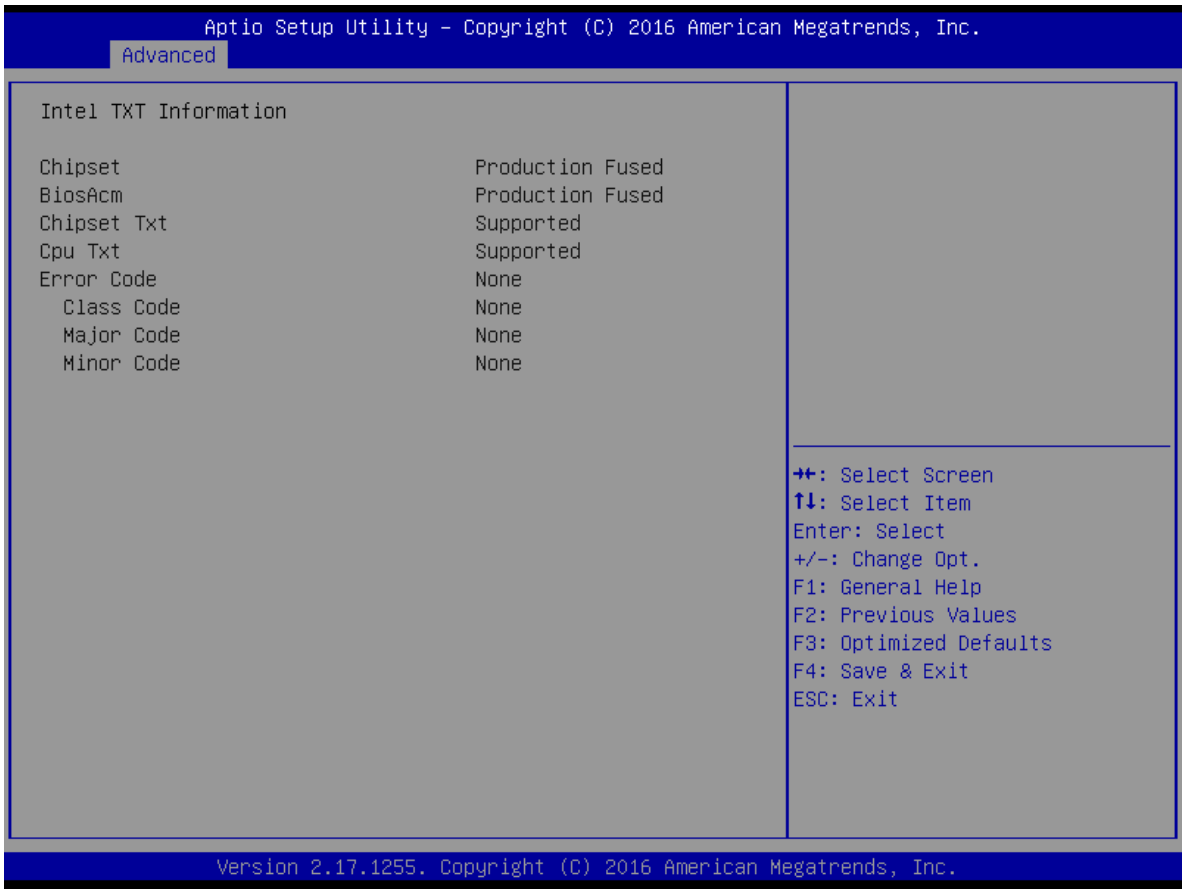
■ **Intel TXT(LT) Support [Disabled]**
Enable or disable Intel TXT support
Configuration options: [Enabled] [Disabled]

■ **SW Guard Extensions(SGX) [software controlled]**
Enable or disables Guard Extensions
Configuration options:[Disabled][Enabled][Software Controlled]

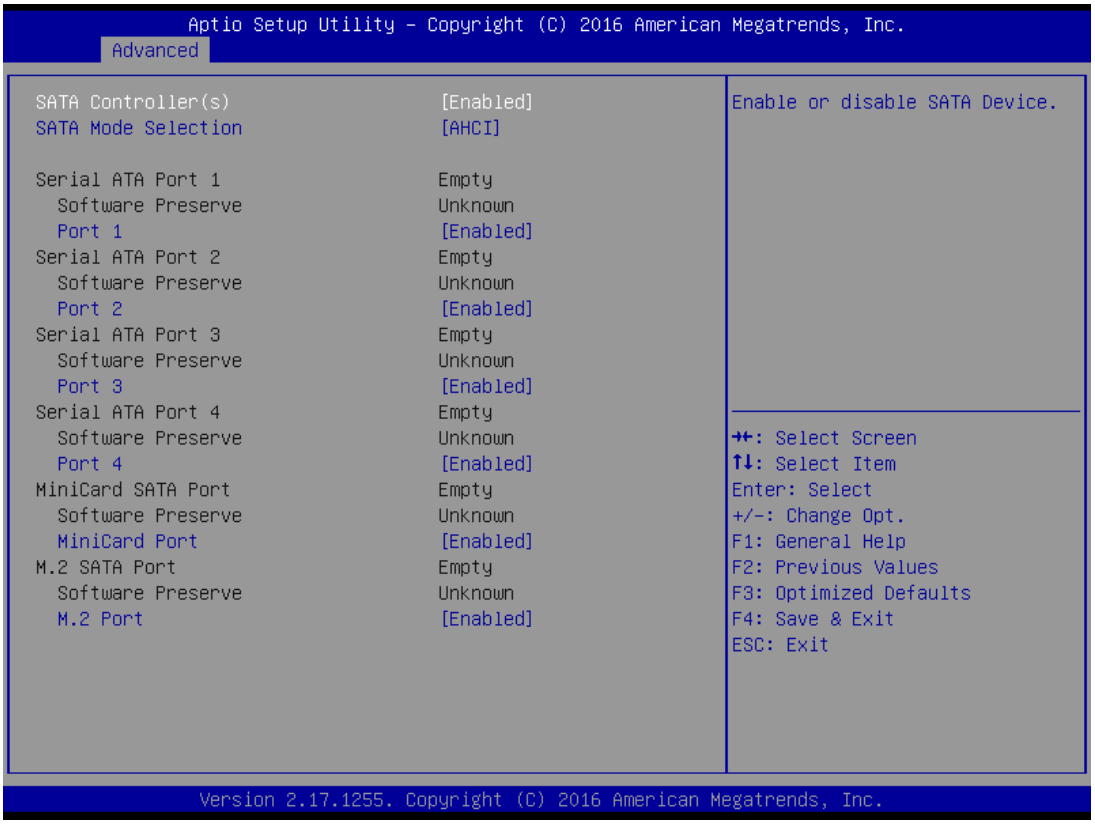
■ **Select owner EPOCH input type [No change in owner EPOCHs]**
After user enters EPOCH values manually, the values will not be visible for security reasons
Configuration options:[No change in owner EPOCHs][change to new random owner EPOCHs][Manual user defined owner EPOCHs]

4.3.9 Intel TXT Information

Display Intel TXT information



4.3.10 SATA Configuration



■ SATA Controller [Enabled]
Enable or Disable SATA device
Configuration options: [Enabled][Disabled]

■ SATA Mode Selection [AHCI]
Determines how SATA controller operate
Configuration options: [AHCI][RAID]

■ Serial – ATA Port 1
This item allows you to enable or disable Serial-ATA Port 1.

■ Serial – ATA Port 2
This item allows you to enable or disable Serial-ATA Port 2.

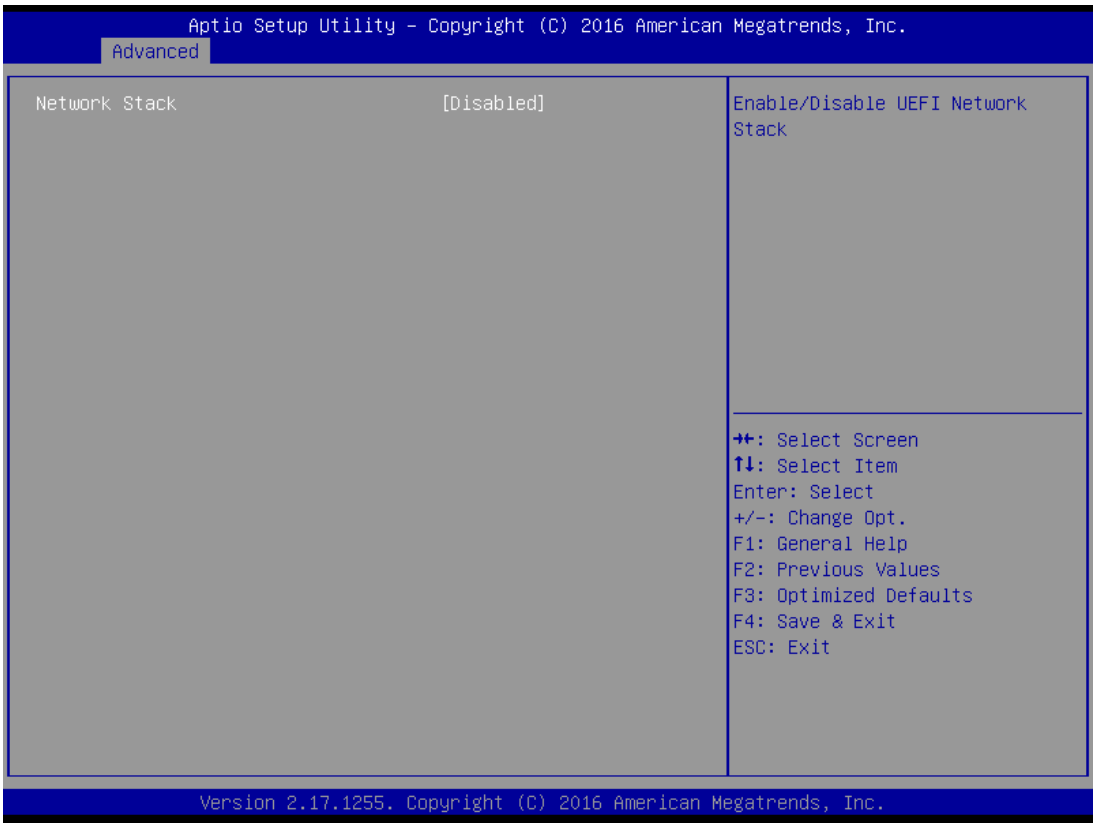
■ Serial – ATA Port 3
This item allows you to enable or disable Serial-ATA Port 3.

■ Serial – ATA Port 4
This item allows you to enable or disable Serial-ATA Port 4.

■ MiniCard SATA Port
This item allows you to enable or disable mSATA.

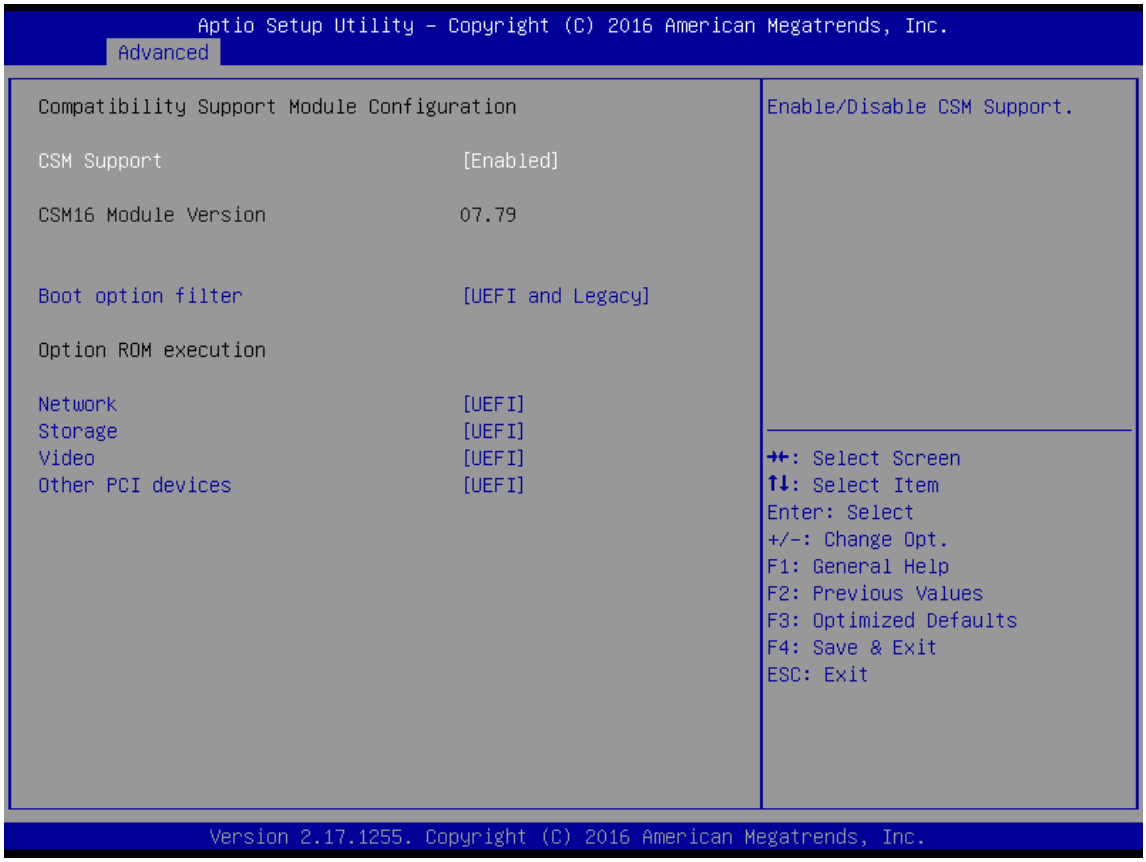
■ M.2 SATA Port
This item allows you to enable or disable M.2 SATA Port.

4.3.11 Network Stack Configuration



■ Network Stack [Disabled]
Enabled or disabled UEFI Network Stack
Configuration options: [Disabled] [Enabled]

4.3.12 Compatibility Support Module Configuration



■ CSM Support
Enabled or disabled CSM Support
Configuration options: [Disabled] [Enabled]

■ Boot option filter
This option controls Legacy/UEFI ROMs Priority
Configuration options: [UEFI and Legacy] [Legacy Only][UEFI Only]

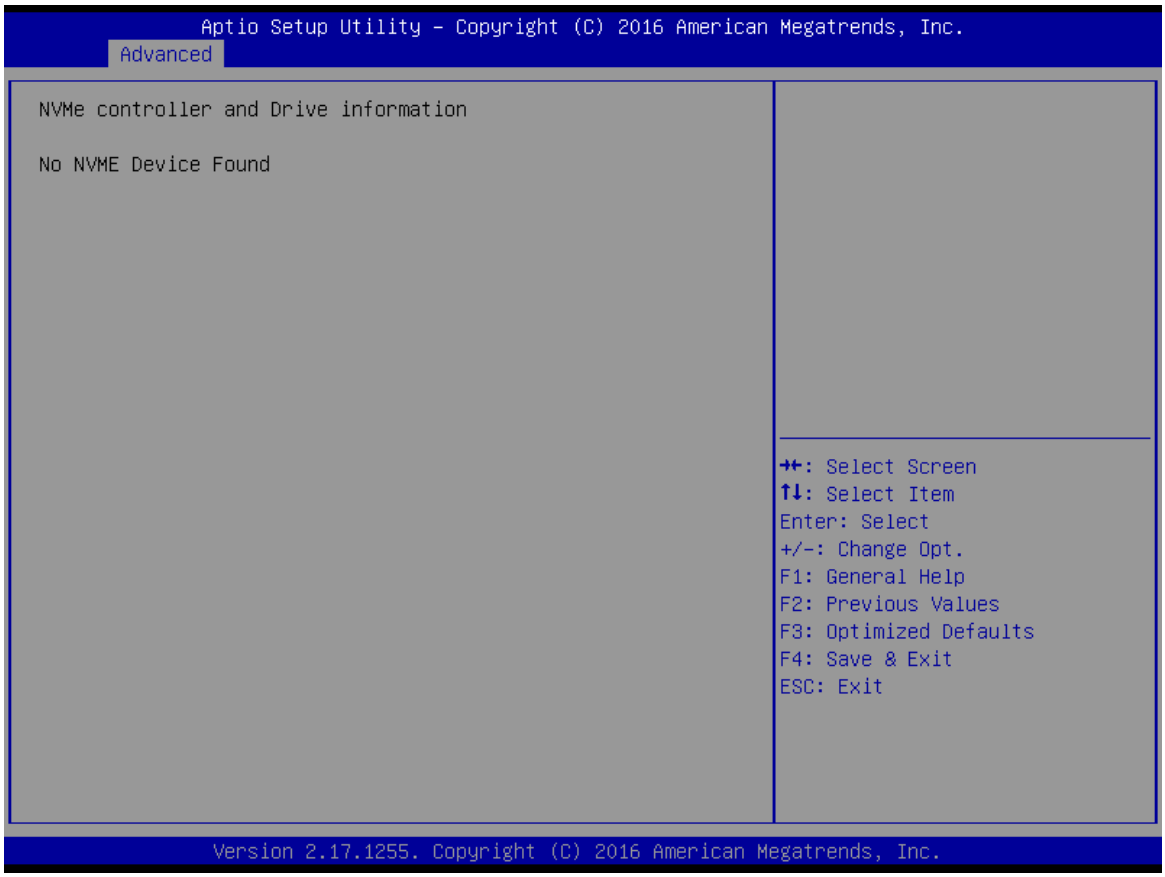
■ Network [UEFI]
Control the execution of UEFI and Legacy PXE OpROM
Configuration options: [Do not launch] [UEFI][Legacy]

■ Storage [UEFI]
Control the execution of UEFI and Legacy Storage OpROM
Configuration options: [Do not launch] [UEFI][Legacy]

■ Video [UEFI]
Control the execution of UEFI and Legacy Video OpROM
Configuration options: [Do not launch] [UEFI][Legacy]

■ Other PCI devices [UEFI]
Determines OpROM execution policy for devices other than Network, Storage, or Video.
Configuration options: [Do not launch] [UEFI][Legacy]

4.3.13 NVMe Configuration



4.3.14 USB Configuration

■ Legacy USB Support [Enabled]

Enabled Legacy USB Support. Auto Option disables legacy support if no USB devices are connected. Disabled option will keep USB devices available only for EFI application.
Configuration options: [Disabled] [Enabled][Auto]

■ XHCI Hand-off [Enabled]

This is a workaround for OSes without XHCI hand-off support. This XHCI ownership change should be claimed by XHCI drivers
Configuration options: [Disabled] [Enabled]

■ USB Mass storage Driver Support[Enabled]

Enabled or Disabled USB Mass storage driver support.
Configuration options: [Disabled] [Enabled]

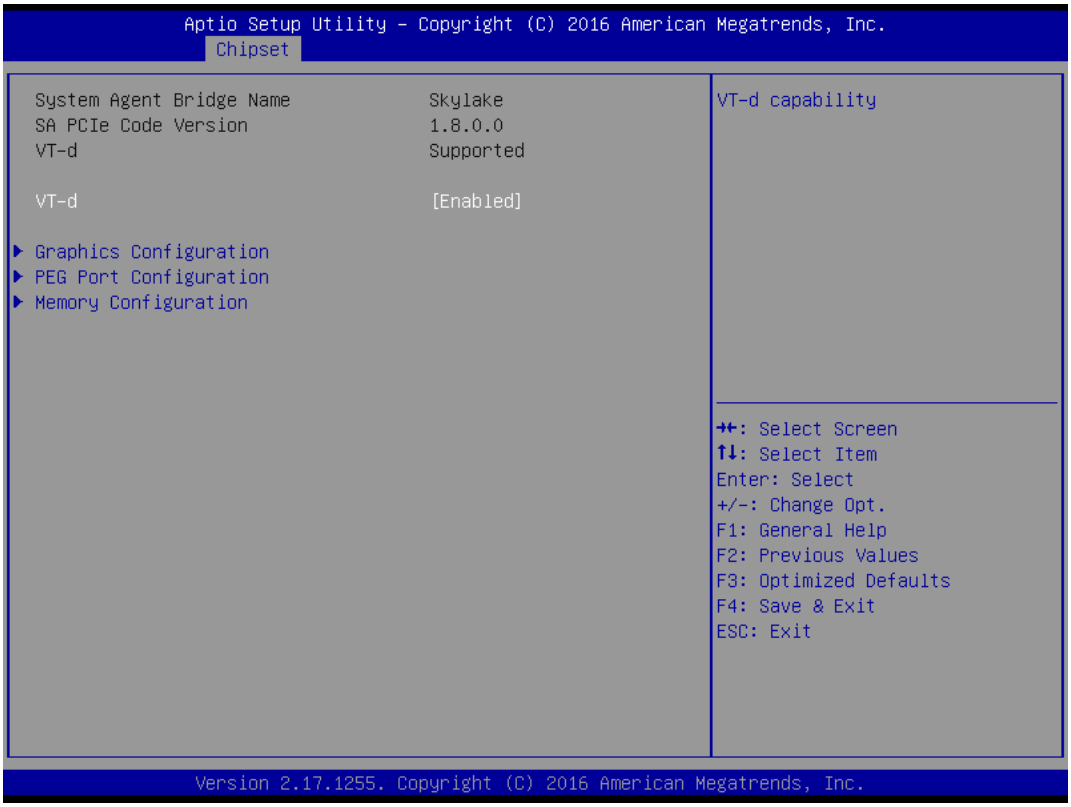
■ JetFlashTranscend 16GB 8.07 [Auto]

Mass storage device emulation type. 'Auto' enumerates devices according to their media format. Optical drives are emulated as 'CDROM', drives with no media will be emulated according to a drive type.
Configuration options: [Auto] [Floopy][Forced FDD][hard Disk][CD-ROM]

4.4 Chipset

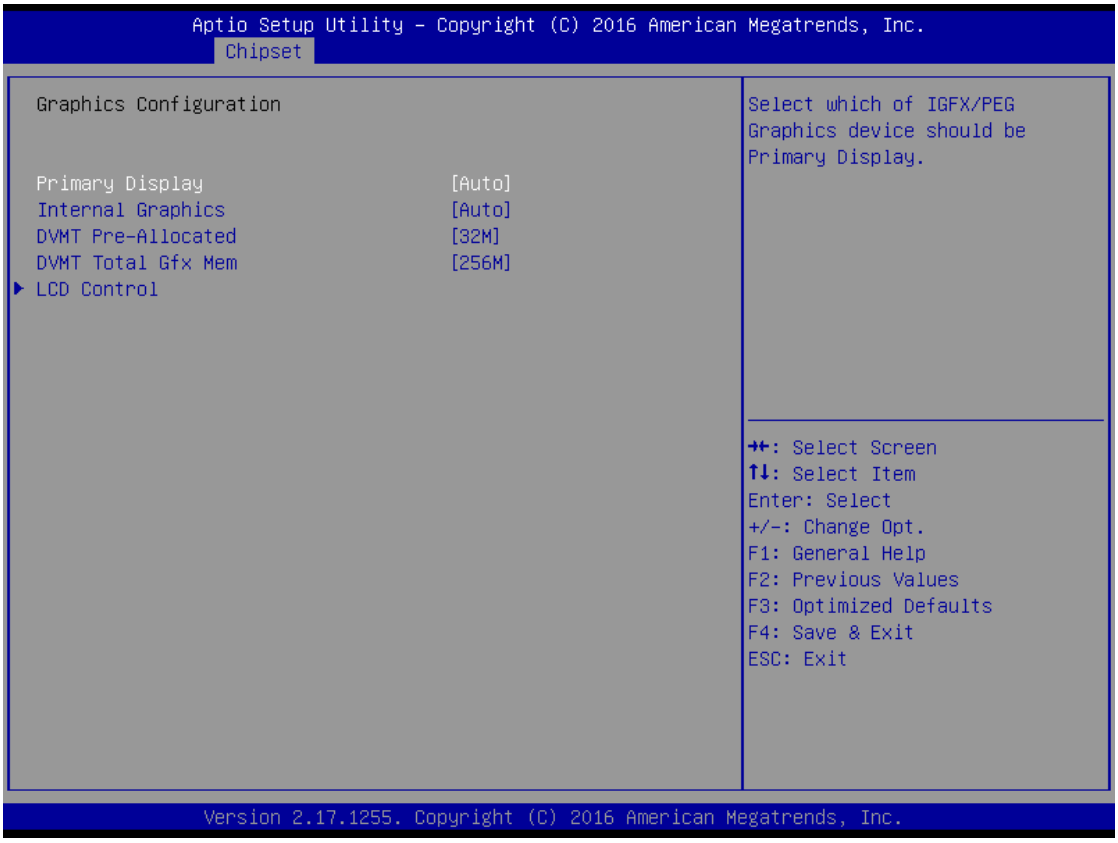
4.4.1 System Agent Configuration

This section provides configure options for on-graphic, PEG port, and installed memory.



■ Graphic Configuration

This section provides onboard graphics-related configuration options.



❑ Primary Display

Select which of IGFX/PEG/PCI graphic device should be primary display or select SG for switchable GFx.
Configuration options: [Auto] [IGFX][PEG][PCIE]

❑ Internal Graphics

Keep IGFX enabled based on the setup options
Configuration options: [Auto] [disabled][enabled]

❑ DVMT Pre-Allocated

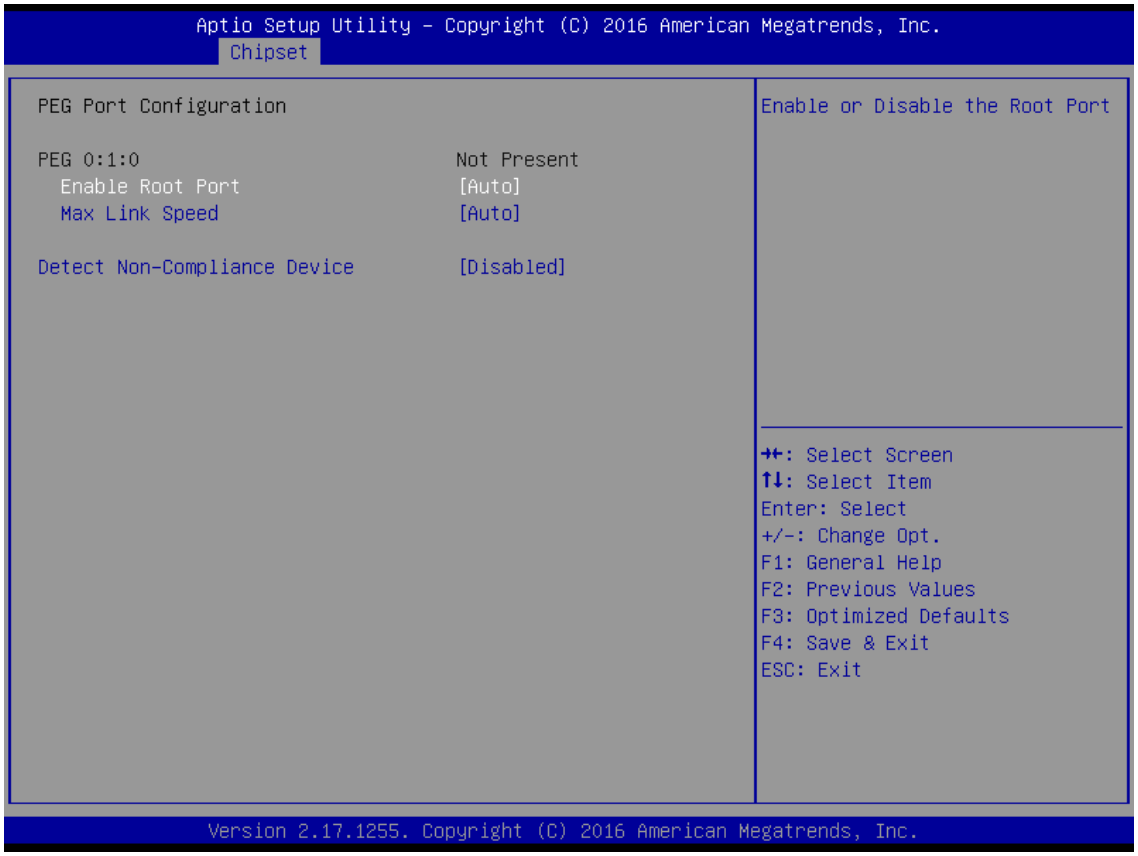
This item selects DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device. . Select <64M>, <96M>, <128M>, <160M>, <192M>, <224M>, <256M>, <288M>, <320M>, <352M>, <384M>, <416M>, <448M>, <480M>, <512M>, <1024M>, <1536M>, or <2048>.

❑ DVMT Total Gfx Mem

This item selects DVMT5.0 Total Graphic Memory size used by the Internal Graphics Device. Select <128MB>, <256MB> or <Max>.

■ PEG Port Configuration

This section provides PEG Port configuration options.



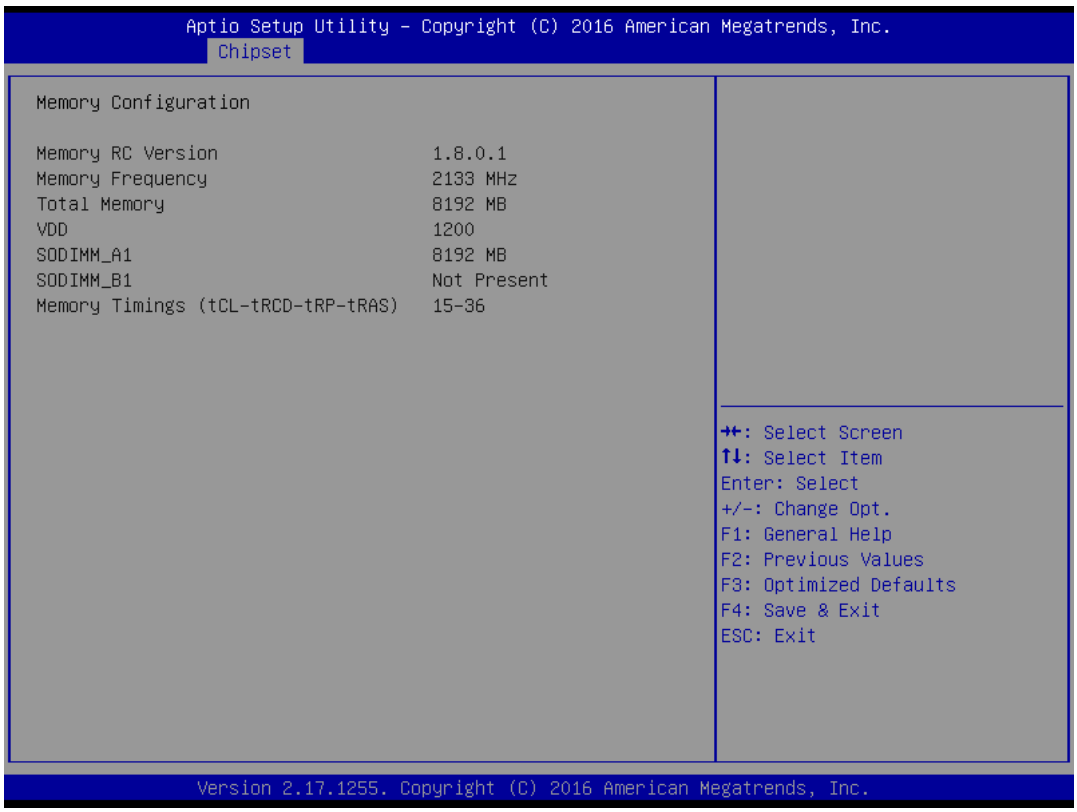
❑ **Enable root Port [Auto]**
Enable or Disable the root port
Configuration options: [Disabled][Enabled][Auto]

❑ **Max Link Speed [Auto]**
Configure PEG 0:1:0 Max Speed
Configuration options: [Auto][Gen1][Gen2][Gen3]

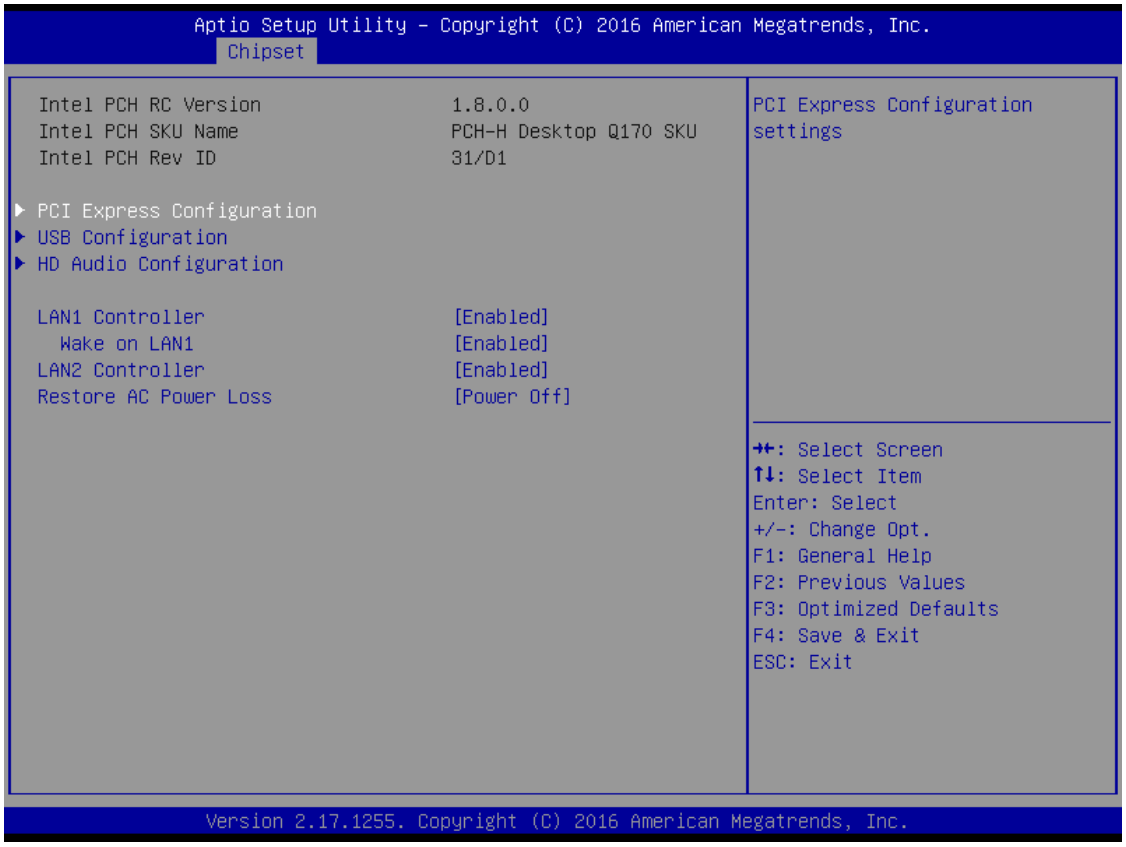
❑ **Detect Non-Compliance Device [Disabled]**
Detect non-compliance PCI express Device in PEG
Configuration options: [Disabled][Enabled]

Memory Configuration

This section provides installed memory information.



4.4.2 PCH-IO Configuration



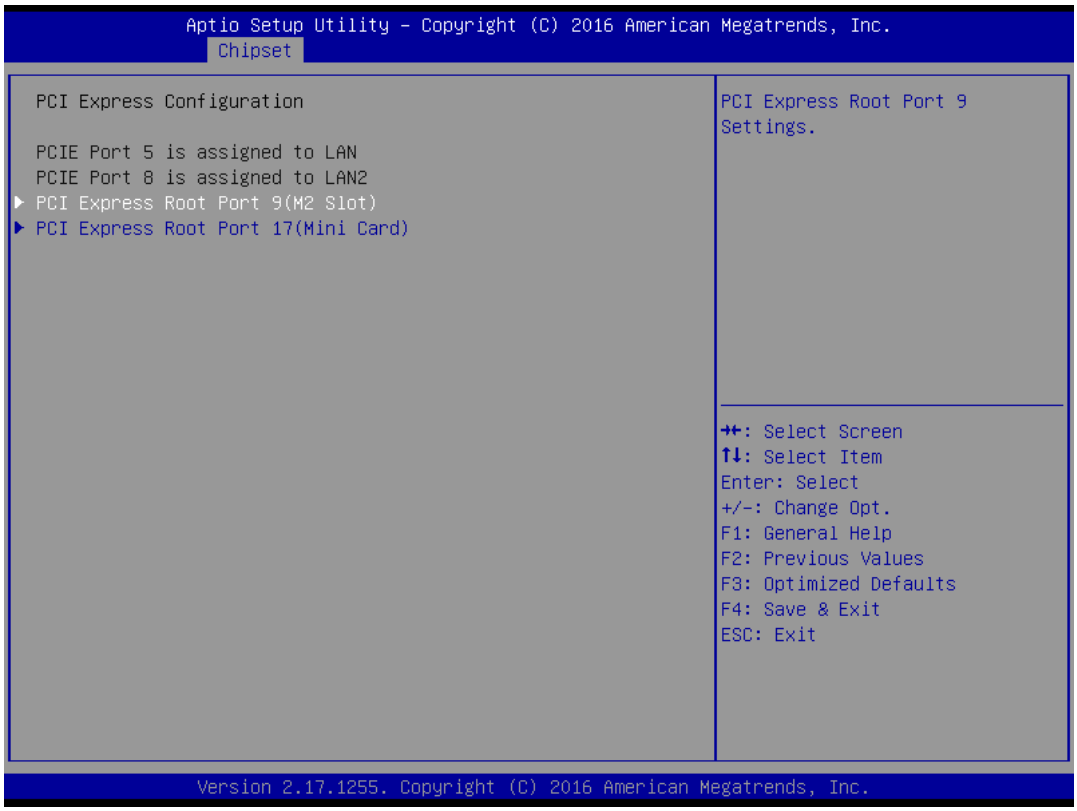
■ Lan1 Controller [Enabled]
Enable or Disable onboard Lan1
Configuration options: [Disabled][Enabled]

■ Wake on lan [Auto]
Enable or Disable integrated LAN to wake the system
Configuration options: [Disabled][Enabled]

■ Lan2 Controller [Enabled]
Enable or Disable onboard Lan2
Configuration options: [Disabled][Enabled]

■ Restore AC power Loss [Power off]
Specify what state to go to when power is re-applied after a power failure.
Configuration options: [Power on][Power off][Last State]

PCI Express Configuration



❑ **PCI Express Root Port 9 [Enabled]**
Control the PCI Express Port
Configuration options: [Disabled][Enabled]

❑ **ASPM Support [Disabled]**
Set the ASPM level: Force L0s- Force all links to L0s State; Auto- BIOS auto configure; Disabled- Disables ASPM
Configuration options: [Disabled][L0s][L1][L0sL2][Auto]

❑ **PCIe Speed [Auto]**
Select PCI Express Port speed
Configuration options: [Auto][Gen1][Gen2][Gen3]

❑ **Detect Non-compliance device [Disabled]**
Detect non-compliance PCI express Device, If enabled, it will take more time at Post time.
Configuration options: [Disabled][Enabled]

❑ **PCI Express Root Port 17 [Enabled]**
Control the PCI Express Port
Configuration options: [Disabled][Enabled]

❑ **ASPM Support [Disabled]**
Set the ASPM level: Force L0s- Force all links to L0s State; Auto- BIOS auto configure; Disabled- Disables ASPM
Configuration options: [Disabled][L0s][L1][L0sL2][Auto]

❑ **PCIe Speed [Auto]**
Select PCI Express Port speed
Configuration options: [Auto][Gen1][Gen2][Gen3]

❑ **Detect Non-compliance device [Disabled]**
Detect non-compliance PCI express Device, If enabled, it will take more time at Post time.
Configuration options: [Disabled][Enabled]

■ USB Configuration

❑ USB Precondition[Disabled]

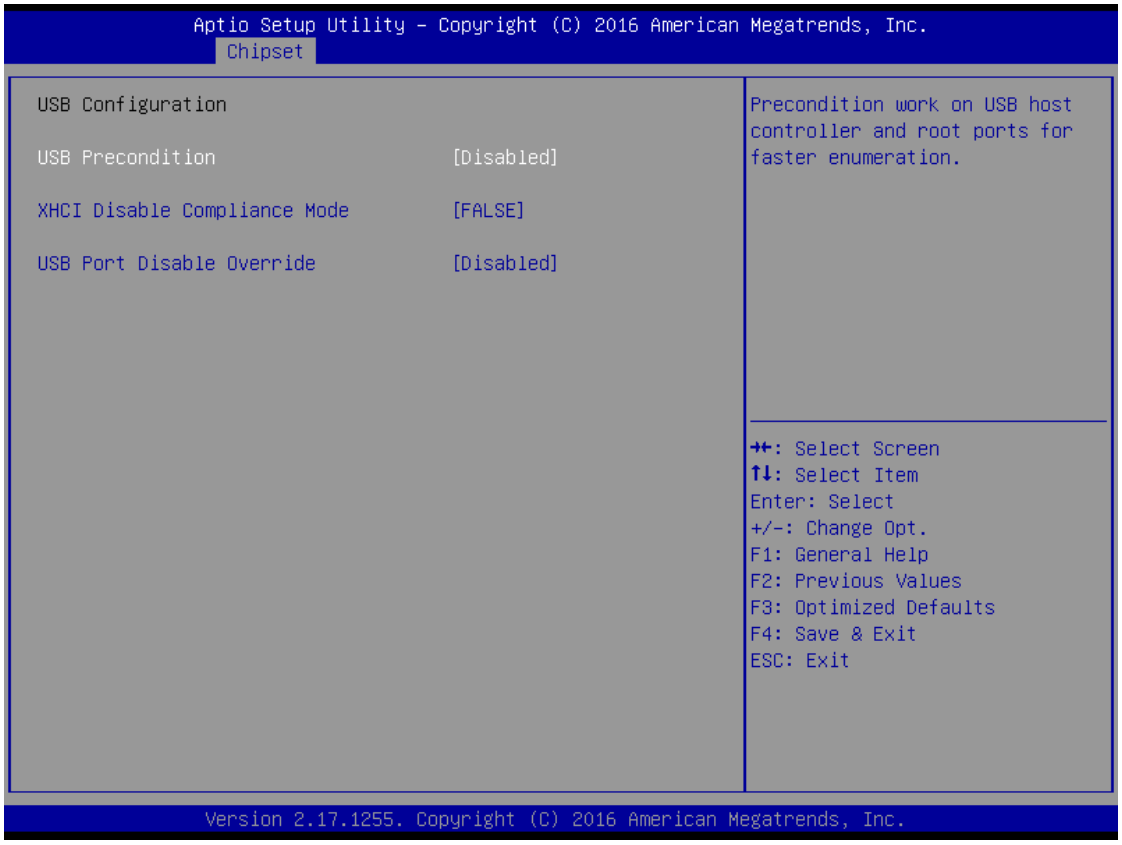
Precondition work on USB host controller and root ports for faster enumeration
Configuration options: [Disabled] [Enabled]

❑ XHCI Disabled Compliance Mode [False]

Options to disable compliance mode.
Configuration options: [False][true]

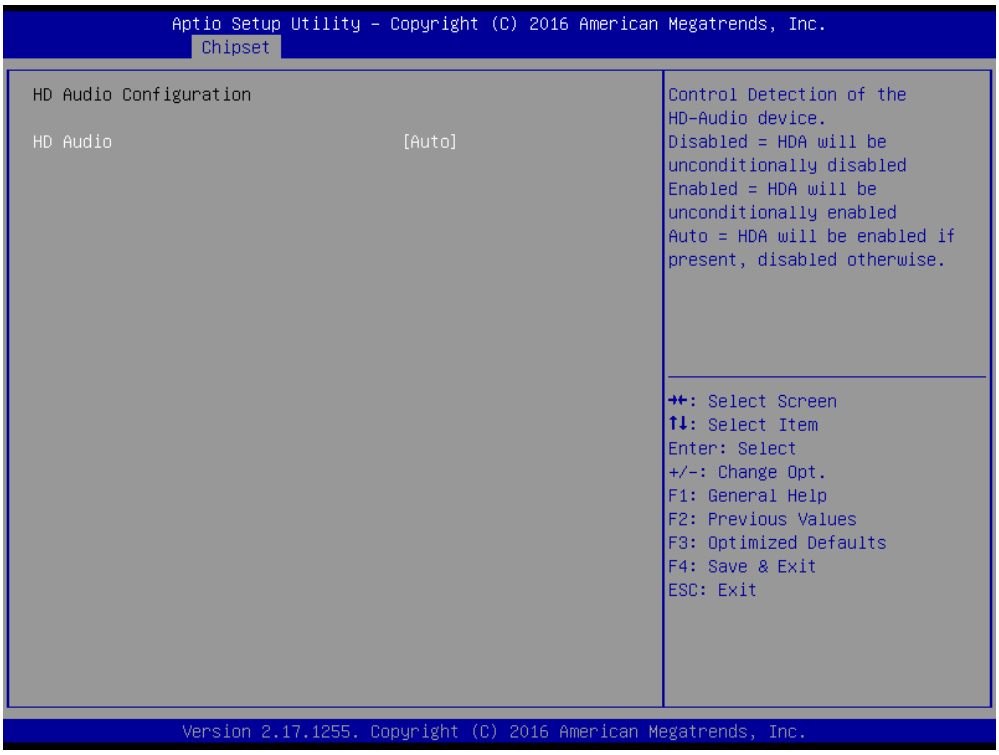
❑ USB Port Disable override [Disabled]

Selectively Enabled/Disabled the corresponding USB port from reporting a device connection to the controller.
Configuration options: [Disabled] [Select Per-Pin]



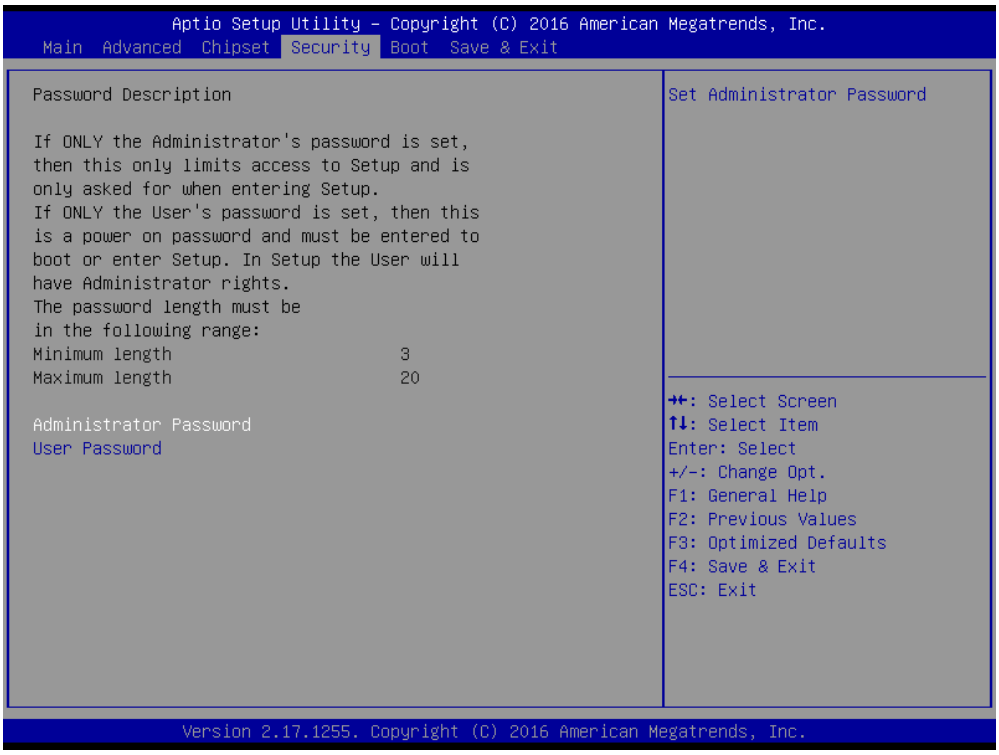
■ HD Audio Configuration

Control Detection of the HD-Audio device.
Configuration options: [Disabled] [Enabled][Auto]



4.5 Security

Security menu allow you to change administrator password and user password settings.



4.5.1 Administrator Password

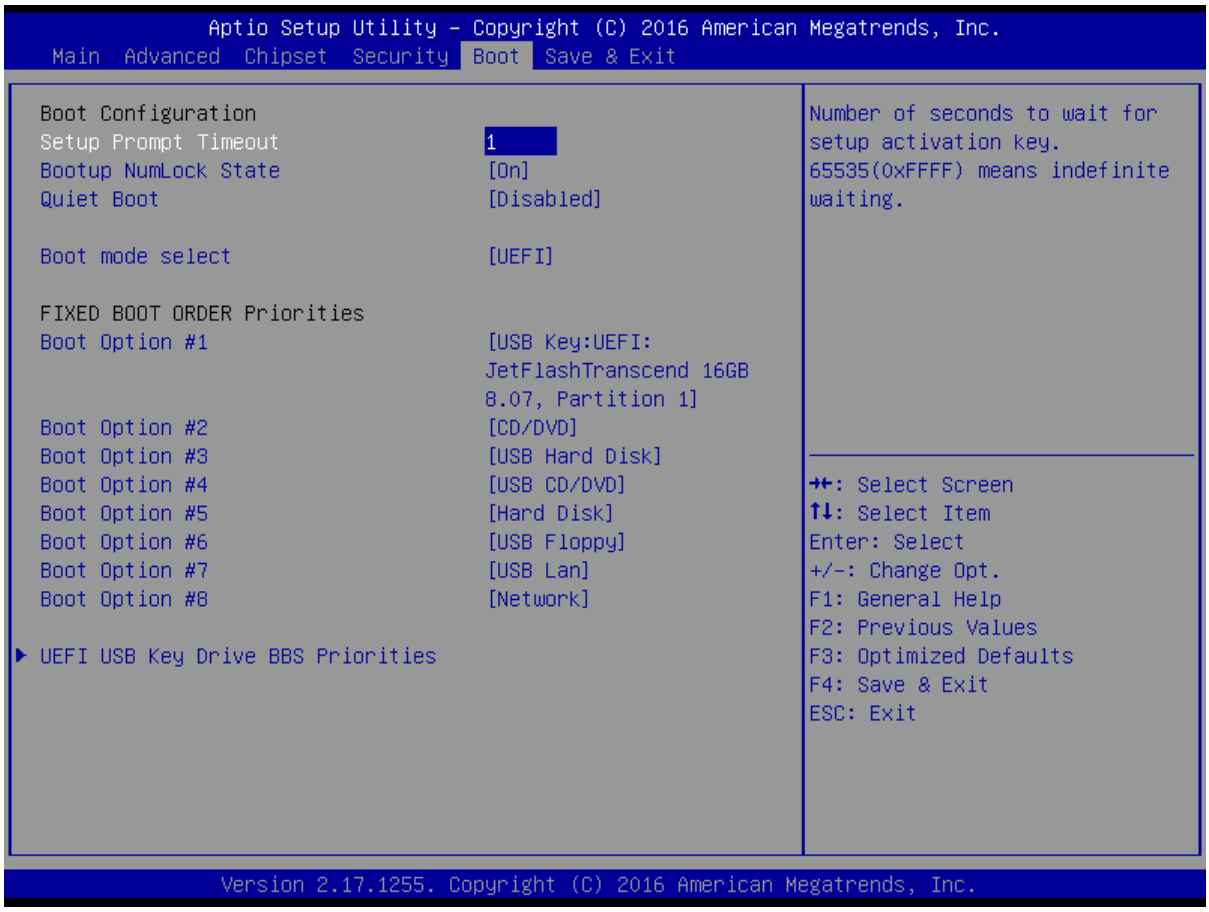
This item allows you to set Administrator Password.

4.5.2 User Password

This item allows you to set User Password.

4.6 Boot

This menu allows you to setup the system boot options.



4.6.1 Setup Prompt Timeout

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

4.6.2 Bootup NumLock State

This item selects the keyboard NumLock state. Select <On> or <Off>.

4.6.3 Quiet Boot

Enable or disable Quiet Boot option
Configuration options: [Disabled] [Enabled]

4.6.4 Boot mode select [UEFI]

Select boot mode LEGACY/UEFI
Configuration options: [LEGACY] [UEFI]

4.6.5 Boot Option Priorities

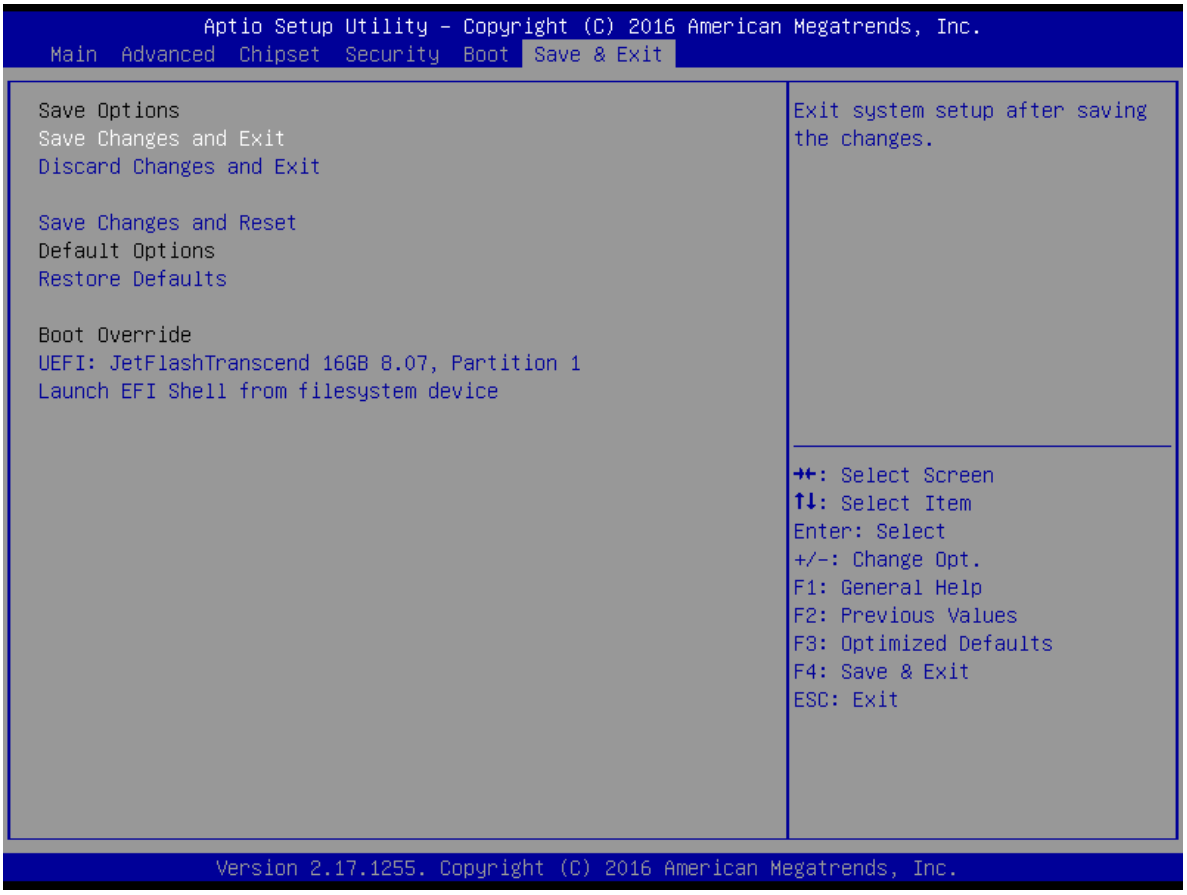
The items specify the boot device priority sequence from the available devices. The number of device items that appears on the screen depends on the number of devices installed in the system.

4.6.6 UEFI USB Key Drive BBS Priorities

Specifies the boot device priority sequence from available UEFI USB key Drives.

4.7 Save & Exit

This setting allows you to configure the boot settings.



4.7.1 Save Changes and Exit

This item allows you exit BIOS Setup after saving the changes.

4.7.2 Discard Changes and Exit

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

4.7.3 Save Changes and Reset

This item allows you reset the system after saving the changes.

4.7.4 Restore Defaults

This selection allows you to reload the BIOS when problem occurs during system booting sequence. These configurations are factory settings optimized for this system.

4.7.5 Launch EFI Shell from Filesystem Device

Attempts to launch EFI shell application from one of the available filesystem devices.