

EBM-SKLU-B1

Intel® 6th Generation ULT Processor 5.25" Mini Module

User's Manual



1st Ed –27 July 2021

FCC Statement



THIS DEVICE COMPLIES WITH PART 15 FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS:

- (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE.
- (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRE OPERATION.

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 WHICH CASE THE USER WILL BE REQUIRED TO CORRECT THE INTERFERENCE AT HIS OWN EXPENSE.

Notice

This guide is designed for experienced users to setup the system within the shortest time. For detailed information, please always refer to the electronic user's manual.

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3. If your product is diagnosed as defective, obtain an RMA (return material authorization) number from your dealer. This allows us to process your good return more quickly.
4. Carefully pack the defective product, a complete Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

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1. Getting Started

1.1 Safety Precautions

Warning!



Always completely disconnect the power cord from your chassis whenever you work with the hardware. Do not make connections while the power is on. Sensitive electronic components can be damaged by sudden power surges. Only experienced electronics personnel should open the PC chassis.

Caution!



Always ground yourself to remove any static charge before touching the CPU card. Modern electronic devices are very sensitive to static electric charges. As a safety precaution, use a grounding wrist strap at all times. Place all electronic components in a static-dissipative surface or static-shielded bag when they are not in the chassis.

1.2 Packing List

Before you begin installing your single board, please make sure that the following materials have been shipped:

- 1 x EBM-SKLU-B1 Intel® 6th Generation ULT Processor 5.25" Mini Module



If any of the above items is damaged or missing, contact your retailer.

1.3 Document Amendment History

Revision	Date	By	Comment
1 st	July 2021	Avalue	Initial Release

1.4 Manual Objectives

This manual describes in details Avalue Technology EBM-SKLU-B1 Single Board.

We have tried to include as much information as possible but we have not duplicated information that is provided in the standard IBM Technical References, unless it proved to be necessary to aid in the understanding of this board.

We strongly recommend that you study this manual carefully before attempting to set up EBM-SKLU-B1 or change the standard configurations. Whilst all the necessary information is available in this manual we would recommend that unless you are confident, you contact your supplier for guidance.

Please be aware that it is possible to create configurations within the CMOS RAM that make booting impossible. If this should happen, clear the CMOS settings, (see the description of the Jumper Settings for details).

If you have any suggestions or find any errors regarding this manual and want to inform us of these, please contact our Customer Service department with the relevant details.

1.5 System Specifications

System	
CPU	Onboard 6th generation Intel® Skylake i7/i5/i3 2+2e SoC ULT Processor (15W)
BIOS	AMI uEFI BIOS, 128 Mbit SPI Flash ROM iAMT supported
I/O Chip	EC(IT8528E)
System Memory	Two 260-pin DDR4 SODIMM (non ECC) support up to 32GB
Watchdog Timer	H/W Reset, 1sec. ~ 65535sec. and 1sec./step
H/W Status Monitor	Monitoring System Temperature, Voltage and FAN Status with Auto Throttling Control
TPM	TPM 2.0 by option (Infineon SLC9665TT2.0 FW5.63)
iAMT	iAMT 11.0
Expansion Slot	
mPCIe	1 x Mini PCIe connector (for PCIe & USB2.0 & SIM Card) 1 x Mini PCIe connector (for MSATA)
Storage	
mSATA	1 x Mini PCIe connector (for MSATA)
SATA	1 x SATA III
Edge I/O	
COM	2 x DB-9 male connector for COM1/2 (RS-232/422/485 selected by jumper w/ Auto Flow)
LAN	2 x RJ-45 connectors for two GbE ports
USB 3.1	4 x USB3.0 (dual deck USB connector for 2 USB3.0 port)
HDMI	1 x HDMI (HDMI type A connector)
Audio	1 x Line out connector
DC Input	1 x Lockable DC Jack
LED Indicator	1 x dual deck LED: Green indicator: power-on Yellow indicator: HDD active
Reset Switch	1 x Reset button
Others	1 x Reset button
Onboard I/O	
COM	4 x RS-232 (Pin Header)
USB 2.0	4 x USB 2.0 (Wafer)
GPIO	16 bit GPIO (2 x 10 pin wafer w/2.0mm pitch) 8 x In, 8 x Out
SATA Power	1 x 1 x 2 pin wafer w/2.0mm pitch for SATA Power
CPU/System	1 x 4 pin header w/2.54mm pitch

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FAN	
Buzzer	Onboard
Front Panel	5 x 2 wafer, pitch 2.00mm
RTC Battery	Yes
AT/ATX Selector	*1 x 6pin DIP Switch for COM1 & COM2 (RS232/422/485 selection), AT/ATX, Touch on/off
Clear CMOS	3 x 1 header, pitch 2.00mm
LVDS	DIN 40-pin wafer, pitch 1.25mm
LCD Backlight Brightness	1. 1 x 2 x 3 pin w/2.0mm pitch (VR voltage adjustment)-- 1/3/5 pin connected to EC 2. 1 x 1 x 5 pin wafer w/2.0mm pitch 3. 1 x 1 x 3 pin header w/2.0mm pitch(DC/PWM)-- 1pin for PWM, 3pin for DC
LCD Inverter	5 x 1 wafer, pitch 2.00mm
Touch	5 x 1 header, pitch 2.54mm (EETI ETP-CP-MER4485XRU)
LPC	5 x 2 header, pitch 2.00mm
BIOS SPI	4 x 2 header, pitch 2.00mm
EC Debug	2 x 1 header, pitch 2.00 mm
Audio	2 x 1 x 2 wafer w/2.0mm pitch for AMP (if use 2.1 Audio Codec)
DC-Input	2 x 2 wafer, pitch 4.20mm
Amp Connector	2 x 2 x 1 wafer, pitch 2.00mm
Display	
Graphic Chipset	Intel® Skylake U Processor integrated Graphics
Spec. & Resolution	LVDS: 1920 x 1080@60Hz HDMI: 3840 x 2160@24Hz
Multiple Display	Dual display
Other	1 x eDP via CH7511 Supports 24-bit Dual Channel LVDS 2x20 pin Hirose Connector for (Optional BOM for 1 x internal eDP or default 1 x CH7511B LVDS for 2 x 24-bit.)
Audio	
Audio Codec	Tempo Audio IC 92HD95B
Amplifier	2W Per Channel Line-Out and Amp
Ethernet	
LAN Chip	1 x Intel I210AT GbE controller 1 x Intel I219LM Gigabit Ethernet PHY
LAN Spec.	10/100/1000 Base-Tx compatible
Mechanical & Environmental	
Power Requirement	+12V ~ +26V

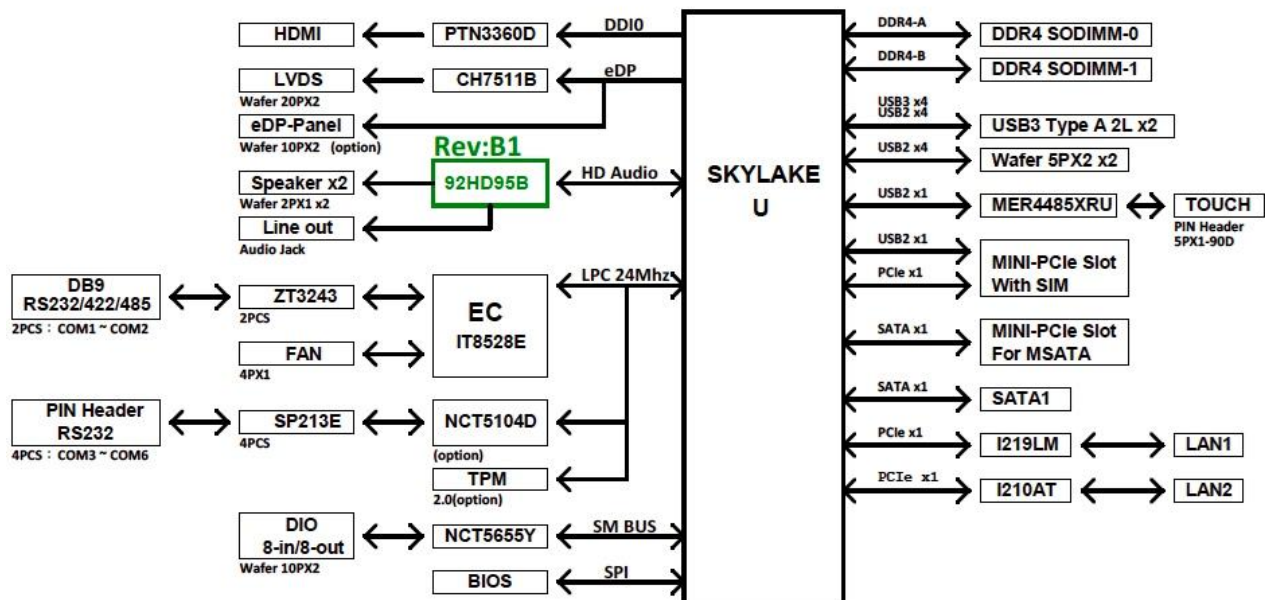
ACPI	Single power ATX Support S0, S3, S4, S5 ACPI 5.0 Compliant
Power Mode	AT / ATX
Operating Temp.	0°C ~ 60°C (32°F ~ 140°F) for board level
Storage Temp.	-20°C ~ 70°C (-4°F ~ 140°F)
Operating Humidity	40°C @ 95% Relative Humidity, Non-condensing
Size (L x W)	8" x 5.75" (203mm x 146mm)
Weight	0.55lb (0.25kg)
Vibration Test	<p>Operate:</p> <p>1 PSD: 0.00454G²/Hz , 1.5 Grms</p> <p>2 Operation mode</p> <p>3 Test Frequency : 5-500Hz</p> <p>4 Test Axis : X,Y and Z axis</p> <p>5 30 min. per each axis</p> <p>6 IEC 60068-2-64 Test:Fh</p> <p>Non Operate:</p> <p>1 PSD: 0.01818G²/Hz , 3.0 Grms</p> <p>2 Non-Operation mode</p> <p>3 Test Frequency : 5-500Hz</p> <p>4 Test Axis : X,Y and Z axis</p> <p>5 30 min. per each axis 6 IEC 60068-2-64 Test:Fh</p>
Drop Test	<p>1 One corner , three edges, six faces</p> <p>2 ISTA 2A, IEC-60068-2-32 Test:Ed</p>
OS Information	Windows 10 IoT



Note: Specifications are subject to change without notice.

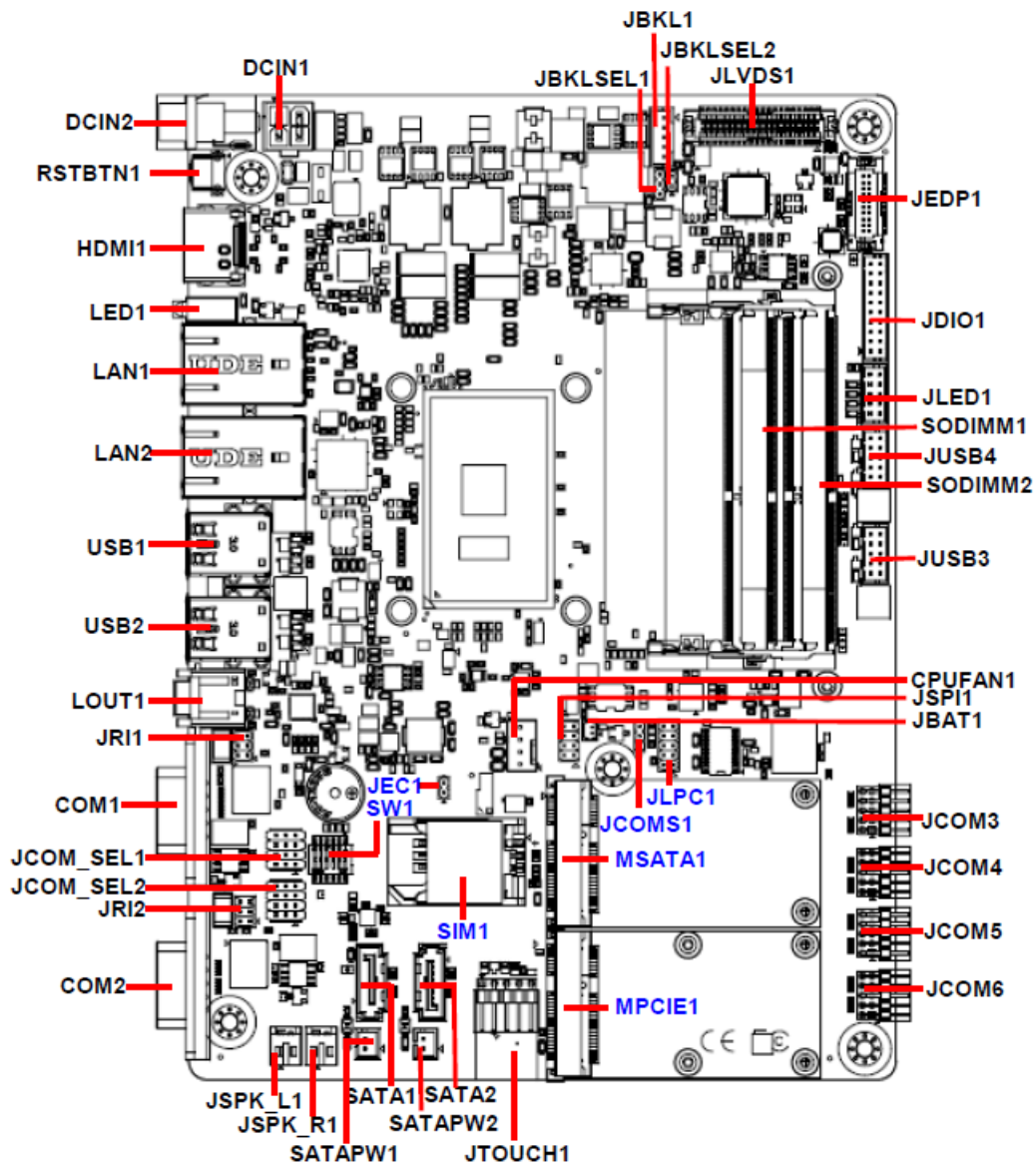
1.6 Architecture Overview—Block Diagram

The following block diagram shows the architecture and main components of EBM-SKLU-B1.



2. Hardware Configuration

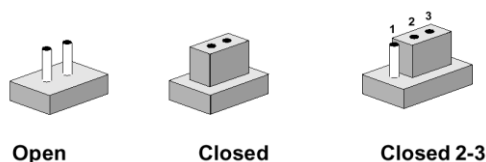
2.1 Product Overview



2.2 Jumper and Connector List

You can configure your board to match the needs of your application by setting jumpers. A jumper is the simplest kind of electric switch.

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 two pins.



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



A pair of needle-nose pliers may be helpful when working with jumpers.

Connectors on the board are linked to external devices such as hard disk drives, a keyboard, or floppy drives. In addition, the board has a number of jumpers that allow you to configure your system to suit your application.

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.

The following tables list the function of each of the board's jumpers and connectors.

Jumpers

Label	Function	Note
JRI1/2	Serial port 1/2 pin9 signal select	3 x 2 header, pitch 2.00mm
JCOM_SEL1	Serial port 1 – RS232/422/485 mode select	4 x 3 header, pitch 2.00mm
JCOM_SEL2	Serial port 2 – RS232/422/485 mode select	4 x 3 header, pitch 2.00mm
JBKLSEL1	LCD brightness DC/PWM mode select 1	3 x 1 header, pitch 2.00mm
SW1	Multi-function select	DIP switch 6pin
JCOMS1	Clear CMOS	3 x 1 header, pitch 2.00mm

Connectors

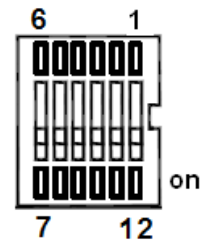
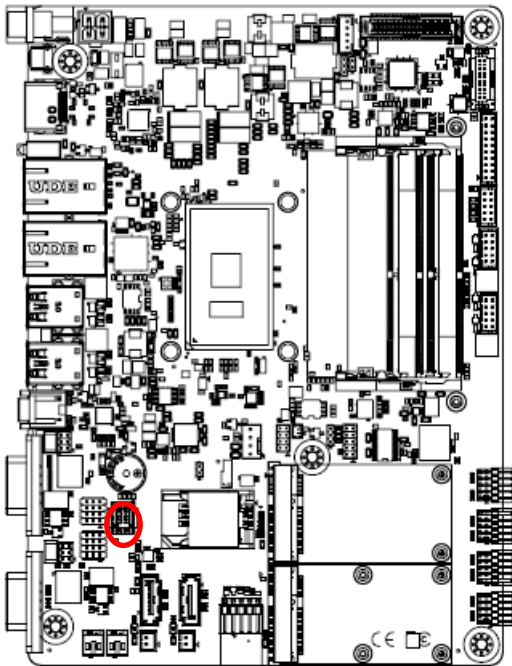
Label	Function	Note
JBKLSEL2	LCD brightness DC/PWM mode select 2	2 x 1 header, pitch 2.00mm
JBKL1	LCD Inverter connector	5 x 1 wafer, pitch 2.00mm

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CPUFAN1	CPU fan connector	4 x 1 wafer, pitch 2.54mm
COM1/2	Serial Port 1/2 connector	D-sub 9 pin, male
JCOM3/4/5/6	Serial Port 3/4/5/6 connector	5 x 2 header, pitch 2.00mm
JDIO1	General purpose I/O connector	10 x 2 wafer, pitch 2.00mm
JLED1	Front Panel connector	5 x 2 wafer, pitch 2.00mm
LED1	HDD/Power LED indicator	
JLVDS1	LVDS connector	DIN 40-pin wafer, pitch 1.25mm
JTOUCH1	Touch panel connector	5 x 1 header, pitch 2.54mm
USB1/2	4 x USB3.0 connector	
JUSB3	USB connector	5 x 2 wafer, pitch 2.00mm
JUSB4	USB connector	5 x 2 wafer, pitch 2.00mm
LAN1/2	RJ-45 Ethernet 1/2	
JBAT1	Battery connector	2 x 1 wafer, pitch 1.25mm
SODIMM1/2	DDR4 SODIMM socket	
JSPK_L1	Amplifier connector	2 x 1 wafer, pitch 2.00mm
JSPK_R1	Amplifier connector	2 x 1 wafer, pitch 2.00mm
MSATA1	Full size mPCIe Slot	
MPCIE1	Mini-PCIe_connector	
JLPC1	LPC connector	5 x 2 header, pitch 2.00mm
DCIN1	Power connector	2 x 2 wafer, pitch 4.20mm
DCIN2	Power connector	
RSTBTN1	Reset button	
JSPI1	SPI connector	4 x 2 header, pitch 2.00mm
JEC1	EC Debug connector	2 x 1 header, pitch 2.00 mm
SATAPW1/2	SATA Power connector 1/2	2 x 1 wafer, pitch 2.00mm
SATA1/2	Serial ATA connector 1/2	
SIM1	SIM card slot	
HDMI1	HDMI connector	
LOUT1	Audio line-out connector	
JEDP1	eDP_Panel connector	10 x 2 wafer, pitch 1.25mm

2.3 Setting Jumpers & Connectors

2.3.1 Multi-function select (SW1)



In Serial Port 1 mode

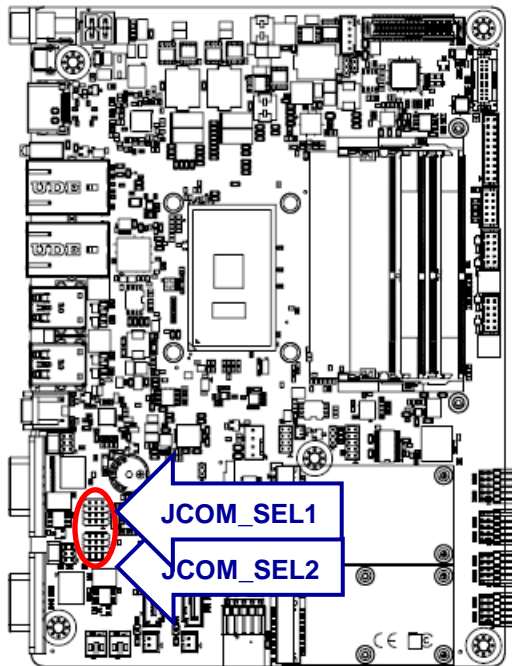
	RS-232	RS-422	RS-485
1	OFF	ON	ON
2	ON	OFF	ON

In Serial Port 2 mode

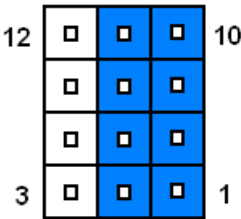
	RS-232	RS-422	RS-485
3	OFF	ON	ON
4	ON	OFF	ON

	ON	OFF
5	AT SEL	ATX SEL
6	Touch off	Touch on

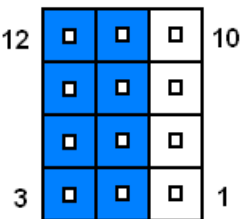
2.3.2 Serial port 1/2 RS-232/422/485 mode select (JCOM_SEL1/2)



RS-232*

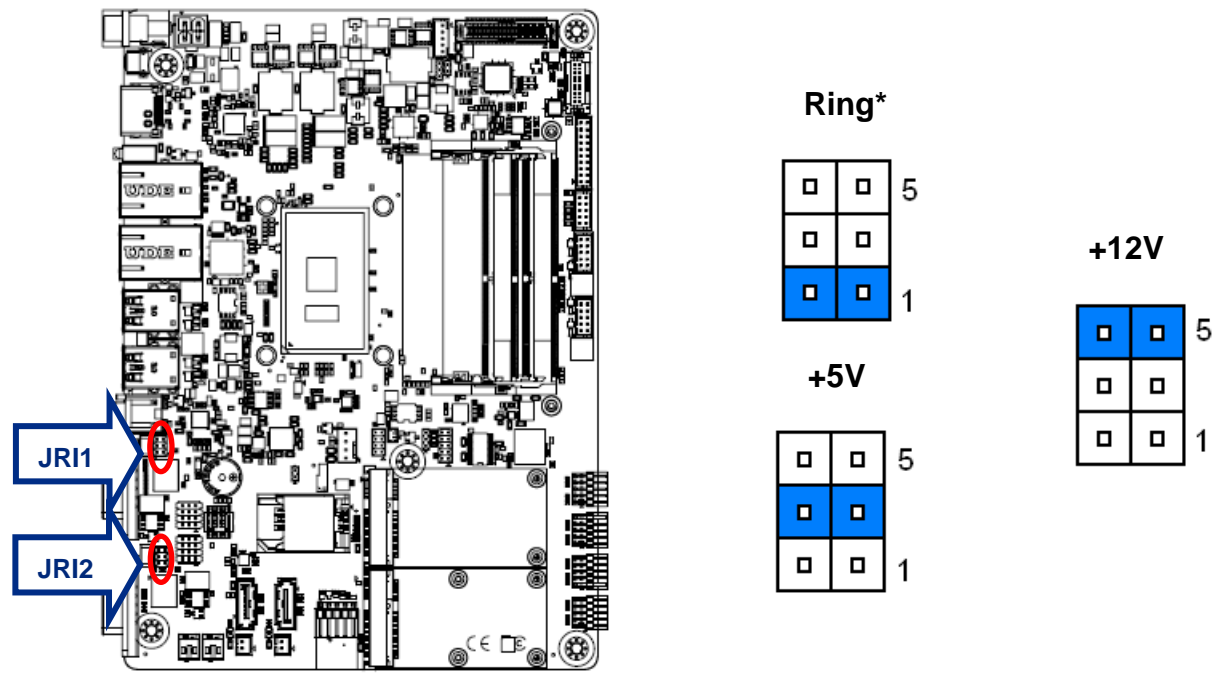


RS-422/ 485



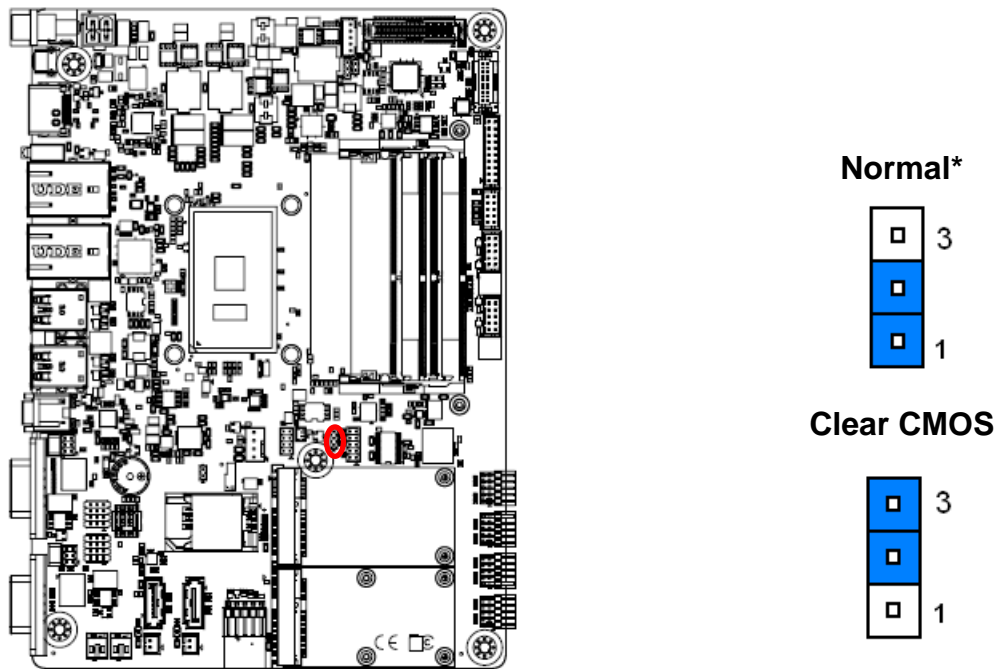
* Default

2.3.3 Serial port 1/ 2 pin9 signal select (JRI1/ JRI2)



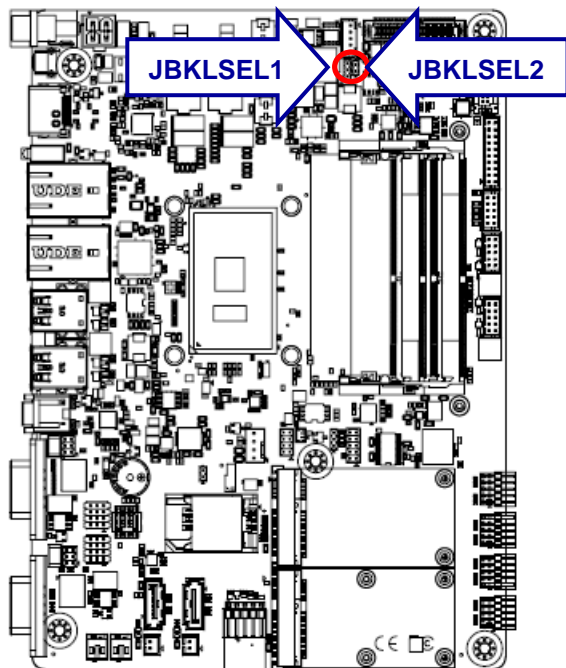
* Default

2.3.4 Clear CMOS (JCOMS1)

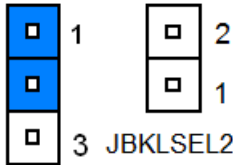


* Default

2.3.5 LCD brightness DC/PWM mode select 1/2 (JBKLSEL1/2)

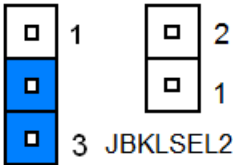


PWM Mode*



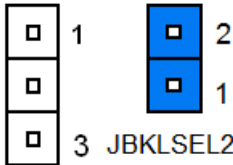
JBKLSEL1

DC Mode



JBKLSEL1

OS Driver



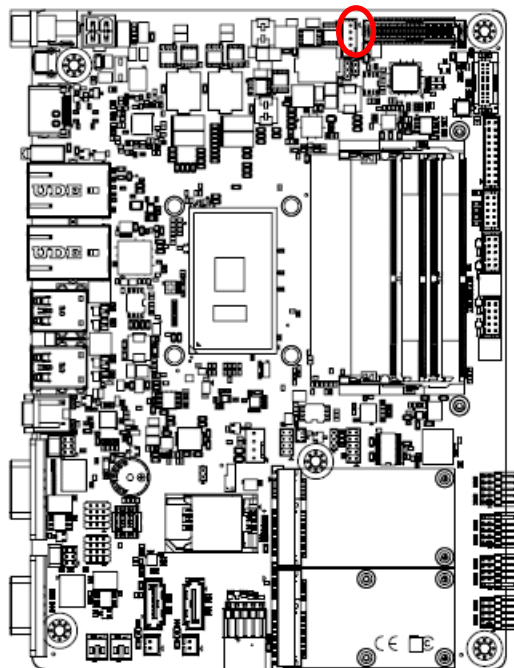
JBKLSEL1

* Default

Note:

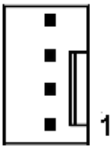
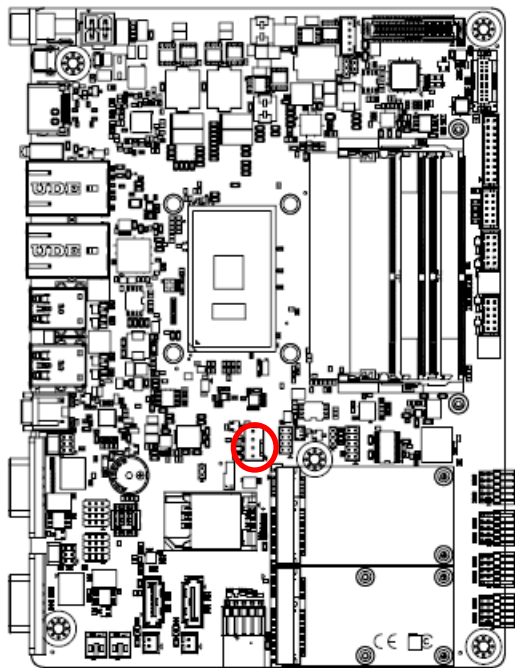
JBKLSEL1/2 can't be used simultaneously.

2.3.6 LCD Inverter connector (JBKL1)



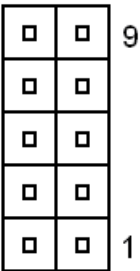
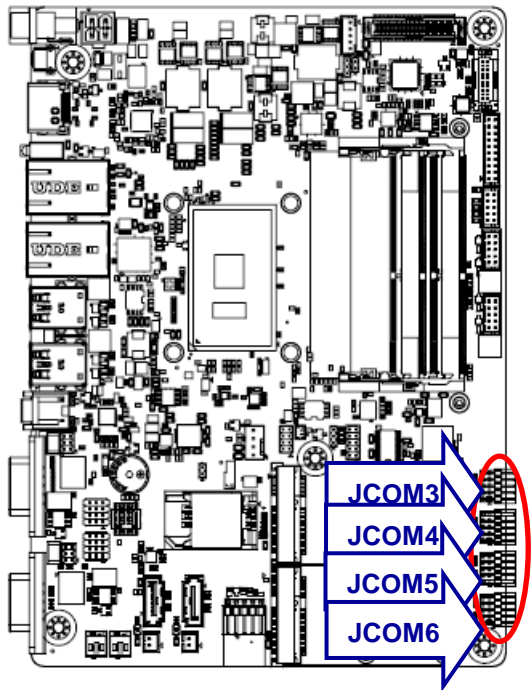
Signal	PIN
+12V	1
GND	2
LVDS_BKLT_EN	3
LVDS_BKLTCTL	4
+5V	5

2.3.7 CPU fan connector (CPUFAN1)



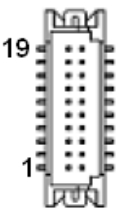
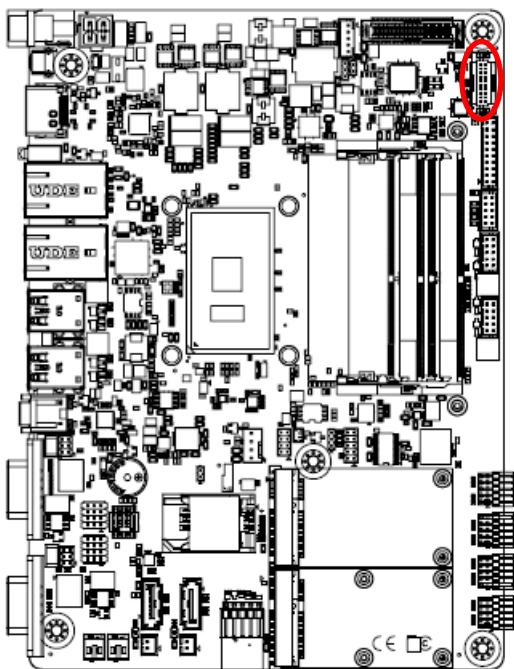
Signal	PIN
+5V	4
EC_TACH0	3
+12V	2
GND	1

2.3.8 Serial port 3/4/5/6 connector (JCOM3/JCOM4/JCOM5/JCOM6)



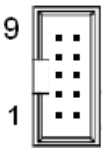
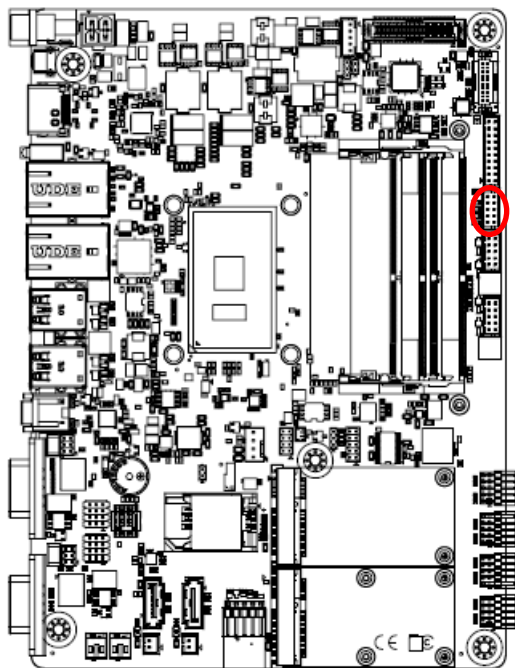
Signal	PIN	PIN	Signal
COM_RI#	10	9	NC
COM_RTS#	8	7	COM_CTS#
GND	6	5	COM_DSR#
COM_TXD	4	3	COM_DTR#
COM_DCD#	2	1	COM_RXD

2.3.9 eDP_Panel connector (JEDP1)



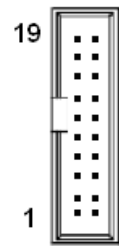
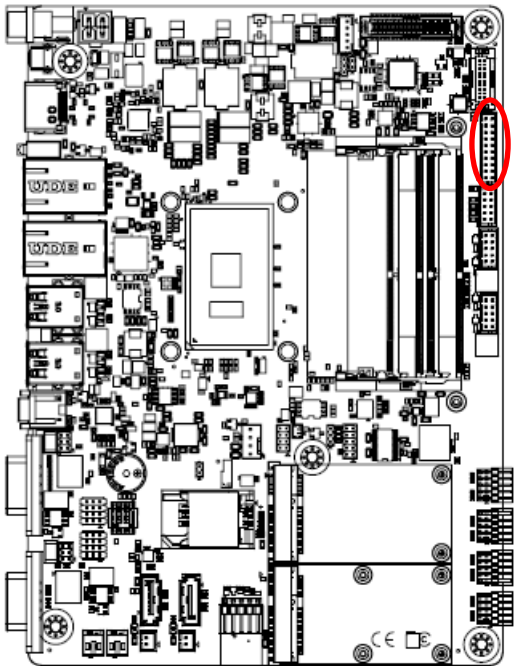
Signal	PIN	PIN	Signal
+V3512_EDP	19	20	+V3512_EDP
EDP_Panel_TXP2	17	18	EDP_Panel_HPDP
EDP_Panel_TXN2	15	16	GND
GND	13	14	EDP_Panel_AUXP
EDP_Panel_TXP1	11	12	EDP_Panel_AUXN
EDP_Panel_TXN1	9	10	GND
GND	7	8	NC
EDP_Panel_TXP0	5	6	EDP_Panel_TXP3
EDP_Panel_TXN0	3	4	EDP_Panel_TXN3
GND	1	2	GND

2.3.10 Front Panel connector (JLED1)



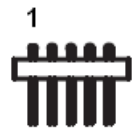
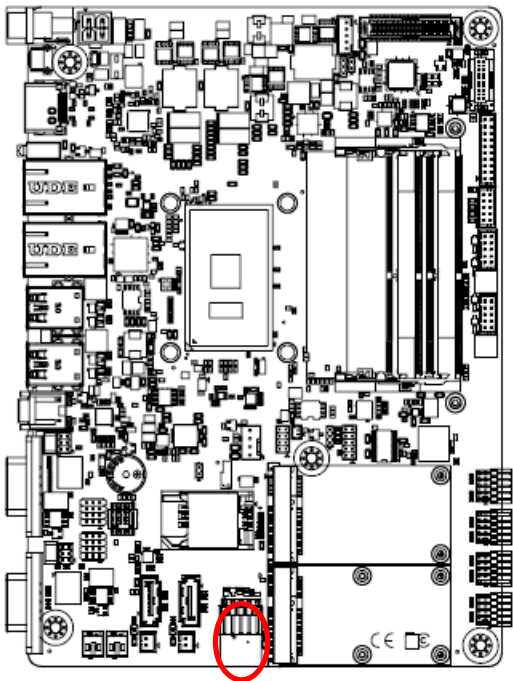
Signal	PIN	PIN	Signal
GND	9	10	PWRBTN#
+5VSB	7	8	LAN2_ACT#_LED
+5VSB	5	6	LAN1_ACT#_LED
+5V	3	4	HDD_LED#
+5VSB	1	2	PWR_LED-

2.3.11 General purpose I/O connector (JDIO1)



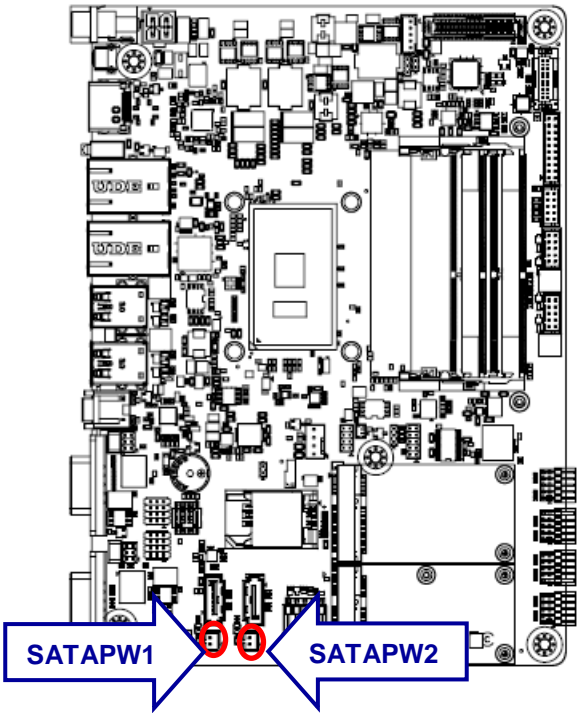
Signal	PIN	PIN	Signal
+5V	19	20	GND
SMB_DATA_5655	17	18	SMB_CLK_5655
DIO_GP27	15	16	DIO_GP17
DIO_GP26	13	14	DIO_GP16
DIO_GP25	11	12	DIO_GP15
DIO_GP24	9	10	DIO_GP14
DIO_GP23	7	8	DIO_GP13
DIO_GP22	5	6	DIO_GP12
DIO_GP21	3	4	DIO_GP11
DIO_GP20	1	2	DIO_GP10

2.3.12 Touch panel connector (JTOUCH1)



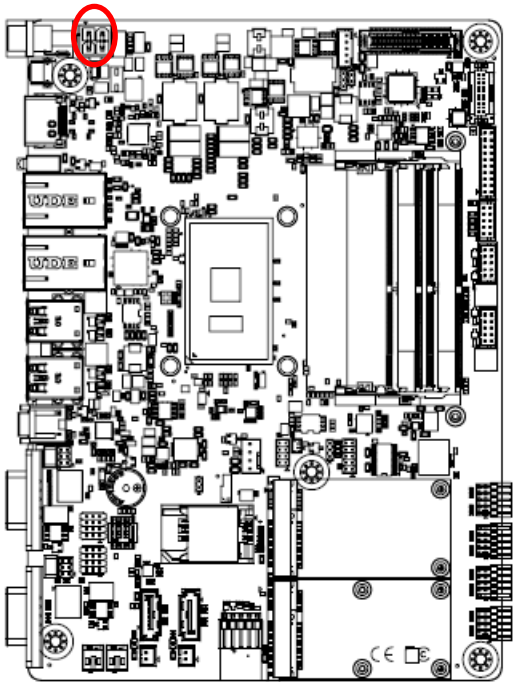
Signal	PIN
THX+	1
THX-	2
THPROBE_R	3
THY+	4
THY-	5

2.3.13 SATA Power connector 1/2 (SATAPW1/2)



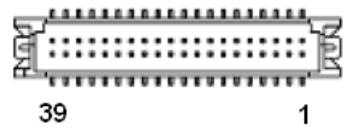
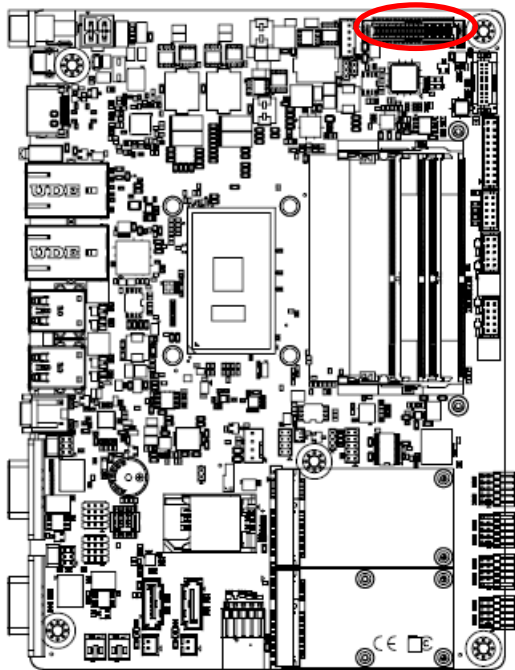
Signal	PIN
+5V	2
GND	1

2.3.14 Power connector (DCIN1)



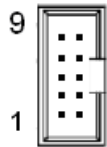
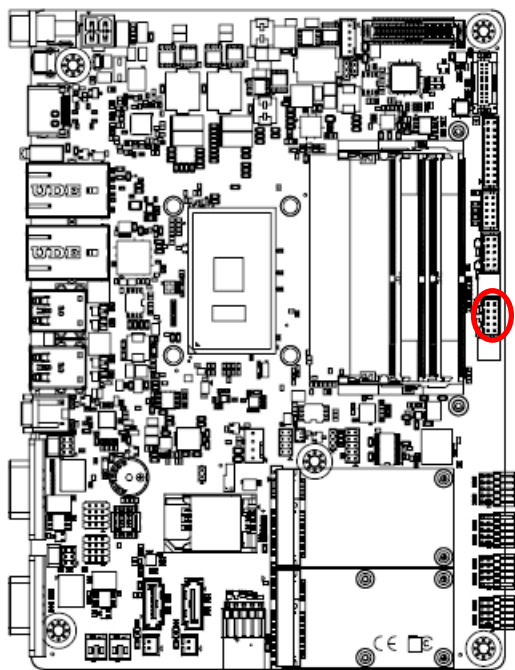
Signal	PIN	PIN	Signal
GND	1	2	GND
+VIN_26V	3	4	+VIN_26V

2.3.15 LVDS connector (JLVDS1)



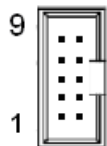
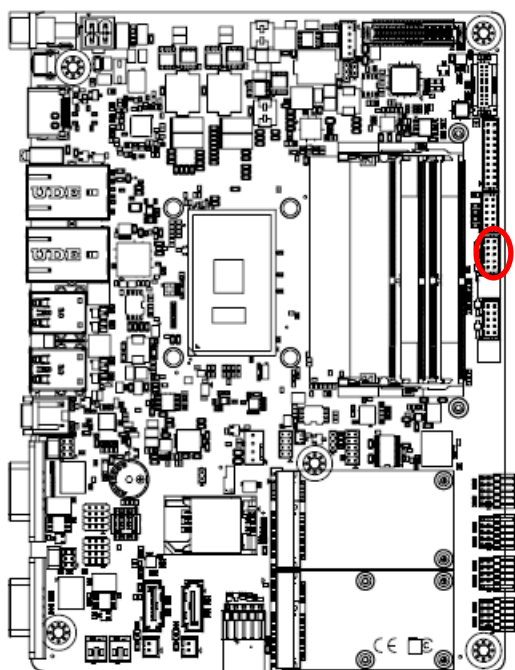
Signal	PIN	PIN	Signal
+3.3V	1	2	+5V
+3.3V	3	4	+5V
NC	5	6	NC
GND	7	8	GND
LVDS_DATA1_P	9	10	LVDS_DATA0_P
LVDS_DATA1_N	11	12	LVDS_DATA0_N
GND	13	14	GND
LVDS_DATA3_P	15	16	LVDS_DATA2_P
LVDS_DATA3_N	17	18	LVDS_DATA2_N
GND	19	20	GND
LVDS_DATA5_P	21	22	LVDS_DATA4_P
LVDS_DATA5_N	23	24	LVDS_DATA4_N
GND	25	26	GND
LVDS_DATA7_P	27	28	LVDS_DATA6_P
LVDS_DATA7_N	29	30	LVDS_DATA6_N
GND	31	32	GND
LVDS_CLK2_P	33	34	LVDS_CLK1_P
LVDS_CLK2_N	35	36	LVDS_CLK1_N
GND	37	38	GND
+12V	39	40	+12V

2.3.16 USB connector (JUSB3)



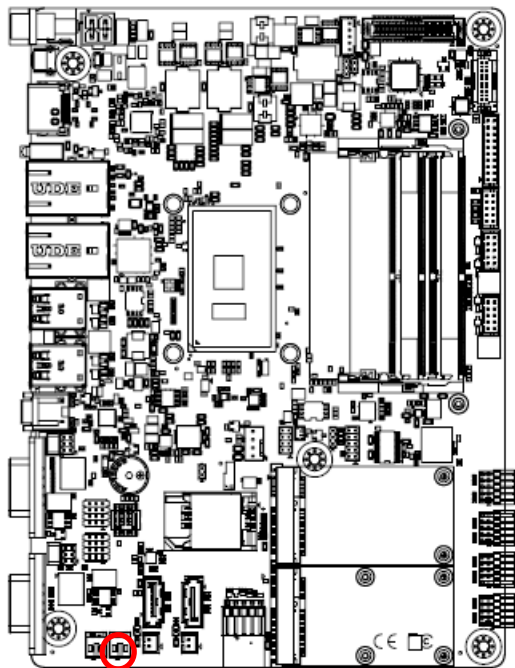
Signal	PIN	PIN	Signal
GND	9	10	GND
GND	7	8	GND
USB_Z_PP5	5	6	USB_Z_PP6
USB_Z_PN5	3	4	USB_Z_PN6
+5VSB	1	2	+5VSB

2.3.17 USB connector (JUSB4)



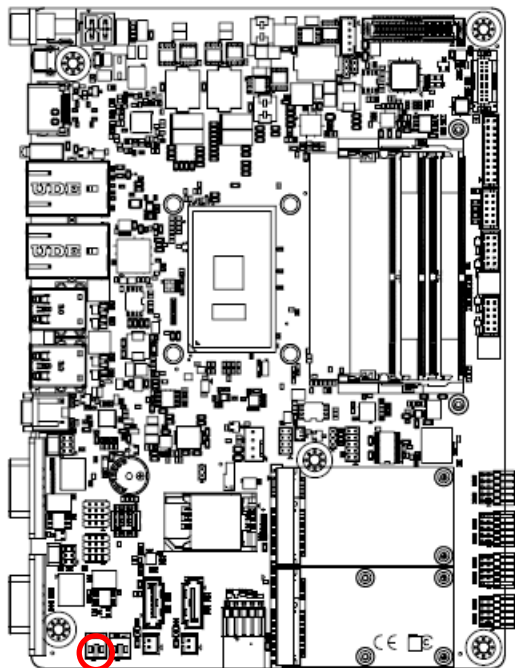
Signal	PIN	PIN	Signal
GND	9	10	GND
GND	7	8	GND
USB_Z_PP7	5	6	USB_Z_PP8
USB_Z_PN7	3	4	USB_Z_PN8
+5VSB	1	2	+5VSB

2.3.18 Amplifier connector (JSPK_R1)



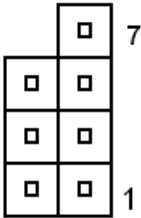
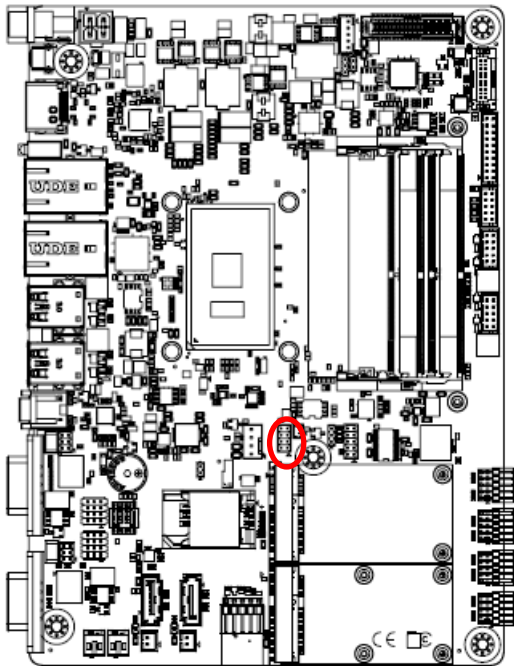
Signal	PIN
SPK_R+	1
SPK_R-	2

2.3.19 Amplifier connector (JSPK_L1)



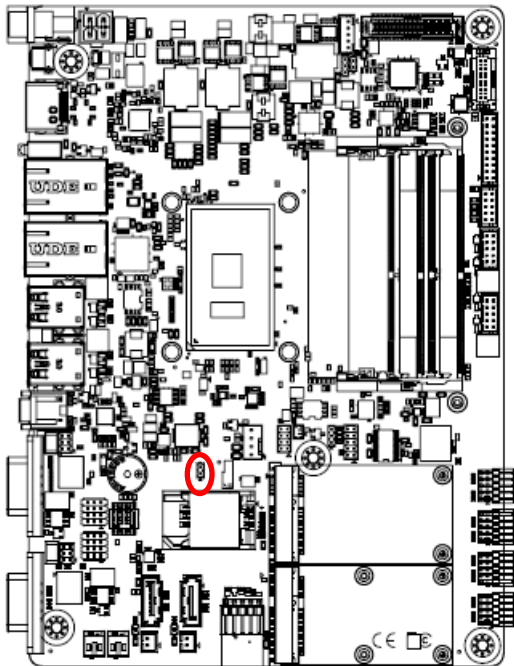
Signal	PIN
SPK_L+	1
SPK_L-	2

2.3.20 SPI connector (JSPI1)



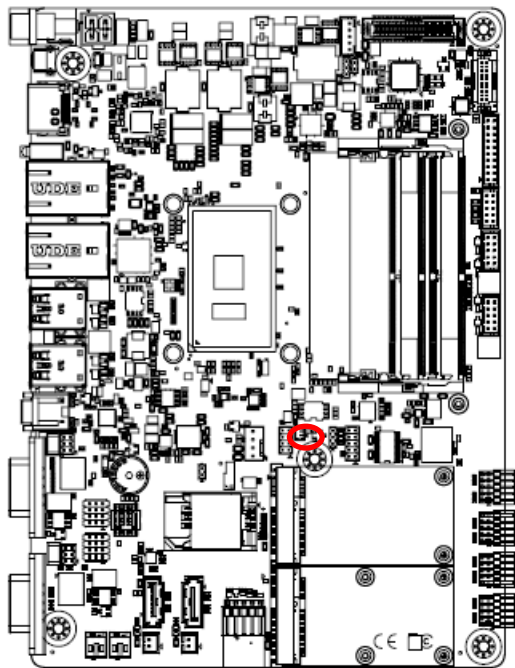
Signal	PIN	PIN	Signal
		7	HOLD#
SPI_SI	6	5	SPI_SO
SPI_CLK	4	3	SPI0_CS0#
GND	2	1	+3.3VSB

2.3.21 EC Debug connector (JEC1)



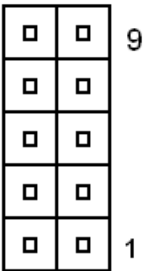
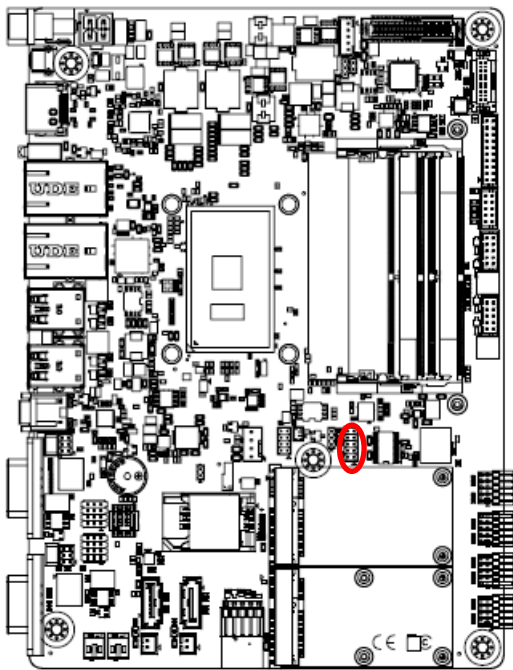
Signal	PIN
EC_SMDAT_DEBUG	2
EC_SMCLK_DEBUG	1

2.3.22 Battery connector (JBAT1)



Signal	PIN
GND	2
+RTCBAT	1

2.3.23 LPC connector (JLPC1)



Signal	PIN	PIN	Signal
GND	10	9	LPC_SERIRQ
CLK2_LPC_PORT80	8	7	LPC_AD3
LPC_LFRAME#	6	5	LPC_AD2
RST_PORT80#	4	3	LPC_AD1
+3.3VSB	2	1	LPC_AD0

3.BIOS Setup

3.1 Introduction

The BIOS setup program allows users to modify the basic system configuration. In this following chapter will describe how to access the BIOS setup program and the configuration options that may be changed.

3.2 Starting Setup

AMI BIOS™ is immediately activated when you first power on the computer. The BIOS reads the system information contained in the NVRAM and begins the process of checking out the system and configuring it. When it finishes, the BIOS will seek an operating system on one of the disks and then launch and turn control over to the operating system.

While the BIOS is in control, the Setup program can be activated in one of two ways:

By pressing <F2> or immediately after switching the system on, or

By pressing the <F2> or key when the following message appears briefly at the left-top of the screen during the POST (Power On Self Test).

Press <F2> or to enter SETUP

If the message disappears before you respond and you still wish to enter Setup, restart the system to try again by turning it OFF then ON or pressing the "RESET" button on the system case. You may also restart by simultaneously pressing <Ctrl>, <Alt>, and <Delete> keys.

3.3 Using Setup

In general, you use the arrow keys to highlight items, press <Enter> to select, use the PageUp and PageDown keys to change entries, press <F1> for help and press <Esc> to quit. The following table provides more detail about how to navigate in the Setup program using the keyboard.

Button	Description
↑	Move to previous item
↓	Move to next item
←	Move to the item in the left hand
→	Move to the item in the right hand
Esc key	Main Menu -- Quit and not save changes into NVRAM Status Page Setup Menu and Option Page Setup Menu -- Exit current page and return to Main Menu
+ key	Increase the numeric value or make changes
- key	Decrease the numeric value or make changes
F1 key	General help, only for Status Page Setup Menu and Option Page Setup Menu
F2 key	Previous Values
F3 key	Optimized defaults
F4 key	Save & Exit Setup

- **Navigating Through The Menu Bar**

Use the left and right arrow keys to choose the menu you want to be in.



Note: Some of the navigation keys differ from one screen to another.

- **To Display a Sub Menu**

Use the arrow keys to move the cursor to the sub menu you want. Then press <Enter>. A “➤” pointer marks all sub menus.

3.4 Getting Help

Press F1 to pop up a small help window that describes the appropriate keys to use and the possible selections for the highlighted item. To exit the Help Window press <Esc> or the F1 key again.

3.5 In Case of Problems

If, after making and saving system changes with Setup, you discover that your computer no longer is able to boot, the AMI BIOS supports an override to the NVRAM settings which resets your system to its defaults.

The best advice is to only alter settings which you thoroughly understand. To this end, we strongly recommend that you avoid making any changes to the chipset defaults. These defaults have been carefully chosen by both BIOS Vendor and your systems manufacturer to provide the absolute maximum performance and reliability. Even a seemingly small change to the chipset setup has the potential for causing you to use the override.

3.6 BIOS setup

Once you enter the Aptio Setup Utility, the Main Menu will appear on the screen. The Main Menu allows you to select from several setup functions and exit choices. Use the arrow keys to select among the items and press <Enter> to accept and enter the sub-menu.

3.6.1 Main Menu

This section allows you to record some basic hardware configurations in your computer and set the system clock.



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3.6.1.1 System Language

This option allows choosing the system default language.

3.6.1.2 System Date

Use the system date option to set the system date. Manually enter the day, month and year.

3.6.1.3 System Time

Use the system time option to set the system time. Manually enter the hours, minutes and seconds.

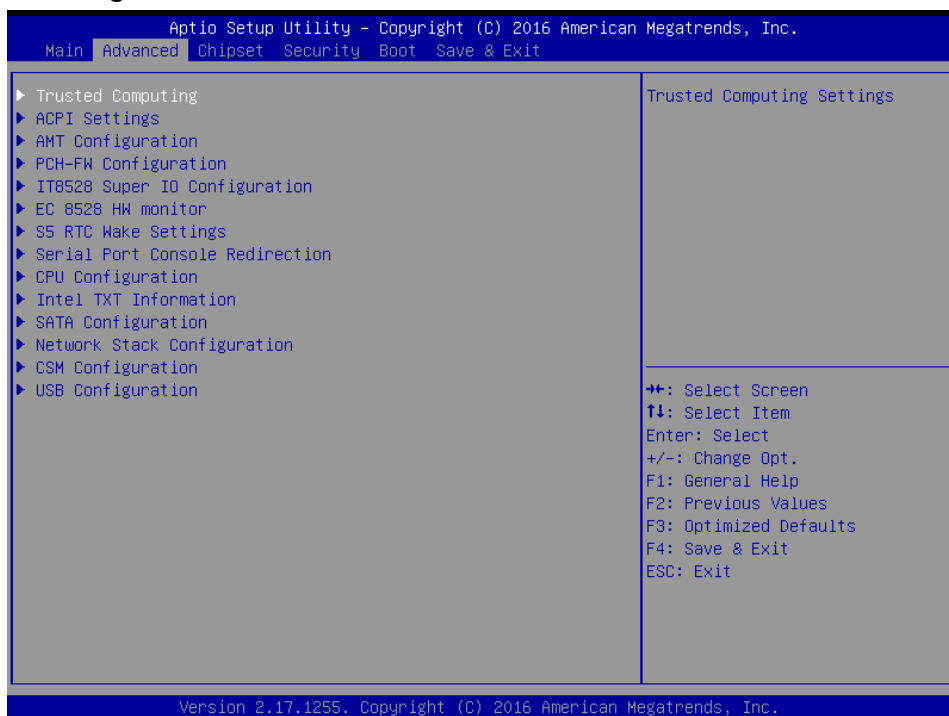


Note: The BIOS setup screens shown in this chapter are for reference purposes only, and may not exactly match what you see on your screen.

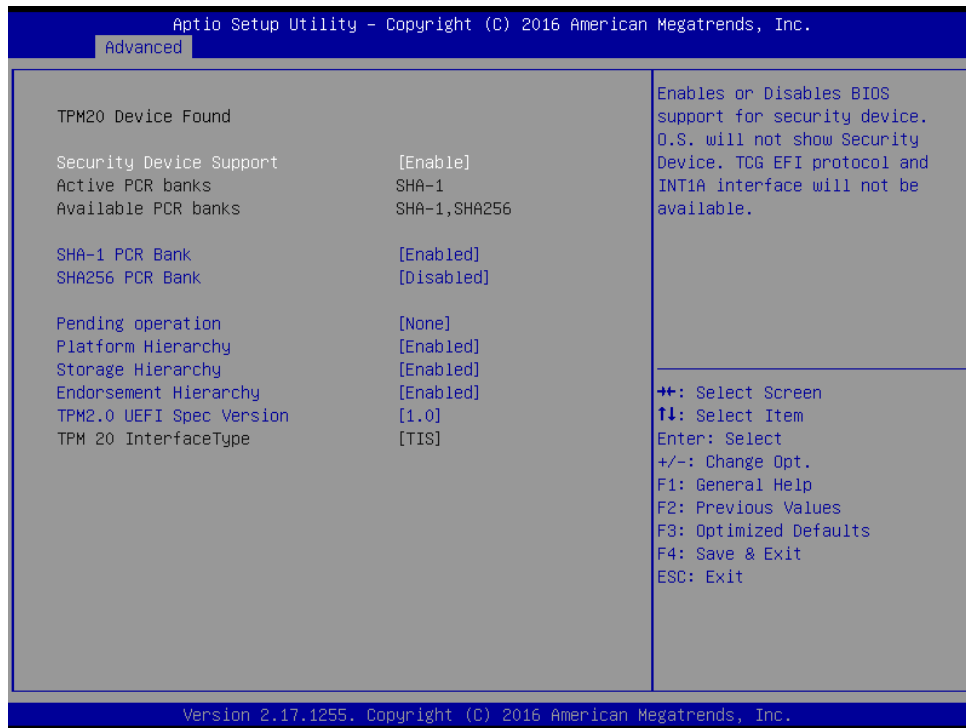
Visit the Avalue website (www.avalue.com.tw) to download the latest product and BIOS information.

3.6.2 Advanced Menu

This section allows you to configure your CPU and other system devices for basic operation through the following sub-menus.

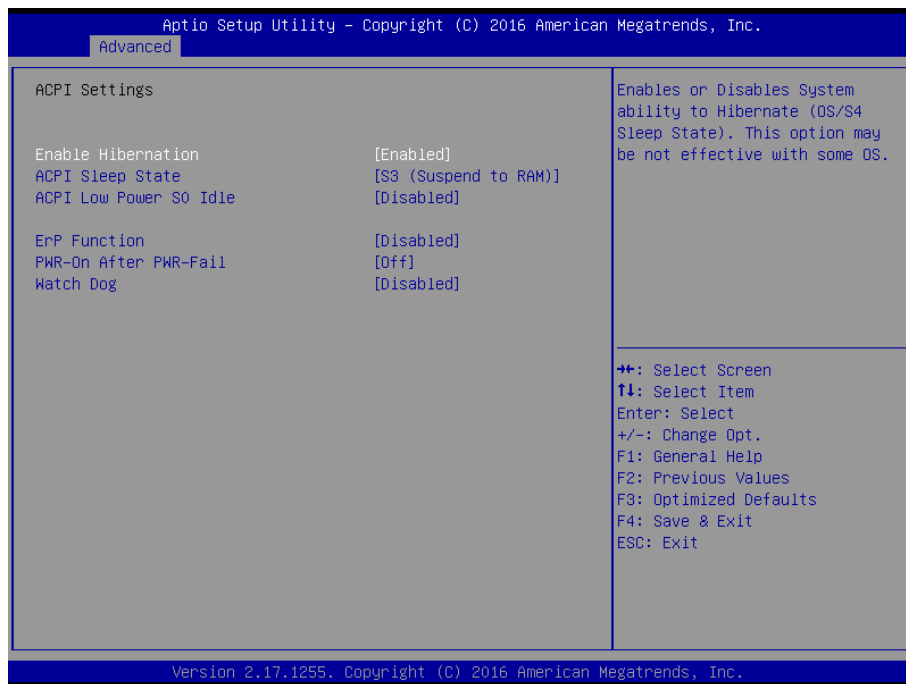


3.6.2.1 Trusted Computing



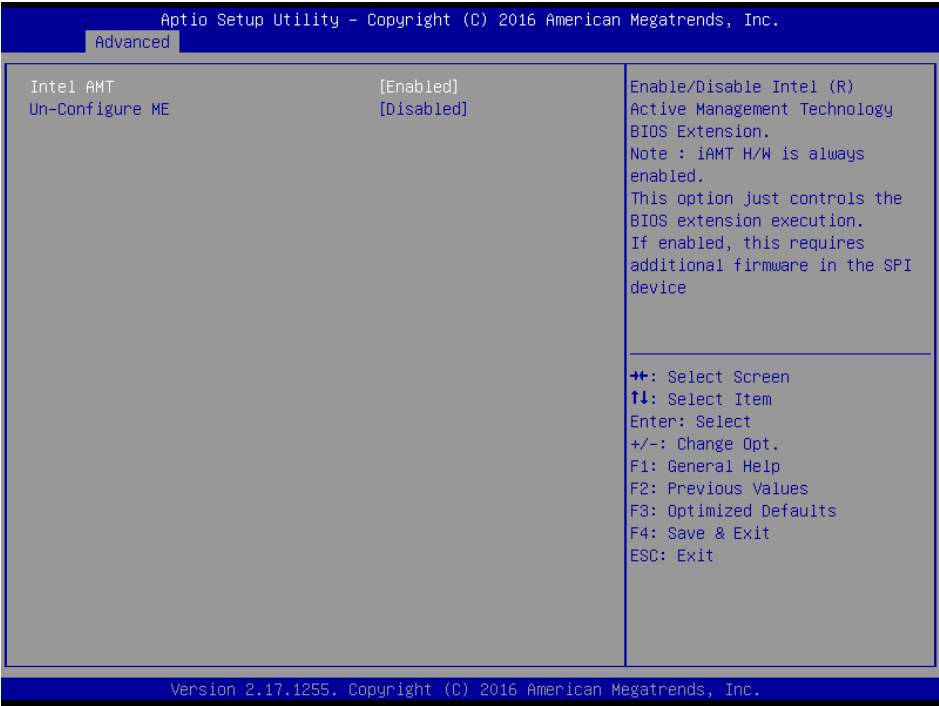
Item	Options	Description
Security Device Support	Disable, Enable[Default]	Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
SHA-1 PCR Bank	Disabled Enabled[Default],	Enables or Disables SHA-1 PCR Bank.
SHA256 PCR Bank	Disabled[Default] Enabled,	Enables or Disables SHA256 PCR Bank.
Pending operation	None[Default], TPM Clear	Schedule an Operation for the Security Device. NOTE: Your Computer will reboot during restart in order to change State of Security Device.
Platform Hierarchy	Disabled Enabled[Default],	Enable or Disable Platform Hierarchy.
Storage Hierarchy	Disabled Enabled[Default],	Enable or Disable Storage Hierarchy.
Endorsement Hierarchy	Disabled Enabled[Default],	Enable or Disable Endorsement Hierarchy.
TPM2.0 UEFI Spec Version	1.0[Default], 1.x	Select the TCG2 Spec Version Support. 1.0: the Compatible mode for Win8/Win10, 1.x: For TCG2 newer spec for Win10.

3.6.2.2 APCI Settings



Item	Options	Description
Enable Hibernation	Disabled Enabled[Default],	Enables or Disables System ability to Hibernates (OS/S4 Sleep State). This option may be not effective with some OS.
ACPI Sleep State	Suspend Disabled, S3 (Suspend to RAM) [Default]	Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.
ACPI Low Power S0 Id1e	Disabled[Default], Enabled	Enable or Disable ACPI Low Power S0 Id1e Support.
ErP Function	Disabled[Default], Enabled	ErP Function (Deep S5).
PWR-On After PWR-Fail	Off[Default] On Last state	AC loss resume.
Watch Dog	Disabled[Default], 30 sec 40 sec 50 sec 1 min 2 min 10 min 30 min	Select WatchDog.

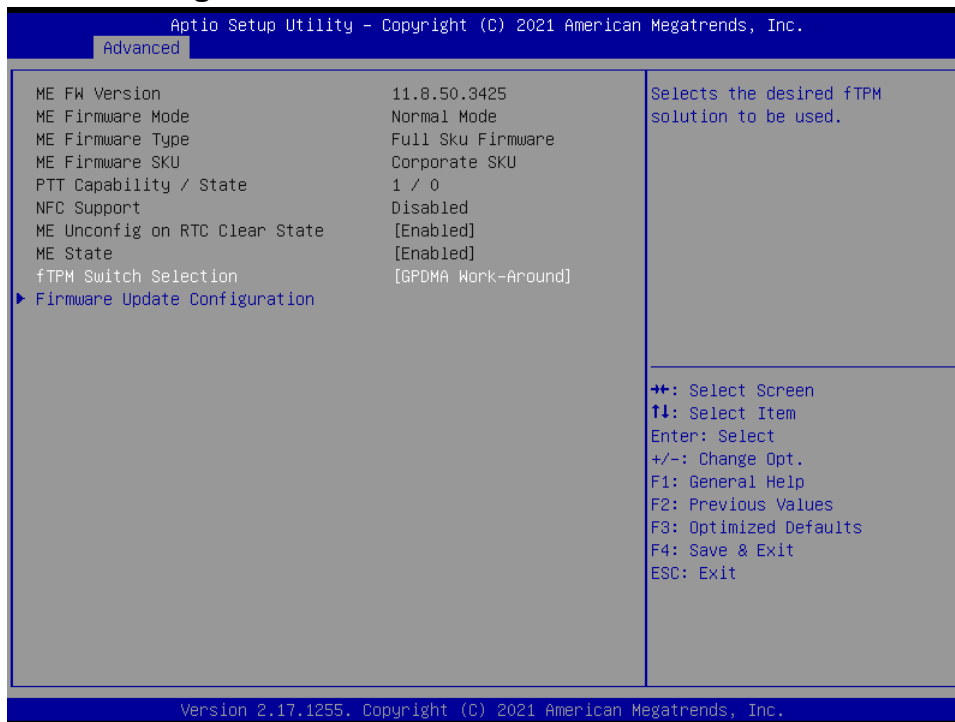
3.6.2.3 AMT Configuration



Item	Options	Description
Intel AMT	Disabled Enabled [Default] ,	Enable/Disable Intel® Active Management Technology BIOS Extension. Note: iAMT H/W is always enabled. This option just controls the BIOS extension execution. If enabled, this requires additional firmware in the SPI device.
Un-Configure ME	Disabled [Default] Enabled,	OEMFlag Bit 15: Un-Configure ME without password.

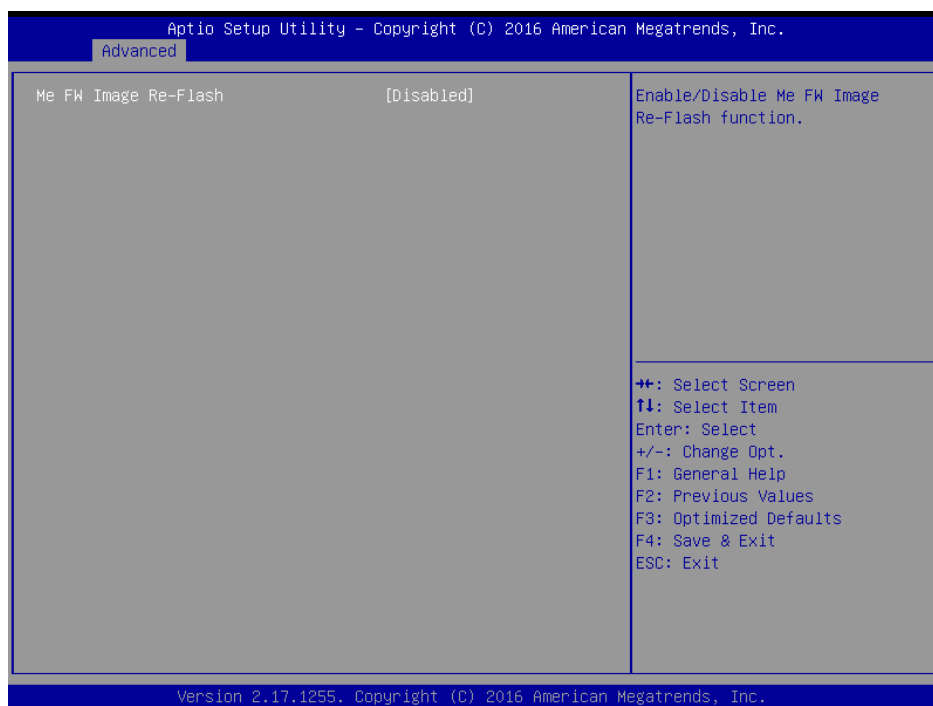
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3.6.2.4 PCH-FW Configuration



Item	Options	Description
fTPM Switch Selection	GPDMA Work-Around[Default], MSFT QFE Solution	Select the desired fTPM solution to be used.

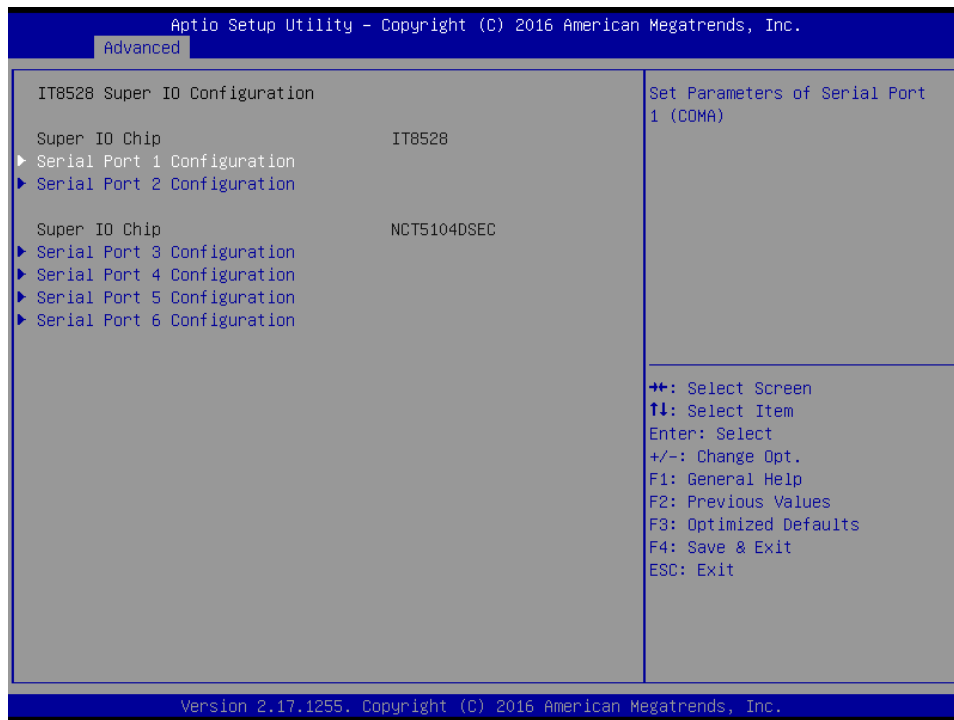
3.6.2.4.1 Firmware Update Configuration



Item	Option	Description
ME FW Image Re-Flash	Disabled [Default], Enabled	Enable/Disable Me FW Image Re-Flash function.

3.6.2.5 IT8528 Super IO Configuration

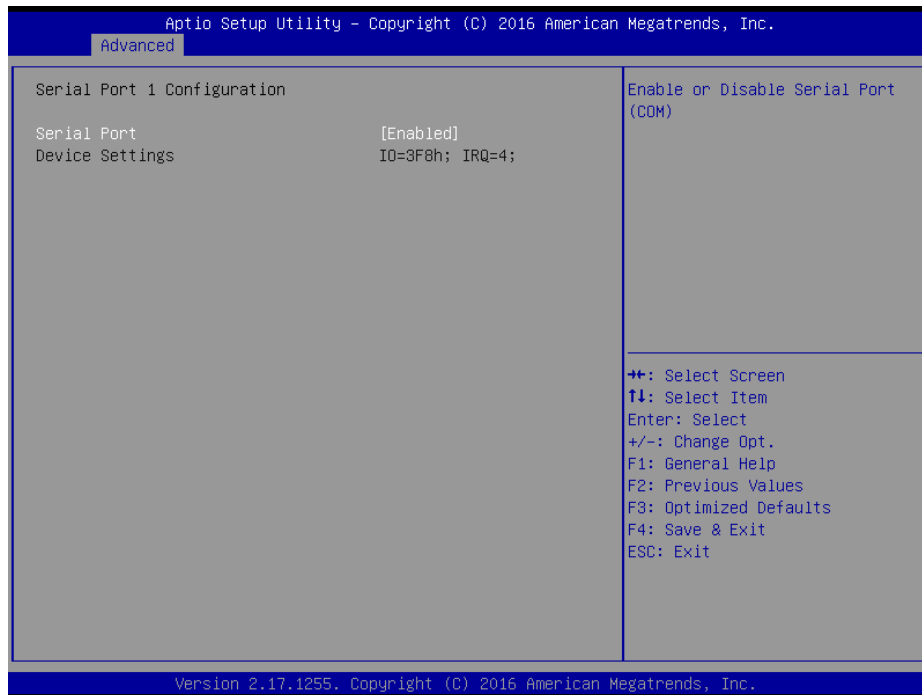
You can use this item to set up or change the IT8528 Super IO configuration for serial ports. Please refer to 3.6.2.5.1~ 3.6.2.5.6 for more information.



Item	Description
Serial Port 1 Configuration	Set Parameters of Serial Port 1 (COMA).
Serial Port 2 Configuration	Set Parameters of Serial Port 2 (COMB).
Serial Port 3 Configuration	Set Parameters of Serial Port 3 (COMC).
Serial Port 4 Configuration	Set Parameters of Serial Port 4 (COMD).
Serial Port 5 Configuration	Set Parameters of Serial Port 5 (COME).
Serial Port 6 Configuration	Set Parameters of Serial Port 6 (COMF).

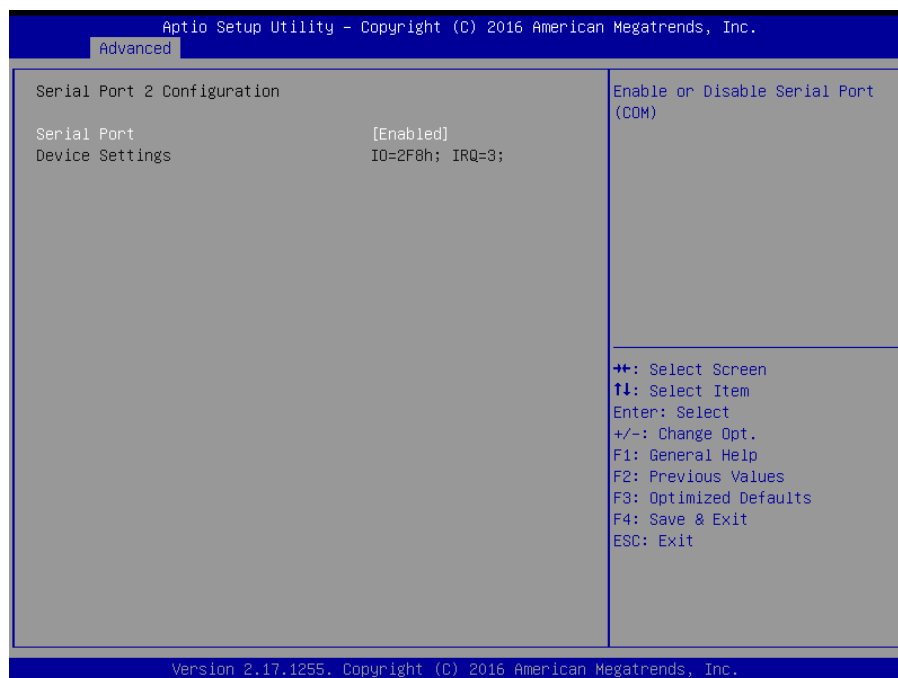
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3.6.2.5.1 Serial Port 1 Configuration



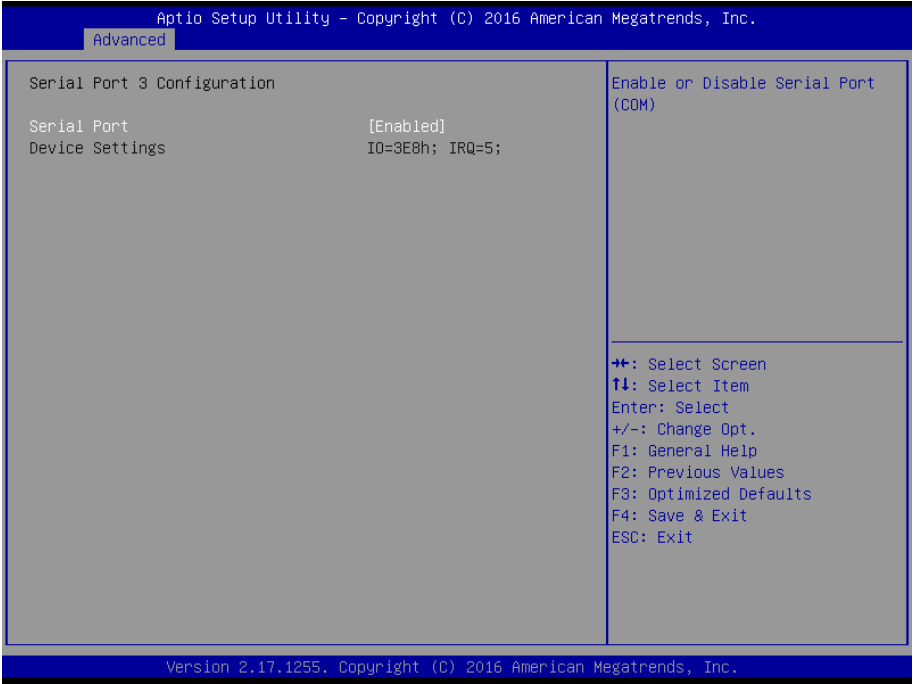
Item	Option	Description
Serial Port	Enabled[Default], Disabled	Enable or Disable Serial Port (COM).

3.6.2.5.2 Serial Port 2 Configuration



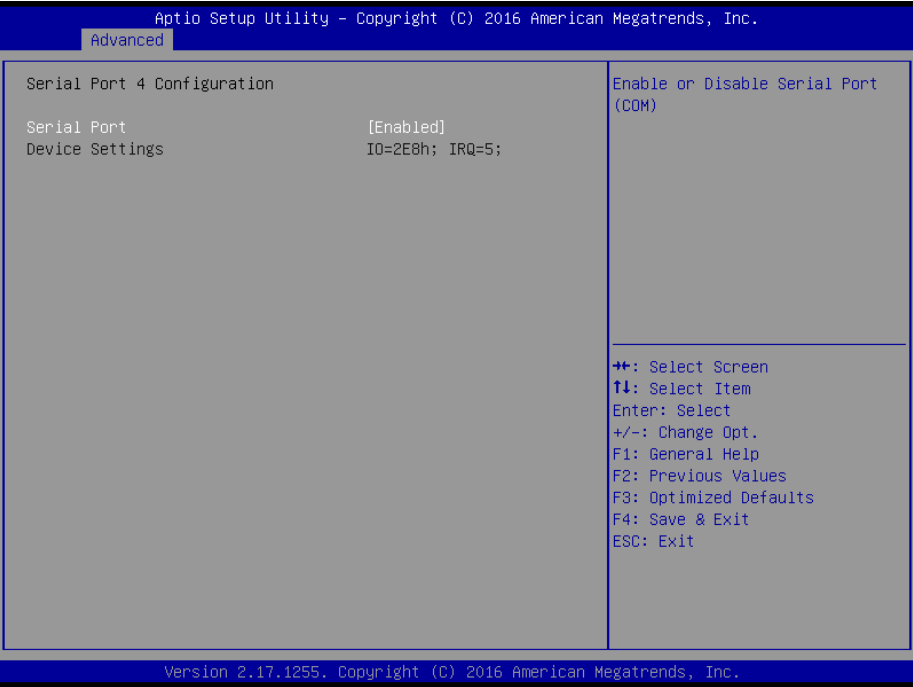
Item	Option	Description
Serial Port	Enabled[Default], Disabled	Enable or Disable Serial Port (COM).

3.6.2.5.3 Serial Port 3 Configuration



Item	Option	Description
Serial Port	Enabled[Default], Disabled	Enable or Disable Serial Port (COM).

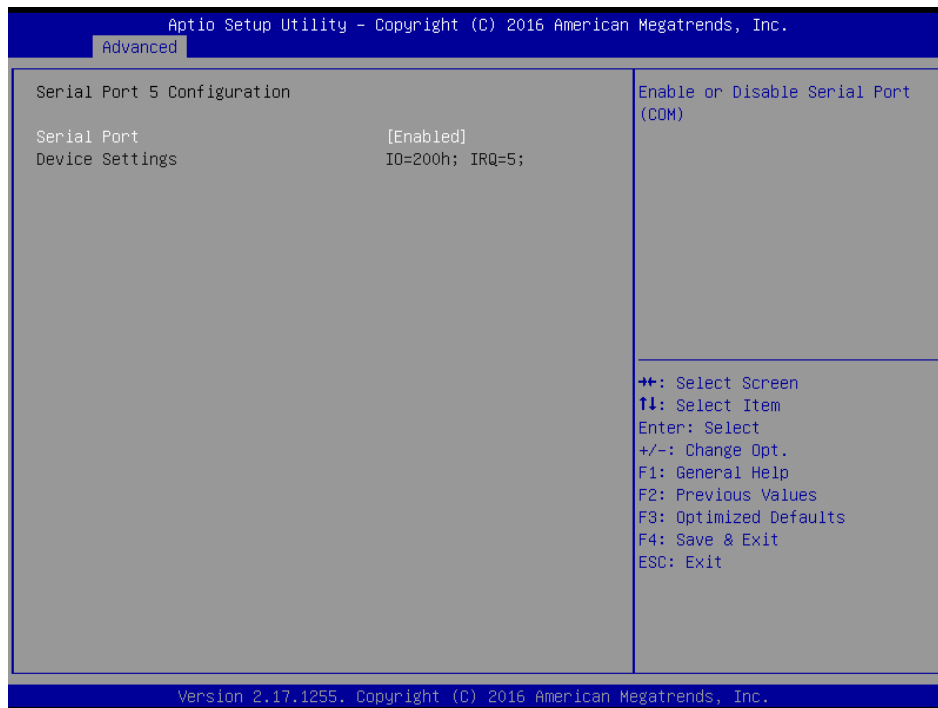
3.6.2.5.4 Serial Port 4 Configuration



Item	Option	Description
Serial Port	Enabled[Default], Disabled	Enable or Disable Serial Port (COM).

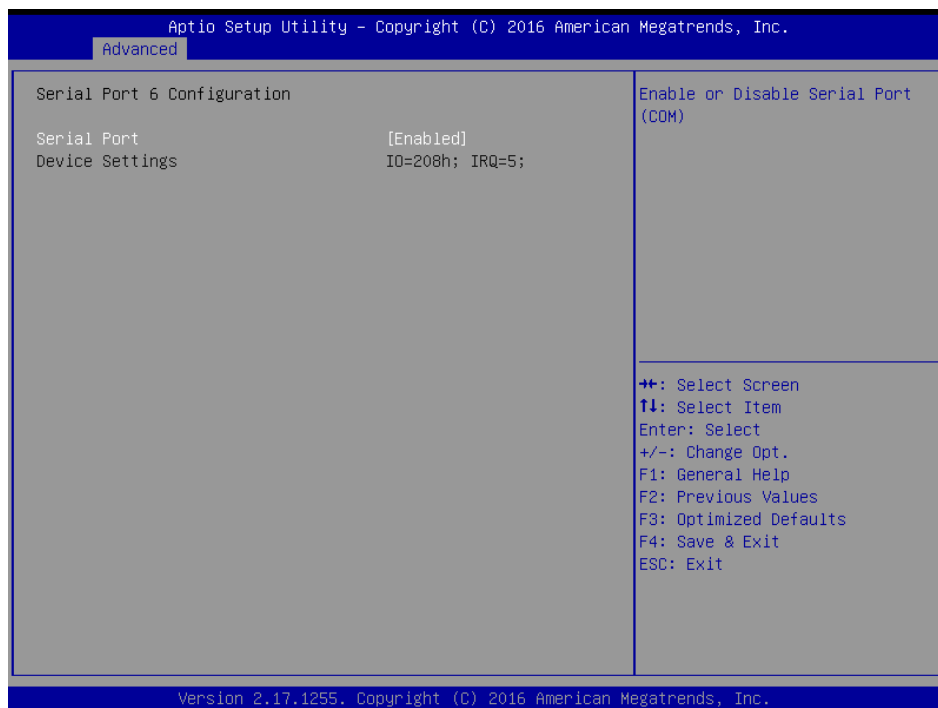
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3.6.2.5.5 Serial Port 5 Configuration



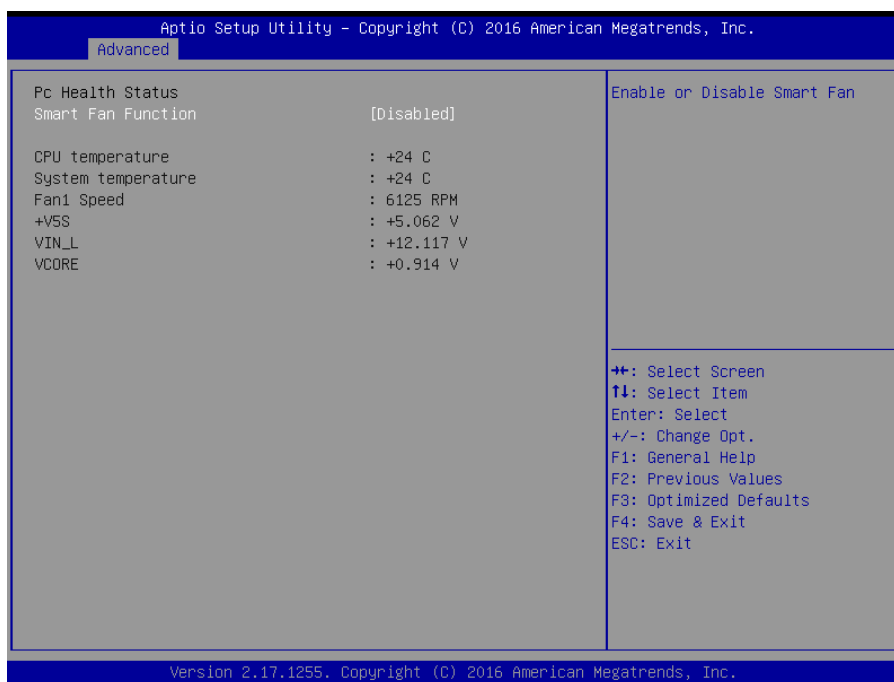
Item	Option	Description
Serial Port	Enabled[Default], Disabled	Enable or Disable Serial Port (COM).

3.6.2.5.6 Serial Port 6 Configuration



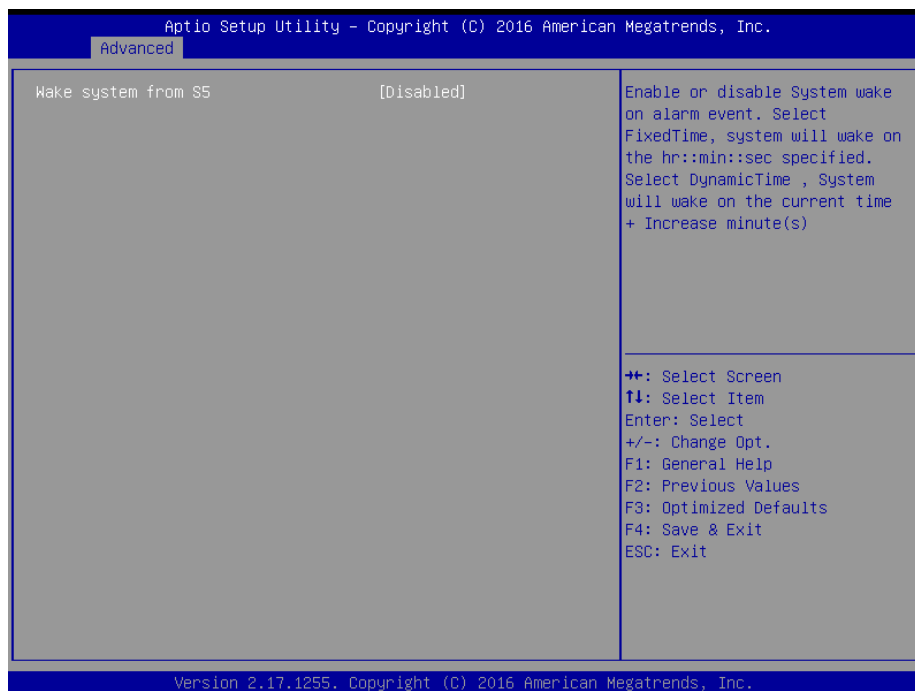
Item	Option	Description
Serial Port	Enabled[Default], Disabled	Enable or Disable Serial Port (COM).

3.6.2.6 H/W Monitor



Item	Options	Description
Smart Fan Function	Enabled, Disabled[Default]	Enables or Disables Smart Fan.

3.6.2.7 S5 RTC Wake Settings

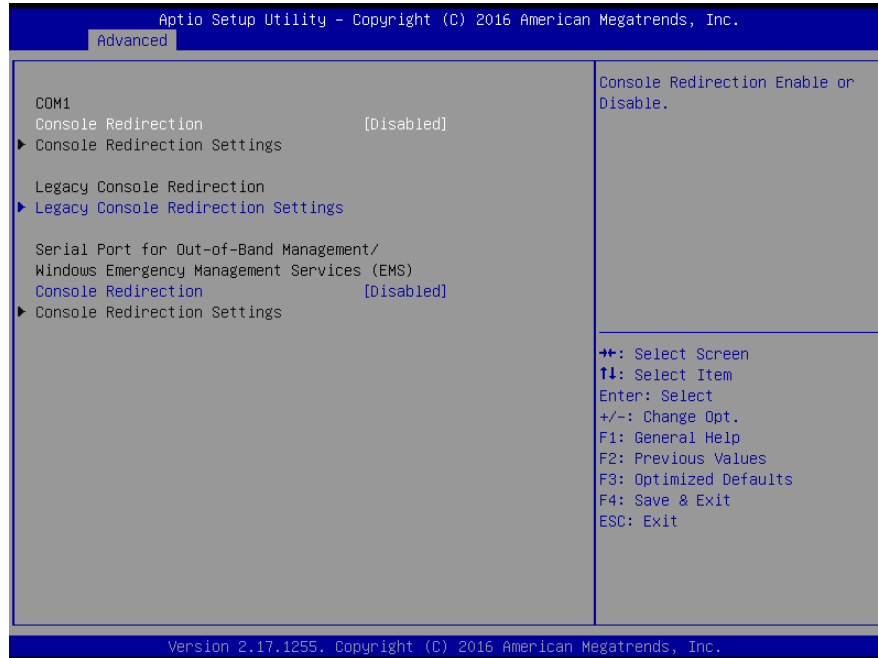


Item	Options	Description
Wake system from S5	Disabled[Default],	Enable or disable System wake on alarm

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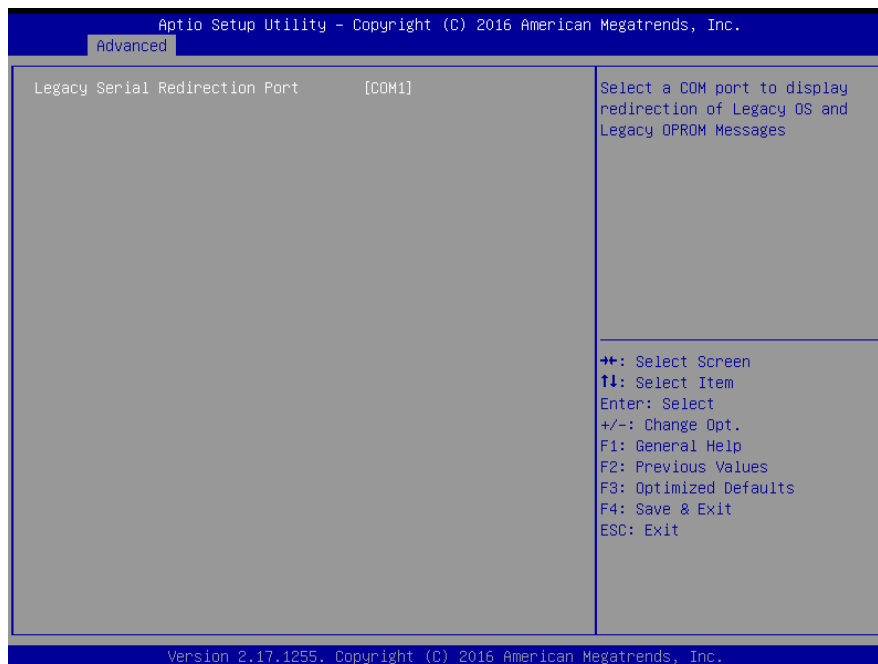
	Fixed Time Dynamic Time	event. Select Fixed Time, system will wake on the hr::min::sec specified. Select Dynamic Time, System will wake on the current time + Increase minute(s).
--	----------------------------	---

3.6.2.8 Serial Port Console Redirection



Item	Options	Description
Console Redirection	Disabled[Default], Enabled	Console Redirection Enable or Disable.

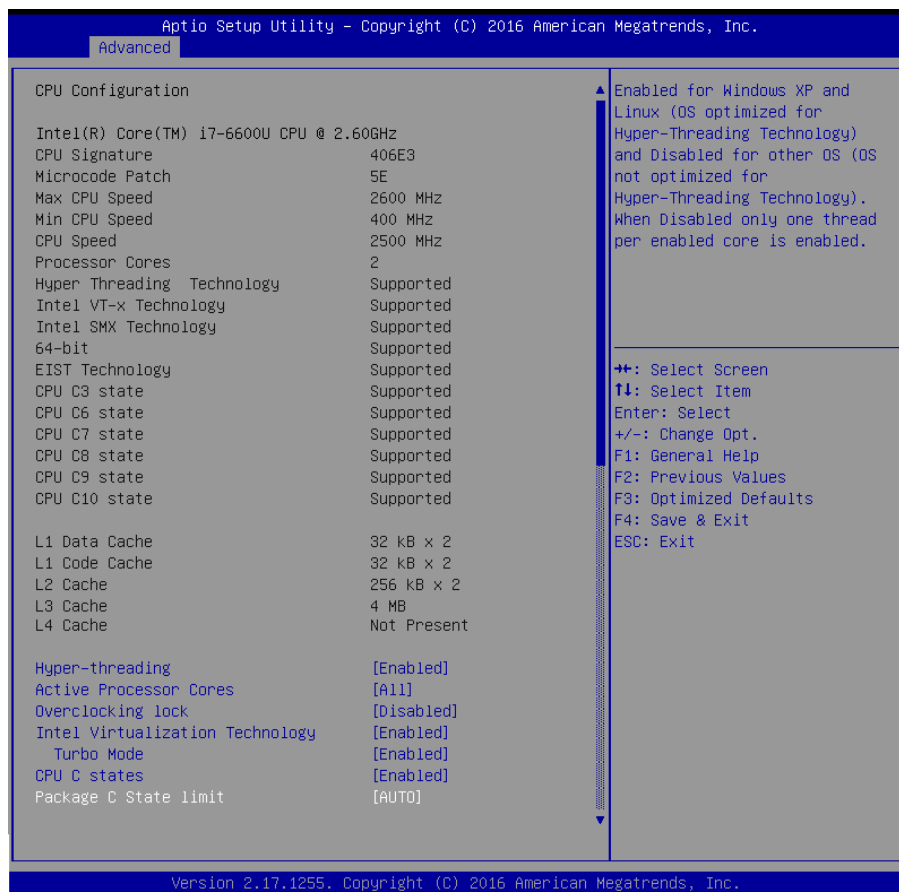
3.6.2.8.1 Legacy Console Redirection Settings



Item	Option	Description
Legacy Serial Redirection	COM1[Default],	Select a COM port to display redirection of Legacy OS and Legacy OPROM Messages.

3.6.2.9 CPU Configuration

Use the CPU configuration menu to view detailed CPU specification and configure the CPU.

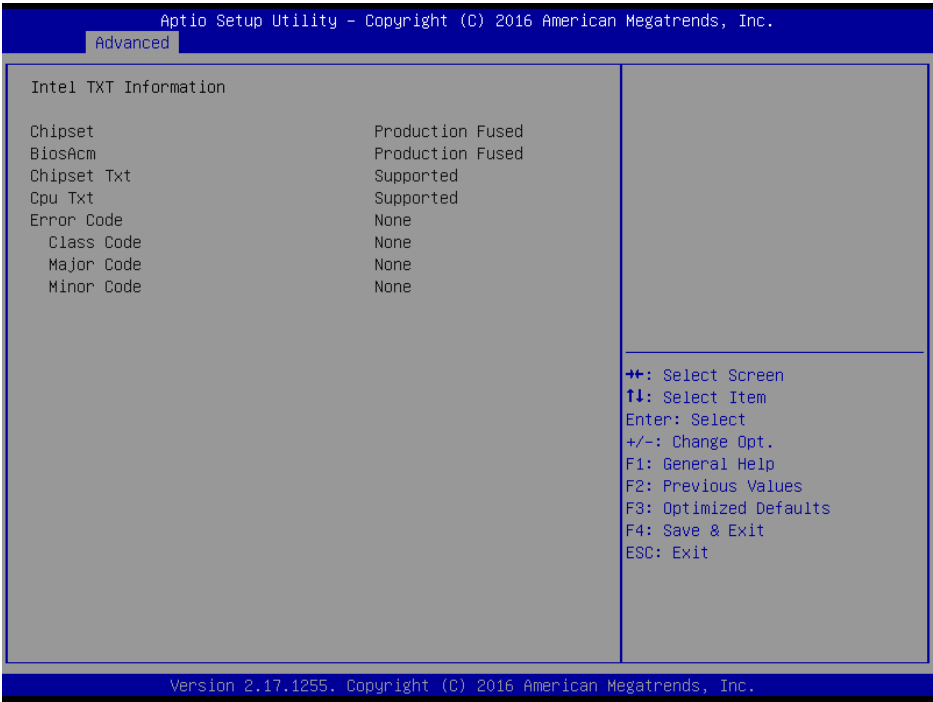


Item	Options	Description
Hyper-threading	Disabled, Enabled[Default]	When Hyper-threading is enabled, 2 logical CPUS per core is present.
Active Processor Cores	All[Default] 1 2 3	Number of cores to enable in each processor package.
Overclocking lock	Disabled[Default], Enabled	FLEX_RATIO (194) MSR.
Intel Virtualization Technology	Disabled Enabled[Default]	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
Turbo Mode	Disabled Enabled[Default]	Turbo Mode.
CPU C states	Disabled Enabled[Default]	Enable or disable CPU C state.

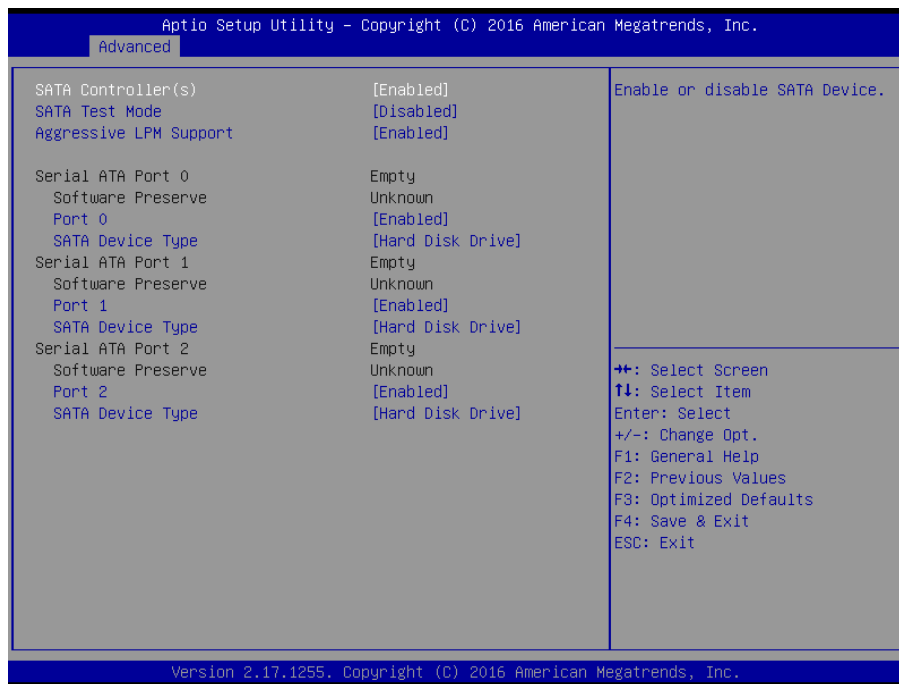
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Package C State limit	C0/C1	Package C State limit.
	C2	
	C3	
	C6	
	C7	
	C7s	
	C8	
	C9	
	C10	
	Auto[Default]	

3.6.2.10 Intel TXT Configuration



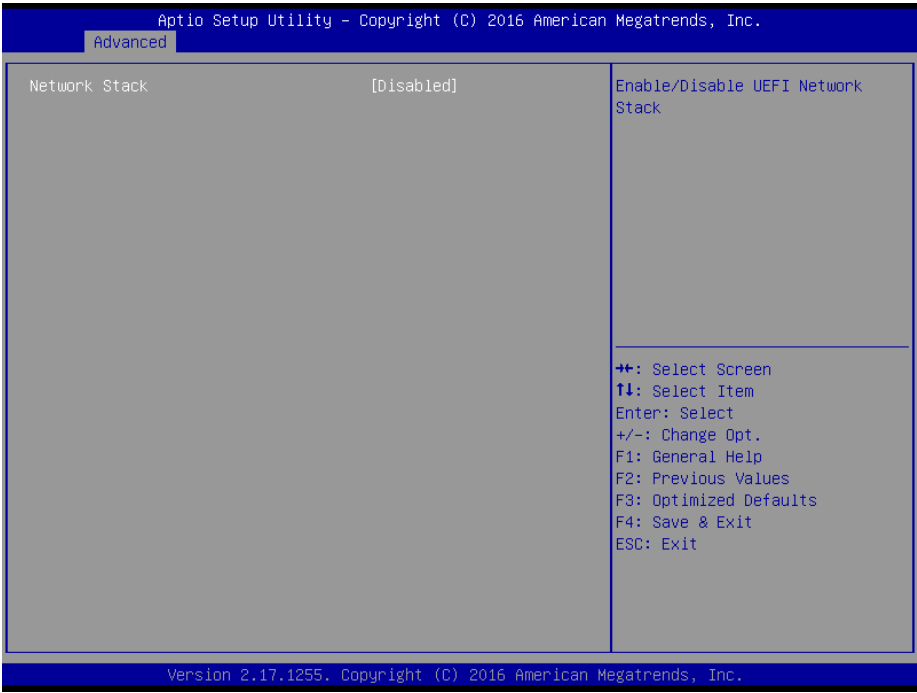
3.6.2.11 SATA Configuration



Item	Options	Description
SATA Controller(s)	Enabled[Default] Disabled,	Enable or disable SATA Device.
SATA Test Mode	Enabled Disabled[Default],	Test Mode Enable/Disable (Loop Back).
Aggressive LPM Support	Enabled[Default] Disabled	Enable PCH to aggressively enter link power state.
Port 0/1/2	Enabled[Default] Disabled,	Enable or Disable SATA Port.
SATA Device Type	Hard Disk Drive [Default] Solid State Drive	Identify the SATA port is connected to Solid State Drive or Hard Disk Drive.

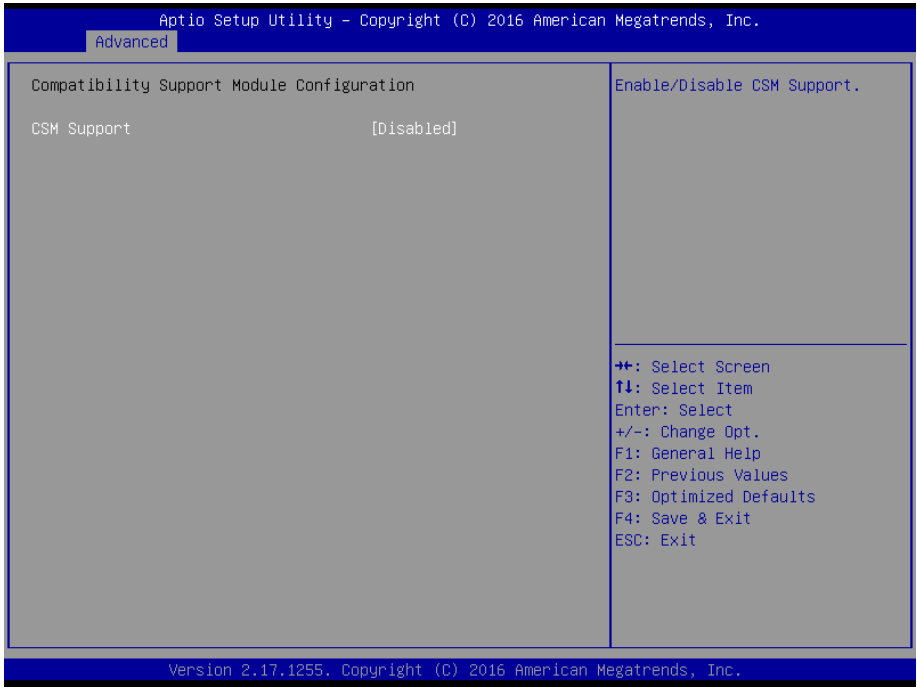
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3.6.2.12 Network Stack Configuration



Item	Options	Description
Network Stack	Enabled Disabled [Default]	Enable/Disable UEFI Network Stack.

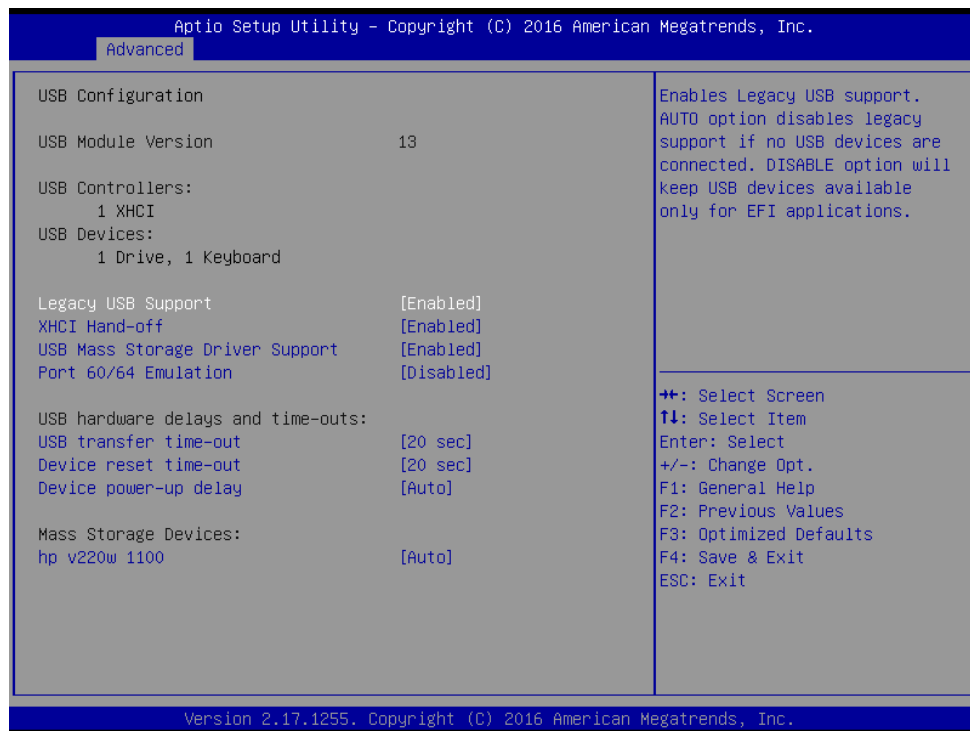
3.6.2.13 CSM Configuration



Item	Options	Description
CSM Support	Enabled Disabled [Default]	Enable/Disable CSM Support.

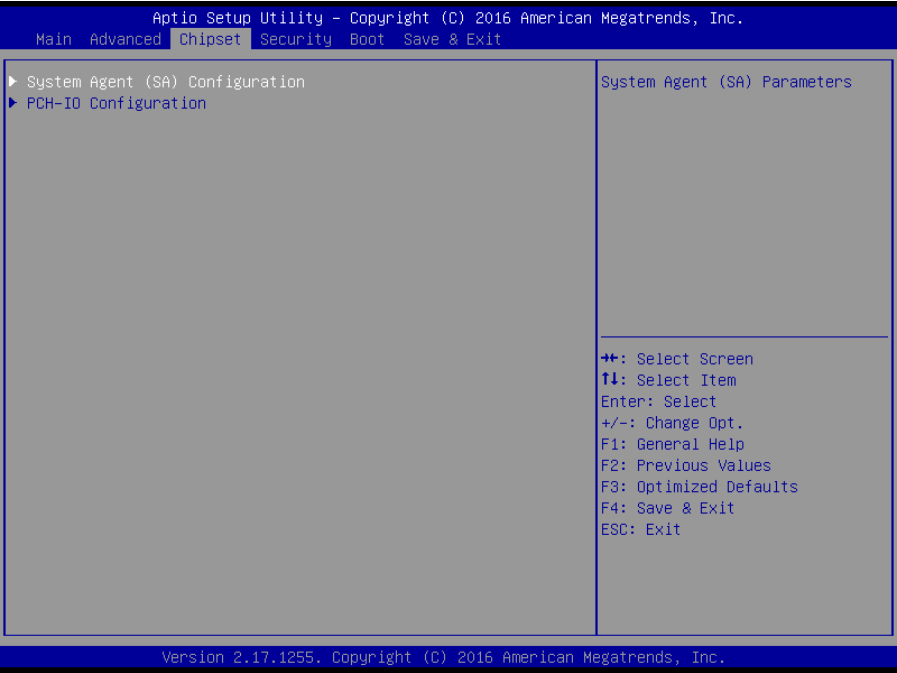
3.6.2.14 USB Configuration

The USB Configuration menu helps read USB information and configures USB settings.



Item	Options	Description
Legacy USB Support	Enabled[Default] Disabled Auto	Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.
XHCI Hand-off	Enabled[Default] Disabled	This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
USB Mass Storage Driver Support	Enabled[Default] Disabled	Enable/Disable USB Mass Storage Driver Support.
Port 60/64 Emulation	Enabled Disabled[Default]	Enable I/O port 60h/64h emulation support. This should be enabled for the complete USB keyboard legacy support for non-USB aware OSes.
USB transfer time-out	1 sec 5 sec 10 sec 20 sec[Default]	The time-out value for Control, Bulk, and Interrupt transfers.
Device reset time-out	10 sec 20 sec[Default] 30 sec 40 sec	USB mass storage device Start Unit command time-out.
Device power-up delay	Auto[Default] Manual	Maximum time the device will take before it properly reports itself to the Host Controller. 'Auto' uses default value: for a Root port it is 100ms, for a Hub port the delay is taken from Hub descriptor.

3.6.3 Chipset

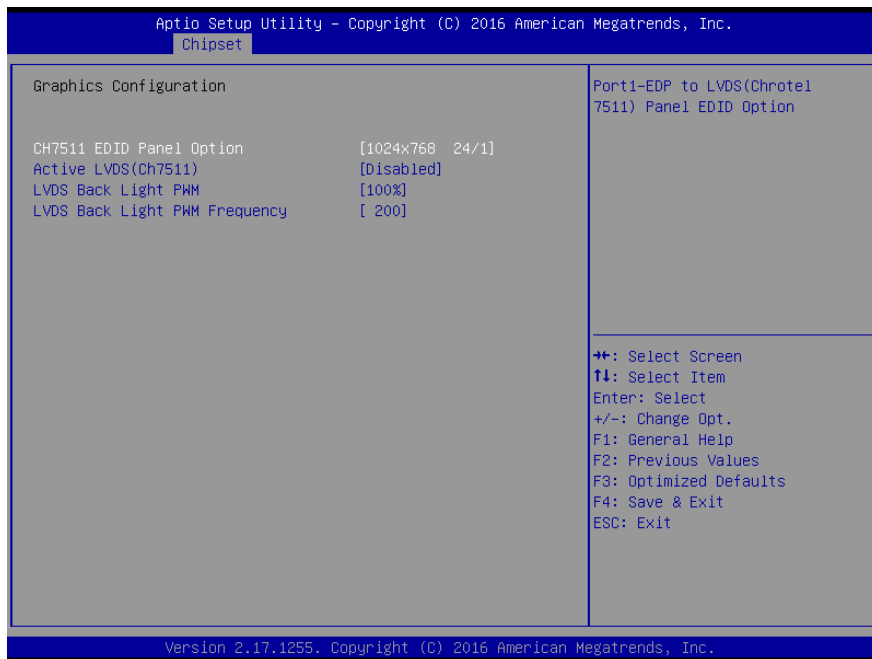


3.6.3.1 System Agent (SA) Configuration



Item	Option	Description
VT-d	Enabled[Default] Disabled	VT-d capability.

3.6.3.1.1 Graphics Configuration

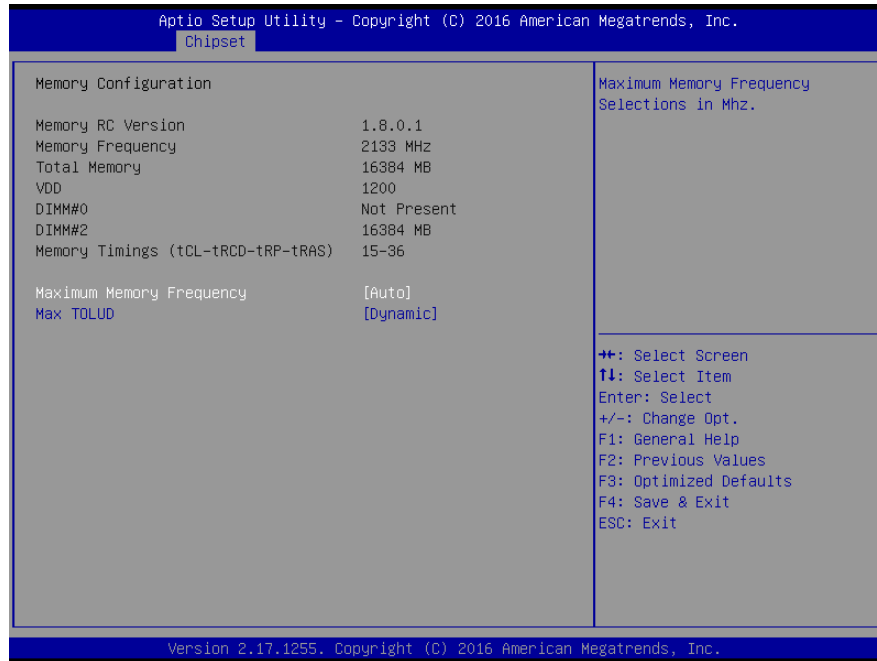


Item	Option	Description
CH7511 EDID Panel Option	1024x768 24/1[Default] 800x600 18/1 1024x768 18/1 1366x768 18/1 1024x600 18/1 1280x800 18/1 1920x1200 24/2 1920x1080 18/2 1280x1024 24/2 1440x900 18/2 1600x1200 24/2 1366x768 24/1 1920x1080 24/2 1680x1050 24/2	Port1-EDP to LVDS (Chrotel 7511) Panel EDID Option.
Active LVDS (CH7511)	Enabled[Default] Disabled	Active Internal LVDS (eDP->Ch7511-to-LVDS).
LVDS Back Light PWM	00% 25% 50% 75% 100%[Default]	Select LVDS back light PWM duty.
LVDS Back Light PWM Frequency	200[Default] 300 400 500 700 1k 2k	Select LVDS back light PWM Frequency.

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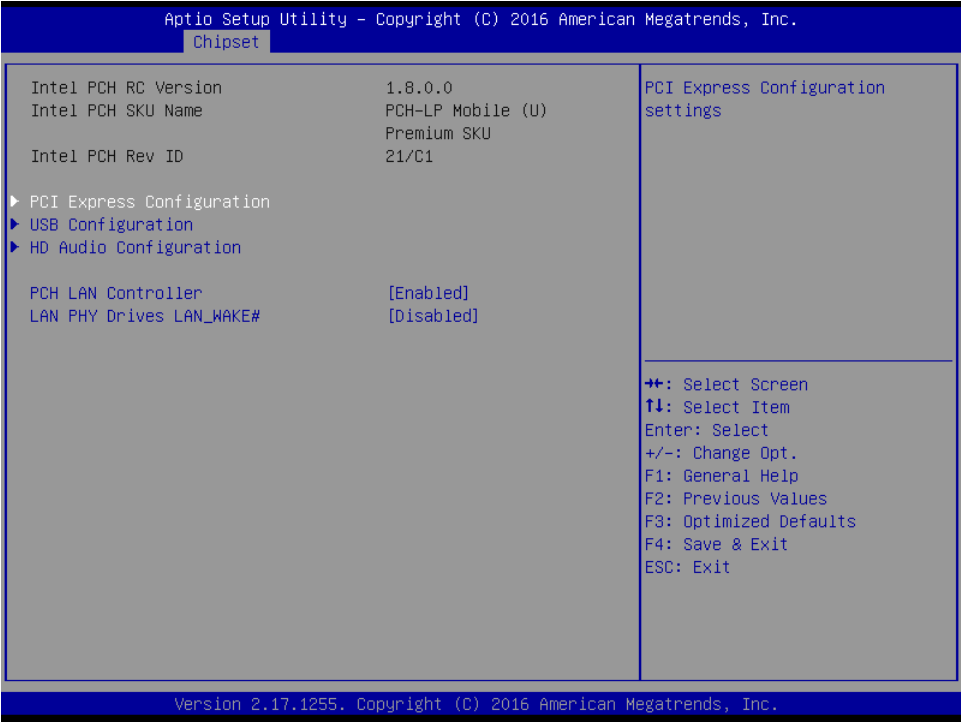
	3k	
	5k	
	10k	
	20k	

3.6.3.1.2 Memory Configuration



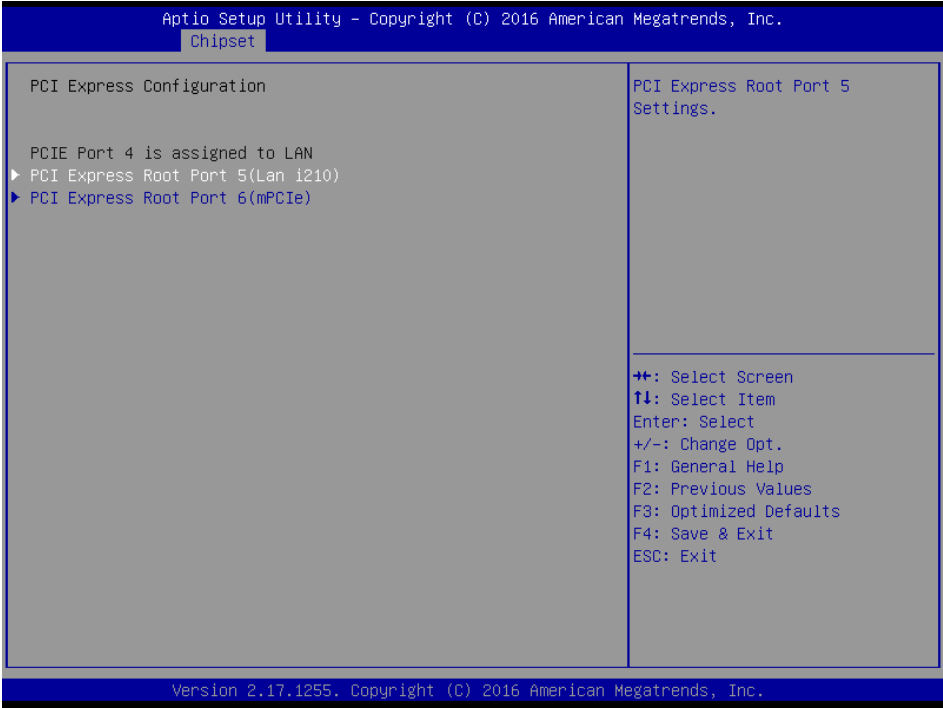
Item	Option	Description
Maximum Memory Frequency	Auto[Default] 1067/1200/1333/1400/1600 /1800/1867/2000/2133/2200 /2400/2600/2667/2800/2933 /3000/3200	Maximum Memory Frequency Selections in Mhz.
Max TOLUD	Dynamic[Default] 1GB/1.25GB/1.5GB/1.75GB /2GB/2.25GB/2.5GB/2.75GB /3GB/3.25GB/3.5GB	Maximum Value of TOLUD. Dynamic assignment would adjust TOLUD automatically based on largest MMIO length of installed graphic controller.

3.6.3.2 PCH-IO Configuration

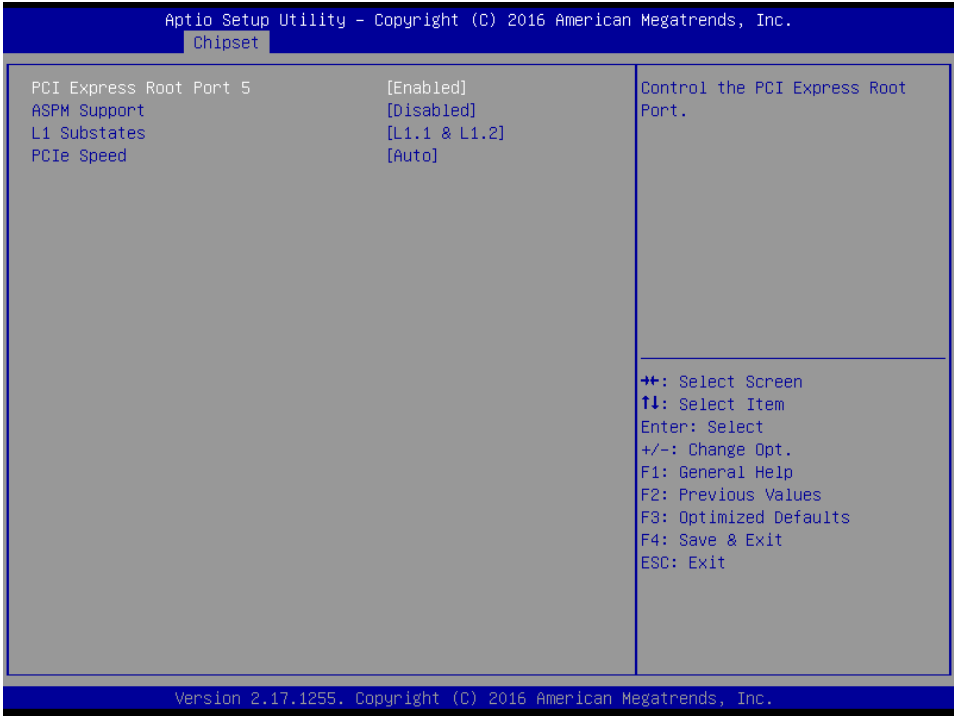


Item	Option	Description
PCH LAN Controller	Disabled Enabled[Default]	Enable or disable onboard NIC.
LAN PHY Drives LAN_WAKE#	Disabled[Default] Enabled	Enable/Disable LAN Phy driving LAN_WAKE# else platform drives LAN_WAKE#.

3.6.3.2.1 PCI Express Configuration

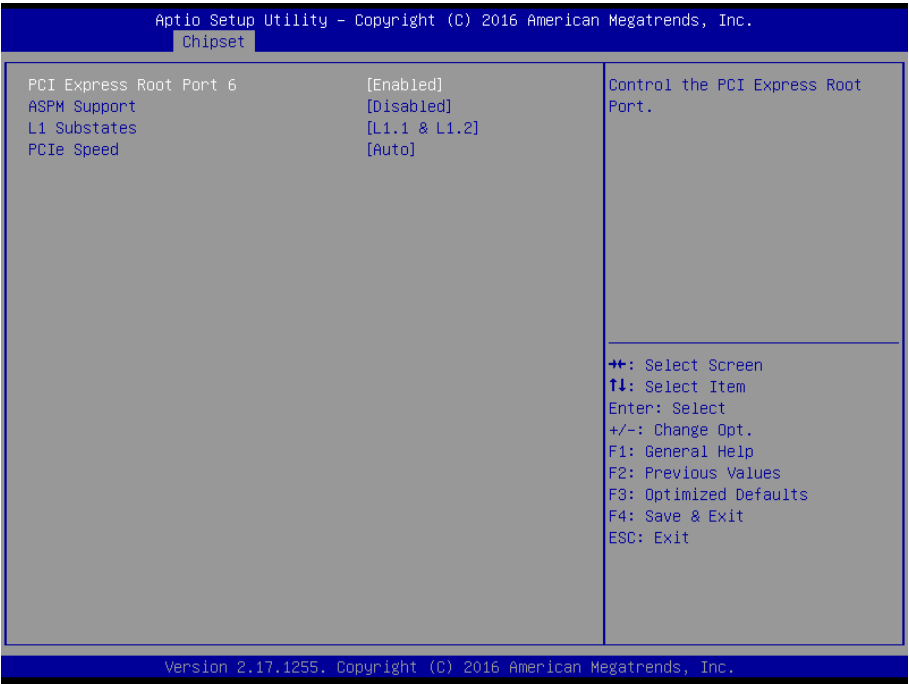


3.6.3.2.1.1 PCI Express Root Port5 (Lan i210)



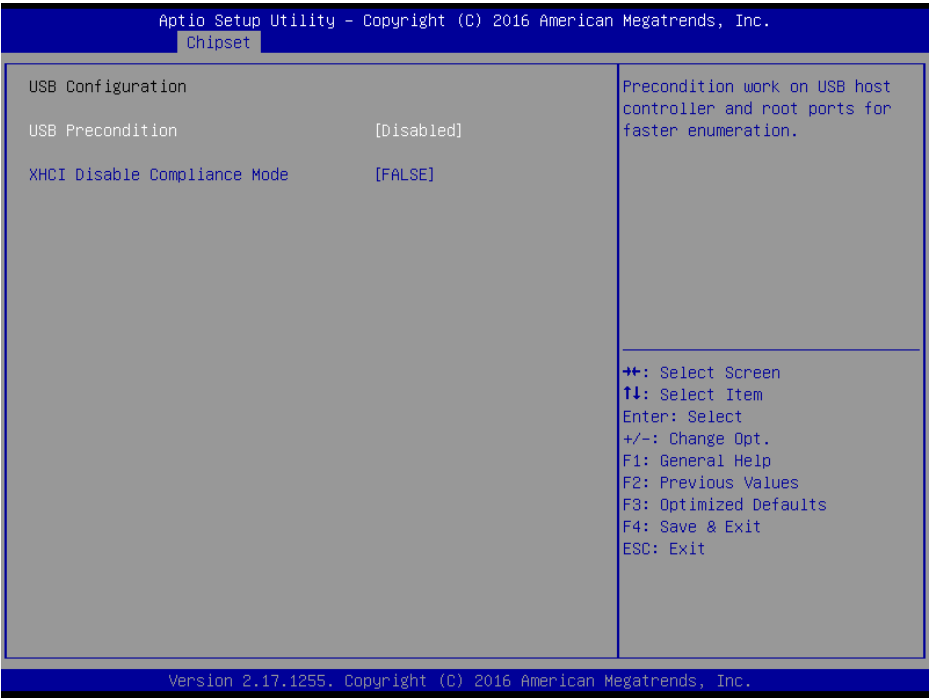
Item	Option	Description
PCI Express Root Port 5	Enabled [Default] , Disabled	Control the PCI Express Root Port.
ASPM Support	Disabled [Default] , L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM.
L1 Substates	Disabled L1.1 L1.2 L1.1 & L1.2 [Default] ,	PCI Express L1 Substates settings.
PCIe Speed	Auto [Default] Gen1 Gen2 Gen3	Select PCI Express port speed.

3.6.3.2.1.2 PCI Express Root Port6 (mPCIe)



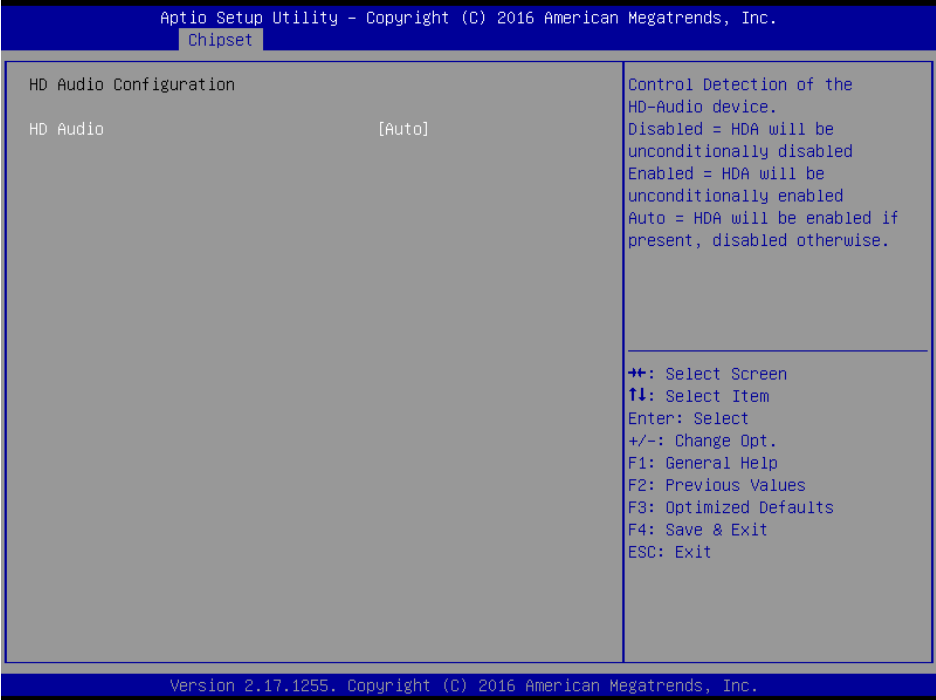
Item	Option	Description
PCI Express Root Port 6	Enabled [Default] , Disabled	Control the PCI Express Root Port.
ASPM Support	Disabled [Default] , L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM.
L1 Substates	Disabled L1.1 L1.2 L1.1 & L1.2 [Default] ,	PCI Express L1 Substates settings.
PCIe Speed	Auto [Default] Gen1 Gen2 Gen3	Select PCI Express port speed.

3.6.3.2.2 USB Configuration



Item	Option	Description
USB Precondition	Enabled Disabled [Default] ,	Precondition work on USB host controller and root ports for faster enumeration.
XHCI Disable Compliance Mode	FALSE [Default] , TRUE	Option to disable Compliance Mode. Default is FALSE to not disable Compliance Mode. Set TRUE to disable Compliance Mode.

3.6.3.2.3 HD Audio Configuration



Item	Option	Description
HD Audio	Disabled Enabled Auto[Default],	Control Detection of the HD-Audio device. Disable = HDA will be unconditionally disabled Enabled = HDA will be unconditionally enabled Auto = HDA will be enabled if present, disabled otherwise.

3.6.4 Security



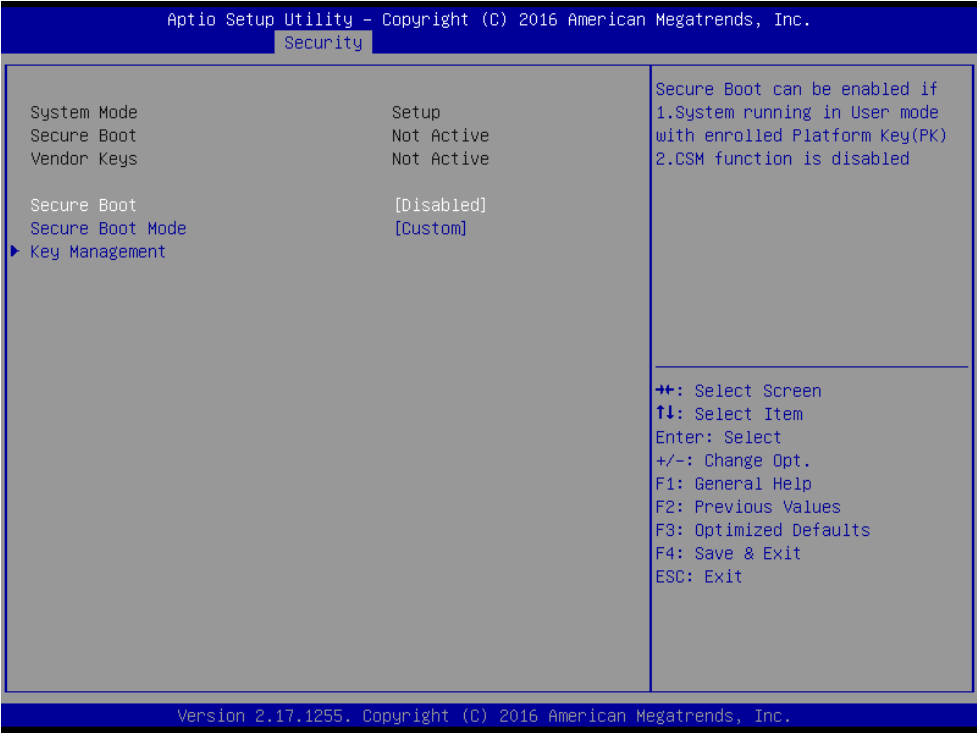
- **Administrator Password**

Set setup Administrator Password

- **User Password**

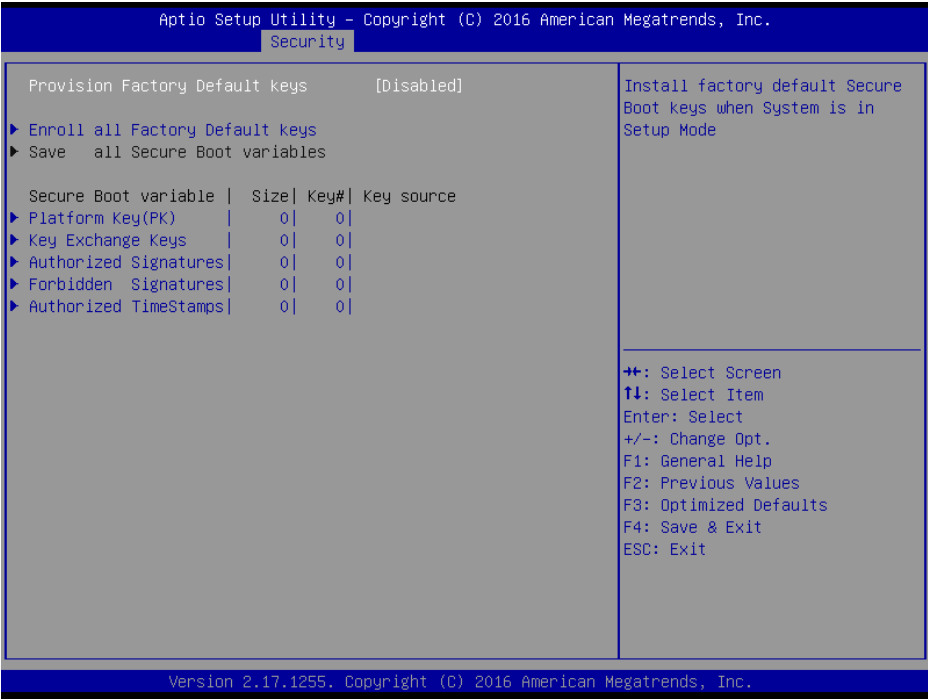
Set User Password

3.6.4.1 Secure Boot menu



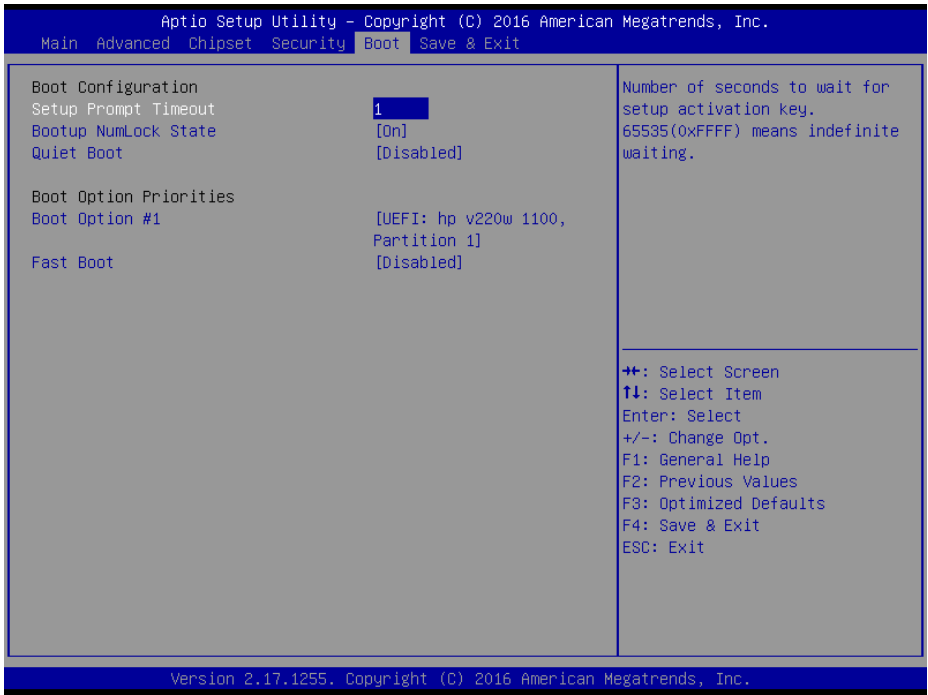
Item	Option	Description
Secure Boot	Disabled[Default] Enabled	Secure Boot can be enabled if 1.System running in User mode with enrolled Platform Key(PK) 2.CSM function is disabled.
Secure Boot Mode	Standard Custom[Default]	Secure Boot mode selector. 'Custom' Mode enables users to change Image Execution policy and manage Secure Boot Keys.

3.6.4.1.1 Key Management



Item	Option	Description
Provision Factory Default keys	Enabled, Disabled [Default]	Install Factory default Secure Boot Keys when System is in Setup Mode.

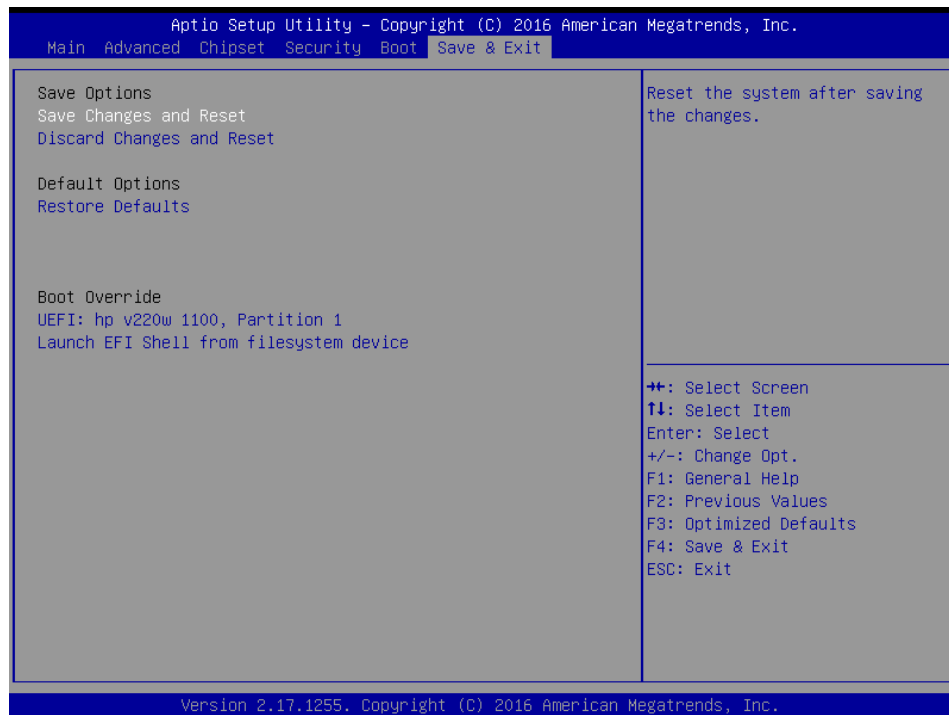
3.6.5 Boot

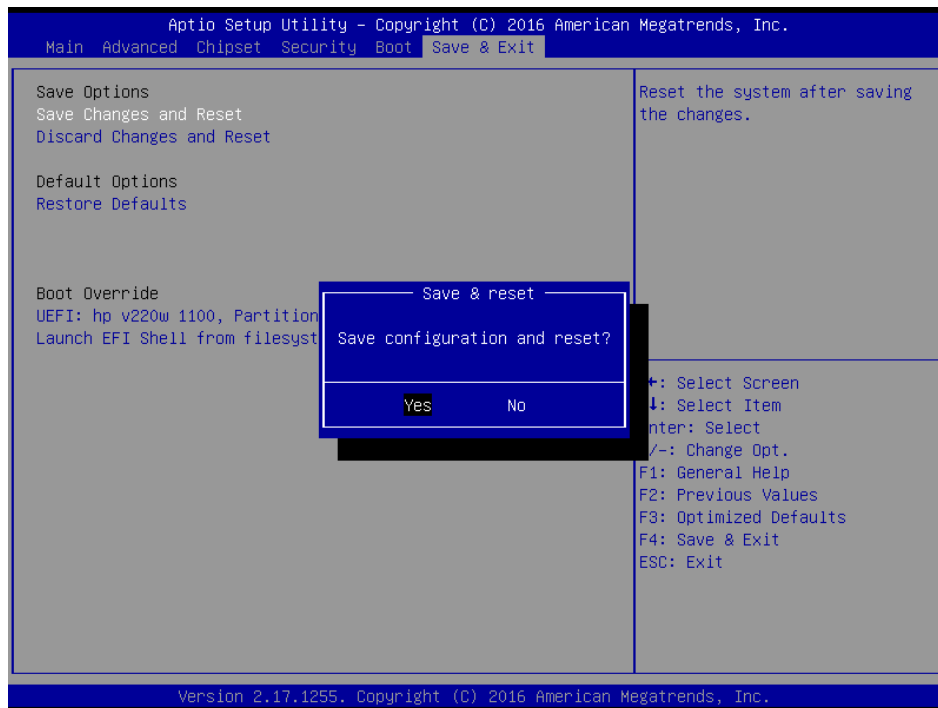


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Item	Option	Description
Setup Prompt Timeout	1~ 65535	Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.
Bootup NumLock State	On[Default] Off	Select the Keyboard NumLock state
Quiet Boot	Disabled[Default] Enabled	Enables or disables Quiet Boot option
Fast Boot	Disabled[Default] Enabled	Enables or disables boot with initialization of a minimal set of devices required to launch active boot option. Has no effect for BBS boot options.
Boot Option #1	Set the system boot order.	

3.6.6 Save and exit





3.6.6.1 *Save Changes and Reset*

Reset the system after saving the changes.

3.6.6.2 *Discard Changes and Reset*

Any changes made to BIOS settings during this session of the BIOS setup program are discarded. The setup program then exits and reboots the controller.

3.6.6.3 *Restore Defaults*

This option restores all BIOS settings to the factory default. This option is useful if the controller exhibits unpredictable behavior due to an incorrect or inappropriate BIOS setting.

3.6.6.4 *Launch EFI Shell from filesystem device*

Attempts to Launch EFI Shell application (Shellx64.efi) from one of the available filesystem devices.

4. Drivers Installation



Note: Installation procedures and screen shots in this section are for your reference and may not be exactly the same as shown on your screen.

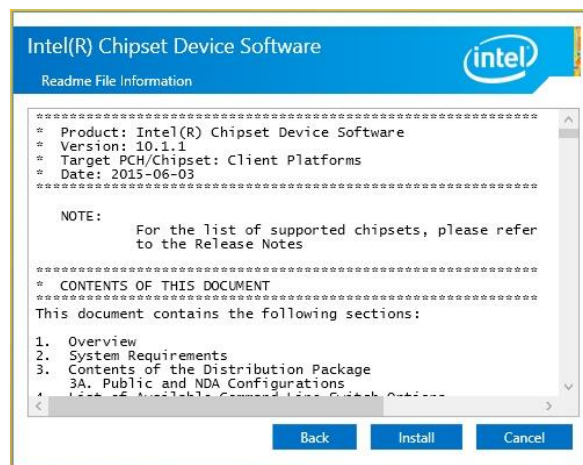
4.1 Install Chipset Driver

All drivers can be found on the Avalue Official Website:

<http://www.avalue.com.tw>.



Note: The installation procedures and screen shots in this section are based on Windows 10 operation system.



Step 3. Click Install.



Step1. Click Next.



Step 2. Click Accept.



Step 4. Setup completed.

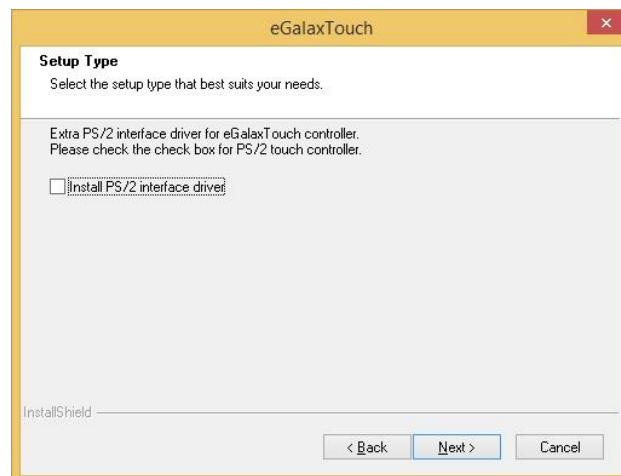
4.2 Install Touch Driver

All drivers can be found on the Avalue Official Website:

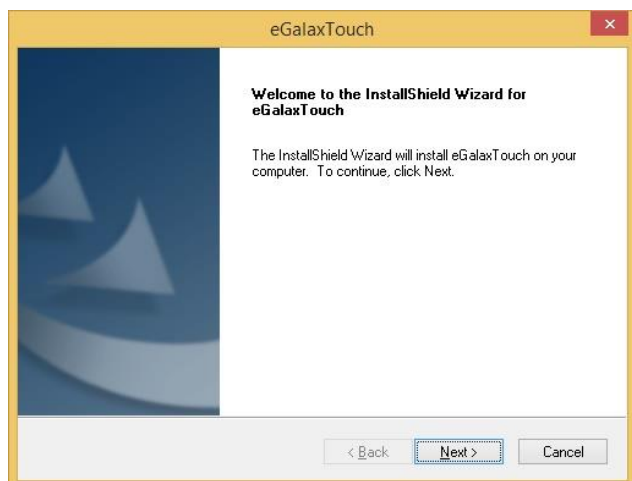
<http://www.avalue.com.tw>.



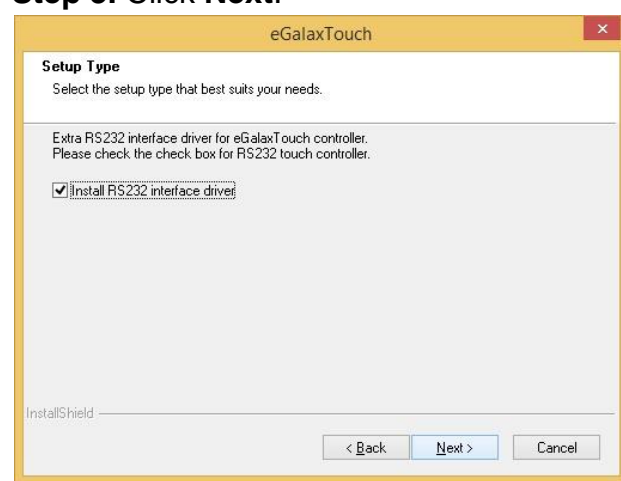
Note: The installation procedures and screen shots in this section are based on Windows 10 operation system.



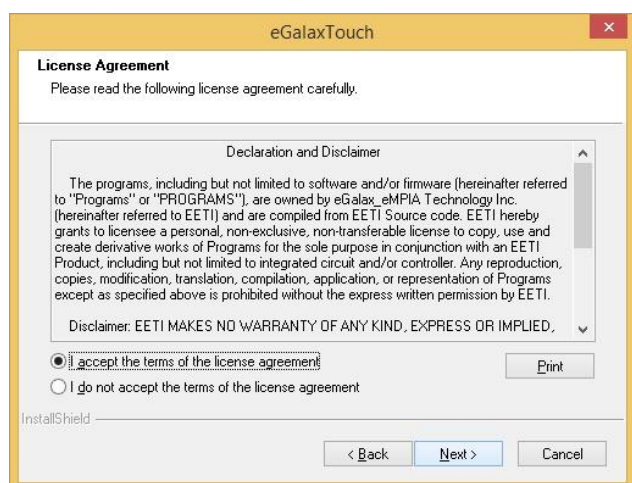
Step 3. Click Next.



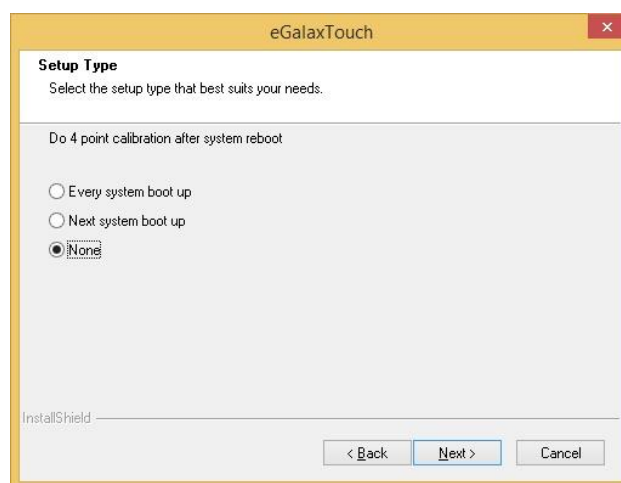
Step1. Click Next to start installation.



Step 4. Click Next.



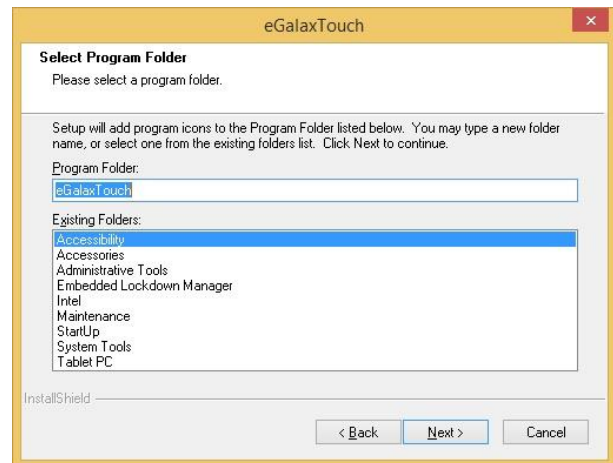
Step 2. Click Next to proceed setup.



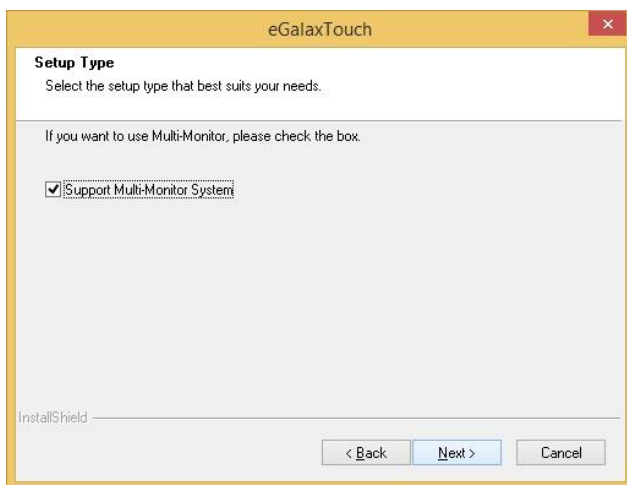
Step 5. Click Next.



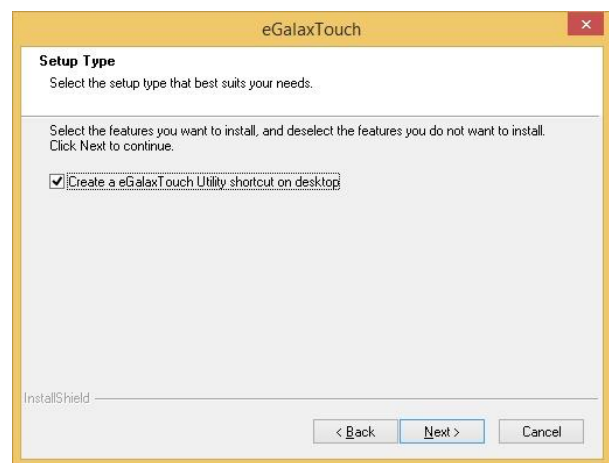
Step 6. Click OK.



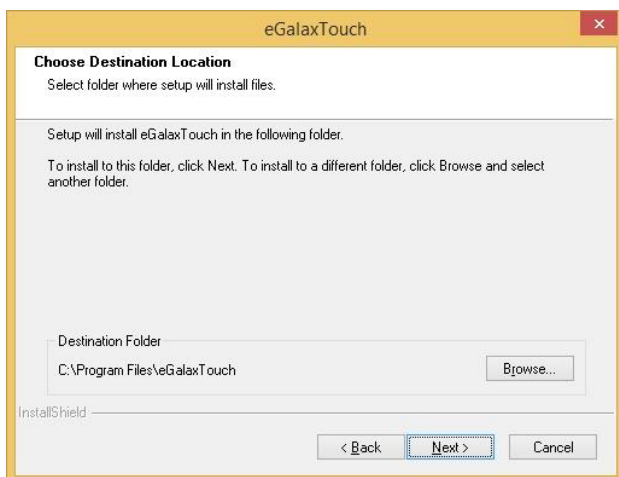
Step 9. Click Next.



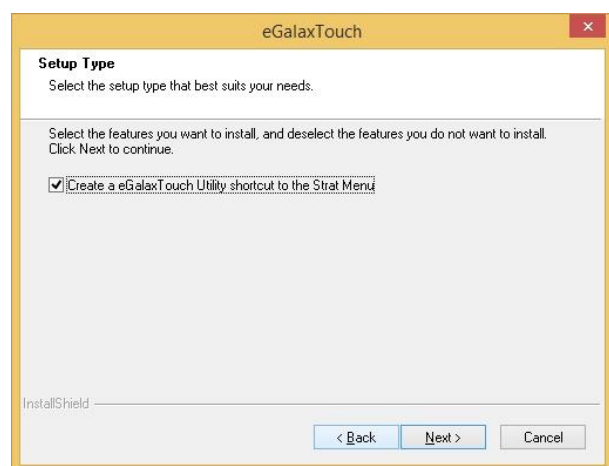
Step 7. Click Next.



Step 10. Click Next.

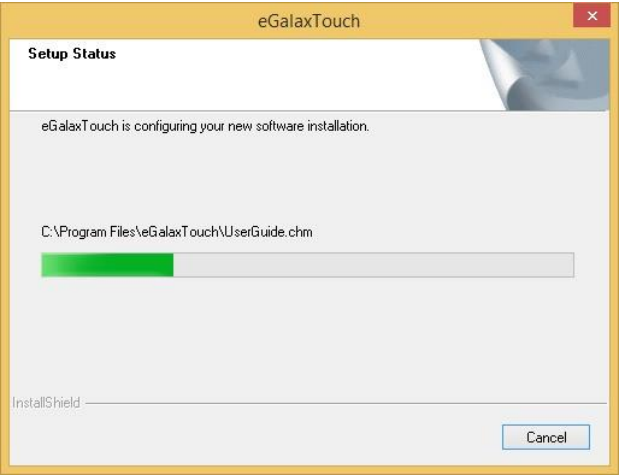


Step 8. Click Next to proceed setup.



Step 11. Click Next.

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Step 12. Setup completed

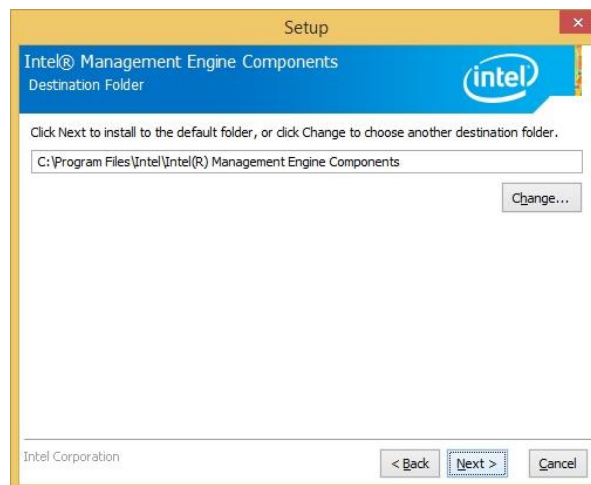
4.3 Install ME Driver

All drivers can be found on the Avalue Official Website:

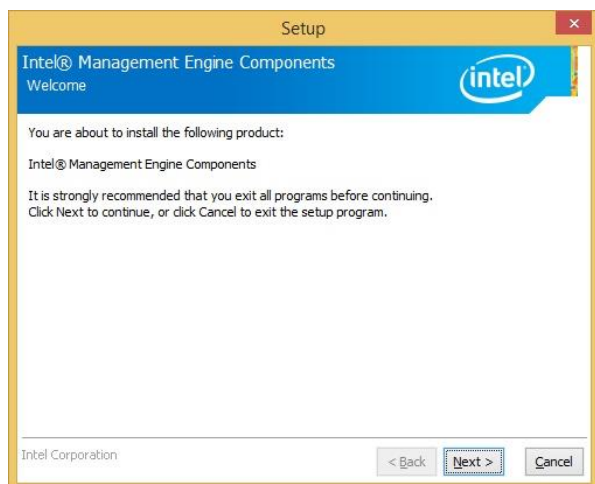
<http://www.avalue.com.tw>.



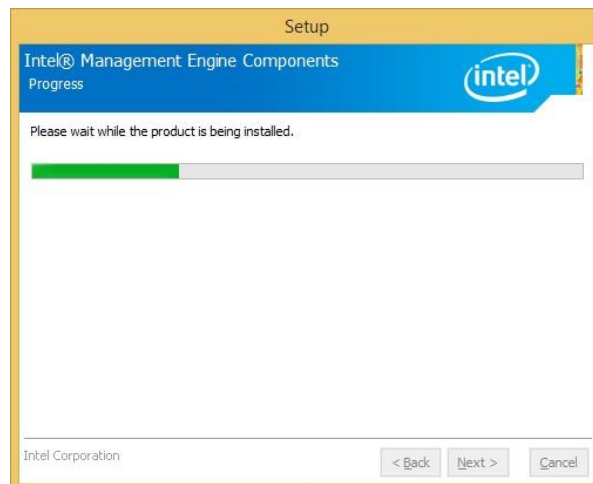
Note: The installation procedures and screen shots in this section are based on Windows 10 operation system.



Step 3. Click **Next** to continue installation.



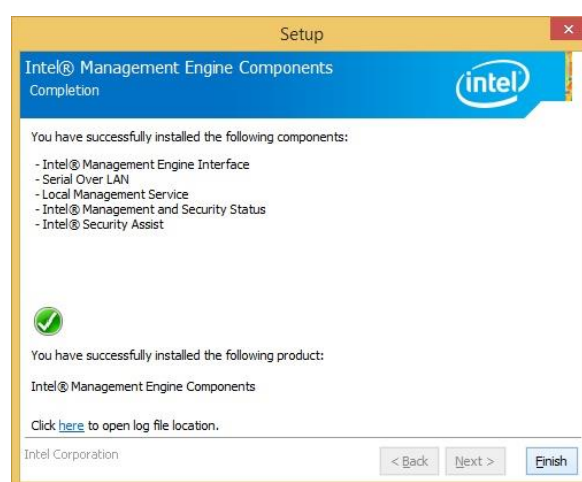
Step1. Click **Next** to start installation.



Step 4. Installing.



Step 2. Click **Next**.



Step 5. Click **Finish** to complete setup.

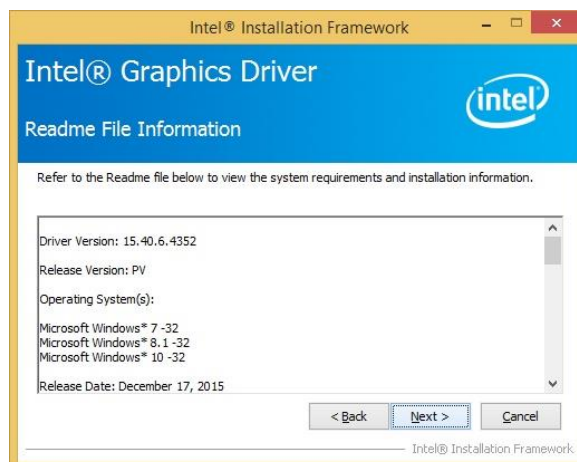
4.4 Install VGA Driver

All drivers can be found on the Avalue Official Website:

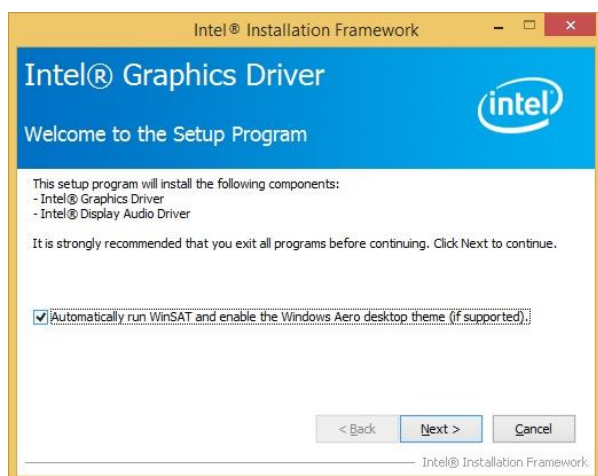
<http://www.avalue.com.tw>.



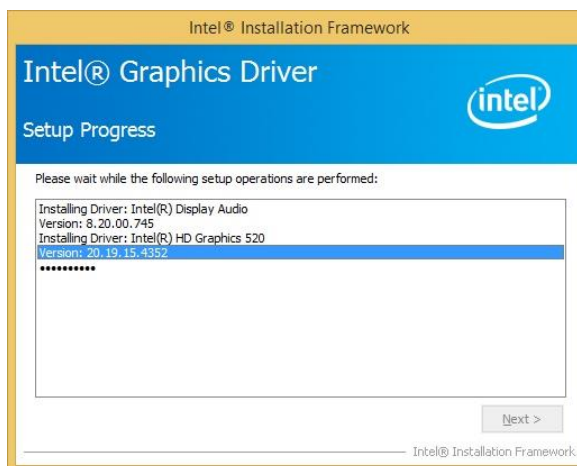
Note: The installation procedures and screen shots in this section are based on Windows 10 operation system.



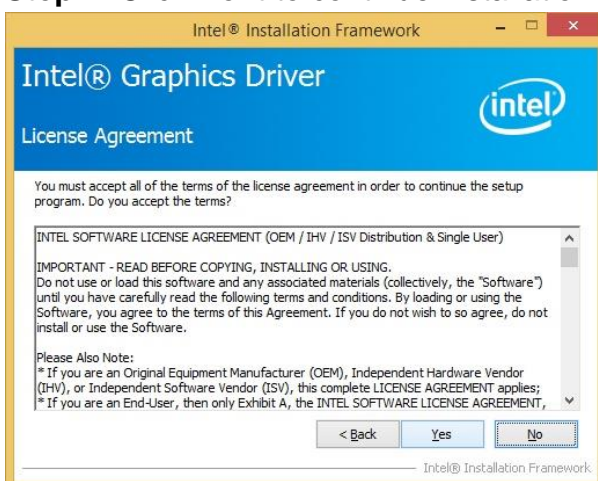
Step 3. Click Next.



Step 1. Click Next to continue installation.

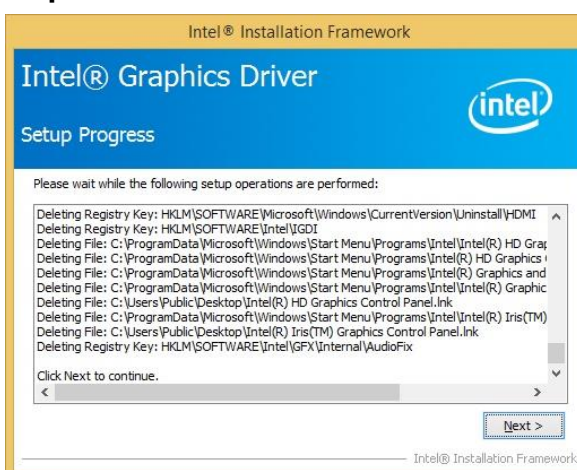


Step 4. Click Next.

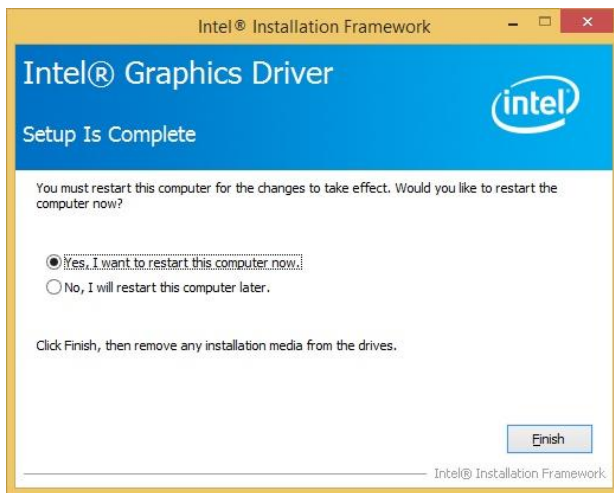


Step 2.

Click **Yes** to accept license agreement.



Step 5. Click Next.



Step 6. Click **Finish** to complete setup.

4.5 Install Ethernet Driver

All drivers can be found on the Avalue Official Website:

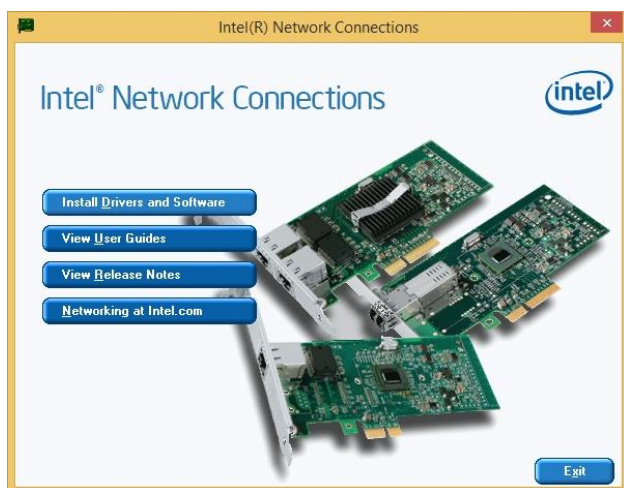
<http://www.avalue.com.tw>.



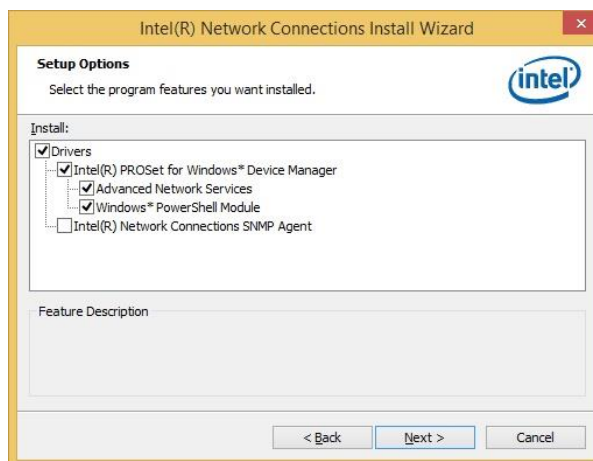
Note: The installation procedures and screen shots in this section are based on Windows 10 operation system.



Step 3. Click Next.



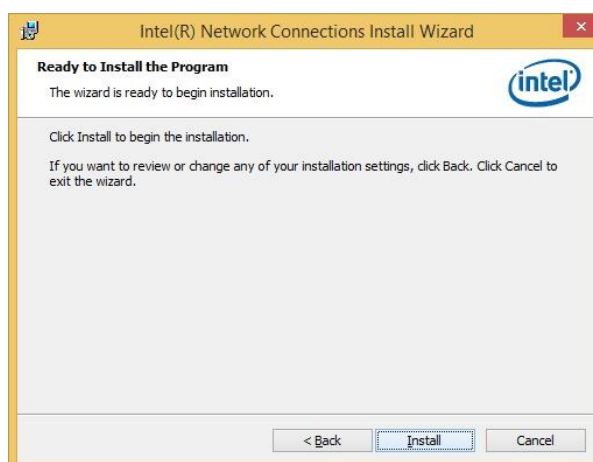
Step 1. Click Install Drivers and Software to continue installation.



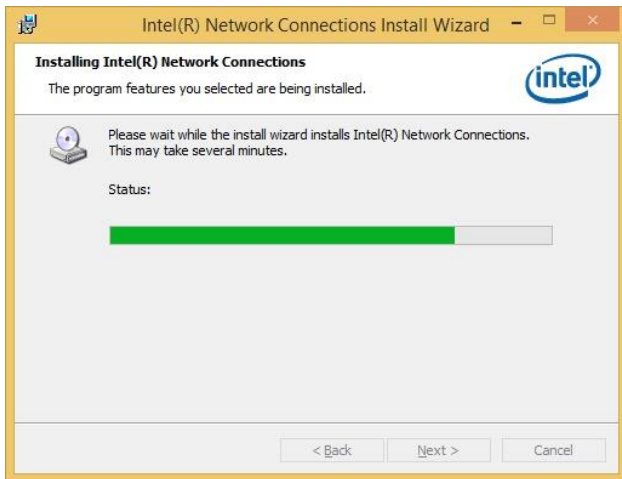
Step 4. Click Next to continue.



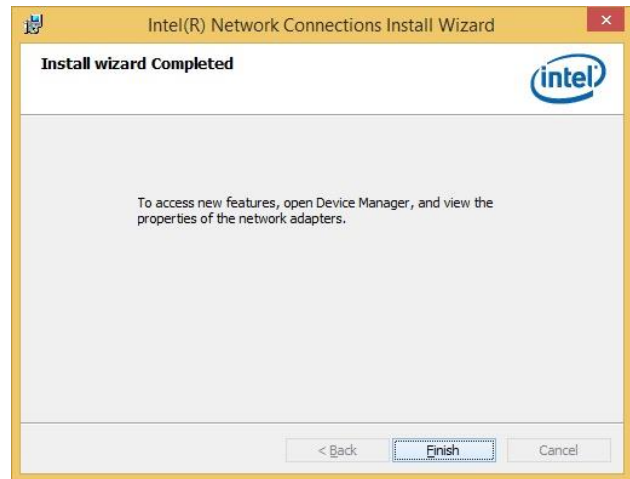
Step 2. Click Next.



Step 5. Click Install.



Step 6. Installing.



Step 7. Click Finish to complete setup.

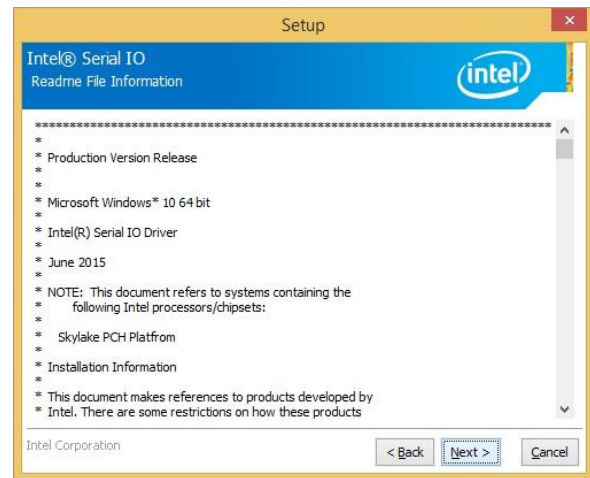
4.6 Install Serial IO Driver

All drivers can be found on the Avalue Official Website:

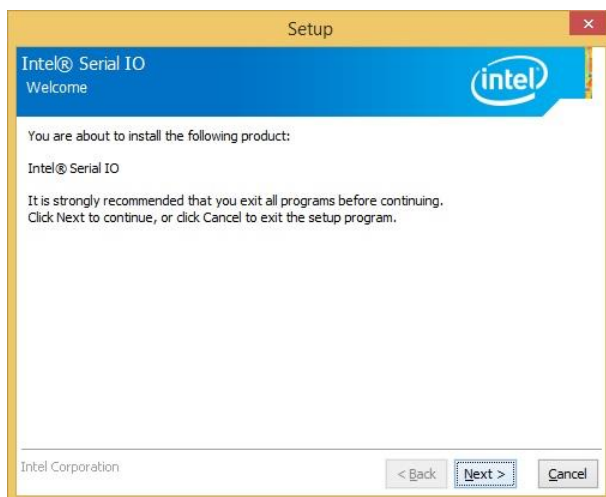
<http://www.avalue.com.tw>.



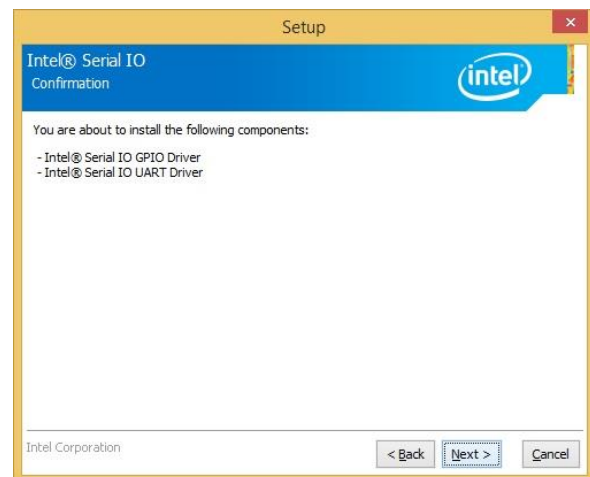
Note: The installation procedures and screen shots in this section are based on Windows 10 operation system.



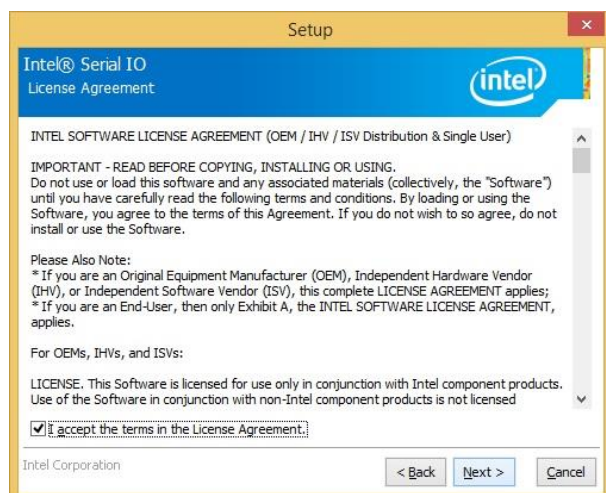
Step 3. Click Next.



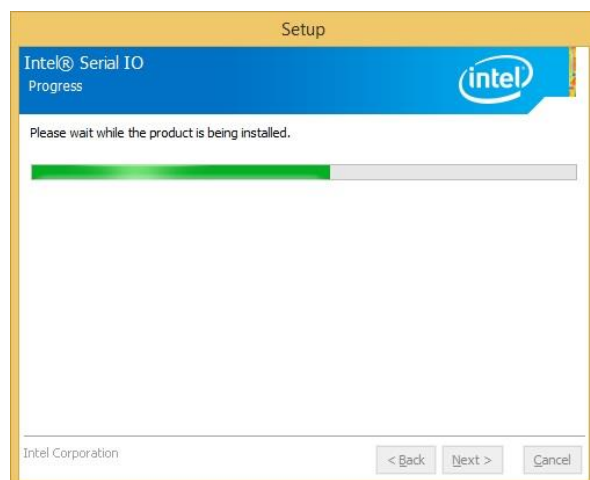
Step 1. Click Next to continue installation.



Step 4. Click Next.



Step 2. Click Next.



Step 5. Installing.



Step 6. Click **Finish** to complete setup.

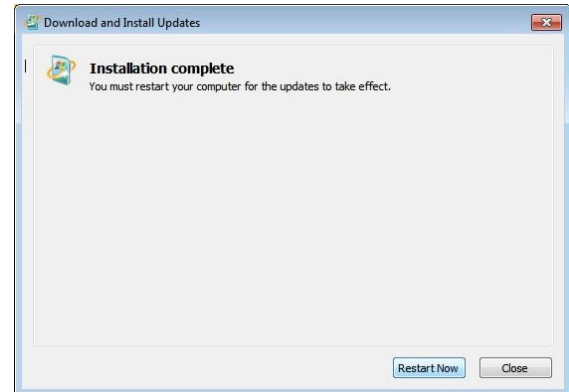
4.7 Install TPM2.0 Driver

All drivers can be found on the Avalue Official Website:

<http://www.avalue.com.tw>.



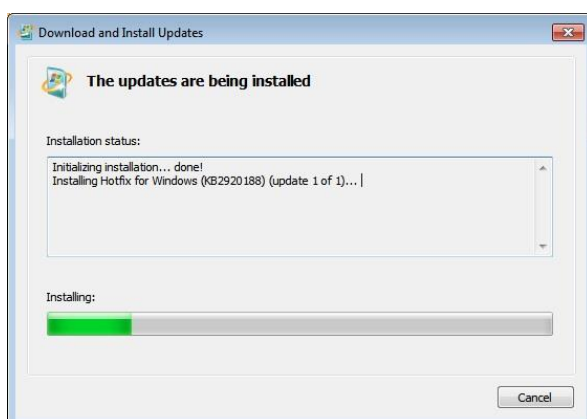
Note: The installation procedures and screen shots in this section are based on Windows 10 operation system.



Step 3. Setup completed.



Step 1. Click **Yes** to continue setup.



Step 2. Installing.

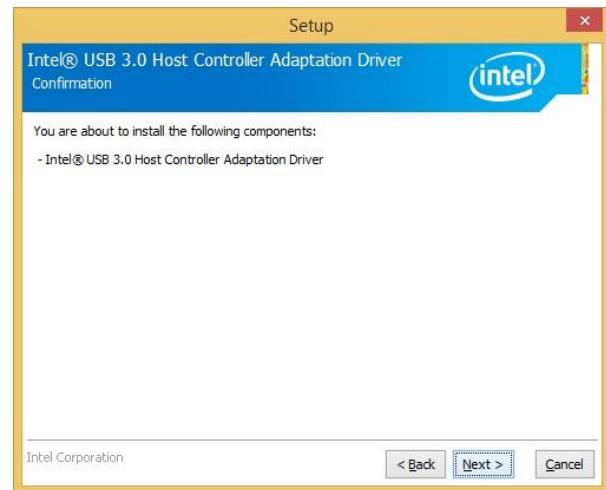
4.8 Install USB3.0 Driver

All drivers can be found on the Avalue Official Website:

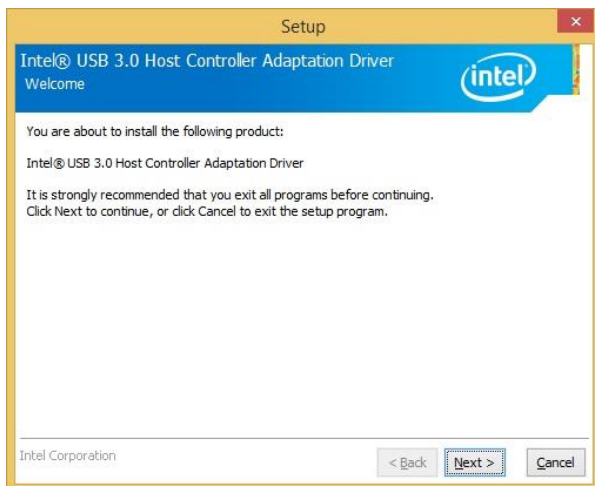
<http://www.avalue.com.tw>.



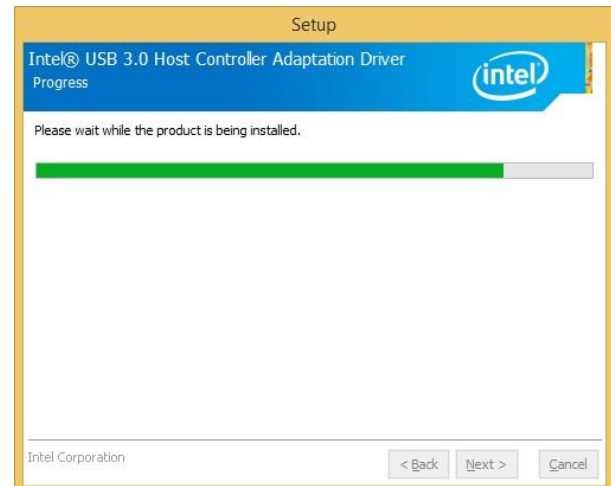
Note: The installation procedures and screen shots in this section are based on Windows 10 operation system.



Step 3. Click **Next** to continue installation.



Step1. Click **Next** to start installation.



Step 4. Installing.



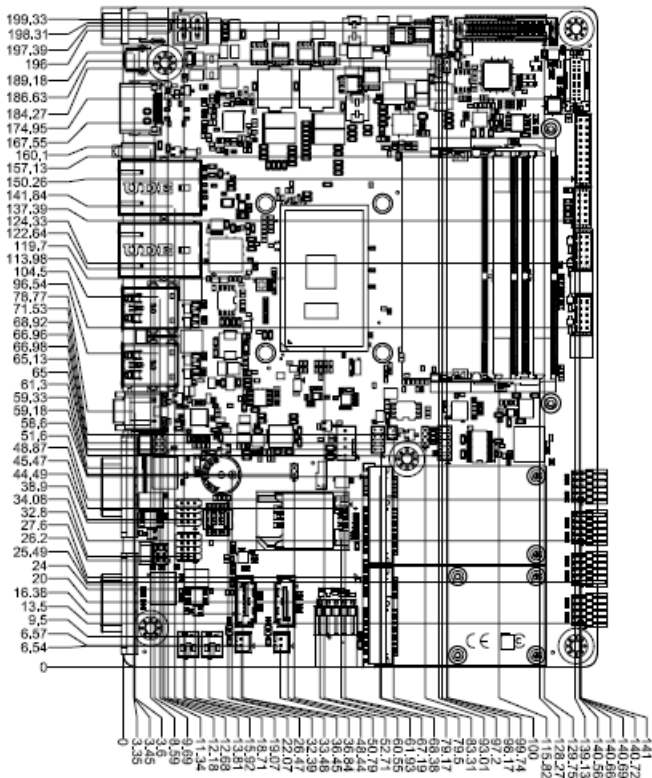
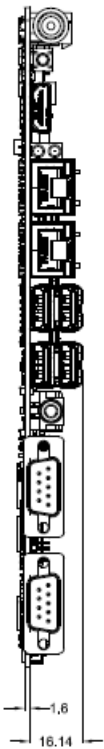
Step 2. Click **Next**.



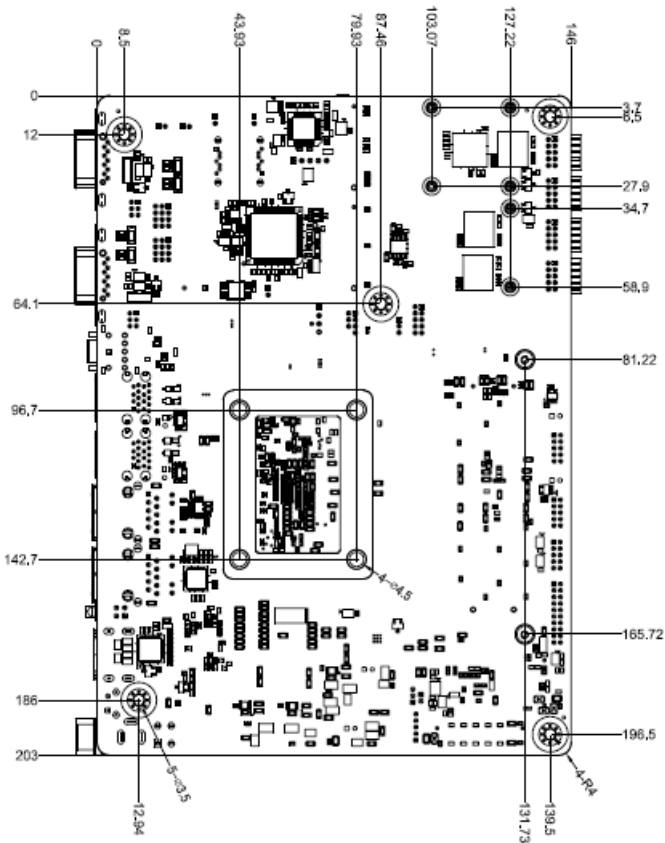
Step 5. Click **Finish** to complete setup.

5. Mechanical Drawing





Unit: mm



Unit: mm

