

VMS-CFS

Intel® Pentium®/Celeron®/Core™ i7/i5/i3 SoC BGA
Processor Fanless Vehicle Telematics System

Quick Reference Guide

6th Ed –07 May 2021

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- (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRE OPERATION.

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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.

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To receive the latest version of the user's manual; please visit our Web site at:

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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

- 1 x VMS-CFS
- Other major components include the followings:
 - 1 x Accessory kit (Dust cover, Rubber foot and Screws)
 - 1 x DP to VGA Adapter
 - 1 x Integrated Wall Mount Kit



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

1.3 System Specifications

System	
SBC	- EBM-CFSV (New SBC for Vehicle) - EBM-CFSV DB-A (Power Switch Board) - AUX-M04 A1 (LAN in RJ45) - EBM-CFSV DB-B (LAN in M12)
CPU	- Intel® Core™ i7-8700T Processor (12M Cache, up to 4.00 GHz) - Intel® Core™ i5-8500T Processor (9M Cache, up to 3.50 GHz) - Intel® Core™ i3-8100T Processor (6M Cache, 3.10 GHz) - Intel® Pentium® Gold G5400T Processor (4M Cache, 3.10 GHz) - Intel® Celeron® G4900T Processor (2M Cache, 2.90 GHz)
System Chipset	Intel® CNL PCH-H Q370
BIOS	- AMI UEFI BIOS, 256 Mbit SPI Flash ROM - iAMT 12.0, Power limit, RAID 0/1/5/10 supported
Memory	Two 260-pin SODIMM Socket Up to 64GB DDR4 2400/2666MHz SDRAM
TPM 2.0	- fTPM 2.0 support (default) - Infineon SLB9665TT2.0 (Factory Option, for ST version only)
Watchdog	H/W Reset, 1sec. ~ 65535sec.
H/W Status Monitor	Monitoring CPU & System Temperature and Voltage
Operation System	Windows 10 and later, Linux
Expansion	1 x Avalue 80-Pin IET Interface (4 x Gen.3 PCIe1, 3 x USB2.0, 1 x LPC, 1 x Line-Out (R/L), 1 x SMBus) 1 x Full Size Mini PCIe (PCIe + USB w/ push-push SIM Slot) 1 x M.2 Key-E 2230 for Wi-Fi & BT Module 2 x M.2 Key-B 2242/3042/2280 w/ push-push SIM slot for SSD/ LTE/ I/O Modules 1 x CANBus Module Interface for ATBS Module (via UART)
Storage	
Combination	2 x 2.5" Drive Bay (SATA III, Max. up to 12,5mm Height Storage) 2 x M.2 Key-B SSD (SATA III, Max. up to 2280)
Front Side External I/O Connector	2 x USB 3.2 Gen. 1 Host (included USB 2.0 signal) 3 x SIM Card Slot (External Accessible w/Dust Protection Cover) 2 x Front-Access 2.5" Drive Bay Tray 1 x Push Button for Power on/off w/ LED 1 x Push Button for Reset in hiding 3 x LEDs for Storage, WLAN/ HSDPA 1 x Line-Out

	1 x Mic-In 1 x 8-bit GPIO, supports 1.5KV Isolation <table border="1"> <tr> <th colspan="2">Digital Input</th></tr> <tr> <td>Input Channels</td><td>8 source type</td></tr> <tr> <td>Digital Input Levels for Dry Contacts</td><td>Logic level 0: Close to GND Logic level 1: Open</td></tr> <tr> <td>Digital Input Levels for Wet Contacts</td><td>Logic level 0: +5V to +30V Logic level 1: +3V max.</td></tr> <tr> <th colspan="2">Digital Output</th></tr> <tr> <td>Output Channels</td><td>8 sink type</td></tr> <tr> <td>Output Current</td><td>Max. 200mA per channel, current sink type</td></tr> <tr> <td>External Voltage</td><td>10 to 30VDC, open collector to 30V</td></tr> </table>	Digital Input		Input Channels	8 source type	Digital Input Levels for Dry Contacts	Logic level 0: Close to GND Logic level 1: Open	Digital Input Levels for Wet Contacts	Logic level 0: +5V to +30V Logic level 1: +3V max.	Digital Output		Output Channels	8 sink type	Output Current	Max. 200mA per channel, current sink type	External Voltage	10 to 30VDC, open collector to 30V
Digital Input																	
Input Channels	8 source type																
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Digital Output																	
Output Channels	8 sink type																
Output Current	Max. 200mA per channel, current sink type																
External Voltage	10 to 30VDC, open collector to 30V																
Rear Side External I/O Connector	1 x 3-Pin Terminal Block for DC Power Input 1 x 12V/4A DC output (wo/ Powered LAN module) 1 x DP 2 x HDMI 2 x RS232/422/485, (Jumper + DIP switch), with +5V and +12V support on Pin-9 via Jumper + DIP switch, support auto-flow (COM1 onboard, COM2 via Cable) 1 x RS-232 (COM3), with +5V and +12V support on Pin-9 via Jumper + DIP switch, 2 x RJ-45 4 x USB 3.2 Gen.1 Host (Included USB 2.0 signal) 1 x DB26 LVDS interface with 12V and USB2.0 LVDS Power input Voltage Selection in header (+3.3V/ 5V in) 1 x Line-Out 1 x Mic-In 5 x Antenna Mounting w/Dust Protection Cover																
GPS																	
Chipset	u-blox NEO-M8N module supports GPS/ Gloness/ QZSS/ Galileo/ Beidou (Factory Option NEO-M8U with Read Recording Supported)																
Interface	UART																
Display																	
Chipset	- Processor Graphics - Intel® UHD Graphics 630 (i7-8700T, i5-8500T, i3-8100T) - Intel® UHD Graphics 610 (Pentium G5400T, Celeron G4900T)																
Connector	1 x DP in Edge Connector																

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	2 x HDMI in Edge Connector w/ tie up design, Reserve 1 x TX/RX design 1 x eDP 1.4 to LVDS in D-SUB Connector
Resolution	- DP 1.2: 4096 x 2160@60Hz w/HDR - HDMI 1.4: 4096 x 2160@30Hz - LVDS: 1920 x 1200@60Hz, supports 2 channels 18/24-bit via Chrontel® CH7511B (eDP to LVDS)
Multiple Display	- Up to 3 Independent Display - Combination: HDMI1+HDMI2+DP HDMI1+DP+LVDS HDMI2+DP+LVDS
Ethernet	
Chipset	1 x Intel I211-AT GbE Controller 1 x Intel I219-LM GbE PHY
Ethernet Interface	10/100/1000 Base-Tx GbE compatible
LAN Port	2 x RJ-45
Audio	
Chipset	Realtek ALC888S HD codec
Audio Interface	2 x Mic-In and 2 x Line-Out
Mechanical	
Power Requirement	- Vehicle: Typical 12/24 Vdc (+9~ 36Vdc) - Railway: Typical 24/48/72/96/110 Vdc (16~160Vdc) , w/ 4242VDC input to output reinforced isolation
Power Connector Type	3-Pin Terminal Block
ACPI	- Single Power ATX Support S0, S3, S4, S5 - ACPI 5.0 Compliant
Power Type	Vehicle Power Mode (Default Setting)/Industrial PC Power Mode
Dimension	279.4mm x 210mm x 110 mm(wall mount)
Weight	4.5KG
Color	Blue + Black
Mounting Kit	Wall mount kit (Standard)
Reliability	
Certification	- Type 1, CE, FCC Class A w/ERP, E Mark, ISO 7637-2 - Type 2, CE, FCC Class A w/ERP, EN50155, EN50121, EN45545-2 *OT1, OT2, OT3, OT4 *S1, S2, S3 *Class C1, C2
Dust and Rain Test	IP 50 Rating

Vibration (Random)	With SSD : 1.5g@5~500 Hz (in operation)
Vibration Test	- Operating with SSD : MIL-STD-810G, Method 514.6, Category 4, common carrier US highway truck vibration exposure - Storage with SSD : MIL-STD-810G, Method 514.6, Category 24, minimum integrity test
Mechanical Shock Test	- Operating with SSD : MIL-STD-810G, Method 516.6, Procedure I, functional shock=20G - Non-Operating with SSD : MIL-STD-810G, Method 516.6, Procedure V, crash hazard shock test=75G
Drop Test	- Package drop test - Reference ISTA 2A, Method : IEC-60068-2-32 Test : Ed - Test phase : One corner, three edges, six faces
Operating Temperature	- ST: -25°C ~ 70°C (-13°F ~ 158°F) with 0.5m/S air flow, extended temperature peripherals - WT: -40°C ~ 70°C (-40°F ~ 158°F) with 0.5m/S air flow, extended temperature peripherals (Factory option)
Operating Humidity	5% ~ 90% Relative Humidity, Non-condensing
Storage Temperature	-40°C ~ 85°C (-40°F ~ 185°F)
Power Management	
Definition	- Vehicle Power Mode BIOS sets up as Vehicle PC ACC Function (JACC1) sets up as Enable AT/ATX Jumper (SW1) sets up as AT - Industrial PC Power Mode BIOS sets up as Industrial PC ACC Function (JACC1) sets up as Disable AT/ATX Jumper (SW1) sets up as AT or ATX - ACC Function (JACC1) - It is Vehicle PC power mode (Power on/off controlled by Ignition or Power button) if ACC Function sets up as Enable. - It is Industrial PC power mode (Power on/off controlled by Power button) if ACC Function sets up as Disable. - AT/ATX Jumper (SW1) This function will be active if ACC Function (JACC1) sets up Disable (Industrial PC power mode). - Power Input Selection (SW2) To set up the DC input voltage is +12Vdc, +24Vdc or wide range from +9~36Vdc. - Vin Work/Shutdown (BIOS)

- To set up the startup/shutdown voltage in accordance with DC input voltage as +12Vdc, +24Vdc or wide range from +9~36Vdc.

Mode↕	+12Vdc↕		+24Vdc↕	
	Startup↕	Shutdown↕	Startup↕	Shutdown↕
1↕	11.5V↕	10.5V↕	23V↕	21V↕
2↕	12.0V↕	11.0V↕	24V↕	22V↕
3↕	12.5V↕	11.0V↕	25V↕	22V↕
4↕	12.5V↕	11.5V↕	25V↕	23V↕

- The following behaviors happen if ACC Function (JACC1) sets up as Enable:

VMS-CFS won't power on if the DC Input voltage is lower than the startup voltage.

VMS-CFS will automatically power on, if the DC input voltage reaches the startup voltage.

VMS-CFS will automatically power on, if the DC input voltage reaches the startup voltage and power on delay ends up (the power on delay is Enable in BIOS).

VMS-CFS will automatically power off, if the DC input voltage is lower than shutdown voltage, and the time exceeds 60sec. If it still doesn't power off and the time exceeds 6min, VMS-CFS will be forced power off immediately.

- Power on delay time is selectable by BIOS in following hierarchies

10sec / 30sec / 1min / 5min / 10 min / 15min / 30min / 1hr.

The delay time starts to count if ignition turns on.

User can skip the delay time to turn on VMS-CFS if pressing power button.

VMS-CFS will automatically power on if the delay time ends up.

- Power off delay time is selectable by BIOS in following hierarchies

20sec / 1min / 5min / 10min / 30min / 1hr / 6hr / 18hr.

The delay time starts to count if ignition turns off.

User can skip the delay time to turn off VMS-CFS if pressing power button.

VMS-CFS will automatically power off, if the delay time ends up. If it still doesn't power off and the time exceeds 60sec, VMS-CFS will be forced power off immediately.

- S3, S4 suspend mode

In the vehicle power mode, the S3/S4 is only able to resume from power button.

- The status of Ignition On/Off is detectable by SW
- The status of Low battery is detectable by SW
- VMS will shut down automatically when internal temperature is reach the setting (it is selectable by BIOS).

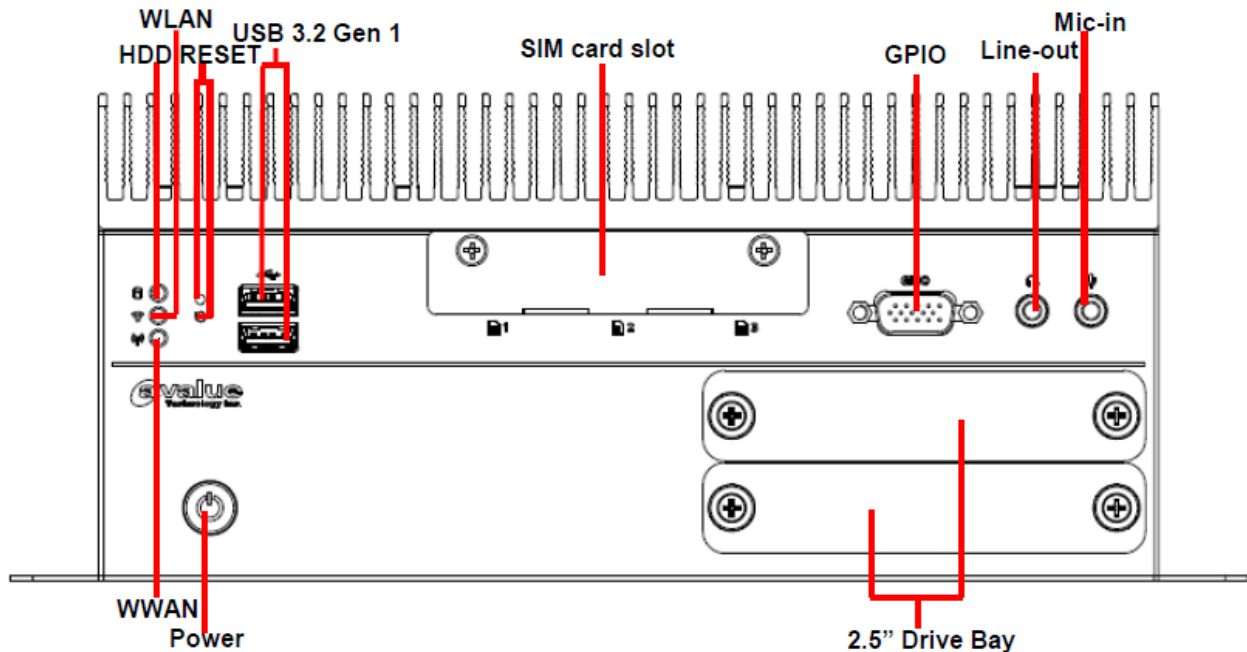
	• VMS-CFS will cancel the delay function, and then continue to operate normally, if the ignition is turned on again and the power off delay is in process. • VMS-CFS will shut down completely, and then power on again automatically, if the ignition is turned on again and the power off delay ended. • VMS-CFS will cancel the delay and stayed in power off status, if the ignition is turned off again and power on delay is in process. • VMS-CFS is only 10mA if it is off.
IET modules	
AUX-M02	• 4LAN bypass Module/ 4LAN+2USB
AUX-M04	• 4LAN Powered LAN 802.3af module/ 4LAN+2USB
EBM-CFSV DB-B	• 4LAN (M12) Powered LAN 802.3af module/ 4LAN(M12)



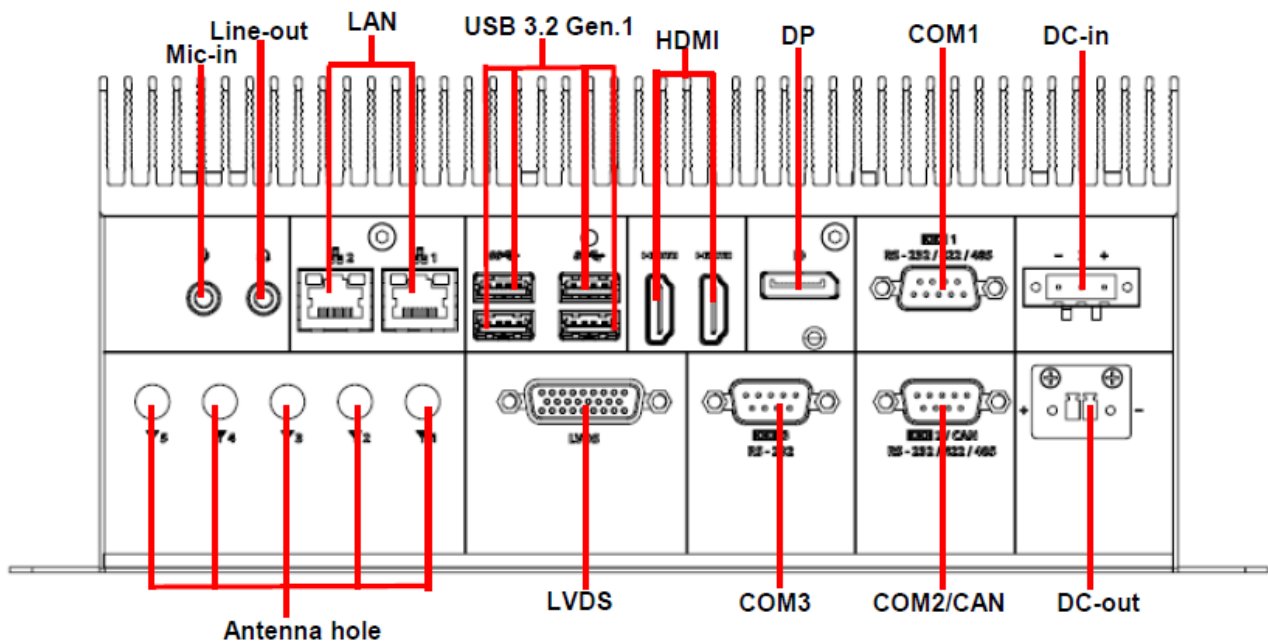
Note: Specifications are subject to change without notice.

1.4 System Overview

1.4.1 Front View



1.4.2 Rear View

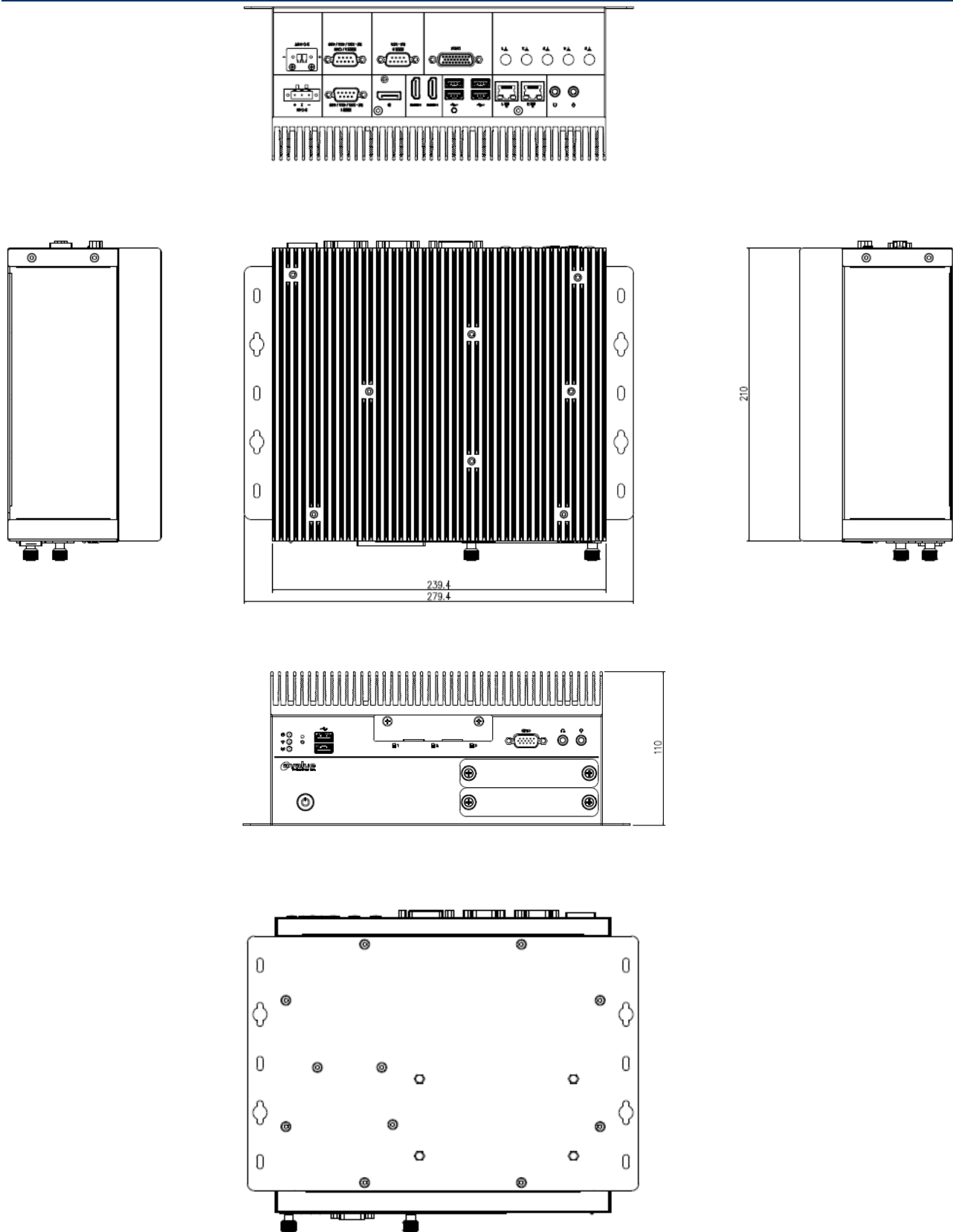


Connectors

Label	Function	Note
Power	Power on button	
USB 3.2 Gen 1	6 x USB 3.2 Gen 1 connector	
SIM card slot	3 x SIM card slot	

2.5" Drive Bay	2.5" Drive Bay socket
GPIO	General purpose I/O connector
Line-out	Line-out jack
Mic-in	Mic-in audio jack
WWAN	WWAN Indicator
WLAN	WLAN Indicator
HDD	HDD Indicator
RESET	Reset button
LAN	2 x RJ-45 Ethernet connector
DP	DP connector
COM1	Serial port 1 connector
COM2/CAN	Serial port 2 connector CAN connector
COM3	Serial port 3 connector
LVDS	LVDS connector
DC-in	DC power-in connector
DC-out	DC power-out connector
HDMI	2 x HDMI connector
Antenna hole	5 x Antenna hole

1.5 System Dimensions



(Unit: mm)

2. Hardware Configuration

Jumper and Connector Setting, Driver and BIOS Installing

For advanced information, please refer to:

- 1- EBM-CFSV included in this manual.

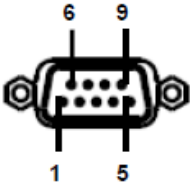
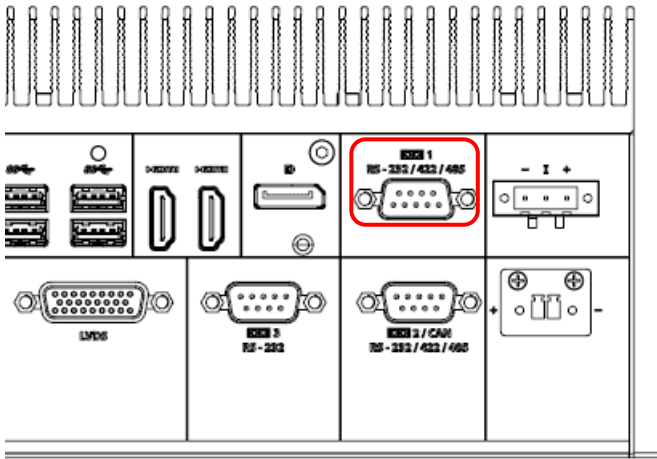


Note: If you need more information, please visit our website:

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2.1 VMS-CFS connector mapping

2.1.1 Serial Port 1 connector (COM1)



In RS-232 Mode

Signal	PIN	PIN	Signal
NDCD#	1	6	NDSR#
NRXD	2	7	NRTS#
NTXD	3	8	NCTS#
NDTR#	4	9	NRI#
GND	5		

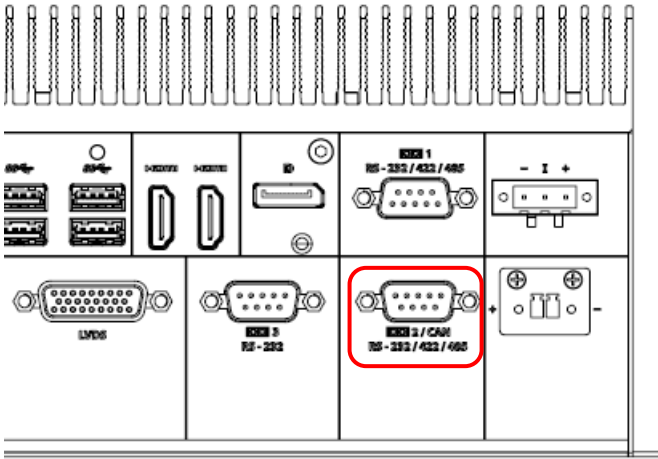
In RS-422 Mode

Signal	PIN	PIN	Signal
TxD1-	1	6	NC
TxD1+	2	7	NC
RxD1+	3	8	NC
RxD1-	4	9	NC
GND	5		

In RS-485 Mode

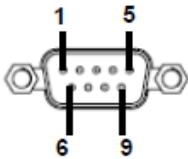
Signal	PIN	PIN	Signal
DATA1-	1	6	NC
DATA1+	2	7	NC
NC	3	8	NC
NC	4	9	NC
GND	5		

2.1.2 Serial Port 2 connector/CAN connector (COM2/CAN)



CAN BUS

	DB9/M
1708-	1
1708+	8
1939-	5
1939+	3
GND	2



In RS-232 Mode

Signal	PIN	PIN	Signal
NDCD#	1	6	NDSR#
NRXD	2	7	NRTS#
NTXD	3	8	NCTS#
NDTR#	4	9	NRI#
GND	5		

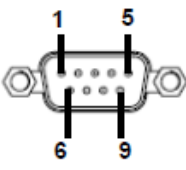
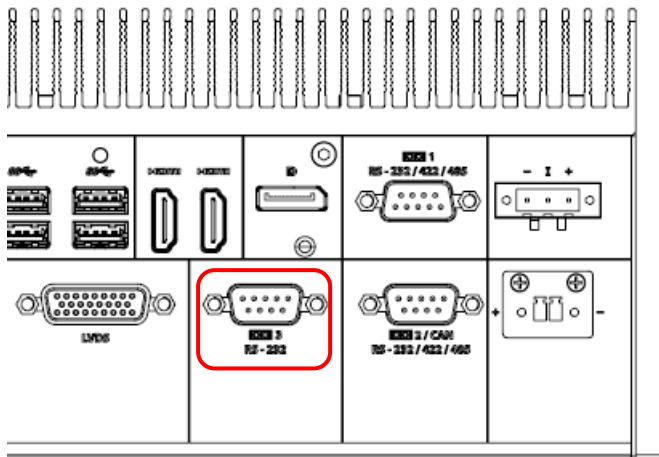
In RS-422 Mode

Signal	PIN	PIN	Signal
TxD1-	1	6	NC
TxD1+	2	7	NC
RxD1+	3	8	NC
RxD1-	4	9	NC
GND	5		

In RS-485 Mode

Signal	PIN	PIN	Signal
DATA1-	1	6	NC
DATA1+	2	7	NC
NC	3	8	NC
NC	4	9	NC
GND	5		

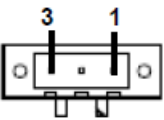
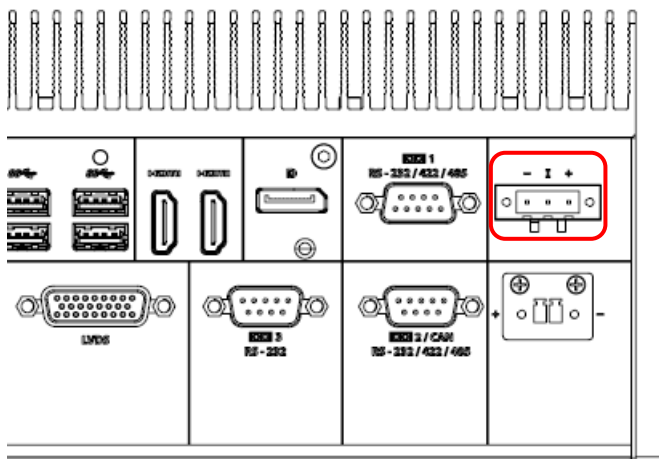
2.1.3 Serial Port 3 connector (COM3)



In RS-232 Mode

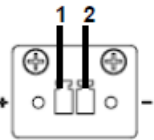
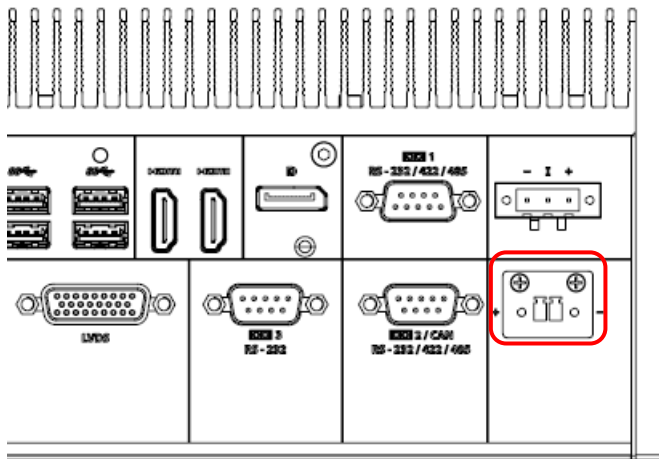
Signal	PIN	PIN	Signal
ND CD#	1	6	ND SR#
NR XD	2	7	NR TS#
NT XD	3	8	NC TS#
ND TR#	4	9	NR I#
GND	5		

2.1.4 DC power-in connector (DC-in)



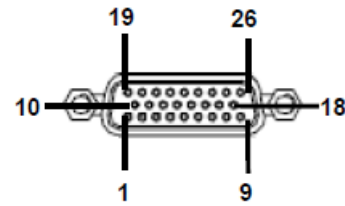
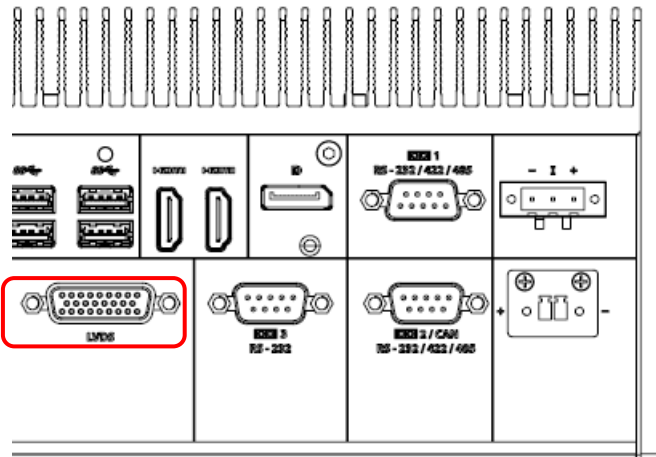
Signal	PIN
VIN + (BAT+)	1
ACC (IGN)	2
VIN- (BAT-)	3

2.1.5 DC power-out connector (DC-out)



Signal	PIN
+12V	1
GND	2

2.1.6 LVDS connector (LVDS)

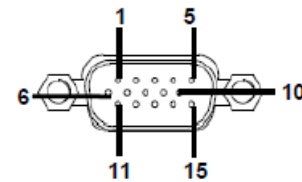
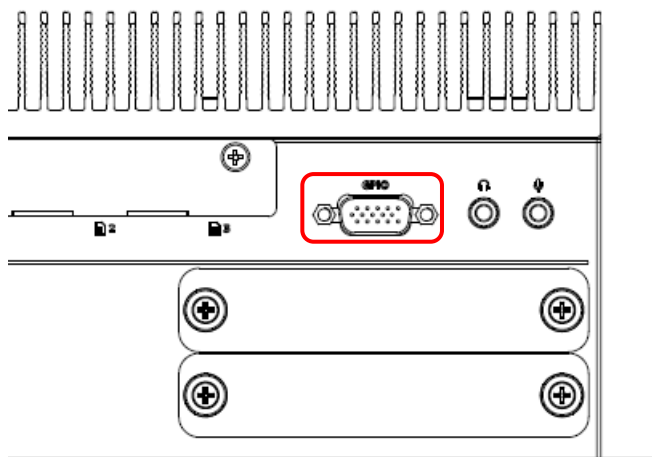


PIN	Signal	PIN	Signal	PIN	Signal
1	PS_ON	10	1+	19	12V
2	GND	11	1-	20	GND
3	3.3V	12	GND	21	Backlight_EN
4	5V	13	2+	22	VBRIGHT
5	GND	14	2-	23	USB_VCC
6	GND	15	3+	24	D-
7	0+	16	3-	25	D+
8	0-	17	CLK+	26	USB_GND
9	GND	18	CLK-		

Note:

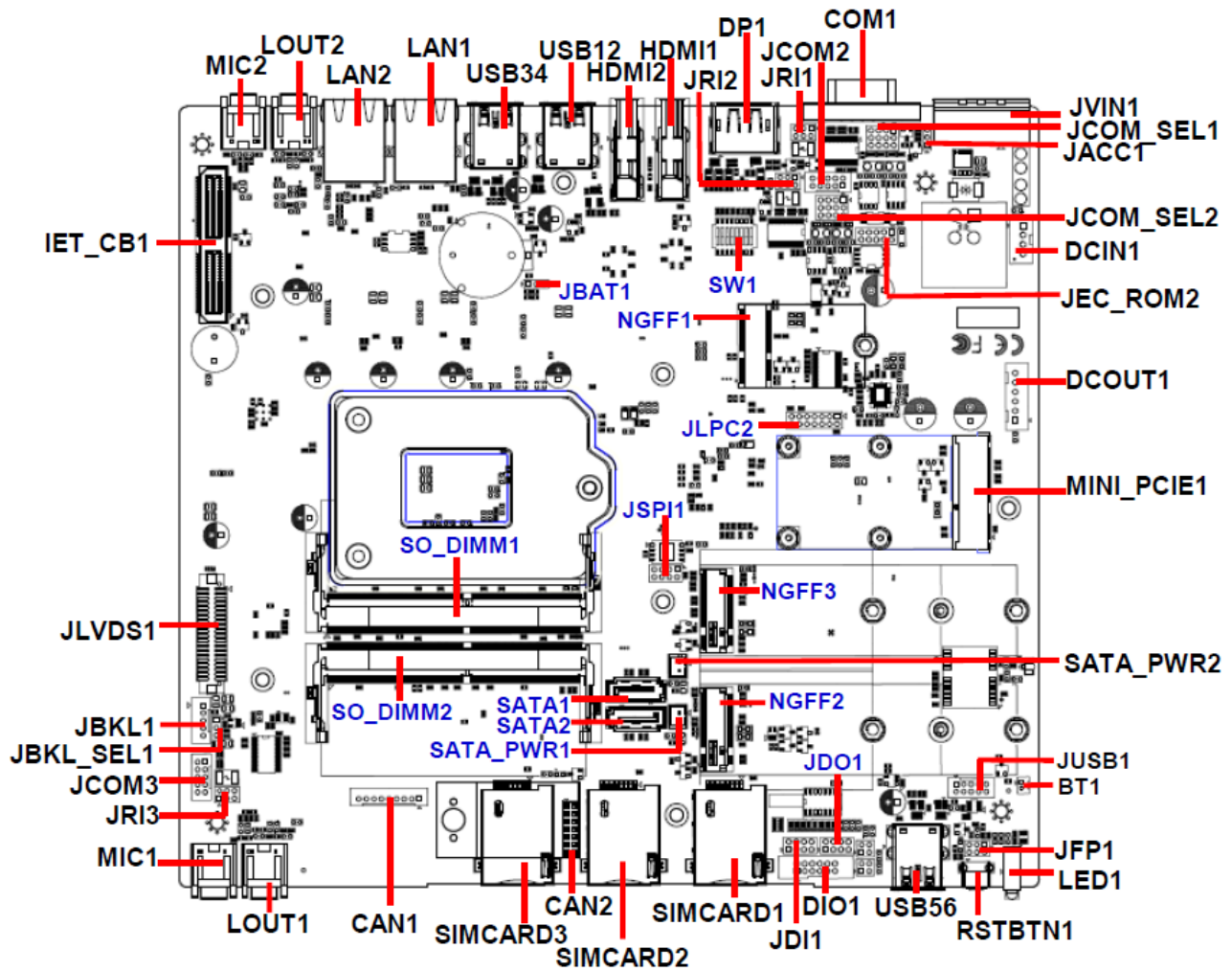
This connector included LVDS, USB, 12V and 5V interfaces.

2.1.7 General purpose I/O connector (GPIO)



PIN	Signal	PIN	Signal	PIN	Signal
1	DIO_GPO0	6	DIO_GPI2	11	GND
2	DIO_GPI0	7	DIO_GPO3	12	NA
3	DIO_GPO1	8	DIO_GPI3	13	NC
4	DIO_GPI1	9	NA	14	NC
5	DIO_GPO2	10	NA	15	NC

2.2 EBM-CFSV Overviews



2.3 EBM-CFSV Jumper & Connector list

Jumpers

Label	Function	Note
JBAT1	Clear CMOS	3 x 1 header, pitch 2.00 mm
JRI1/2/3	COM 1/2/3 pin 9 signal selector	3 x 2 header, pitch 2.00 mm
SW1	Multi-function select	DIP switch 8pin
JCOM_SEL1/2	Serial port 1/2 – RS232/422/485 mode select	4 x 3 header, pitch 2.00 mm
JDI1	Digital Input selector	4 x 2 header, pitch 2.00 mm
JDO1	Digital Output selector	4 x 2 header, pitch 2.00 mm
JACC1	Vehicle/Industrial PC power mode selector	3 x 1 header, pitch 2.00 mm
JBKL_SEL1	LCD backlight brightness adjustment	3 x 1 header, pitch 2.00 mm

Connectors

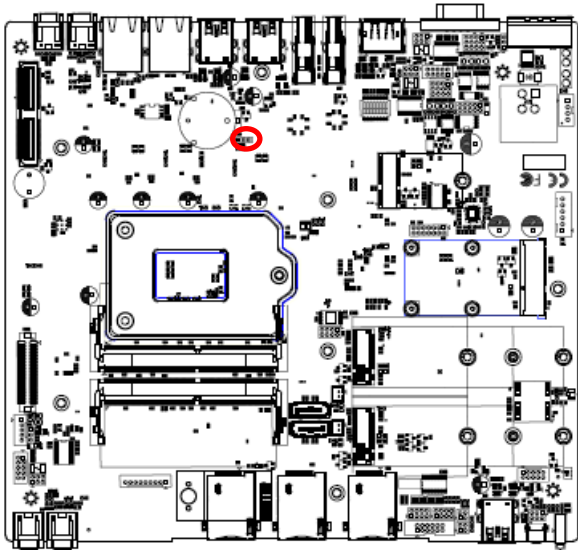
Label	Function	Note
USB12/34/56	6 x USB 3.2 connector	
BT1	Battery connector	2 x 1 wafer, pitch 1.25 mm
LAN1/2	RJ-45 Ethernet 1/2	
JVIN1	DC-Input connector	1 x 3 terminal block, pitch 5.08 mm
DIO1	General purpose I/O connector	6 x 2 wafer, pitch 2.00 mm
COM1	Serial port connector 1	
JCOM2	Serial port 2 connector	5 x 2 wafer, pitch 2.00 mm
JCOM3	Serial port 3 connector	5 x 2 wafer, pitch 2.00 mm
CAN1	CAN Module connector 1	9 x 1 wafer, pitch 2.00 mm
CAN2	CAN Module connector 2	7 x 2 header, pitch 2.00 mm
DP1	DP connector	
MINI_PCIE1	Mini PCI Express connector	
RSTBTN1	Reset button	
LED1	LED Power HDD	
NGFF1/2/3	1 x M.2 KEY-E 2230 connector 2 x M.2 KEY-B 2242/3042/2280 connector	
LOUT1/2	Audio line-out connector 1/2	

VMS-CFS

MIC1/2	Audio mic-in connector 1/2	
JLVDS1	LVDS connector	20 x 2 wafer, pitch 1.25 mm
SO_DIMM1/2	DDR4 SODIMM connector 1/2	
IET_CB1	IET Expansion slot	
JLPC2	LPC port connector	7 x 2 header, pitch 2.00 mm
JSPI1	SPI connector	4 x 2 header, pitch 2.00 mm
JBKL1	LCD inverter connector	5 x 1 wafer, pitch 2.00 mm
SATA1/2	Serial ATA connector 1	
SATA_PWR1/2	SATA power connector 1/2	
DCOUT1	DC Output connector	6 x 1 wafer, pitch 2.50 mm
JEC_ROM2	EC Debug connector	5 x 2 header, pitch 2.00 mm
SIMCARD1/2/3	SIM card slot 1/2/3	
HDMI1/2	HDMI connector 1/2	
DCIN1	DC Input connector	4 x 1 wafer, pitch 2.50 mm
JFP1	Front Panel connector	3 x 2 header, pitch 2.00 mm
JUSB1	USB connector	5 x 2 wafer, pitch 2.00 mm

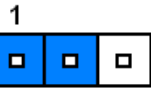
2.4 EBM-CFSV Jumpers & Connectors settings

2.4.1 Clear CMOS (JBAT1)



*Default

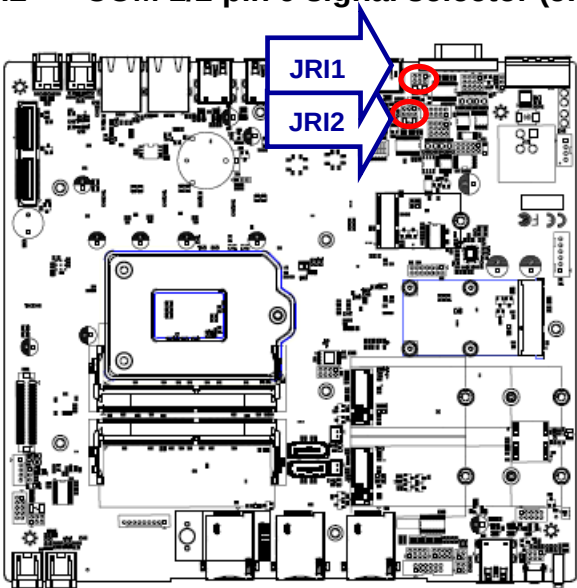
Protect*



Clear CMOS

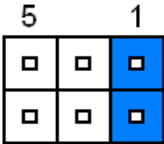


2.4.2 COM 1/2 pin 9 signal selector (JRI1/2)

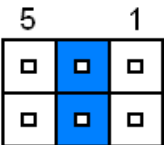


* Default

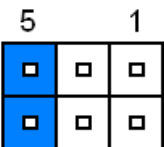
Ring*



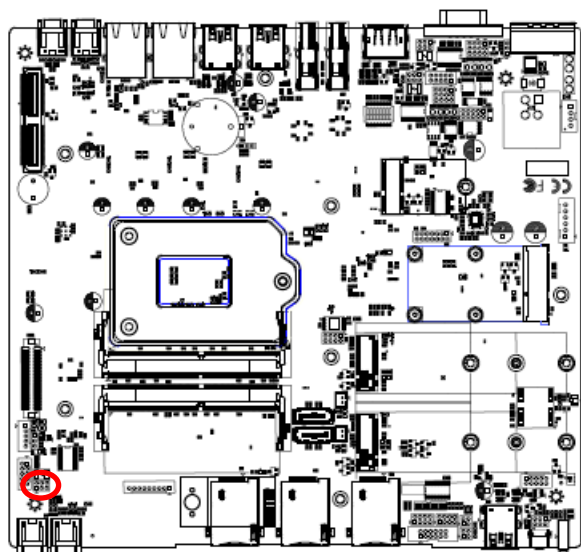
+5V



+12V



2.4.3 COM 3 pin 9 signal selector (JRI3)



Ring*

□	□	□
□	□	□

1 5

+5V

□	■	□
□	■	□

1 5

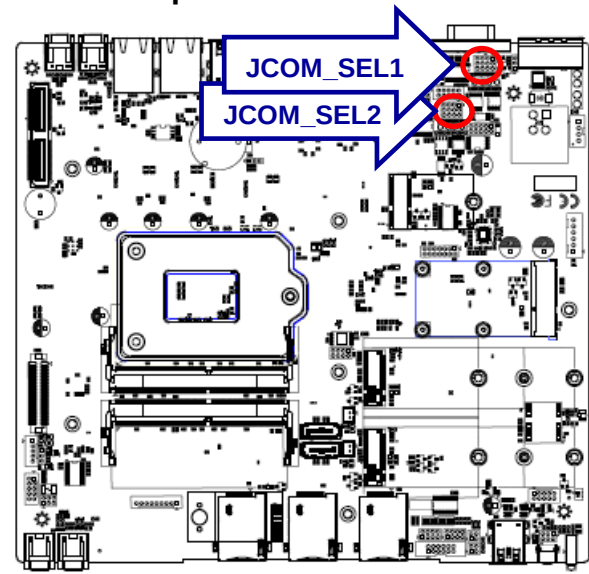
+12V

□	□	■
□	□	■

1 5

* Default

2.4.4 Serial port 1/2 – RS232/422/485 mode select (JCOM_SEL1/2)



RS-232*

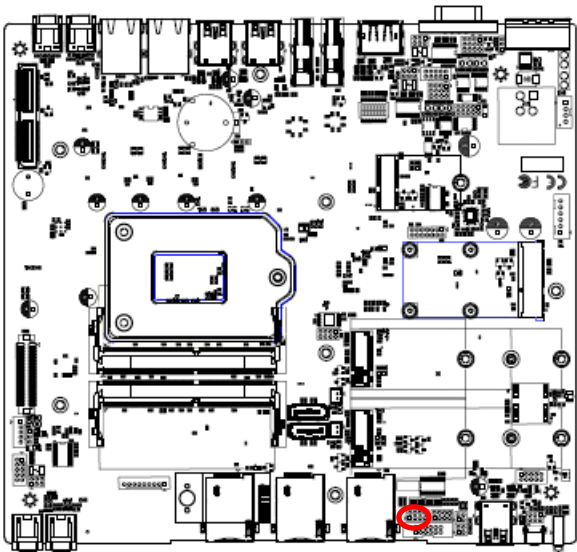
10	□	□	□	1
	□	□	□	
	□	□	□	
12				3

RS422/485

10	□	□	□	1
	□	□	□	
	□	□	□	
12				3

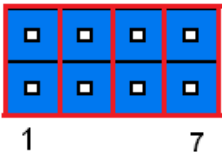
*Default

2.4.5 Digital Input selector (JDI1)

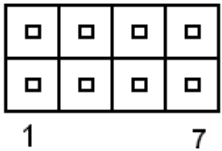


* Default

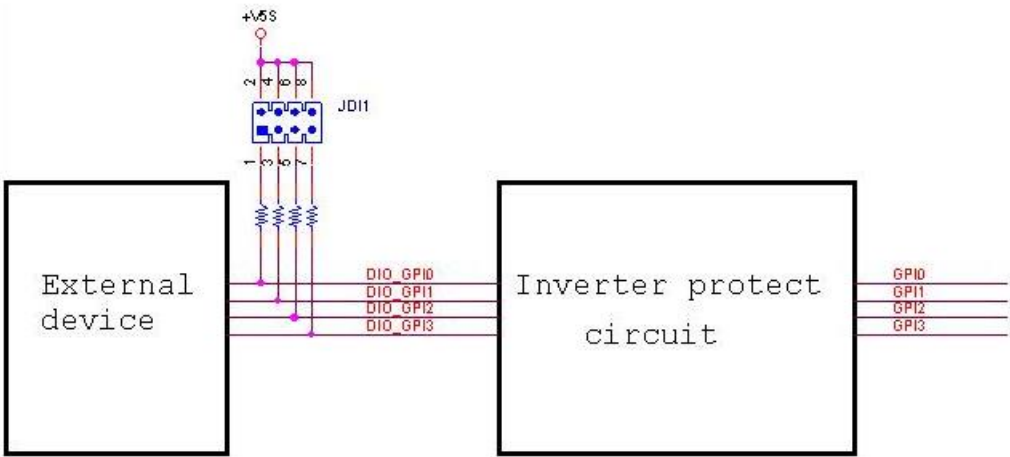
Dry*



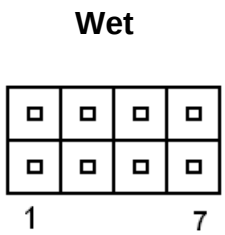
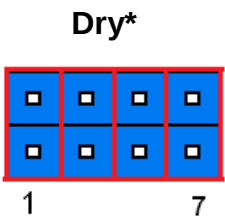
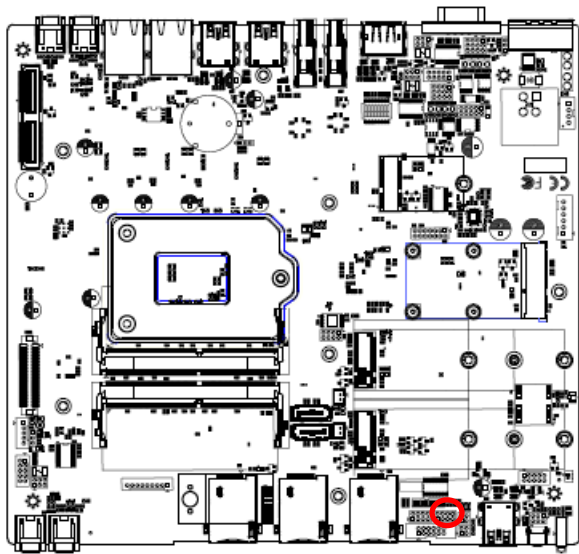
Wet



Mode	Digital Input
Dry	Logic level 1: Close to GND Logic level 0: Open
Wet	Logic level 1: < 3V Logic level 0: 5V ~ 30V



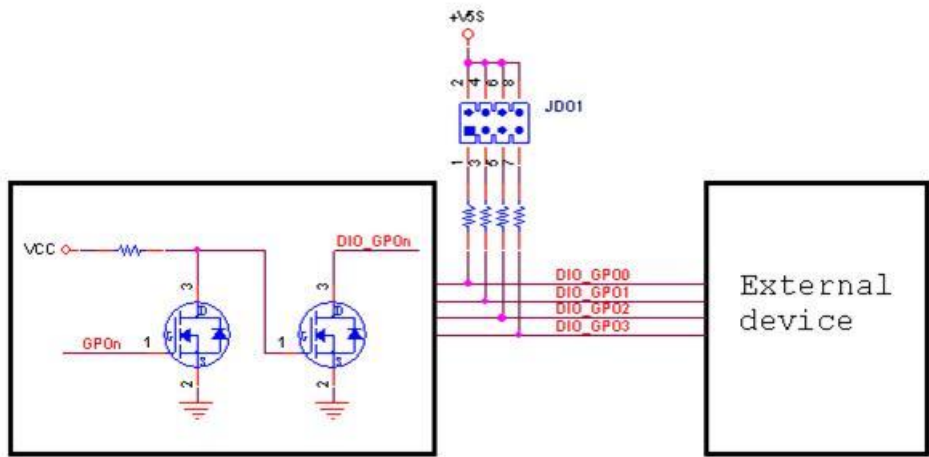
2.4.6 Digital Output selector (JD01)



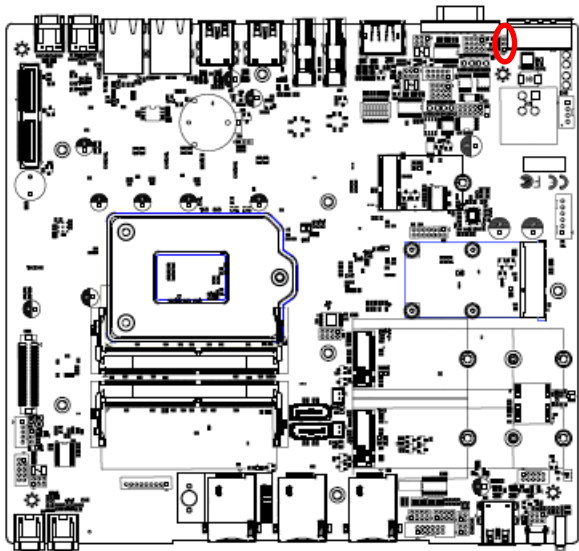
* Default

Note:

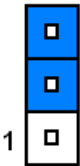
Output Voltage: Max 250 mA per channel, current sink type.



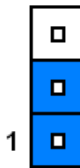
2.4.7 Vehicle/Industrial PC power mode selector (JACC1)



Enable*



Disable



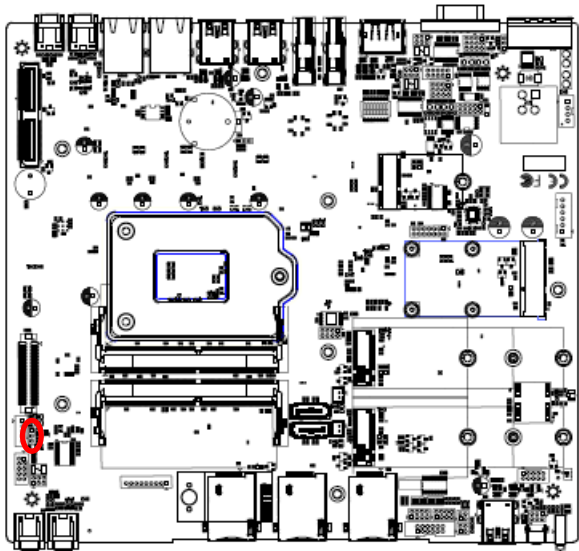
* Default

Note:

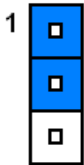
It is Vehicle PC power mode (Power on/off controlled by Ignition or Power button) if ACC Function sets up as Enable.

It is Industrial PC power mode (Power on/off controlled by Power button) if ACC Function sets up as Disable.

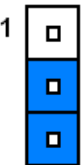
2.4.8 LCD backlight brightness adjustment (JBKL_SEL1)



PWM Mode*

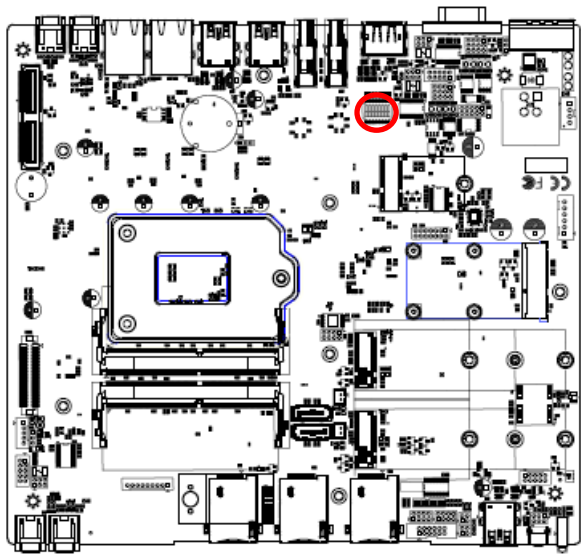


DC Mode

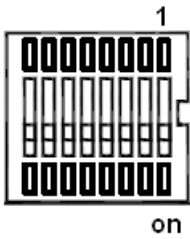


* Default

2.4.9 Multi-function select (SW1)



* Default



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

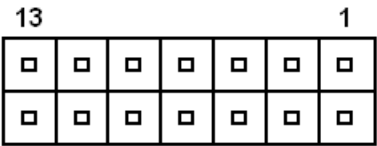
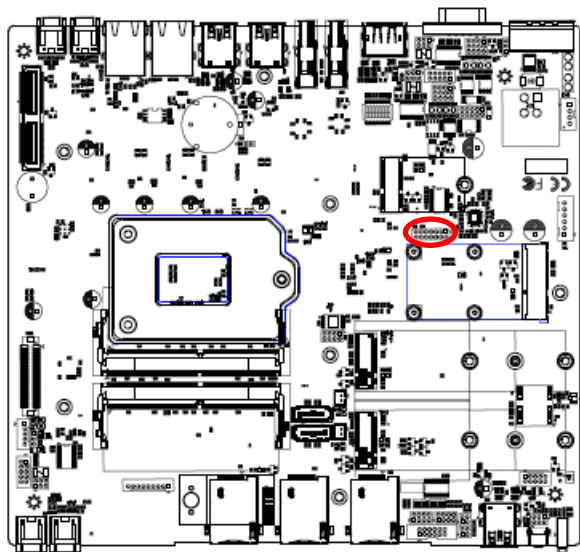
Power mode

	AT*	ATX
5	ON	OFF

Battery Type

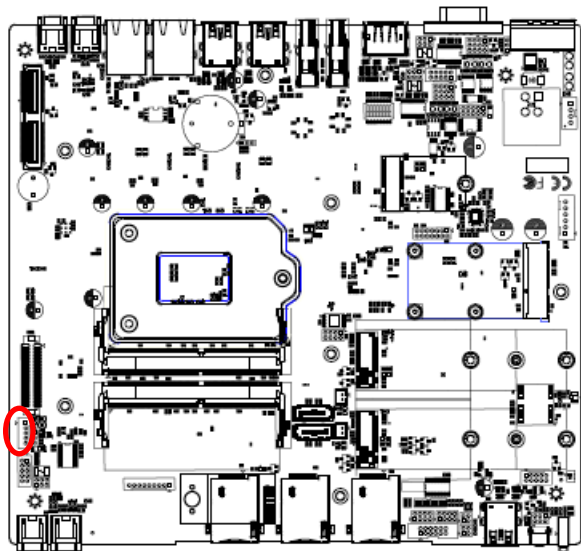
	+12V	+24V	+9V~+36V*
6	OFF	ON	OFF
7	ON	ON	OFF

2.4.10 LPC port connector (JLPC2)



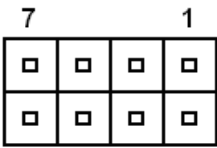
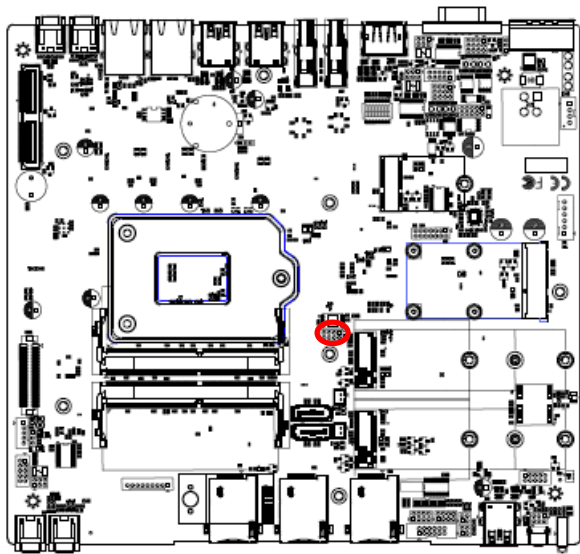
Signal	PIN	PIN	Signal
LPC_AD0	1	2	+3.3V
LPC_AD1	3	4	RST_BUF#
LPC_AD2	5	6	LPC_FRAME#
LPC_AD3	7	8	CLK_24M_80
LPC_SERIRQ	9	10	GND
+5V	11	12	GND
+5VSB	13	14	NC

2.4.11 LCD inverter connector (JBKL1)



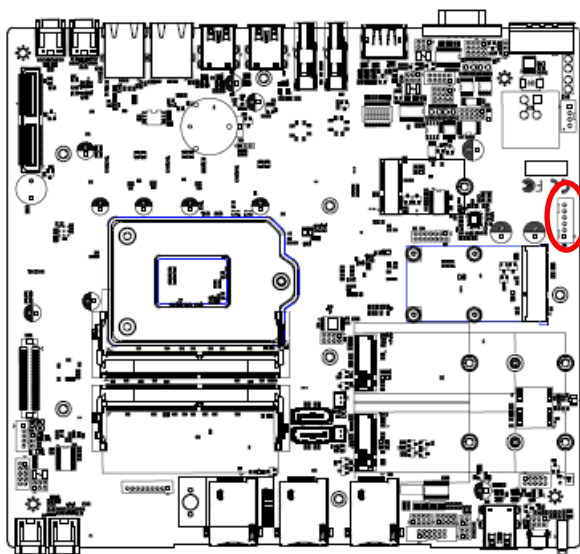
Signal	PIN
+12V	1
GND	2
BKLEN	3
VBRIGHT	4
+5V	5

2.4.12 SPI connector (JSPI1)



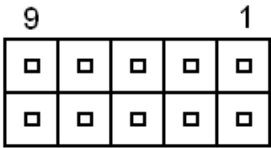
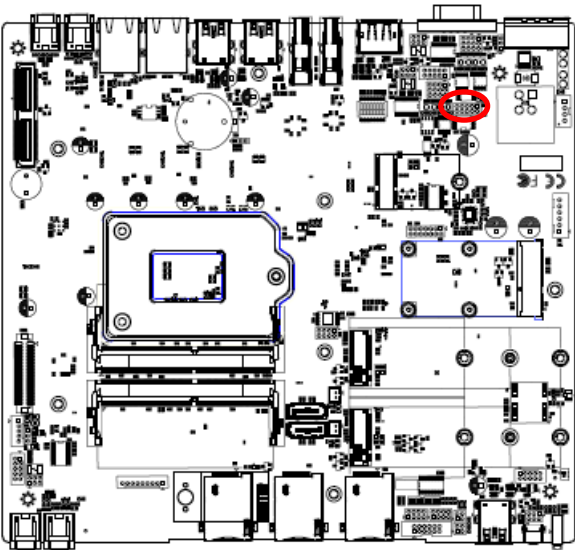
Signal	PIN	PIN	Signal
+3.3VSB	1	2	GND
SPI_CS0#	3	4	SPI_CLK
SPI_MISO	5	6	SPI_MOSI
BIOS_HOLD#	7	8	BIOS_WP#

2.4.13 DC Output connector (DCOUT1)



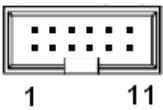
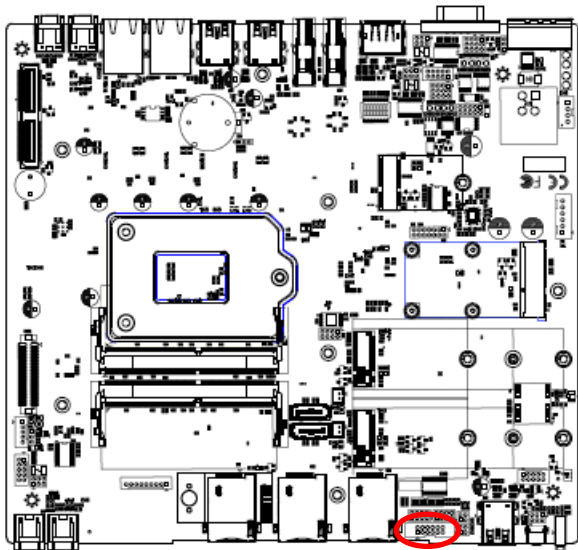
Signal	PIN
GND	6
GND	5
GND	4
+12VSB	3
+12VSB	2
+12VSB	1

2.4.14 EC Debug connector (JEC_ROM2)



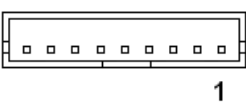
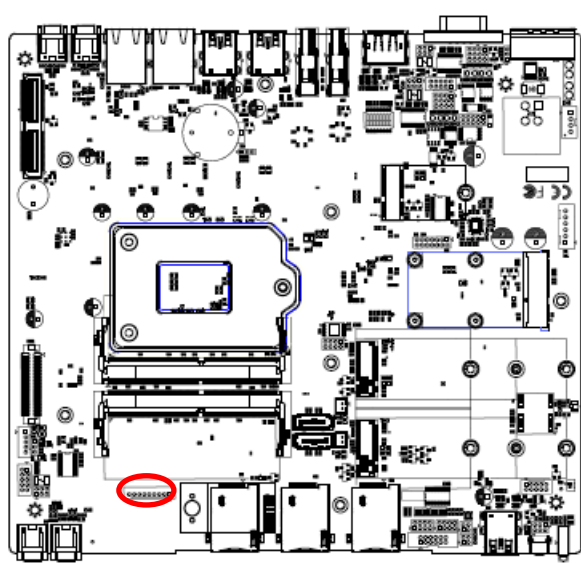
Signal	PIN	PIN	Signal
+VSPI_EC	1	2	GND
EC_FSCE#	3	4	EC_FSCK
EC_FMISO	5	6	EC_FMOSI
EC_HOLD#	7	8	NC
EC_SMCLK_DBU	9	10	EC_SMDAT_DBG

2.4.15 General purpose I/O connector (DIO1)



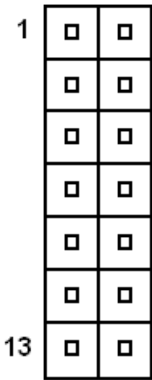
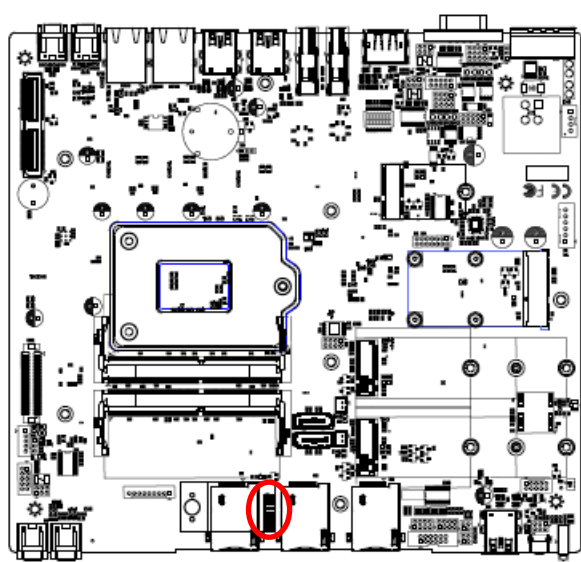
Signal	PIN	PIN	Signal
DIO_GPO0	1	2	DIO_GPI0
DIO_GPO1	3	4	DIO_GPI1
DIO_GPO2	5	6	DIO_GPI2
DIO_GPO3	7	8	DIO_GPI3
NC	9	10	NC
GND	11	12	NC

2.4.16 CAN Module connector 1 (CAN1)



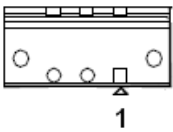
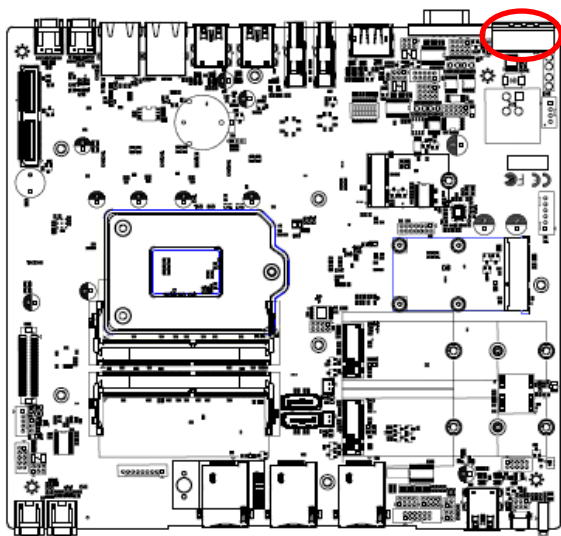
Signal	PIN
BAT_PWR	1
CAN_8	2
CAN_9	3
BAT_GND	4
CAN_11	5
CAN_12	6
CAN_13	7
CAN_14	8
NC	9

2.4.17 CAN Module connector 2 (CAN2)



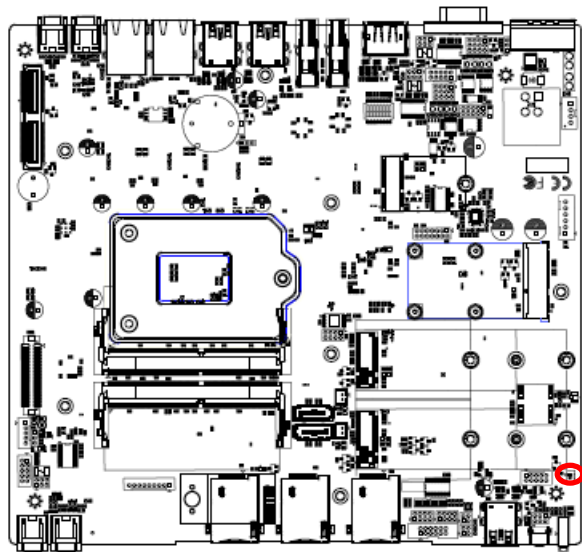
Signal	PIN	PIN	Signal
CAN_PWR	1	2	CAN_8
CAN_IND	3	4	CAN_9
GND	5	6	BAT_GND
CAN_WAKE	7	8	CAN_11
CAN_TX	9	10	CAN_12
CAN_RX	11	12	CAN_13
+5V	13	14	CAN_14

2.4.18 DC-Input connector (JVIN1)



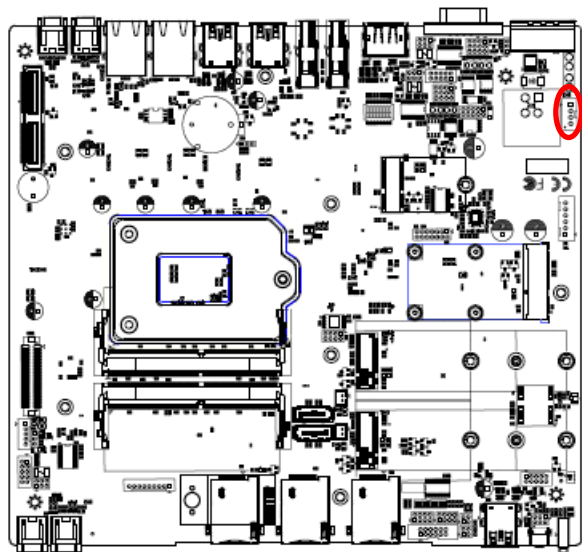
Signal	PIN
+VIN_BAT	1
ACC_ON	2
GND	3

2.4.19 Battery connector (BT1)



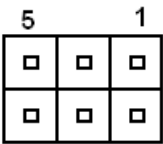
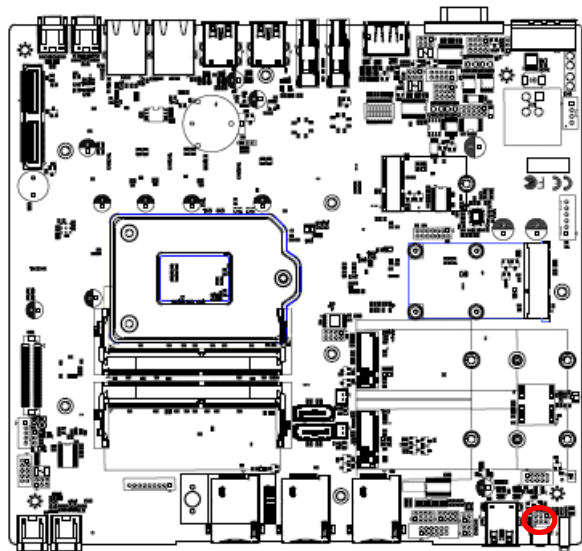
Signal	PIN
+RTCBATT	1
GND	2

2.4.20 DC Input connector (DCIN1)



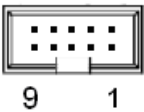
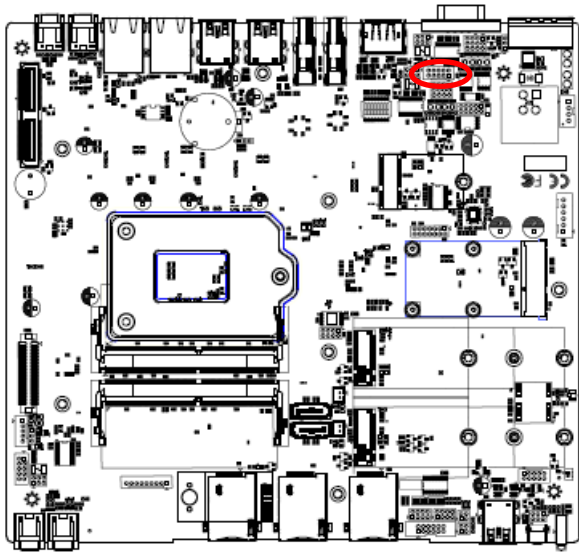
Signal	PIN
+VIN	1
+VIN	2
GND	3
GND	4

2.4.21 Front Panel connector (JFP1)



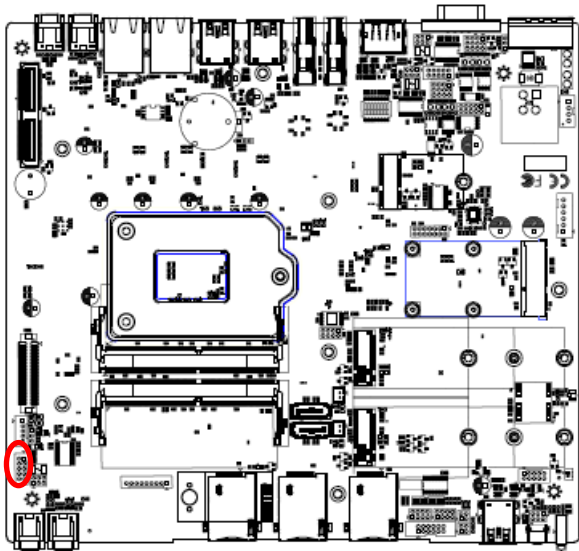
Signal	PIN	PIN	Signal
PWRBTN_R_IN#	1	2	GND
PWR_LED+	3	4	PWR_LED-
PM_R_SYSRST#	5	6	GND

2.4.22 Serial port 2 connector (JCOM2)



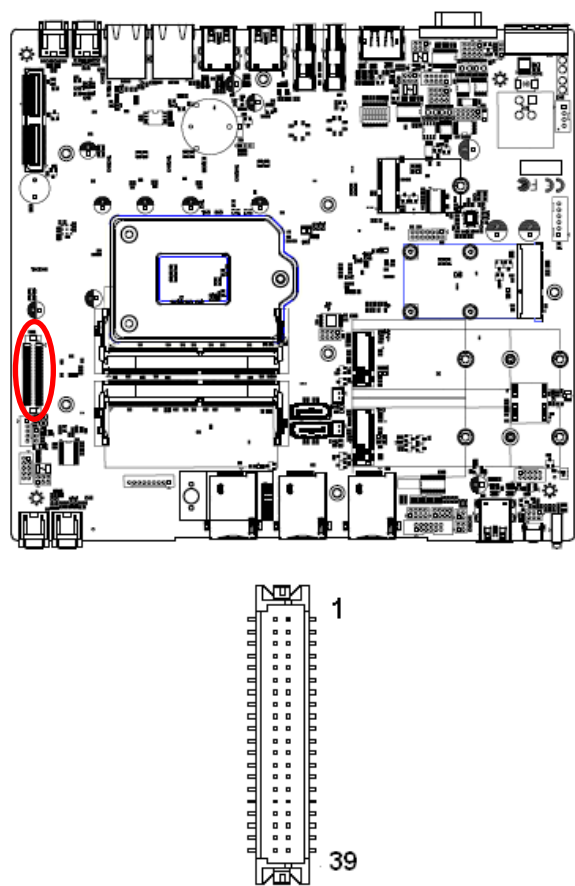
Signal	PIN	PIN	Signal
COM2-1	1	2	COM2-2
COM2-3	3	4	COM2-4
GND	5	6	NDSRB#
NRTSB#	7	8	NCTSB#
NRIB#	9	10	NC

2.4.23 Serial port 3 connector (JCOM3)



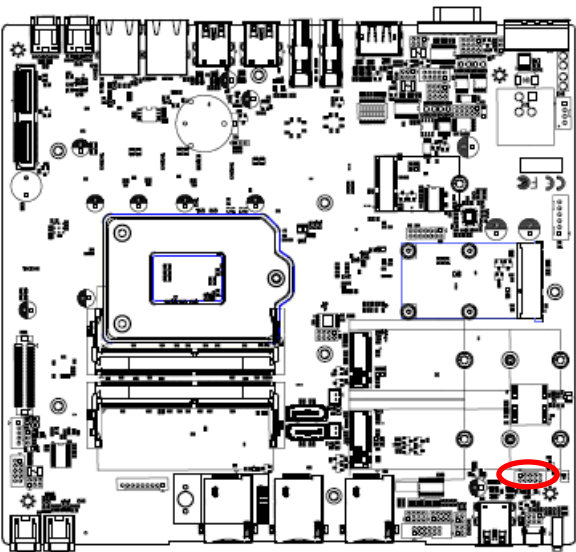
Signal	PIN	PIN	Signal
NDCDC#	1	2	NRXDC
NTXDC	3	4	NDTRC#
GND	5	6	NDSRC#
NRTSC#	7	8	NCTSC#
NRIC#	9	10	NC

2.4.24 LVDS connector (JLVDS1)



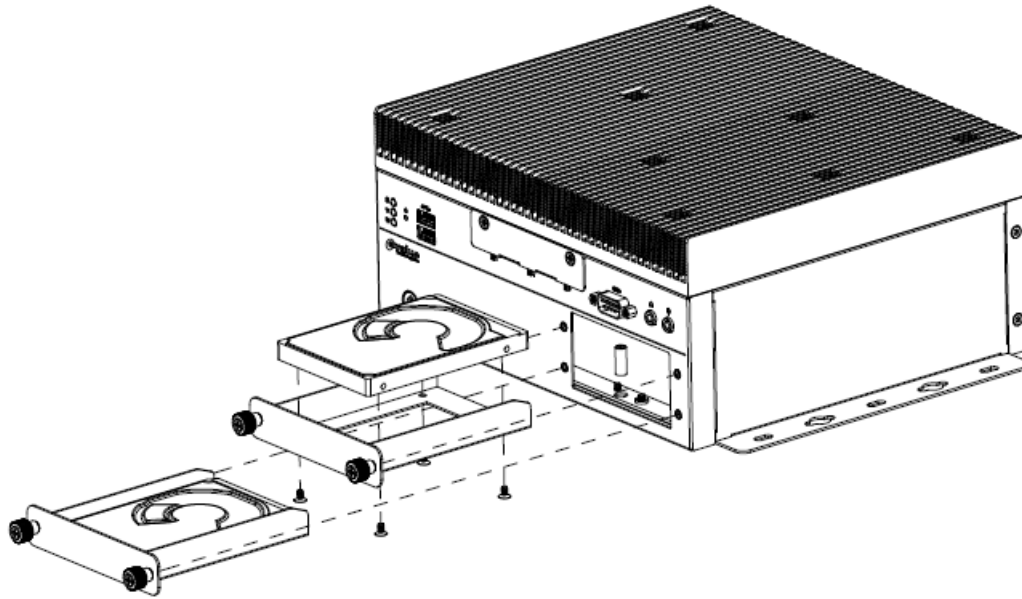
Signal	PIN	PIN	Signal
+5V	2	1	+3.3V
+5V	4	3	+3.3V
NC	6	5	NC
GND	8	7	GND
LVDS_DATA0_P	10	9	LVDS_DATA1_P
LVDS_DATA0_N	12	11	LVDS_DATA1_N
GND	14	13	GND
LVDS_DATA2_P	16	15	LVDS_DATA3_P
LVDS_DATA2_N	18	17	LVDS_DATA3_N
GND	20	19	GND
LVDS_DATA4_P	22	21	LVDS_DATA5_P
LVDS_DATA4_N	24	23	LVDS_DATA5_N
GND	26	25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

2.4.25 USB connector (JUSB1)



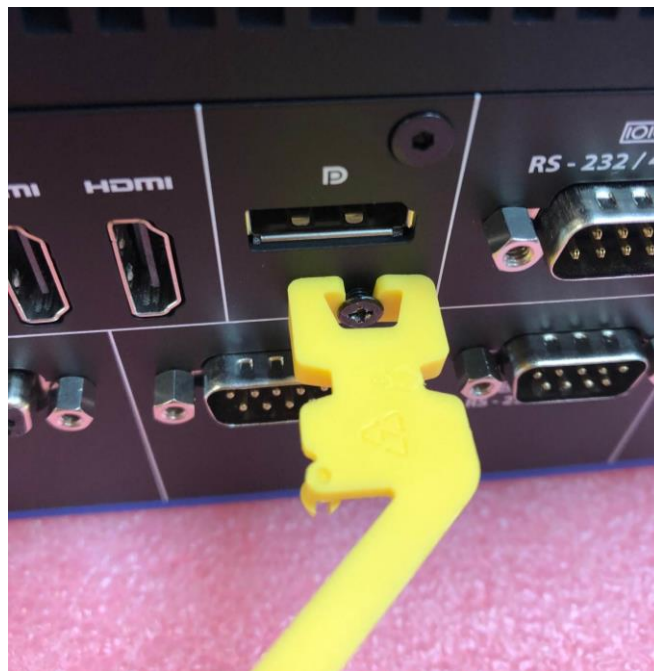
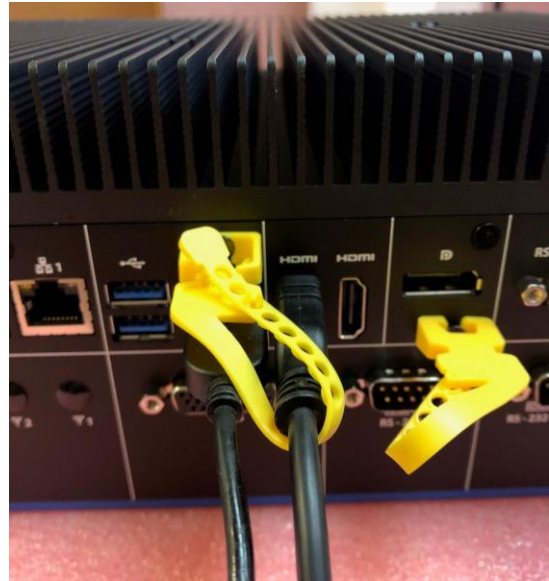
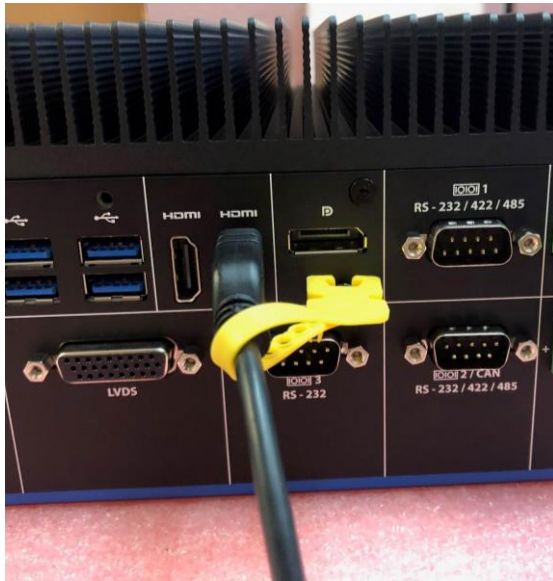
Signal	PIN	PIN	Signal
NC	1	2	+5VSB
NC	3	4	USB_DN14
NC	5	6	USB_DP14
NC	7	8	GND
NC	9	10	GND

2.5 Installing Hard Disk & Memory, PCI devices



- Step 1.** Unfasten 4 screws from the HDD brackets and take it off.
- Step 2.** Remove 4 screws to release the HDD bracket.
- Step 3.** Slide HDD into its bracket until properly seated.
- Step 4.** Secure HDD by means of 4 screws.
- Step 5.** Insert HDD bracket into designated locations and fasten with 2 screws to complete HDD installation.

2.6 HDMI Cable Lock



Step 1. Lock the cable tie on the screw to secure the HDMI cable.

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 BIOS supports an override to the NVRAM settings which resets your system to its defaults.

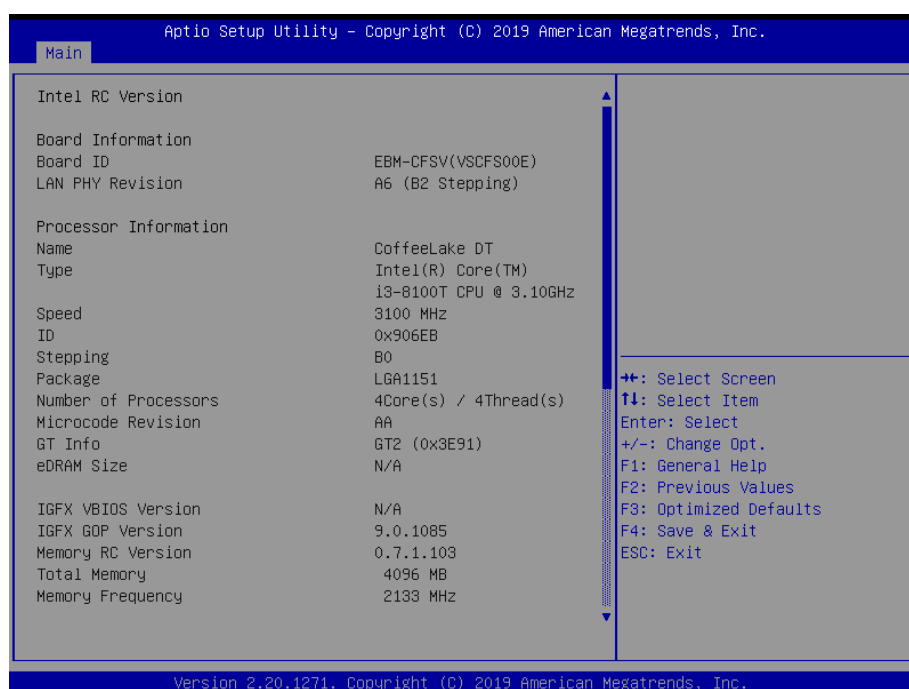
The best advice is to only alter settings which you thoroughly understand. To this end, we strongly recommend that you avoid making any changes to the chipset defaults. These defaults have been carefully chosen by both your systems manufacturer to provide the absolute maximum performance and reliability. 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.



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.

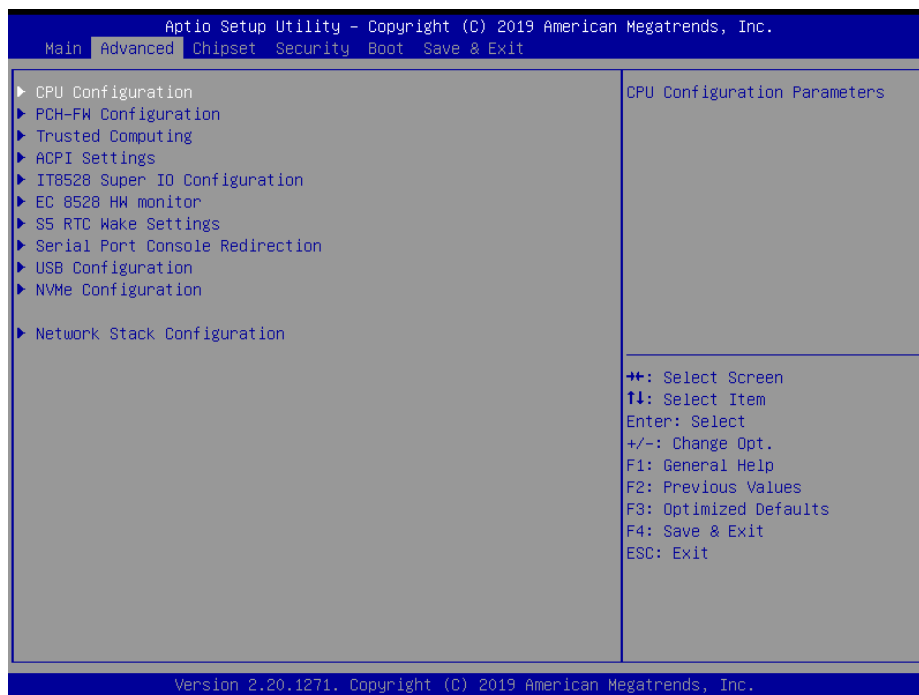


Note: The BIOS setup screens shown in this chapter are for reference purposes only, and may not exactly match what you see on your screen.

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

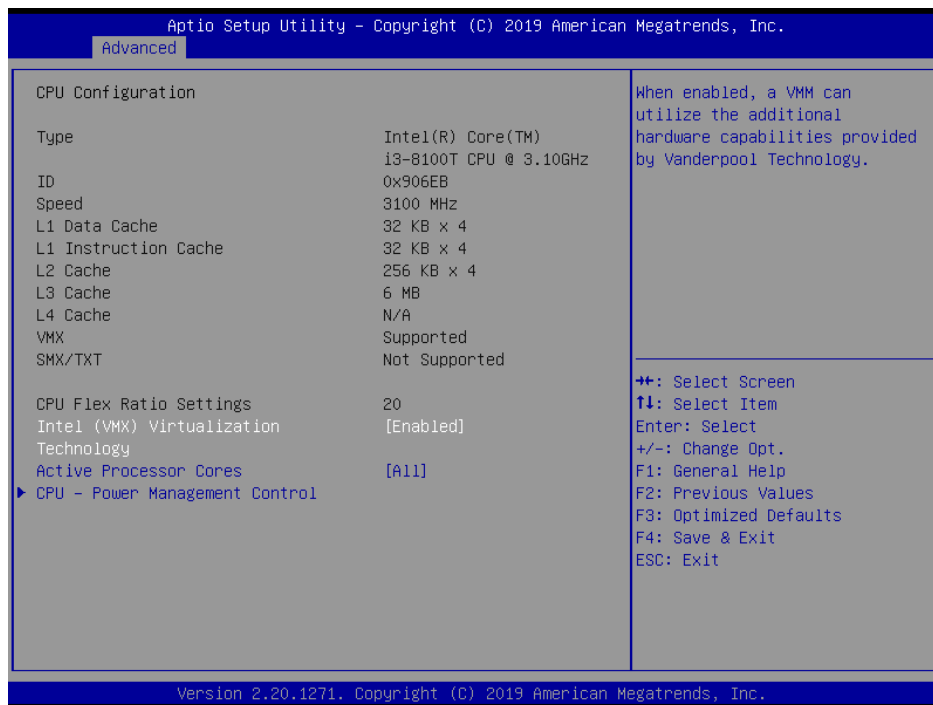
3.6.2 Advanced Menu

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



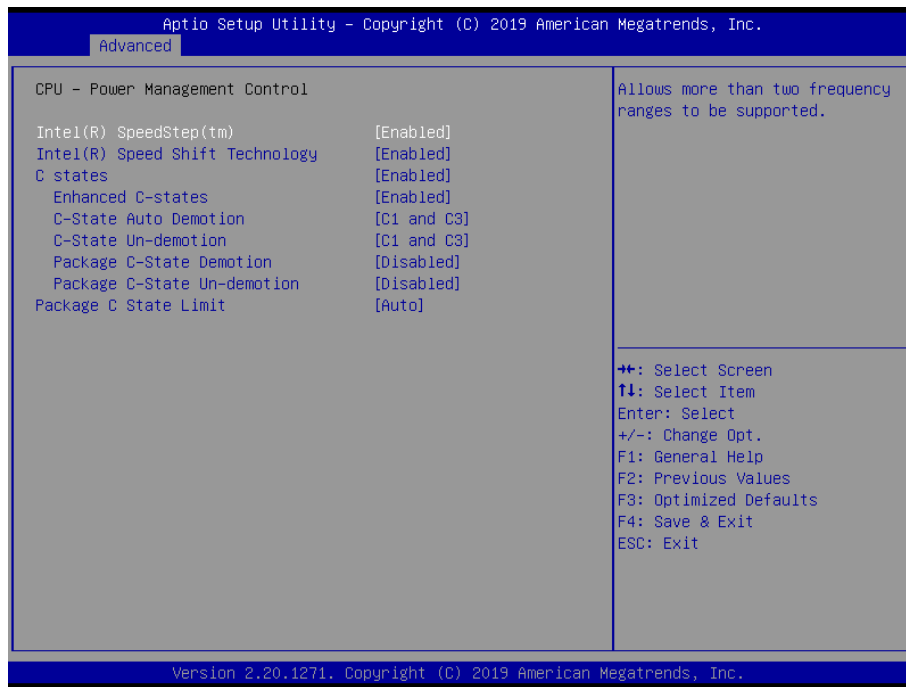
3.6.2.1 CPU Configuration

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



Item	Options	Description
Intel (VMX) Virtualization Technology	Disabled Enabled[Default]	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
Active Processor Cores	All[Default] 1 2 3	Number of cores to enable in each processor package.

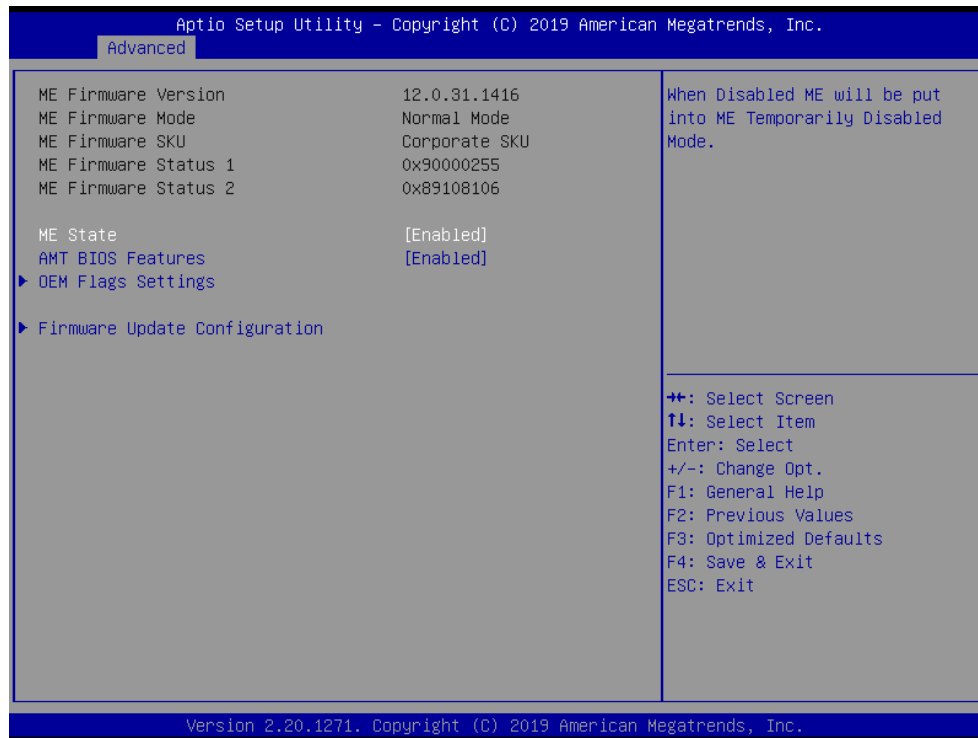
3.6.2.1.1 CPU – Power Management Control



Item	Option	Description
Intel® SpeedStep™	Enabled[Default], Disabled	Allows more than two frequency ranges to be supported.
Intel® Speed Shift Technology	Enabled[Default], Disabled	Enable/Disable Intel® Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware controlled P-states.
C States	Enabled[Default], Disabled	Enable/Disable CPU Power Management. Allows CPU to go to C states when it's not 100% utilized.
Enhanced C-states	Enabled[Default], Disabled	Enable/Disable C1E. When enabled, CPU will switch to minimum speed when all cores enter C-State.
C-State Auto Demotion	Disabled, C1, C3, C1 and C3[Default]	Configure C-State Auto Demotion.
C-State Un-demotion	Disabled, C1, C3, C1 and C3[Default]	Configure C-State Un-demotion.
Package C-State Demotion	Enabled, Disabled[Default]	Package C-State Demotion.
Package C-State Un-demotion	Enabled, Disabled[Default]	Package C-State Un-demotion.
Package C State Limit	C0/C1, C2, C3, C6, C7, C7S	Maximum Package C State Limit Setting. CPU Default: Leaves to Factory default value. Auto: Initializes to deepest available Package C State Limit.

	C8 C9 C10 CPU Default Auto[Default]	
--	---	--

3.6.2.2 PCH-FW Configuration



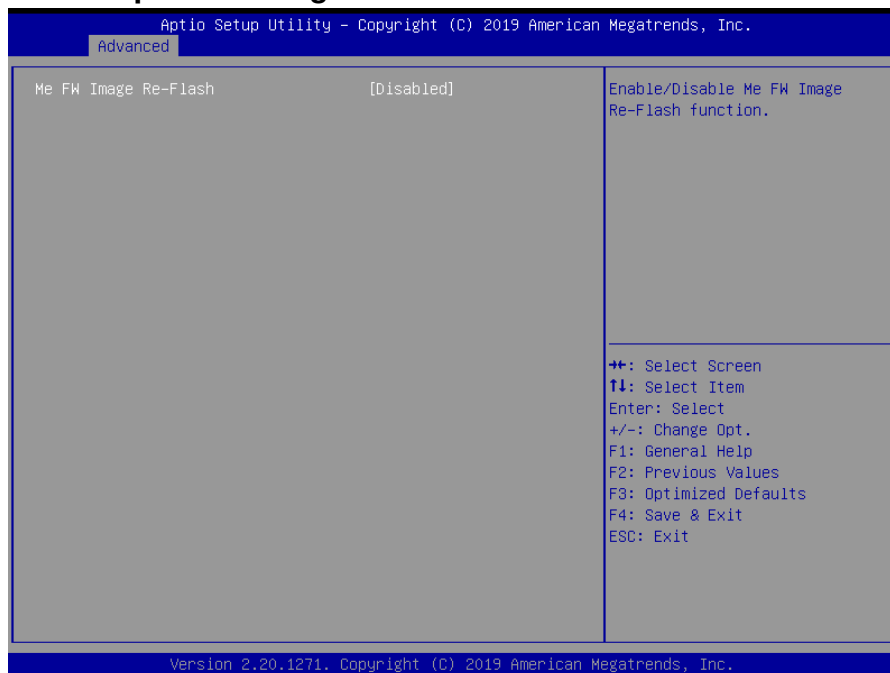
Item	Options	Description
ME State	Disabled, Enabled[Default]	When Disabled ME will be put into ME Temporarily Disabled Mode.
AMT BIOS Features	Disabled, Enabled[Default]	When disable AMT BIOS Features are no longer supported and user is no longer able to access MEBx Setup. Note: This option does not disable Manageability Features in FW.

3.6.2.2.1 OEM Flags Settings



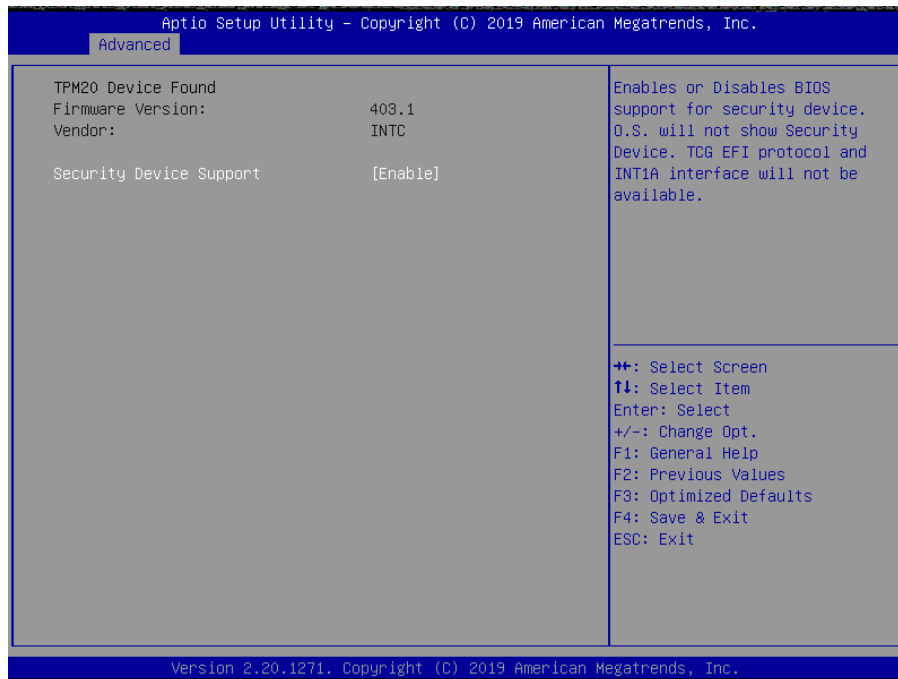
Item	Option	Description
Unconfigure ME	Disabled[Default], Enabled	OEMFlag Bit 15: Unconfigure ME with resetting MEBx password to default.

3.6.2.2.2 Firmware Update Configuration



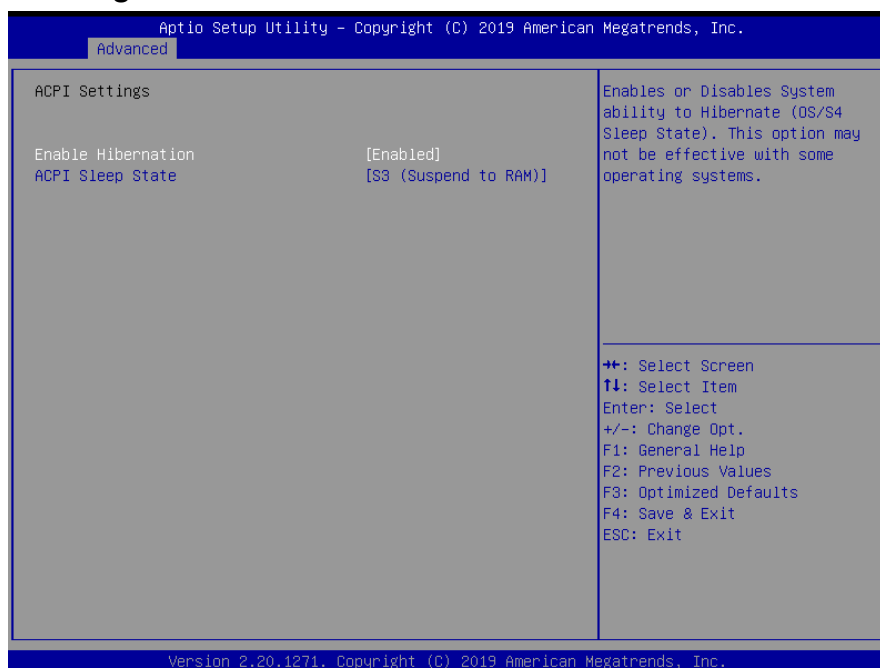
Item	Option	Description
Me FW Image Re-Flash	Disabled[Default], Enabled	Enable/Disable Me FW Image Re-Flash function.

3.6.2.3 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.

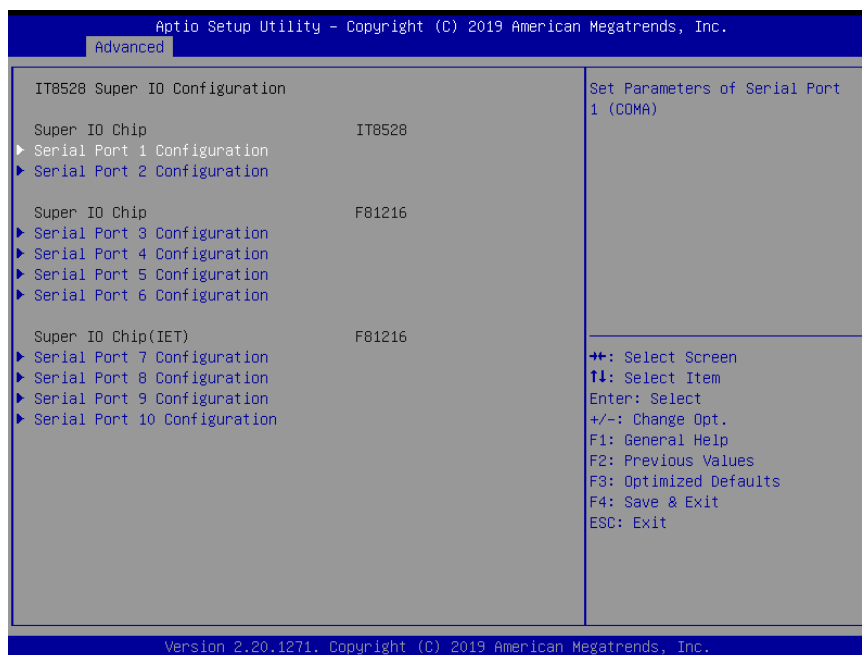
3.6.2.4 APCI Settings



Item	Options	Description
Enable Hibernation	Disabled Enabled[Default],	Enables or Disables System ability to Hibernates (OS/S4 Sleep State). This option may not be effective with some operating systems.
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.

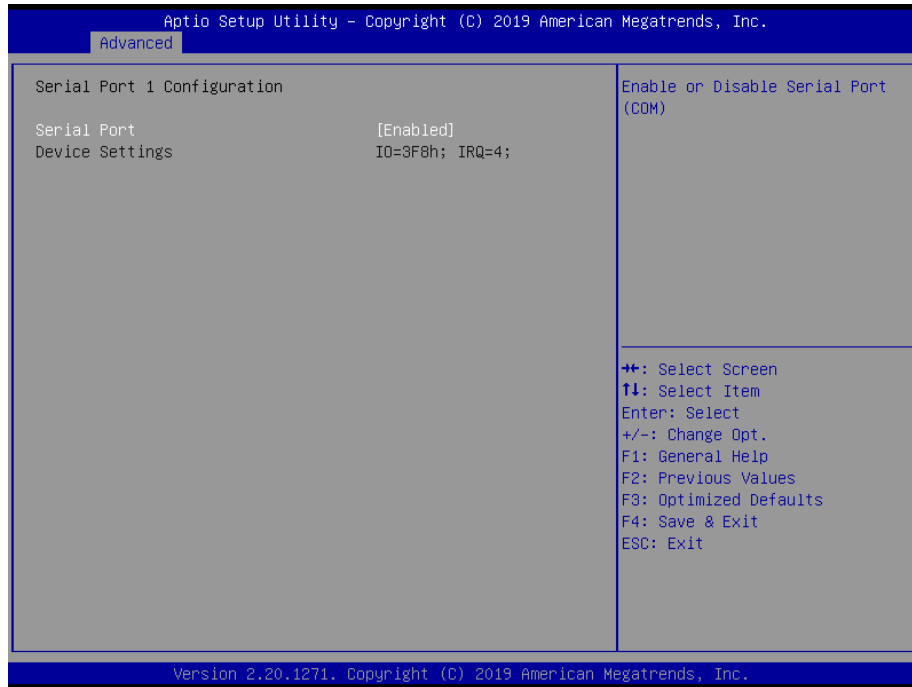
3.6.2.5 IT8528 Super IO Configuration

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~ 3.6.2.5.10 for more information.



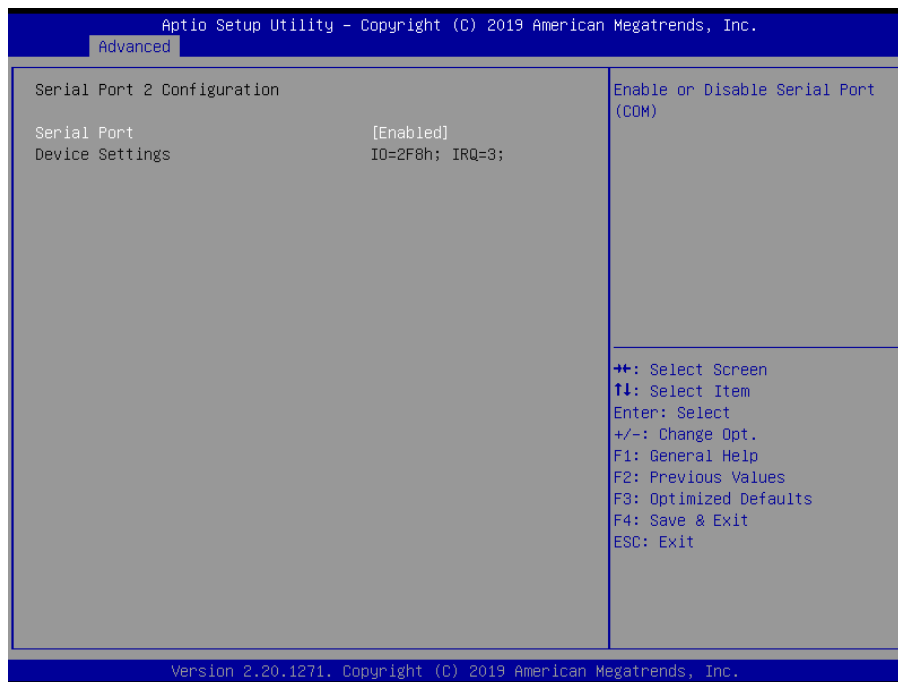
Item	Description
Serial Port 1 Configuration	Set Parameters of Serial Port 1 (COMA).
Serial Port 2 Configuration	Set Parameters of Serial Port 2 (COMB).
Serial Port 3 Configuration	Set Parameters of Serial Port 3 (COMC).
Serial Port 4 Configuration	Set Parameters of Serial Port 4 (COMD).
Serial Port 5 Configuration	Set Parameters of Serial Port 5 (COME).
Serial Port 6 Configuration	Set Parameters of Serial Port 6 (COMF).
Serial Port 7 Configuration	Set Parameters of Serial Port 7 (COMG).
Serial Port 8 Configuration	Set Parameters of Serial Port 8 (COMH).
Serial Port 9 Configuration	Set Parameters of Serial Port 9 (COMI).
Serial Port 10 Configuration	Set Parameters of Serial Port 10 (COMJ).

3.6.2.5.1 Serial Port 1 Configuration



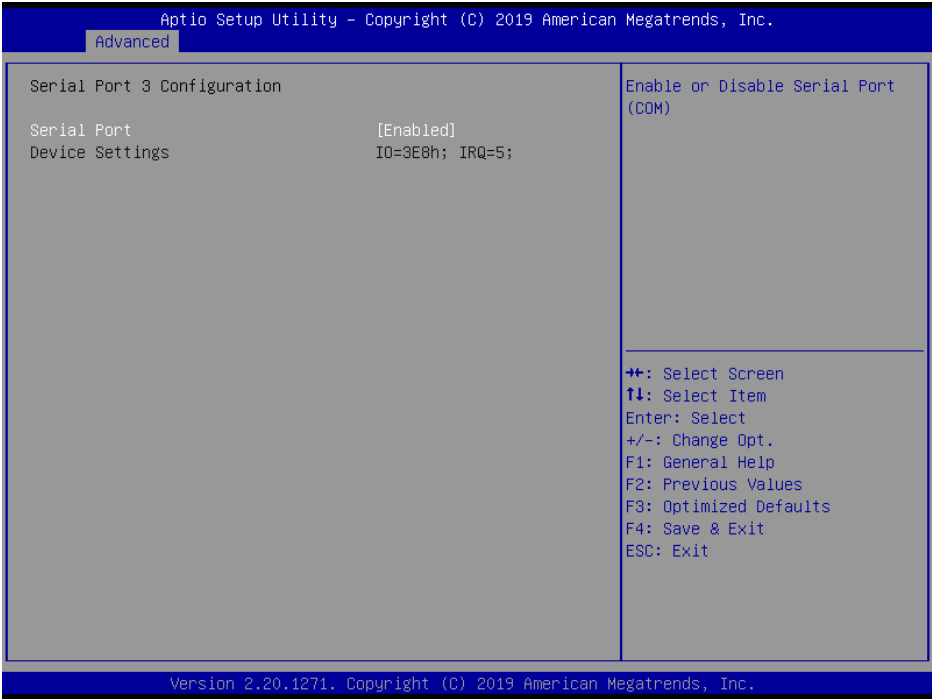
Item	Option	Description
Serial Port	Enabled[Default], Disabled	Enable or Disable Serial Port (COM).

3.6.2.5.2 Serial Port 2 Configuration



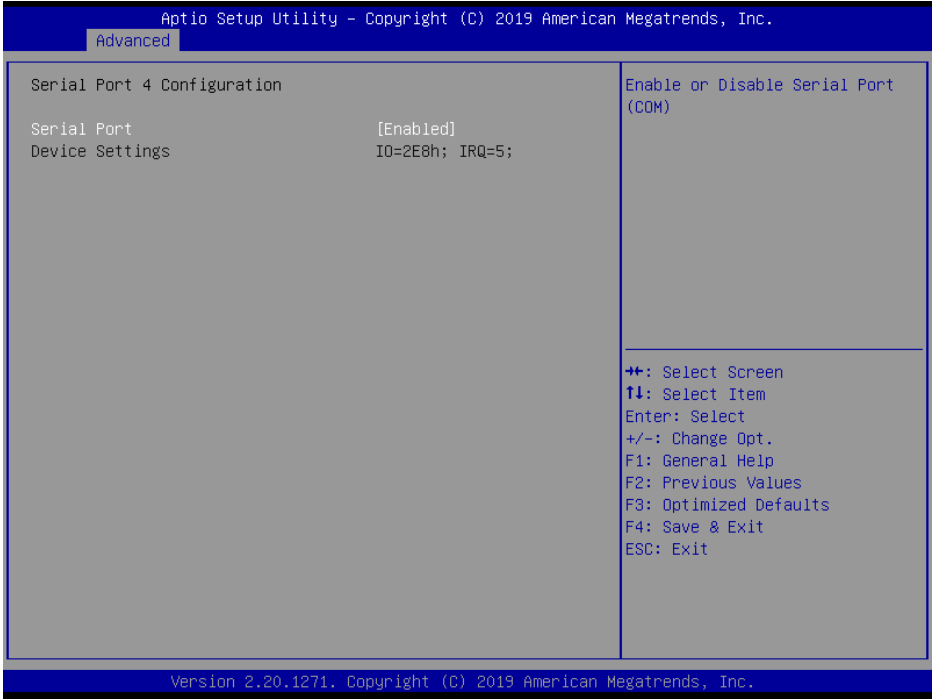
Item	Option	Description
Serial Port	Enabled[Default], Disabled	Enable or Disable Serial Port (COM).

3.6.2.5.3 Serial Port 3 Configuration



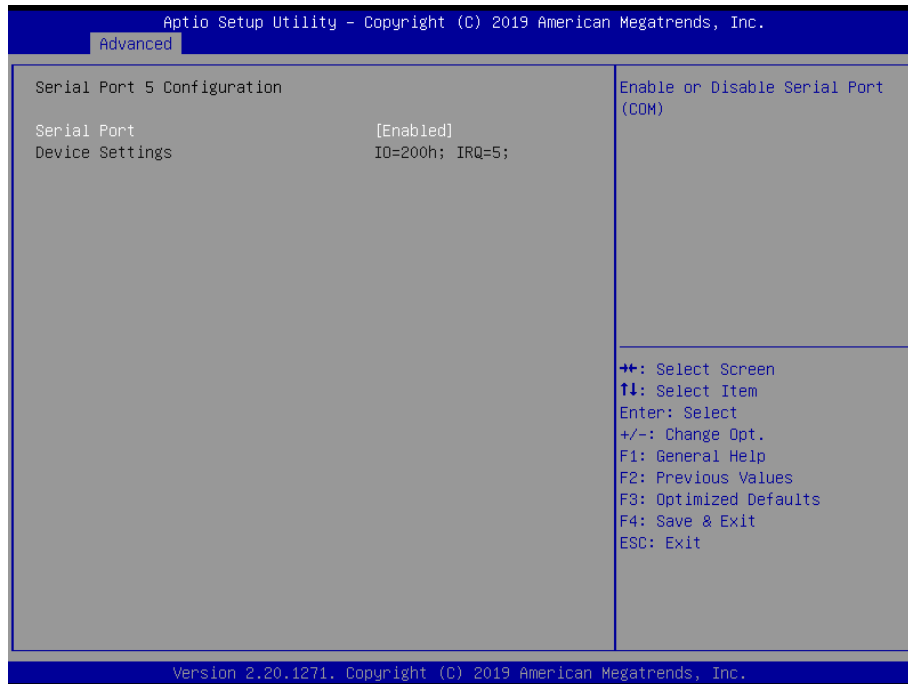
Item	Option	Description
Serial Port	Enabled [Default] , Disabled	Enable or Disable Serial Port (COM).

3.6.2.5.4 Serial Port 4 Configuration



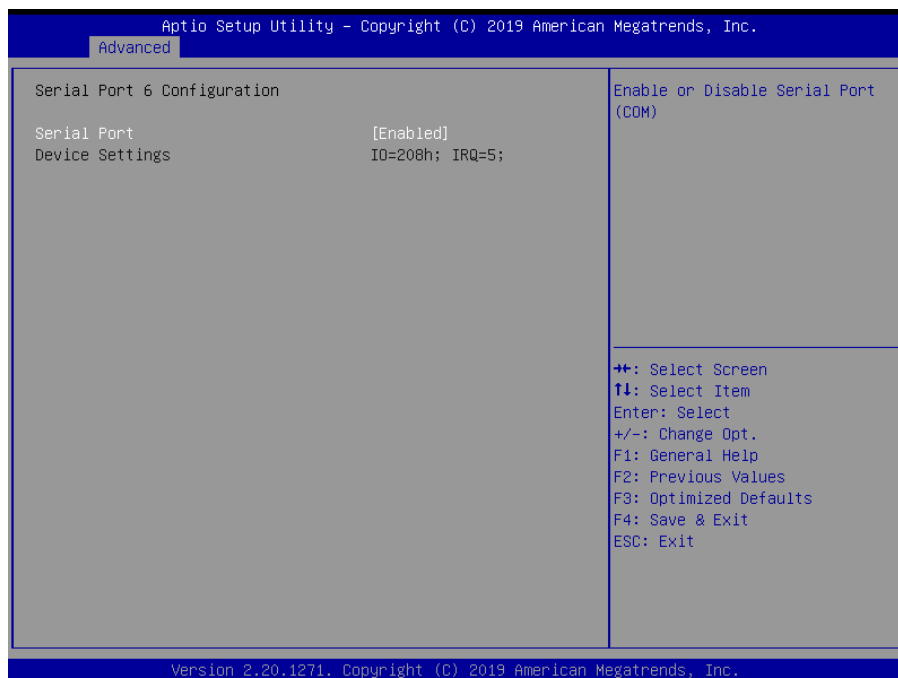
Item	Option	Description
Serial Port	Enabled [Default] , Disabled	Enable or Disable Serial Port (COM).

3.6.2.5.5 Serial Port 5 Configuration



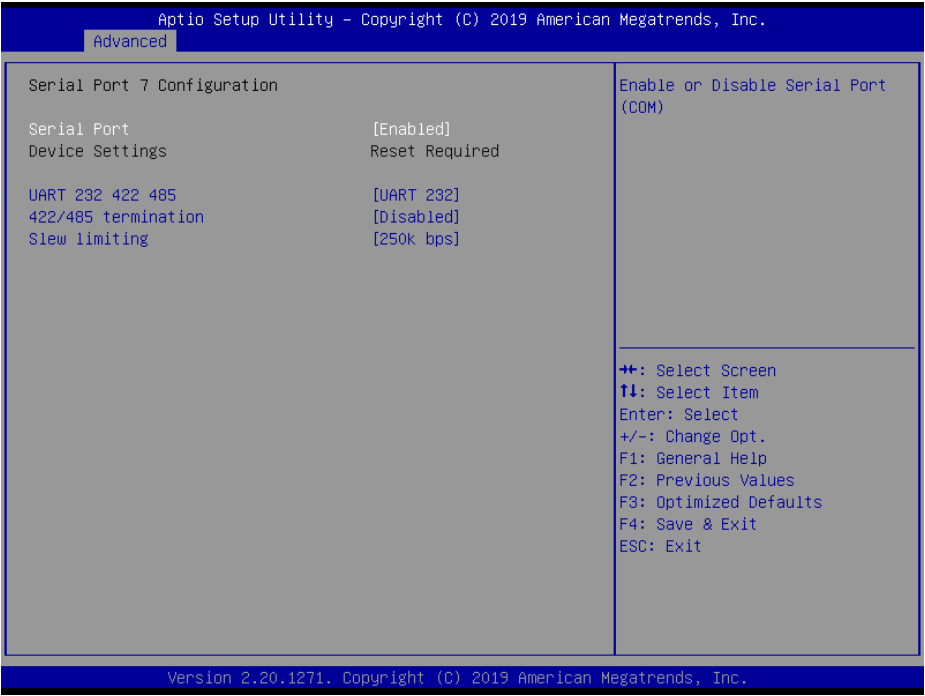
Item	Option	Description
Serial Port	Enabled[Default], Disabled	Enable or Disable Serial Port (COM).

3.6.2.5.6 Serial Port 6 Configuration



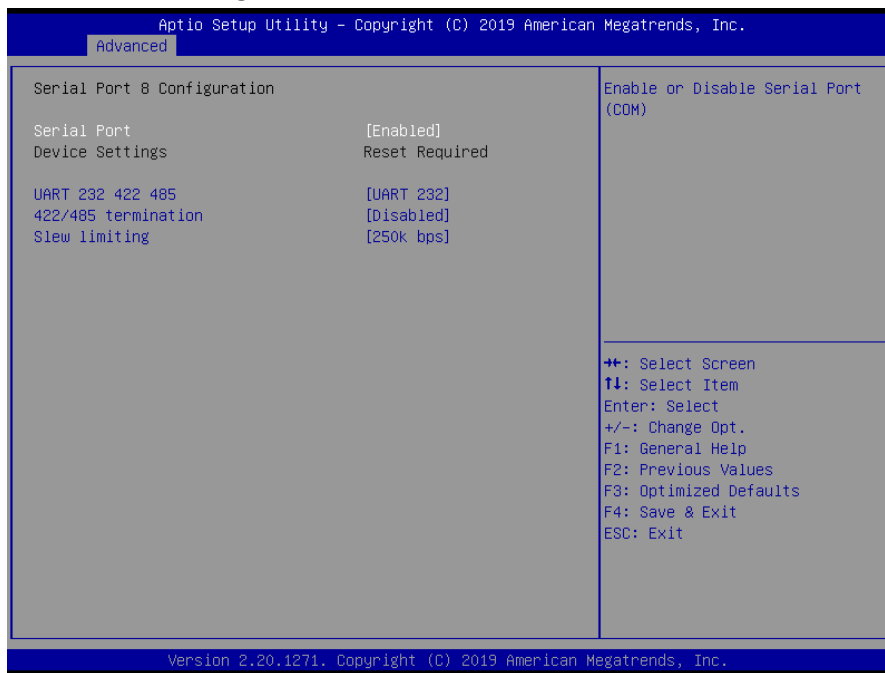
Item	Option	Description
Serial Port	Enabled[Default], Disabled	Enable or Disable Serial Port (COM).

3.6.2.5.7 Serial Port 7 Configuration



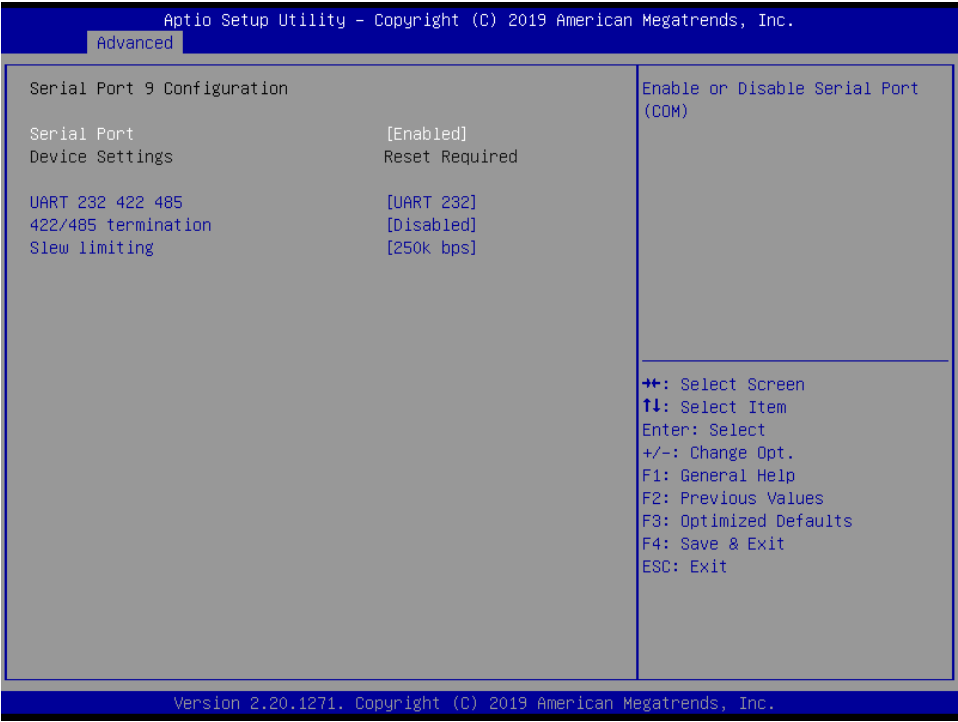
Item	Option	Description
Serial Port	Enabled [Default] , Disabled	Enable or Disable Serial Port (COM).
UART 232 422 485	UART 232(LOOPBACK) UART 232 [Default] UART 422 UART 485	Change the Serial Port as RS232/422/485.
422/485 termination	Enabled Disabled [Default]	TERM from GPIO.
Slew limiting	10M bps 250k bps [Default]	SLEW from GPIO.

3.6.2.5.8 Serial Port 8 Configuration



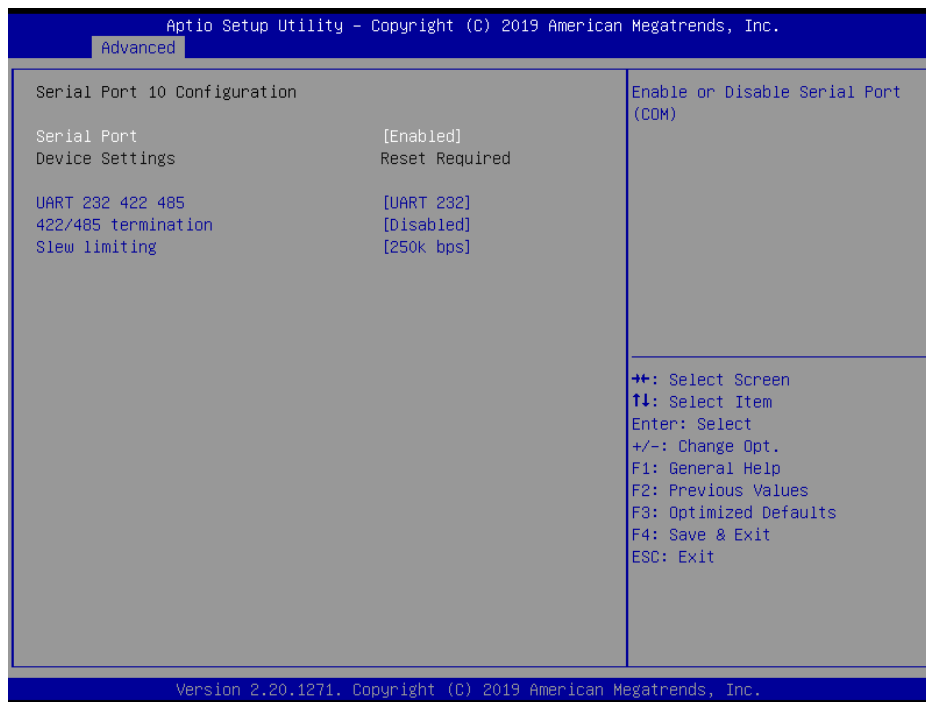
Item	Option	Description
Serial Port	Enabled[Default], Disabled	Enable or Disable Serial Port (COM).
UART 232 422 485	UART 232(LOOPBACK) UART 232[Default] UART 422 UART 485	Change the Serial Port as RS232/422/485.
422/485 termination	Enabled Disabled[Default]	TERM from GPIO.
Slew limiting	10M bps 250k bps[Default]	SLEW from GPIO.

3.6.2.5.9 Serial Port 9 Configuration



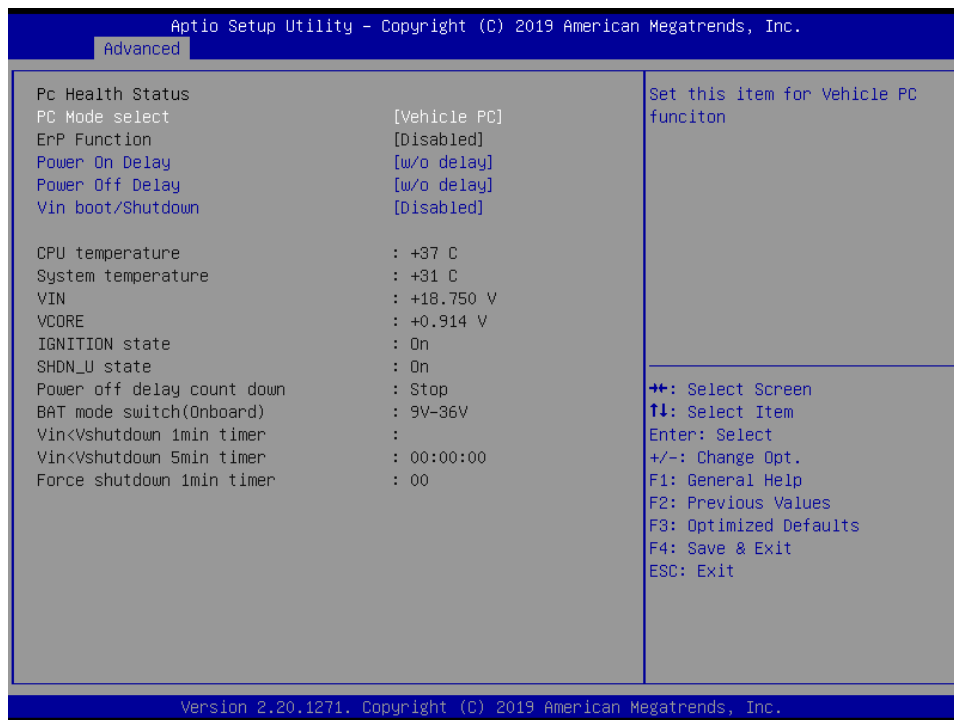
Item	Option	Description
Serial Port	Enabled [Default] , Disabled	Enable or Disable Serial Port (COM).
UART 232 422 485	UART 232(LOOPBACK) UART 232 [Default] UART 422 UART 485	Change the Serial Port as RS232/422/485.
422/485 termination	Enabled Disabled [Default]	TERM from GPIO.
Slew limiting	10M bps 250k bps [Default]	SLEW from GPIO.

3.6.2.5.10 Serial Port 10 Configuration



Item	Option	Description
Serial Port	Enabled[Default], Disabled	Enable or Disable Serial Port (COM).
UART 232 422 485	UART 232(LOOPBACK) UART 232[Default] UART 422 UART 485	Change the Serial Port as RS232/422/485.
422/485 termination	Enabled Disabled[Default]	TERM from GPIO.
Slew limiting	10M bps 250k bps[Default]	SLEW from GPIO.

3.6.2.6 EC 8528 HW Monitor



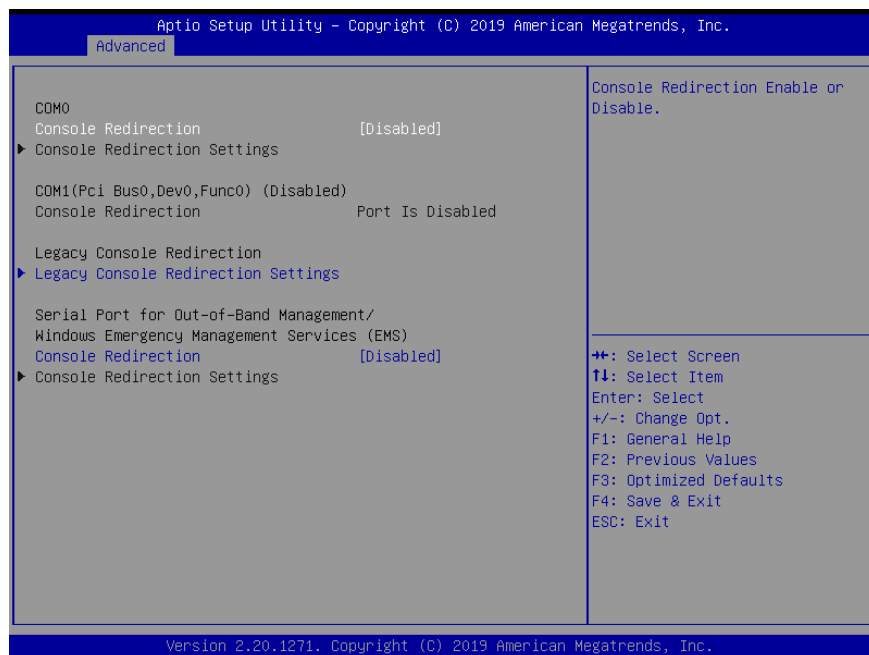
Item	Options	Description
PC Mode select	Industry PC Vehicle PC[Default]	Set this item for Vehicle PC function.
ErP Function	Enabled, Disabled[Default]	ErP Function(Deep S5).
Power On Delay	w/o delay[Default] 10 Sec 30 Sec 1 Min 5 Min 10 Min 15 Min 30 Min 1 Hour	Power On Delay.
Power Off Delay	w/o delay[Default] 20 Sec 1 Min 5 Min 10 Min 30 Min 1 Hour 6 Hour 18 Hour	Power Off Delay.
Vin boot/Shutdown	Disabled[Default] (11.5V, 10.5V)/(23V, 21V) (12.0V, 11.0V)/(24V, 22V) (12.5V, 11.0V)/(25V, 22V) (12.5V, 11.5V)/(25V, 23V)	Vin > Vboot: Allow system power on Vin < Vshutdown: system shutdown.

3.6.2.7 S5 RTC Wake Settings



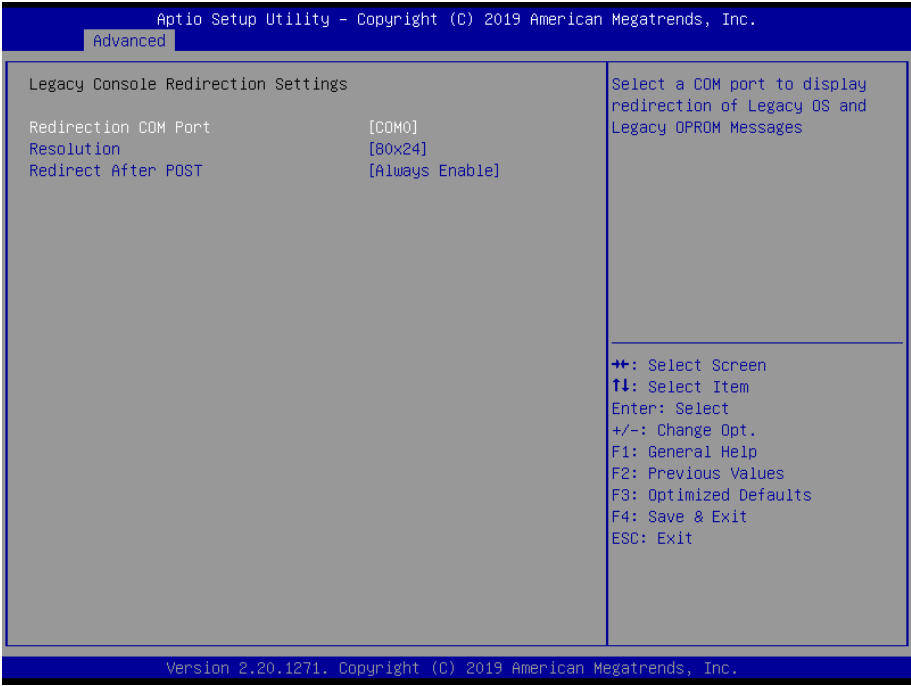
Item	Options	Description
Wake system from S5	Disabled[Default], Fixed Time Dynamic Time	Enable or disable System wake on alarm event. Select Fixed Time, system will wake on the hr:min:sec specified. Select Dynamic Time, System will wake on the current time + Increase minute(s).

3.6.2.8 Serial Port Console Redirection



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

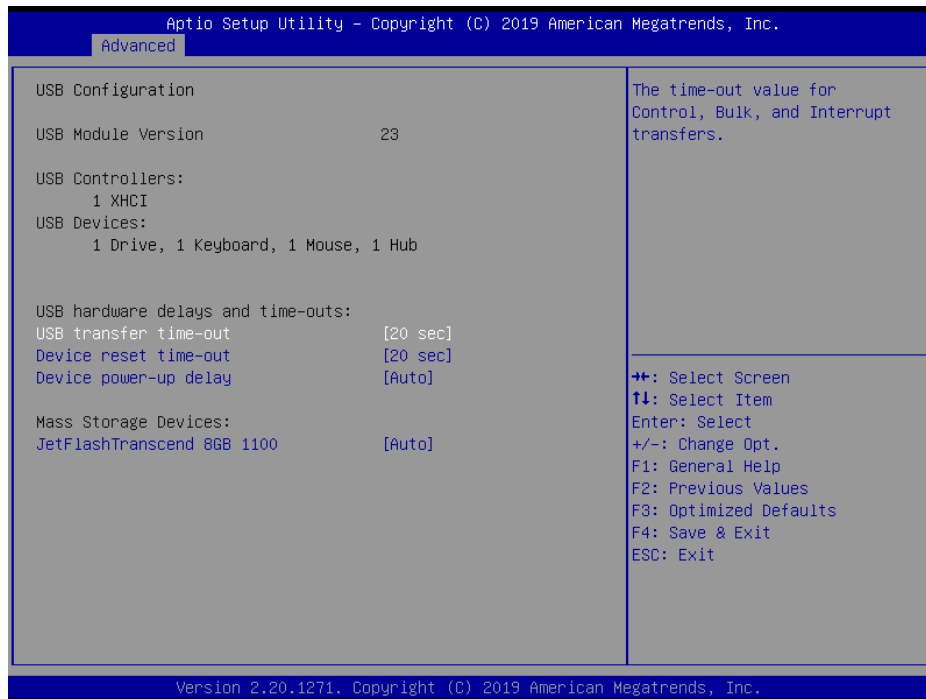
3.6.2.8.1 Legacy Console Redirection Settings



Item	Option	Description
Redirection COM Port	COM0[Default]	Select a COM port to display redirection of Legacy OS and Legacy OPRM Messages.
Resolution	80x24[Default] 80x25	On Legacy OS, the Number of Rows and Columns supported redirection.
Redirect After POST	Always Enable[Default] BootLoader	When Bootloader is selected, then Legacy Console Redirection is disabled before booting to legacy OS. When Always Enable is selected, then Legacy Console Redirection is enabled for legacy OS. Default setting for this option is set to Always Enable.

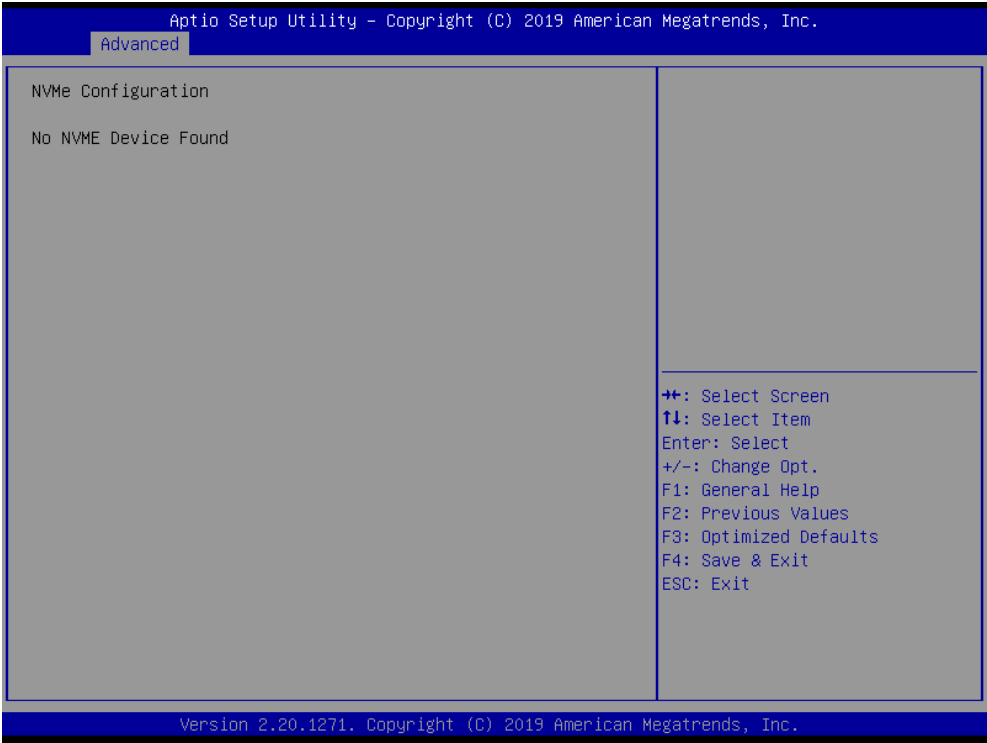
3.6.2.9 USB Configuration

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

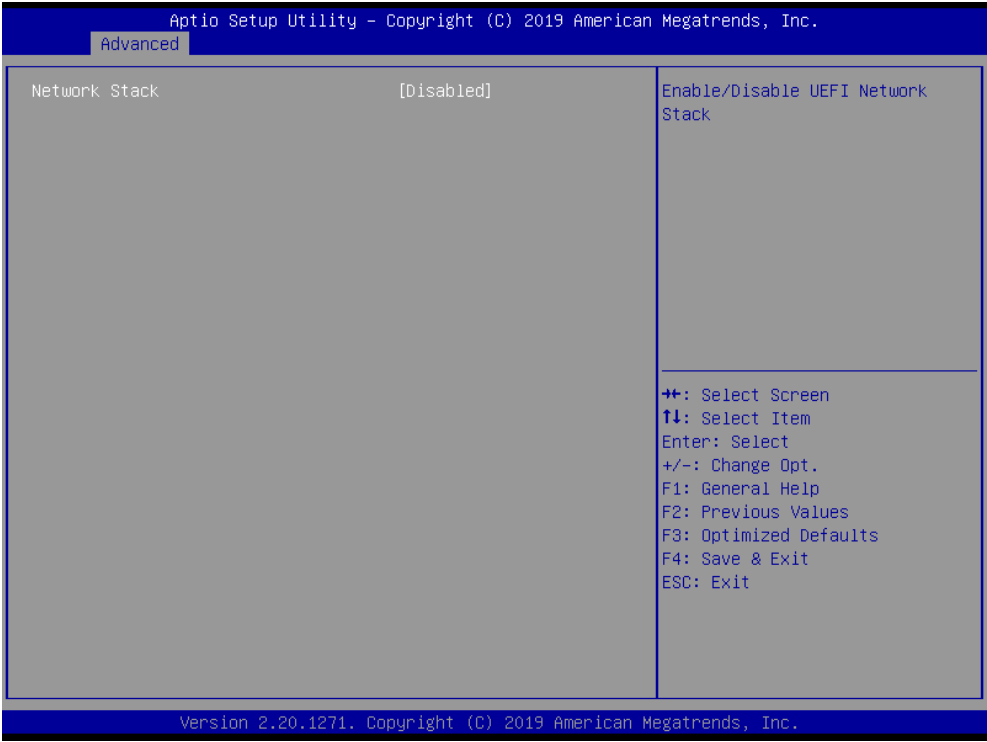


Item	Options	Description
USB transfer time-out	1 sec 5 sec 10 sec 20 sec[Default]	The time-out value for Control, Bulk, and Interrupt transfers.
Device reset time-out	10 sec 20 sec[Default] 30 sec 40 sec	USB mass storage device Start Unit command time-out.
Device power-up delay	Auto[Default] Manual	Maximum 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.
Mass Storage Devices	Auto[Default] Floppy Forced FDD Hard Disk CD-ROM	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.

3.6.2.10 NVMe Configuration

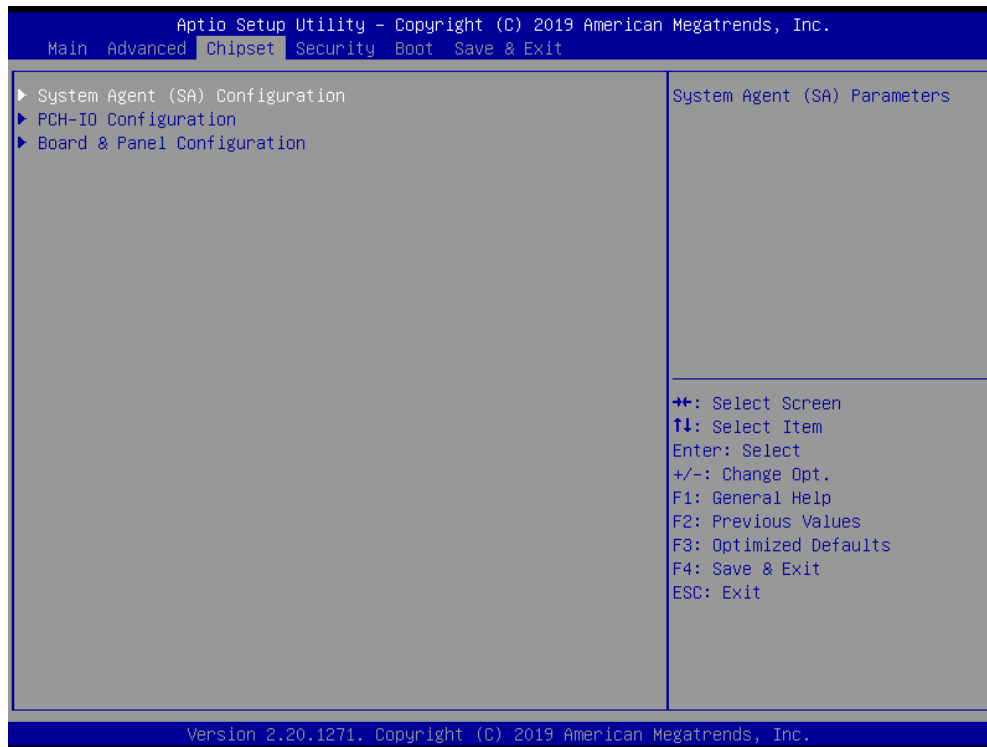


3.6.2.11 Network Stack Configuration



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

3.6.3 Chipset

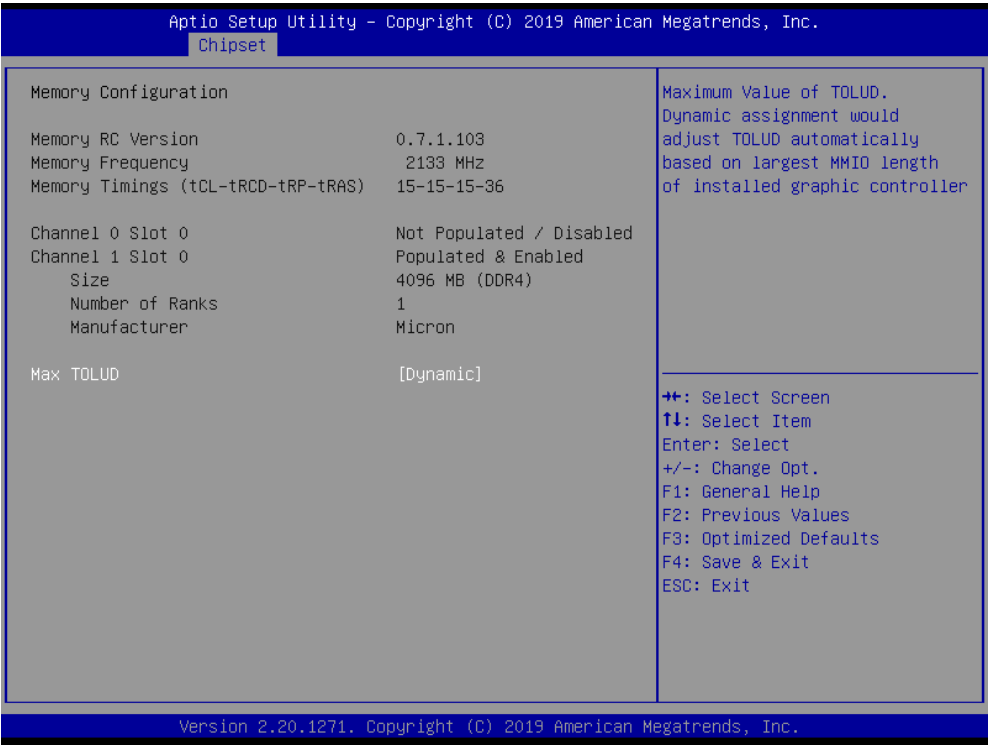


3.6.3.1 System Agent (SA) Configuration



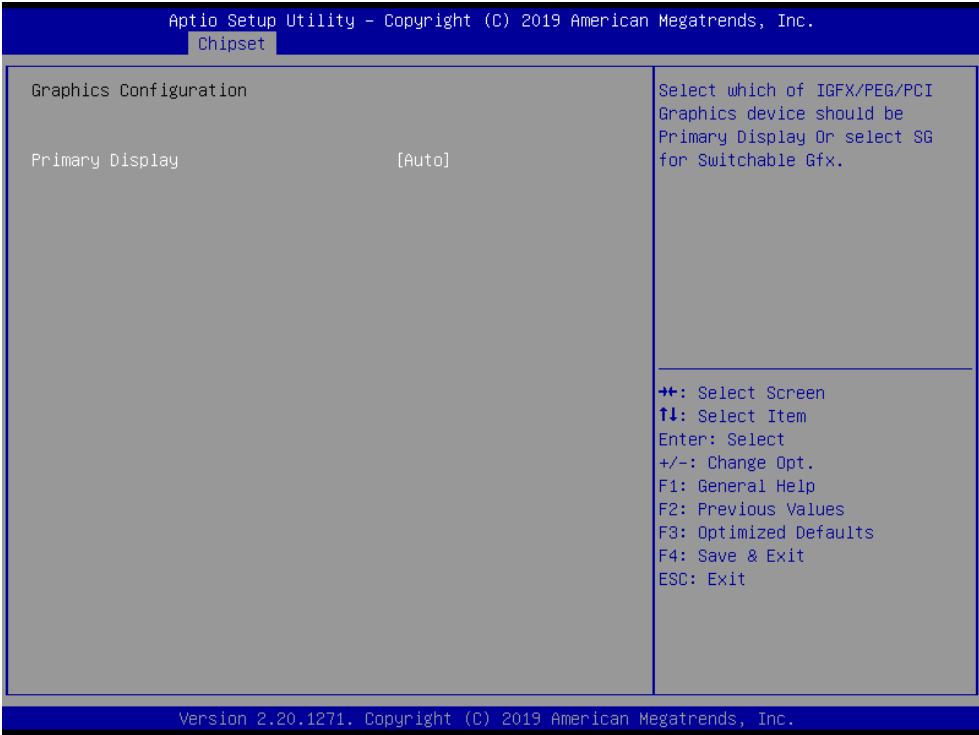
Item	Option	Description
VT-d	Enabled [Default] Disabled	VT-d capability.

3.6.3.1.1 Memory Configuration



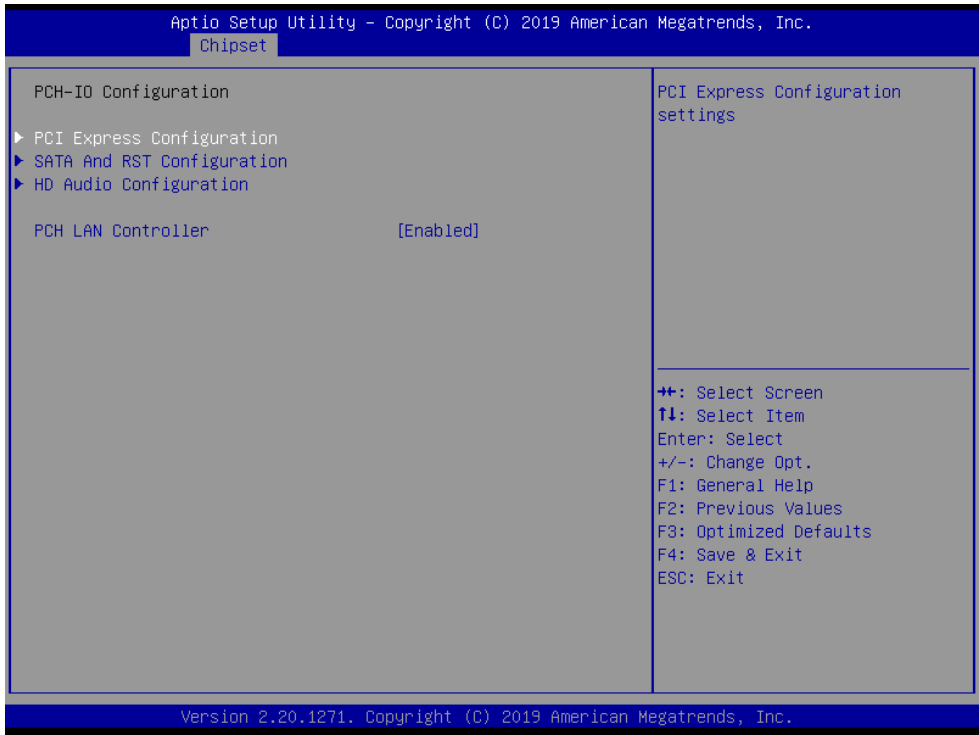
Item	Option	Description
Max TOLUD	Dynamic[Default]	Maximum Value of TOLUD. Dynamic assignment would adjust TOLUD automatically based on largest MMIO length of installed graphic controller.
	1 GB	
	1.25 GB	
	1.5 GB	
	1.75 GB	
	2 GB	
	2.25 GB	
	2.5 GB	
	2.75 GB	
	3 GB	

3.6.3.1.2 Graphics Configuration



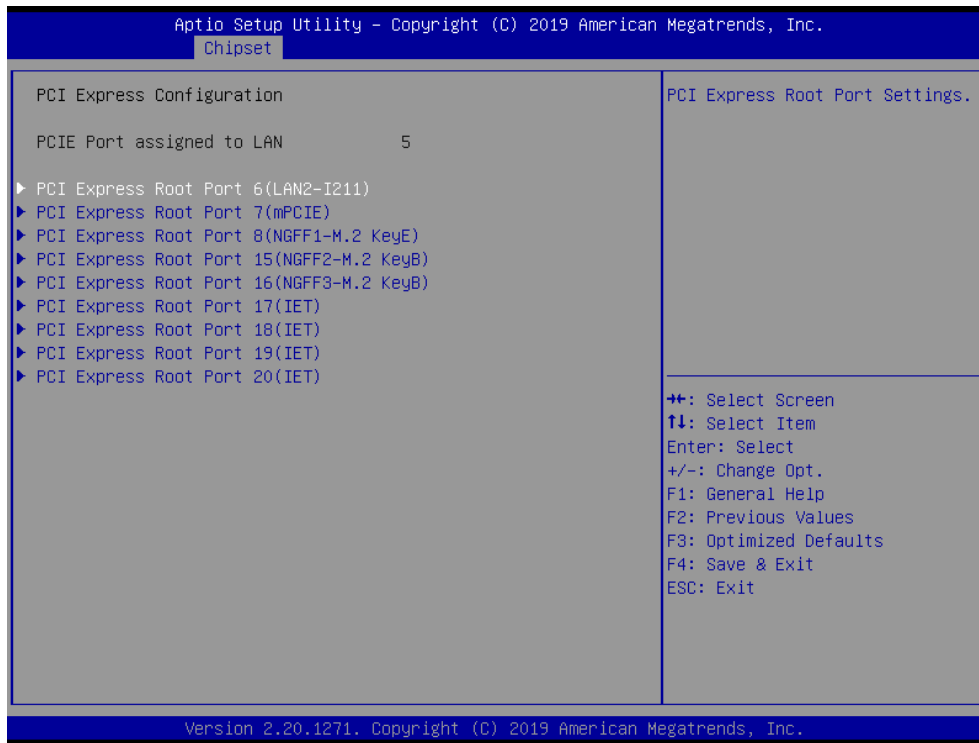
Item	Option	Description
Primary Display	Auto[Default] IGFX	Select which of IGFX/PEG/PCI Graphics device should be Primary Display Or select SG for Switchable Gfx.

3.6.3.2 PCH-IO Configuration

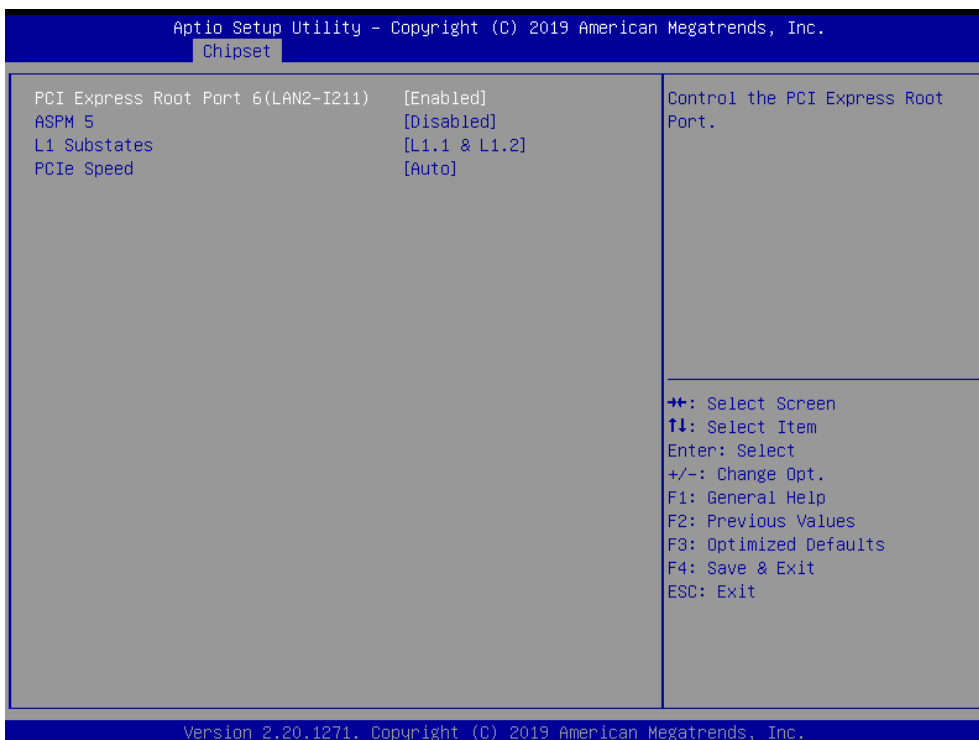


Item	Option	Description
PCH LAN Controller	Disabled Enabled[Default]	Enable/Disable onboard NIC.

3.6.3.2.1 PCI Express Configuration

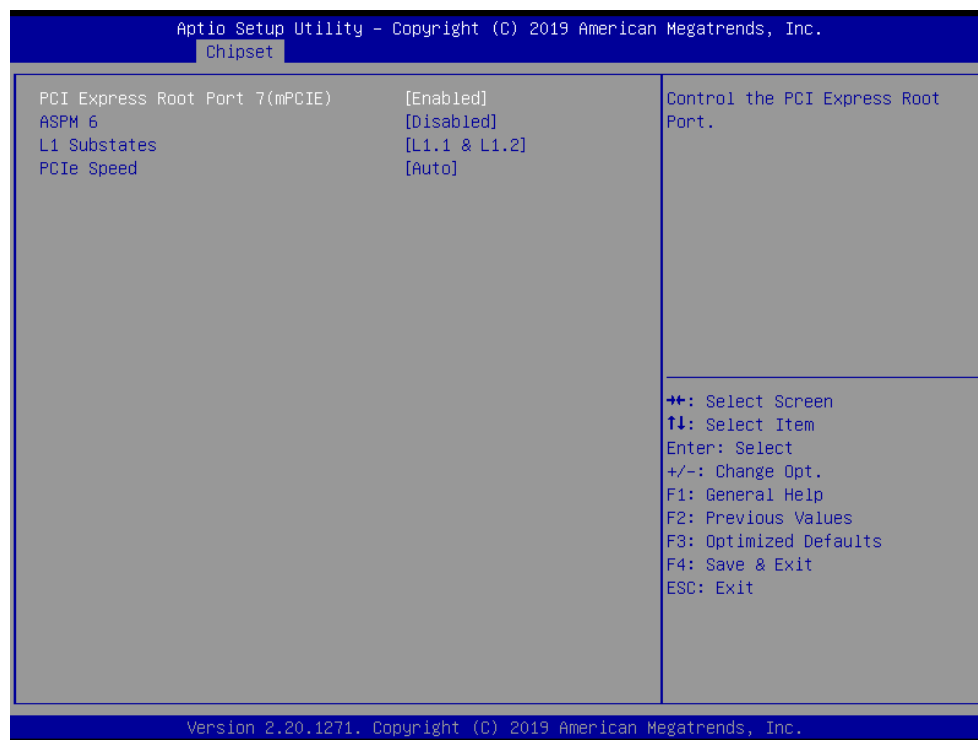


3.6.3.2.1.1 PCI Express Root Port 6(LAN2-I211)



Item	Option	Description
PCI Express Root Port 6(LAN2-I211)	Enabled[Default], Disabled	Control the PCI Express Root Port.
ASPM 5	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 L1.1 & L1.2[Default]	PCI Express L1 Substates settings.
PCIe Speed	Auto[Default] Gen1 Gen2 Gen3	Configure PCIe Speed.

3.6.3.2.1.2 PCI Express Root Port 7(mPCIIE)

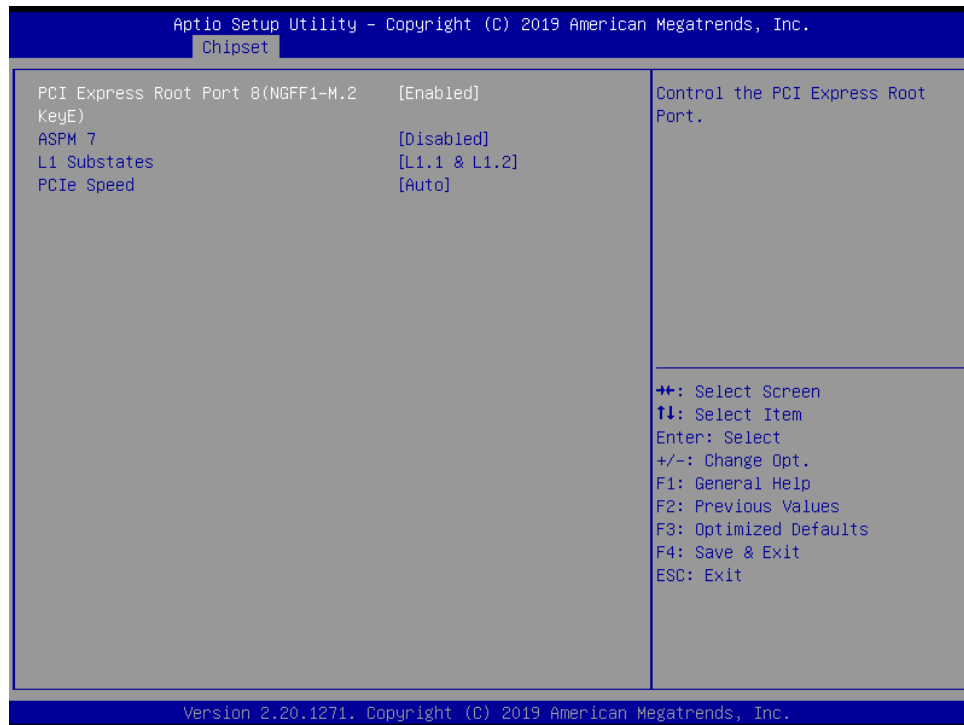


Item	Option	Description
PCI Express Root Port 7(mPCIIE)	Enabled[Default], Disabled	Control the PCI Express Root Port.
ASPM 6	Disabled[Default], L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM.

VMS-CFS

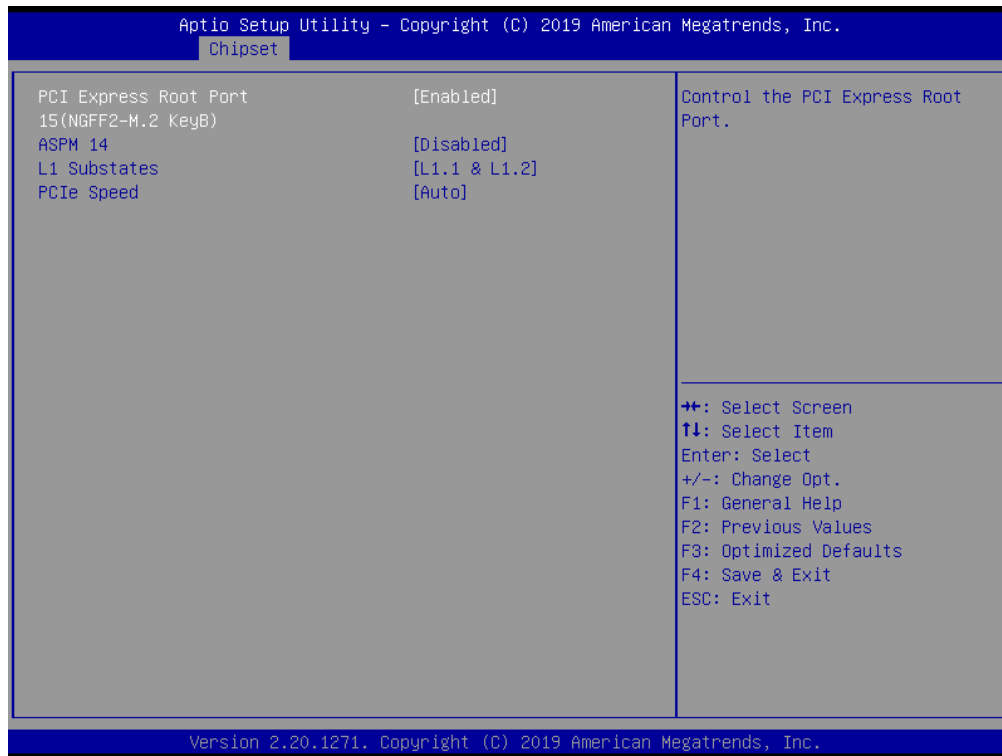
L1 Substates	Disabled, L1.1 L1.1 & L1.2[Default]	PCI Express L1 Substates settings.
PCIe Speed	Auto[Default] Gen1 Gen2 Gen3	Configure PCIe Speed.

3.6.3.2.1.3 PCI Express Root Port 8(NGFF1-M.2 KeyE)



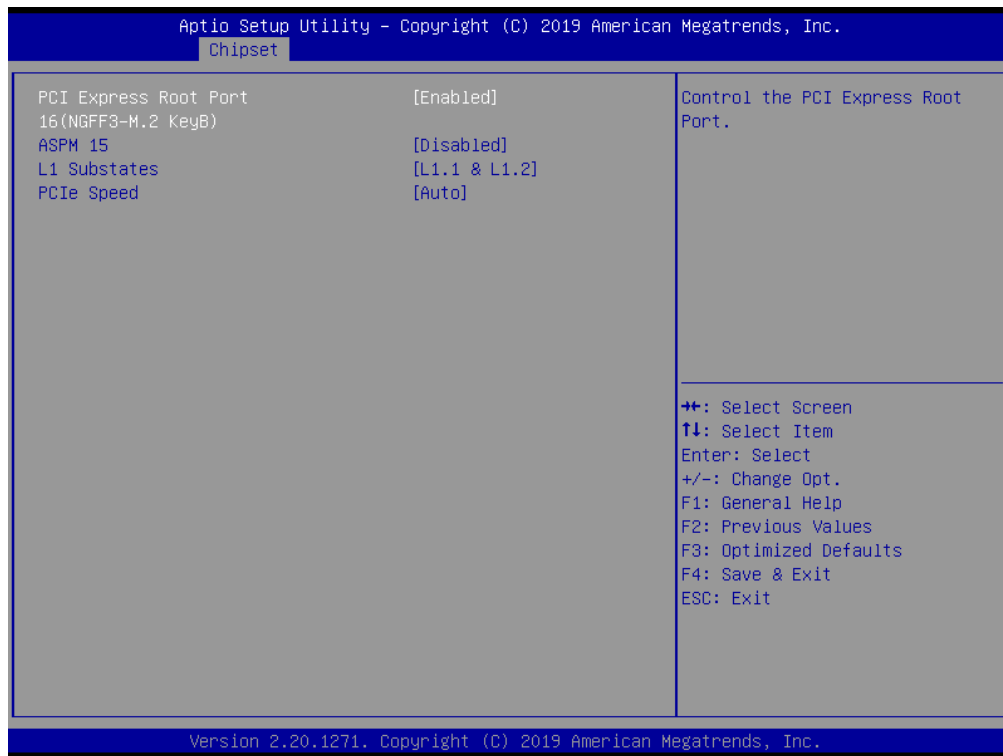
Item	Option	Description
PCI Express Root Port 8(NGFF1-M.2 KeyE)	Enabled[Default], Disabled	Control the PCI Express Root Port.
ASPM 7	Disabled[Default], L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM.
L1 Substates	Disabled, L1.1 L1.1 & L1.2[Default]	PCI Express L1 Substates settings.
PCIe Speed	Auto[Default] Gen1 Gen2 Gen3	Configure PCIe Speed.

3.6.3.2.1.4 PCI Express Root Port 15(NGFF2-M.2 KeyB)



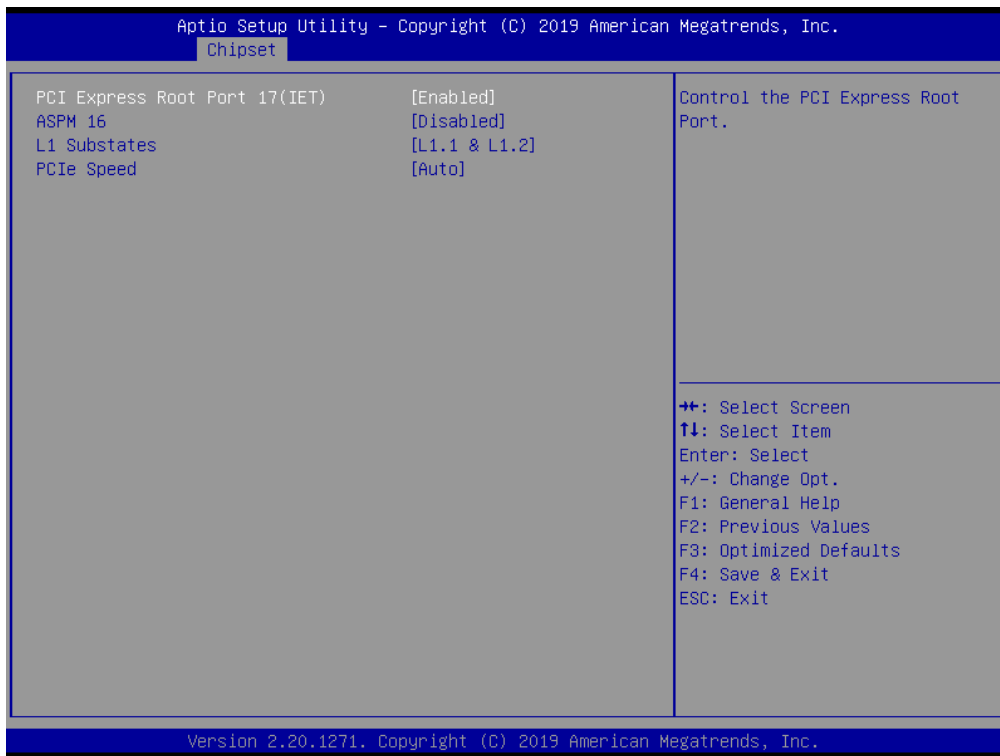
Item	Option	Description
PCI Express Root Port 15(NGFF2-M.2 KeyB)	Enabled[Default], Disabled	Control the PCI Express Root Port.
ASPM 14	Disabled[Default], L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM.
L1 Substates	Disabled, L1.1 L1.1 & L1.2[Default]	PCI Express L1 Substates settings.
PCIe Speed	Auto[Default] Gen1 Gen2 Gen3	Configure PCIe Speed.

3.6.3.2.1.5 PCI Express Root Port 16(NGFF3-M.2 KeyB)



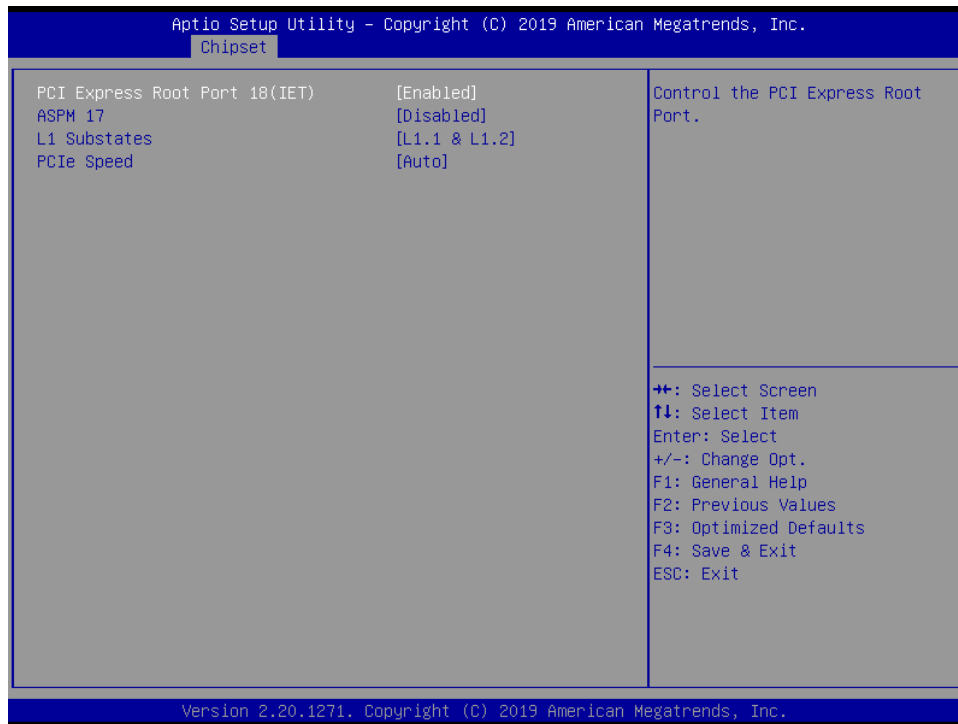
Item	Option	Description
PCI Express Root Port 16(NGFF3-M.2 KeyB)	Enabled[Default], Disabled	Control the PCI Express Root Port.
ASPM 15	Disabled[Default], L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM.
L1 Substates	Disabled, L1.1 L1.1 & L1.2[Default]	PCI Express L1 Substates settings.
PCIe Speed	Auto[Default] Gen1 Gen2 Gen3	Configure PCIe Speed.

3.6.3.2.1.6 PCI Express Root Port 17(IET)



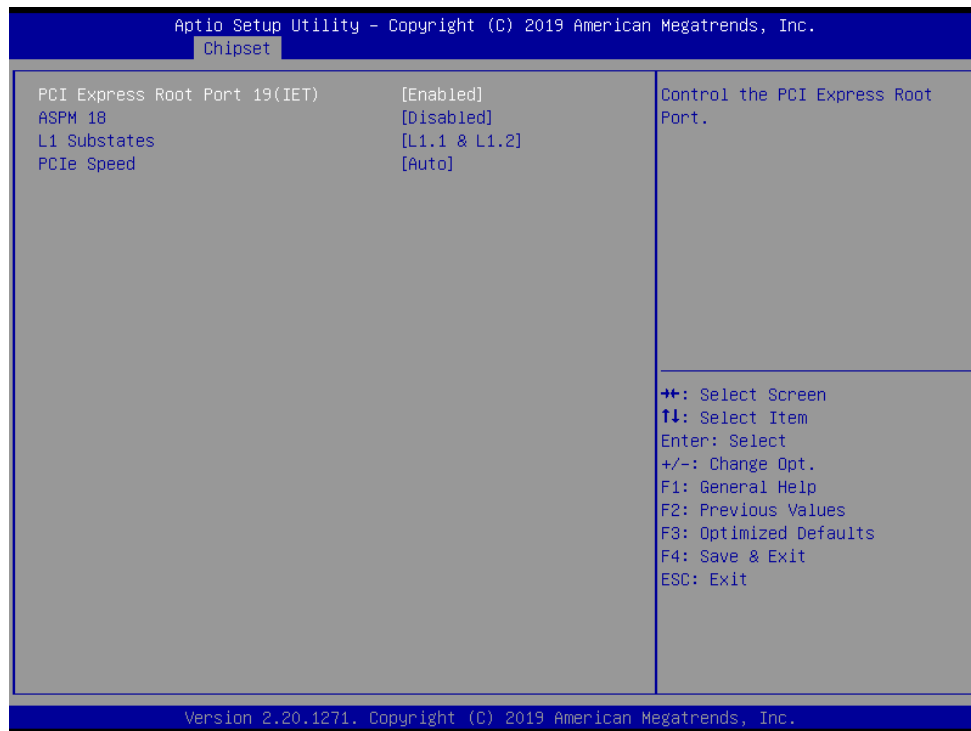
Item	Option	Description
PCI Express Root Port 17(IET)	Enabled[Default], Disabled	Control the PCI Express Root Port.
ASPM 16	Disabled[Default], L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM.
L1 Substates	Disabled, L1.1 L1.1 & L1.2[Default]	PCI Express L1 Substates settings.
PCIe Speed	Auto[Default] Gen1 Gen2 Gen3	Configure PCIe Speed.

3.6.3.2.1.7 PCI Express Root Port 18(IET)



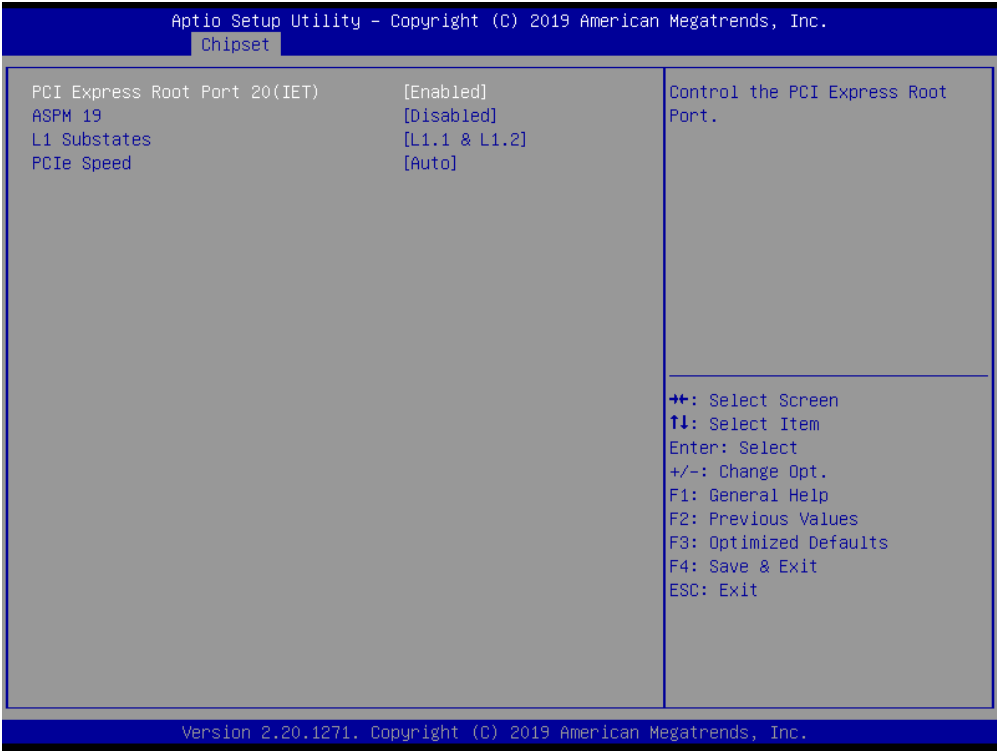
Item	Option	Description
PCI Express Root Port 18(IET)	Enabled[Default], Disabled	Control the PCI Express Root Port.
ASPM 17	Disabled[Default], L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM.
L1 Substates	Disabled, L1.1 L1.1 & L1.2[Default]	PCI Express L1 Substates settings.
PCIe Speed	Auto[Default] Gen1 Gen2 Gen3	Configure PCIe Speed.

3.6.3.2.1.8 PCI Express Root Port 19(IET)



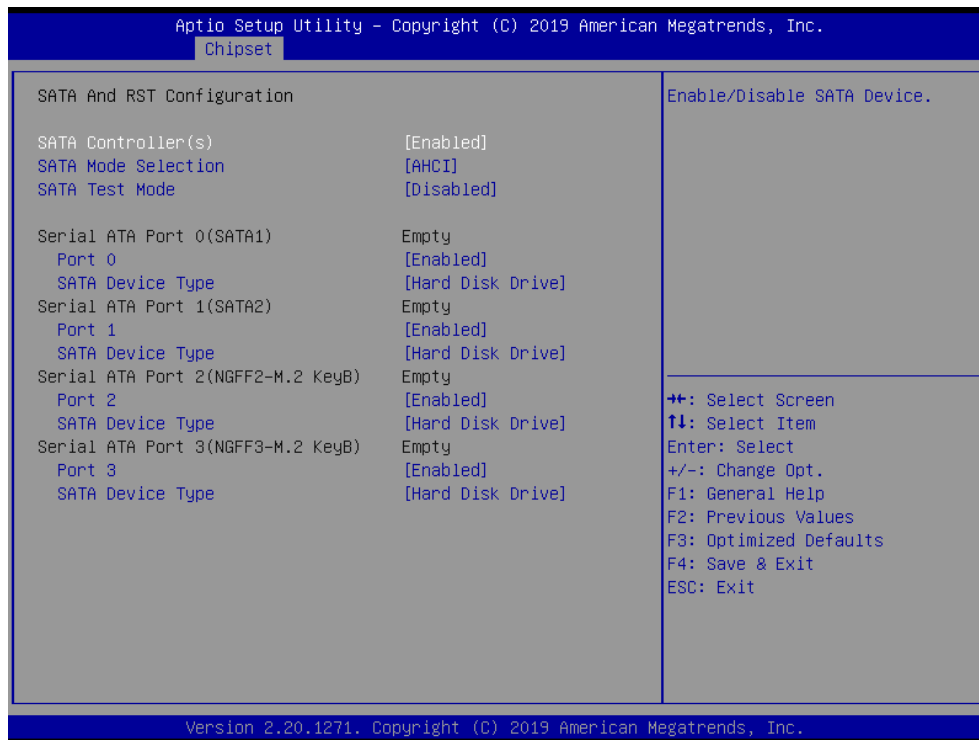
Item	Option	Description
PCI Express Root Port 19(IET)	Enabled[Default], Disabled	Control the PCI Express Root Port.
ASPM 18	Disabled[Default], L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM.
L1 Substates	Disabled, L1.1 L1.1 & L1.2[Default]	PCI Express L1 Substates settings.
PCIe Speed	Auto[Default] Gen1 Gen2 Gen3	Configure PCIe Speed.

3.6.3.2.1.9 PCI Express Root Port 20(IET)



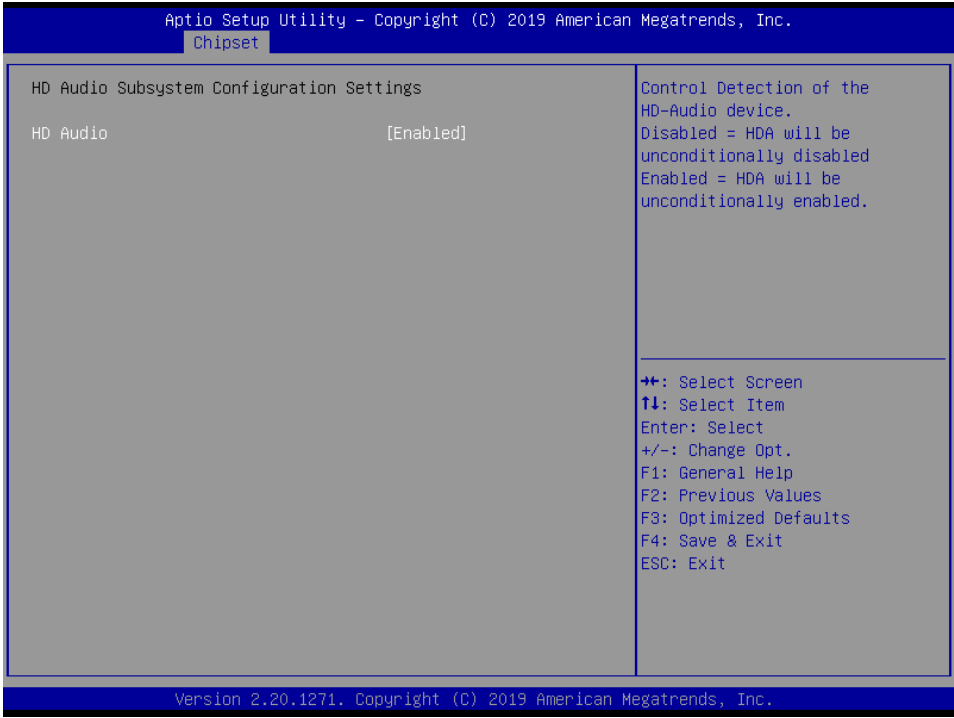
Item	Option	Description
PCI Express Root Port 20(IET)	Enabled[Default], Disabled	Control the PCI Express Root Port.
ASPM 19	Disabled[Default], L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM.
L1 Substates	Disabled, L1.1 L1.1 & L1.2[Default]	PCI Express L1 Substates settings.
PCIe Speed	Auto[Default] Gen1 Gen2 Gen3	Configure PCIe Speed.

3.6.3.2.2 SATA And RST Configuration



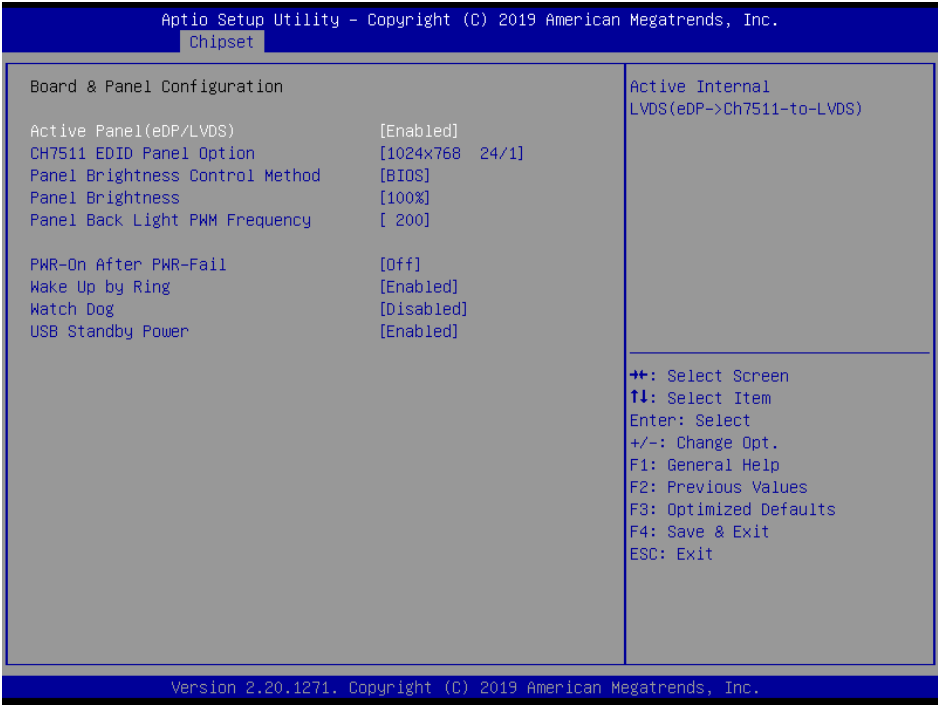
Item	Options	Description
SATA Controller(s)	Enabled[Default] Disabled,	Enable/Disable SATA Device.
SATA Mode Selection	AHCI[Default], RAID	Determines how SATA controller(s) operate.
SATA Test Mode	Enabled Disabled[Default]	The Mode Enable/Disable (Loop Back).
Port 0/1/2/3	Enabled[Default] Disabled	Enable 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.

3.6.3.2.3 HD Audio Configuration



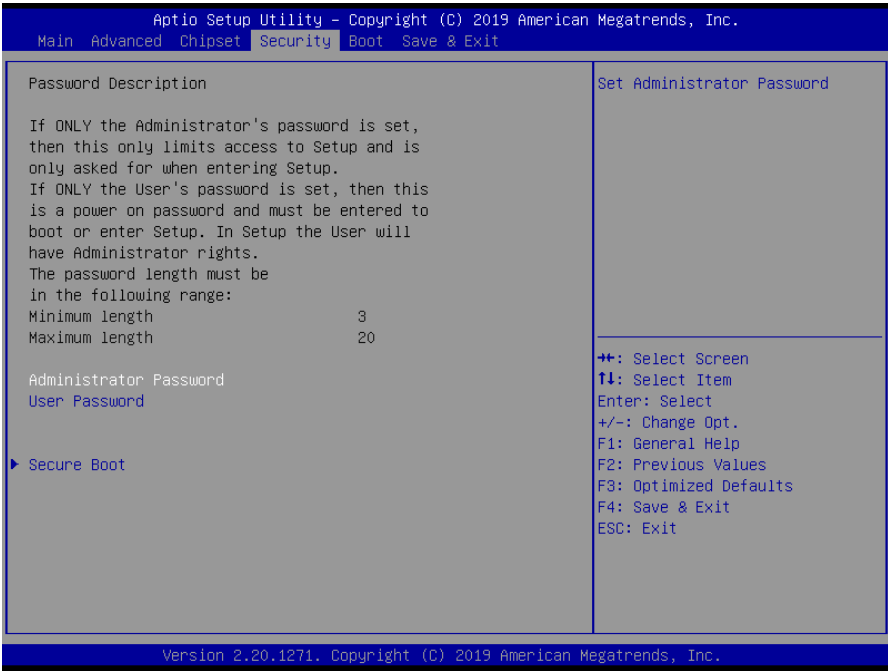
Item	Option	Description
HD Audio	Disabled Enabled[Default]	Control Detection of the HD-Audio device. Disable = HDA will be unconditionally disabled Enabled = HDA will be unconditionally enabled

3.6.3.3 Board & Panel Configuration



Item	Option	Description
Active Panel (eDP/LVDS)	Disabled Enabled[Default]	Active Internal LVDS(eDP->Cg7511-to-LVDS).
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.
Panel Brightness Control Method	BIOS[Default] OS Driver	Panel Brightness Control Method. 1.BIOS 2.OS Driver.
Panel Brightness	00% 25% 50% 75% 100%[Default]	Select Panel(eDP/LVDS) back light PWM duty.
Panel Back Light PWM Frequency	200[Default] 300 400 500 700 1k 2k 3k 5k 10k 20k	Select Panel(eDP/LVDS) back light PWM duty Frequency.
PWR-On After PWR-Fail	Off[Default] On Last state	AC loss resume.
Wake Up by Ring	Disabled Enabled[Default]	Wake Up by Ring from S3/S4/S5.
Watch Dog	Disabled[Default] 30 sec 40 sec 50 sec 1 min 2 min 10 min 30 min	Select WatchDog.
USB Standby Power	Disabled Enabled[Default]	Enable/Disabled USB Standby Power during S3/S4/S5.

3.6.4 Security



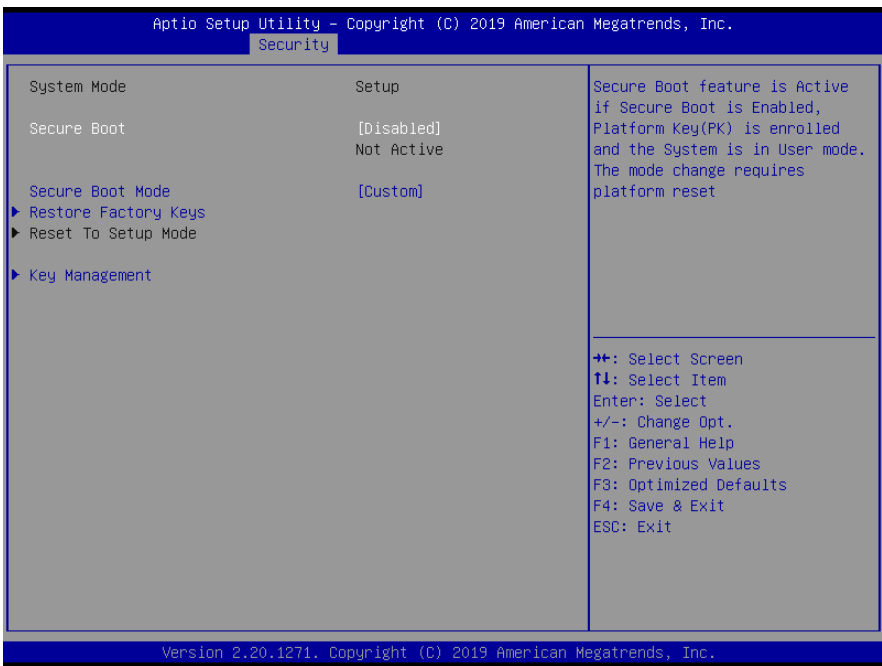
- Administrator Password

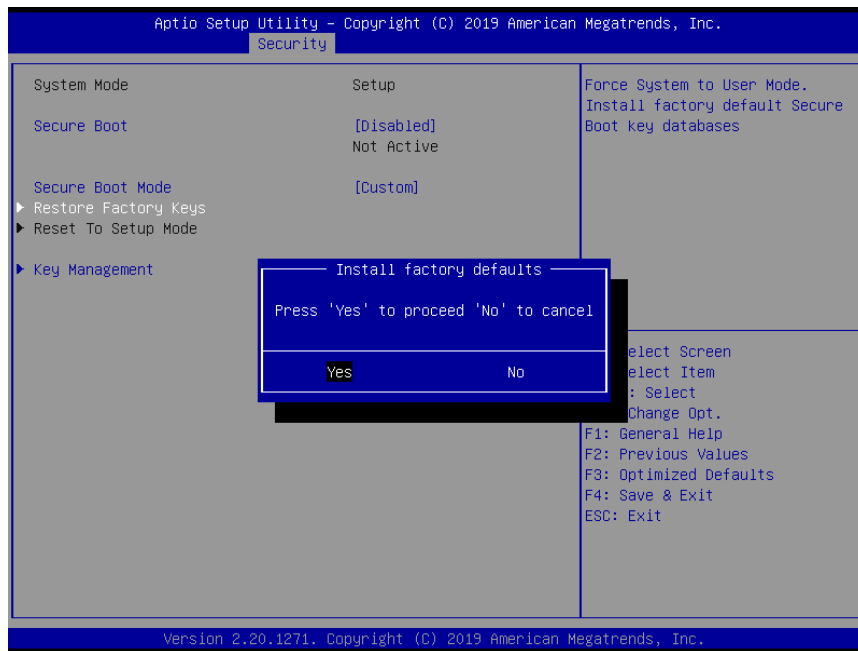
Set setup Administrator Password

- User Password

Set User Password

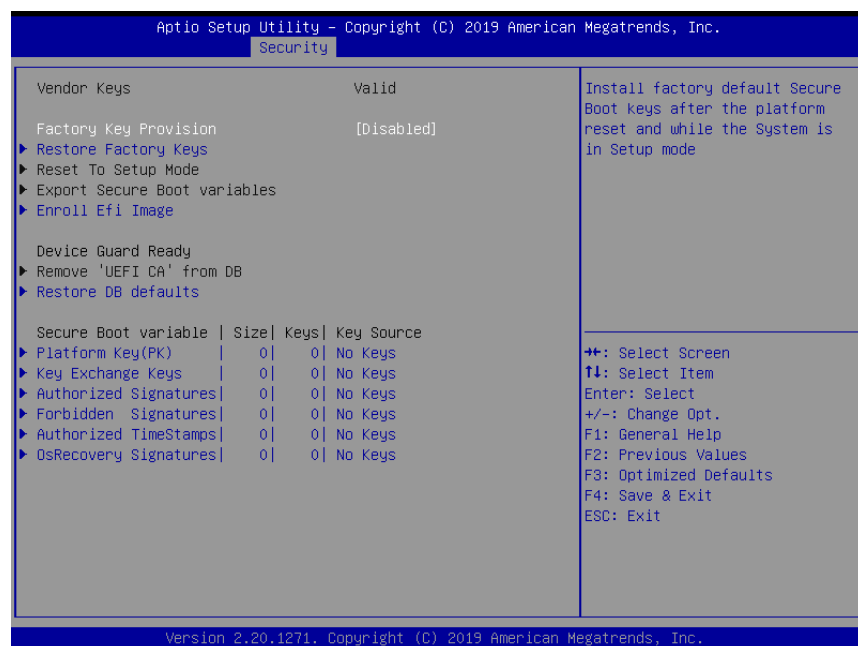
3.6.4.1 Secure Boot





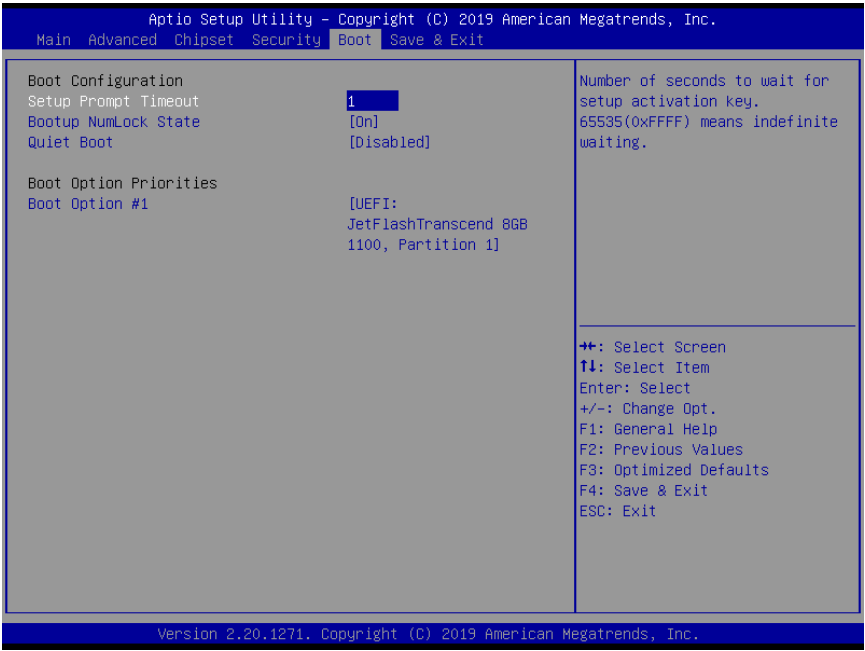
Item	Option	Description
Secure Boot	Disabled[Default] Enabled	Secure Boot feature is Active if Secure Boot is Enabled, Platform Key(PK) is enrolled and the System is in User mode. The mode change requires platform reset.
Secure Boot Mode	Standard Custom[Default]	Secure Boot mode selector: Standard/Custom. In Custom mode Secure Boot Variables can be configured without authentication.

3.6.4.1.1 Key Management



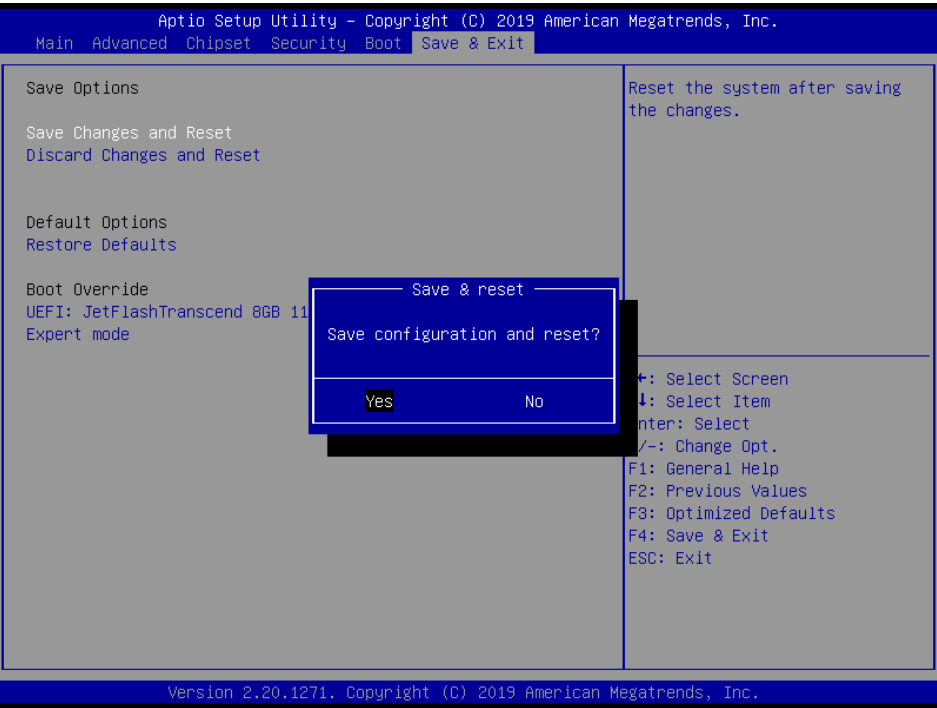
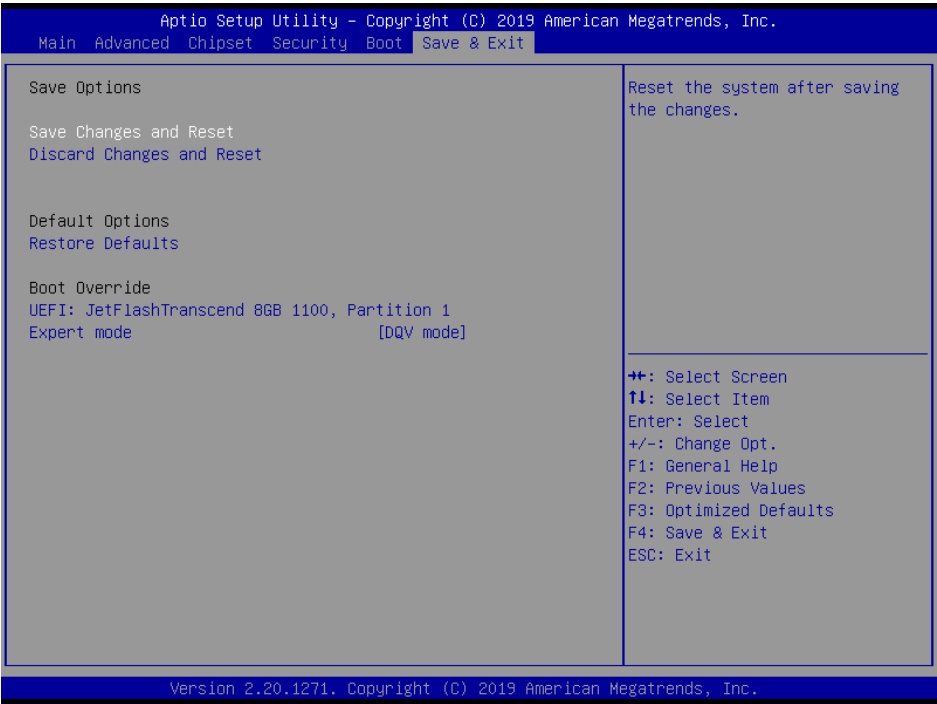
Item	Option	Description
Factory Key Provision	Disabled[Default] Enabled	Install factory default Secure Boot keys after the platform reset and while the System is in Setup mode.

3.6.5 Boot



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
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.

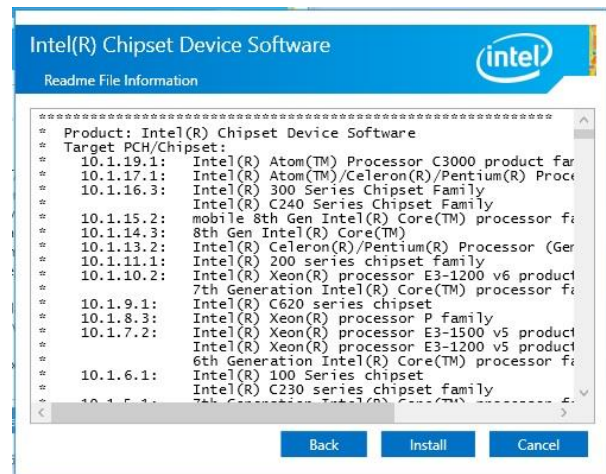
4.1 Install Chipset Driver

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. If the warning message appears while the installation process, click Continue to go on.



Step 3. Click Install.



Step1. Click Next.



Step 2. Click Accept.



Step 4. Click Finish to complete setup.

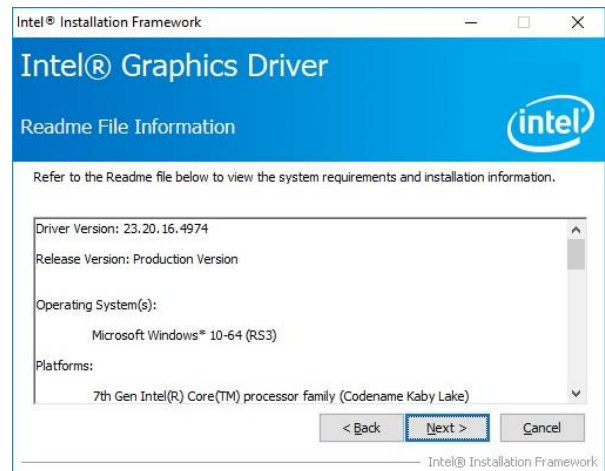
4.2 Install VGA Driver

All drivers can be found on the Avalue Official Website:

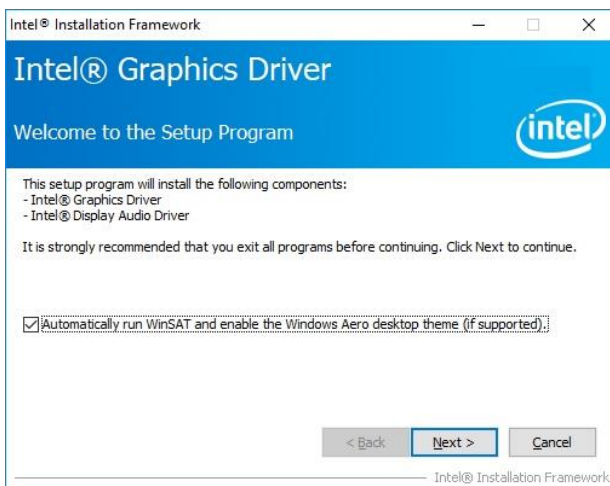
<http://www.avalue.com.tw>.



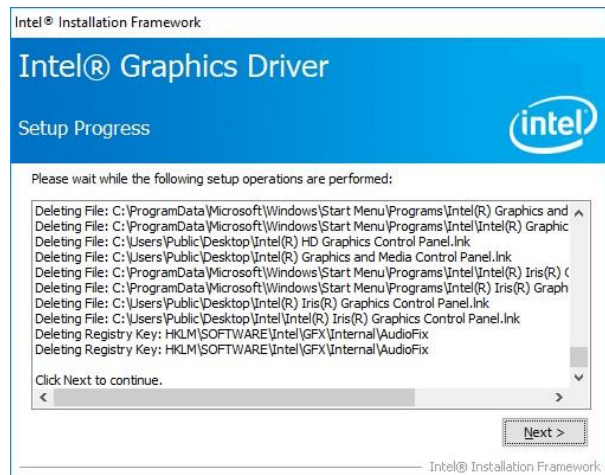
Note: The installation procedures and screen shots in this section are based on Windows 10 operation system.



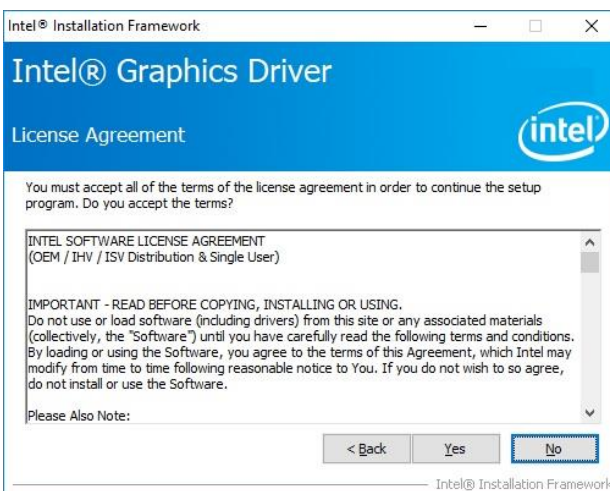
Step 3. Click Next.



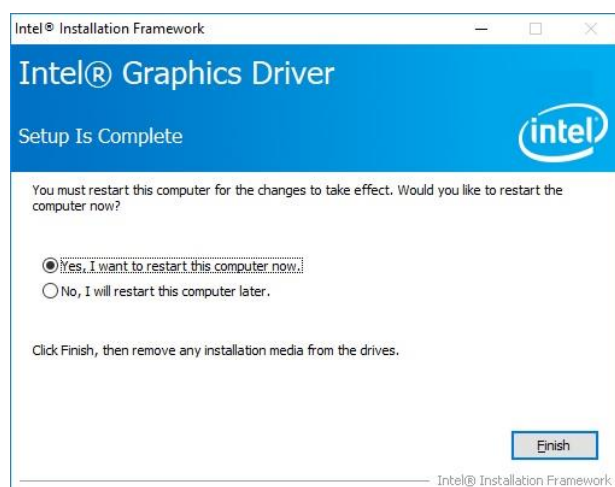
Step 1. Click Next to continue installation.



Step 4. Click Next.



Step 2.
Click **Yes** to accept license agreement.



Step 5. Click Finish to complete setup.

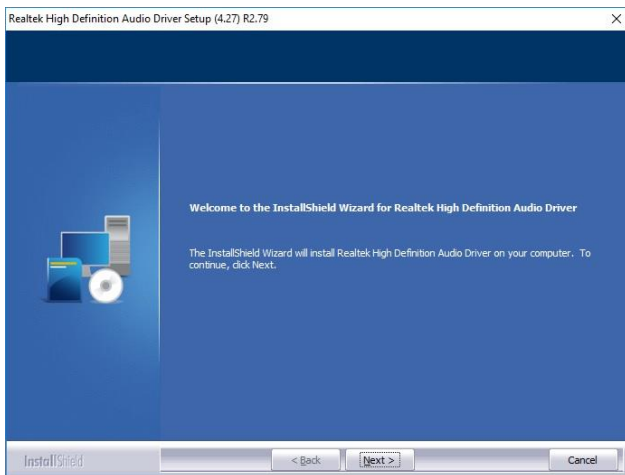
4.3 Install Audio Driver (For Realtek ALC888S HD Audio)

All drivers can be found on the Avalue Official Website:

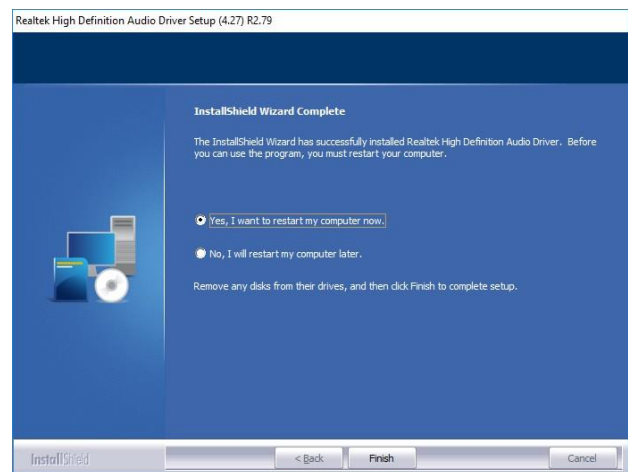
<http://www.avalue.com.tw>.



Note: The installation procedures and screen shots in this section are based on Windows 10 operation system. If the warning message appears while the installation process, click Continue to go on.



Step1. Click **Next** to Install.



Step 2. Select **Finish** to complete Installation.

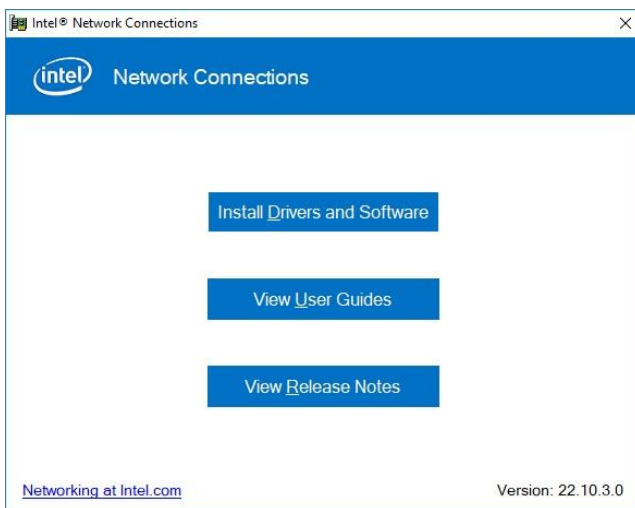
4.4 Install LAN Driver (For Intel I211AT)

All drivers can be found on the Avalue Official Website:

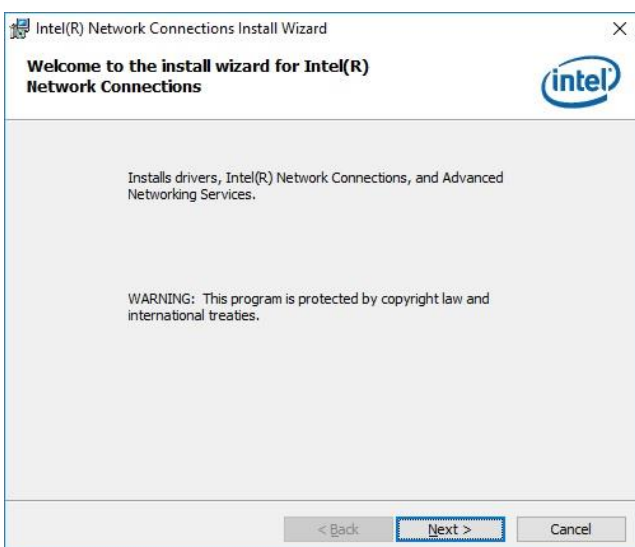
<http://www.avalue.com.tw>.



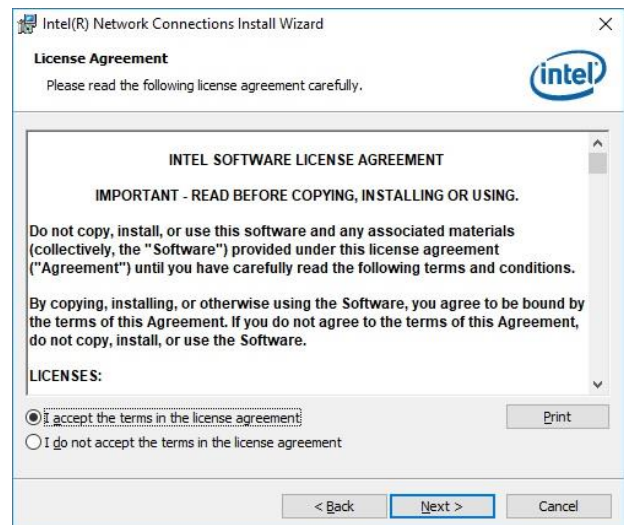
Note: The installation procedures and screen shots in this section are based on Windows 10 operation system.



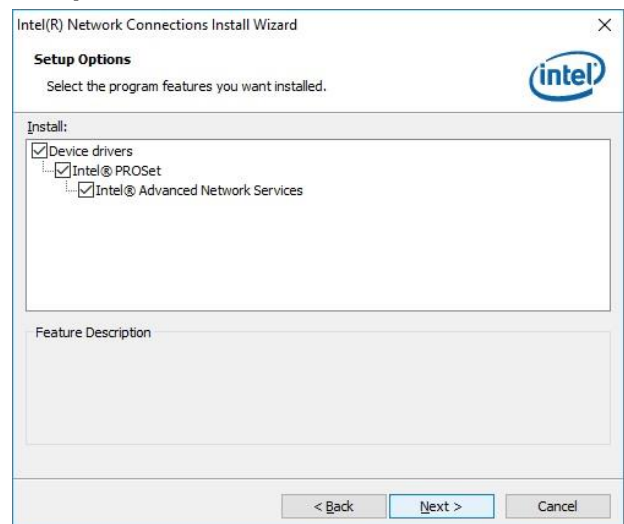
Step 1. Click **Install Drivers and Software** to continue installation.



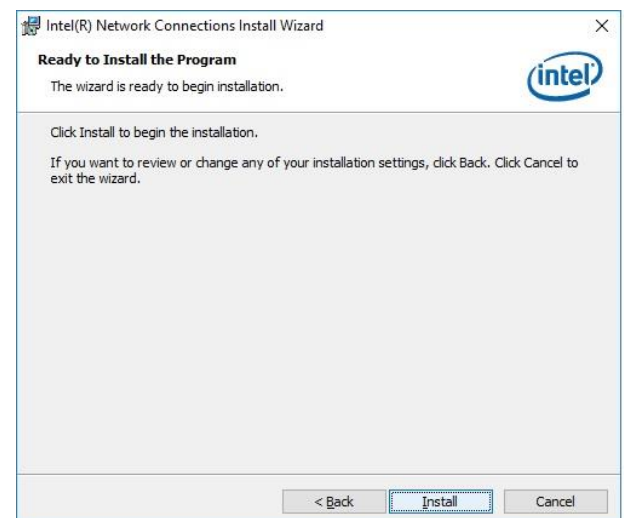
Step 2. Click **Next**.



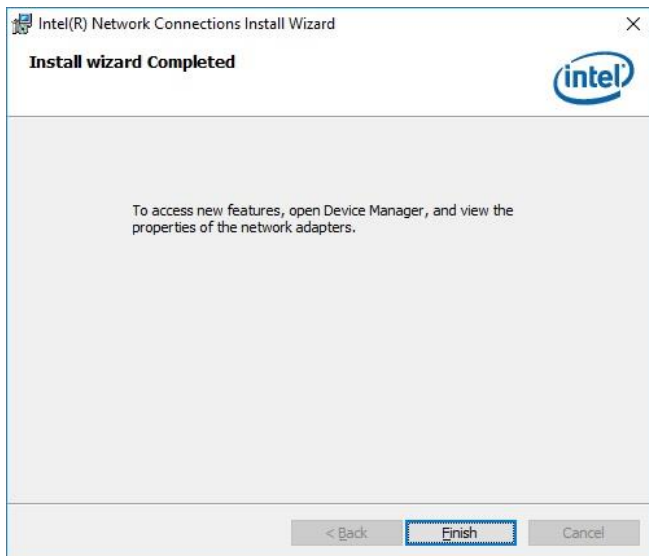
Step 3. Click **Next**.



Step 4. Click **Next**.



Step 5. Click **Install**.



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

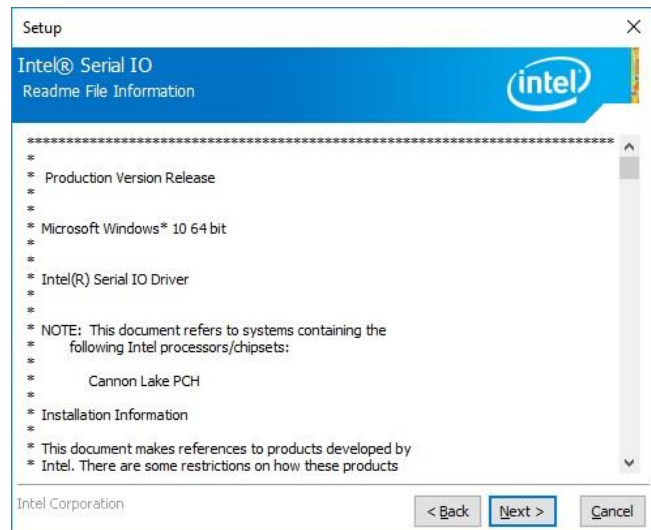
4.5 Install Serial IO Driver

All drivers can be found on the Avalue Official Website:

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



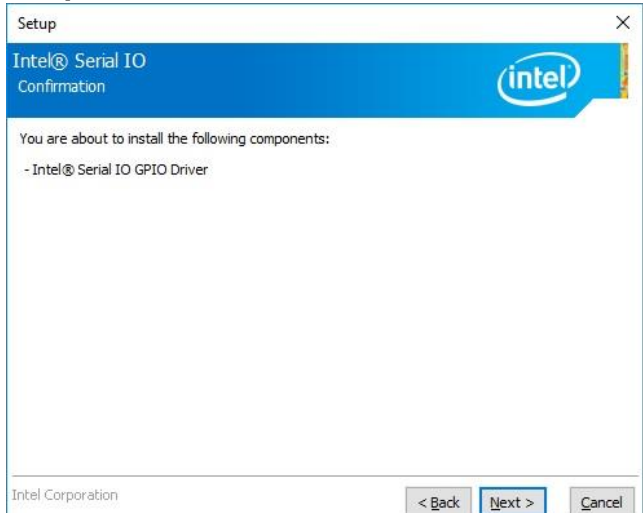
Note: The installation procedures and screen shots in this section are based on Windows 10 operation system.



Step 3. Click Next.



Step 1. Click Next to continue setup.



Step 4. Click Next.



Step 2. Click Next.



Step 5. Click Finish to complete the setup.

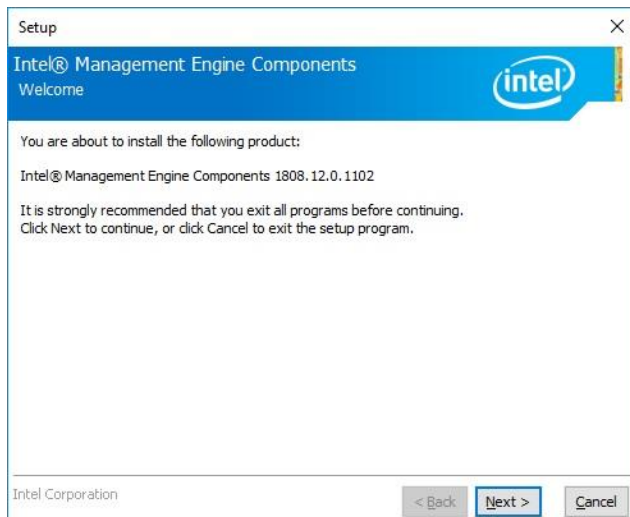
4.6 Install ME Driver

All drivers can be found on the Avalue Official Website:

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



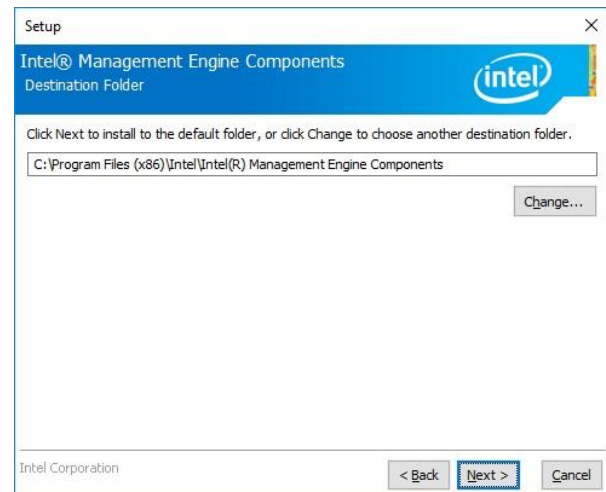
Note: The installation procedures and screen shots in this section are based on Windows 10 operation system.



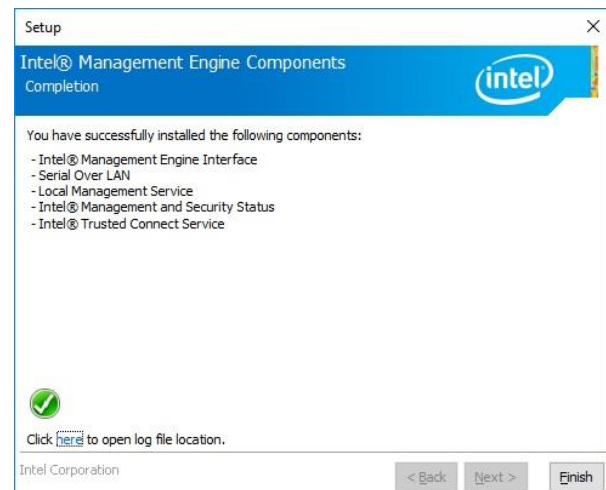
Step 1. Click Next to continue setup.



Step 2. Click Next.



Step 3. Click Next



Step 4. Click Finish to complete the setup

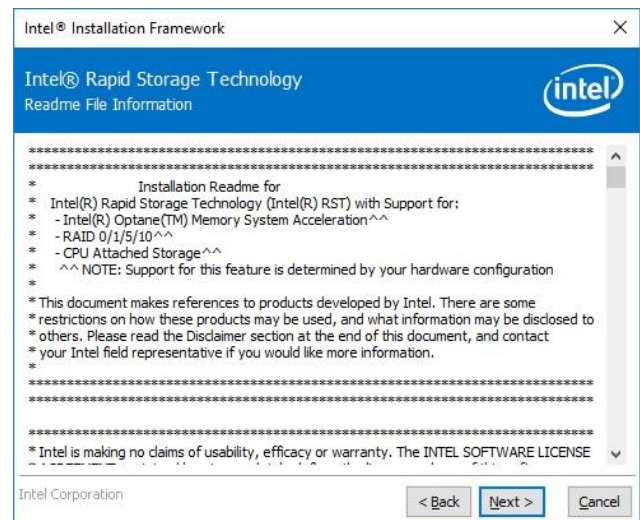
4.7 Install IRST Driver

All drivers can be found on the Avalue Official Website:

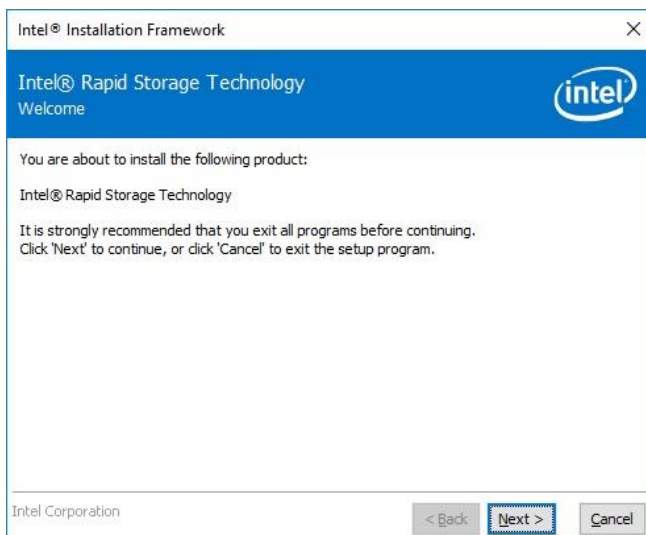
<http://www.avalue.com.tw>.



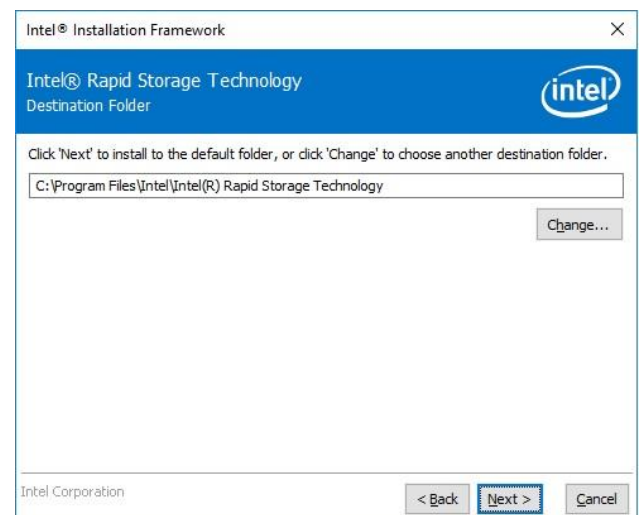
Note: The installation procedures and screen shots in this section are based on Windows 10 operation system.



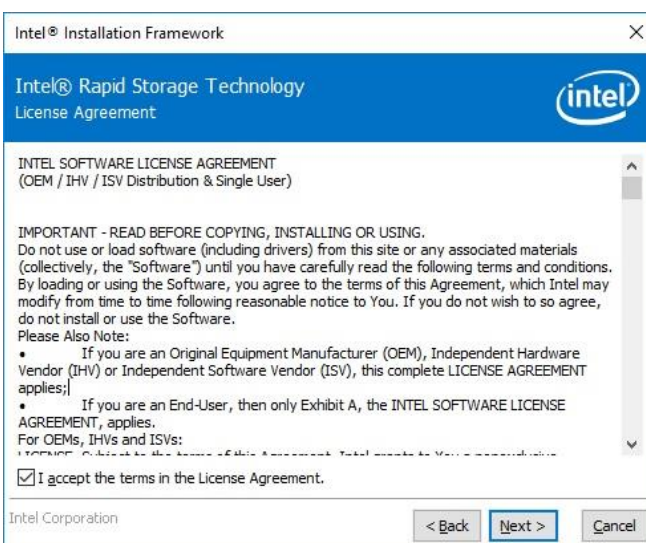
Step 3. Click Next.



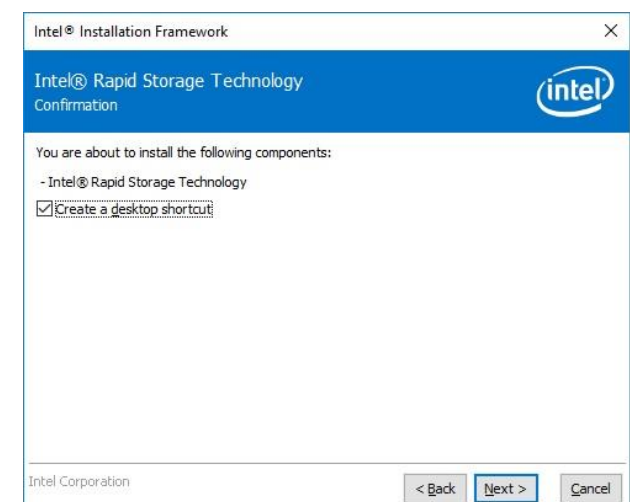
Step 1. Click Next to continue installation.



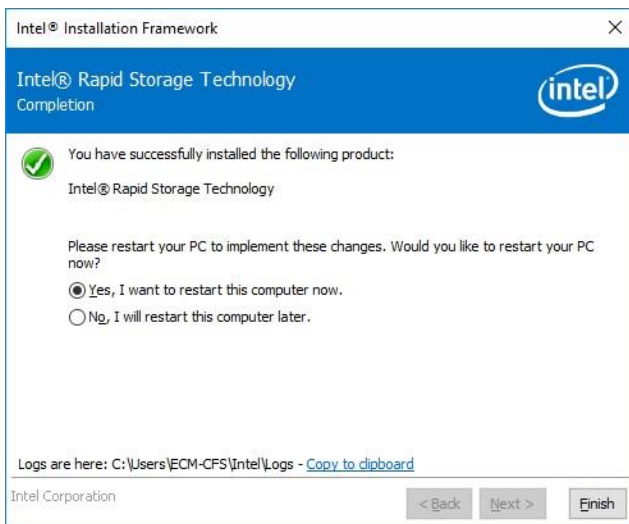
Step 4. Click Next.



Step 2. Click Next.



Step 5. Click Next.



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

