



Embedded Computing Platform

Hardware Platforms for Intelligent Edge Computing

LEC-2290L User Manual

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About this Document

This manual describes the overview of the various functionalities of this product, and the information you need to get it ready for operation. It is intended for those who are:

- responsible for installing, administering and troubleshooting this system or Information Technology professionals.
- assumed to be qualified in the servicing of computer equipment, such as professional system integrators, or service personnel and technicians.

Icon Descriptions

The icons are used in the manual to serve as an indication of interest topics or important messages. Below is a description of these icons:



Note or Information: This mark indicates that there is a note of interest and is something that you should pay special attention to while using the product.



Warning or Important: This mark indicates that there is a caution or warning and it is something that could damage your property or product.

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Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- ▶ Reorient or relocate the receiving antenna.
- ▶ Increase the separation between the equipment and receiver.
- ▶ Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- ▶ Consult the dealer or an experienced radio/TV technician for help.

FCC Caution

- ▶ Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.
- ▶ This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.



Note

1. An unshielded-type power cord is required to meet FCC emission limits and to prevent interference to the nearby radio and television reception. It is essential that only the supplied power cord be used.
2. Use only shielded cables to connect I/O devices to this equipment.
3. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.



Important

1. Operations in the 5.15-5.25GHz band are restricted to indoor usage only.
2. This device meets all the other requirements specified in Part 15E, Section 15.407 of the FCC Rules.

Safety Guidelines

Follow these guidelines to ensure general safety:

- ▶ Keep the chassis area clear and dust-free during and after installation.
- ▶ Do not wear loose clothing or jewelry that could get caught in the chassis. Fasten your tie or scarf and roll up your sleeves.
- ▶ Wear safety glasses if you are working under any conditions that might be hazardous to your eyes.
- ▶ Do not perform any action that creates a potential hazard to people or makes the equipment unsafe.
- ▶ Disconnect all power by turning off the power and unplugging the power cord before installing or removing a chassis or working near power supplies
- ▶ Do not work alone if potentially hazardous conditions exist.
- ▶ Never assume that power is disconnected from a circuit; always check the circuit.

Consignes de sécurité

Suivez ces consignes pour assurer la sécurité générale :

- ▶ Laissez la zone du châssis propre et sans poussière pendant et après l'installation.
- ▶ Ne portez pas de vêtements amples ou de bijoux qui pourraient être pris dans le châssis. Attachez votre cravate ou écharpe et remontez vos manches.
- ▶ Portez des lunettes de sécurité pour protéger vos yeux.
- ▶ N'effectuez aucune action qui pourrait créer un danger pour d'autres ou rendre l'équipement dangereux.
- ▶ Coupez complètement l'alimentation en éteignant l'alimentation et en débranchant le cordon d'alimentation avant d'installer ou de retirer un châssis ou de travailler à proximité de sources d'alimentation.
- ▶ Ne travaillez pas seul si des conditions dangereuses sont présentes.
- ▶ Ne considérez jamais que l'alimentation est coupée d'un circuit, vérifiez toujours le circuit. Cet appareil génère, utilise et émet une énergie radiofréquence et, s'il n'est pas installé et utilisé conformément aux instructions des fournisseurs de composants sans fil, il risque de provoquer des interférences dans les communications radio.

Lithium Battery Caution

- ▶ There is risk of Explosion if Battery is replaced by an incorrect type.
- ▶ Dispose of used batteries according to the instructions.
- ▶ Installation only by a skilled person who knows all Installation and Device Specifications which are to be applied.
- ▶ Do not carry the handle of power supplies when moving to another place.
- ▶ Please conform to your local laws and regulations regarding safe disposal of lithium BATTERY.
- ▶ Disposal of a battery into fire or a hot oven, or mechanically crushing or cutting of a battery can result in an explosion.
- ▶ Exposing a battery to high temperatures may cause it to explode or leak flammable substances.
- ▶ A battery exposed to extremely low air pressure may explode or leak flammable liquids or gases.

Avertissement concernant la pile au lithium

- ▶ Risque d'explosion si la pile est remplacée par une autre d'un mauvais type.
- ▶ Jetez les piles usagées conformément aux instructions.
- ▶ L'installation doit être effectuée par un électricien formé ou une personne formée à l'électricité connaissant toutes les spécifications d'installation et d'appareil du produit.
- ▶ Ne transportez pas l'unité en la tenant par le câble d'alimentation lorsque vous déplacez l'appareil.

Operating Safety

- ▶ Electrical equipment generates heat. Ambient air temperature may not be adequate to cool equipment to acceptable operating temperatures without adequate circulation. Be sure that the room in which you choose to operate your system has adequate air circulation.
- ▶ Ensure that the chassis cover is secure. The chassis design allows cooling air to circulate effectively. An open chassis permits air leaks, which may interrupt and redirect the flow of cooling air from internal components.
- ▶ Electrostatic discharge (ESD) can damage equipment and impair electrical circuitry. ESD damage occurs when electronic components are improperly handled and can result in complete or intermittent failures. Be sure to follow ESD-prevention procedures when removing and replacing components to avoid these problems.
- ▶ Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. If no wrist strap is available, ground yourself by touching the metal part of the chassis.
- ▶ Periodically check the resistance value of the antistatic strap, which should be between 1 and 10 megohms (Mohms).

Sécurité de fonctionnement

- ▶ L'équipement électrique génère de la chaleur. La température ambiante peut ne pas être adéquate pour refroidir l'équipement à une température de fonctionnement acceptable sans circulation adaptée. Vérifiez que votre site propose une circulation d'air adéquate.
- ▶ Vérifiez que le couvercle du châssis est bien fixé. La conception du châssis permet à l'air de refroidissement de bien circuler. Un châssis ouvert laisse l'air s'échapper, ce qui peut interrompre et rediriger le flux d'air frais destiné aux composants internes.
- ▶ Les décharges électrostatiques (ESD) peuvent endommager l'équipement et gêner les circuits électriques. Des dégâts d'ESD surviennent lorsque des composants électroniques sont mal manipulés et peuvent causer des pannes totales ou intermittentes. Suivez les procédures de prévention d'ESD lors du retrait et du remplacement de composants.
- ▶ Portez un bracelet anti-ESD et veillez à ce qu'il soit bien au contact de la peau. Si aucun bracelet n'est disponible, reliez votre corps à la terre en touchant la partie métallique du châssis.
- ▶ Vérifiez régulièrement la valeur de résistance du bracelet antistatique, qui doit être comprise entre 1 et 10 mégohms (Mohms).

Mounting Installation Precaution

The following should be put into consideration for rackmount or similar mounting installations:

- ▶ Do not install and/or operate this unit in any place that flammable objects are stored or used in.
- ▶ The installation of this product must be performed by trained specialists; otherwise, a non-specialist might create the risk of the system's falling to the ground or other damages.
- ▶ Lanner Electronics Inc. shall not be held liable for any losses resulting from insufficient strength for supporting the system or use of inappropriate installation components.
- ▶ Elevated Operating Ambient - If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (Tma) specified by the manufacturer.
- ▶ Reduced Air Flow - Installation of the equipment in a rack should be such that the amount of airflow required for safe operation of the equipment is not compromised.
- ▶ Mechanical Loading - Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.
- ▶ Circuit Overloading - Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
- ▶ Reliable Grounding - Reliable grounding of rack mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).

Installation & Operation:

- ▶ This equipment must be grounded. The power cord for product should be connected to a socket-outlet with earthing connection.
Cet équipement doit être mis à la terre. La fiche d'alimentation doit être connectée à une prise de terre correctement câblée
- ▶ Suitable for installation in Information Technology Rooms in accordance with Article 645 of the National Electrical Code and NFPA 75.
Peut être installé dans des salles de matériel de traitement de l'information conformément à l'article 645 du National Electrical Code et à la NFPA 75.
- ▶ The machine can only be used in a restricted access location and must be installed by a skilled person.
Les matériels sont destinés à être installés dans des EMPLACEMENTS À ACCÈS RESTREINT.
- ▶ This product is intended to be supplied by a Listed Power Adapter or DC power source, rated 12-24Vdc, 17.5-8A minimum, Tma = 70°C, and the altitude of operation = 5000m.
- ▶ Lanner Electronics Inc. shall not be held liable for any losses resulting from insufficient strength for supporting the system or use of inappropriate installation components.

Electrical Safety Instructions

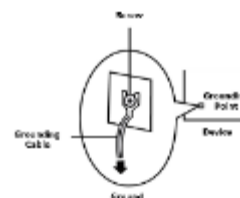
Before turning on the device, ground the grounding cable of the equipment. Proper grounding (grounding) is very important to protect the equipment against the harmful effects of external noise and to reduce the risk of electrocution in the event of a lightning strike. To uninstall the equipment, disconnect the ground wire after turning off the power. A ground wire is required and the part connecting the conductor must be greater than 4 mm² or 10 AWG.

Consignes de sécurité électrique

- ▶ Avant d'allumer l'appareil, reliez le câble de mise à la terre de l'équipement à la terre.
- ▶ Une bonne mise à la terre (connexion à la terre) est très importante pour protéger l'équipement contre les effets néfastes du bruit externe et réduire les risques d'électrocution en cas de foudre.
- ▶ Pour désinstaller l'équipement, débranchez le câble de mise à la terre après avoir éteint l'appareil.
- ▶ Un câble de mise à la terre est requis et la zone reliant les sections du conducteur doit faire plus de 4 mm² ou 10 AWG.

Grounding Procedure for Power Source

- ▶ Loosen the screw of the earthing point.
- ▶ Connect the grounding cable to the ground.
- ▶ The protection device for the power source must provide 30 A current.
- ▶ This protection device must be connected to the power source before power.
- ▶ The cable should be 16 AWG



Procédure de mise à la terre pour source d'alimentation

- ▶ Desserrez la vis du terminal de mise à la terre.
- ▶ Branchez le câble de mise à la terre à la terre.
- ▶ L'appareil de protection pour la source d'alimentation doit fournir 30 A de courant.
- ▶ Cet appareil de protection doit être branché à la source d'alimentation avant l'alimentation.
- ▶ Le câble doit être 16 AWG

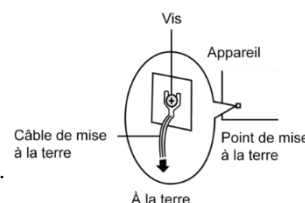


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CHAPTER 1: PRODUCT OVERVIEW

The LEC-2290L is a rugged, GPU-powered intelligent edge computing appliance, featuring support for the NVIDIA® L4 GPU and powered by the Intel® Core™ i7-9700TE (Coffee Lake S) processor. This AI-optimized platform significantly accelerates performance for service providers, enabling AI-based video and data analytics across industrial edge applications, including healthcare, transportation, smart cities, and more.

Key Features

- ▶ Intel® Core™ i7-9700TE
- ▶ NVIDIA® L4 GPU Card Support
- ▶ 2x DDR4 2133/2400 SO-DIMM
- ▶ 2x RJ45 GbE LAN, 4x PoE, 4x USB 3.0, 6x COM Ports, 8x DI & 8x DO
- ▶ 2x Removable HDD/SSD External Slot w/ RAID, 1x mSATA
- ▶ 1x PCIe*16 (support *4/*8/*16), 1x Mini-PCIe w/ Nano-SIM, 1x B-Key M.2 w/ Nano-SIM
- ▶ Built-in TPM 2.0 & IPMI Support

Package Content

Your package contains the following items:

- ▶ 1x Intelligent Edge Computing Box PC Unit
- ▶ 4x Rubber Foot

Ordering Information

SKU No.	Description
LEC-2290L	Intelligent Edge Computing Box PC with Intel® Core™ i7-9700TE, 32GB System Memory, 128GB mSATA and 2.5" 256GB SATA Storage, 1x PCIe*16 Expansion Slot with Nvidia Tesla L4 GPU Card (NVIDIA AI Software Suite Preinstalled), TPM, IPMI Module (Optional), and +9~30VDC Input with 270W AC/DC Adapter.

Optional Accessories

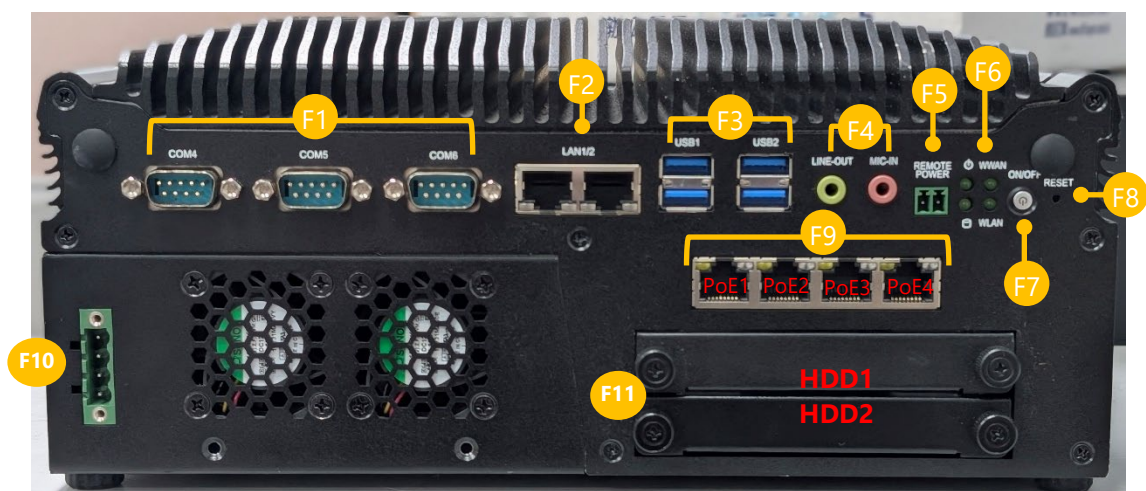
Model No.	Description
IAC-AST2500L	IPMI BMC Card Module
0TAW000234000	EG25GGB-MiniPCIe-S Quectel IoT/M2M-optimized LTE Cat 4
0TAW000165000	WPEQ-261ACN(BT) Sparklan WI-FI Card 2T2R Wi-Fi+Bluetooth 4.1 Combo
090W000791100	Extending Bracket for half-size mini-card in full-size miniPCIe
0TAW000222000	EM7455 Sierra LTE M.2 Card (Americas and EMEA), CAT 6
0TAW000147000	EM7430 Sierra LTE M.2 Card (Asia Pacific), CAT 6
0TAW000223000	EM7511 Sierra LTE M.2 Card (AT&T for the FirstNet), CAT 12
PSF7184-001	4G Module PGN-300 KIT (Does not support MB version: LEB-2291D MB)
PSF7877-001	4G Module PGN-600 KIT (Does not support MB version: LEB-2291D MB)
PSFA922-002	5G Module PGN-750D KIT (Support MB version: LEB-2291D MB Only)
098W000004000	Wall mount Kit (with screws)
098W000006010	Rack mount Kit (with screws)

System Specifications

Processor System	CPU	Intel® Core™ i7-9700TE (Codenamed Coffee Lake)
	Frequency & Cores	Up to 1.8GHz, 8 Cores
	Chipset	C246
Fanless		No
Memory	Technology	DDR4 2133/2400 SO-DIMM
	Max. Capacity	Up to 64GB
	Socket	2x 260-pin SO-DIMM
Graphic	Processor	Intel® UHD Graphics 630
Audio	Codec	TSI 92HD73C HD code
Ethernet	Controller	Intel i210IT Ethernet Controller
	Speed	10/100/1000 Mbps
	PoE	4x IEEE 802.3af / IEEE 802.3at (Total PoE Budget of 60W)
Storage	HDD/SSD	2x 2.5" 256GB SSD Storage
	mSATA	1x 128GB mSATA Storage
I/O	Serial Port	6x D-Sub 9 COM ports, Support RS232/422/485
	Ethernet Port	2x RJ45 GbE Ethernet Ports
	PoE Port	4x PoE supporting IEEE802.3af (15.5W); Single port supporting IEEE802.3at (25.5W); Total PoE Power Budget: 60W
	USB Port	4x USB 3.0 Type A Ports
	Audio Interface	1x Mic-in, 1x Line-out
	Remote Power Switch	1x 2-Pin Remote Power Switch
	LED Indicators	Power/Storage/WWAN/WLAN, refer to Appendix A
	Reset/Power-ON Button	1x Reset Button; 1x Power-ON Button w/ LED (Red-Standby, Green-Operating)
	Display Port	1x Display Port, max. 4096x2304@60Hz; 2x HDMI Ports, max. 4096x2304@24Hz
	Digital Interface	1x Terminal Block Isolation; 8x DI (12V), 8x DO (Sink mode, 12V@100mA)
	Power Input	1x 4-Pin Terminal Block (Pin define: -/+/-) for 9~30V DC input (normal 12VDC & 24VDC)
	Antenna	4x SMA Antenna Holes
Expansion Interface	Mini-PCIe	1x mini-PCIe (PCIe + USB2.0) with Nano-SIM;
	PCIe	1x PCIe *16 (support *4/*8/*16) Slot
	M.2	1x M.2 B-Key (PCIe + USB3.0) with Nano-SIM
Miscellaneous	Watchdog Timer	1-255 Level Time Interval System Reset, Software Programmable
	TPM	TPM 2.0 Onboard
Power	Connector	1x 4-Pin Terminal Block
	Supply Voltage	DC 9~30V (-/+/-)
	Power Consumption (Idle)	29.5W@ +12VDC-IN
	Power Consumption (Full Load)	121.6W@ +12VDC-IN
Environment	Operating Temperature	0°C~40°C
	Storage Temperature	-40°C~70°C
	Relative Humidity	10%~90% (Non-condensing)
	Vibration	IEC 60068-2-64, 0.5Grms, random 5~500Hz, 40 mins/axis
Mechanical	Dimension (W x H x D)	275 x 115 x 225mm
	Weight	6.9 kg
	Mounting	Wallmount

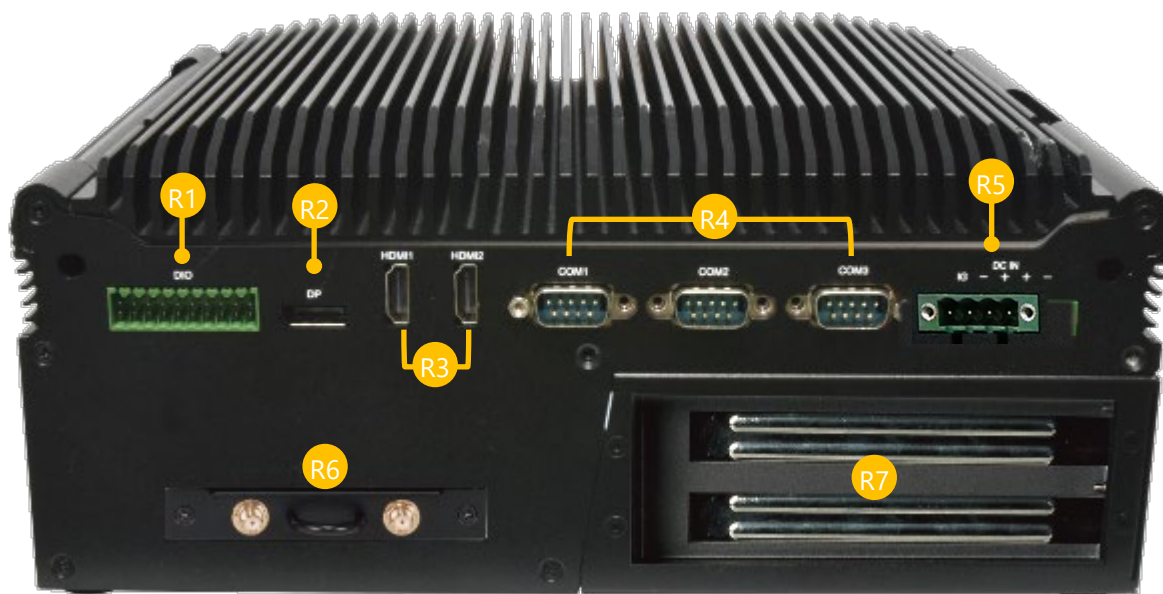
OS Support	Microsoft Windows	Windows 10 IoT 64-bit series
	Linux	Kernel 3.12 or Above, Ubuntu 18.10 64bit or Above, Cent OS 7 or Above, Fedora 30 64bit or Above
Certification	EMC	FCC/CE Class A
	Safety	UL62368/CB 62368 & 60950

Front Panel



No.	Description	
F1	COM Port	3x DB9 Male Connector for RS232/422/485 COM Ports
F2	LAN Port	2x RJ45 Ethernet Ports with LED indicators
F3	USB Port	4x USB 3.0 Type A Ports
F4	Audio Jack	3.5mm Line-out and Mic-in Jack
F5	Remote Switch	1x 2-Pin Remote Power Switch
F6	LED Indicator	System Power Storage  WWAN Connection Status WLAN Connection Status
F7	Power Button	Power On/Off button with LED Indicator
F8	Reset Button	For Software Reset
F9	PoE Port	4x PoE Port with LED Indicators supporting IEEE802.3af (15.5W); Single Port supporting IEEE802.3at (25.5W), Total PoE Power Budget: 60W
F10	DC Input	1x 4-Pin Terminal Block (Pin Define: -/+/-/-) for 12V DC Input (Max. 200W)
F11	Storage Bay	2x HDD/SSD Disk Bays (Max. 9.5mm height each)

Rear Panel

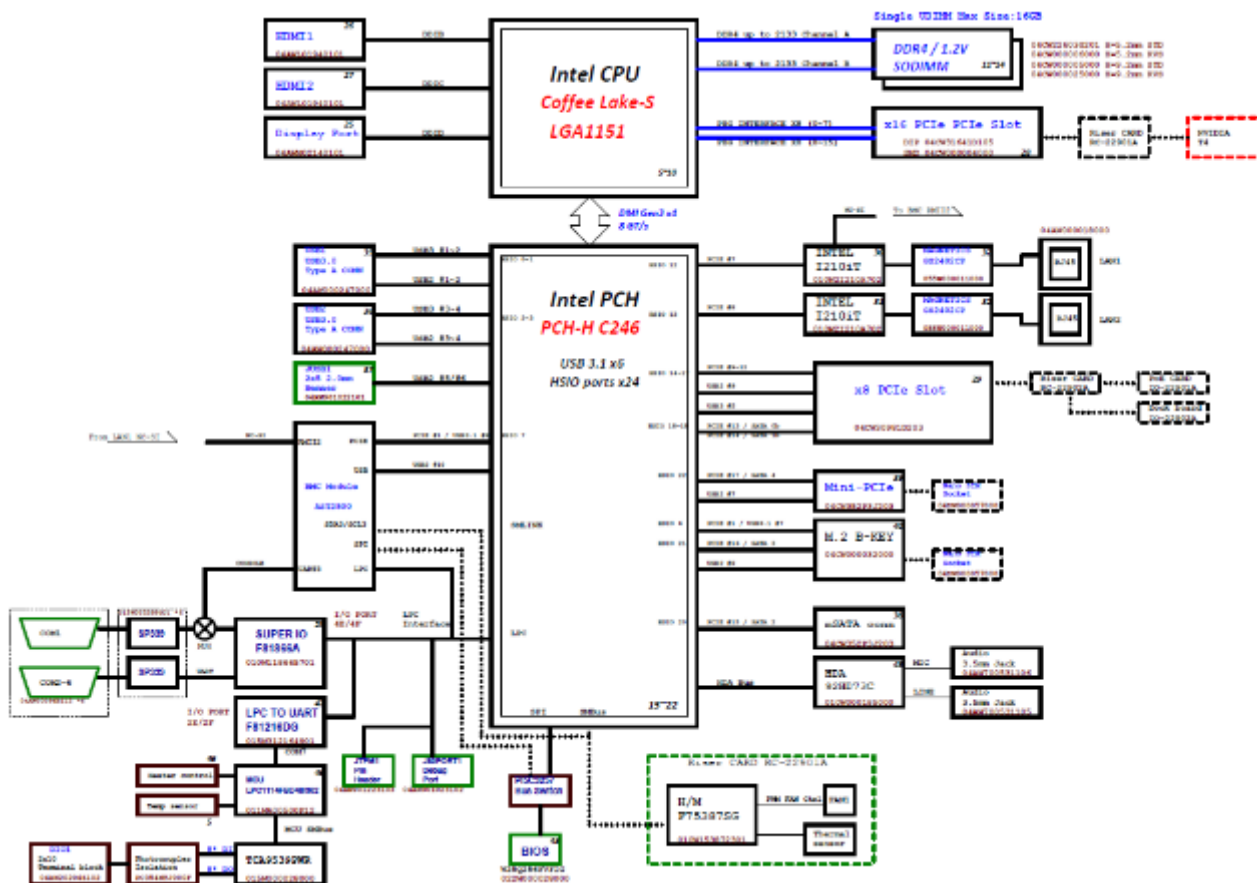


No.	Description	
R1	DIO	1x 20-Pin Terminal Block, 8x DI (12V) & 8x DO (12V,100mA) Isolation
R2	Display Port	1x Display Port
R3	HDMI Port	2x HDMI Ports
R4	COM Port	3x DB9 Male Connector for RS232/422/485 COM Ports
R5	DC Input	1x 4-Pin Terminal Block for DC 9~36V Power Source
R6	Module Slot (Antenna Port)	Removable PGN Module Slot
R7	PCIE Slot	1x PCIe*16 Slot

Motherboard Information

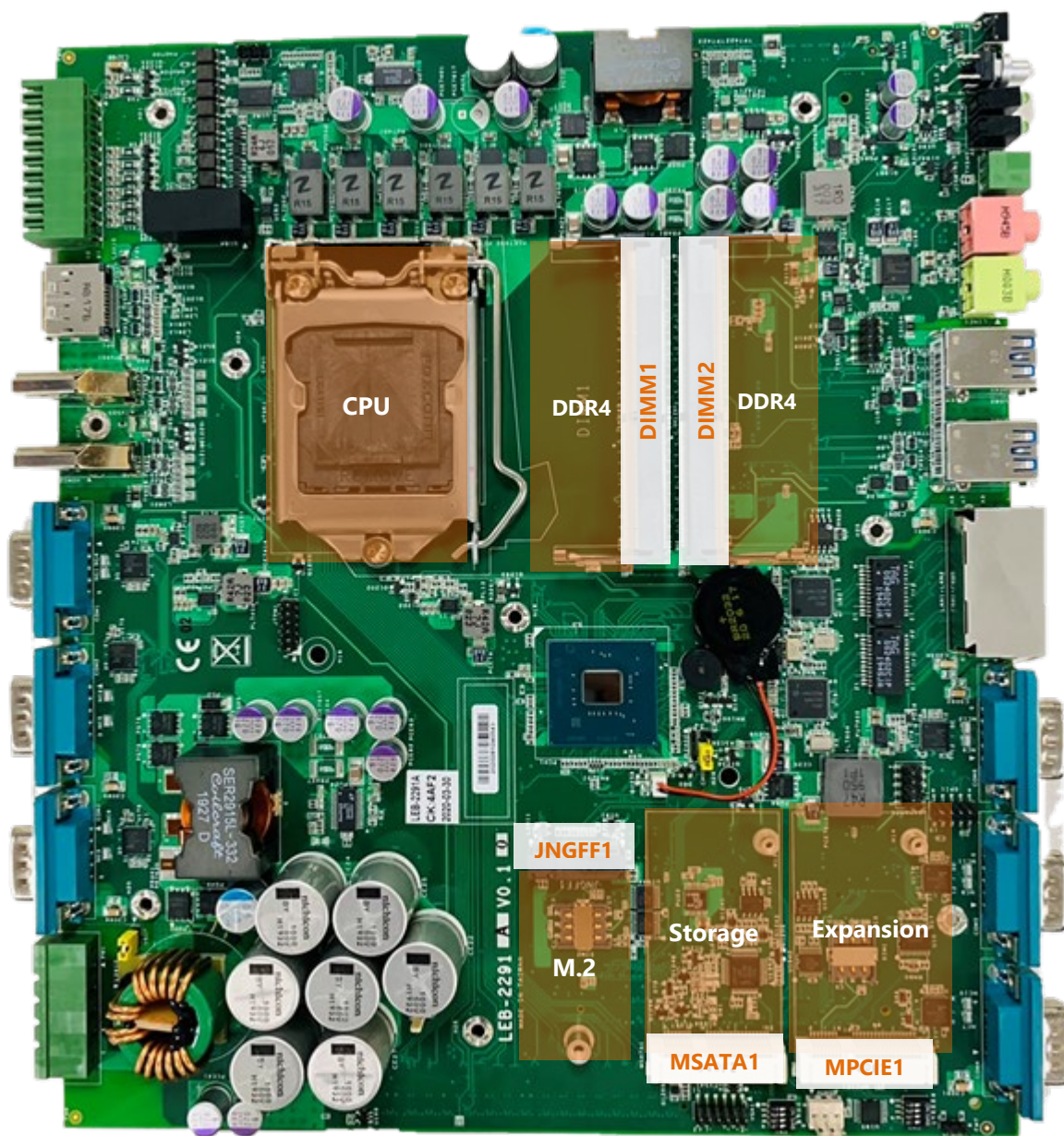
Block Diagram

The block diagram indicates how data flows among components on the motherboard. Please refer to the following figure for the motherboard's layout design.

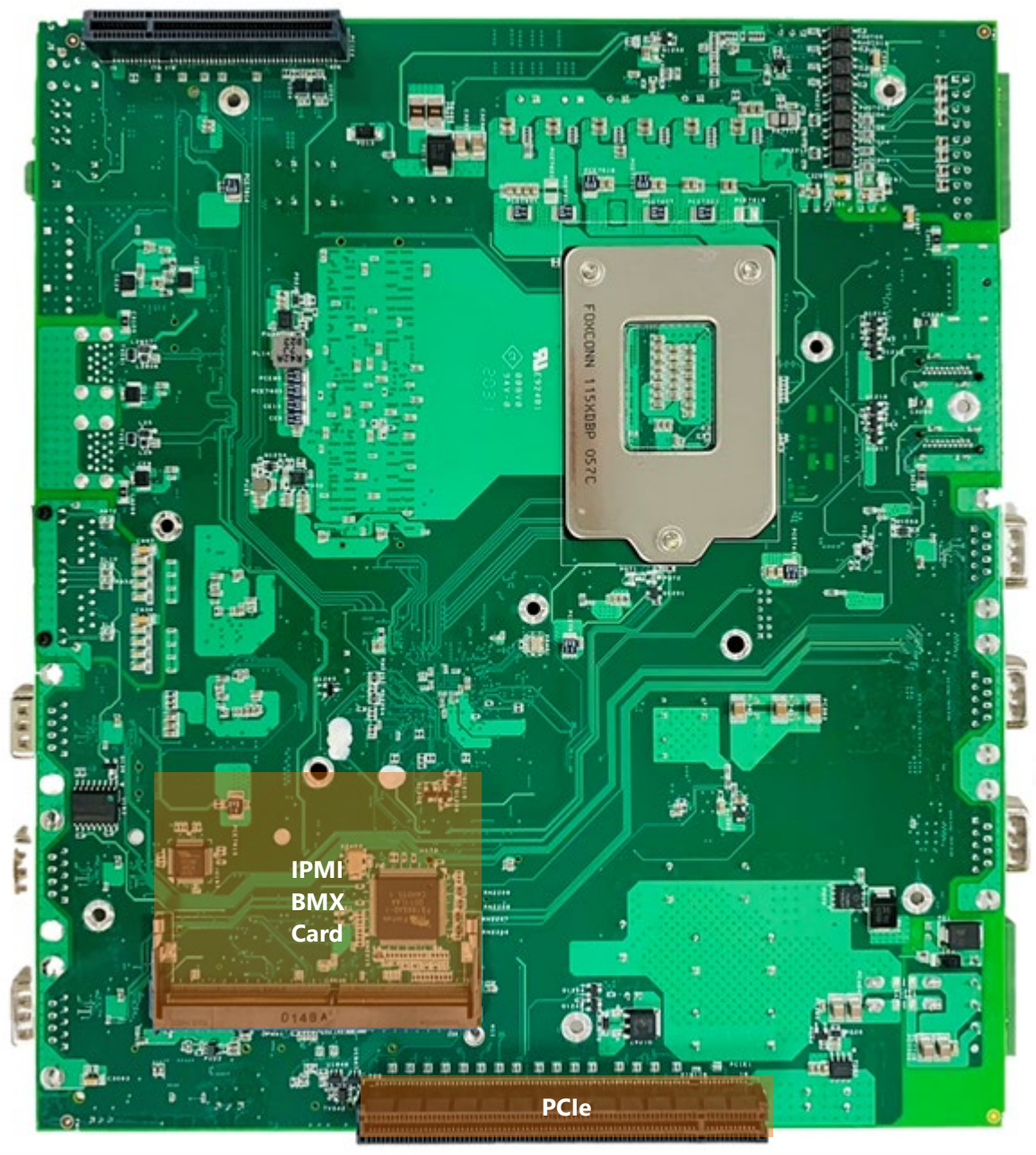


Motherboard Layout

Front View



Rear View

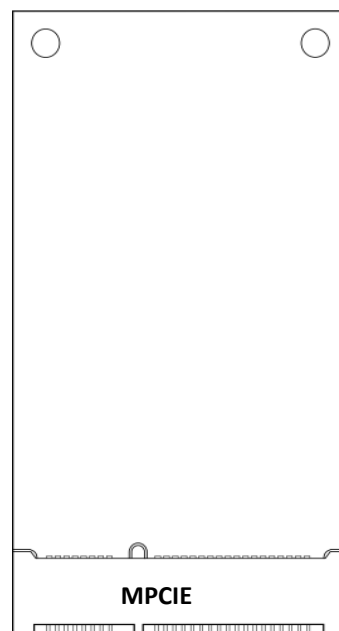


Internal Jumpers and Connector

The pin headers on the motherboard are often associated with important functions. With the shunt (Jumper) pushed down on the designated pins (the pin numbers are printed on the circuit board, surrounding the pin header), certain feature can be enabled or disabled. When changing the jumpers, make sure your system is completely turned off.

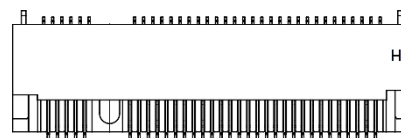
MPCIE1 (MCCIE Mini Card Slot)

PIN	DESCRIPTION	PIN	DESCRIPTION
1	WAKE#	2	+3.3V
3	RSVD	4	GND
5	RSVD	6	+1.5V
7	CLKREQ#	8	UIM_PWR
9	GND	10	UIM_DATA
11	REFCLK-	12	UIM_CLK
13	REFCLK+	14	UIM_RESET
15	GND	16	UIM_VPP
KEY B			
17	RSVD	18	GND
19	RSVD	20	W_DISABLE#
21	GND	22	PERST#
23	PERn0	24	+3.3V
25	PERp0	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	PETn0	32	SMB_DATA
33	PETp0	34	GND
35	GND	36	USB_D+
37	GND	38	USB_D-
39	+3.3V	40	GND
41	+3.3V	42	LED_WWAN#
43	GND	44	LED_WLAN#
45	RSVD	46	LED_WPAN#
47	RSVD	48	+1.5V
49	RSVD	50	GND
51	RSVD	52	+3.3V
57	GND	56	NC
59	ANTCTL0	58	NC
61	ANTCTL1	60	COEX3
63	ANTCTL2	62	COEX2
65	ANTCTL3	64	COEX1
67	PEDET	66	SIM_DET
69	PEDET/CONFIG1	68	SUSCLK
71	GND	70	3V3_AUX
73	GND	72	3V3_AUX
75	CONFIG2	74	3V3_AUX



JNGFF1: M.2 Slot (B-KEY)

PIN	DESCRIPTION	PIN	DESCRIPTION
1	CONFIG3	2	3V3_AUX
3	GND	4	3V3_AUX
5	GND	6	CARD PWROFF
7	USB D+	8	W_DIS



9	USB D-	10	DAS/DSS#
11	GND		
KEY B			
21	CONFIG0	20	AUDIO_0
23	NC	22	AUDIO_1
25	NC	24	AUDIO_2
27	GND	26	AUDIO_3
29	PERn1/USB3RX-	28	UIM_RFU
31	PERp1/USB3RX+	30	UIM_RESET
33	GND	32	UIM_CLK
35	PETn1/USB3TX-	24	UIM_DATA
37	PETp1/USB3TX+	36	UIM_PWR
39	GND	38	DEVSLP
41	PETn0/SATA_B+	40	GNSS0
43	PETp0/SATA_B-	42	GNSS1
45	GND	44	GNSS2
47	PERn0/SATA_A-	46	GNSS3
49	PERp0/SATA_A+	48	GNSS4
51	GND	50	PRESET#
53	REFCLK-	52	CLKREQ#
55	REFCLK+	54	WALE#
57	GND	56	NC
59	ANTCTL0	58	NC
61	ANTCTL1	60	COEX3
63	ANTCTL2	62	COEX2
65	ANTCTL3	64	COEX1
67	PEDET	66	SIM_DET
69	PEDET/CONFIG1	68	SUSCLK
71	GND	70	3V3_AUX
73	GND	72	3V3_AUX
75	CONFIG2	74	3V3_AUX

PCIE1: 16x PCIE Slot

PIN	DESCRIPTION	PIN	DESCRIPTION
B1	12V	A1	PRSNT1#
B2	12V	A2	12V
B3	12V	A3	12V
B4	GND	A4	GND
B5	SMCLK	A5	JTAG2
B6	SMDAT	A6	JTAG3
B7	GND	A7	JTAG4
B8	3.3V	A8	JTAG5
B9	JTAG1	A9	3.3V
B10	3.3VAUX	A10	3.3V
B11	WAKE#	A11	PERST#
KEY B			

B12	RSVD	A12	GND
B13	GND	A13	REFCLKA+
B14	HSOP0	A14	REFCLKA-
B15	HSO0N0	A15	GND
B16	GND	A16	HSIP0
B17	PRSNT2#	A17	HSIN0
B18	GND	A18	GND
B19	HSOP1	A19	RSVD
B20	HSO0N1	A20	GND
B21	GND	A21	HSIP1
B22	GND	A22	HSIN1
B23	HSOP2	A23	GND
B24	HSO0N2	A24	GND
B25	GND	A25	HSIP2
B26	GND	A26	HSIN2
B27	HSOP3	A27	GND
B28	HSO0N3	A28	GND
B29	GND	A29	HSIP3
B30	RSVD	A30	HSIN3
B31	PRSNT2#	A31	GND
B32	GND	A32	RSVD(REFCLKB+)
B33	HSOP4	A33	RSVD(REFCLKB-)
B34	HSO0N4	A34	GND
B35	GND	A35	HSIP4
B36	GND	A36	HSIN4
B37	HSOP5	A37	GND
B38	HSO0N5	A38	GND
B39	GND	A39	HSIP5
B40	GND	A40	HSIN5
B41	HSOP6	A41	GND
B42	HSO0N6	A42	GND
B43	GND	A43	HSIP6
B44	GND	A44	HSIN6
B45	HSOP7	A45	GND
B46	HSO0N7	A46	GND
B47	GND	A47	HSIP7
B48	PRSNT2#	A48	HSIN7

B49	GND	A49	GND
B50	HSOP8	A50	RSVD
B51	HSOP8	A51	GND
B52	GND	A52	HSIP8
B53	GND	A53	HSIN8
B54	HSOP9	A54	GND
B55	HSOP9	A55	GND
B56	GND	A56	HSIP9
B57	GND	A57	HSIN9
B58	HSOP10	A58	GND
B59	HSOP10	A59	GND
B60	GND	A60	HSIP10
B61	GND	A61	HSIN10
B62	HSOP11	A62	GND
B63	HSOP11	A63	GND
B64	GND	A64	HSIP11
B65	GND	A65	HSIN11
B66	HSOP12	A66	GND
B67	HSOP12	A67	GND
B68	GND	A68	HSIP12
B69	GND	A69	HSIN12
B70	HSOP13	A70	GND
B71	HSOP13	A71	GND
B72	GND	A72	HSIP13
B73	GND	A73	HSIN13
B74	HSOP14	A74	GND
B75	HSOP14	A75	GND
B76	GND	A76	HSIP14
B77	GND	A77	HSIN14
B78	HSOP15	A78	GND
B79	HSOP15	A79	GND
B80	GND	A80	HSIP15
B81	PRSNT2#	A81	HSIN15
B82	RSVD(CARD_DET#)	A82	GND

PCIE2 x8PCIE Slot (non-standard x8 PCIE SLOT)

PIN	DESCRIPTION	PIN	DESCRIPTION
B1	12V	A1	PRSNT1#
B2	12V	A2	12V
B3	12V	A3	12V
B4	GND	A4	GND
B5	SMCLK	A5	JTAG2
B6	SMDAT	A6	JTAG3
B7	GND	A7	JTAG4
B8	3.3V	A8	JTAG5
B9	JTAG1	A9	3.3V
B10	3.3VAUX	A10	3.3V
B11	WAKE#	A11	PERST#
KEY B			
B12	RSVD	A12	GND
B13	GND	A13	REFCLK+
B14	HSOP0	A14	REFCLK-
B15	HSOP0	A15	GND
B16	GND	A16	HSIP0
B17	PRSNT2#	A17	HSIN0
B18	GND	A18	GND
B19	HSOP1	A19	PoE_INT
B20	HSOP1	A20	GND
B21	GND	A21	HSIP1
B22	GND	A22	HSIN1
B23	HSOP2	A23	GND
B24	HSOP2	A24	GND
B25	GND	A25	HSIP2
B26	GND	A26	HSIN2
B27	HSOP3	A27	GND
B28	HSOP3	A28	GND
B29	GND	A29	HSIP3
B30	RSVD	A30	HSIN3
B31	PRSNT2#	A31	GND
B32	GND	A32	12V
B33	USB2_P9	A33	12V
B34	USB2_N9	A34	GND

B35	GND	A35	12V
B36	GND	A36	12V
B37	USB3_TX5+	A37	GND
B38	USB3_TX5-	A38	GND
B39	GND	A39	USB3_RX5+
B40	GND	A40	USB3_RX5-
B41	SATA_TX1+	A41	GND
B42	SATA_TX1-	A42	GND
B43	GND	A43	SATA_RX1+
B44	GND	A44	SATA_RX1-
B45	SATA_TX2+	A45	GND
B46	SATA_TX2-	A46	GND
B47	GND	A47	SATA_RX2+
B48	4G_PERST#	A48	SATA_RX2-
B49	VSIM_SW	A49	GND

OPMA1 (Non-Standard DIMM Socket)

DDR4 OPMA Pin Define

PIN	DESCRIPTION	PIN	DESCRIPTION
1	Card detect	2	P12V_ADC11 / GPIX3
3	GND1	4	RSVD9
5	I2C_SCL8 / GPIOK6	6	SYS_UART2_DCD
7	I2C_SDA8 / GPIOK7	8	SYS_UART2_DSR
9	RSVD1	10	SYS_UART2_CTS
11	RSVD2	12	SYS_UART2_RI
13	TACH4 / GPIOO4	14	GND32
15	TACH3 / GPIOO3	16	RSVD10
17	TACH11 / GPIOP3	18	P5V_ADC10 / GPIX2
19	RSVD3	20	RSVD11
21	P3V3_ADC9 / GPIX1	22	BMC_UART_RXD
23	RSVD4	24	BMC_UART_TXD
25	GND2	26	GND33
27	I2C_SDA6 / GPIOK3	28	ADC2 / GPIW2
29	I2C_SCL6 / GPIOK2	30	ADC3 / GPIW3
31	GND3	32	ADC8 / GPIX0
33	I2C_SDA7 / GPIOK5	34	GND34
35	I2C_SCL7 / GPIOK4	36	SYS_UART1_DSR
37	GND4	38	SYS_UART1_TXD
39	SYS_UART1_DCD	40	SYS_UART1_RXD

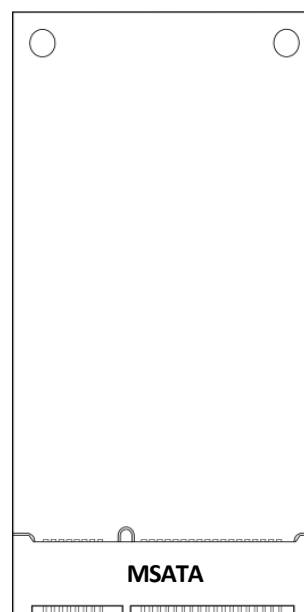
41	SYS_UART1_CTS	42	SYS_UART1_RI
43	GND5	44	SYS_UART1_DTR
45	PWM5 / GPION5	46	SYS_UART1_RTS
47	PWM3 / GPION3	48	GND35
49	PWM0 / GPION0	50	RSVD12
51	PWM1 / GPION1	52	CPU_CORE1_ADC1 / GPIW1
53	GND6	54	ADC5 / GPIW5
55	TACH1 / GPIOO1	56	ADC4 / GPIW4
57	TACH0 / GPIOO0	58	ADC7 / GPIW7
59	TACH2 / GPIOO2	60	CPU_CORE0_ADC0 / GPIW0
61	GND7	62	ADC6 / GPIW6
63	SYS_UART2_RXD	64	RSVD13
65	SYS_UART2_TXD	66	GND36
67	SYS_UART2_RTS	68	I2C_SCL5_Transceiver/others
69	SYS_UART2_DTR	70	I2C_SDA5_Transceiver/others
71	GND8	72	GND37
73	RSVD5	74	PWM2 / GPION2
75	GND9	76	PWM4 / GPION4
77	TACH8 / GPIOP0	78	GND38
79	TACH7 / GPIOO7	80	RSVD14
81	TACH5 / GPIOO5	82	PECI_VDD
83	TACH9 / GPIOP1	84	PECI
85	TACH6 / GPIOO6	86	GND39
87	TACH10 / GPIOP2	88	BIOS_SPICK
89	GND10	90	BIOS_MOSI
91	RSVD6	92	BIOS_MISO
93	GND11	94	BIOS_CS0
95	GPIO2 / SALT5	96	GND40
97	GPIOZ1 / NORA1 / SIOPWRGD	98	GPIOZ0 / NORA0 / SIOPB#
99	GPIOZ2 / NORA2 / SIOPBO#	100	GPIO20 / SPI2CS1#
101	GPIOZ3 / NORA3 / SIOSCI#	102	GPIO21 / BMCINT
103	GPIOAB1 / NORWE#	104	GPIO23 / SALT6
105	GPIOAB2 / WDTSTR1	106	GPIOAB0 / NOROE#
107	SYS_SLP_S5_IN	108	GPIOAB3 / WDTSTR2
109	SYS_SLP_S3_IN	110	EXTRST#
111	GPIOY3 / SIOONCTRL#	112	PEWAKE# / GPIOQ7
113	BMC_SPI_SWITCH_OUT	114	GND41
115	I2C_SCL14_IPMIB2	116	I2C_SDA1_Thermail Sensors/HW_monitor
117	I2C_SDA14_IPMIB2	118	I2C_SCL1_Thermail Sensors/HW_monitor
119	GND12	120	GND42
121	PERXP	122	I2C_SCL2_MB_ID_EEPROM/LOM_EEPROM

123	PERXN	124	I2C_SDA2_MB_ID_EEPROM/LOM_EEPROM
125	GND13	126	GND43
127	PETXP	128	PERST#
129	PETXN	130	GND44
131	GND14	132	RSVD15
133	PEREFCLKP	134	RSVD16
135	PEREFCLKN	136	GND45
137	GND15	138	SOL_UART_DCD
139	SOL_UART_DSR	140	SOL_UART_RI
141	SOL_UART_DTR	142	SOL_UART_RTS
143	GND16	144	GND46
145	SYS-CS# / GPIO10	146	SYS_UART_SWITCH_OUT
147	SYSMISO / GPIO13	148	BIOS_READY_IN
149	SYSCK / GPIO11	150	BMC_PWRBTN_OUT
151	SYSMOSI / GPIO12	152	BMC_READY_OUT
153	GND17	154	SYS_NMI_IN
155	GND18	156	GND47
157	SYS_SMI_IN	158	BMC_SMI_OUT
159	MDC2 / GPIOA6 / TIMER7	160	CPU_CATERR_IN
161	MDIO2 / GPIOA7 / TIMER8	162	BMC_UART_SWITCH_OUT
163	SYS_RSMRST_IN	164	GND48
165	GND19	166	CPU_THERMTRIP_IN
167	ESPI_RESET	168	BMC_RSTBTN_OUT
169	LSIRQ# / ESPIALT# / GPIOAC6	170	SYS_PWROK_IN
171	ESPI_ALERT	172	CPU0_PROCHOT_IN
173	GND20	174	CPU0_FIVR_FAULT_IN
175	LPCRST# / ESPIRST# / GPIOAC7	176	BMC_SPKR_OUT
177	LFRAMEN# / ESPICS# / GPIOAC5	178	CPU1_FIVR_FAULT_IN
179	LAD1 / ESPID1 / GPIOAC1	180	GND49
181	LAD0 / ESPID0 / GPIOAC0	182	I2C_SCL9_IPMB1
183	LAD3 / ESPID3 / GPIOAC3	184	I2C_SDA9_IPMIB1
185	LAD2 / ESPID2 / GPIOAC2	186	GND50
187	LCLK / ESPICK / GPIOAC4	188	I2C_SDA3_SMLink0
189	GND21	190	I2C_SCL3_SMLink0
191	CPU_ERR_0_IN	192	GND51
193	CPU_ERR_1_IN	194	I2C_SCL4_PMBus
195	CPU_ERR_2_IN	196	I2C_SDA4_PMBus
197	GND31	198	GND52
199	USB2A_DP	200	BMC_NMI_OUT
201	USB2A_DN	202	CPU1_PROCHOT_IN
203	GND22	204	GND53

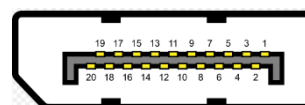
205	RSVD7	206	LAN_100M#
207	RSVD8	208	LAN_ACT#
209	GND23	210	LAN_1G#
211	SOL_CTS3	212	GND54
213	SOL_TXD3	214	GPIOA1_MAC2LINK
215	SOL_RXD3	216	RGMII2RXD3 / RMII2RXER / GPIOV7
217	GND24	218	RGMII2RXD0 / RMII2RXD0 / GPIOV4
219	MDI0P	220	RGMII2RXCK / RMII2RCLKI / GPIOV2
221	MDI0N	222	RGMII2RXCTL / GPIOV3
223	GND25	224	RGMII2RXD2 / RMII2CRSDV / GPIOV6
225	MDI1P	226	RGMII2RXD1 / RMII2RXD1 / GPIOV5
227	MDI1N	228	GND55
229	GND26	230	MAC2 STRAP
231	MDI2P	232	RGMII2TXD3 / GPIOU3
233	MDI2N	234	RGMII2TXCK / RMII2RCLKO / GPIOT6
235	GND27	236	RGMII2TXD0 / RMII2TXD0 / GPIOU0
237	MDI3P	238	RGMII2TXD2 / GPIOU2
239	MDI3N	240	RGMII2TXCK / RMII2RCLKO / GPIOT7
241	GND28	242	RGMII2TXD1 / RMII2TXD1 / GPIOU1
243	DAC_RO	244	GND56
245	DAC_GO	246	RSVD17
247	DAC_BO	248	P1V8_SB
249	HSYNC_O	250	RSVD18
251	VSYNC_O	252	P3V3_SB_1
253	GND29	254	P3V3_SB_2
255	DDC_DATA	256	P3V3_SB_3
257	DDC_CLK	258	RSVD19
259	GND30	260	P5V_SB

MSATA1: MSATA Slot (Full Size)

PIN	DESCRIPTION	PIN	DESCRIPTION
1	N.C	2	+3.3V
3	N.C	4	GND
5	N.C	6	N.C
7	N.C	8	N.C
9	GND	10	N.C
11	N.C	12	N.C
13	N.C	14	N.C
15	GND	16	N.C
KEY			
17	N.C	18	GND
19	N.C	20	N.C
21	GND	22	N.C
23	SATA_RXp	24	+3.3V
25	SATA_RXn	26	GND
27	GND	28	N.C
29	GND	30	N.C
31	SATA_TXn	32	N.C
33	SATA_TXp	34	GND
35	GND	36	N.C
37	GND	38	N.C
39	+3.3V	40	GND
41	+3.3V	42	N.C
43	GND	44	N.C
45	N.C	46	N.C
47	N.C	48	N.C
49	N.C	50	GND
51	N.C	52	+3.3V

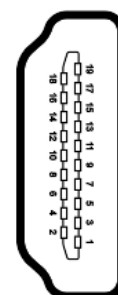
**DP1: Display Port Interface**

PIN	DESCRIPTION	PIN	DESCRIPTION
1	LANE0+	2	GND
3	LANE0-	4	LANE1+
5	GND	6	LANE1-
7	LANE2+	8	GND
9	LANE2-	10	LANE3+
11	GND	12	LANE3-
13	GND	14	GND
15	AUX CH+	16	GND
17	AUX CH-	18	HOT PLUG
19	RETURN	20	DP PWR

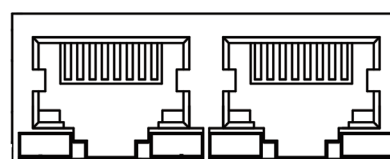


HDMI1/HDMI2: High-definition Multimedia Interface

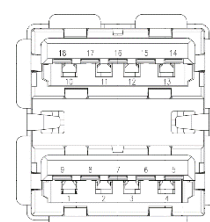
PIN	DESCRIPTION	PIN	DESCRIPTION
1	DATA2+	2	GND
3	DATA2-	4	DATA1+
5	GND	6	DATA1-
7	DATA0+	8	GND
9	DATA0-	10	CLK+
11	GND	12	CLK-
13	N.C	14	N.C
15	DDC CLK	16	DDC DAT
17	GND	18	HDMI_VCC
19	HPD		

**Ethernet LAN1/LAN2: Dual RJ-45 with LED**

PIN	DESCRIPTION	
	Fast E-Net	Giga Net
1	TX+	MD0+
2	TX-	MD0-
3	RX+	MD1+
4	T45	MD2+
5	T45	MD2-
6	RX-	MD1-
7	T78	MD3+
8	T78	MD3-
9	10-/100-/1000+	
10	10+/100+/1000-	
11	Link+ /ACT-	
12	Link- /ACT+	

**USB1/USB2: USB3.0 Double Stack Type A**

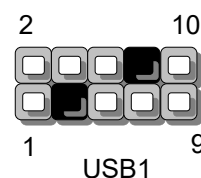
PIN	9	8	7	6	5
DESCRIPTION	USB1_TX+	USB1_TX-	GND	USB1_RX+	USB1_RX-
PIN	1	2	3	4	
DESCRIPTION	USB_VCC1	USB1_D-	USB1_D+	GND	



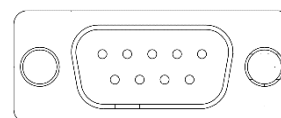
PIN	9	8	7	6	5
DESCRIPTION	USB1_TX+	USB1_TX-	GND	USB1_RX+	USB1_RX-
PIN	1	2	3	4	
DESCRIPTION	USB_VCC1	USB1_D-	USB1_D+	GND	

JUSB1: Internal USB Connector

PIN	DESCRIPTION	PIN	DESCRIPTION
1	USB_VCC	2	GND
3	KEY	4	+USB
5	-USB	6	-USB
7	+USB	8	KEY
9	GND	10	USB_VCC

**COM1~6: Serial Port 1~6 (RS232/422/485)**

PIN	DESCRIPTION	DESCRIPTION	DESCRIPTION
1	DCD#	Tx-	RxTx-
2	RX	Tx+	RxTx+
3	TX	Rx+	
4	DTR#	Rx-	
5	GND	GND	GND
6	DSR		
7	RTS#		
8	CTS#		
9	RI#		

**DIO1: Isolation Digital Input / Output**

PIN	DESCRIPTION	PIN	DESCRIPTION
1	DO_0	2	DI_0
3	DO_1	4	DI_1
5	DO_2	6	DI_2
7	DO_3	8	DI_3
9	DO_4	10	DI_4
11	DO_5	12	DI_5
13	DO_6	14	DI_6
15	DO_7	16	DI_7
17	DO_COM	18	I_COM
19	DO_COM	20	12V_OUT(400mA)

Audio LINE1:**3.5mm headphone Jack (Green)**

PIN	DESCRIPTION
1	GND
2	LINE_OUT_L
3	GND
4	GND
5	LINE_OUT_R

Audio MIC1:**3.5mm headphone Jack (Pink)**

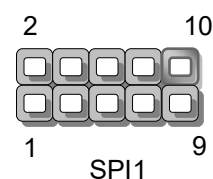
PIN	DESCRIPTION
1	GND
2	MIC_L
3	GND
4	GND
5	MIC_R

PW1: DC IN Connector (1x4 PIN 5.0mm Terminal block)

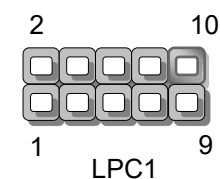
PIN	DESCRIPTION
1	DC_IN (-)
2	DC_IN (+)
3	DC_IN (+)
4	DC_IN (-)

SP1: SPI Interface (debug only)

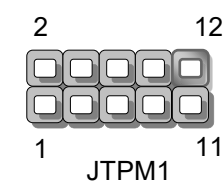
PIN	DESCRIPTION	PIN	DESCRIPTION
1	SPI_HOLD	2	N.C
3	SPI_CS#	4	SPI_VCC
5	SPI_MO	6	N.C
7	N.C	8	SPI_CLK
9	GND	10	SPI_MI

**J80PORT1: LPC Debug 80Port (debug only)**

PIN	DESCRIPTION	PIN	DESCRIPTION
1	SPI_HOLD	2	N.C
3	SPI_CS#	4	SPI_VCC
5	SPI_MO	6	N.C
7	N.C	8	SPI_CLK
9	GND	10	SPI_MI

**JTPM1: TPM Module Connector**

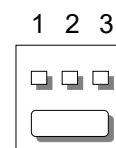
PIN	DESCRIPTION	PIN	DESCRIPTION
1	SERIRQ#	2	+3.3V
3	LAD0	4	+3.3V
5	LAD1	6	GND
7	LFRAME#	8	key



9	LPC_CLK	10	PLTRST#
11	LAD2	12	LAD3

CN1: MCU Debug Connector (debug only)

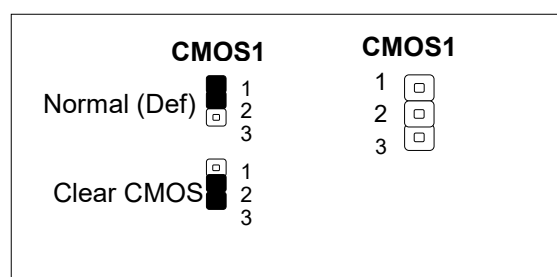
PIN NO.	DESCRIPTION
1	EXT_TX
2	GND
3	EXT_RX



CN1

CMOS1: Clear CMOS

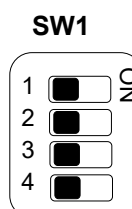
Description	CMOS1
Normal (Default)	1-2
Clear CMOS	2-3

**PSBTN2: External Power button (1x2 Pin 3.81mm Terminal block)**

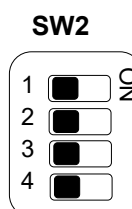
PIN	DESCRIPTION
1	PS_IN
2	GND

SW1: Ignition Function Setting

SW	DESCRIPTION	Off	On
S1	DETECT POWER GOOD	Disable	Enable
S2	LOW POWER DETECT	Disable	Enable
S3	MCU WATCH DOG	Disable	Enable
S4	PROGRAM MODE	Disable	Enable

**SW2: MCU Communication Port Select**

Description	SW2
Connect internal RS232(COM7)	S1/S2 on S3/S4 off
Connect external RS232 from CN1 (Debug & Update FW)	/S2 off S3/S4 on



JIG1: Disable Ignition Function

Description.	DESCRIPTION
Normal	1-2 Short
IG mode	1-2 Open

JIG1

- 1 
- 2 

JIGBTN1: Disable Ignition Function

Description	DESCRIPTION
Power button from MCU	1-2 Short
Power button from PSBTN1	1-2 Open

JIGBTN1

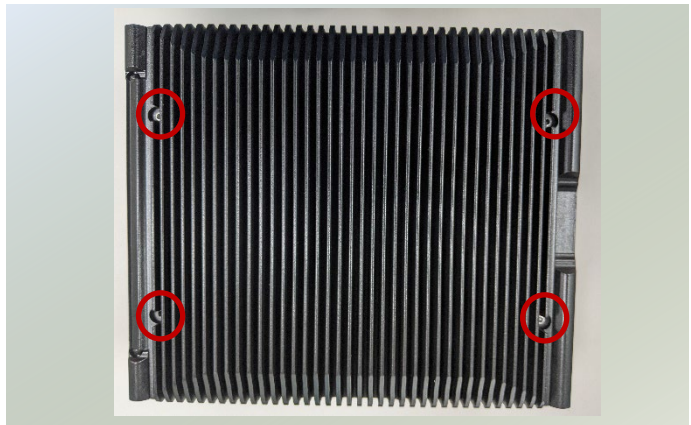
- 1 
- 2 

CHAPTER 2: HARDWARE SETUP

To reduce the risk of personal injury, electric shock, or damage to the unit, please remove all power connections to completely shut down the device, and wear ESD protection gloves when conducting the steps in this chapter.

Open the Chassis

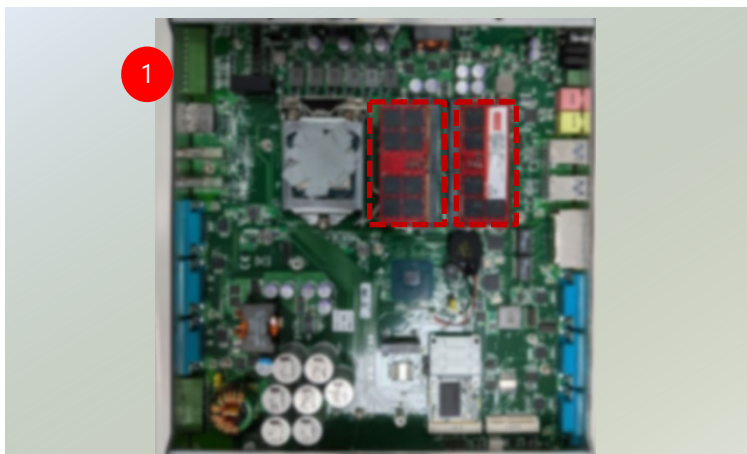
1. Power off the system and disconnect the power cord. Unscrew the four (4) screws securing the cover.
2. Loosen all the screws and lift the cover chassis up.



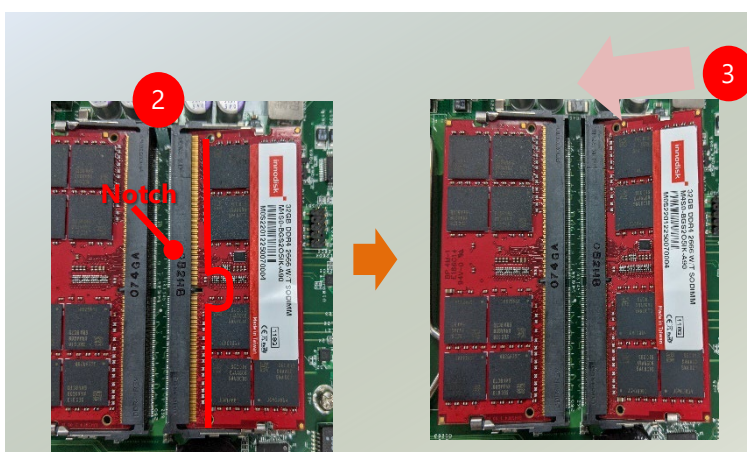
Installing System Memory

The motherboard supports two (2) memory slots for DDR4 registered DIMM. Please follow the steps for installation.

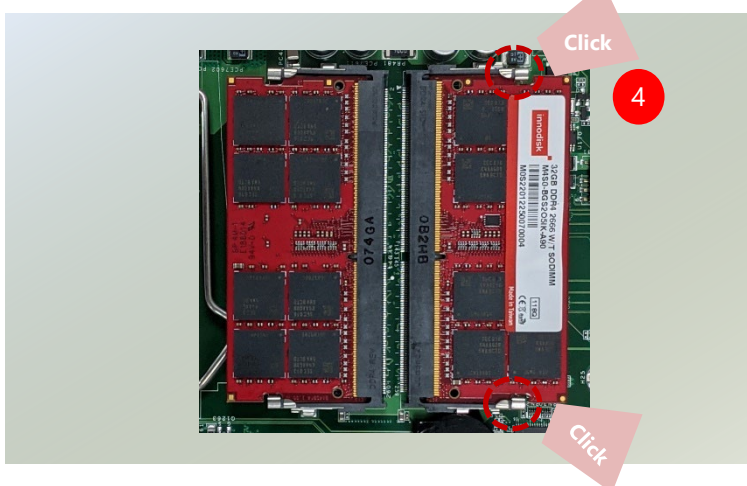
1. Power off the system and open the system chassis cover. Locate the memory slots on the motherboard.



2. Align the notch of the module with the socket key in the pin slot.
3. Insert the memory card pins at 30 degrees into the socket until it is fully seated.



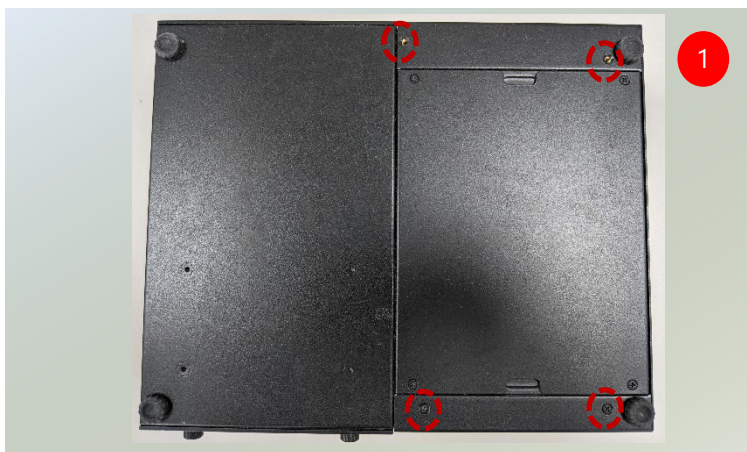
4. Push down on the module until the slot latches catches and clicks into place.



Installing IPMI BMC Card (Optional)

IPMI provides better server management, server monitoring, and remote access. IPMI is independent of the system's CPU operating system via hardware applied directly into the motherboard. Please follow the steps for installation.

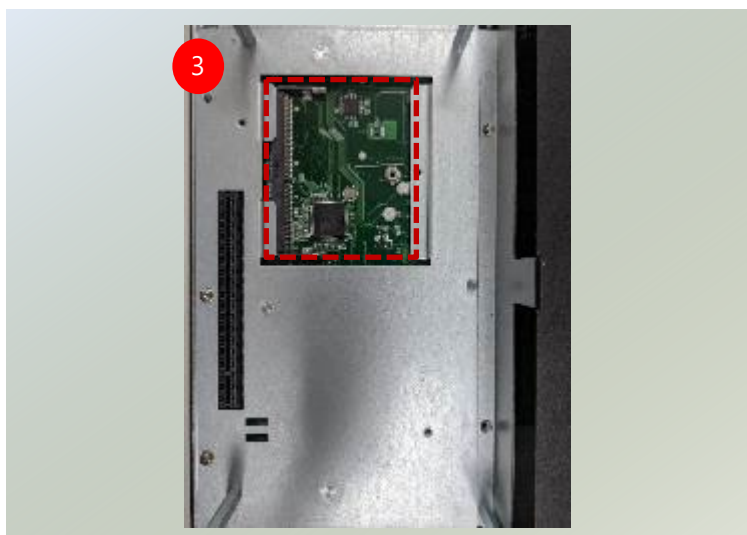
1. Power off the system and turn the system upside down. Locate the four (4) screws on the bottom panel.



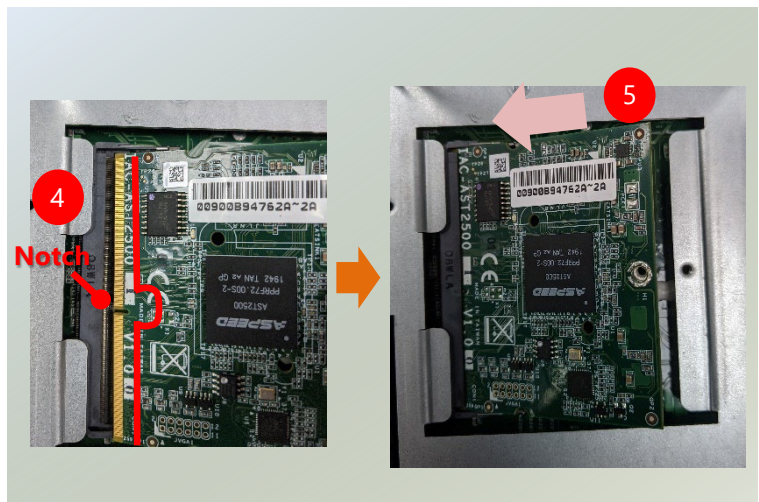
2. Loosen the screws and lift up to remove, and place it aside. Watch out for the metal pillars on each corner and PCIe pins.



3. Locate the BMC module slot on the motherboard.



4. Align the notch of the module with the socket key in the pin slot.
5. Insert the BMC card pins at 30 degrees into the socket until it is fully seated.



6. Push down on the module until the slot latches catches and clicks into place. Then, secure into place with one (1) screw.

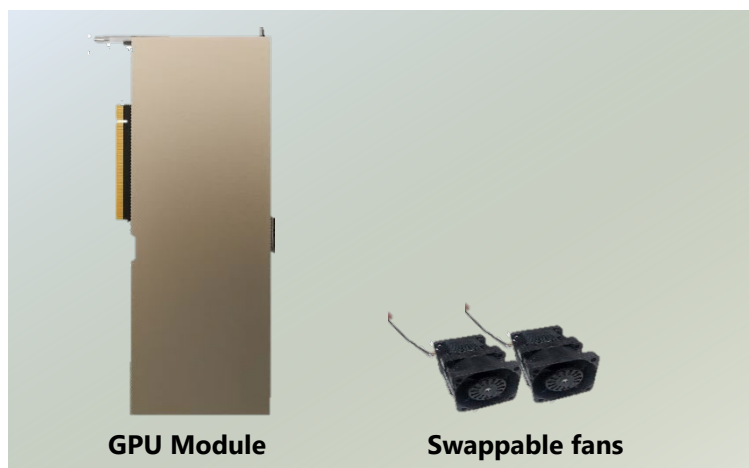


Installing GPU Module (Optional)

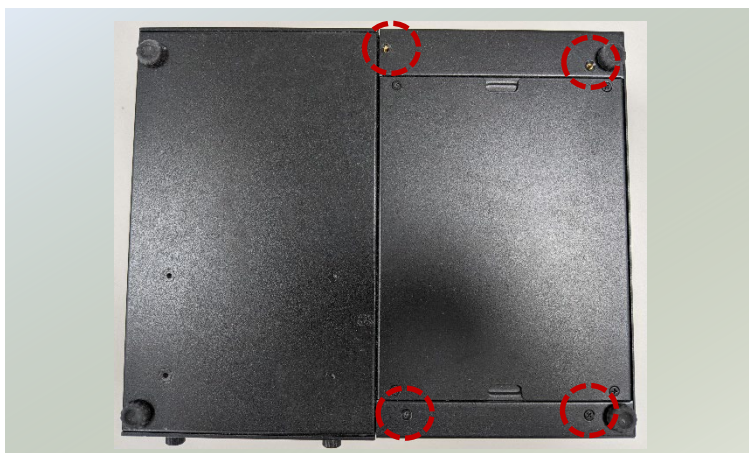
LEC-2290L comes with a slot for GPU graphic card expansion. The GPU graphic card requires a rather complex installation process; therefore, the assembly must be handled with care. Please read through the instructions in this section to make sure you have acquired the necessary knowledge and comply with the requirements.

1. The GPU expansion kit will include:

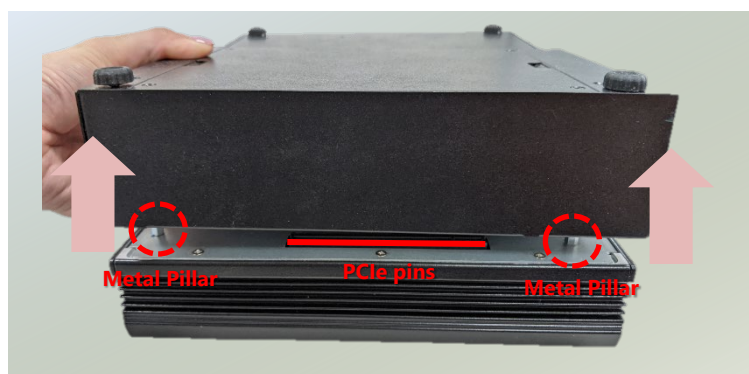
- ▶ 1x NVIDIA® L4 GPU module
- ▶ 2x Swappable fans
- ▶ 1x Screw Pack



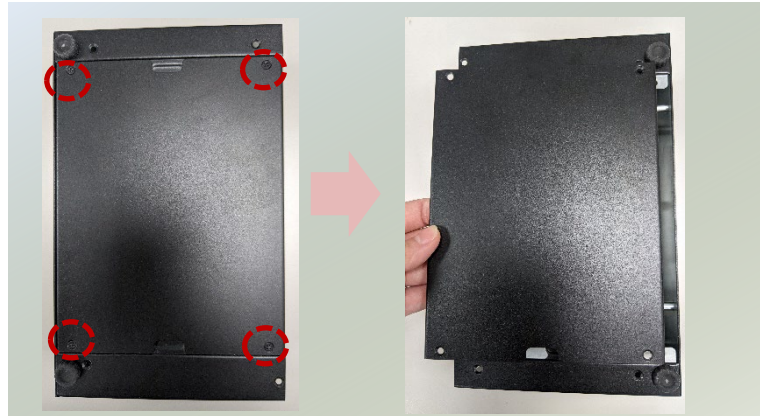
2. Power off the system and turn the system upside down. Locate the four (4) screws on the bottom panel.



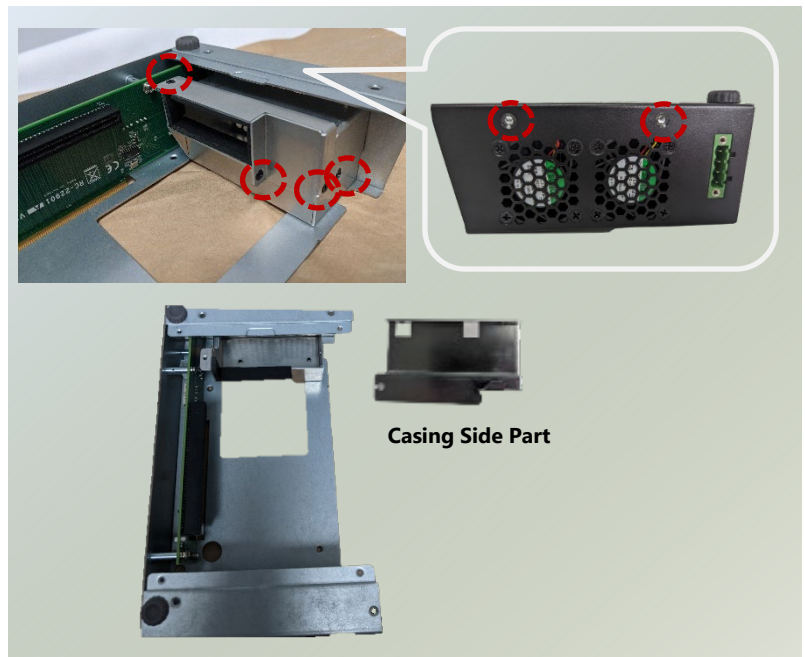
3. Loosen the four (4) screws and lift up the section to remove. Watch out for the pillar studs on each corner and PCIe pins.



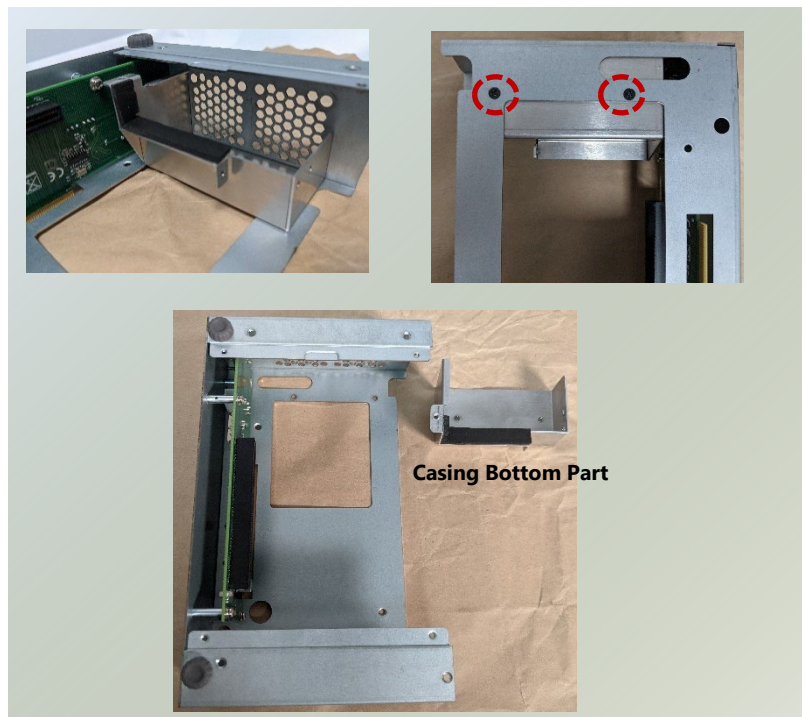
- Loosen the four (4) screws and open the top chassis.



- First, remove the casings parts (side part & bottom part). To remove the side part, unscrew the six (6) screws.



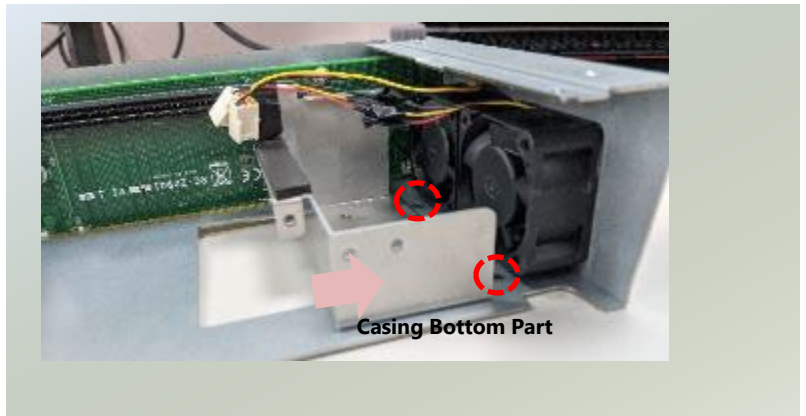
- To remove the bottom part, unscrew the two (2) screws from the underside.



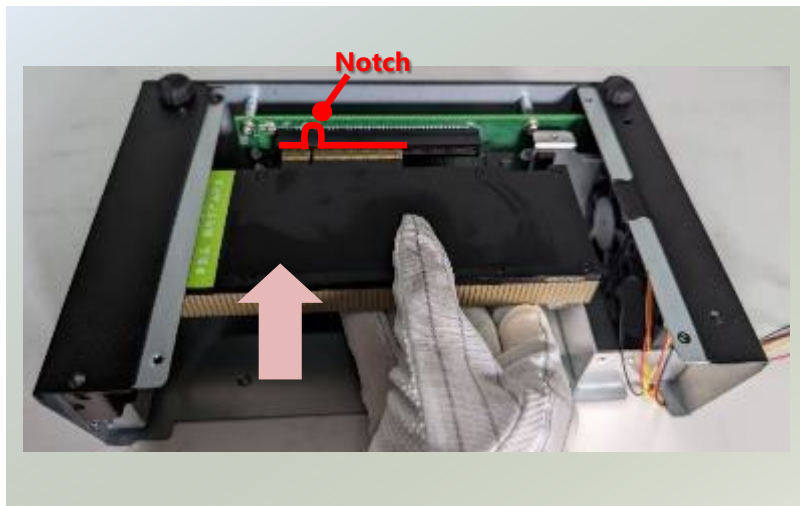
6. After removing the casing parts, install the swappable fans. Secure the fan with four (4) screws each.



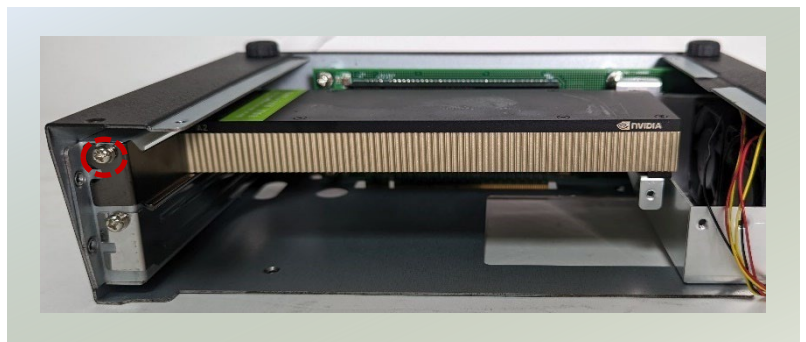
7. Place in the bottom casing part and secure with two (2) screws on the underside.



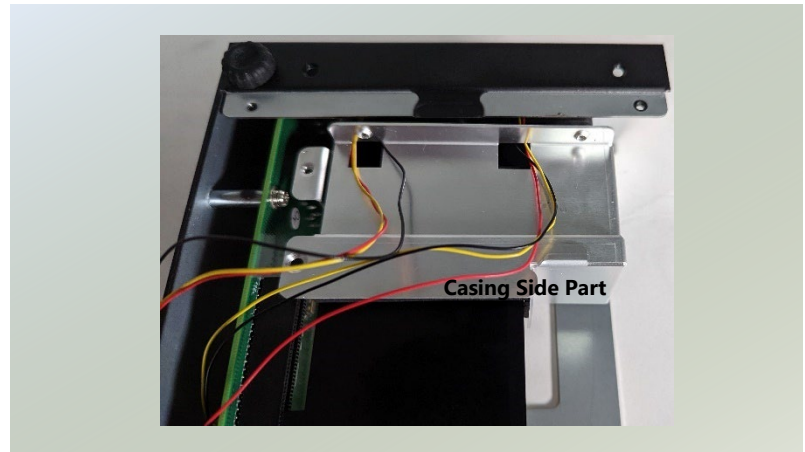
8. Insert the GPU graphic card. Align with the notch and slide until fully seated.



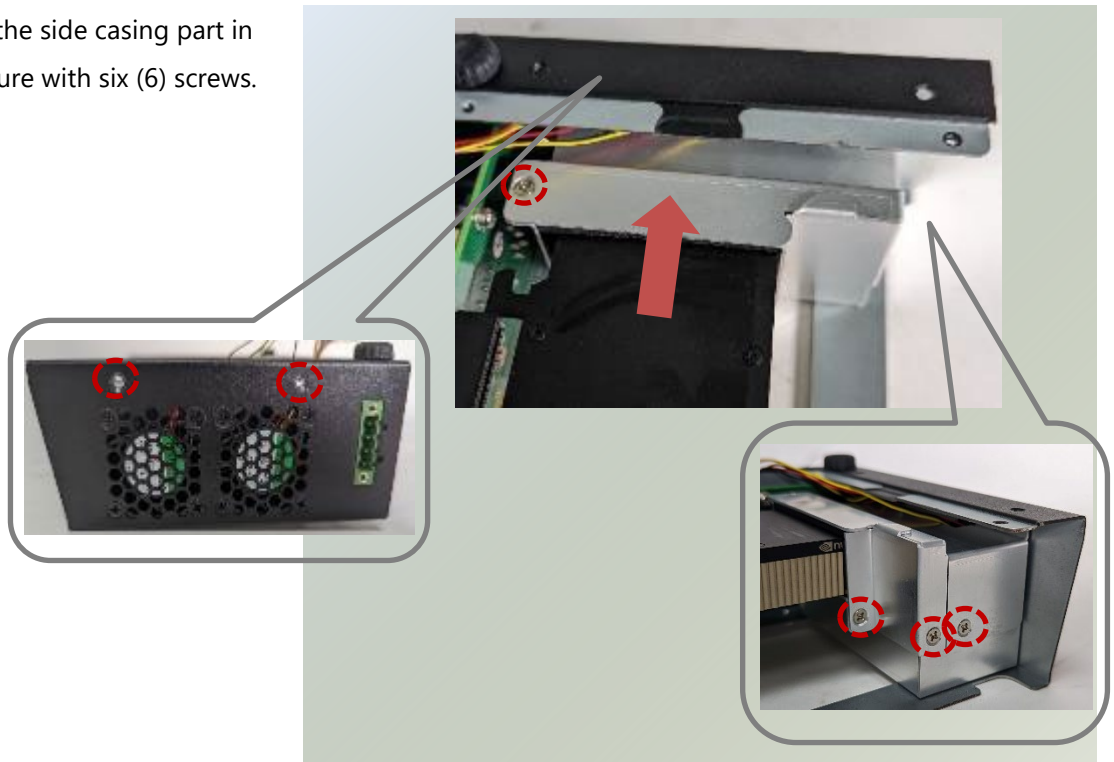
9. Secure with one (1) screw on the side.



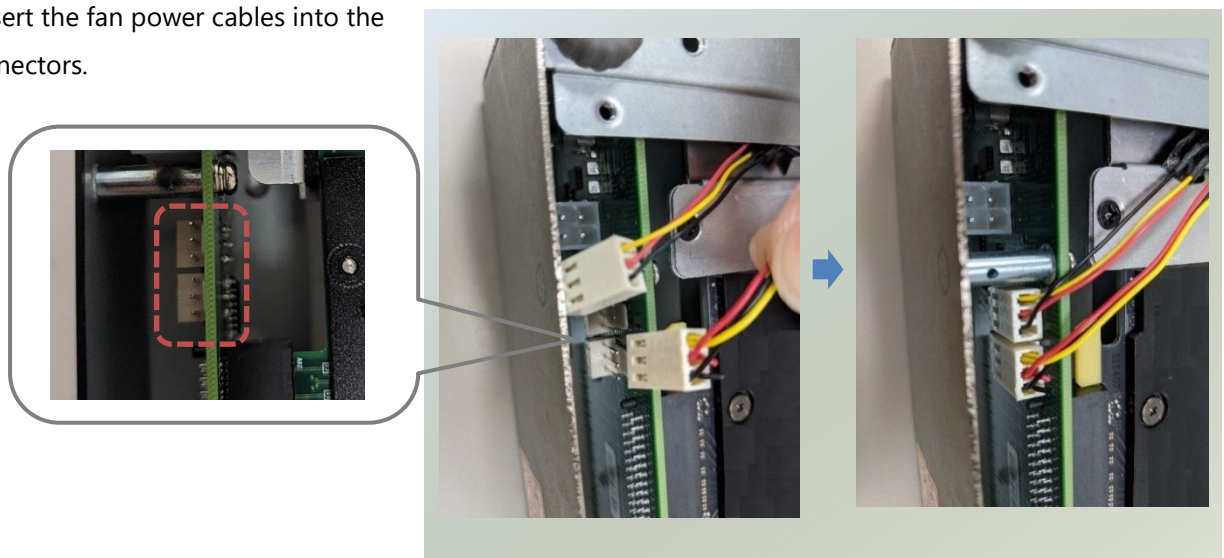
10. Place the fan power cables through the casing side part holes.



11. Gently push the side casing part in place, and secure with six (6) screws.



12. Insert the fan power cables into the connectors.

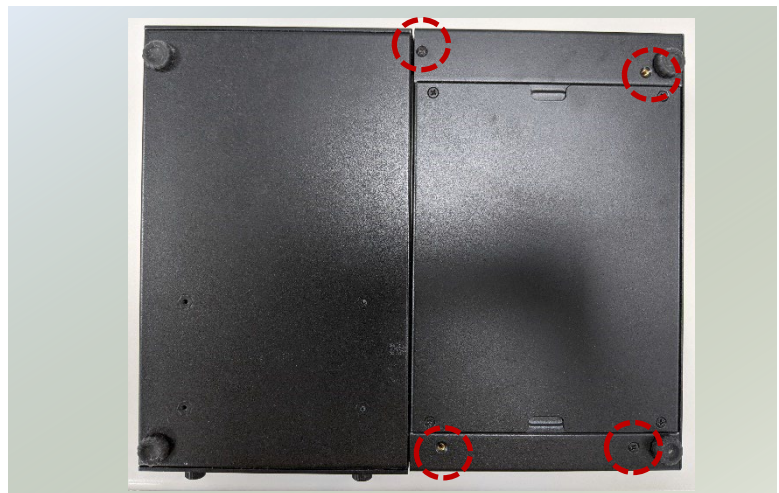
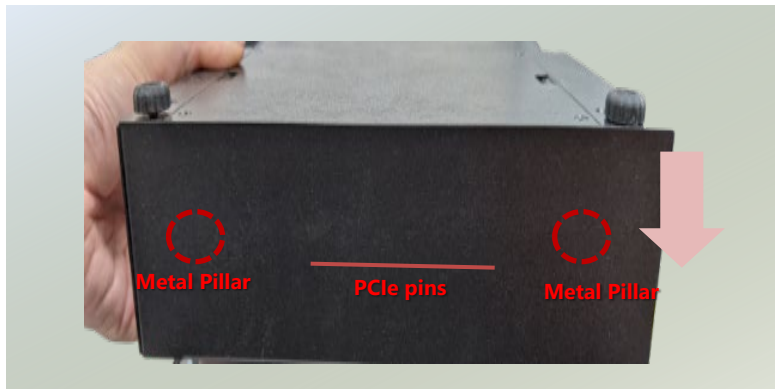


13. Place the top chassis back and secure with four (4) screws.



14. Insert the bottom panel back, watch out for the PCIe pins and metal pillars.
Secure with four (4) screws.

15. The GPU graphic card has been successfully installed.



Installing the Disk Drive(s) (Optional)

The system supports two 2.5" HDD/SSD drive bays, with one 2.5" SSD drive included. The following will discuss disk drive installation procedures.

1. Power off the system and unplug the power cord. Unscrew the two thumbscrews that fix the tray on the system. Pull the drive tray out.



2. Install the disk onto the tray and secure with four (4) screws, two on each side. Make sure the SATA connector faces outwards as shown in the image.



3. Insert the tray into the bay and fasten the two thumbscrews that fix the tray on the system.



Wall-Mounting the System (Optional)

The system can be mounted on a flat surfaced wall. Please take the following into considerations when mounting the system onto the wall.

The Wallmount kit contains the following items:

- ▶ 1x pair of Wall Brackets
- ▶ 1x Screw Pack



1. Invert the system to expose the bottom side. Secure the two wall brackets to the system base using four (4) screws, two (2) per bracket.



2. Now the system can be mounted on a flat surface wall.

Rackmount the System (Optional)

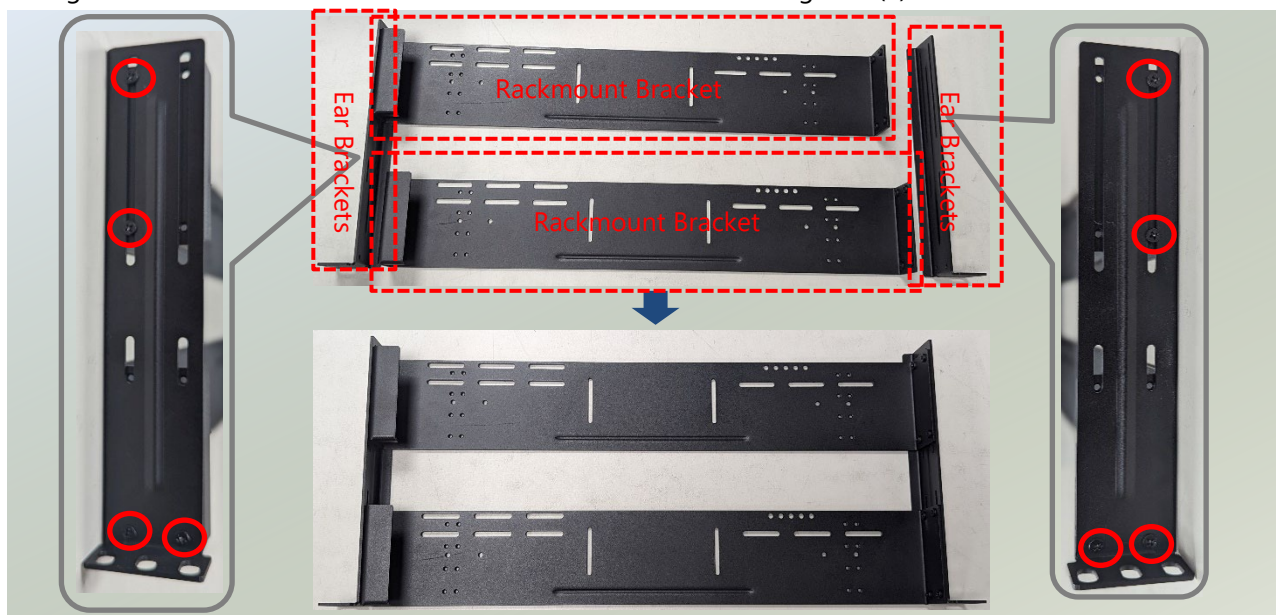
With a rackmount kit, LEC-2290L can be installed into a rack. Please contact Lanner's sales representative for purchasing the rackmount kit.

The rackmount kit contains the following:

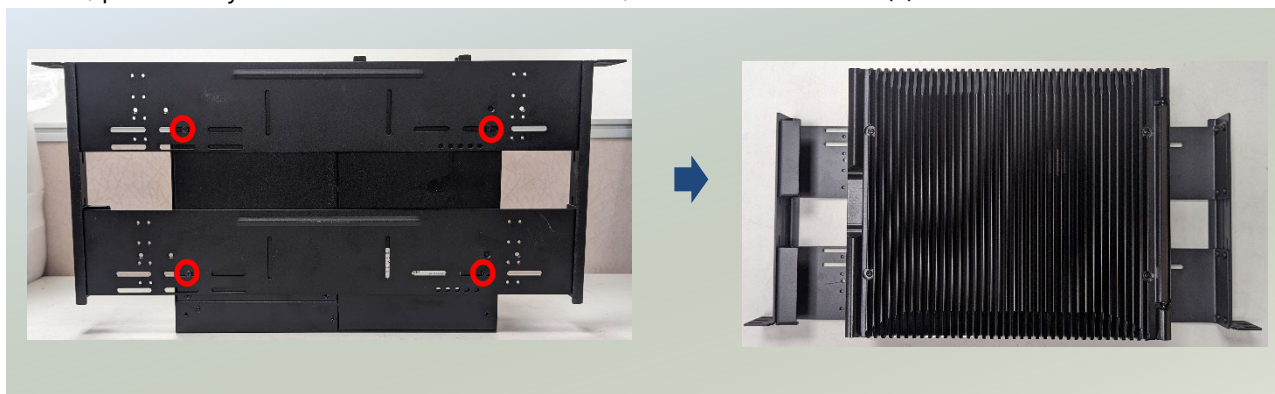
- ▶ 2x Rackmount Brackets
- ▶ 2x Ear Brackets
- ▶ 1x Screws Pack



1. Align the ear brackets to the rackmount brackets and secure using four (4) screws on each side.



2. Next, place the system in the center of the bracket, and secure with four (4) screws on the bottom side.



3. Position the system with its front facing you, gently lift it, and insert it into the rack. Attach the ear brackets to the rack rails using rack-mount screws (not provided).



CHAPTER 3: SOFTWARE SETUP

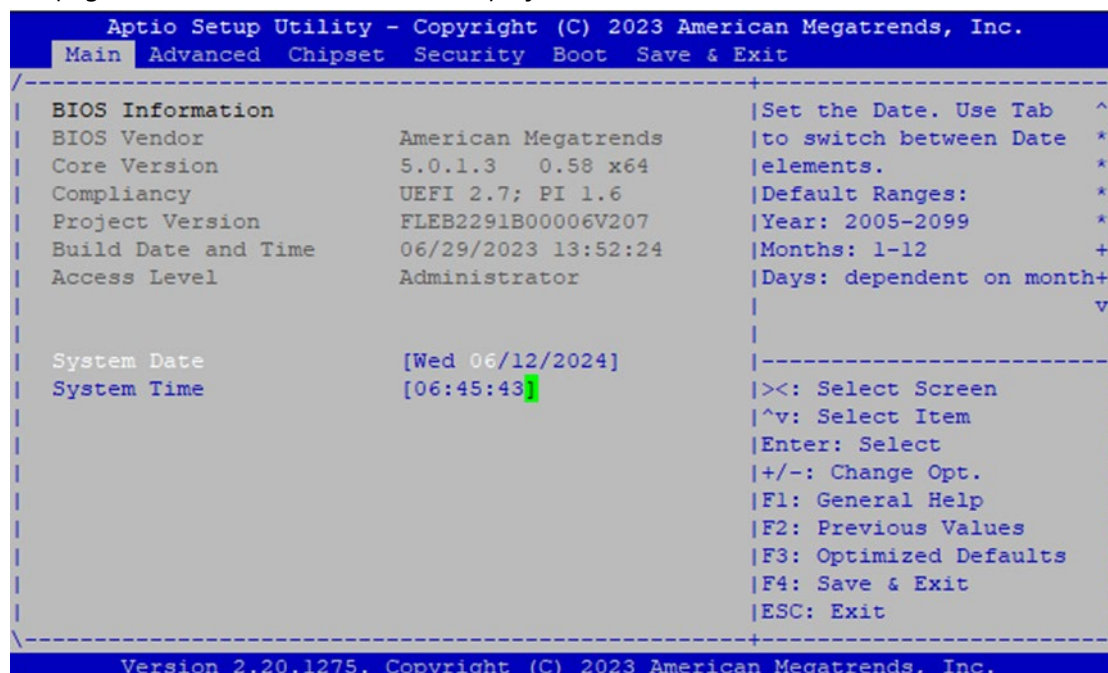
Entering BIOS

The system has AMI BIOS built-in, with a SETUP utility that allows users to configure required settings or to activate certain system features. Pressing the **<Tab>** or **** key immediately allows you to enter the Setup utility.

Control Keys	Description
→←	select a setup screen, for instance, [Main], [Advanced],[Chipset], [Security], [Boot], and [Save & Exit]
↑↓	select an item/option on a setup screen
<Enter>	select an item/option or enter a sub-menu
+/-	to adjust values for the selected setup item/option
F1	to display General Help screen
F2	to retrieve previous values, such as the parameters configured the last time you had entered BIOS.
F3	to load optimized default values
F4	to save configurations and exit BIOS
<Esc>	to exit the current screen

Main Page

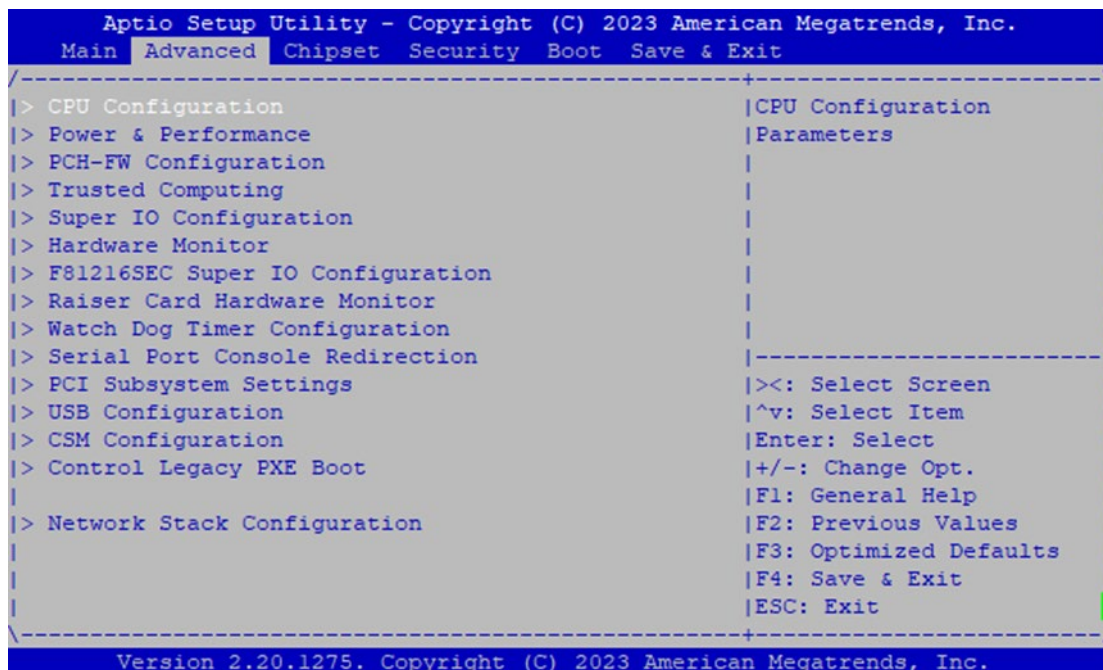
Setup main page contains BIOS information and project version information.



Feature	Description
BIOS Information	BIOS Vendor: American Megatrends Core Version: AMI Kernel version, CRB code base, X64 Compliancy: UEFI version, PI version Project Version: BIOS release version Build Date and Time: MM/DD/YYYY HH:MM:SS Access Level: Administrator / User
System Date	To set the Date, use <Tab> to switch between Date elements. Default Range of Year: 2005-2099 Default Range of Month: 1-12 Days: dependent on Month.
System Time	To set the Date, use <Tab> to switch between Date elements.

Advanced Page

Select the **Advanced** menu item from the BIOS setup screen to enter the “Advanced” setup screen. Users can select any of the items in the left frame of the screen.



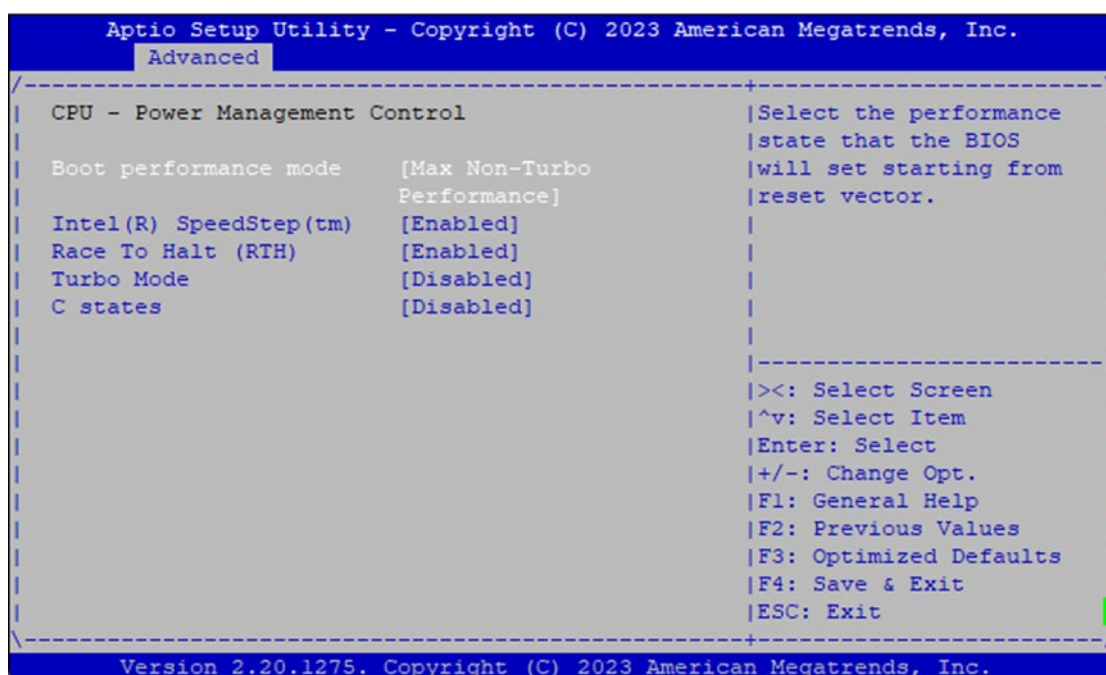
CPU Configuration

Aptio Setup Utility - Copyright (C) 2023 American Megatrends, Inc.		
Advanced		
CPU Configuration		
Type	Intel(R) Core(TM)	^ Enable/Disable moving
	i7-9700TE CPU @ 1.80GHz	* of DRAM contents to PRM
ID	0x906ED	* memory when CPU is in
Speed	1800 MHz	* C6 state
L1 Data Cache	32 KB x 8	*
L1 Instruction Cache	32 KB x 8	*
L2 Cache	256 KB x 8	+
L3 Cache	12 MB	+
L4 Cache	N/A	+
Microcode Revision	D6	+ ><: Select Screen
VMX	Supported	+ ^v: Select Item
SMX/TXT	Supported	+ Enter: Select
		+ +/-: Change Opt.
		+ F1: General Help
C6DRAM	[Disabled]	+ F2: Previous Values
Software Guard	[Disabled]	+ F3: Optimized Defaults
Extensions (SGX)		v F4: Save & Exit
		ESC: Exit
Version 2.20.1275. Copyright (C) 2023 American Megatrends, Inc.		
Aptio Setup Utility - Copyright (C) 2023 American Megatrends, Inc.		
Advanced		
CPU Flex Ratio		
Override	[Disabled]	^ Enables utilization of
CPU Flex Ratio	18	+ additional hardware
Settings		+ capabilities provided
Hardware Prefetcher	[Enabled]	+ by Intel (R) Trusted
Adjacent Cache Line	[Enabled]	+ Execution Technology.
Prefetch		+ Changes require a full
Intel (VMX)	[Enabled]	+ power cycle to take
Virtualization		+ effect.
Technology		v
Active Processor Cores	[All]	* -----
BIST	[Disabled]	* ><: Select Screen
AP threads Idle Manner	[MWAIT Loop]	* ^v: Select Item
AES	[Enabled]	* Enter: Select
MachineCheck	[Enabled]	* +/-: Change Opt.
MonitorMWait	[Enabled]	* F1: General Help
Intel Trusted	[Disabled]	* F2: Previous Values
Execution Technology		+ F3: Optimized Defaults
		v F4: Save & Exit
		ESC: Exit
Version 2.20.1275. Copyright (C) 2023 American Megatrends, Inc.		
Aptio Setup Utility - Copyright (C) 2023 American Megatrends, Inc.		
Advanced		
Hardware Prefetcher		
Adjacent Cache Line	[Enabled]	^ Reset TPM Aux content.
Prefetch		+ Txt may not functional
Intel (VMX)	[Enabled]	+ after AUX content gets
Virtualization		+ reset.
Technology		+
Active Processor Cores	[All]	+
BIST	[Disabled]	+
AP threads Idle Manner	[MWAIT Loop]	+
AES	[Enabled]	+
MachineCheck	[Enabled]	* -----
MonitorMWait	[Enabled]	* ><: Select Screen
Intel Trusted	[Disabled]	* ^v: Select Item
Execution Technology		* Enter: Select
Alias Check Request	[Disabled]	* +/-: Change Opt.
DPR Memory Size (MB)	4	* F1: General Help
Reset AUX Content	[no]	* F2: Previous Values
		+ F3: Optimized Defaults
		v F4: Save & Exit
		ESC: Exit
Version 2.20.1275. Copyright (C) 2023 American Megatrends, Inc.		

Feature	Options	Description
C6DRAM	Disabled Enabled	Enable/Disable moving of DRAM contents to PRM memory when CPU is in C6 state
Software Guard Extensions (SGX)	Disabled Enabled Software Controlled	Enable/Disable Software Guard Extensions (SGX)
CPU Flex Ratio Override	Disabled Enabled	Enable/Disable CPU Flex Ratio Programming
CPU Flex Ratio Settings	20	This value must be between Max Efficiency Ratio (LFM) and Maximum non-turbo ratio set by Hardware (HFM).
Hardware Prefetcher	Disabled Enabled	To turn on/off the MLC streamer prefetcher.
Adjacent Cache Line Prefetch	Disabled Enabled	To turn on/off prefetching of adjacent cache lines.
Intel (VMX) Virtualization Technology	Disabled Enabled	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
Active Processor Cores	All 1 2 3 4 5 6 7	Number of cores to enable in each processor package.
BIST	Disabled Enabled	Enable/Disable BIST (Built-In Self-Test) on reset
AP threads Idle Manner	HALT Loop MWAIT Loop RUN Loop	AP threads Idle Manner for waiting signal to run
AES	Disabled Enabled	Enable/Disable AES (Advanced Encryption Standard)
MachineCheck	Disabled Enabled	Enable/Disable Machine Check
MonitorMWait	Disabled Enabled	Enable/Disable MonitorMWait

Intel Trusted Execution Technology	Disabled Enabled	Enables utilization of additional hardware capabilities provided by Intel (R) Trusted Execution Technology. Changes require a full power cycle to take effect.
Alias Check Request	Disabled Enabled	Enables Txt Alias Checking Capability Changes require full Txt capability before it will take effect. It is a one-time only change; next reboot will be reset.
DPR Memory Size (MB)	4	Reserve DPR memory size (0-255) MB
Reset AUX Content	yes no	Reset TPM Aux content. Txt may not functional after AUX content gets reset.

Power & Performance



Feature	Options	Description
Boot performance mode	Max Battery Max Non-Turbo Performance Turbo Performance	Select the performance state that the BIOS will set starting from reset vector.
Intel(R) SpeedStep(tm)	Disabled Enabled	Allows more than two frequency ranges to be supported.
Race To Halt (RTH)	Disabled Enabled	Enable/Disable Race To Halt feature. RTH will dynamically increase CPU frequency in order to enter pkg C-State faster to reduce overall power. (RTH is controlled through MSR 1FC bit 20)
Turbo Mode	Disabled Enabled	Enable/Disable processor Turbo Mode (requires Intel Speed Step or Intel Speed Shift to be available and enabled).
C states	Disabled Enabled	Enable/Disable CPU Power Management. Allows CPU to go to C states when it's not 100% utilized.

PCH-FW Configuration

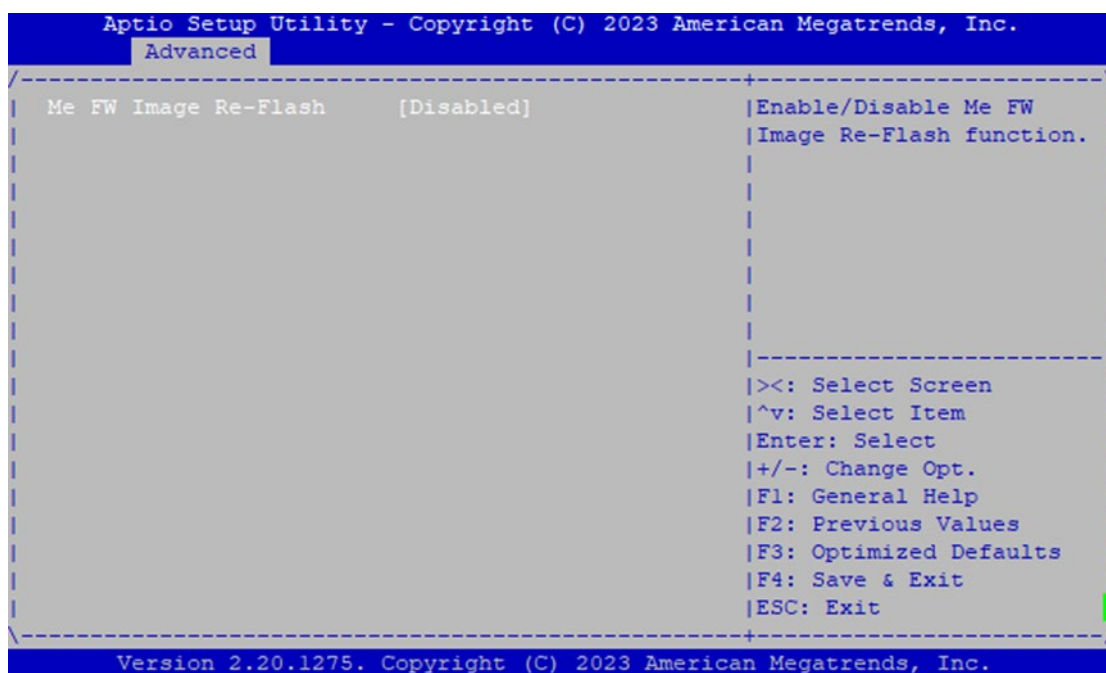
```

Aptio Setup Utility - Copyright (C) 2023 American Megatrends, Inc.
  Advanced
/-----/
| ME Firmware Version      12.0.64.1551      |When Disabled ME will
| ME Firmware Mode         Normal Mode        |be put into ME
| ME Firmware SKU          Corporate SKU       |Temporarily Disabled
| ME Firmware Status 1     0x90000255         |Mode.
| ME Firmware Status 2     0x3285810E         |
| ME State                  [Enabled]          |
|> Firmware Update Configuration              |
|                                              |-----|
|                                              |><: Select Screen
|                                              |^v: Select Item
|                                              |Enter: Select
|                                              |+/-: Change Opt.
|                                              |F1: General Help
|                                              |F2: Previous Values
|                                              |F3: Optimized Defaults
|                                              |F4: Save & Exit
|                                              |ESC: Exit
|                                              |
|-----|
Version 2.20.1275. Copyright (C) 2023 American Megatrends, Inc.

```

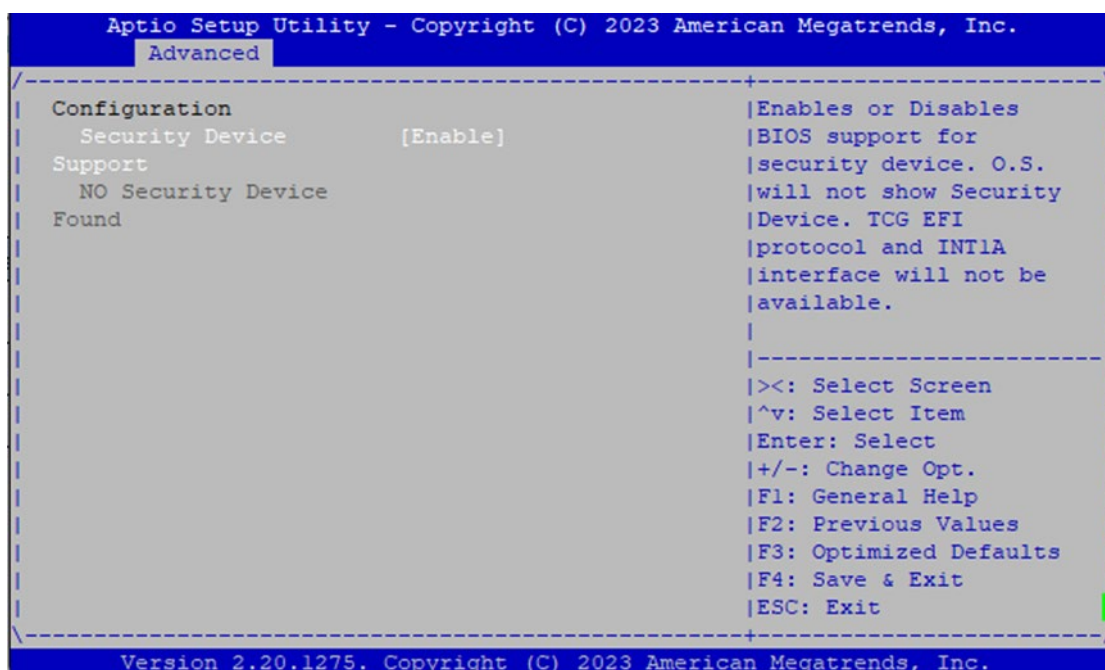
Feature	Options	Description
ME State	Disabled Enabled	When Disabled ME will be put into ME Temporarily Disabled Mode.

PCH-FW Configuration



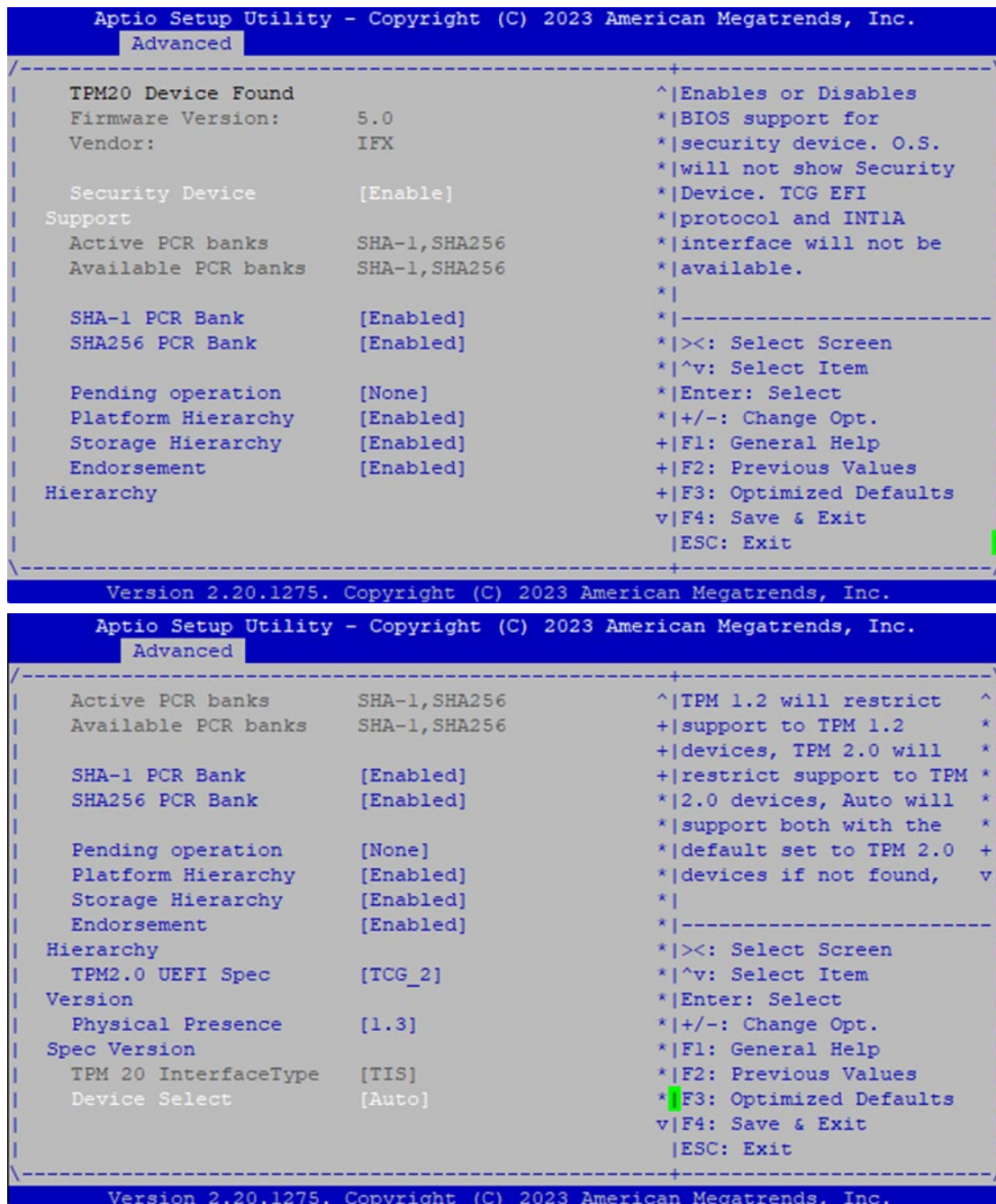
Feature	Options	Description
Me FW Image Re-Flash	Disabled Enabled	Enable/Disable Me FW Image Re-Flash function.

Trusted Computing



Feature	Options	Description
Security Device Support	Disabled Enabled	Enables or disables BIOS support for security device. By disabling this function, OS will not show Security Device. TCG EFI protocol and INT1A interface will not be available.

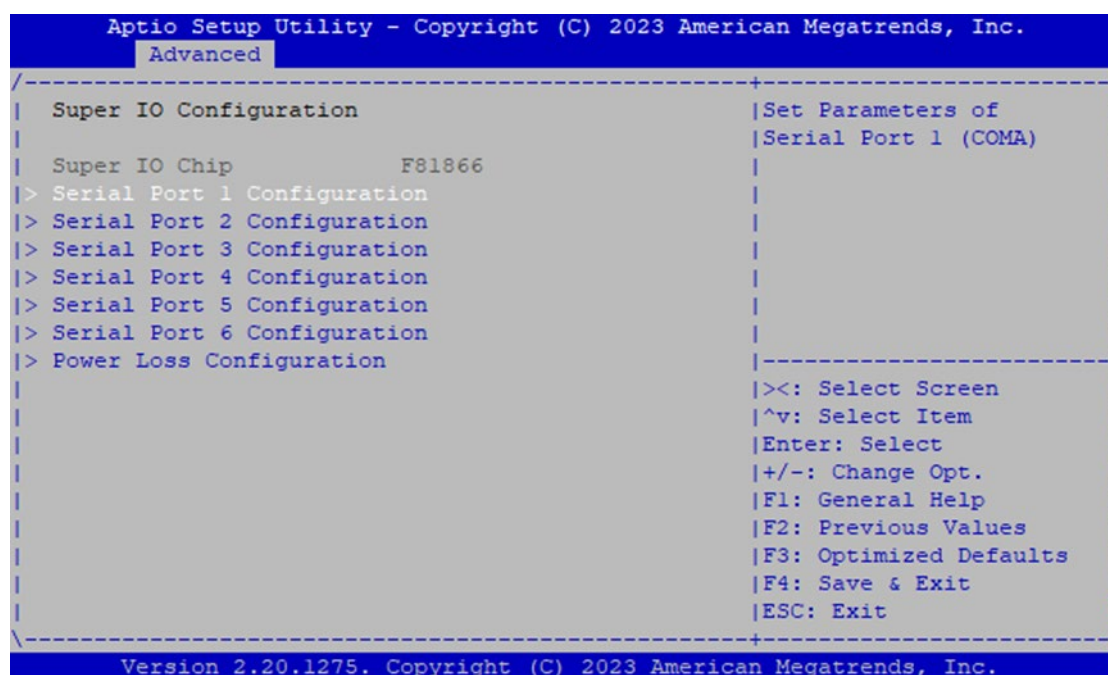
Trusted Computing (TPM2.0)



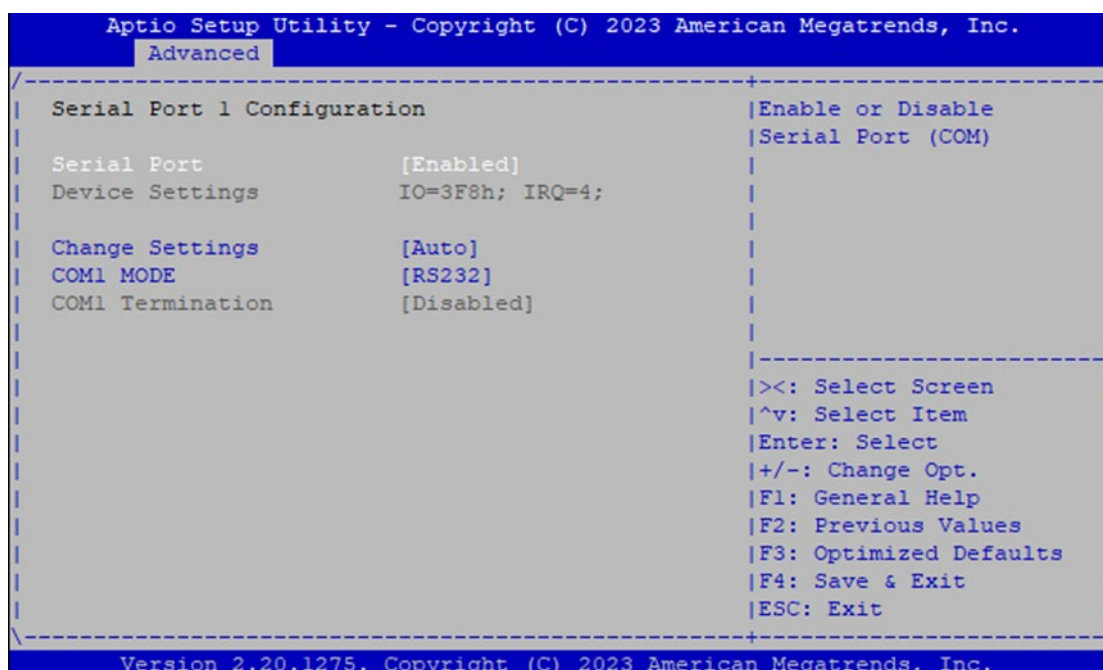
Feature	Options	Description
Security Device Support	Enabled Disabled	Enables or disables BIOS support for security device. By disabling this function, OS will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
SHA-1 PCR Bank	Enabled Disabled	Enables or disables SHA-1 PCR Bank.
SHA256 PCR Bank	Enabled Disabled	Enables or disables SHA256 PCR Bank.

Pending operation	None TPM Clear	Schedules an Operation for the Security Device. NOTE: Your computer will reboot during restart in order to change State of Security Device.
Platform Hierarchy	Enabled Disabled	Enables or disables Platform Hierarchy.
Storage Hierarchy	Enabled Disabled	Enables or disables Storage Hierarchy.
Endorsement Hierarchy	Enabled Disabled	Enables or disables Endorsement Hierarchy.
TPM2.0 UEFI Spec Version	TCG_1_2 TCG_2	Select the TCG2 Spec Version, TCG_1_2: Supports the Compatible mode for Win8/Win10 TCG_2: Supports new TCG2 protocol and event format for Win10 or later.
Physical Presence Spec Version	1.2 1.3	Select to tell OS to support PPI Spec Version 1.2 or 1.3. NOTE: Some HCK tests might not support 1.3.
TPM 20 InterfaceType	TIS	Select TPM 20 Device for the Communication Interface.
Device Select	TPM 1.2 TPM 2.0 Auto	TPM 1.2 will restrict support to TPM 1.2 devices; while TPM 2.0 will restrict support to TPM 2.0 devices; Auto will support both with the default set to TPM 2.0 devices. If not found, TPM 1.2 devices will be enumerated.

Super IO Configuration

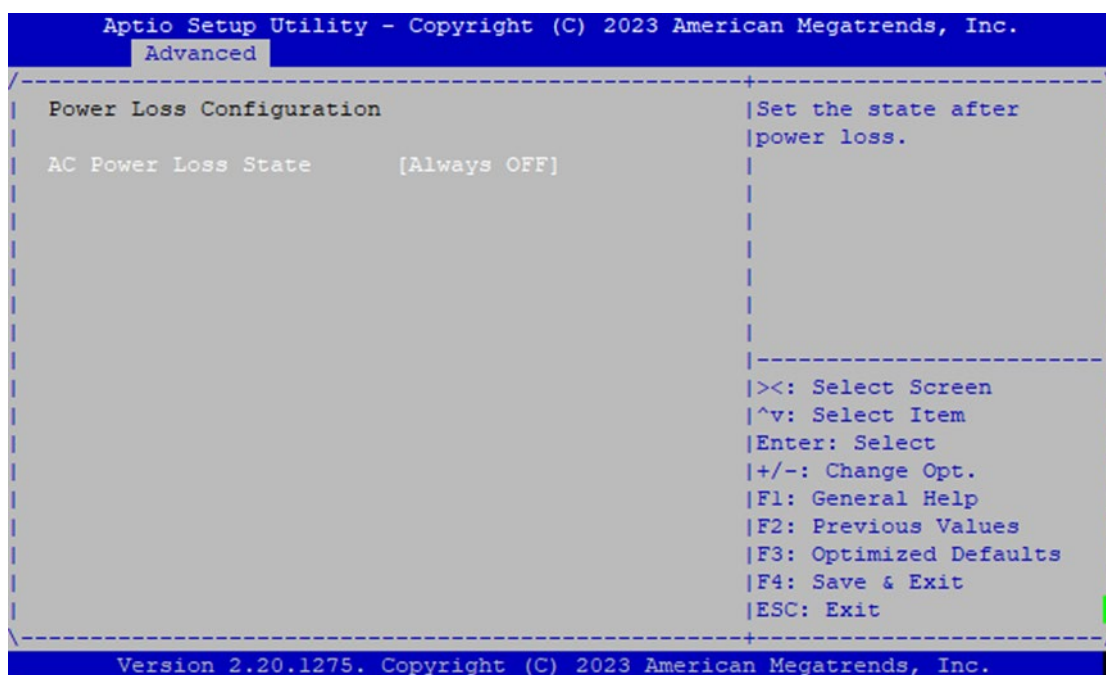


Serial Port 1-6 Configuration



Feature	Options	Description
Serial Port	Disabled Enabled	Enables or disables Serial Port 1.
Device Settings	NA	IO=3F8h; IRQ = 4;
Change Settings	Auto IO=3F8h; IRQ=4; IO=3F8h; IRQ=3,4,5,6,7,9,10,11,12; IO=2F8h; IRQ=3,4,5,6,7,9,10,11,12; IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12; IO=2E8h; IRQ=3,4,5,6,7,9,10,11,12;	Select an optimal setting for Super IO device
COM# MODE	RS232 RS485 RS422	Select Com Mode as RS232/RS485/RS422
COM# Termination	Disabled Enabled	COM RS-422/485 Receiver Termination

Power Loss Configuration

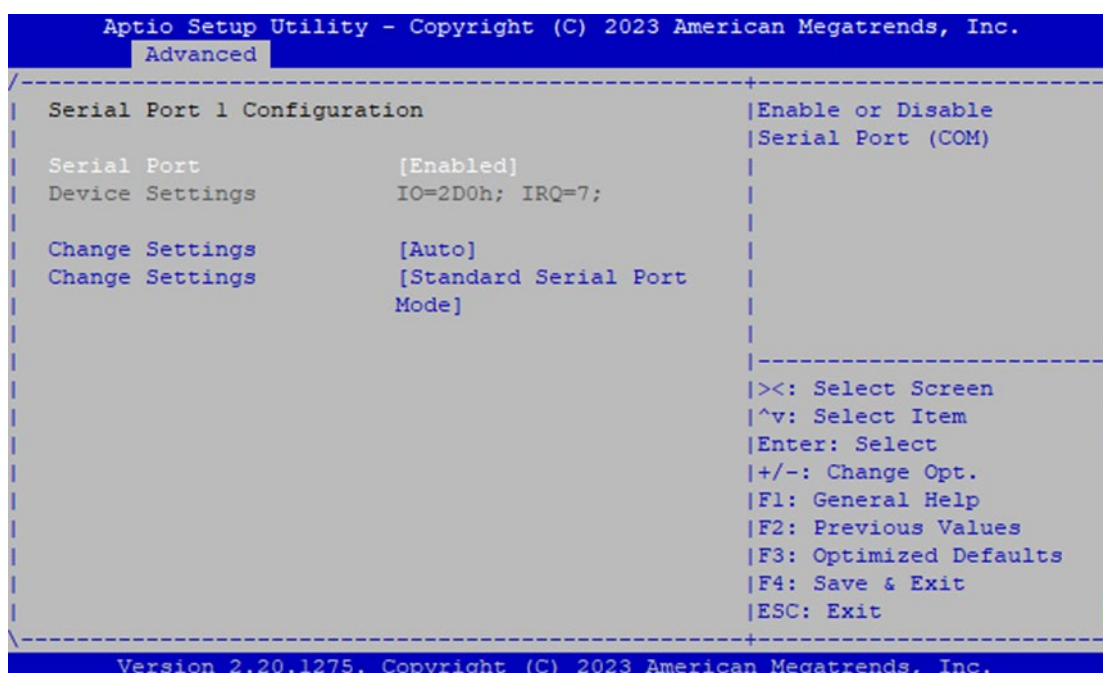


Feature	Options	Description
AC Power Loss State	Always OFF Always ON Last state	Set power state after power loss.

H/W Monitor

```
Aptio Setup Utility - Copyright (C) 2023 American Megatrends, Inc.
  Advanced
-----
Pc Health Status
-----
CPU temperature      : +46 C
SYSTEM temperature  : +45 C
VCore                : +0.808 V
VGT                  : +0.672 V
5V                   : +4.961 V
12V                  : +12.144 V
VSB3V                : +3.312 V
VBAT                 : +3.056 V
-----
><: Select Screen
^v: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
-----
Version 2.20.1275. Copyright (C) 2023 American Megatrends, Inc.
```

F81216SEC Super IO Configuration

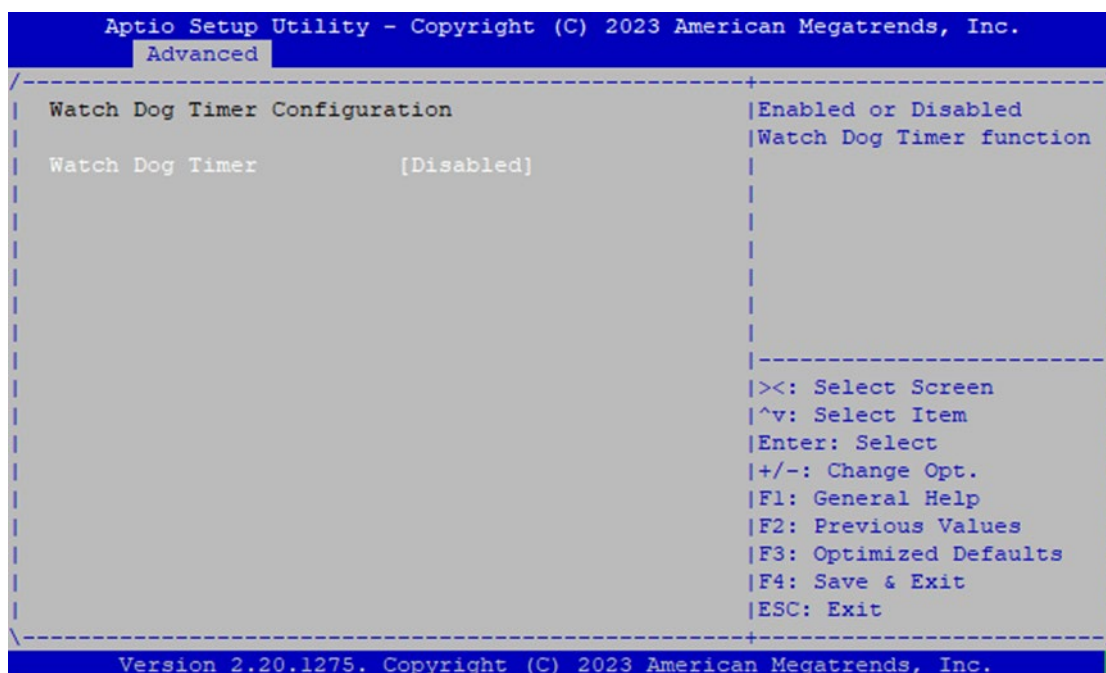


Feature	Options	Description
Serial Port	Disabled Enabled	Enable or Disable Serial Port (COM)
Device Settings	NA	IO=2D0h; IRQ=7;
Change Settings	Auto IO=240h; IRQ=7; IO=240h; IRQ=3,4,5,6,7,10,11,12; IO=248h; IRQ=3,4,5,6,7,10,11,12; IO=250h; IRQ=3,4,5,6,7,10,11,12; IO=258h; IRQ=3,4,5,6,7,10,11,12;	Select an optimal setting for Super IO Serial Port Device
Change Settings	Standard Serial Port Mode IrDA Active pulse 1.6 uS, Full Duplex IrDA Active pulse 1.6 uS, Half Duplex IrDA Active pulse 3/16 bit time, Full Duplex IrDA Active pulse 3/16 bit time, Half Duplex	Select an optimal setting for Super IO Serial Port Device

Raiser Card Hardware Monitor

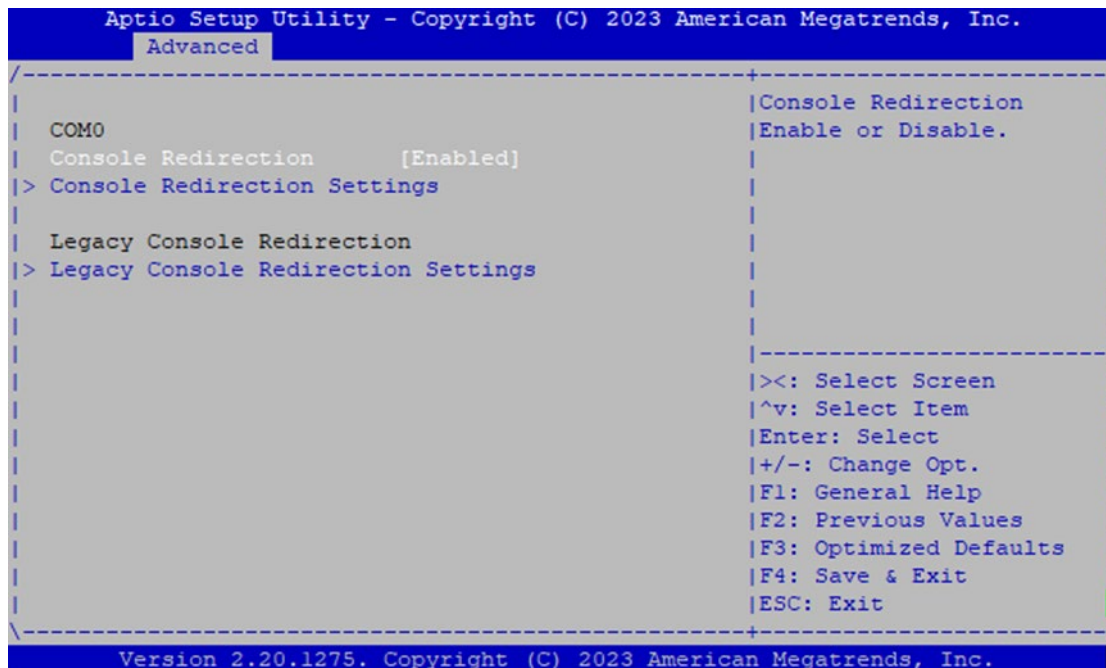
```
Aptio Setup Utility - Copyright (C) 2023 American Megatrends, Inc.
  Advanced
-----
Pc Health Status
-----
Graphic Card           : +39 C
temperature1
Graphic Card           : +45 C
temperature2
Fan1 Speed             : 9933 RPM
Fan2 Speed             : 9677 RPM
-----
|><: Select Screen
|^v: Select Item
|Enter: Select
|+/-: Change Opt.
|F1: General Help
|F2: Previous Values
|F3: Optimized Defaults
|F4: Save & Exit
|ESC: Exit
-----
Version 2.20.1275. Copyright (C) 2023 American Megatrends, Inc.
```

Watch Dog Timer Configuration



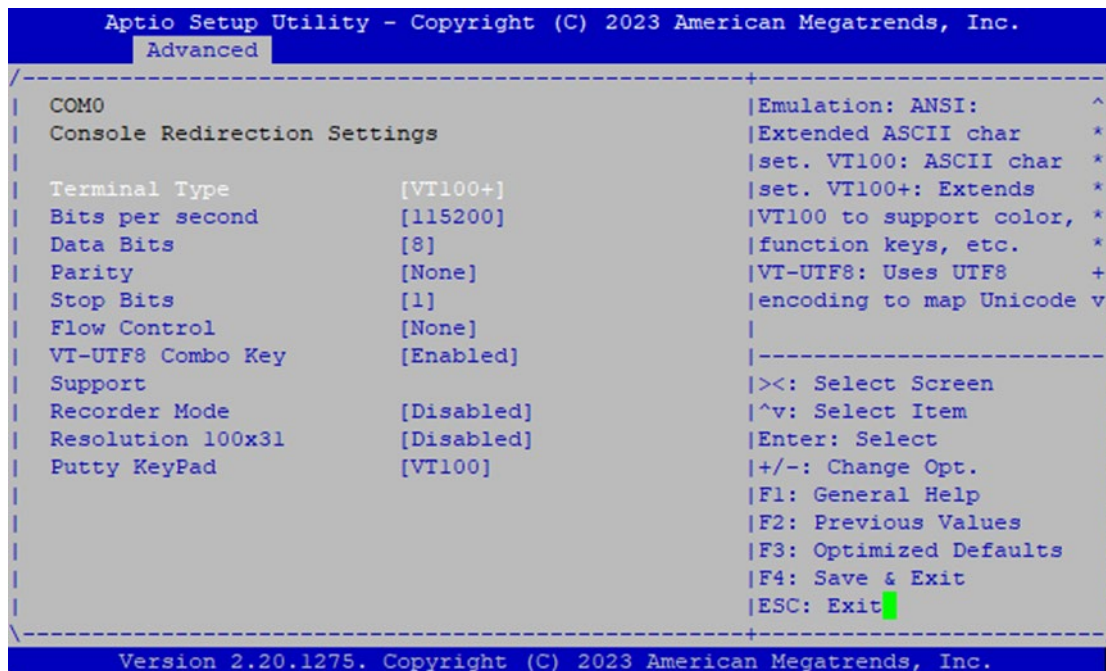
Feature	Options	Description
Watch Dog Timer	Enabled Disabled	Enables or disables Watch Dog Timer function

Serial Port Console Redirection



Feature	Options	Description
COM0 Console Redirection	Enabled Disabled	Enables or disables Console Redirection

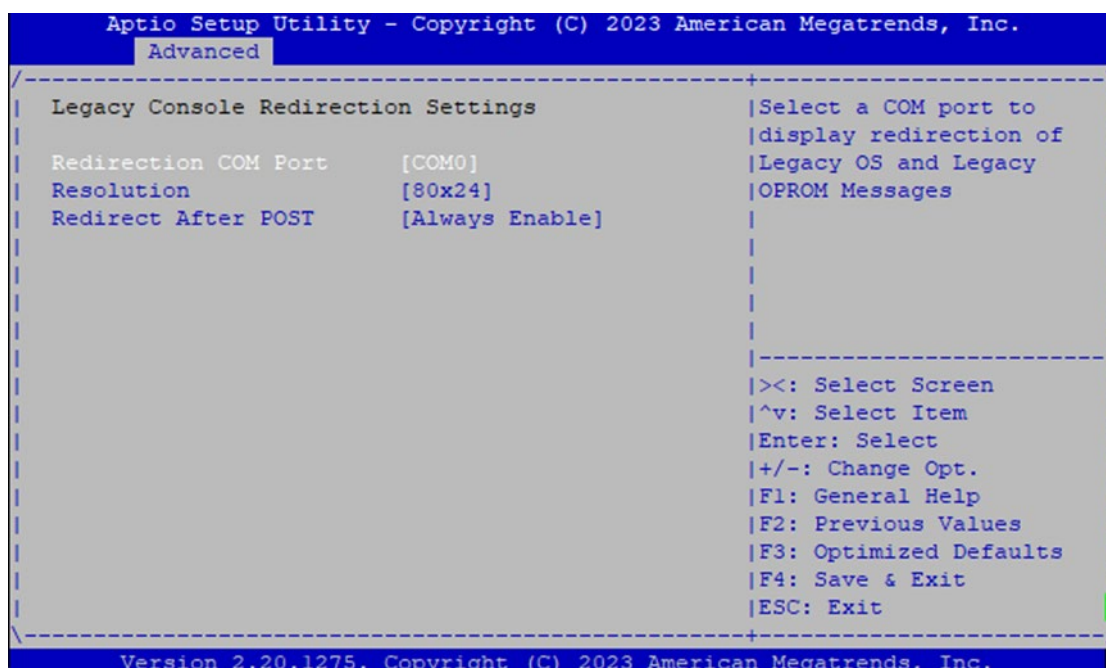
Console Redirection Settings



Feature	Options	Description
Terminal Type	VT100 VT100+ VT-UTF8 ANSI	Emulation: ANSI: Extended ASCII char set. VT100: ASCII char set. VT100+: Extends VT100 to support color, function keys, etc. VT-UTF8: Uses UTF8 encoding to map Unicode chars onto 1 or more bytes.
Bits per second	9600 19200 38400 57600 115200	Selects serial port transmission speed. The speed must be matched on the other side. Long or noisy lines may require lower speeds.
Data Bits	7 8	Data Bits
Parity	None Even Odd Mark Space	A parity bit can be sent with the data bits to detect some transmission errors. Even: parity bit is 0 if the num of 1's in the data bits is even. Odd: parity bit is 0 if num of 1's in the data bits is odd. Mark: parity bit is always 1. Space: Parity bit is always 0. Mark and Space Parity do not allow for error detection. They can be used as an additional data bit.
Stop Bits	1 2	Stop bits indicate the end of a serial data packet. (A start bit indicates the beginning). The standard setting is 1 stop bit. Communication with slow devices may require more than 1 stop bit.

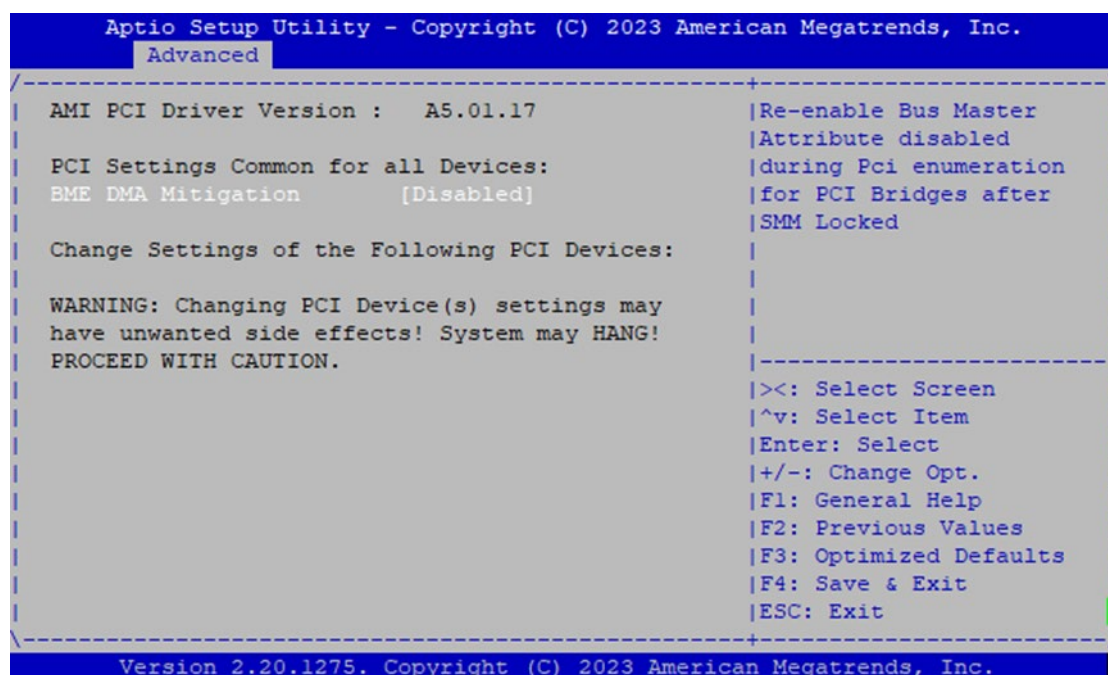
Flow Control	None Hardware RTS/CTS	Flow control can prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a 'stop' signal can be sent to stop the data flow. Once the buffers are empty, a 'start' signal can be sent to re-start the flow. Hardware flow control uses two wires to send start/stop signals.
VT-UTF8 Combo Key Support	Disabled Enabled	Enables VT-UTF8 Combination Key Support for ANSI/VT100 terminals
Recorder Mode	Disabled Enabled	With this mode enabled only text will be sent. This is to capture Terminal data.
Resolution 100x31	Disabled Enabled	Enables or disables extended terminal resolution
Putty KeyPad	VT100 LINUX XTERMR6 SCO ESCN VT400	Select FunctionKey and KeyPad on Putty.

Console Redirection Settings



Feature	Options	Description
Redirection COM Port	COM0	Select a COM port to display redirection of Legacy OS and Legacy OPROM Messages.
Resolution	80x24 80x25	On Legacy OS, the Number of Rows and Columns supported redirection.
Redirection After BIOS POST	Always Enable BootLoader	When Bootloader is selected, 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 .

PCI Subsystem Settings



Feature	Options	Description
BME DMA Mitigation	Disabled	Re-enable Bus Master Attribute disabled during Pci enumeration for PCI Bridges after SMM Locked
	Enabled	

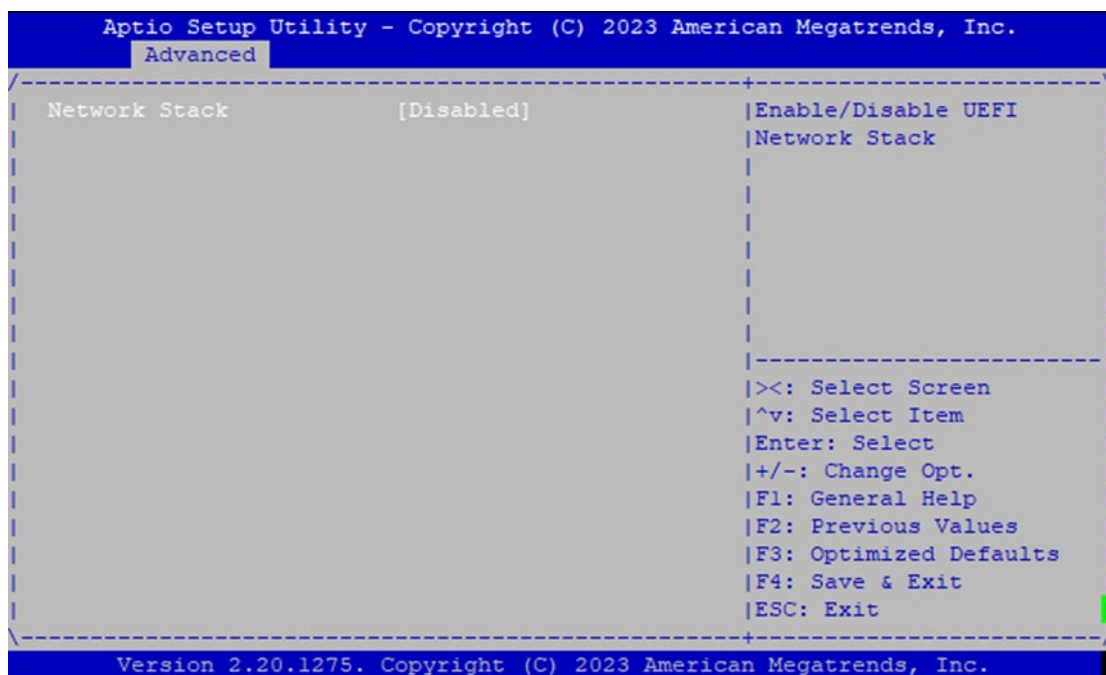
USB Configuration



Feature	Options	Description
Legacy USB Support	Enabled Disabled Auto	Enables Legacy USB support. Auto option disables legacy support if no USB devices are connected; Disabled option will keep USB devices available only for EFI applications.
XHCI Hand-off	Enabled Disabled	This is a workaround for OSeS without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.

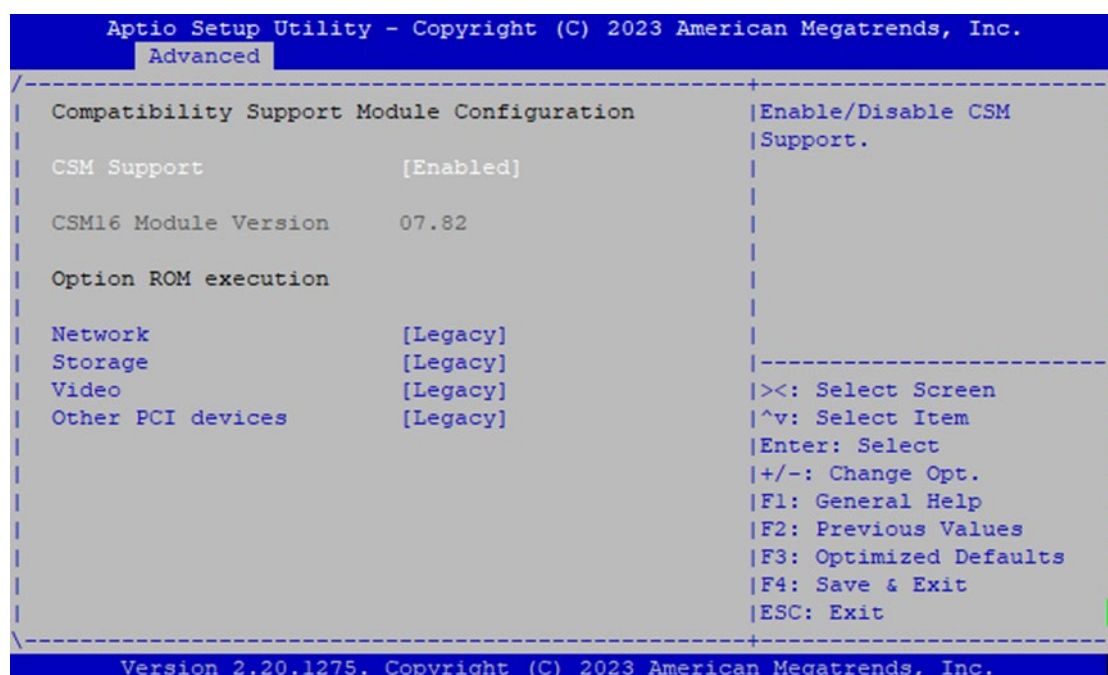
USB Mass Storage Driver Support	Disabled Enabled	Enables or disables USB Mass Storage Driver Support.
USB transfer time-out	1 sec 5 sec 10 sec 20 sec	The time-out value for Control, Bulk, and Interrupt transfers
Device reset time-out	10 sec 20 sec 30 sec 40 sec	USB mass storage device Start Unit command time-out
Device power-up delay	Auto 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 100 ms, for a Hub port the delay is taken from Hub descriptor.

Network Stack Configuration



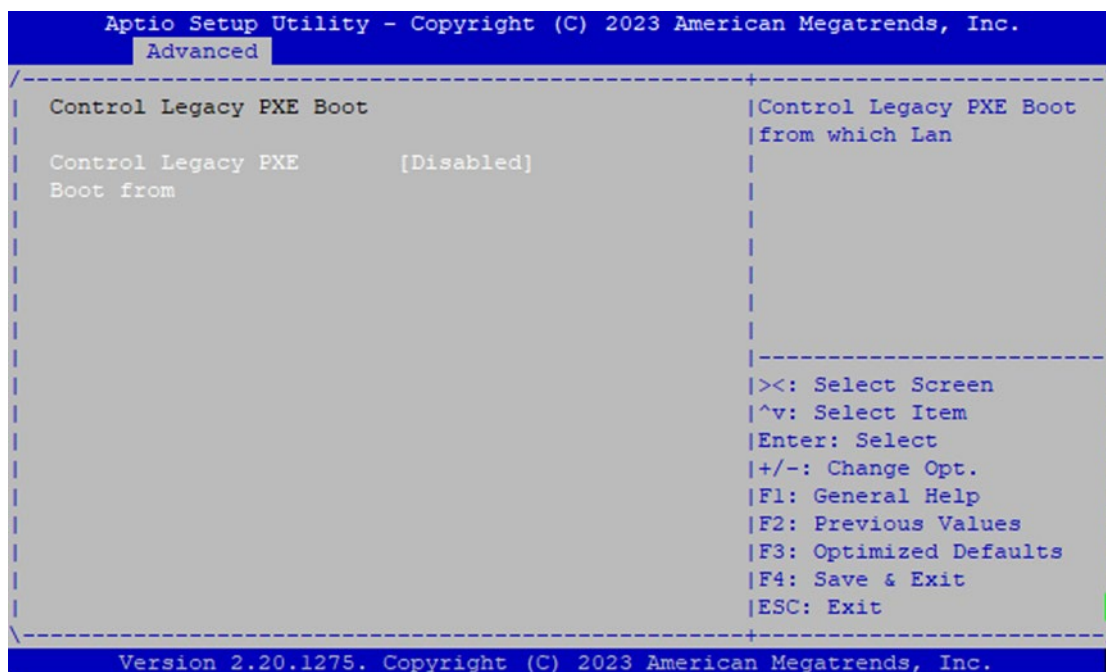
Feature	Options	Description
Network Stack	Disabled Enabled	Enables or disables UEFI Network Stack

CSM Configuration



Feature	Options	Description
CSM Support	Disabled Enabled	Enables or disables CSM Support
Network	Do Not Launch UEFI Legacy	Controls the execution of UEFI and Legacy PXE OpROM
Storage	Do Not Launch UEFI Legacy	Controls the execution of UEFI and Legacy Storage OpROM
Video	Do Not Launch UEFI Legacy	Controls the execution of UEFI and Legacy Video OpROM
Other PCI device	Do Not Launch UEFI Legacy	Determines OpROM execution policy for devices other than Network, Storage, or Video

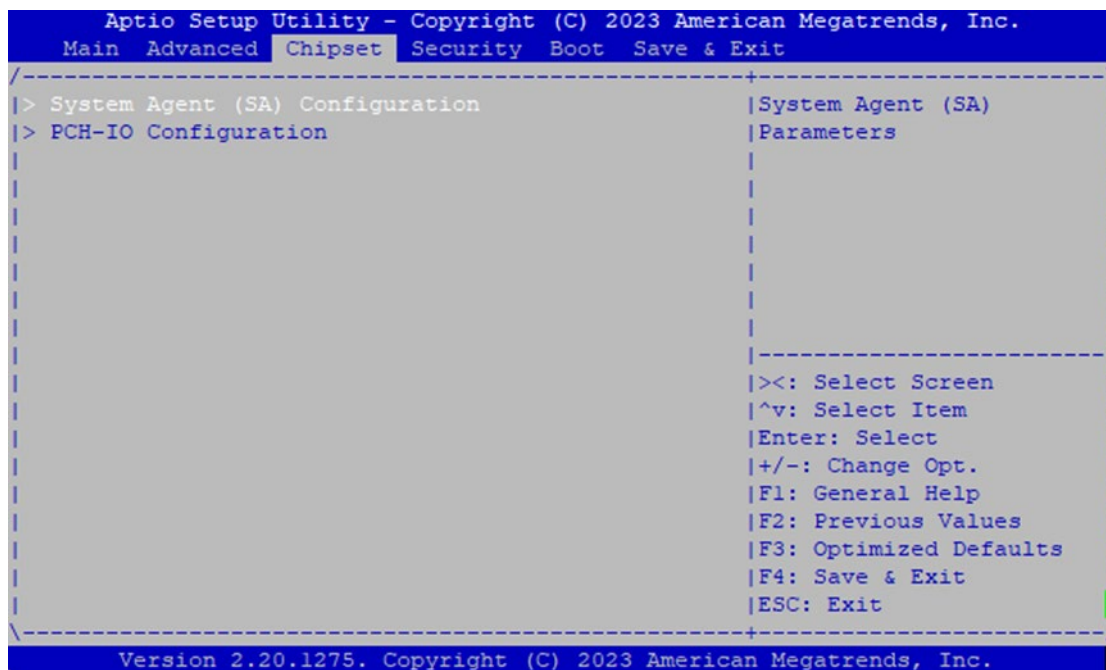
Control Legacy PXE Boot



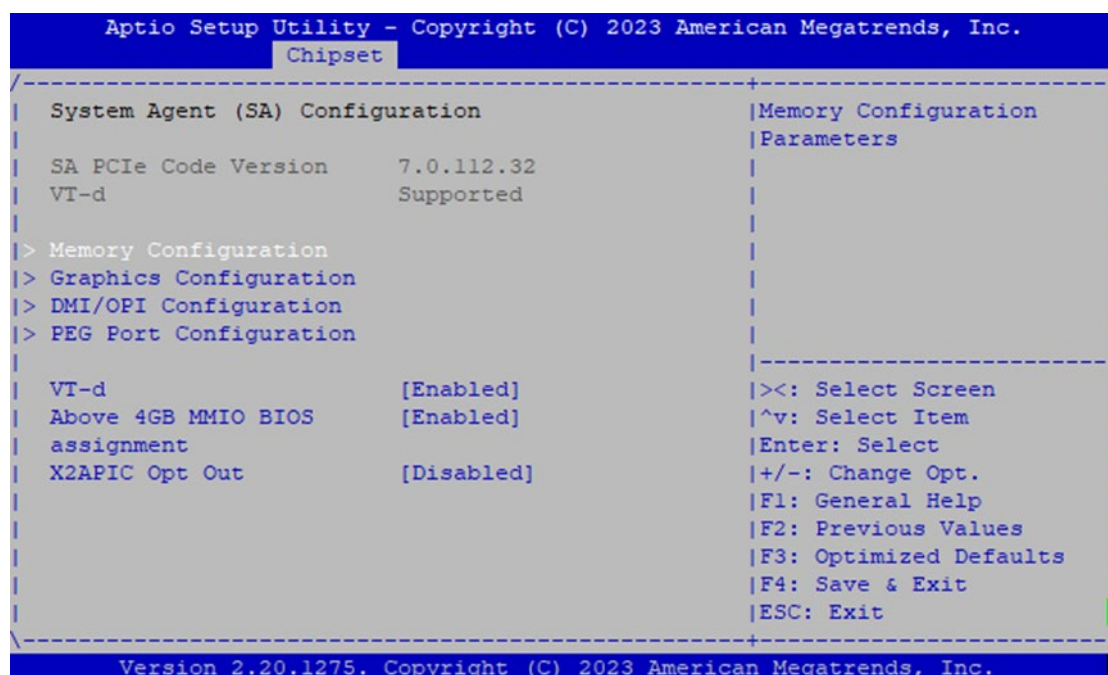
Feature	Options	Description
Control Legacy PXE Boot from	Disabled MGMT Lan1 MGMT Lan2	Control Legacy PXE Boot from which Lan

Chipset

Select the Chipset menu item from the BIOS setup screen to enter the Platform Setup screen. Users can select any of the items in the left frame of the screen.

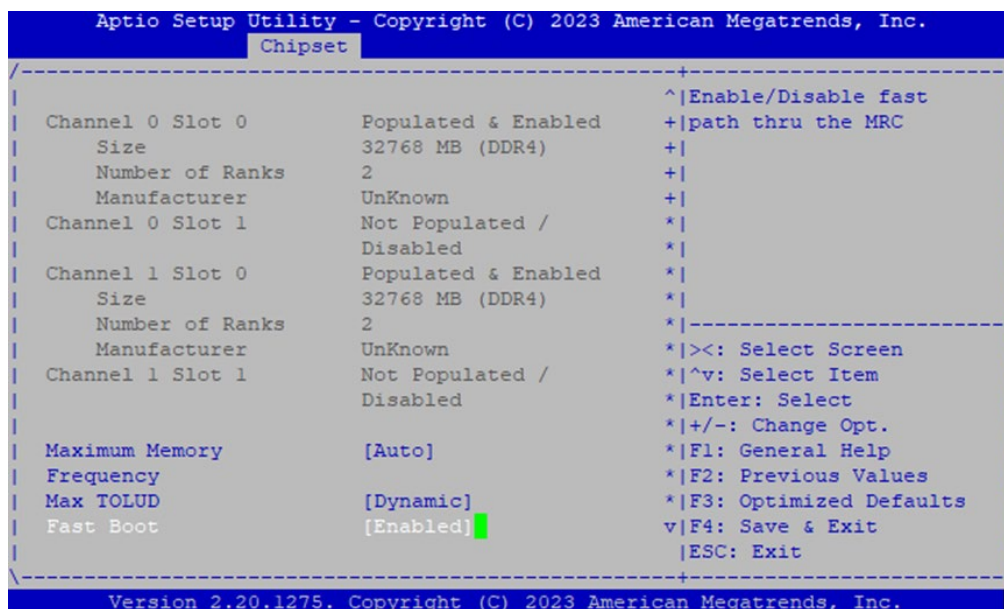
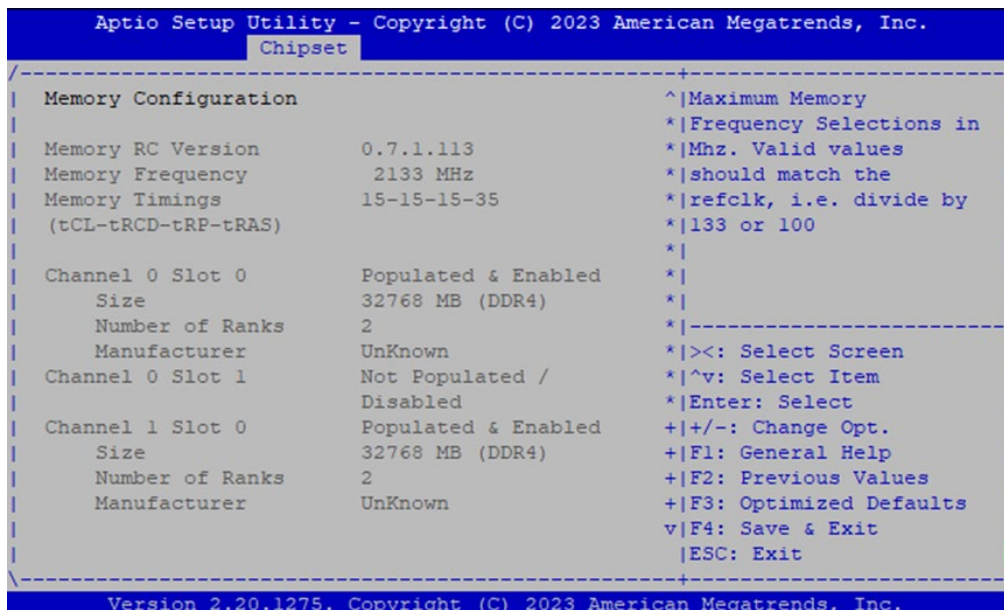


System Agent (SA) Configuration



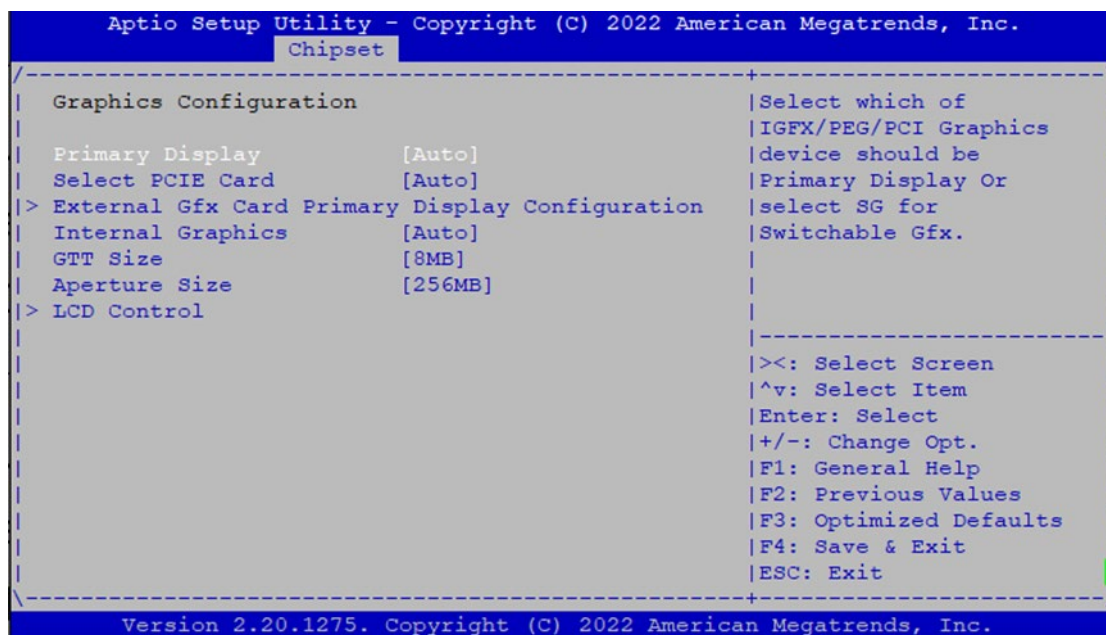
Feature	Options	Description
VT-d	Disabled Enabled	VT-d capability
Above 4GB MMIO BIOS assignment	Enabled Disabled	Enable/Disable above 4GB MemoryMappedIO BIOS assignment This is enabled automatically when Aperture Size is set to 2048MB.
X2APIC Opt Out	Enabled Disabled	Enable/Disable X2APIC_OPT_OUT bit

Memory Configuration

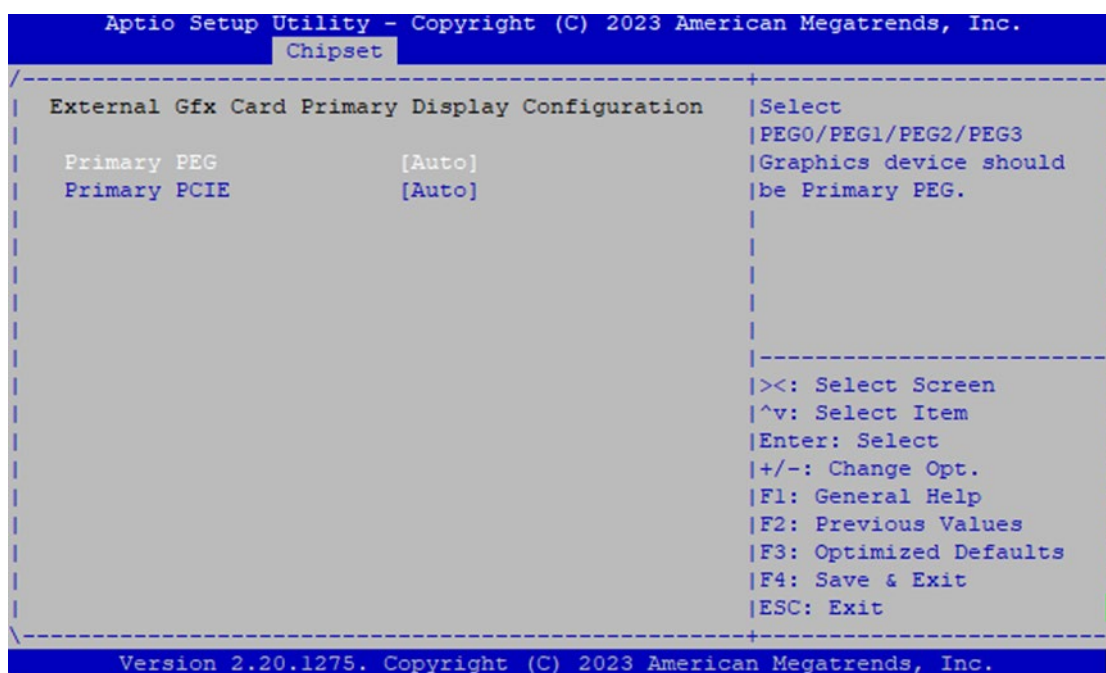


Feature	Options	Description
Maximum Memory Frequency	Auto 1067 ~ 6200	Maximum Memory Frequency Selections in Mhz. Valid values should match the refclk, i.e. divide by 133 or 100
Max TOLUD	Dynamic 1 GB ~ 3.5GB	Maximum Value of TOLUD. Dynamic assignment would adjust TOLUD automatically based on largest MMIO length of installed graphic controller
Fast Boot	Disabled Enabled	Enable/Disable fast path thru the MRC

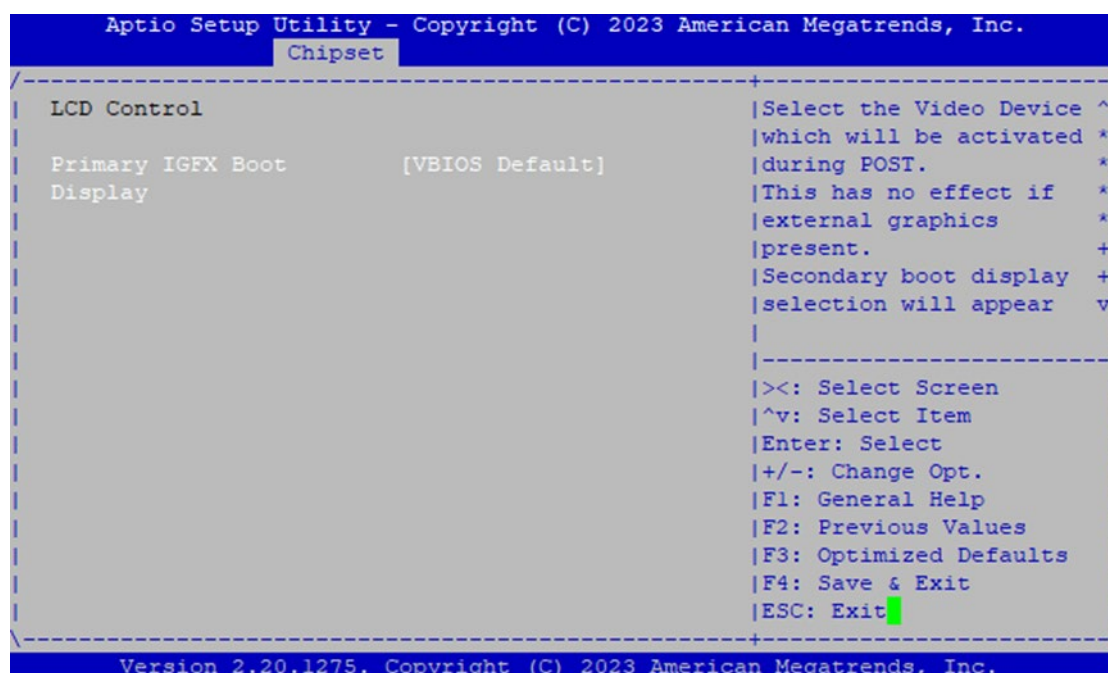
Graphics Configuration



Feature	Options	Description
Primary Display	Auto IGFX PEG PCI SG	Select which of IGFX/PEG/PCI Graphics device should be Primary Display Or select SG for Switchable Gfx.
Select PCIE Card	Auto Elk Creek 4 PEG Eval	Select the card used on the platform Auto: Skip GPIO based Power Enable to dGPU Elk Creek 4: DGPU Power Enable = ActiveLow PEG Eval: DGPU Power Enable = ActiveHigh
Internal Graphics	Auto Disabled Enabled	Keep IGFX enabled based on the setup options.
GTT Size	2M 4M 8M	Select the GTT Size
Aperture Size	128MB 256MB 512MB 1024MB 2048MB	Select the Aperture Size Note: Above 4GB MMIO BIOS assignment is automatically enabled when selecting 2048MB aperture. To use this feature, please disable CSM Support.

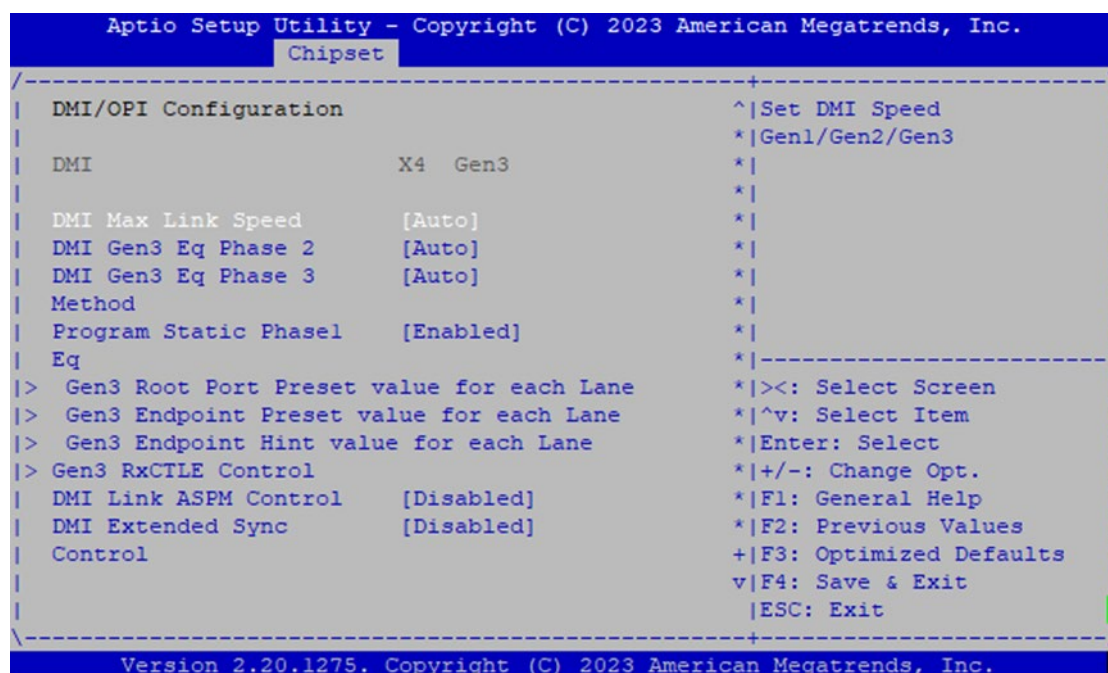


Feature	Options	Description
Primary PEG	Auto PEG11 PEG12	Select PEG0/PEG1/PEG2/PEG3 Graphics device should be Primary PEG.
Primary PCIE	Auto PCIE1 ~ PCIE19	Select Auto/PCIE1/PCIE2/PCIE3/PCIE4/PCIE5/PCIE6/PCIE7 of D28:F0/F1/F2/F3/F4/F5/F6/F7, PCIE8/PCIE9/PCIE10/PCIE11/PCIE12/PCIE13/PCIE14/PCIE15 of D29:F0/F1/F2/F3/F4/F5/F6/F7, PCIE16/PCIE17/PCIE18/PCIE19 of D27:F0/F1/F2/F3, Graphics device should be Primary PCIE.



Feature	Options	Description
Primary IGFX Boot Display	VBIOS Default	Select the Video Device which will be activated during POST. This has no effect if external graphics present. Secondary boot display selection will appear based on your selection. VGA modes will be supported only on primary display
	EFP	
	LFP	
	EFP3	
	EFP2	
	EFP4	

DMI/OPI Configuration



Control various DMI functions. Please keep at default setting.

PEG Port Configuration

```

Aptio Setup Utility - Copyright (C) 2023 American Megatrends, Inc.
Chipset
-----
PEG Port Configuration
PEG 0:1:0          xl6 Gen3
  Enable Root Port [Enabled]
  Max Link Speed   [Auto]
  Max Link Width   [Auto]
  Power Down Unused [Auto]
  Lanes            +
  Gen3 Eq Phase 2  [Auto]
  Gen3 Eq Phase 3  [Auto]
  Method           +|>: Select Screen
  ASPM             [Disabled]
  De-emphasis Control [-3.5 dB]
  OBFF             [Enabled]
  LTR              [Enabled]
  PEG0 Slot Power   75
  Limit Value       +|v: Select Item
                   +|Enter: Select
                   +|+/-: Change Opt.
                   +|F1: General Help
                   +|F2: Previous Values
                   +|F3: Optimized Defaults
                   v|F4: Save & Exit
                   |ESC: Exit
-----
Version 2.20.1275. Copyright (C) 2023 American Megatrends, Inc.
Aptio Setup Utility - Copyright (C) 2023 American Megatrends, Inc.
Chipset
-----
PEG0 Slot Power    [1.0x]
Limit Scale        +|Set the physical slot
PEG0 Physical Slot 1 +|number attached to this
Number            +|Port. The number has to
PEG0 Hotplug       [Enabled] +|be globally unique
Extra Bus Reserved 0 +|within the chassis.
Reserved Memory    10 +|Values 0-8191
Reserved I/O       4 +|
PEG 0:1:1          Not Present
  Enable Root Port [Auto]
  Max Link Speed   [Auto]
  PEG1 Slot Power   75
  Limit Value       +|>: Select Screen
  PEG1 Slot Power   [1.0x]
  Limit Scale       +|v: Select Item
  PEG1 Physical Slot 2 +|Enter: Select
Number            +|+/-: Change Opt.
PEG 0:1:2          Not Present +|F1: General Help
                   +|F2: Previous Values
                   +|F3: Optimized Defaults
                   v|F4: Save & Exit
                   |ESC: Exit
-----
Version 2.20.1275. Copyright (C) 2023 American Megatrends, Inc.
Aptio Setup Utility - Copyright (C) 2023 American Megatrends, Inc.
Chipset
-----
Max Link Speed     [Auto]
PEG1 Slot Power     75
Limit Value        +|PEG Port Feature
PEG1 Slot Power     [1.0x] +|Configuration
Limit Scale        +|
PEG1 Physical Slot  2 +|
Number            +|
PEG 0:1:2          Not Present
  Enable Root Port [Auto]
  Max Link Speed   [Auto]
  PEG2 Slot Power   75
  Limit Value       +|>: Select Screen
  PEG2 Slot Power   [1.0x]
  Limit Scale       +|v: Select Item
  PEG2 Physical Slot 3 +|Enter: Select
Number            +|+/-: Change Opt.
                   +|F1: General Help
                   +|F2: Previous Values
                   +|F3: Optimized Defaults
                   v|F4: Save & Exit
                   |ESC: Exit
> PEG Port Feature Configuration
-----
Version 2.20.1275. Copyright (C) 2023 American Megatrends, Inc.

```

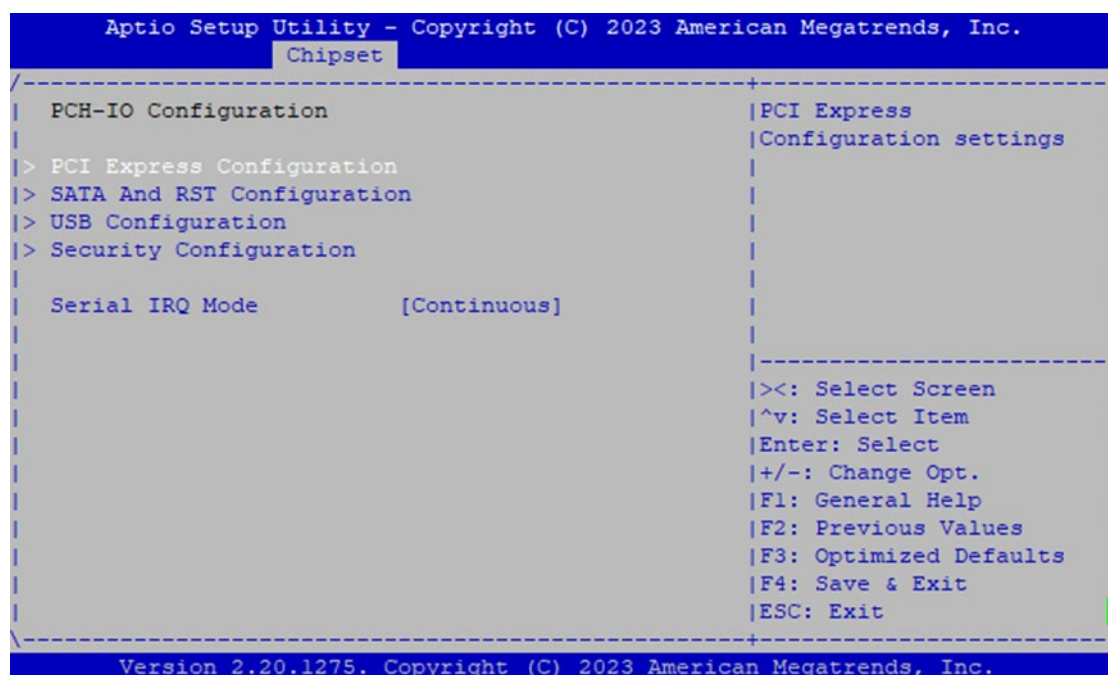
Feature	Options	Description
Enable Root Port	Disabled Enabled Auto	Enable or Disable the Root Port
Max Link Speed	Auto Gen1 Gen2 Gen3	Configure PEG 0:1:0 Max Speed
Max Link Width	Auto Force X1 Force X2 Force X4 Force X8	Force PEG link to retrain to X1/2/4/8
Power Down Unused Lanes	Disabled Auto	Power Down Unused Lanes. Disabled: No power saving Auto: Bios will power down unused lanes based on the max possible link width
Gen3 Eq Phase 2	Disabled Enabled Auto	Perform Gen3 Equalization Phase 2
Gen3 Eq Phase 3 Method	Auto Adaptive Hardware Equalization Adaptive Software Equalization Static Equalization Disabled	Select Method for Gen3 Equalization Phase 3
ASPM	Disabled Auto ASPM L0s ASPM L1 ASPM L0sL1	Control ASPM support for the PEG 0. This has no effect if PEG is not the currently active device.
De-emphasis Control	-6 dB -3.5 dB	PEG0: Configure the De-emphasis control on PEG
OBFF	Disabled Enabled	CPU PEG0 (0,1,0) OBFF Enable/Disable
LTR	Disabled Enabled	CPU PEG0 (0,1,0) Latency Reporting Enable/Disable

PEG# Slot Power Limit Value	75	Sets the upper limit on power supplied by slot. Power limit (in Watts) is calculated by multiplying this value by the Slot Power Limit Scale. Values 0-255
PEG# Slot Power Limit Scale	1.0x 0.1x 0.01x 0.001x	Select the scale used for the Slot Power Limit Value.
PEG# Physical Slot Number	1	Set the physical slot number attached to this Port. The number has to be globally unique within the chassis. Values 0-8191
PEG0 Hotplug	Disabled Enabled	PCI Express Hot Plug Enable/Disable
Extra Bus Reserved	0	Extra Bus Reserved (0-7) for bridges behind this Root Bridge.
Reserved Memory	10	Reserved Memory for this Root Bridge (1-4096) MB
Reserved I/O	4	Reserved I/O (4K/8K/12K/16K/20K) Range for this Root Bridge.

PEG Port Feature Configuration

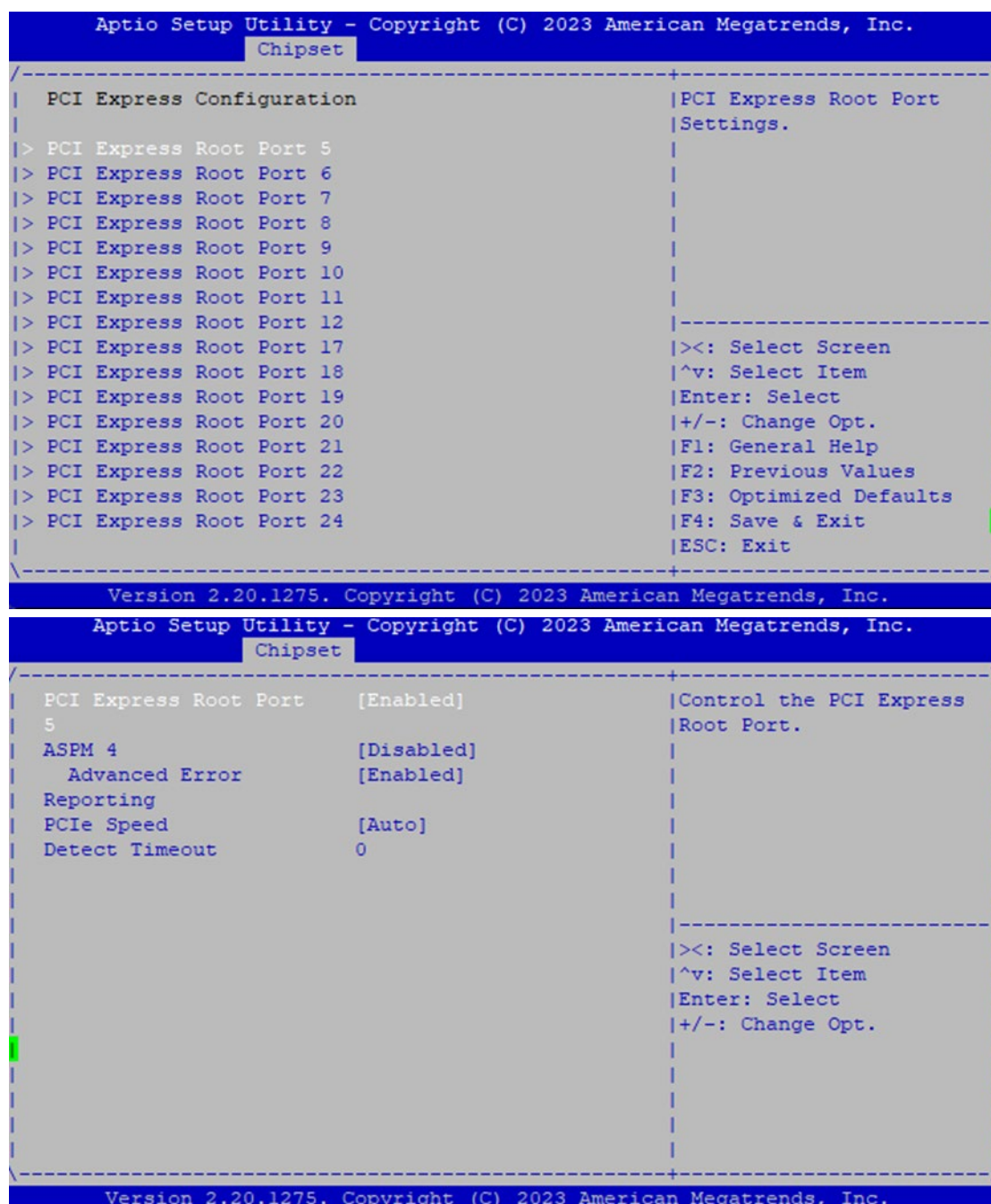
Aptio Setup Utility - Copyright (C) 2023 American Megatrends, Inc.		
Chipset		
PEG Port Feature Configuration		Detect Non-Compliance PCI Express Device in PEG
Detect Non-Compliance Device	[Enabled]	
		><: Select Screen ^v: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Version 2.20.1275. Copyright (C) 2023 American Megatrends, Inc.		
Feature	Options	Description
Detect Non-Compliance Device	Disabled Enabled	Detect Non-Compliance PCI Express Device in PEG

PCH-IO Configuration



Feature	Options	Description
Serial IRQ Mode	Quiet Continuous	Configure Serial IRQ Mode.

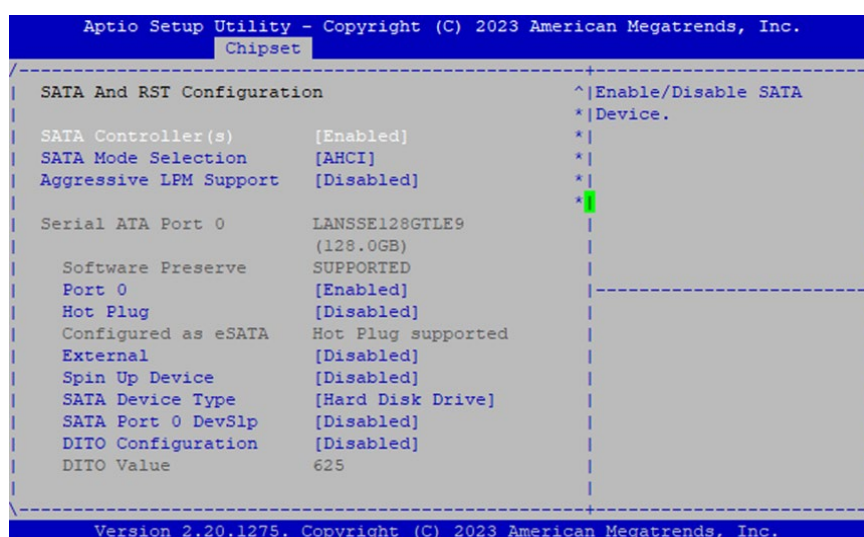
PCI Express Configuration



Feature	Options	Description
PCI Express Root Port #	Disabled Enabled	Control the PCI Express Root Port.
ASPM #-1	Disabled L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s - Force all links to L0s State AUTO - BIOS auto configure DISABLE - Disables ASPM

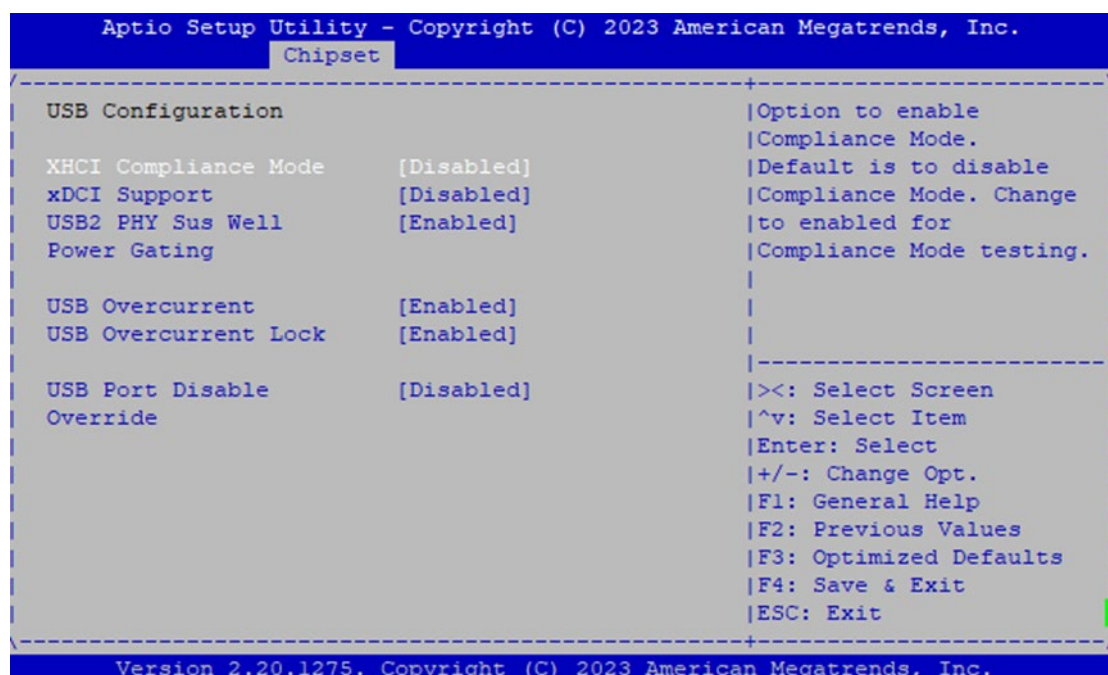
Advanced Error Reporting	Disabled Enabled	Advanced Error Reporting Enable/Disable.
PCIe Speed	Auto Gen1 Gen2 Gen3	Configure PCIe Speed
Detect Timeout	0	The number of milliseconds reference code will wait for link to exit Detect state for enabled ports before assuming there is no device and potentially disabling the port.

SATA And RST Configuration



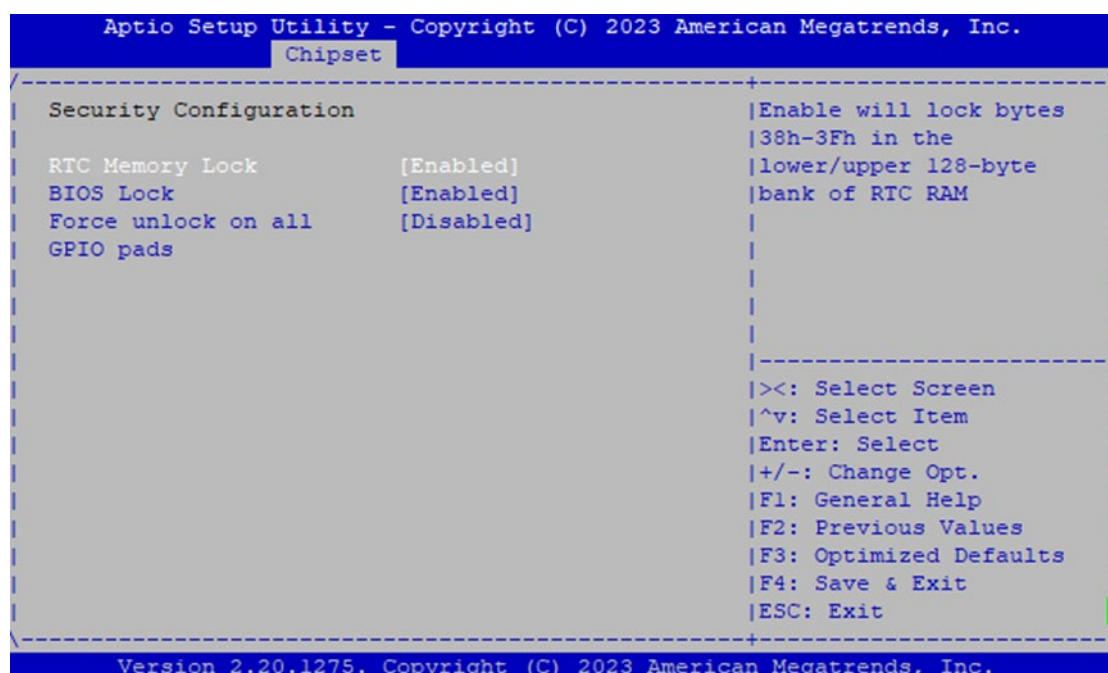
Feature	Options	Description
SATA Controller(s)	Enabled Disabled	Enable/Disable SATA Device.
SATA Mode Selection	AHCI Intel RST	Determines how SATA controller(s) operate.
Aggressive LPM Support	Enabled Disabled	Enable PCH to aggressively enter link power state.
Port #	Enabled Disabled	Enable or Disable SATA Port
Hot Plug	Enabled Disabled	Designates this port as Hot Pluggable.
External	Enabled Disabled	Marks this port as external.
Spin Up Device	Enabled Disabled	If enabled for any of ports Staggered Spin Up will be performed and only the drives which have this option enabled will spin up at boot. Otherwise all drives spin up at boot.
SATA Device Type	Hard Disk Drive Solid State Drive	Identify the SATA port is connected to Solid State Drive or Hard Disk Drive
SATA Device Type	Hard Disk Drive Solid State Drive	Identify the SATA port is connected to Solid State Drive or Hard Disk Drive
SATA Port # DevSlp	Disabled Enabled	Enable/Disable SATA Port # DevSlp. For DevSlp to work, both hard drive and SATA port need to support DevSlp function, otherwise an unexpected behavior might happen.
DITO Configuration	Disabled Enabled	Enable/Disable DITO Configuration

USB Configuration



Feature	Options	Description
XHCI Compliance Mode	Disabled Enabled	Option to enable Compliance Mode. Default is to disable Compliance Mode. Change to enabled for Compliance Mode testing
xDCI Support	Disabled Enabled	Enable/Disable xDCI (USB OTG Device).
USB2 PHY Sus Well Power Gating	Disabled Enabled	Select 'Enabled' to enable SUS Well PG for USB2 PHY. This option has no effect on PCH-H
USB Overcurrent	Disabled Enabled	Select 'Disabled' for pin-based debug. If pin-based debug is enabled but USB overcurrent is not disabled, USB DbC does not work.
USB Overcurrent Lock	Disabled Enabled	Select 'Enabled' if Overcurrent functionality is used. Enabling this will make xHCI controller consume the Overcurrent mapping data
USB Port Disable Override	Disabled Select Per-Pin	Selectively Enable/Disable the corresponding USB port from reporting a Device Connection to the controller.

Security Configuration

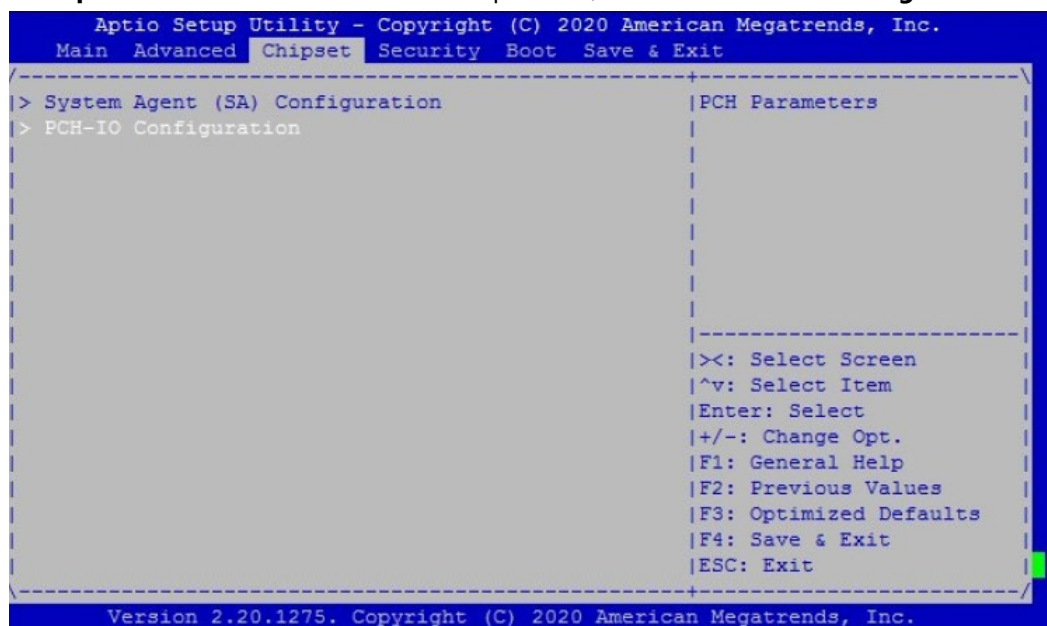


Feature	Options	Description
RTC Memory Lock	Disabled Enabled	Enable will lock bytes 38h-3Fh in the lower/upper 128-byte bank of RTC RAM
BIOS Lock	Disabled Enabled	Enable/Disable the PCH BIOS Lock Enable feature. Required to be enabled to ensure SMM protection of flash.
Force unlock on all GPIO pads	Disabled Enabled	If Enabled BIOS will force all GPIO pads to be in unlocked state

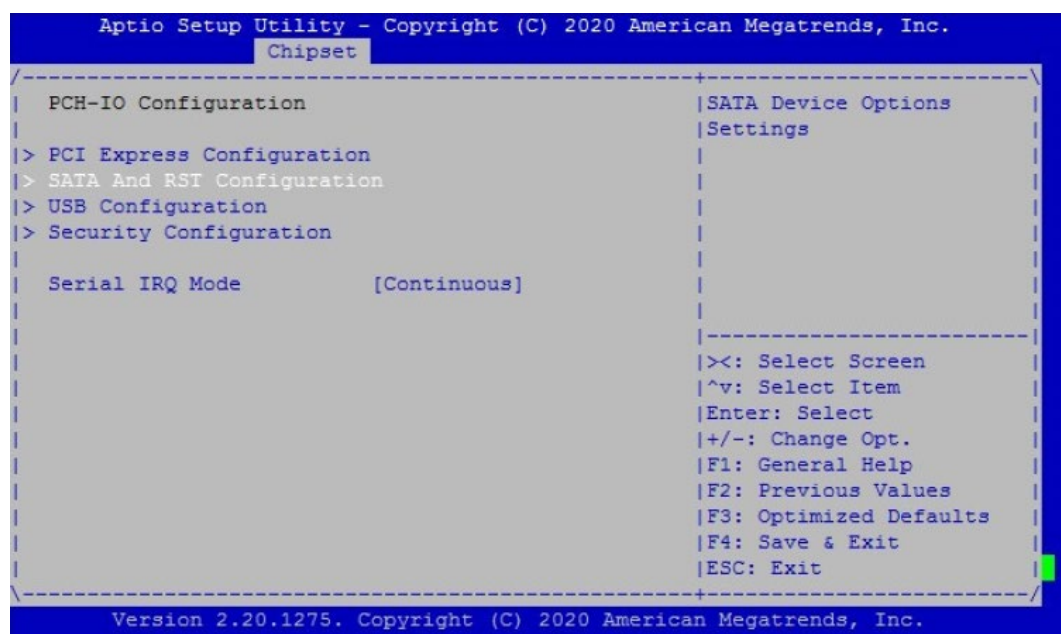
RAID 0/1 Setup

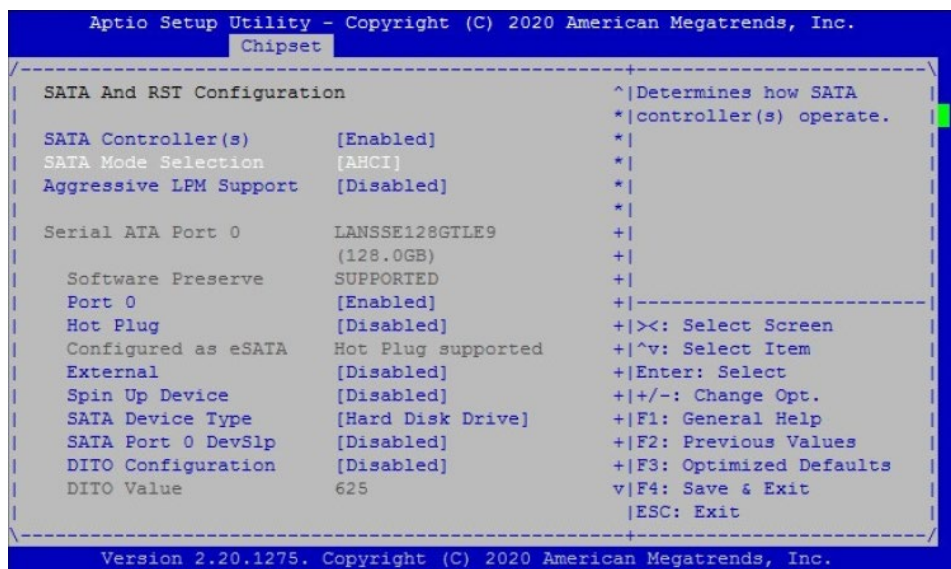
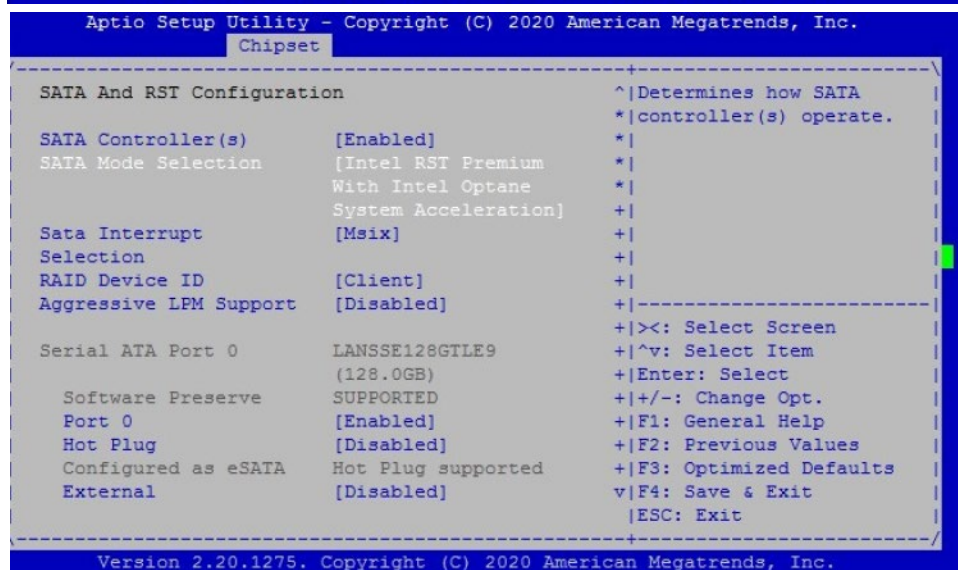
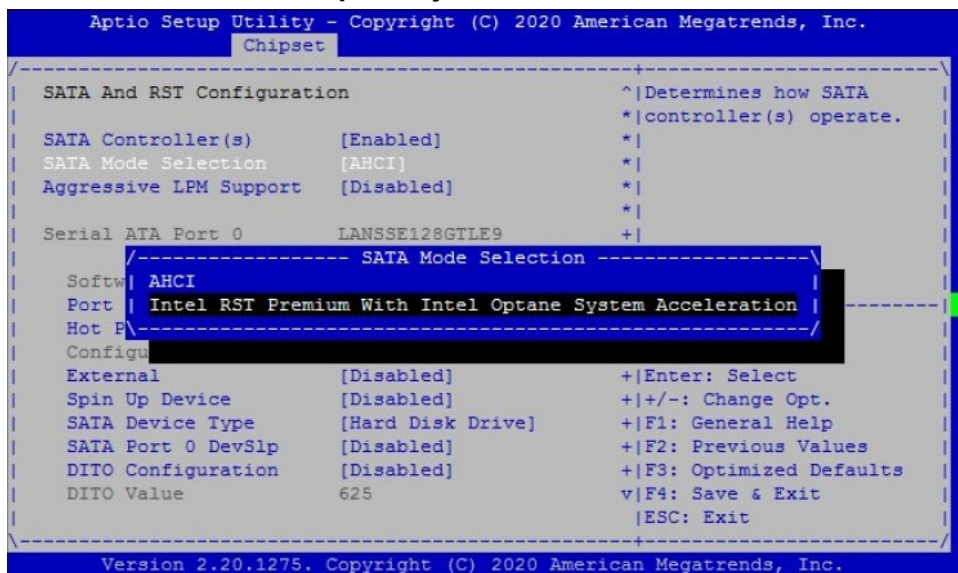
RAID, the abbreviation of Redundant Array of Independent Disks, is a technological combination of multiple physical disk drives to appear as one single logical storage unit on the operating system layer. RAID-0 requires at least two physical disk drives and the total capacity is the sum of all available storage devices. RAID-1 requires two or more physical disk drives to operate. Current BIOS default setting is to disable RAID FW function, please follow setup steps below to enable RAID 0 features.

1. Select the **Chipset** menu item from the BIOS setup screen, and select **PCH-IO Configuration**.

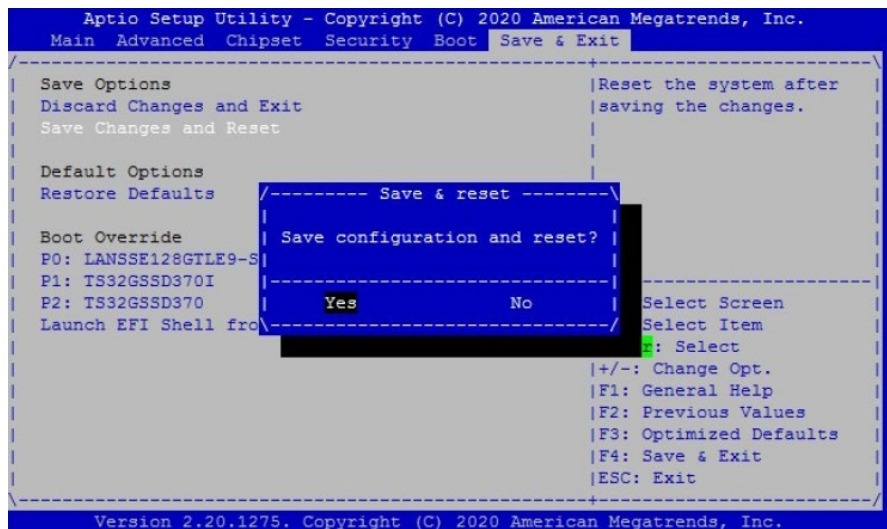


2. Select **SATA And RST Configuration**.



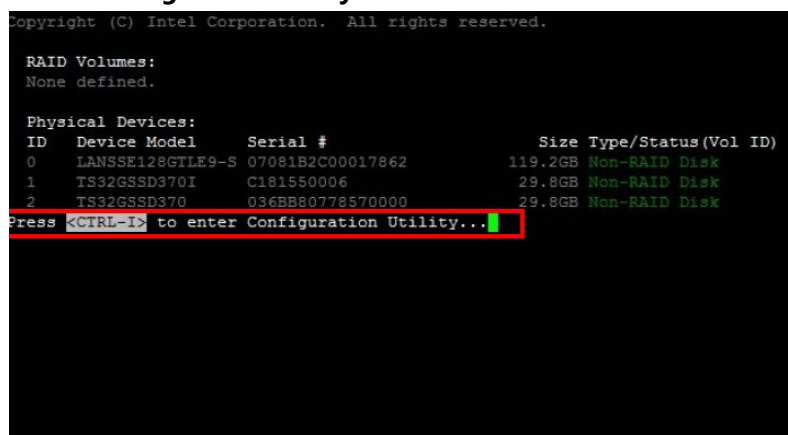
3. Select **SATA Mode Selection**.4. Select **Intel RST Premium With Intel Optane System Acceleration**.

5. Then Select Save & Exit Menu item and select **Yes** to **Save configuration and reset**. RAID 0 function has been enabled.

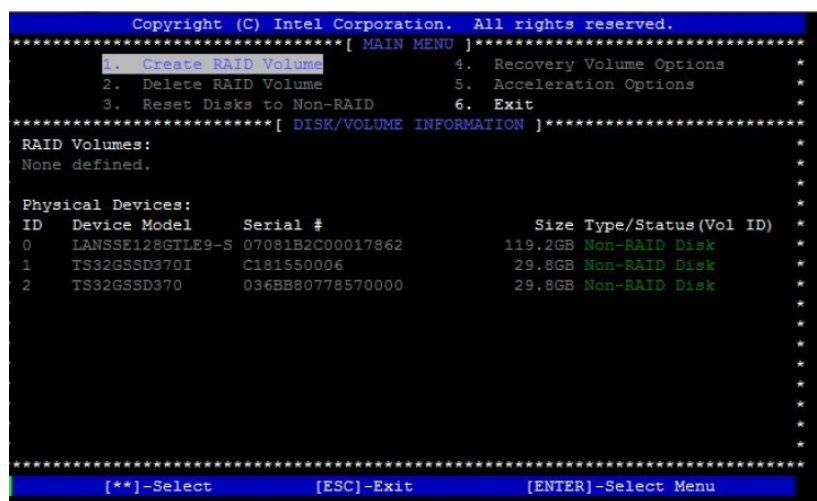


RAID-0 Setup

1. Select <CTRL-I> to enter Configuration Utility...



2. On the **MAIN MENU**, select **1. Create RAID Volume**.



3. In the **CREATE VOLUME MENU**, select the disk to use in creating the volume.

```

Copyright (C) Intel Corporation. All rights reserved.
*****[ CREATE VOLUME MENU ]*****
*
*      Name:  Volume1
*      RAID Level:  RAID0(Stripe)
*      *****[ SELECT DISKS ]*****
*
*  * ID   Drive Model      Serial #           Size Status
*  * 0    LANSSE128GTLE9-SB2-2  07081B2C00017862  119.2GB Non-RAID Disk
*  * **1   TS32GSSD370I       C181550006        29.8GB Non-RAID Disk
*  * **2   TS32GSSD370        036BB80778570000  29.8GB Non-RAID Disk
*
*
*      Select 2 to 6 disks to use in creating the volume.
*
*  ***[**]-Prev/Next [SPACE]-SelectDisk [ENTER]-Done*****
*
*****
*
*      [**]Change  [TAB]-Next  [ESC]-Previous Menu  [ENTER]-Select

```

4. Insert **Strip Size** values.

```

Copyright (C) Intel Corporation. All rights reserved.
*****[ CREATE VOLUME MENU ]*****
*
*      Name:  Volume1
*      RAID Level:  RAID0(Stripe)
*      Disks:  Select Disks
*      Strip Size:  64KB
*      Capacity:  59.6  GB
*      Sync:      N/A
*      Create Volume
*
*      *****[ HELP ]*****
*
*      The following are typical values:
*
*          RAID0  - 128KB
*          RAID10 - 64KB
*          RAID5  - 64KB
*
*
*      [**]Change  [TAB]-Next  [ESC]-Previous Menu  [ENTER]-Select

```

5. Insert **Capacity** values.

```

Copyright (C) Intel Corporation. All rights reserved.
*****[ CREATE VOLUME MENU ]*****
*
*      Name:  Volume1
*      RAID Level:  RAID0(Stripe)
*      Disks:  Select Disks
*      Strip Size:  64KB
*      Capacity:  59.6  GB
*      Sync:      N/A
*      Create Volume
*
*      *****[ HELP ]*****
*
*      The default value indicates the maximum capacity using the selected
*      disks. Entering a lower capacity allows you to create a second
*      volume on these disks.
*
*
*      [**]Change  [TAB]-Next  [ESC]-Previous Menu  [ENTER]-Select

```

6. Select **Y** to create this volume.

```

Copyright (C) Intel Corporation. All rights reserved.
*****[ CREATE VOLUME MENU ]*****
*
*      Name:  Volume1
*      RAID Level:  RAID0(Stripe)
*      Disks:  Select Disks
*      Strip Size:  64KB
*      Capacity:  59.6  GB
*      Sync:  N/A
*
*      *****
*      *      WARNING: ALL DATA ON SELECTED DISKS WILL BE LOST.      *
*      *****
*      Are you sure you want to create this volume? (Y/N):
*      *****
*
*      Press ENTER to create the specified volume.
*
*
*      *****
*      [**]Change  [TAB]-Next  [ESC]-Previous Menu  [ENTER]-Select

```

7. Select **Y** to exit.

```

Copyright (C) Intel Corporation. All rights reserved.
*****[ MAIN MENU ]*****
*
*      1. Create RAID Volume
*      2. Delete RAID Volume
*      3. Reset Disks to Non-RAID
*      4. Recovery Volume Options
*      5. Acceleration Options
*      6. Exit
*
*      *****[ DISK/VOLUME INFORMATION ]*****
*
*      RAID Volumes:
*      ID  Name          Level          Strip      Size Status      Bootable*
*      0   Volume1       RAID0(Stripe)  64KB       59.6GB Normal      Yes
*
*      *****[ CONFIRM EXIT ]*****
*      Physical*
*      ID  Dev*          Are you sure you want to exit? (Y/N):      *Vol ID)
*      0   LAN*
*      1   TS3*
*      2   TS32GSSD370  036BB80778570000  29.8GB Member Disk(0)
*
*
*      *****
*      [**]-Select  [ESC]-Exit  [ENTER]-Select Menu

```

RAID-1 Setup

1. Select **<CTRL-I>** to enter Configuration Utility...

```

Copyright (C) Intel Corporation. All rights reserved.

RAID Volumes:
None defined.

Physical Devices:
ID  Device Model      Serial #          Size Type/Status(Vol ID)
0   LANSSE128GTLE9-S  07081B2C00017862  119.2GB Non-RAID Disk
1   TS32GSSD370I     C181550006       29.8GB Non-RAID Disk
2   TS32GSSD370     036BB80778570000  29.8GB Non-RAID Disk

Press <CTRL-I> to enter Configuration Utility...

```

2. On the **MAIN MENU**, select **1. Create RAID Volume**.

```

Copyright (C) Intel Corporation. All rights reserved.
*****[ MAIN MENU ]*****
1. Create RAID Volume          4. Recovery Volume Options
2. Delete RAID Volume          5. Acceleration Options
3. Reset Disks to Non-RAID     6. Exit
*****[ DISK/VOLUME INFORMATION ]*****

RAID Volumes:
None defined.

Physical Devices:
ID  Device Model      Serial #              Size Type/Status(Vol ID)
0   LANSSE128GTLE9-S  07081B2C00017862     119.2GB Non-RAID Disk
1   TS32GSSD370I     C181550006           29.8GB Non-RAID Disk
2   TS32GSSD370      036BB80778570000     29.8GB Non-RAID Disk

*****
[**]-Select      [ESC]-Exit      [ENTER]-Select Menu

```

3. In the **CREATE VOLUME MENU**, Select **Name**.

```

Copyright (C) Intel Corporation. All rights reserved.
*****[ CREATE VOLUME MENU ]*****
*
*      Name:  Volume1
*      RAID Level: RAID0(Stripe)
*      Disks:  Select Disks
*      Strip Size: 128KB
*      Capacity: 0.0  GB
*      Sync:  N/A
*      Create Volume
*
*****[ HELP ]*****
*
*      Enter a unique volume name that has no special characters and is
*      16 characters or less.
*
*****
[**]Change  [TAB]-Next  [ESC]-Previous Menu  [ENTER]-Select

```

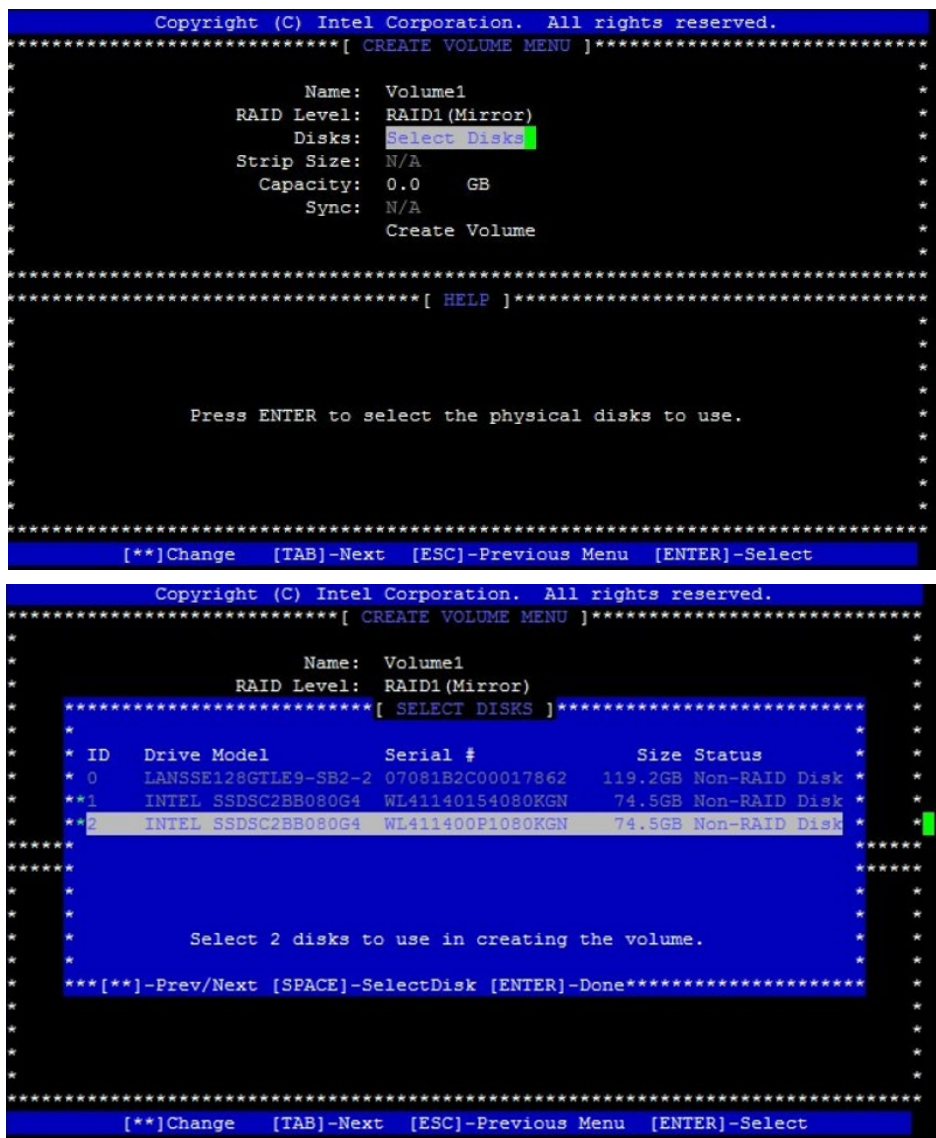
4. Enter **RAID Level** value.

```

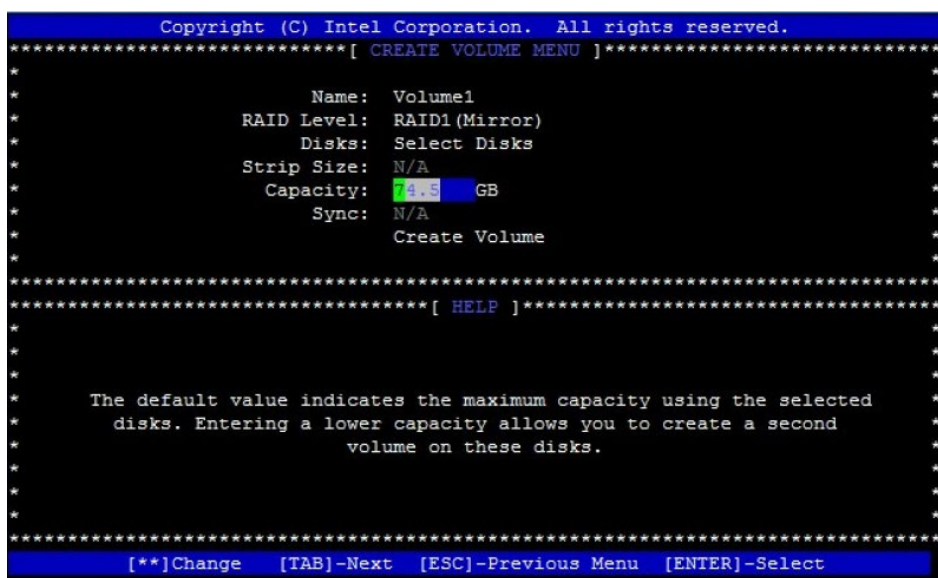
Copyright (C) Intel Corporation. All rights reserved.
*****[ CREATE VOLUME MENU ]*****
*
*      Name:  Volume1
*      RAID Level: RAID1(Mirror)
*      Disks:  Select Disks
*      Strip Size: N/A
*      Capacity: 0.0  GB
*      Sync:  N/A
*      Create Volume
*
*****[ HELP ]*****
*
*      RAID 1: Mirrors data (redundancy).
*
*****
[**]Change  [TAB]-Next  [ESC]-Previous Menu  [ENTER]-Select

```

5. Select the Disks to use in creating the volume.



6. Enter Capacity value.



7. Select **Create Volume**. Select **Y** to create this volume.

```

Copyright (C) Intel Corporation. All rights reserved.
*****[ CREATE VOLUME MENU ]*****
*
*      Name:  Volume1
*      RAID Level:  RAID1(Mirror)
*      Disks:  Select Disks
*      Strip Size:  N/A
*      Capacity:  74.5   GB
*      Sync:  N/A
*      Create Volume
*
*****[ HELP ]*****
*
*
*      Press ENTER to create the specified volume.
*
*****
[**]Change  [TAB]-Next  [ESC]-Previous Menu  [ENTER]-Select

Copyright (C) Intel Corporation. All rights reserved.
*****[ CREATE VOLUME MENU ]*****
*
*      Name:  Volume1
*      RAID Level:  RAID1(Mirror)
*      Disks:  Select Disks
*      Strip Size:  N/A
*      Capacity:  74.5   GB
*      Sync:  N/A
*
*      *****
*      *      WARNING: ALL DATA ON SELECTED DISKS WILL BE LOST.      *
*      *****
*      Are you sure you want to create this volume? (Y/N):
*      *****
*
*      Press ENTER to create the specified volume.
*
*****
[**]Change  [TAB]-Next  [ESC]-Previous Menu  [ENTER]-Select

```

7. Back in the **MAIN MENU**, Select **6. Exit**. Select **Y** to exit.

```

Copyright (C) Intel Corporation. All rights reserved.
*****[ MAIN MENU ]*****
*
*      1. Create RAID Volume
*      2. Delete RAID Volume
*      3. Reset Disks to Non-RAID
*      4. Recovery Volume Options
*      5. Acceleration Options
*      6. Exit
*
*****[ DISK/VOLUME INFORMATION ]*****
*
* RAID Volumes:
* ID  Name          Level          Strip      Size Status      Bootable*
* 0   Volume1       RAID0(Stripe)  64KB       59.6GB Normal      Yes
*
* *****[ CONFIRM EXIT ]*****
*
* Physical*
* ID  Dev*          Are you sure you want to exit? (Y/N):      *Vol ID)
* 0   LAN*
* 1   TS3
* 2   TS32GSSD370   036BB80778570000      29.8GB Member Disk(0)
*
*****
[**]-Select      [ESC]-Exit      [ENTER]-Select Menu

```

Reset RAID Disk

1. Select <CTRL-I> to enter Configuration Utility...

```
Copyright (C) Intel Corporation. All rights reserved.

RAID Volumes:
None defined.

Physical Devices:
ID Device Model Serial # Size Type/Status (Vol ID)
0 LANSSE128GTLE9-S 07081B2C00017862 119.2GB Non-RAID Disk
1 TS32GSSD370I C181550006 29.8GB Non-RAID Disk
2 TS32GSSD370 036BB80778570000 29.8GB Non-RAID Disk
Press <CTRL-I> to enter Configuration Utility...
```

2. In the MAIN MENU, select 3. Reset Disks to Non-RAID.

```
Copyright (C) Intel Corporation. All rights reserved.
*****[ MAIN MENU ]*****
1. Create RAID Volume 4. Recovery Volume Options *
2. Delete RAID Volume 5. Acceleration Options *
3. Reset Disks to Non-RAID 6. Exit *
*****[ DISK/VOLUME INFORMATION ]*****
RAID Volumes:
ID Name Level Strip Size Status Bootable*
0 Volume1 RAID0 (Stripe) 64KB 59.6GB Normal Yes *
Physical Devices:
ID Device Model Serial # Size Type/Status (Vol ID) *
0 LANSSE128GTLE9-S 07081B2C00017862 119.2GB Non-RAID Disk *
1 TS32GSSD370I C181550006 29.8GB Member Disk(0) *
2 TS32GSSD370 036BB80778570000 29.8GB Member Disk(0) *
*****
[**]-Select [ESC]-Exit [ENTER]-Select Menu
```

3. Select the disks that should be reset. Select **Y** to reset RAID data.

```

Copyright (C) Intel Corporation. All rights reserved.
*****[ MAIN MENU ]*****
* 1. Create RAID Volume 4. Recovery Volume Options *
* *****[ RESET RAID DATA ]***** *
* * Resetting RAID disk will remove its RAID structures *
* * and revert it to a non-RAID disk. *
* RA* *
* ID* WARNING: Resetting a disk causes all data on the disk to be lost. *le*
* 0 * (This does not apply to Recovery volumes or Cache disks) *
* *
* Ph* ID Drive Model Serial # Size Status *
* ID* 1 TS32GSSD370I C181550006 29.8GB Member Disk *
* 0 * 2 TS32GSSD370 036BB80778570000 29.8GB Member Disk *
* 1 *
* 2 *
* *
* * Select the disks that should be reset. *
* *
* *****[**]-Previous/Next [SPACE]-Selects [ENTER]-Selection Complete*****
*
* *****
*
* [**]-Select [ESC]-Exit [ENTER]-Select Menu

```

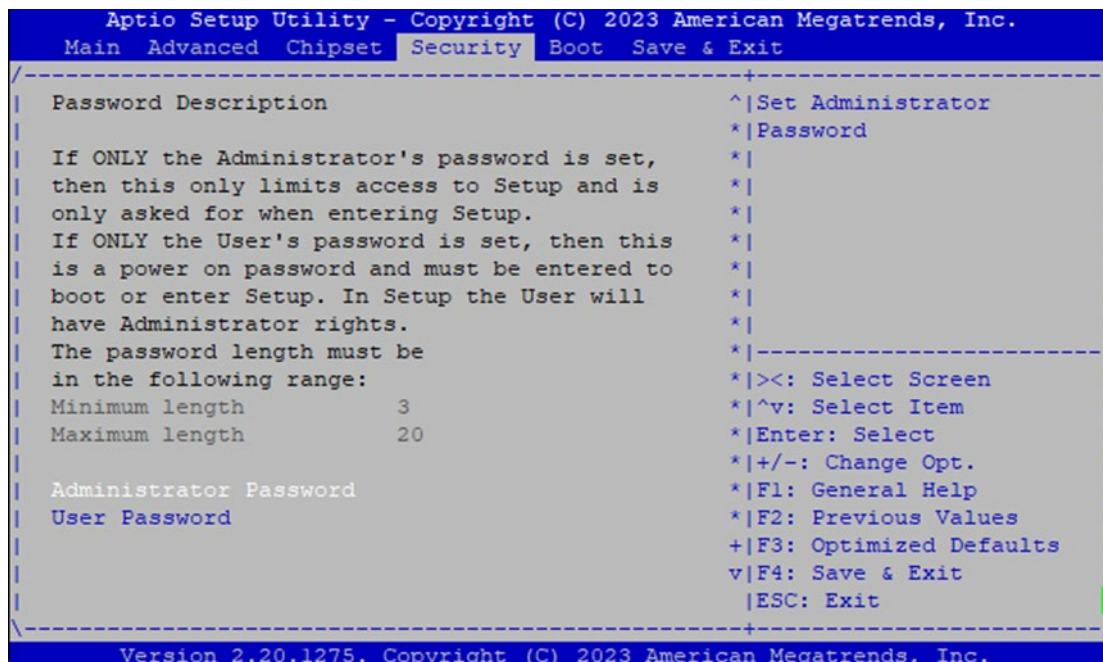
```

Copyright (C) Intel Corporation. All rights reserved.
*****[ MAIN MENU ]*****
* 1. Create RAID Volume 4. Recovery Volume Options *
* *****[ RESET RAID DATA ]***** *
* * Resetting RAID disk will remove its RAID structures *
* * and revert it to a non-RAID disk. *
* RA* *
* ID* WARNING: Resetting a disk causes all data on the disk to be lost. *le*
* 0 * (This does not apply to Recovery volumes or Cache disks) *
* *
* Ph* ID Drive Model Serial # Size Status *
* ID* *1 TS32GSSD370I C181550006 29.8GB Member Disk *
* 0 * *2 TS32GSSD370 036BB80778570000 29.8GB Member Disk *
* 1 *
* 2 *
* *
* * Are you sure you want to reset RAID data on selected disks? (Y/N): *
* *
* *****[**]-Previous/Next [SPACE]-Selects [ENTER]-Selection Complete*****
*
* *****
*
* [**]-Select [ESC]-Exit [ENTER]-Select Menu

```

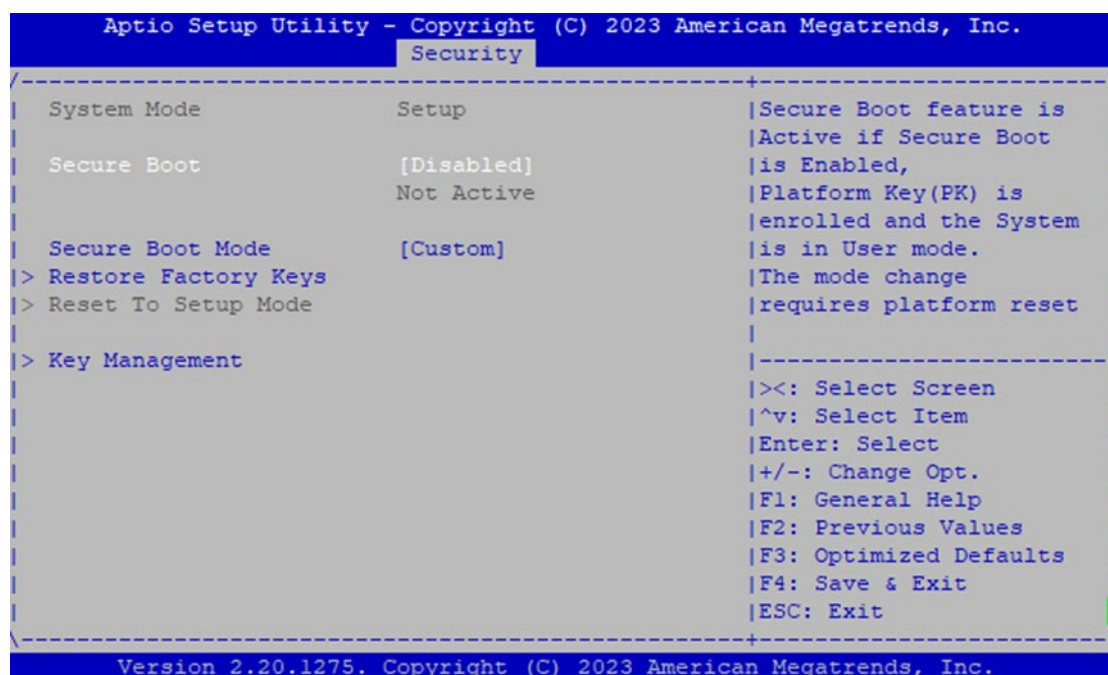
Security

Select the Security menu item from the BIOS setup screen to enter the Security Setup screen. Users can select any of the items in the left frame of the screen.



Feature	Description
Administrator Password	If ONLY the Administrator's password is set, it only limits access to Setup and is only asked for when entering Setup.
User Password	If ONLY the User's password is set, it serves as a power-on password and must be entered to boot or enter Setup. In Setup, the User will have Administrator rights.

Secure Boot



Feature	Options	Description
Secure Boot Enable	Disabled 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	Customizable Secure Boot mode: In Custom mode, Secure Boot Policy variables can be configured by a physically present user without full authentication.
Restore Factory Keys	None	Force System to User Mode. Install factory default Secure Boot key databases
Reset To Setup Mode	None	Delete all Secure Boot key databases from NVRAM

Key Management

```

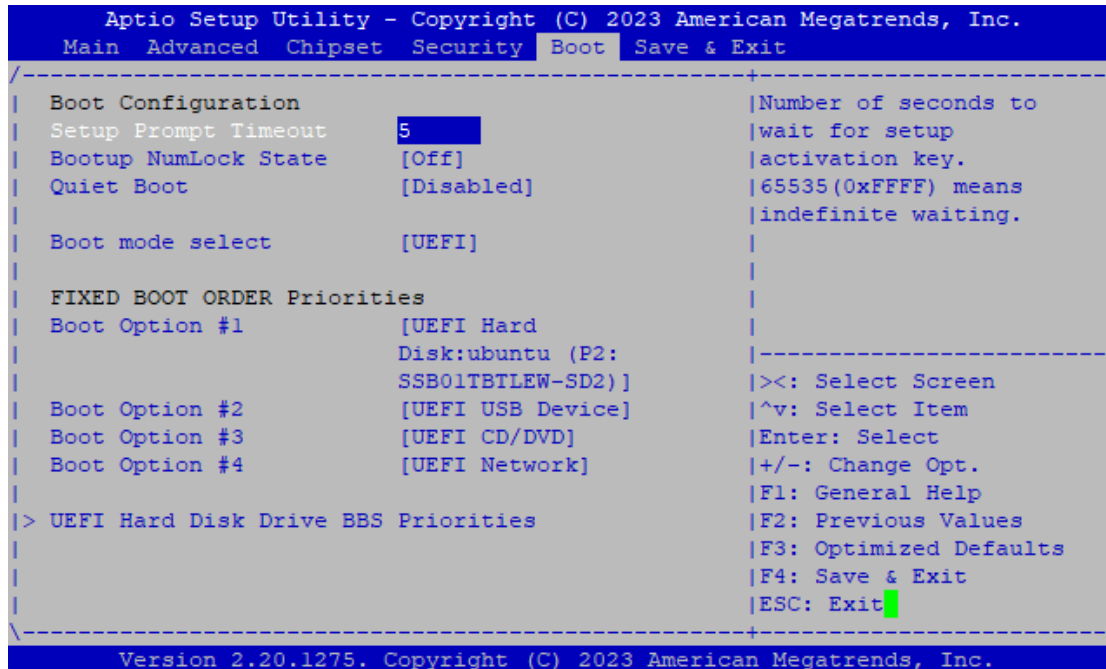
Aptio Setup Utility - Copyright (C) 2023 American Megatrends, Inc.
Security
-----
| Vendor Keys          Modified          ^|Install factory default
|                      |                  *|Secure Boot keys after
| Factory Key Provision [Disabled]      *|the platform reset and
|> Restore Factory Keys                  *|while the System is in
|> Reset To Setup Mode                  *|Setup mode
|> Export Secure Boot variables          *|
|> Enroll Efi Image                     *|
|                      *|
| Device Guard Ready                    *|
|> Remove 'UEFI CA' from DB              *|-----
|> Restore DB defaults                  *|><: Select Screen
|                      *|^v: Select Item
| Secure Boot variable | Size| Keys| Key Source *|Enter: Select
|> Platform Key(PK)    |  0|  0| No Keys *|+/-: Change Opt.
|> Key Exchange Keys   |  0|  0| No Keys *|F1: General Help
|> Authorized Signatures|  0|  0| No Keys *|F2: Previous Values
|> Forbidden Signatures|  0|  0| No Keys +|F3: Optimized Defaults
|> Authorized TimeStamps|  0|  0| No Keys v|F4: Save & Exit
|                      |ESC: Exit
-----
Version 2.20.1275. Copyright (C) 2023 American Megatrends, Inc.

```

Feature	Options	Description
Factory Key Provision	Disabled Enabled	Install factory default Secure Boot keys after the platform reset and while the System is in Setup mode
Restore Factory keys	None	Force System to User Mode. Install factory default Secure Boot key databases
Reset To Setup Mode	None	Delete all Secure Boot key databases from NVRAM
Export Secure Boot variables	None	Copy NVRAM content of Secure Boot variables to files in a root folder on a file system device
Enroll Efi Image	None	Allows the image to run in Secure Boot mode. Enroll SHA256 hash of the binary into Authorized Signature Database (db)
Remove 'UEFI CA' from DB	None	Device Guard ready system must not list 'Microsoft UEFI CA' Certificate in Authorized Signature database (db)

Boot Menu

Select the Boot menu item from the BIOS setup screen to enter the Boot Setup screen. Users can select any of the items in the left frame of the screen.

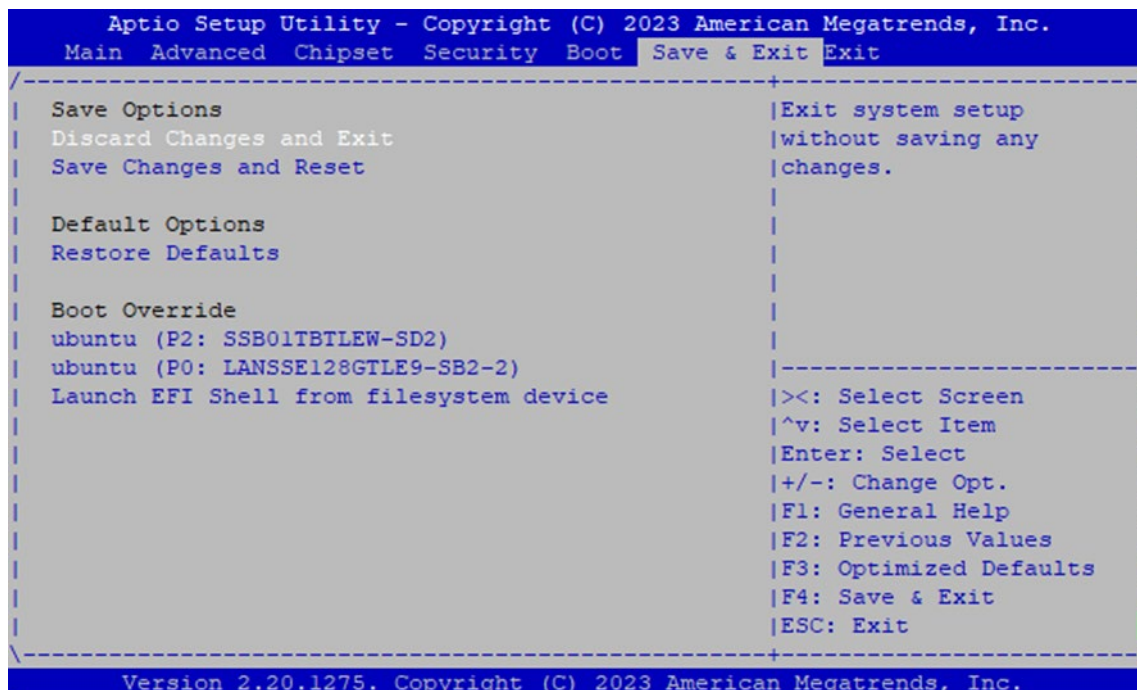


Feature	Options	Description
Setup Prompt Timeout	5	Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.
Bootup NumLock State	On Off	Select the keyboard NumLock state
Quiet Boot	Disabled Enabled	Enables or disables Quiet Boot option.
Boot mode select	LEGACY (*1) UEFI (*2) DUAL	Select boot mode for LEGACY or UEFI. (*1) LEB-2291C SKU default setting (*2) LEB-2291B SKU default setting

- Choose boot priority from boot option group.
- Choose specifies boot device priority sequence from available Group device.

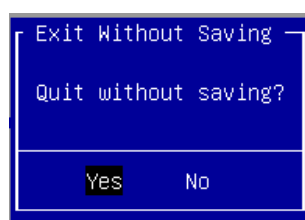
Save and Exit Menu

Select the Save and Exit menu item from the BIOS setup screen to enter the Save and Exit Setup screen. Users can select any of the items in the left frame of the screen.



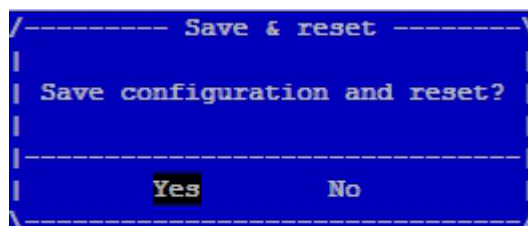
■ Discard Changes and Exit

Select this option to quit Setup without saving any modifications to the system configuration. The following window will appear after the **"Discard Changes and Exit"** option is selected. Select **"Yes"** to Discard changes and Exit Setup.



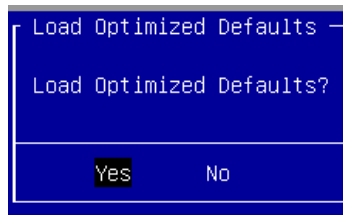
■ Save Changes and Reset

When Users have completed the system configuration changes, select this option to save the changes and reset from BIOS Setup in order for the new system configuration parameters to take effect. The following window will appear after selecting the **"Save Changes and Reset"** option is selected. Select **"Yes"** to Save Changes and reset.



■ Restore Defaults

Restore default values for all setup options. Select **“Yes”** to load Optimized defaults.



PS: The items under Boot Override may not be the same as the image above as it should depend on the actual devices connected to the system.

Command Line Configuration

You can configure the value of voltage, power on delay, DI/DO and others on LEC-2290L via the MCU command line. Below are the requirements to enable the command line

1. Host communication interface: COM#7 (RS-232)
2. Support baud rate: 57600/ 8N1
3. Communication protocol: ANSI terminal.

Use below formula to set/get your command line:

GET VariableName

SET VariableName value

MCU Command	Write/Read (SET/GET)	Variable Name	Value	
Startup Voltage(mV)	SET	STARTUP_VOLTAGE	0(default)	0mV
	GET	STARTUP_VOLTAGE		
Shutdown Voltage(mV)	SET	INPUT_VOLTAGE_MIN	8500(default)	8500mV
	GET	INPUT_VOLTAGE_MIN		
PowerOn Delay (Sec)	SET	POWERON_DELAY	4(default)	4S
	GET	POWERON_DELAY		
PowerOff Delay (Sec)	SET	SHUTDOWN_DELAY	4(default)	4S
	GET	SHUTDOWN_DELAY		
Input Voltage	GET	INPUT_VOLTAGE		
Device ID	GET	DEVICE_ID	LEC-2290_N	
Firmware Version	GET	VERSION	0.07B	
Ignition	GET	IGNITION		
Digital POE	SET	DIGITAL_POE	15(default)	0~15
	GET	DIGITAL_POE		
Digital DO	SET	DIGITAL_DO	0(default)	0~255
Digital DI	GET	DIGITAL_DI		
Save flash	SAVE			

Example**1. The minimum voltage for startup****Setting: 6V(6000mV)**

SET STARTUP_VOLTAGE 6000	command
OK	response message
GET STARTUP_VOLTAGE	command
STARTUP_VOLTAGE= 6000	response message

2. The delay time for POWERON_DELAY state Setting: 4 S

SET POWERON_DELAY 4	command
OK	response message
GET POWERON_DELAY	command
POWERON_DELAY= 4	response message

3. Device ID

GET DEVICE_ID	command
DEVICE_ID= LEC-2290_N	response message

4. Firmware Version

GET VERSION	command
VERSION= 0.07B	response message

5. Ignition state (Read only)

GET IGNITION	command
IGNITION= 0	response message (0: Ignition off / 1: ignition on)

6. Control the ON/OFF of each POE port

SET DIGITAL_POE 1	command
OK	response message
GET DIGITAL_POE	command
DIGITAL_POE= 1	response message

POE1/bit0	=	1
POE2/bit1	=	2
POE3/bit2	=	4
POE4/bit3	=	8

To achieve POE1~4 enable, please entry value setting at 15.

7. Write/Read Digital DO state Setting: DO1/DO2/DO3/DO4/DO5/DO6/DO7/DO8

SET DIGITAL_DO 3	command
OK	response message
GET DIGITAL_DO	command
DIGITAL_DO= 3	response message

DO1/bit0	=	1
DO2/bit1	=	2
DO3/bit2	=	4
DO4/bit3	=	8
DO5/bit4	=	16
DO6/bit5	=	32
DO7/bit6	=	64
DO8/bit7	=	128

To achieve DO1~8 enable, please entry value setting at 255.

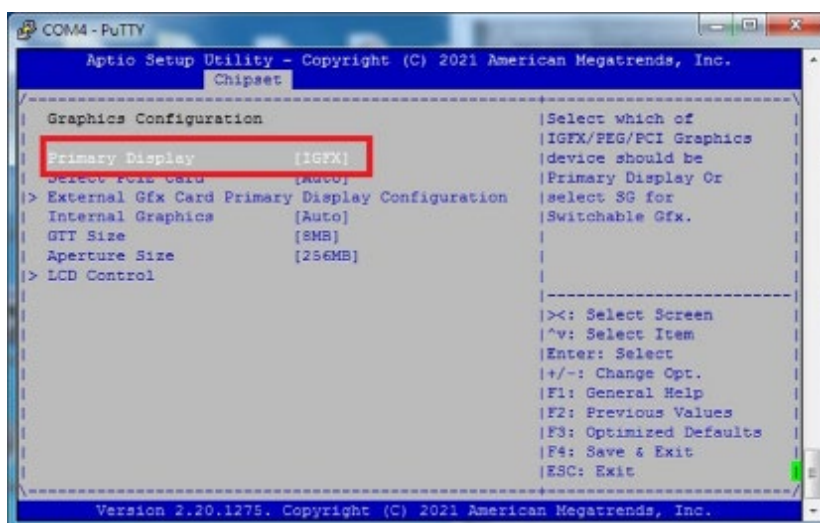
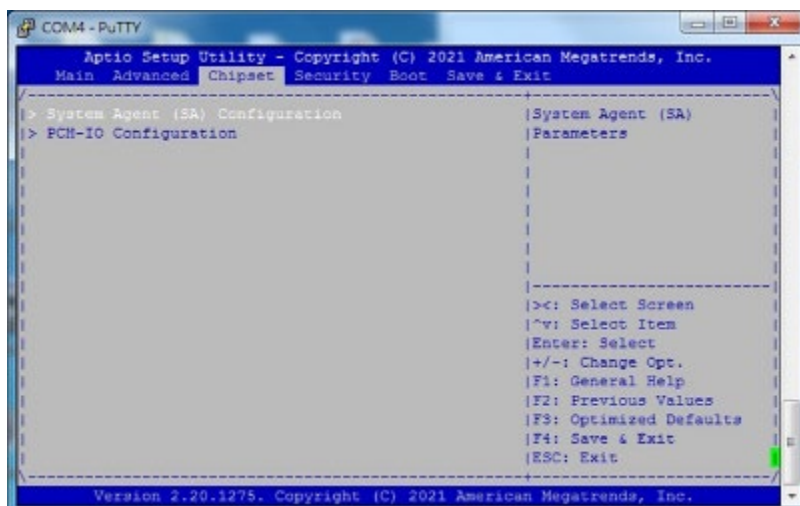
8. Save setting

SAVE	command
OK Flash Updated.	response message

NVIDIA EGX Installation Guide

Enable internal HDMI

Please enter BIOS Setup Menu (<Delete> or <tab>), CHIPSET>SYSTEM Agent (SA) Configuration> Graphics Configuration>Primary Display set to **IGFX**.



Installing the Ubuntu Operating System

```
sudo nano /etc/modprobe.d/blacklist-nouveau.conf
```

Insert the following:

```
blacklist nouveau
options nouveau modeset=0
```

Now execute the below:

```
sudo update-initramfs -u
sudo reboot
```

Installing Docker-CE

```
sudo apt-get update
sudo apt-get install -y apt-transport-https ca-certificates curl gnupg-agent software-properties-common

curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo apt-key add -

sudo apt-key fingerprint 0EBFCD88
sudo add-apt-repository "deb [arch=amd64] https://download.docker.com/linux/ubuntu $(lsb_release -cs) stable"
sudo apt-get update
sudo apt-get install -y docker-ce=5:19.03.5~3-0~ubuntu-bionic docker-ce-cli=5:19.03.5~3-0~ubuntu-bionic containerd.io
```

Verify that Docker Engine - Community is installed correctly by running the hello-world image:

```
sudo docker run hello-world
```

Installing Kubernetes

```
sudo systemctl start docker && sudo systemctl enable docker
sudo apt-get update && sudo apt-get install -y apt-transport-https curl

curl -s https://packages.cloud.google.com/apt/doc/apt-key.gpg | sudo apt-key add -

sudo mkdir -p /etc/apt/sources.list.d/
sudo nano /etc/apt/sources.list.d/kubernetes.list
```

Add the following lines in kubernetes.list and save the file:

```
deb https://apt.kubernetes.io/ kubernetes-xenial main
```

Now execute the below:

```
sudo apt-get update
sudo apt-get install -y -q kubelet=1.17.5-00 kubectcl=1.17.5-00 kubeadm=1.17.5-00
sudo apt-mark hold kubelet kubeadm kubectcl
```

Initializing the Kubernetes cluster to run as master

```
sudo swapoff -a
sudo nano /etc/fstab
```

Add a # before all the lines that start with /swap. # is a comment and the result should look something like this:

```
UUID=e879fda9-4306-4b5b-8512-bba726093f1d / ext4 defaults 0 0
UUID=DCD4-535C /boot/efi vfat defaults 0 0
#/swap.img none swap sw 0 0
```

Execute the following command:

```
sudo kubeadm init --pod-network-cidr=192.168.0.0/16
```

Following the instructions in the output, execute the commands as shown below:

```
mkdir -p $HOME/.kube
sudo cp -i /etc/kubernetes/admin.conf $HOME/.kube/config
sudo chown $(id -u):$(id -g) $HOME/.kube/config

kubectl apply -f https://docs.projectcalico.org/v3.11/manifests/calico.yaml

kubectl get pods --all-namespaces
```

Output:

```
lanner@lanner:~$ kubectl get pods --all-namespaces
NAMESPACE   NAME                                     READY   STATUS    RESTARTS   AGE
kube-system  calico-kube-controllers-79bc685f4c-cf2j9 0/1     Pending   0           6s
kube-system  calico-node-xrzxw6                       0/1     Init:0/3   0           6s
kube-system  coredns-6985765f44-bt6sd                 0/1     Pending   0           88s
kube-system  coredns-6985765f44-r8kmd                 0/1     Pending   0           88s
kube-system  etcd-lanner                              1/1     Running   0           81s
kube-system  kube-apiserver-lanner                     1/1     Running   0           81s
kube-system  kube-controller-manager-lanner            1/1     Running   0           81s
kube-system  kube-proxy-4pj2c                         1/1     Running   0           88s
kube-system  kube-scheduler-lanner                     1/1     Running   0           81s
lanner@lanner:~$
```

Execute the below:

```
kubectl get nodes
kubectl taint nodes --all node-role.kubernetes.io/master-
```

Installing Helm

```
sudo wget https://get.helm.sh/helm-v3.1.0-linux-amd64.tar.gz
sudo tar -zxvf helm-v3.1.0-linux-amd64.tar.gz
sudo mv linux-amd64/helm /usr/local/bin/helm
```

Installing the GPU Operator

```
helm repo add nvidia https://nvidia.github.io/gpu-operator
helm repo update
helm install --version 1.1.7 --devel nvidia/gpu-operator --wait --generate-name

kubectl get pods --all-namespaces | grep -v kube-system
```

Output:

```
lanner@lanner:~$ kubectl get pods --all-namespaces | grep -v kube-system
NAMESPACE      NAME                                                    READY   STATUS    RESTARTS   AGE
default        gpu-operator-1626833565-node-feature-discovery-master-c44bkjfdg  1/1     Running   0          24m
default        gpu-operator-1626833565-node-feature-discovery-worker-1lrdz     1/1     Running   0          24m
default        gpu-operator-74c97448d9-mw9wz                             1/1     Running   0          24m
default        nvidia-smi                                                0/1     ImagePullBackOff  0          13m
gpu-operator-resources  nvidia-container-toolkit-daemonset-zkm2q                1/1     Running   0          24m
gpu-operator-resources  nvidia-dcgm-exporter-6b9c2                                1/1     Running   0          24m
gpu-operator-resources  nvidia-device-plugin-daemonset-wcgx9                     1/1     Running   0          24m
gpu-operator-resources  nvidia-device-plugin-validation                           0/1     Completed  0          24m
gpu-operator-resources  nvidia-driver-daemonset-9pc2k                             1/1     Running   0          24m
gpu-operator-resources  nvidia-driver-validation                                   0/1     Completed  0          24m
lanner@lanner:~$
```

Validating the Installation

Example 1: nvidia-smi

```
# 原本指令
# kubectl run nvidia-smi --rm -t -i --restart=Never --image=nvidia/cuda --limits=nvidia.com/gpu=1 -- nvidia-smi
kubectl run nvidia-smi --rm -t -i --restart=Never --image=nvidia/cuda:11.0.3-base-ubuntu18.04 --limits=nvidia.com/gpu=1 -- nvidia-smi
```

output:

```
lanner@lanner:~$ kubectl run nvidia-smi --rm -t -i --restart=Never --image=nvidia/cuda:11.0.3-base-ubuntu18.04 --limits=nvidia.com/gpu=1 -- nvidia-smi
Wed Jul 21 03:25:01 2021
+-----+
| NVIDIA-SMI 440.64.00      Driver Version: 440.64.00      CUDA Version: 11.0      |
+-----+-----+
| GPU Name      Persistence-M| Bus-Id        Disp.A | Volatile Uncorr. ECC |
| Fan  Temp  Perf  Pwr:Usage/Cap|      Memory-Usage | GPU-Util  Compute M. |
|-----+-----+
| 0  Tesla T4           On   | 00000000:01:00:00 Off  |      0%      Default |
| N/A   35C    P8       9W / 70W |  6MiB / 15109MiB |           |         |
+-----+-----+
+-----+
| Processes:                               GPU Memory |
|  GPU       PID    Type    Process name                               Usage      |
|-----+-----+
| No running processes found               |
+-----+
pod "nvidia-smi" deleted
lanner@lanner:~$
```

Example 2: CUDA-Vector-Add

```
sudo nano cuda-samples.yaml
```

Add the below and save it as cuda-samples.yaml:

```
apiVersion: v1
kind: Pod
metadata:
  name: cuda-vector-add
spec:
  restartPolicy: OnFailure
  containers:
    - name: cuda-vector-add
      image: "k8s.gcr.io/cuda-vector-add:v0.1"
```

Run the below command to create a sample gpu pod:

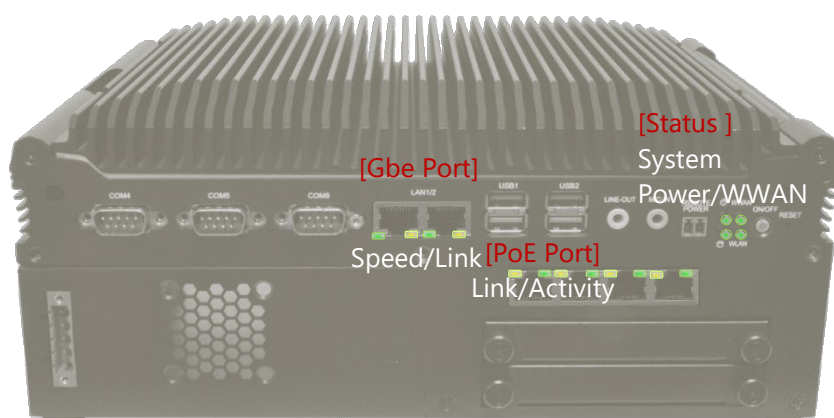
```
sudo kubectl apply -f cuda-samples.yaml
# Check if the cuda-samples pod was created:
kubectl get pods
```

Output:

```
lanner@lanner:~$ kubectl get pods
NAME                                                    READY   STATUS    RESTARTS   AGE
cuda-vector-add                                         0/1     Completed  0          26s
gpu-operator-1626833565-node-feature-discovery-master-c44bkjfdg  1/1     Running   0          32m
gpu-operator-1626833565-node-feature-discovery-worker-1lrdz     1/1     Running   0          32m
gpu-operator-74c97448d9-mw9wz                             1/1     Running   0          32m
```

APPENDIX A: LED INDICATOR EXPLANATIONS

The status explanations of LED indicators on the Front Panel are as follows:



Status LED

LED	COLOR	LED ACTION	DESCRIPTION
Power	Green	Steady	System ON
	OFF	N/A	System OFF
Storage	Green	Blinking	Data Access Successful
	OFF	N/A	No Data Access
WWAN (4G)	Programmable LED		
WLAN (Wi-Fi)	Programmable LED		

GbE Port LED

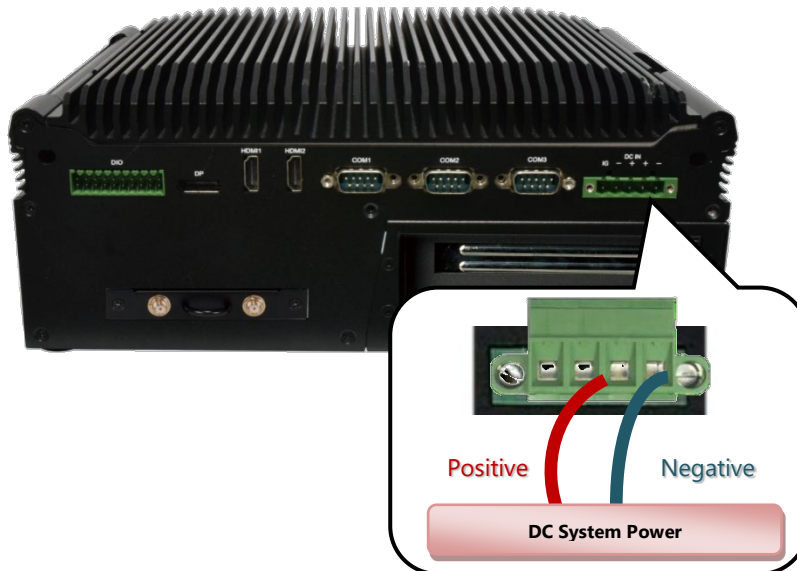
LED	COLOR	LED ACTION	DESCRIPTION
Link Activity	Amber	Blinking	Active
	Amber	Steady	Not Active
	OFF	N/A	No Link
Speed	Amber	Steady	1000Mbps Connection Successful
	Green	Steady	100Mbps Connection Successful
	OFF	N/A	10Mbps Connection Successful

PoE Port LED

LED	COLOR	LED ACTION	DESCRIPTION
Link Activity	Amber	Blinking	Active
	Amber	Steady	Not Active
	OFF	N/A	No Link
Speed	Green	Steady	100Mbps Connection Successful
	OFF	N/A	10Mbps Connection Successful

APPENDIX B: CONNECT TO DC POWER

1. Make sure your system is turned off.
2. Follow the wiring definition and illustration below to connect the power source to the system through the 4-pin terminal block connector as DC Input. Connect the two Power Wires to the Terminal Block (supplied along with the system) by respectively inserting the red wire to the Positive contact, the other wire to the Negative contact, and then secure them onto the terminal block.



3. Follow the wiring definition and illustration below to connect the power source to the PCIe card through the 4-pin terminal block connector as DC Input. Connect the two Power Wires to the Terminal Block (supplied along with the system) by respectively inserting the red wire to the Positive contact, the other wire to the Negative contact, and then secure them onto the terminal block.



APPENDIX C: TERMS AND CONDITIONS

Warranty Policy

1. All products are under warranty against defects in materials and workmanship for a period of one year from the date of purchase.
2. The buyer will bear the return freight charges for goods returned for repair within the warranty period; whereas the manufacturer will bear the after-service freight charges for goods returned to the user.
3. The buyer will pay for the repair (for replaced components plus service time) and transportation charges (both ways) for items after the expiration of the warranty period.
4. If the RMA Service Request Form does not meet the stated requirement as listed on "RMA Service," RMA goods will be returned at customer's expense.
5. The following conditions are excluded from this warranty:
 - ▶ Improper or inadequate maintenance by the customer
 - ▶ Unauthorized modification, misuse, or reversed engineering of the product
 - ▶ Operation outside of the environmental specifications for the product.

RMA Service

Requesting an RMA#

1. To obtain an RMA number, simply fill out and fax the "RMA Request Form" to your supplier.
2. The customer is required to fill out the problem code as listed. If your problem is not among the codes listed, please write the symptom description in the remarks box.
3. Ship the defective unit(s) on freight prepaid terms. Use the original packing materials when possible.
4. Mark the RMA# clearly on the box.

Note: Customer is responsible for shipping damage(s) resulting from inadequate/loose packing of the defective unit(s). All RMA# are valid for 30 days only; RMA goods received after the effective RMA# period will be rejected.

RMA Service Request Form

When requesting RMA service, please fill out the following form. Without this form enclosed, your RMA cannot be processed.

RMA No.:		Reasons to Return: ☐ Repair(Please include failure details)	
		☐ Testing Purpose	
Company:		Contact Person:	
Phone No.		Purchased Date:	
Fax No.:		Applied Date:	
Return Shipping Address: _____			
Shipping by: ☐ Air Freight ☐ Sea ☐ Express_____			
☐ Others:_____			
Item	Model Name	Serial Number	Configuration

Item	Problem Code	Failure Status

*Problem Code:

01:D.O.A.	07: BIOS Problem	13: SCSI	19: DIO
02: Second Time	08: Keyboard Controller Fail	14: LPT Port	20: Buzzer
R.M.A.	09: Cache RMA Problem	15: PS2	21: Shut Down
03: CMOS Data Lost	10: Memory Socket Bad	16: LAN	22: Panel Fail
04: FDC Fail	11: Hang Up Software	17: COM Port	23: CRT Fail
05: HDC Fail	12: Out Look Damage	18: Watchdog Timer	24: Others (Pls specify)
06: Bad Slot			

Request Party

Confirmed By Supplier

Authorized Signature / Date

Authorized Signature / Date