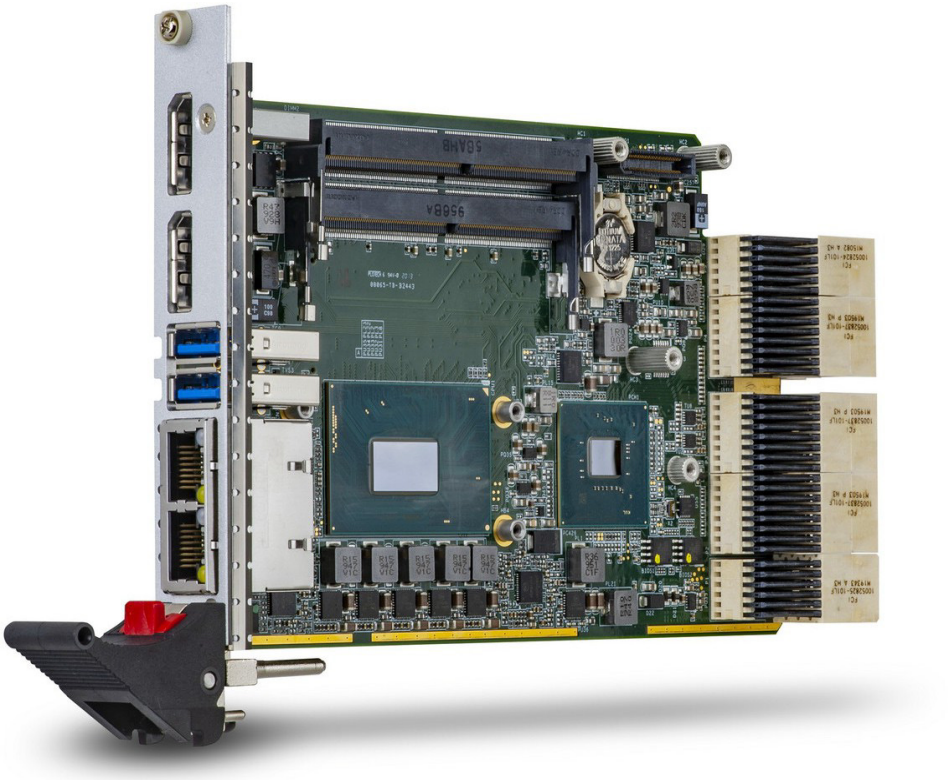
cPCI-A3525 Series

User's Manual

Performance 3U CompactPCI® Serial
9th Gen Intel® Core™/ Intel® Xeon® Processor Blade



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Leading **EDGE COMPUTING**

Revision History

Revision	Description	Date	By
1.0	Initial release	2023-08-08	JC
1.1	Note regarding Intel PCH and PCIe specifications added	2025-05-14	
1.2	Specifications updated	2025-10-28	AL

Preface

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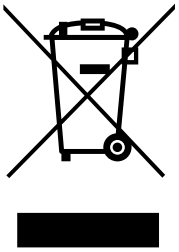
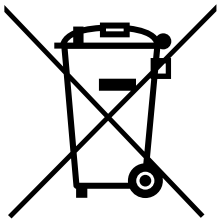


Battery Labels (for products with battery)



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WARNING: This product can expose you to chemicals including acrylamide, arsenic, benzene, cadmium, Tris(1,3-dichloro-2-propyl)phosphate (TDCPP), 1,4-Dioxane, formaldehyde, lead, DEHP, styrene, DINP, BBP, PVC, and vinyl materials, which are known to the State of California to cause cancer, and acrylamide, benzene, cadmium, lead, mercury, phthalates, toluene, DEHP, DIDP, DnHP, DBP, BBP, PVC, and vinyl materials, which are known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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Conventions

Take note of the following conventions used throughout this manual to make sure that users perform certain tasks and instructions properly.

NOTE:

Additional information, aids, and tips that help users perform tasks.

CAUTION:

Information to prevent ***minor*** physical injury, component damage, data loss, and/or program corruption when trying to complete a task.

WARNING:

Information to prevent ***serious*** physical injury, component damage, data loss, and/or program corruption when trying to complete a specific task.

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1 Introduction

1.1 Overview

CompactPCI® Serial (PICMG CPCI-S.0) is a new modular computer standard officially adopted by PICMG in 2011. The Compact-PCI Serial standard defines a completely new connector to support high-speed serial interfaces including PCI Express, SATA, USB and Ethernet. A CompactPCI Serial backplane has six high-speed connectors P1 to P6 on the system slot but only P1 is mandatory on peripheral slots, P2 to P6 being optional. A CompactPCI Serial system can comprise a total of nine blades (one system blade and eight peripheral I/O blades) through an Ethernet full mesh or single star architecture. The CompactPCI® Serial standard is the next-generation of the CompactPCI® specification and provides more flexibility and higher speed and bandwidth in modular system solutions.

The ADLINK cPCI-A3525 Series is a 3U CompactPCI Serial compatible processor blade with SO-DIMM DDR4-2666 ECC memory up to 64GB. The ADLINK cPCI-A3525 features a 8th/9th generation Intel® Core™ processor with Mobile Intel® CM246 PCH Chipset.

The cPCI-A3525 Series is a 3U CompactPCI Serial blade available in single-slot (4HP) form factors with optional daughter boards to provide extra storage and with 2 extra GbE port through P6 to the rear backplane. Faceplate I/O on the single slot (4HP) includes 1x DP, 2x GbE and 2x USB 3.0 ports (these I/O are common to all versions). Serial interfaces on the backplane connectors P1 to P5 include two PCI Express x8, one PCI Express x2, two PCI Express x4, three PCI Express x1, seven SATA 6Gb/s, two USB 3.0, and eight USB 2.0 ports. Additionally, the P6 connector supports two Gigabit Ethernet interfaces.

The cPCI-A3525 is a high-performance solution for transportation, factory automation, defense and other industrial applications that require superior data transfer capability and advanced computing power. The ADLINK cPCI-A3525 provides high manageability, supports Satellite mode operation as a standalone blade in peripheral slots, and Smart Embedded Management Agent (SEMA) for system health monitoring. In addition, with multiple operating system and board support package (BSP) support, users can build a reliable and high-performance industrial system with cPCI-A3525 Series.

1.2 Features

- 3U CompactPCI Serial (PICMG CPCI-S.0) processor blade in 4HP width form factor
- 9th generation Intel® Core™ Processor
- Graphics engine integrated in processor supporting independent displays with DirectX 12, OpenGL 4.5
- Dual channel DDR4-2666 SO-DIMM memory with ECC, up to 32GB
- Backplane communication by PCI Express, USB 2.0/3.0, SATA, and Gigabit Ethernet
- Supports Satellite mode operation as a standalone blade in peripheral slots
- Supports SEMA for system health monitoring
- Storage: onboard SATA SSD

1.3 Model Number Decoder

cPCI-	EX	A3525	KR	/9850HL	/M16
	(A)		(B)	(C)	(D)

(A) Operating Temperature Code

- ▷ **Blank** = -20°C to +70°C
- ▷ **EX**= -40°C to +85°C (for CPUs with TDP below 37W only)

(B) Configuration Code

- ▷ **Blank** = Single slot width, 1x DP, 2x GbE, 2x USB 3.0
- ▷ **Other** = ODM/OEM project code

(C) CPU Code

- ▷ **2276ML** = Quad-core Intel® Xeon® 2276ML processor
- ▷ **9850HL** = Quad-core Intel® Core™ i7-9850HL processor

(D) Memory Size Code

- ▷ **M16** = 2x 8GB DDR4-2666 SO-DIMM SDRAM
- ▷ **M32** = 2x 16GB DDR4-2666 SO-DIMMSDRAM

(E) Storage Configuration Code

- ▷ **Blank** = Default without P6 daughter board
- ▷ **S128** = Onboard soldered 128GB SSD with Dual GbE Port to P6 on daughter board
- ▷ **S32** = Onboard soldered 32GB SSD with Dual GbE Port to P6 on daughter board

1.4 Package Contents

The cPCI-A3525 is packaged with the following components. If any of the following items are missing or damaged, retain the shipping carton and packing material and contact the dealer for inspection. Please obtain authorization before returning any product to ADLINK. The packing contents of cPCI-A3525 Series non-standard configurations will vary depending on customer requests.

1.4.1 Processor Blade

- The cPCI-A3525 Series Processor Blade
  - CPU and memory specifications will differ depending on options selected
  - Thermal module is assembled on the board

The contents of non-standard cPCI-A3525 configurations may vary depending on the customer's requirements.

1.5 Optional Accessories

- DisplayPort to DVI adapter cable (P/N 30-01120-0000)
- DisplayPort to VGA adapter cable (P/N 30-01121-0000)
- DisplayPort to HDMI adapter cable (P/N 30-01119-0000)

This product must be protected from static discharge and physical shock. Never remove any of the components except at a static-free workstation. Use the anti-static bag shipped with the product when putting the board on a surface. Wear an anti-static wrist strap properly grounded on one of the system's ESD ground jacks when installing or servicing system components.

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2 Specifications

2.1 Product Specifications

2.1.1 cPCI-A3525 Processor Blade Specifications

CompactPCI S.0 Standards	• PICMG 2.0 CPCI-S.0 CompactPCI® Serial R1.0
Mechanical	• Standard 3U CompactPCI • Board size: 100mm x 160mm • Single slot (4HP, 20.32mm) • CompactPCI Serial P1 to P6 connectors (P6 on DB-P620 daughter board)
Processor	• Intel® Xeon® 2276ML Processor 2.0 to 4.2 GHz, 12M Cache, 25W by TDP • Intel® Core™ i7-9850HE Processor 2.7 to 4.1 GHz, 9M Cache, 45W by TDP • Intel® Core™ i7-9850HL Processor 1.9 to 4.1 GHz, 9M Cache, 25W by TDP • Passive heatsink
Chipset	• Mobile Intel® CM246 Chipset
Memory	• Dual channel DDR4-2666 ECC SO-DIMM memory (Xeon® E-2276M) • Dual channel DDR4-2666 SO-DIMM memory (Core™ i7-9850HL)
BIOS	• Dual AMI EFI BIOS, 128Mbit SPI flash memory
CompactPCI Bus	• Support through CompactPCI bridge (cPCI-A3525B only[1]) • PCI 32-bit, 33/66MHz; 3.3V, 5V universal V(IO)
Gigabit Ethernet	• One PCIe x1 Intel® I219 GbE PHY and one PCIe x1 Intel® I210 Gigabit Ethernet controllers • Two egress 10/100/1000BASE-T ports on faceplate • Dual Gigabit Ethernet interfaces via P6 connector to backplane
Graphics	• Integrated in Intel® processor • DisplayPort outputs on faceplate with resolution up to 4096x2304 @60Hz
USB	• Dual USB 3.0 ports on faceplate • 2x USB 3.0 to P1/P3 • 8x USB 2.0 to P1/P2/P3
PCI Express	• 2x PCIe 3.0 x8 to P1/P2 • 1x PCIe 2.0 x2 to P4 • 2x PCIe 2.0 x4 to P5
TPM	TPM 2.0 SLB 9665XT2.0 (upon request)
Storage Interfaces	• Optional onboard up to 128GB SSD on daughter board 7x SATA 6Gb/s to P3
Faceplate I/O	• 2x USB 3.0/2.0 ports • 2x 10/100/1000BASE-T Ethernet ports 2x DisplayPort
OS Compatibility	Microsoft Windows 10 64-bit

Environmental	• Operating Temperature (with forced air flow)[2]:
	  • Standard: 0°C to 60°C
	  • Extreme temperature: -20°C to 70°C (screened, by Intel cTDP and forced air flow)
	• Storage Temperature: -40°C to 100°C
	• Humidity: 95% @60°C non-condensing
	• Shock: 20G peak-to-peak, 11ms duration, operating
	Vibration: 2Grms random vibration, 5-500Hz, each axis, operating

EMI	• CE EN55022 • FCC Class A

1. The cPCI-A3525B supporting CompactPCI bus requires a PICMG CPCI-S.0 backplane with system slot on the left and a PICMG 2.0 backplane with system slot on the right. Please contact your ADLINK representative for detailed information on compatible backplanes.
2. ADLINK-certified thermal design. The thermal performance is dependent on the chassis cooling design. Sufficient forced air-flow is required. Temperature limits of optional mass storage devices may also affect the thermal specification.
3. Due to Intel PCH specification limitations, the maximum number of PCIe Root Ports (or devices) that can be enabled at the same time is 16. The PCIe from PCH, peripheral slot 3 of the backplane, is affected when CPU slot is named as slot 0, while the PCIe from CPU, peripheral slots 1 and 2 are not affected.

2.2 I/O Connectivity Table

Function	cPCI-A3525 (4HP)	
	Faceplate	Onboard
GbE	2 (RJ-45)	—
USB	2 (3.0)	—
Display	2 (DP)	—
Onboard SSD	—	1

2.3 Power Requirements

In order to guarantee a stable functionality of the system, it is recommended to provide more power than the system requires. **An industrial power supply unit should be able to provide at least twice as much power as the entire system requires of each voltage**. An ATX power supply unit should be able to provide at least three times as much power as the entire system requires of each voltage.

2.3.1 Power Consumption

This section provides information on the power consumption of cPCI-A3525 Series when using Intel® Core™ i7 processors with 16GB DDR4-2666 SO-DIMM memory and 2.5" SATA 256GB SATA SSD. The cPCI-A3525 is powered by +12V only.

Intel® Core™i7-9850HE		
OS/Mode	**Current @12V**	**Total Power**
	EIST Disabled / Enabled	
Windows 10 x64 Idle Mode[1]	0.99A / 1.13A	11.88W / 13.5W
Windows 10 x64 Typical Mode[2]	3.65A / 4.82A	43.8W / 57.84W
Windows 10 x64 Maximum Mode[3]	4.08A / 4.94A	48.96W / 59.22W

Intel® Core™i7-9850HL		
OS/Mode	**Current @12V**	**Total Power**
	EIST Disabled / Enabled	
Windows 10 x64 Idle Mode[1]	0.70A / 0.79A	8.40W / 9.48W
Windows 10 x64 Typical Mode[2]	3.43A / 3.63A	41.16W / 43.56W
Windows 10 x64 Maximum Mode[3]	3.58A / 3.76A	42.96W / 45.12W

1. The system set to idle mode and stays idle for 10 minutes.
2. Run BurnInTest™ that includes CPU, memory, video and 2D/3D graphics. Set all test items to 100% loading and run for 10 minutes.
3. Run Intel® Thermal Analysis Tool that includes CPU, graphics and memory. Set all test items to 100% loading and run for 10 minutes.

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3 Block Diagram

3.1.1 cPCI-A3525 Processor Blade

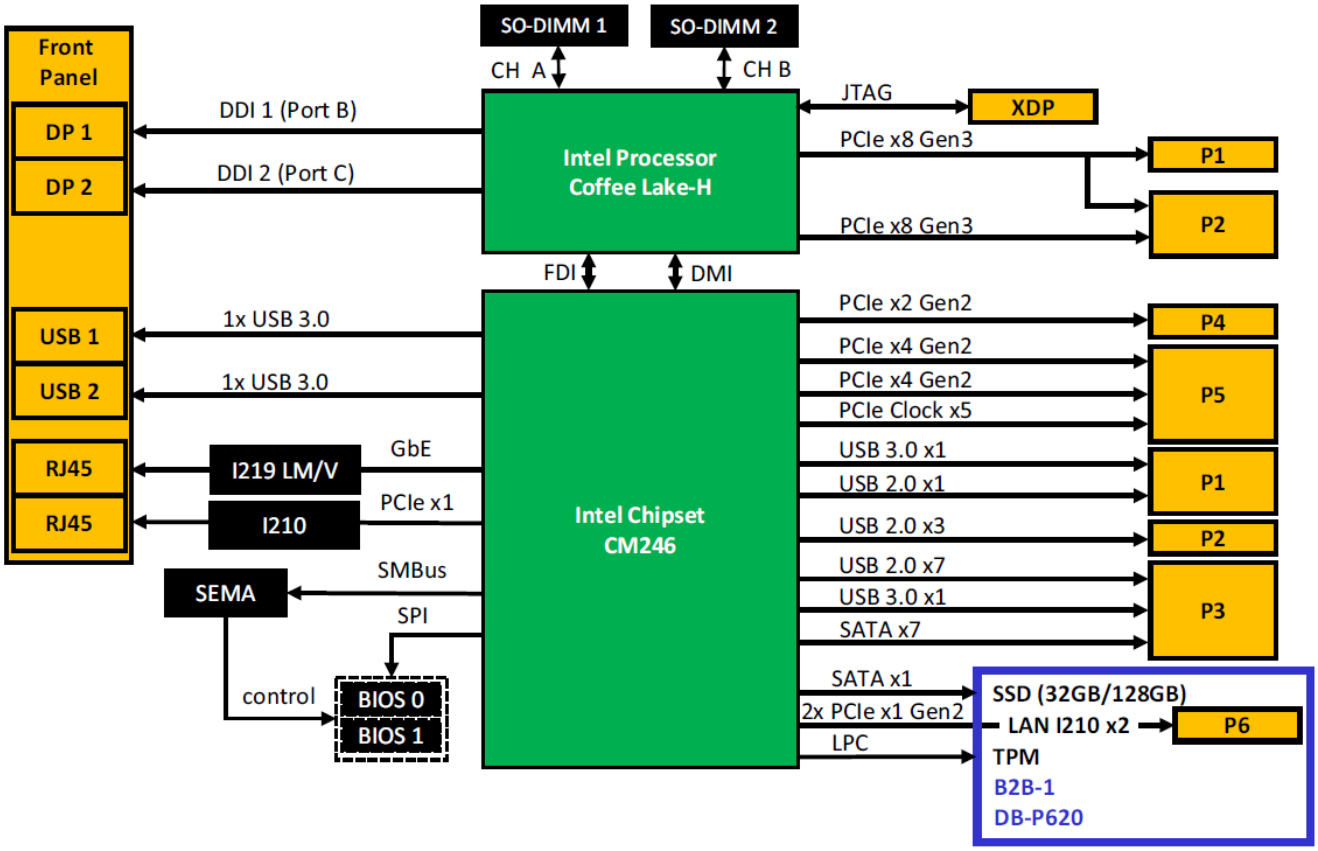

Figure 1: Functional block diagram

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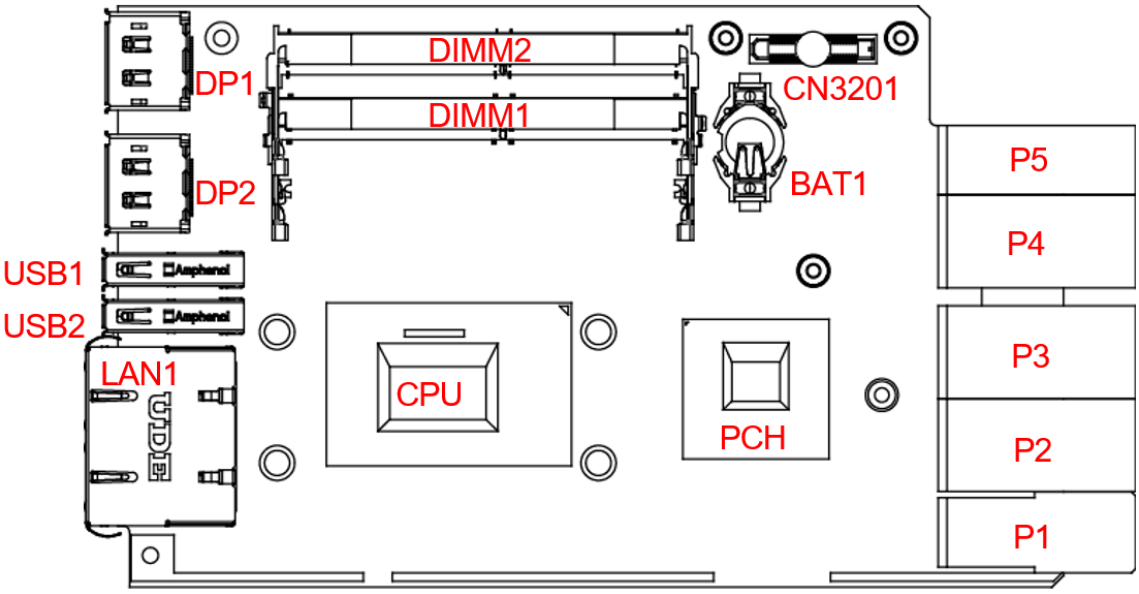
4 Board Interfaces

4.1 Connector and Switch Locations

This chapter illustrates the board layouts, connector pin assignments, and jumper settings.

4.1.1 cPCI-A3525 Series Board Layout

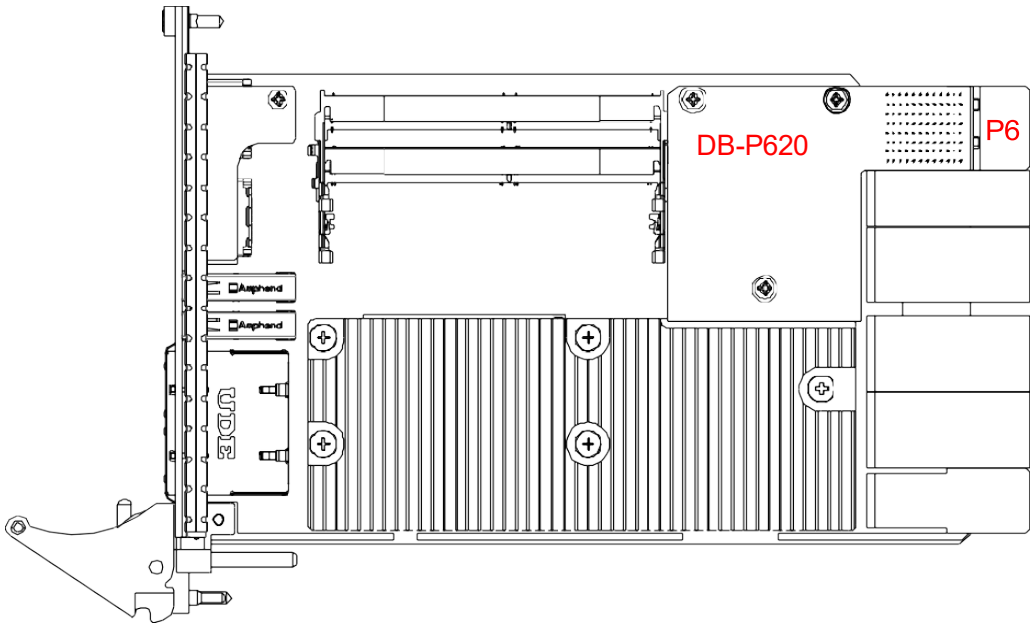


CPU	Intel® Core™ Processor	**P1-P5**	CompactPCI Serial P1 to P5 connectors
PCH	Intel® CM246 Chipset	**CN3201**	Storage/Ethernet daughter board connector
BAT1	CMOS battery	**DP1/2**	DisplayPort connector
USB1/2	USB connectors	**LAN1**	Dual Ethernet connectors
DIMM1/2	DDR4 SO-DIMM Sockets		

Figure 2: cPCI-A3525 series board layout (component side)

4.1.2 cPCI-A3525 Blade Assembly Layout

This section describes the final assembly layout of the single slot cPCI-A3525 blade.



DB-P620	Daughter board	**P6**	CompactPCI Serial P6 connector

Figure 3: cPCI-A3525 series faceplate

4.1.3 cPCI-A3525 Faceplate Layout

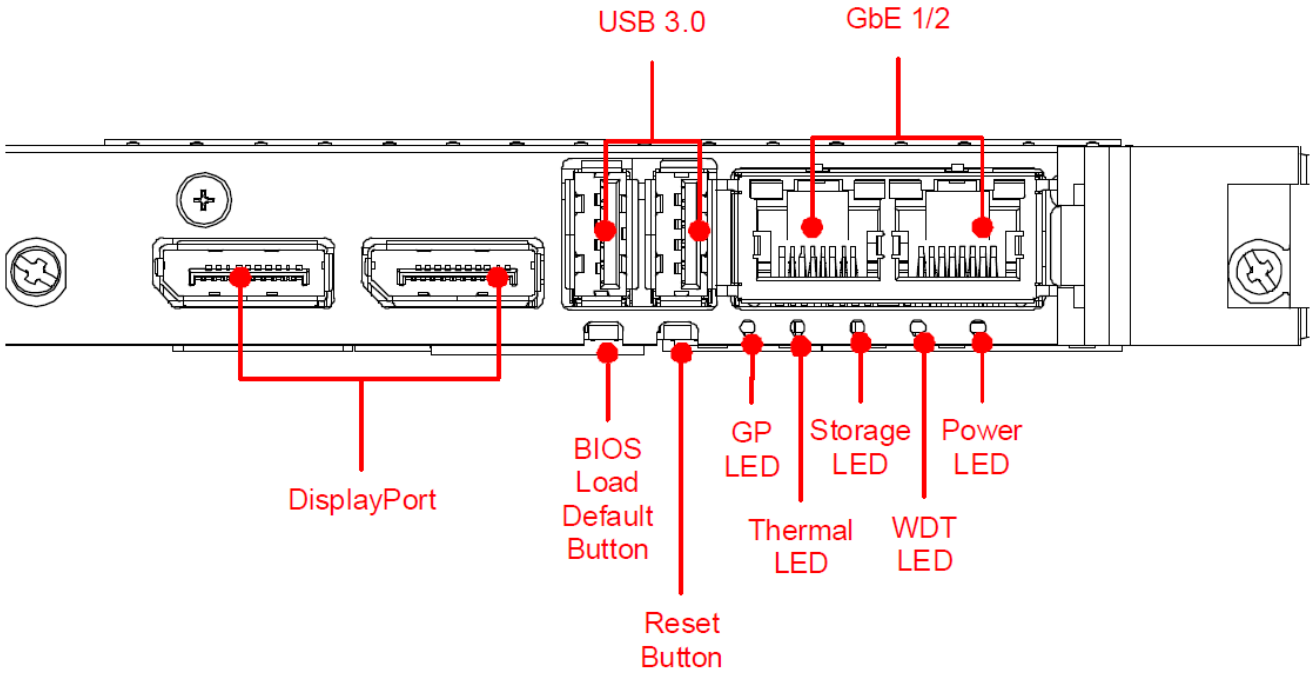


Figure 4: cPCI-A3525 faceplate layout

System LED Status

Table 1: System LED status

LED	Color	Condition	Indication
Power	Green/ Red	Off	System is off
		Red	System POST OK
		Green	Power OK
WDT	Amber	Off	No Watchdog event
		Blinking	Watchdog event alert
Drive	Blue	Off	No SSD/mSATA/SATA drive activity
		Blinking	Data read/write in process for SSD/ mSATA/SATA drive
Overheat	Red	Off	CPU temperature is under 95ºC
		Blinking	CPU temperature exceeds 95ºC
GP (General Purpose)	Yellow	Off	No activity
		On/Blinking	Defined by user

NOTE:

The GP LED is connected to the GPIO pins of the BMC. The GP LED can be programmed by the user as a general-purpose LED.

4.1.4 cPCI-A3525 Rear Signal Distribution

Table 2: Rear signal distribution

BP Slot	1 (System)	2	3	4	5	6	7	8	9
PCIe	1278	1 (x8)	2 (x8)	3(x2)	-	-	-	7 (x4)	8 (x4)
USB2	12345678	1	2	3	4	5	6	7	8
USB3	12	1	2			-	-	-	-
SATA	2345678	-	2	3	4	5	6	7	8
LAN	12	1*	2*	-	-	-	-	-	-
GA	-	7	6	5	4	3	2	1	0

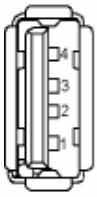
NOTE:

*Supported by DB-P620 daughter board.

4.2 Connector Pin Assignments

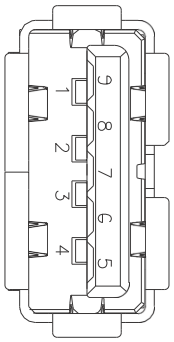
4.2.1 USB 2.0 Connectors

Pin #	Signal Name
1	Vcc
2	UV0-
3	UV0+
4	GND



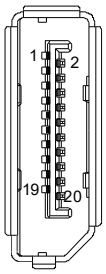
4.2.2 USB 3.0 Connectors

Pin #	Signal Name
1	USB3.0_P5VA
2	USB2_CMAN
3	USB2_CMAP
4	GND
5	USB3A_CMRXN
6	USB3A_CMRXP
7	GND
8	USB3A_CMTXN
9	USB3A_CMTXP



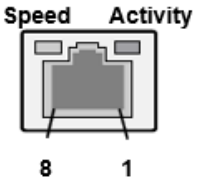
4.2.1 DisplayPort Connectors

Pin #	Signal	Pin #	Signal
1	CN_DP0_P	2	Ground
3	CN_DP0_N	4	CN_DP1_P
5	Ground	6	CN_DP1_N
7	CN_DP2_P	8	Ground
9	CN_DP2_N	10	CN_DP3_P
11	Ground	12	CN_DP3_N
13	CN_CAD-L	14	CN_CEC
15	CN_AUX_P	16	Ground
17	CN_AUX_N	18	DDP_HPD
19	Ground	20	P3V3



4.2.2 RJ-45 Gigabit Ethernet Connectors

Pin #	10BASE-T/ 100BASE-TX	1000BASE-T
1	TX+	LAN_TX0+
2	TX-	LAN_TX0-
3	RX+	LAN_TX1+
4	—	LAN_TX2+
5	—	LAN_TX2-
6	RX-	LAN_TX1-
7	—	LAN_TX3+
8	—	LAN_TX3-



Status		Speed LED (Green/Orange)	Activity LED (Yellow)
Network link is not established or system powered off		OFF	OFF
10 Mbps	Link	OFF	ON
	Active	OFF	Blinking
100 Mbps	Link	Green	ON
	Active	Green	Blinking
1000 Mbps	Link	Orange	ON
	Active	Orange	Blinking

4.3 CompactPCI Serial Connector P1

	A	B	C	D	E	F	G	H	I	J	K	L
6	GND	PEG_ TX2_ P	PEG_ TX2_ N	GND	PEG_ RX2_ P	PEG_ RX2_ N	GND	PEG_ TX3_ P	PEG_ TX3_ N	GND	PEG_ RX3_ P	PEG_ RX3_ N
5	PEG_ TX0_ P	PEG_ TX0_ N	GND	PEG_ RX0_ P	PEG_ RX0_ N	GND	PEG_ TX1_ P	PEG_ TX1_ N	GND	PEG_ RX1_ P	PEG_ RX1_ N	GND
4	GND	USB2 _1P	USB2 _1N	GND	NC	NC	GND	NC	NC	GND	NC	NC
3	USB3 _T4P	USB3 _T4N	GA0	USB3 _R4P	USB3 _R4N	GA1	NC	NC	GA2	NC	NC	GA3
2	GND	BP_I2 C_CL K	BP_I2 C_DA T	GND	PS_O N#	RST#	GND	PRST #	WAKE _IN_O UT#	GND	NC	SYSE N#
1	P12V _CON N	P5VS B	GND	P12V _CON N	P12V _CON N	GND	P12V _CON N	P12V _CON N	GND	P12V _CON N	P12V _CON N	GND

4.4 CompactPCI Serial Connector P2

	A	B	C	D	E	F	G	H	I	J	K	L
8	GND	NC	NC	GND	USB2_2P	USB2_2N	GND	USB2_3P	USB2_3N	NC	USB2_4P	USB2_4N
7	NC	NC	GND	NC	NC	GND	NC	NC	GND	NC	NC	GND
6	GND	PEG_TX14_P	PEG_TX14_N	GND	PEG_RX14_P	PEG_RX14_N	GND	PEG_TX15_P	PEG_TX15_N	GND	PEG_RX15_P	PEG_RX15_N
5	PEG_TX12_P	PEG_TX12_N	GND	PEG_RX12_P	PEG_RX12_N	GND	PEG_TX13_P	PEG_TX13_N	GND	PEG_RX13_P	PEG_RX13_N	GND
4	GND	PEG_TX10_P	PEG_TX10_N	GND	PEG_RX10_P	PEG_RX10_N	GND	PEG_TX11_P	PEG_TX11_N	GND	PEG_RX11_P	PEG_RX11_N
3	PEG_TX8_P	PEG_TX8_N	GND	PEG_RX8_P	PEG_RX8_N	GND	PEG_TX9_P	PEG_TX9_N	GND	PEG_RX9_P	PEG_RX9_N	GND
2	GND	PEG_TX6_P	PEG_TX6_N	GND	PEG_RX6_P	PEG_RX6_N	GND	PEG_TX7_P	PEG_TX7_N	GND	PEG_RX7_P	PEG_RX7_N
1	PEG_TX4_P	PEG_TX4_N	GND	PEG_RX4_P	PEG_RX4_N	GND	PEG_TX5_P	PEG_TX5_N	GND	PEG_RX5_P	PEG_RX5_N	GND

4.5 CompactPCI Serial Connector P3

	A	B	C	D	E	F	G	H	I	J	K	L
8	GND	SATA_7TP	SATA_7TN	GND	SATA_7RP	SATA_7RN	GND	SATA_8TP	SATA_8TN	GND	SATA_8RP	SATA_8RN
7	SATA_5TP	SATA_5TN	GND	SATA_5RP	SATA_5RN	GND	SATA_6TP	SATA_6TN	GND	SATA_6RP	SATA_6RN	GND
6	GND	SATA_3TP	SATA_3TN	GND	SATA_3RP	SATA_3RN	GND	SATA_4TP	SATA_4TN	GND	SATA_4RP	SATA_4RN
5	NC	NC	GND	NC	NC	GND	SATA_2TP	SATA_2TN	GND	SATA_2RP	SATA_2RN	GND
4	GND	NC	NC	GND	NC	NC	GND	NC	NC	GND	NC	NC
3	NC	NC	GND	NC	NC	GND	NC	NC	GND	NC	NC	GND
2	GND	USB 3_2TP	USB 3_2TN	GND	USB 3_2RP	USB 3_2RN	GND	NC	NC	GND	NC	NC
1	USB2_5P	USB2_5N	GND	USB2_6P	USB2_6N	GND	USB2_7P	USB2_7N	GND	USB2_8P	USB2_8N	GND

4.6 CompactPCI Serial Connector P4

	A	B	C	D	E	F	G	H	I	J	K	L
8	GND	NC	NC	GND	NC	NC	GND	NC	NC	GND	NC	NC
7	NC	NC	GND	NC	NC	GND	NC	NC	GND	NC	NC	GND
6	GND	NC	NC	GND	NC	NC	GND	NC	NC	GND	NC	NC
5	NC	NC	GND	NC	NC	GND	NC	NC	GND	NC	NC	GND
4	GND	NC	NC	GND	NC	NC	GND	NC	NC	GND	NC	NC
3	NC	NC	GND	NC	NC	GND	NC	NC	GND	NC	NC	GND
2	GND	NC	NC	GND	NC	NC	GND	NC	NC	GND	NC	NC
1	PCIE_3TP0	PCIE_3TN0	GND	PCIE_3RP0	PCIE_3RN0	GND	PCIE_3TP1	PCIE_3TN1	GND	PCIE_3RP1	PCIE_3RN1	GND

4.7 CompactPCI Serial Connector P5

	A	B	C	D	E	F	G	H	I	J	K	L
6	NC	NC	NC	NC	NC	NC	CLK7_ REQ-L	CLK7 _P	CLK7_ N	CLK8_ REQ-L	CLK8 _P	CLK8 _N
5	CLK1_ P	CLK1_ N	CLK1_ REQ-L	CLK2_ P	CLK2_ N	CLK2_ REQ-L	CLK3_ P	CLK3 _N	CLK3_ REQ-L	NC	NC	NC
4	GND	PCIE_ 8TP2	PCIE_ 8TN2	GND	PCIE_ 8RP2	PCIE_ 8RN2	GN D	PCIE_ 8TP3	PCIE_ 8TN3	GND	PCIE_ 8RP3	PCIE_ 8RN3
3	PCIE_ 8TP0	PCIE_ 8TN0	GND	PCIE_ 8RP0	PCIE_ 8RN0	GND	PCIE_ 8TP1	PCIE_ 8TN1	GND	PCIE_ 8RP1	PCIE_ 8RN1	GND
2	GND	PCIE_ 7TP2	PCIE_ 7TN2	GND	PCIE_ 7RP2	PCIE_ 7RN2	GN D	PCIE_ 7TP3	PCIE_ 7TN3	GND	PCIE_ 7RP3	PCIE_ 7RN3
1	PCIE_ 7TP0	PCIE_ 7TN0	GND	PCIE_ 7RP0	PCIE_ 7RN0	GND	PCIE_ 7TP1	PCIE_ 7TN1	GND	PCIE_ 7RP1	PCIE_ 7RN1	GND

4.8 CompactPCI Serial Connector P6

	A	B	C	D	E	F	G	H	I	J	K	L
8	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
7	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
6	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
5	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
4	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
3	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
2	GND	LAN1 _MDI P0	LAN1 _MDI N0	GND	LAN1 _MDI P1	LAN1 _MDI N1	GND	LAN1 _MDI P2	LAN1 _MDI N2	GND	LAN1 _MDI P3	LAN1 _MDI N3
1	LAN0 _MD I P0	LAN0 _MDI N0	GND	LAN0 _MDI P1	LAN0 _MDI N1	GND	LAN0 _MDI P2	LAN0 _MDI N2	GND	LAN0 _MDI P3	LAN0 _MDI N3	GND

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5 Getting Started

This chapter describes the following installation procedures for the cPCI-A3525 and rear transition module:

- CPU and Heatsink
- Processor blade installation to chassis

5.1 CPU and Heatsink

The cPCI-A3525 Series come with CPU and heatsink pre-installed. Removal of heatsink/CPU by users is not recommended. Please contact your ADLINK service representative for assistance.

5.2 Installing the cPCI-A3525 to the Chassis

The cPCI-A3525 may be installed in a system or peripheral slot of a 3U CompactPCI chassis. These instructions are for reference only. Refer to the user guide that comes with the chassis for more information.

1. Be sure to select the correct slot depending on the operational purpose of the module. The system power may now be powered on or off.
2. Remove the blank face cover from the selected slot, if necessary.
3. Press down on the release catches of the cPCI-A3525 ejector handles.
4. **Remove the black plastic caps securing the mounting screws to the faceplate.**
5. Align the module's top and bottom edges to the chassis card guides, and then carefully slide the module into the chassis. A slight resistance may be felt when inserting the module. If the resistance it too strong, check if there are bent pins on the backplane or if the board's connector pins are not properly aligned with connectors on the backplane. Then push the board until it is completely flush with the chassis.
6. Push the ejector handles outwards to secure the module in place, and then fasten the screws on the module face-plate.
7. Connect the cables and peripherals to the board, and then turn the chassis on if necessary.

The cPCI-A3525B supporting CompactPCI bus requires a PICMG CPCI-S.0 backplane with system slot on the left and a PICMG 2.0 backplane with system slot on the right. Please contact your ADLINK representative for detailed information on compatible backplanes.

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6 Driver Installation

The cPCI-A3525 drivers are available from the ADLINK website (https://www.adlinktech.com/Products/CompactPCI/ 3UCompactPCISerialBlades/cPCI-A3525_Series). ADLINK provides validated drivers for Windows 10 64-bit. We recommend using these drivers to ensure compatibility.

6.1 cPCI-A3525 Drivers

The following describes the cPCI-A3525 driver installation procedures for Windows 10 64-bit. Install the Windows operating system before installing any driver. Most standard I/O device drivers are installed during Windows installation.

1. Install the **chipset driver** by extracting and running the program in **...\chipset-10.1.17541.8066-public-mup.zip**.
2. Install the **graphics driver** and utilities by extracting and running the program in **...\Intel graphics driver 15.65.5037_ x64.zip**.
3. Install the **Management Engine (ME) driver** and utilities by extracting and running the program in **...\Intel(r) csme_ corporate_12.0.3.1091.zip**.
4. Install the **Serial IO driver** by extracting and running the program in **…\intel(r)_serialio_30.100.1727.1**.

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7 Utilities

7.1 SEMA

Hardware monitoring and Watchdog Timer functionality are provided by ADLINK's Smart Embedded Management Agent (SEMA), which operates via a Board Management Controller and communicates with the CPU through the SMBus. A graphical user interface program and command line interface are available to allow you to communicate with SEMA. Please refer to the SEMA user's manuals, available for download from the SEMA product page:
https://www.adlinktech.com/Products/DownloadMDownload?lang=en&pdNo=1274&MainCategory=Industrial_IoT_and_Cloud_solutions&kind=M

The cPCI-A3525 does NOT support the following SEMA functions:

- Save data in write-protectable flash ROM
- LVDS backlight control
- Smart Fan control and fan speed
- Display "Boot Reason" in the SEMA GUI System Health tab after resuming from S4

7.2 Preboot Execution Environment (PXE)

The cPCI-A3525 Series supports the Intel® Preboot Execution Environment (PXE) that is capable of booting up or executing an OS installation through an Ethernet port. To use PXE, there must be a DHCP server on the network with one or more servers running PXE and MTFTP services. It could be a Windows® 2003 server running DHCP, PXE, and MTFTP services or a dedicated DHCP server with one or more additional servers running PXE and MTFTP services.

To build a network environment with PXE support:

1. Setup a DHCP server with PXE tag configuration
2. Install the PXE and MTFTP services
3. Make a boot image file on the PXE server (i.e., the boot server)
4. Enable the PXE boot function on the client computer

7.3 Watchdog Timer

The watchdog timer on the cPCI-A3525 can be implemented in the following ways:

- Embedded Application Programming Interface (EAPI) library functions
- SEMA library functions

Please refer to the SEMA Software Manual for detailed information:
https://www.adlinktech.com/products/industrial_iot_and_cloud_solutions/sema_smart_embedded_management_agent/sema?lang=en

7.3.1 EAPI Library Sample Code

Make sure you have installed the SEMA driver and application. When installing, please check the "Install EAPI" option.

Include the relevant header files

```
#ifndef _WIN32
#include "linux/EApiOs.h"
#else /* _WIN32 */
#include "winnt/EApiOs.h"
#endif /* _WIN32 */
#include "EApi.h"
```

Initialize the EAPI

```
EApiLibInitialize();
```

Call the EAPI function

```
uint32_t status=EApiWDogStart(Delay,EventTimeout, ResetTimeout);
```

Example:

```
#ifndef _WIN32
   #include "linux/EApiOs.h"
#else /* _WIN32 */
  #include "winnt/EApiOs.h"
#endif /* _WIN32 */
   #include "EApi.h"
   void main(void)
  {
      // Initialize the library EApiLibInitialize();

      // Delay in milliseconds uint32_tDelay = 100;
      // Event Timeout in milliseconds uint32_tEventTimeout = 100;
      // Reset Timeout in milliseconds uint32_tResetTimeout = 100;

      // Start Watchdog
      uint32_tstatus = EApiWDogStart( Delay, EventTimeout, ResetTimeout );

      // Release resource EApiLibUnInitialize();
```

For detailed information on the PICMG EAPI Library, please refer to the **PICMG EAPI - Embedded Application Programming Interface specification**.

7.4 General Purpose LED Control

The cPCI-A3525 has a General-Purpose LED that is user programmable. Make sure you have installed the SEMA driver and the cPCI-A3525 SDK library, downloadable from the cPCI-A3525 product page.

Download and extract the contents of the archive **cPCI-A3525_SDK.zip**.

Windows:

1. Copy the file libA3525.dll to the /Windows/System32 folder,
   e.g.: copy lib\Windows32\libA3525.dll Windows\System32
2. Create a temporary folder and copy the tool cPCI-A3525.exe into this folder,
   e.g.: mkdir temp
   copy tool\Windows32\cPCI_A3525.exe temp

Linux:

1. Copy the library to /usr/local/lib
   # cp /lib/Linux32/libA3525.so.2.6 /usr/local/lib/
2. Copy the tool cPCI-A3525 to /usr/local/bin
   # cp /tool/Linux32/cPCI-A3525 /usr/local/bin
3. Add setting
   # echo /usr/local/lib/ > /etc/ld.so.conf.d/libA3525.conf # ldconfig

7.4.1 cPCI-A3525 LED Tool

The cPCI-A3525 tool can control the general-purpose LED. The commands are as follows:

Windows:

- Turn on LED: > cPCI-A3525.exe 1
- Turn off LED: > cPCI-A3525.exe 0
- Blink LED: > cPCI-A3525.exe 2

Linux:

- Turn on LED: # cPCI-A3525 1
- Turn off LED: # cPCI-A3525 0
- Blink LED: # cPCI-A3525 2

7.4.2 SemaApi_SetLED Command

Include the relevant header files

```
#include "sema_api.h"
```

Initialize the API library

```
SemaApi_Init();
```

Call the LED function

```
SemaApi_SetLED(Mode);
```

The available "Mode" parameters of SemaApi_SetLED are as follows:

- 0: off
- 1: on
- 2: blinking

Sample Code

```
#include "sema_api.h"

#define LED_OFF 0
#define LED_ON 1
#define LED_BLINKING 2

void main(void)
{
   // Initialize the library SemaApi_Init();

   // Turn on LED SemaApi_SetLED( LED_ON );

   // Turn off LED SemaApi_SetLED( LED_OFF );
   // Blink LED
   SemaApi_SetLED( LED_BLINKING );

   // Release resource SemaApi_Close();
}
```

8 BIOS Settings

The following chapter describes basic navigation for the AMI EFI BIOS setup utility.

8.1 Starting the BIOS

To enter the setup screen, follow these steps:

1. Power on the motherboard
2. Press the < Delete > key on your keyboard when you see the following text prompt:
   < Press DEL to run Setup >
3. After you press the < Delete > key, the main BIOS setup menu displays. You can access the other setup screens from the main BIOS setup menu.

NOTE:

In most cases, the < Delete > key is used to invoke the setup screen. There are several cases that use other keys, such as < F1 >, < F2 >, and so on.

8.1.1 Setup Menu

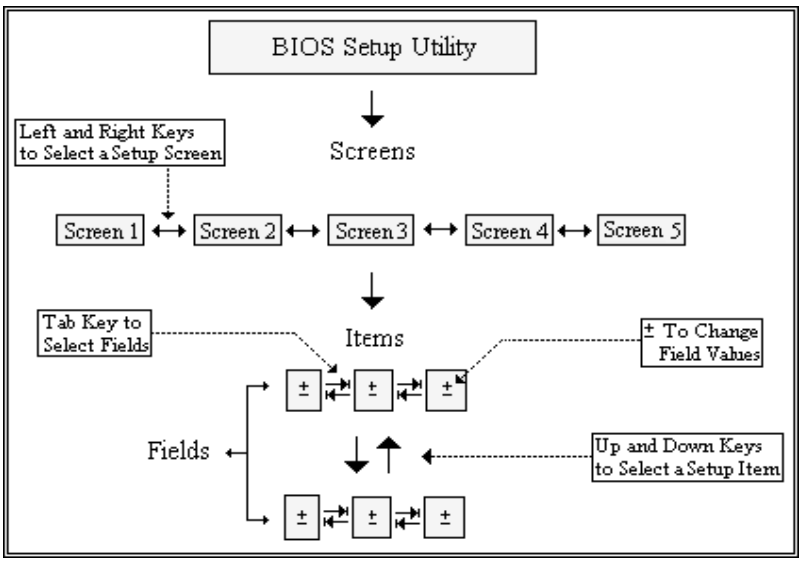
The main BIOS setup menu is the first screen that you can navigate. Each main BIOS setup menu option is described in this user's guide.

The Main BIOS setup menu screen has two main frames. The left frame displays all the options that can be configured. "Grayed" options cannot be configured, "Blue" options can be.

The right frame displays the key legend. Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

8.1.2 Navigation

The BIOS setup/utility uses a key-based navigation system called hot keys. Most of the BIOS setup utility hot keys can be used at any time during the setup navigation process.



NOTE:

There is a hot key legend located in the right frame on most setup screens.

→←	Left/Right: The Left and Right < Arrow > keys allow you to select a setup screen. For example: Main screen, Advanced screen, Chipset screen, and so on.
↑↓	Up/Down: The Up and Down < Arrow > keys allow you to select a setup item or sub-screen.
+-	Plus/Minus: The Plus and Minus < Arrow > keys allow you to change the field value of a particular setup item. For example: Date and Time.
Tab	The < Tab > key allows you to select setup fields.
ESC	The < Esc > key allows you to discard any changes you have made and exit the Setup. Press the < Esc > key to exit the setup without saving your changes. Press the < Enter > key to discard changes and exit. You can also use the < Arrow > key to select Cancel and then press the < Enter > key to abort this function and return to the previous screen.

8.2 Main Setup

When you first enter the Setup Utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab. The Main BIOS Setup menu is shown below.

Main	Advanced	Chipset	Security	Boot	Save & Exit
-BIOS Information -System Information -Board Information -System Date -System Time	-CPU Configuration -Power Management -USB Configuration -AMT Configuration -System Management -Thermal Management -Watchdog Timer -CSM Configuration -Miscellaneous -AMI Graphic Output Protocol Policy -Network Stack Configuration -Intel® I210 Gigabit Network Connection -Intel® Ethernet Connection I219-LM Gigabit Network Connection	-System Agent (SA) Configuration -PCH-IO Configuration	-Administrator Password -User password -Secure Boot Menu	-Boot Configuration -UEFI Application Boot Priorities	-Save Options -Boot Override

NOTE:

- indicates a submenu

Gray text indicates info only

8.2.1 BIOS Information

Feature	Options	Description
BIOS Vendor	Info only	BIOS vendor
BIOS Version	Info only	ADLINK BIOS version
Build Date	Info only	Date the BIOS was built
MRC Version	Info only	Platform MRC Version
GOP Version	Info only	Platform GOP Version
ME FW Version	Info only	Coffee Lake Firmware Version
BIOS Boot Source	Info only	Show Boot SPI for ADLINK Dual BIOS Design

8.2.2 System Information

Feature	Options	Description
Project Name	Info only	Display Project Name
CPU Board Version	Info only	Display CPU Board Version
CPU Brand String	Info only	Display Intel CPU Brand Information
CPU Frequency	Info only	Display CPU Frequency
Total Memory	Info only	Display Current System installed Memory Size
Memory Frequency	Info only	Display Memory Frequency Information
PCH SKU	Info only	Display PCH Version

8.2.3 Board Information

Feature	Options	Description
Serial Number	Info only	Shows the Product Board Serial Number.
Manufacturing Date	Info only	Shows the Product Board Manufacturing Date.
Last Repair Date	Info only	Shows the Product last repair date.
MAC ID	Info only	Shows LAN MAC address on product board.

8.2.3.1 Board Information > Runtime Statistics

Feature	Options	Description
Total Runtime	Info only	Shows total runtime after system fist boot.
Current Runtime	Info only	Shows total runtime of current boot.
Power Cycles	Info only	Shows total system power cycles.
Boot Cycles	Info only	Shows total system boot cycles.
Boot Reason	Info only	Shows Boot reason after system last shut down.

8.2.4 System Date and Time

Feature	Options	Description
System Date	MM/DD/YYYY	Requires the alpha-numeric entry of the day of the week, day of the month, calendar month, and all 4 digits of the year, indicating the century and year (Fri XX/XX/20XX).
System Time	HH/MM/SS	Presented as a 24-hour clock setting in hours, minutes, and seconds.
Access Level	Info only	Shows what access level is used to enter BIOS setup menu.

8.3 Advanced

This menu contains the settings for most of the user interfaces in the system.

8.3.1 CPU Configuration

Feature	Options	Description
Type	Info only	Manufacturer, model
Microcode Revision	Info only	Display Microcode Revision
CPU Speed	Info only	Display CPU Speed.
L1 Data Cache	Info only	Display L1 Data Cache size
L1 Instruction Cache	Info only	Display L1 Instruction Cache size
L2 Cache	Info only	Display L2 Data Cache size
L3 Cache	Info only	Display L3 Data Cache size
L4 Cache	Info only	Display L4 Data Cache size
Boot performance mode	Max Battery **Max Non-Turbo Performance** Turbo Performance	Select the performance state that the BIOS will set starting from reset vector.
Hyper-Threading	Disabled **Enabled**	Enabled or Disabled Hyper-Threading Technology
Active Processor Cores	**All** 1 2 3 4 5 6 7	Number of cores to enable in each processor package
Intel® SpeedStep™	Disabled **Enabled**	Allows more than two frequency ranges to be supported
Intel® Speed Shift Technology	Disabled **Enabled**	Enable/Disable Intel® Speed Shift Technology support.
Turbo Mode	Disabled **Enabled**	Enable/Disable processor Turbo Mode
Configurable TDP Boot Mode	**Nominal** Deactivate	Configurable TDP Mode as Nominal/Deactivate TDP selection. Deactivate option will set MSR to Nominal and MMIO to Zero
Platform PL1 Enable	Disabled **Enabled**	When a processor thermal sensor trips (either core), the PROCHOT# will be driven. If bi-direction is enabled, external agents can drive PROCHOT# to throttle the processor
C state	Disabled **Enabled**	Enable/Disable CPU Power Management. Allows CPU to go to C states when it's not 100% utilized.

Package C State Limit	C0/C1 C2 C3 C6 C7 C7S C8 C9 C10 CPU Default **Auto**	Maximum Package C State Limit Setting. CPU Default: Leaves to Factory default value. Auto: Initializes to deepest available Package C State Limit
VT-d	Disabled **Enabled**	Enable/Disable VT-d capability
DTS SMM	Disabled **Enabled** Critical Temp Reporting (Out of spec)	Disabled: ACPI thermal management uses EC reported temperature values. Enabled: ACPI thermal management uses DTS SMM mechanism to obtain CPU temperature values. Out of Spec: ACPI Thermal Management uses EC reported temperature values and DTS SMM is used to handle Out of Spec.
Intel Trusted Execution Technology	Disabled **Enabled**	Enable/Disable utilization of additional hardware capabilities provided by Intel® Trusted Execution Technology. Changes require a full power cycle to take effect.

8.3.2 Power Management

Feature	Options	Description
Enable ACPI Auto Configuration	**Disabled** Enabled	Enables or Disables BIOS ACPI Auto Configuration
Enable Hibernation	Disabled **Enabled**	Enables or Disables System ability to hibernate (OS/S4 Sleep State). This option may not be effective with some operating systems.
ACPI Sleep State	Suspend Disabled **S3 (Suspend to RAM)**	Select the highest ACPI sleep state the system will enter when the Suspend button is pressed.
Power –Up Mode	**Turn On** Remain Off Last State	Turn On: The machine starts automatically when the power supply is turned on. Remain Off: To start the machine the power button has to be pressed. Last State: The machine will power up to last power state
Power consumption	Submenu	Power consumption

8.3.2.1 Power Management > Power Consumption

Feature	Options	Description
Current Input Current	Info only	Display actual input current
Current Input Power	Info only	Display actual input power
VCORE	Info only	Display actual VMEM voltage.
VCC_GT	Info only	Display actual 5VSB voltage.
1V05_A	Info only	Display actual VIN voltage
VDDQ	Info only	Display actual 5V voltage
VRTC	Info only	Display actual 3.3V voltage
V3P3S	Info only	Display actual 3.3VSB voltage

V3P3A	Info only	Display actual V3P3A voltage
V5S	Info only	Display actual V5S voltage
VCCST	Info only	Display actual VCCST voltage
VCCIO	Info only	Display actual VCCIO voltage
VCCSTG	Info only	Display actual VCCSTG voltage
VCCSA	Info only	Display actual VCCSA voltage
1V8_A	Info only	Display actual 1V8_A voltage
V5SBY	Info only	Display actual V5SBY voltage
V12	Info only	Display actual V12 voltage

8.3.3 USB Configuration

Feature	Options	Description
USB Module version	Info only	
USB Controllers:	Info only	
USB Devices:	Info only	.
XHCI Compliance Mode	Enabled **Disabled**	Option to enable Compliance Mode. Default is to disable Compliance Mode. Change to enabled for Compliance Mode testing.
xDCI Support	Enabled **Disabled**	Enable/Disable xDCI (USB OTG device)
USB Port Disable Override	**Disable Link** Select Per-Pin	Select to Enable/Disable the corresponding USB port from reporting a Device Connection to the Controller.

8.3.4 AMT Configuration

Feature	Options	Description
AMT BIOS Features	**Enable** Disable	When disabled AMT BIOS Features are no longer supported and user is no longer able to access MEBx Setup.
MEBx hotkey Pressed	Enable **Disable**	OEMFLag Bit 1: Enable automatic MEBx hotkey press.

8.3.5 System Management

Feature	Options	Description
Version	Info only	Show System SEMA Version
SEMA Firmware	Info only	Show SEMA Firmware Version
Build Date	Info only	Show SEMA Firmware Build date
SEMA Bootloader	Info only	Show SEMA Bootloader Version
Build Date	Info only	Show SEMA Bootloader Build date
SEMA Features	Submenu	SEMA Features
Flags	Submenu	Flags

8.3.5.1 System Management > SEMA Features

Feature	Options
Uptime & Power Cycles Counter	Info only
System Restart Event	Info only
1024 Bytes User-Flash	Info only
Watchdog	Info only
Temperatures	Info only
Voltage Monitor	Info only
Display Backlight Control	Info only
Power-Up Watchdog	Info only
Power Monitor (current sense)	Info only
Boot Counter	Info only
12V Input-Voltage	Info only
4mR Rsense for Input-Voltage	Info only
Dual-BIOS	Info only
I2C bus 1	Info only
I2C bus 2	Info only
Programmable CPU fan	Info only
AT/ATX mode	Info only
ACPI Thermal Trigger	Info only
Power-Up to last state	Info only
Blacklight restore	Info only
DTS offset registers programmable	Info only
TIVA BMC	Info only
PEC protocol	Info only
SEMA Error Log	Info only
Wake-by-BMC	Info only

8.3.5.2 System Management > Flags

Feature	Options	Description
BMC Flags	Info only	Show BMC Flags
BIOS Select	Info only	Show Current BIOS of Dual BIOS
AT/ATX-Mode	Info only	Show Boot under AT or ATX mode
Exception Code	Info only	Show Exception Code.

8.3.6 Thermal Management

Feature	Options	Description
CPU Temperature - Current - Startup - Min - Max	Info only	Display CPU Temperature

Board Temperature - Current - Startup - Min - Max	Info only	Display Board Temperatures
Passive Cooling Trip Point	Disabled 94 C **95 C** 96 C 97 C 98 C 99 C	This value is the temperature threshold of the Passive Cooling Trip Point.
Active Cooling Trip Point	Disabled 40 C 50 C 60 C 70 C **Refer to BMC**	This value is the temperature threshold of the Active Cooling Trip Point.

8.3.7 Watchdog Timer

Feature	Options	Description
Power-Up Watchdog	**Disabled** Enabled	The Power Up Watchdog resets the system after a certain amount of time after power up. Pressing F12 during start up disables the Power Up Watchdog.
RunTime Watchdog	**Disabled** Enabled	The RunTime Watchdog resets the system after a certain amount of time after power up.

8.3.8 CSM Configuration

Feature	Options	Description
Compatibility Support Module Configuration	**Disabled** Enabled	Enable/Disable CSM Support
CSM16 Module Version	Info only	Display CSM16 Module Version.
GateA20 Active	**Upon Request** Always	Upon Request: GA20 can be disabled using BIOS services. Always: do not allow disabling GA20; this option is useful when any RT code is executed above 1MB.
Boot option filter	**UEFI and Legacy** Legacy only UEFI only	This option controls Legacy/UEFI ROMs priority
Option ROM execution	Info only	
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

8.3.9 Miscellaneous

Feature	Options	Description
Trusted Computing	Submenu	
NVMe Configuration	Submenu	
Power Supply Unit	Emulate AT Mode **ATX Mode**	ATX: OS will turn off system power when shutdown.
BMC I2C Mode	**100Kbps** 400Kbps	BMC I2C Mode
Network	**Do not launch** UEFI Legacy	Controls the execution of UEFI Network OpROM

8.3.9.1 Trusted Computing

Feature	Options	Description
Security Device Support	Enabled **Disabled**	Enables or Disables BIOS support for security device. OS will not show Security Device. TCG EFI protocol and INT1A interface will not be available.

8.3.10 AMI Graphic Output Protocol Policy

Feature	Options	Description
Intel® GOP Driver	Info only	
Output Select	DVI2	Output Interface Selection

8.3.11 Network Stack Configuration

Feature	Options	Description
Network Stack	Enabled **Disabled**	Enables/Disable UEFI Network Stack.
IPv4 TXE PXE Support	Enabled **Disabled**	Enable IPv4 PXE Boot Support. If disabled IPV4 PXE Boot option will not be created.
IPv4 HTTP Support	Enabled **Disabled**	Enable IPv4 HTTP Boot Support. If disabled IPV4 HTTP Boot option will not be created.
IPv6 TXE Support	Enabled **Disabled**	Enable IPv6 PXE Boot Support. If disabled IPV6 PXE Boot option will not be created.
IPv6 HTTP Support	Enabled **Disabled**	Enable IPv6 HTTP Boot Support. If disabled IPV6 HTTP Boot option will not be created.
PXE boot wait time	0	Wait time to press ESC key to abort the PXE boot.
Media detect count	1	Number of times presence of media will be checked.

8.4 Chipset

Feature	Options	Description
System Agent (SA) Configuration	Submenu	System Agent (SA) Parameters
PCH-IO Configuration	Submenu	PCH parameters

8.4.1 System Agent (SA) Configuration

Feature	Options	Description
SA PCIe Code Version	Info only	Display SA PCIe code revision
VT-d	Info only	Display VT-d supported or not
Memory Configuration	Submenu	Memory parameters
Graphics Configuration	Submenu	Graphics parameters
PEG Port Configuration	Submenu	PEG port parameters
Above 4GB MMIO BIOS assignment	Enabled **Disabled**	Enable/Disable above 4GB memory mapped BIOS assignment.

8.4.1.1 Memory Configuration

Feature	Options	Description
Memory RC Version	Info only	Display RC version
Memory Frequency	Info only	Display memory frequency
Memory Voltage	Info only	Display memory voltage
Memory Timings (tCL-tRCD-tRP-tRAS)	Info only	Display memory timing parameters
Channel 0 Slot 0	Info only	Display memory Size
Channel 1 Slot 0	Info only	Display memory Size
Maximum Memory Frequency	**Auto** 1067, 1200…, 5867	Maximum memory frequency selections in MHz. Valid values should match the refclk, i.e., divided by 133 or 100
Max TOLUD	**Dynamic** 1 GB, 1.25GB…3.5GB	Maximum Value of TOLUD. Dynamic assignment would adjust TOLUD automatically based on largest MMIO length of installed graphic controller.

8.4.1.2 South

Feature	Options	Description
Skip Scanning of External Gfx Card	**Disabled** Enabled	If Enabled, it will not scan for External Gfx card on PEG and PCH PCIE ports
Primary Display	**Auto** IGFX PEG PCIe	Select which IGFX/PEG/PCI Graphics device should be Primary Display.
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	2MB 4MB **8MB**	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.
DVMT Pre-Allocated	0M **32M** 64M 4M 8M 12M 16M 20M 24M 28M 32M/F7 36M 40M 44M 48M 52M 56M 60M	Select DVMT 5.0 pre-allocated (fixed) graphics memory size used by the internal graphics device.
DVMT Total Gfx Mem	128M **256M** Max	Select DVMT5.0 total graphics memory used by the internal graphics device.

8.4.1.3 PEG Port Configuration

Feature	Options	Description
PEG 0:1:0 / 0:1:1 / 0:1:2 / 0:6:0		
Enable Root Port	Disabled Enabled **Auto**	Enable or disable this root port
Max Link Speed	**Auto** Gen1 Gen2 Gen3	Configure PEG 0:1:0 max speed
PEG0 Slot Power Limit Value	Info only	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.
PEG0 Slot Power Limit Scale	**1.0x** 0.1x 0.01x 0.001x	Select the scale used for the Slot Power Limit Value.
PEG0 Physical Slot Number	Info only	Set the physical slot number attached to this port. The number has to be globally unique within the chassis. Values 0-8191.
Gen3 RxCTLE Control	Submenu	Gen3 RxCTLE Control per Bundle
PCIe Rx CEM Test Mode	**Disabled** Enabled	Enable/Disable PEG Rx CEM Loopback Mode
PCIe Spread Spectrum Clocking	**Enabled** Disabled	Allows disabling Spread Spectrum Clocking for compliance testing

8.4.1.4 Gen3 RxCTLE Control

Feature	Options	Description
Bundle0	Info only	Gen3 RxCTLE setting for Bundle0 (Lane0, Lane1)
Bundle1	Info only	Gen3 RxCTLE setting for Bundle1 (Lane2, Lane3)
Bundle2	Info only	Gen3 RxCTLE setting for Bundle2 (Lane4, Lane5)
Bundle3	Info only	Gen3 RxCTLE setting for Bundle3 (Lane6, Lane7)
Bundle4	Info only	Gen3 RxCTLE setting for Bundle4 (Lane8, Lane9)
Bundle5	Info only	Gen3 RxCTLE setting for Bundle5 (Lane10, Lane11)
Bundle6	Info only	Gen3 RxCTLE setting for Bundle6 (Lane12, Lane13)
Bundle7	Info only	Gen3 RxCTLE setting for Bundle7 (Lane14, Lane15)
PEG10 RxCTLE Override	**Disabled** Enabled	When Enabled, it overrides PEG0 RxCTLE adaptive behavior
PEG11 RxCTLE Override	**Disabled** Enabled	When Enabled, it overrides PEG1 RxCTLE adaptive behavior
PEG12 RxCTLE Override	**Disabled** Enabled	When Enabled, it overrides PEG2 RxCTLE adaptive behavior
DMI RxCTLE Override	**Disabled** Enabled	When Enabled, it overrides DMI RxCTLE adaptive behavior

8.4.2 PCH-IO Configuration

Feature	Options	Description
PCI Express Configuraiton	Submenu	Configure Serial IRQ Mode.
SATA And RST Configuration	Submenu	Enable/Disable SMBus Support.
HD Audio Configuration	Submenu	Select the target OS.
PCH LAN Controller	**Enabled** Disabled	Enable/Disable onboard NIC
Wake on LAN FOR S5 Enable	**Enabled** Disabled	Enable/Disable integrated LAN to wake the system only for S5.
Serial IRQ Mode	Quiet **Continuous**	Configure Serial IRQ Mode
High Precision Timer	**Enabled** Disabled	Enable or Disable the High Precision Event Timer
PCIE PLL SSC	**Auto** 0.1%~2.0%	PCIe PLL SSC percentage. Auto – Keep HW default, no BIOS override. Range is 0.0%-2.0%
SPD Write Disable	**True** False	Enable/Disable setting SPD write disable.

8.4.2.1 PCIe Express Configuration

Feature	Options	Description
PCIe Configuration	Info only	
PCI Express Clock Gating	Disabled **Enabled**	PCI Express Clock Gating Enable/Disable for each root port
DMI Link ASPM Control	**Disabled** Enabled	The control of Active State Power Management of the DMI Link
PCIE Port assigned to LAN	Info only	5
Compliance Test Mode	**Disabled** Enabled	Enable when using Compliance Load Board
PCIe-USB Glitch W/A	**Disabled** Enabled	PCIe-USB Glitch W/A for bad USB device(s) connected behind PCIE/PEG port.
PCIe function swap	Disabled **Enabled**	When Disabled, prevents PCIE root port function swap. If any function other than 0^{th} is enabled, 0^{th} will become visible.
PCIe Express Root Port1/5/6/7/8/9 /21	Submenu	Control the PCI Express Root Port. Auto: To disable unused root port automatically for the most optimum power savings. Enable: Enable PCIE root port Disable: Disable PCIE root port.

8.4.2.1.1 PCIe Express Configuration > PCI Express Root PortX

Feature	Options	Description
PCIe Express Root PortX	Disabled **Enabled**	Control the PCI Express Root Port.
Connection Type	Built-in **Slot**	Built-In: a built-in device is connected to this rootport. SlotImplemented bit will be clear. Slot: this rootport connects to user-accessible slot. SlotImplemented bit will be set.

ASPM	**Disable** L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all inks to L0s State Auto – BIOS auto configure Disable – Disables ASPM
L1 Substates	Disabled L1.1 **L1.1 & L1.2**	PCI Express L1 substates settings.
Gen3 Eq Phase3 Method	**Hardware** Static Coeff.	PCIe Gens3 Equalization Phase 3 Method
Hot Plug	**Disabled** Enabled	PCI Express Hot Plug Enable/Disable.
UPTP	Info only	Upstream Port Transmitter Preset
DPTP	Info only	Downstream Port Transmitter Preset
ACS	**Enabled** Disabled	Enable/Disable Access Control Services Extended Capability
PTM	**Enabled** Disabled	Enable/Disable Precision Time Measurement
DPC	**Enabled** Disabled	Enable/Disable Downstream Port Containment
EDPC	**Enabled** Disabled	Enable/Disable Rootport extensions for Downstream Port Containment
URR	Enabled **Disabled**	PCI Express Unsupported Request Reporting Enable/Disable
FER	Enabled **Disabled**	PCI Express Device Fatal Error Reporting Enable/Disable
NFER	Enabled **Disabled**	PCI Express Device Non-Fatal Error Reporting Enable/Disable
CER	Enabled **Disabled**	PCI Express Device Correctable Error Reporting Enable/Disable
CTO	Enabled **Disabled**	PCI Express Completion Timer TO Enable/Disable.
SEFE	Enabled **Disabled**	Root PCI Express System Error on Fatal Error Enable/Disable
SENFE	Enabled **Disabled**	Root PCI Express System Error on Non-Fatal Error Enable/Disable.
SECE	Enabled **Disabled**	Root PCI Express System Error on Correctable Error Enable/Disable
PME SCI	**Enabled** Disabled	PCI Express PME SCI Enable/Disable
Hot Plug	Enabled **Disabled**	PCI Express Hot Plug Enable/Disable
Advanced Error Reporting	**Enabled** Disabled	Advanced Error Reporting Enable/Disable
PCIe Speed	Auto Gen1 **Gen2** Gen3	Configure PCIe Speed
Transmitter Half Swing	**Disabled** Enabled	Transmitter Half Swing Enable/Disable
Detect Timeout	Info only	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.

Extra Bus Reserved	Info only	Extra Bus Reserved (0-7) for bridges behind this Root Bridge
Reserved Memory	Info only	Reserved Memory for this Root Bridge (1-20) MB
Reserved I/O	Info only	Reserved I/O (4K/8K/12K/16K/20K) range for this root bridge
PCH PCIe LTR Configuration		
LTR	**Enabled** Disabled	PCH PCIE Latency Reporting Enable/Disable
Snoop Latency Override	Disabled Manual **Auto**	Snoop Latency Override for PCH PCIE. Disabled: Disable override Manual: Manually enter override values. Auto (default): Maintain default BIOS flow.
Non Snoop Latency Override	Disabled Manual **Auto**	Non Snoop Latency Override for PCH PCIE. Disabled: Disable override. Manual: Manually enter override values. Auto (default): Maintain default BIOS flow.
Force LTR Override	**Disabled** Enabled	Force LTR Override for PCH PCIE. Disabled: LTR override values will not be forced. Enabled: LTR override values will be forced and LTR messages from the device will be ignored.
LRT Lock	**Disabled** Enabled	PCIE LTR configuration lock

8.4.2.2 SATA And RST Configuration

Feature	Options	Description
SATA And RST Configuration	Info only	
SATA Controller(s)	Disabled **Enabled**	
SATA Mode Selection	**AHCI** Intel RST Premium with Intel Optane System Acceleration	Determines how SATA controller(s) operate.
SATA Test Mode	Enabled **Disabled**	Test Mode Enable/Disable (Loop Back)
Software Feature Mask Configuration	Submenu	RST Legacy OROM/RST UEFI driver will refer to the SWFM configuration to enable/disable the storage features.
Aggressive LPM Support	Disabled **Enabled**	Enable PCH to aggressively enter link power state.
SATA Controller Speed	Default Gen1 **Gen2** Gen3	Indicates the maximum speed the SATA controller can support
Serial ATA Port 0-7	Info only	
Software Preserve	Info only	
Port 0	Disabled **Enabled**	Enable or Disable SATA Port.
Hot Plug Capability	**Disabled** Enabled	Designates this port as Hot Pluggable
Configured as eSATA	Info only	
External	**Disabled** Enabled	Marks this port as external

Spin Up Device	**Disabled** Enabled	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 Port X DevSlp	**Disabled** Enabled	Enable/Disable SATA Port X DevSlp. For DevSlp to work, both hard drive and SATA port need to support DevSlp function, otherwise an unexpected behavior might happen. Please check board design before enabling it.
DTTO Configuration	**Disabled** Enabled	Enable/Disable DITO configuration
DITO Value	Info only	Display DITO value
DM Value	Info only	Display DM value

8.4.2.2.1 SATA And RST Configuration > Software Feature Mask Configuration

Feature	Options	Description
HDD Unlock	Disabled **Enabled**	If enabled, indicates that the HDD password unlock in the OS is enabled.
LED Locate	Disabled **Enabled**	If enabled, indicates that the LED/SGPIO hardware is attached and ping to locate feature is enabled on the OS.

8.4.2.3 HD Audio Configuration

Feature	Options	Description
HD-Audio Support	Disabled **Enabled**	Enable/Disable HD-Audio support.

8.5 Security

8.5.1 Password Description

Feature	Options	Description
Administrator Password	Enter password	Set Administrator Password
User Password	Enter password	Set user Password
Secure Boot Menu	Submenu	Customizable Secure Boot settings

8.5.1.1 Secure Boot Menu

Feature	Options	Description
System Mode	Info only	Show system mode.
Secure Boot	Info only	Show Secure Boot status.
Secure Boot Control	**Disabled** Enabled	Secure Boot activated when platform Key (PK) is enrolled, system mode is User/Deployed, and CSM function is disabled.
Secure Boot Mode	**Standard** Custom	Secure Boot mode options: If Custom mode, Secure Boot Policy variables can be configured by a physically present user without full authentication.

8.6 Boot

Feature	Options	Description
Setup Prompt Timeout	1	Number of seconds to wait for setup activation key. 65535 (0xFFFF) means indefinite waiting.
Bootup NumLock State	**On** Off	Select the keyboard NumLock state after system boot.
Quiet Boot	Disabled **Enabled**	Enables or disables Quiet Boot option.
Fast Boot	Disabled **Enabled**	Enables or disables boot with initialization of a minimal set of devices required to launch active boot option. Has no effect for BBS boot options.
SATA Support	**Last Boot SATA Devices Only** All SATA Devices	If Last Boot SATA Devices Only, Only last boot SATA device will be available in Post. If All SATA Devices, all SATA devices will be available in OS and Post.
VGA Support	Auto **EFI Driver**	If Auto, only install Legacy OpRom with Legacy OS and logo will NOT be shown during post. EFI driver will still be installed with EFI OS.
USB Support	Disabled **Full Initial** Partial Initial	If Disabled, all USB devices will NOT be available util after OS boot. If Partial Initial, USB Mass Storage and specific USB port/device will NOT be available before OS boot. If Enabled, all USB devices will be available in OS and Post.
PS2 Deivces Support	Disabled **Enabled**	If Disabled, PS2 devices will be skipped.
Network Stack Driver Support	**Disabled** Enabled	If Disabled, Network Stack Driver will be skipped.
Redirection Support	**Disabled** Enabled	If disable, Redirection function will be disabled.
Boot mode select	Legacy **UEFI**	Select boot mode LEGACY/UEFI.
Boot Configuration		
Boot Option #1~9	Hard Disk	Sets the system boot order.
UEFI Application Boot Priorities	Submenu	Specifies the Boot Device Priority sequence from available UEFI Application.

8.6.1 UEFI Application Boot Priorities

Feature	Options	Description
Boot Option #1	**UEFI: Built-in EFI Shell** Disable	Sets the system boot order

8.7 Save & Exit

8.7.1 Reset Options

Feature	Options	Description
Save Changes and Reset	Save changes and reset the system.	Exit system setup after saving the changes.
Discard Changes and Reset	Reset the system without saving any changes.	Exit system setup without saving the changes.
Save Changes and Reset	Reset the system with saving any changes.	Reset the system after saving the changes.
Discard Changes and Reset	Reset the system and discard any changes.	Reset the system after without the changes.
Save Changes		Save Changes done so far to any of the setup options.
Discard Changes		Discard Changes done so far to any of the setup options.
Restore Default		Restore/Load the Default values for all the setup options.
Save as User Default		Save the changes done so far as User Defaults.
Restore User Default		Restore the User Defaults to all the setup options.
UEFI: Built-in EFI Shell		
Launch EFI Shell from filesystem device		

Safety Instructions

Read and follow all instructions marked on the product and in the documentation before you operate your system. Retain all safety and operating instructions for future use.

- Please read these safety instructions carefully.
- Please keep this User‘s Manual for later reference.
- Read the specifications section of this manual for detailed information on the operating environment of this equipment.
- When installing/mounting or uninstalling/removing equipment, turn off the power and unplug any power cords/cables.
- To avoid electrical shock and/or damage to equipment:
  - Keep equipment away from water or liquid sources.
  - Keep equipment away from high heat or high humidity.
  - Keep equipment properly ventilated (do not block or cover ventilation openings).
  - Make sure to use recommended voltage and power source settings.
  - Always install and operate equipment near an easily accessible electrical socket-outlet.
  - Secure the power cord (do not place any object on/over the power cord).
  - Only install/attach and operate equipment on stable surfaces and/or recommended mountings.
  - If the equipment will not be used for long periods of time, turn off and unplug the equipment from its power source.
- Never attempt to fix the equipment. Equipment should only be serviced by qualified personnel.

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