SP2-TGL Series

Open-Frame Panel PC

User's Manual



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LEADING EDGE COMPUTING

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Revision History

Revision	Release Date	Description of Change(s)
1.0	2022-11-25	Initial release

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Preface

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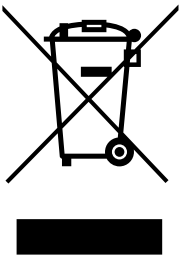
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Conventions

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.
ATTENTION: Informations destinées à prévenir les blessures corporelles mineures, les dommages aux composants, la perte de données et/ou la corruption de programme lors de l'exécution d'une tâche.

WARNING: Information to prevent ***serious*** physical injury, component damage, data loss, and/or program corruption when trying to complete a specific task.
AVERTISSEMENT: Informations destinées à prévenir les blessures corporelles graves, les dommages aux composants, la perte de données et/ou la corruption de programme lors de l'exécution d'une tâche spécifique.

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1 Introduction

1.1 Overview

The SP2-TGL Series open-frame panel PC is based on the ultra-low-power 11th Generation Intel® Core™ i7/i5/i3 and Celeron® processors (formerly Tiger Lake-UP3) featuring flexible IO options. The SP2-TGL is a computing module with powerful computing capabilities and compact size that is easy to integrate with kiosk and panel PC applications.

1.2 Features

- 11th Generation Intel® Core™ i7/i5/i3 and Celeron® 6305 (Tiger Lake-U SoC) processors
- Extensive I/O and functional expansion through wire-to-board connectors and custom function module
- Extensive expansion and customization options for fast and easy integration with all form factors, kiosks and all-in-one panel PC applications
- Enhanced data integrity and protection in case of sudden power outage with support for optional back-up battery
- Low-risk cost-effective choice with pre-compliance EMC testing and high ESD tolerance
- High applicability and reliability in case of power fluctuation with a 9-36V voltage range
- Display outputs: LVDS output (eDP on request) for integrated display, DisplayPort and Mini DisplayPort

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1.3 Packing List

Before unpacking, check the shipping carton for any damage. If the shipping carton and/or contents are damaged, inform your dealer immediately. Retain the shipping carton and packing materials for inspection. Obtain authorization from your dealer before returning any product to ADLINK. Ensure that the following items are included in the package.

- 1x SP2-TGL Smart Panel

1.4 Optional Accessories

- Panel-mount clip kit
- VESA kit
- Rear cover
- Active sink
- Wi-Fi module
- 84W power supply (12V/7A)
- 160W power supply (24V/6.67A)
- Power cable (SP2-TGL to power supply)
- Cables for internal IO expansion
- Function Modules
  - SP FM
  - Titan FM
  - USB FM
  - Railway FM

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2 Specifications

2.1 SP2-TGL Series Specifications

Model	SP2-10WP-TGL	SP2-15WP-TGL	SP2-21WP-TGL
Processor	Standard: Intel® Core™ i7-1185G7E, 2.8(4.4)GHz, 12MB, 15-28W (4C) Intel® Core™ i5-1145G7E, 2.6(4.1)GHz, 8MB, 15-28W (4C) Intel® Core™ i3-1115G4E, 3.0(3.9)GHz, 6MB, 15-28W (2C) Intel® Celeron® 6305E, 1.8GHz, 4MB, 15-28W (2C) By Request: Intel® Core™ i7-1185GRE, 2.8(4.4)GHz, 12MB, 15-28W (4C) Intel® Core™ i5-1145GRE, 2.6(4.1)GHz, 8MB, 15-28W (4C) Intel® Core™ i3-1115GRE, 3.0(3.9)GHz, 6MB, 15-28W (2C)		
Memory	2x SODIMM non-ECC 2400/3200 MHz DDR4 memory up to 64GB		
Storage	1x M.2 SATA 6 Gbps port, M key 2280 1x 2.5” SSD/HDD SATA 6 Gbps port (optional)		
Display and Touch			
Size	10.1"	15.6”	21.5”
Resolution	1280 x 800	1920 x 1080	1920 x 1080
Contrast Ratio	800:1	1000:1	1000:1
Brightness (Nits)	400 cd/m^2 (typ)	420 cd/m^2 (typ)	400 cd/m^2 (typ)
Backlight Life (Hrs)	50,000		
Viewing Angle (U/D/R/L)	89/89/89/89		
Touch Points	10 points		
Touch Structure	Glass/Glass		
Surface Hardness	7H		
Surface Treatment	AS coating		
External I/O			
Ethernet	2x GbE (Intel® I225), RJ45, WOL (up to 2.5 Gb/s)		
Serial Port	1x RS-232/422/485 programmable, auto-flow		
USB Ports	1x USB 2.0, Type-A, OCP, 1000mA 1x USB 3.2, 5 Gbps, Type-A, OCP, 1600mA 2x USB 3.2, Gen 2, 10 Gbps, Type-A, OCP, 1600mA		
DisplayPort	1x DP, DP++, supports resolutions up to 5120x3200@60Hz 24bpp		

Table 2-1: SP2-TGL Series Specifications

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Model	SP2-10WP-TGL	SP2-15WP-TGL	SP2-21WP-TGL
Internal I/O with Wire to Board Connectors			
USB Port	1x USB 2.0 client		
I^2C	2x for I^2C client (one from mainboard or two from FM board)		
Audio	1x for 2x stereo speaker (2 watts) 1x Mic-in and Line-out 1x buzzer		
Keys	1x for 32 physical keys (BOM optional), 1x LCD backlight up/down and volume up/down (BOM optional)		
COM port	1x RS-232/422/485 programmable, auto-flow		
GPIO	1x 8-pin GPIO		
PCIe slot	1x PCIe Gen 4 x4 (optional)		
M.2	1x A/E key 2230 (Wi-Fi/BT) 1x B key 3042 (4G/5G)		
SIM	1x SIM slot for 4G/5G communication		
DisplayPort	1x Mini DP, DP++, resolution up to 5120x3200@60Hz 24bpp		
Power			
Power Input	AT/ATX (default: AT mode) 12V ±5% / 9-36V, both with OVP/UVP protection		
Power Connector	1x 6-pin power connector		
Power/Fail Reset	1x wafer supports system reset, power button and power LED		
Backup Battery	1x wafer for UPS kit to back up data when AC shuts down (optional)		
Environmental			
Operating Temperature (Standard)	0°C to 60°C	0°C to 60°C	0°C to 60°C
Operating Temperature (By Request)	-20°C to 60°C	-20°C to 60°C	Contact ADLINK for details.
Storage Temperature	-20°C to 70°C	-20°C to 70°C	-20°C to 60°C
Humidity	10% to 95%		
Vibration	OP 1 Grms, 5-500Hz w/ SSD, (IEC60068-2-64) X, Y, Z axes, 60 min/axis		
Shock	OP 20G peak acceleration, 11 ms (IEC60068-2-64) ±X, ±Y, ±Z, 3 shocks/asix		
IP Rating	IP65 front panel		
ESD	Air: ±15kV, Contact: ±8kV		

Table 2-1: SP2-TGL Series Specifications

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Model	SP2-10WP-TGL	SP2-15WP-TGL	SP2-21WP-TGL
EMC/Safety Compliance	EMI: IEC/EN 61000-3-2, IEC/EN 61000-3-3, EN 61000-6-4, EN 55032 EMS: EN 55035, EN 61000-6-2 EMC: CE, FCC Class B, IEC 60601-1-2, UNECE R10, EN 50121-3-2 Safety: Compliant with 60601-1/61010-1/62368-1 **Note**: SP2-TGL has passed pre-compliance testing of EMI, EMS, EMC and Safety.		
Software			
WDT	Supported		
Operating Systems	Windows® 10 IoT Enterprise 64-bit Linux Ubuntu 20.04 LTS		
Mechanical			
Size	10.1”	15.6”	21.5”
Construction	SGCC		
Dimensions (HxWxD)	249.66 x 168.3 x 64.4 ±2mm	383.56 x 232.99 x 65.1 ±2mm	517.46 x 309.19 x 67.6 ±2mm
Weight	2.06 ±0.2kg	3.02 ±0.2kg	4.85 ±0.2kg
Mounting (Optional)	Panel Mounting VESA mounting (requires optional rear cover)		

Table 2-1: SP2-TGL Series Specifications

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2.2 SP2-TGL Series Block Diagram

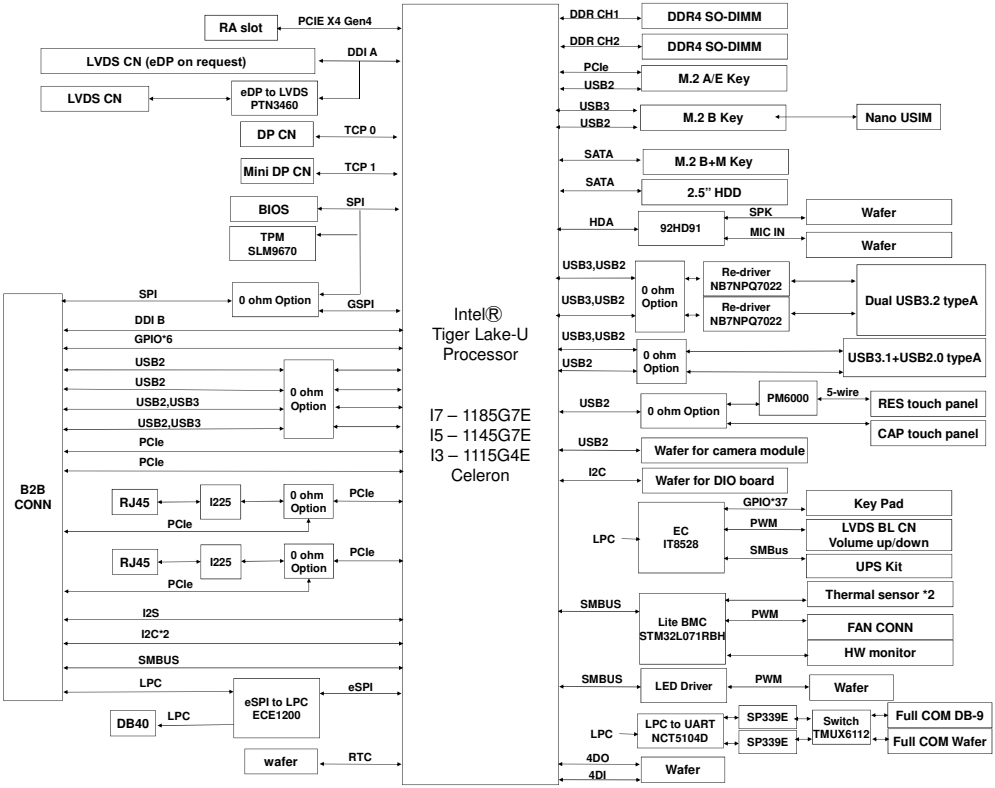


Figure 2-1: SP2-TGL Series Block Diagram

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2.3 Power

Power supply options:

- 84W (12V/7A)
- 160W (24V/6.67A)

2.3.1 DC Input Options

12V DC (default) or 9-36V DC (optional) input are supported.

2.3.2 Power Consumption

Power consumption is based on lab data in which 12V DC is applied and current is measured by the DC power supply. The power consumption (W) is calculated as the product of applied voltage (V) and current (A). Platforms tested for this data have available external I/O interfaces, and are attached to supported devices such as keyboard/ mouse, USB dummy load, COM loop-back, LAN port, and with an internal SSD drive installed. Information is presented for reference only. Actual power consumption will vary with different attached devices and operating systems.

Configuration	Idle	Full Load
SP2-10WP-i7, 9V	17.2935W	67.8096W
SP2-10WP-i7, 12V	15W	67.8096W
SP2-10WP-i7, 24V	17.1W	64.2W
SP2-10WP-i7, 36V	18.414W	67.8852W
SP2-15WP-i5, 12V	22.2W	65.1W
SP2-21WP-i5, 12V	33.7W	77.5W

Table 2-2: Power Consumption

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2.4 Mechanical Dimensions

NOTE:

All dimensions are in millimeters, unless noted.

2.4.1 SP2-10WP-TGL Dimensions

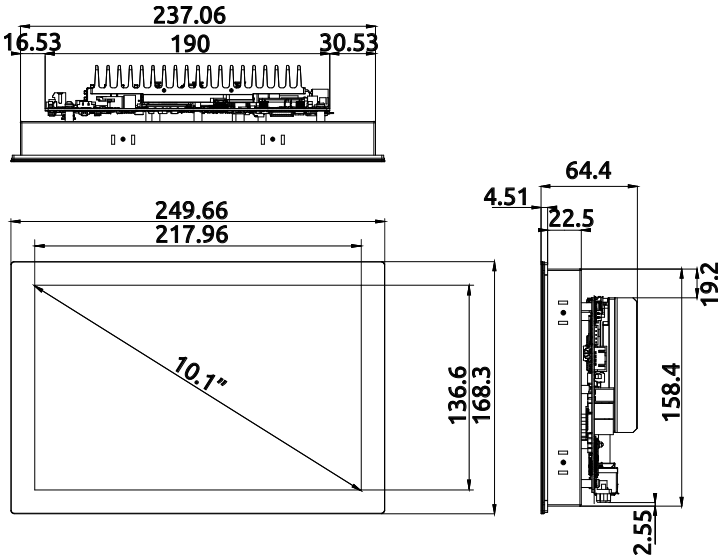


Figure 2-2: SP2-10WP-TGL Dimensions

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2.4.2 SP2-15WP-TGL Dimensions

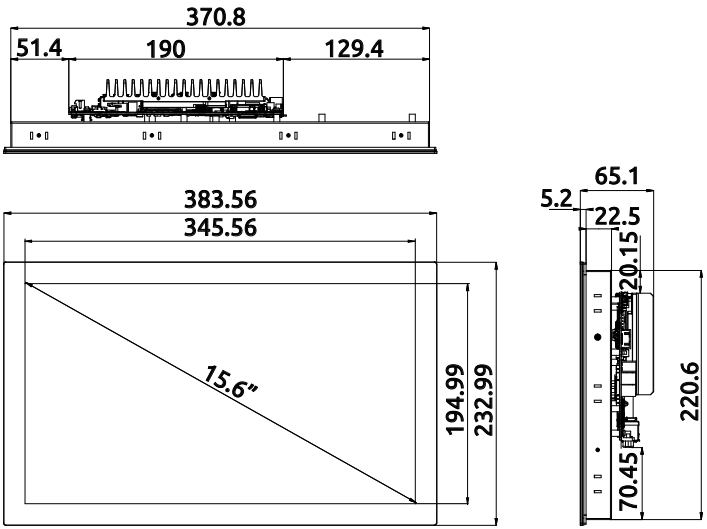


Figure 2-3: SP2-15WP-TGL Dimensions

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2.4.3 SP2-21WP-TGL Dimensions

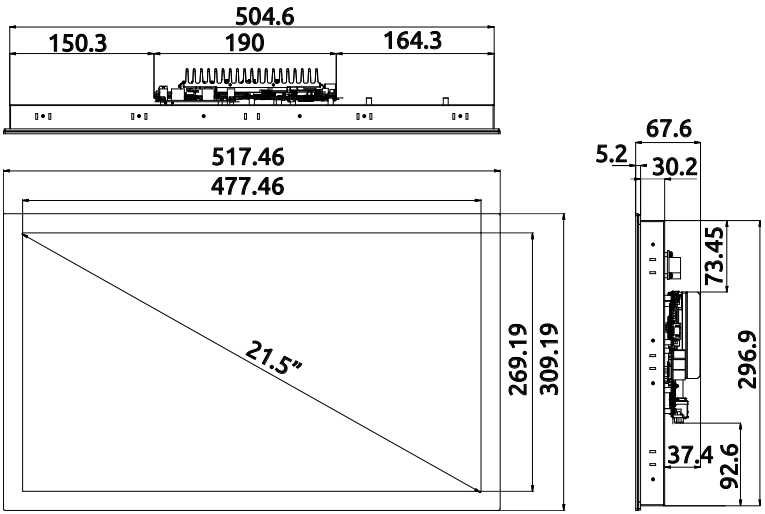


Figure 2-4: SP2-21WP-TGL Dimensions

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2.5 Thermal Options

2.5.1 Active Cooling Heat Sink

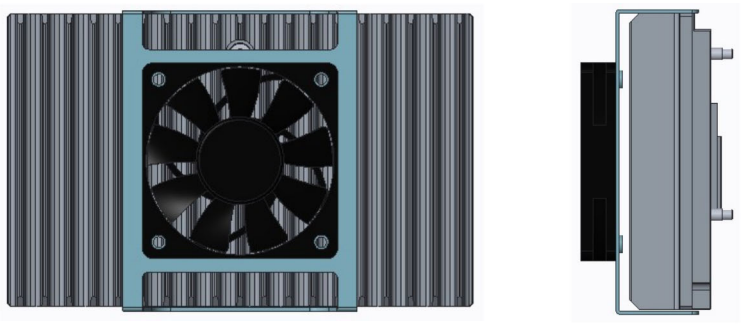


Figure 2-5: Active Cooling Heat Sink

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No.	Description	Part Number	Material	Dimensions	Remarks
1	TIM	N/A	PCM4988	25x15x0.2mm	
2	Heat Sink	32-20614-4000-A0	AL6063	143x90x27.6mm	
3	Fan Bracket	34-35121-0000-A0	SGCC	92.4x72x25mm	
4	Fan	32-00086-3000-A0	Plastic	60x10mm	Axial Fan

Table 2-3: Heat Sink Components

2.5.2 Heat Sink Dimensions

NOTE:

All dimensions are in millimeters, unless noted.

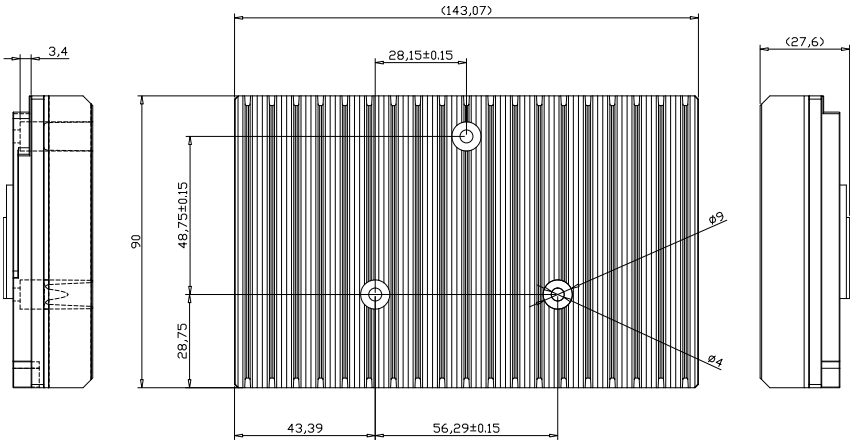


Figure 2-6: Heat Sink Dimensions

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2.5.3 Heat Sink Cable Routing

Heat sink cable routing should avoid high temperature areas as shown.

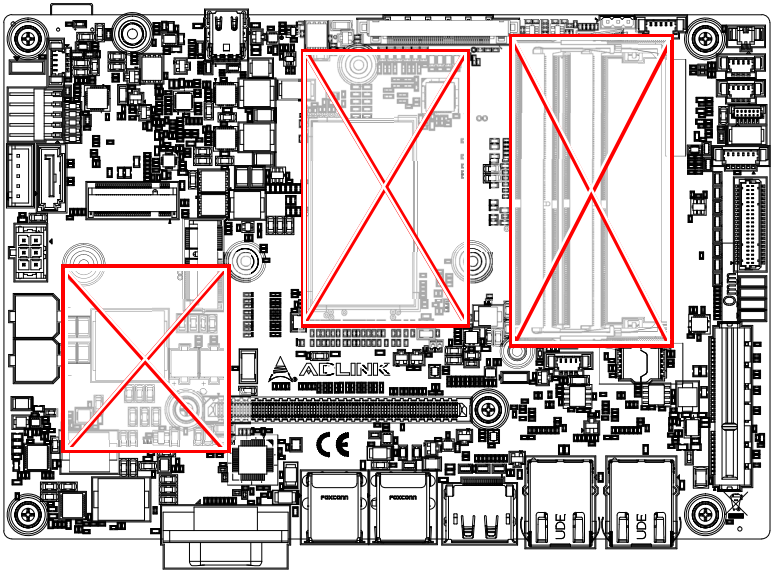


Figure 2-7: Heat Sink Cable Routing

NOTE:

Heat sink designation is based on open-frame locations such as a kiosk installation.

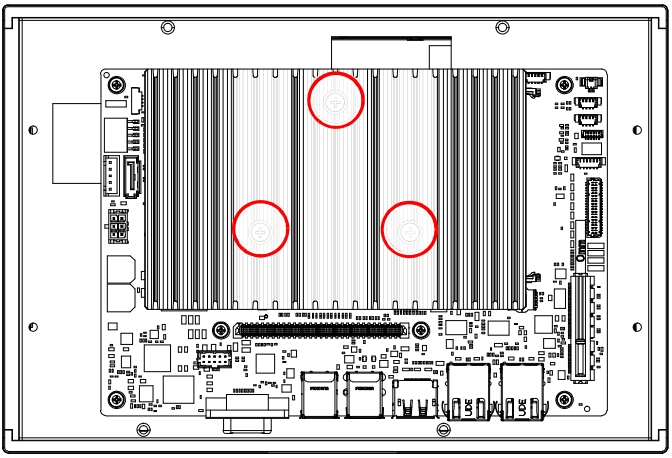
For panel PCs, the design will be different.

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2.6 Adding or Changing Memory

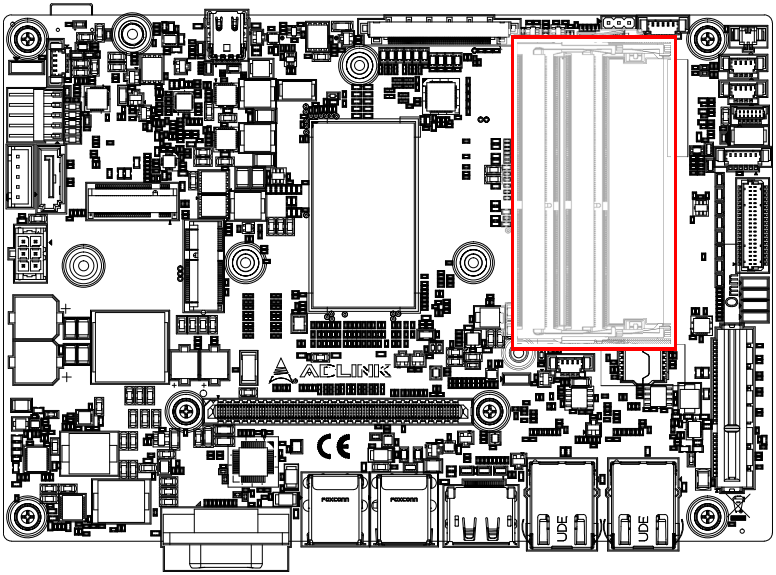
Follow these steps to add or change memory modules.

1. Remove the 3 screws that attach the heat sink to the mainboard and remove the heat sink.



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2. Add or change memory modules to the SODIMM connectors as necessary.



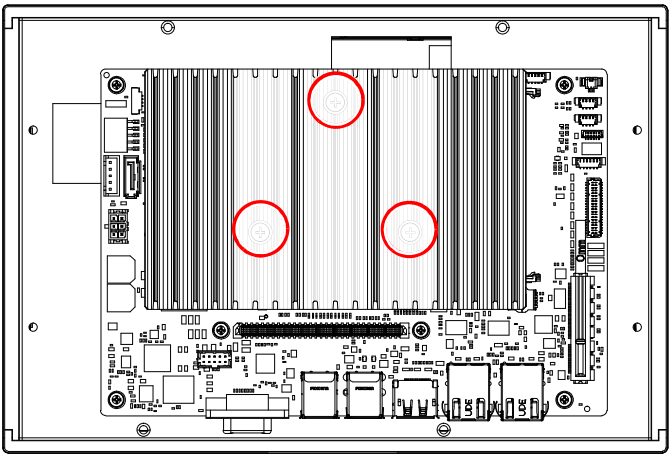
3. Reattach the heat sink to the mainboard with the previously removed screws.

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2.7 Installing a WiFi Module

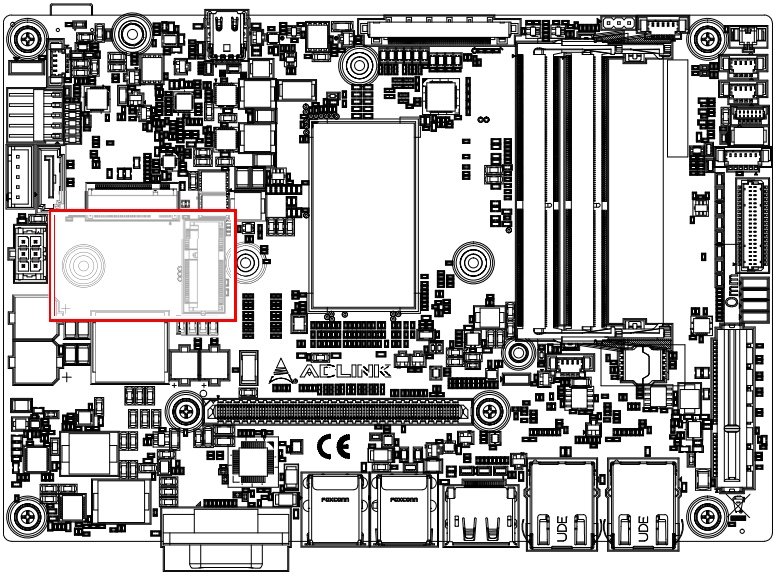
Follow these steps to add or change memory modules.

1. Remove the 3 screws that attach the heat sink to the mainboard and remove the heat sink.



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2. Install the WiFi module.



3. Reattach the heat sink to the mainboard with the previously removed screws.

NOTE:

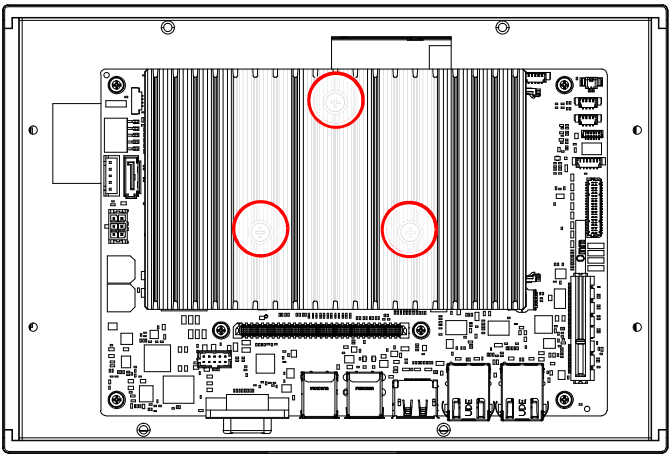
WiFi antennas must be installed on the SP2-TGL Series housing in order for WiFi to function properly.

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2.8 Installing a 4G/5G Module

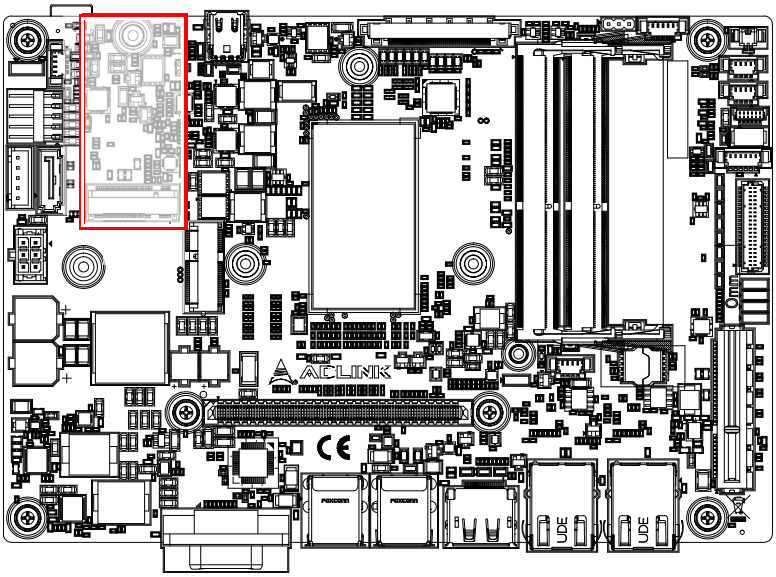
Follow these steps to add or change memory modules.

1. Remove the 3 screws that attach the heat sink to the mainboard and remove the heat sink.



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2. Install the 4G/5G module.



3. Reattach the heat sink to the mainboard with the previously removed screws.

NOTE:

Antennas must be installed on the SP2-TGL Series housing in order for 4G/5G to function properly.

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2.9 Mounting

This section includes details for panel and VESA mounting options.



Risk of physical injuries and / or property damage:
When mounting the device, use the screws to mount the VESA bracket to the rear of the device. Tighten all four screws firmly to support the weight of the device. Make sure that the suspension system is capable of carrying the device!



Risk of burns to the user caused by hot surfaces:
Turn off power and allow the device to cool down prior to performing any mounting or demounting operations. Do not touch the enclosure for over 10 seconds when the device is in operation or is still hot from previous use.



All dimensions are in millimeters, unless noted.

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2.9.1 Panel Mounting

The SP2-TGL Series can be panel mounted with 14 mounting clips (optional items sold separately). Make sure there is adequate space behind the panel for ventilation, and that the panel material and thickness can support the weight of the device.

Step 1: Cut the panel opening using the appropriate cutout dimensions.

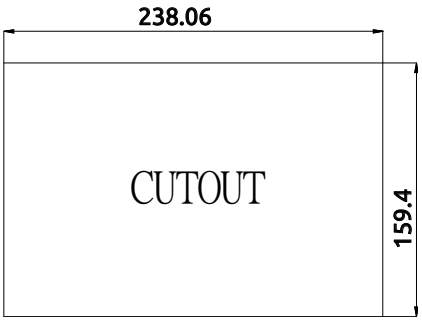


Figure 2-8: SP2-10WP-TGL Cutout Dimensions

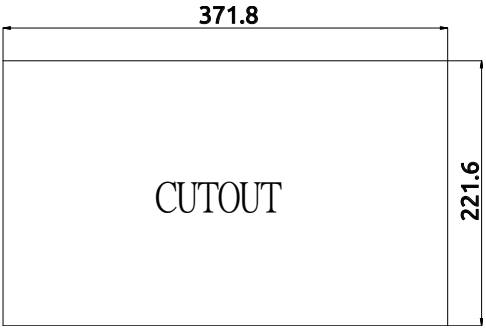


Figure 2-9: SP2-15WP-TGL Cutout Dimensions

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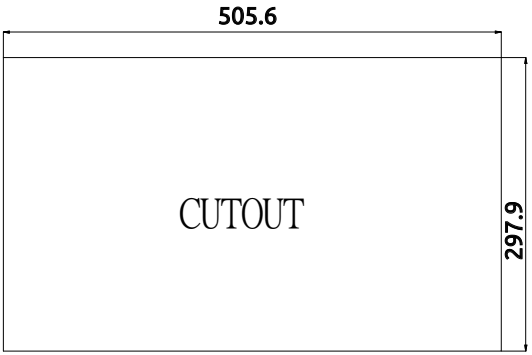
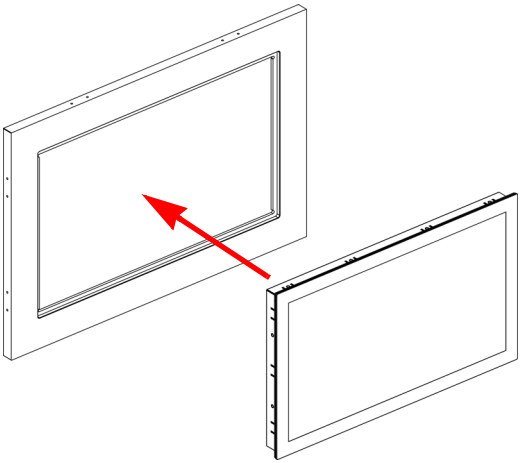


Figure 2-10: SP2-21WP-TGL Cutout Dimensions

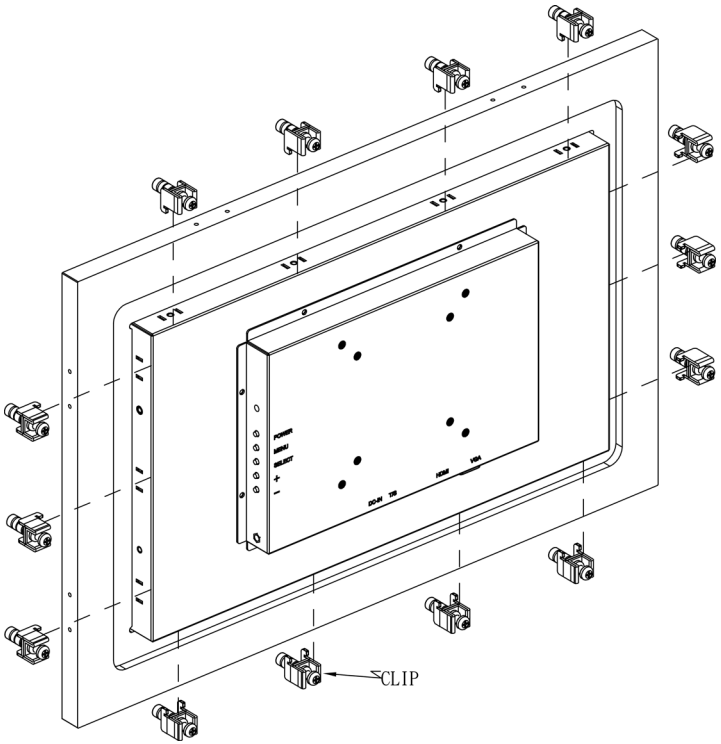
Step 2: Attach I/O cables to the device before installing into the panel if rear access will be limited after installation.

Step 3: Place the device into the panel cutout.



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Step 4: Insert the mounting clips into the slots on the sides of the device as shown. Hand-tighten the mounting clips with a Phillips-head screwdriver to secure it to the panel. Do not overtighten the clips to avoid damaging the device enclosure.



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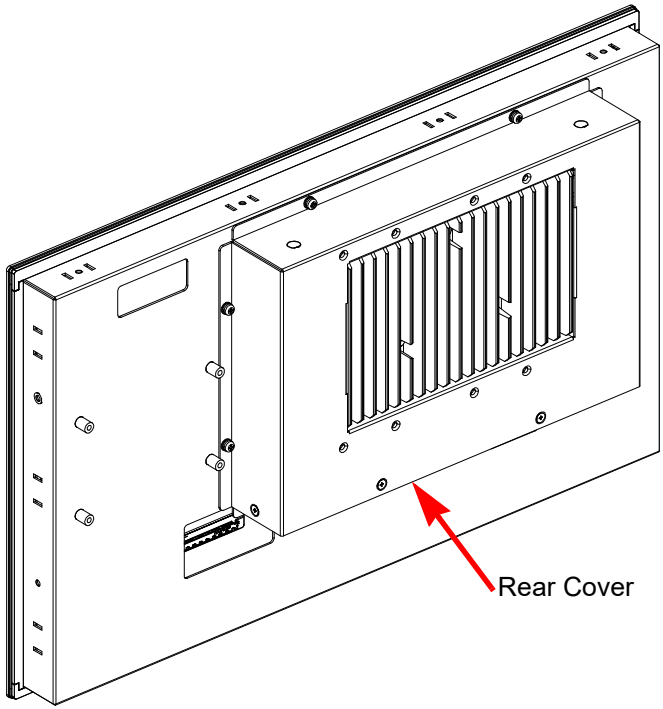
2.9.2 VESA Mounting

The SP2-TGL Series can be VESA mounted with a rear cover and VESA bracket. (Optional items sold separately.)

NOTE:

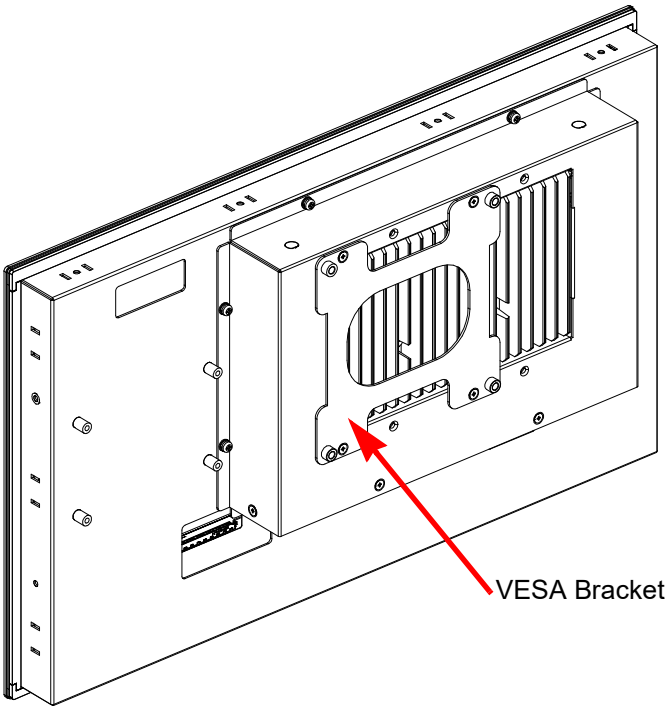
All I/O ports **must** face down.

Step 1: Attach the rear cover to the panel PC with the screws supplied in the kit.



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Step 2: Attach the VESA bracket to the rear cover with the screws supplied in the kit.



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3 System Layout

3.1 External I/O Connectors

The SP2-TGL Series provides the following external I/O connectors.

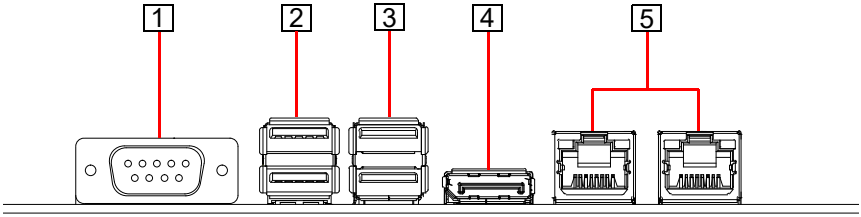


Figure 3-1: SP2-TGL SeriesExternal I/O

1	1x DB-9P COM1 port supports RS-232/422/485
2	2x USB 3.2 Gen2 (10Gbps) Type-A
3	1x USB 3.2 Gen1 (5Gbps) Type-A 1x USB 2.0 Type-A
4	1x DisplayPort
5	2x RJ45 GbE LAN I225 type, up to 2.5GHz

Table 3-1: External I/O Legend

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3.1.1 COM1 Port Connector

The COM1 port is a D-sub 9-pin connector supporting RS-232/422/485 modes by BIOS setting.

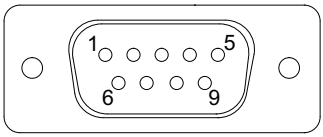


Figure 3-2: COM1 Port Pin Definition

Pin	Signal	RS-232	RS-422	RS-485
1	COM1_DCD-L_CN	DCD#	TXD422-	485DATA-
2	COM1_RXD_CN	RXD	TXD422+	485DATA+
3	COM1_TXD_CN	TXD	RXD422+	N/S
4	COM1_DTR-L_CN	DTR#	RXD422-	N/S
5	GND	GND	N/S	N/S
6	COM1_DSR-L_CN	DSR#	N/S	N/S
7	COM1_RTS-L_CN	RTS#	N/S	N/S
8	COM1_CTS-L_CN	CTS#	N/S	N/S
9	COM1_RI-L_CN	RI#	N/S	N/S

Table 3-2: COM1 Port Pin Definition

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3.1.2 USB 3.2 (10 Gbps) Connector

Two USB 3.2 Gen2 (10 Gbps) Type-A connectors with 1600 mAP power and OCP protection are provided compatible with Super-Speed, Hi-Speed, Full-Speed, and Low-Speed USB devices suitable for USB peripherals.

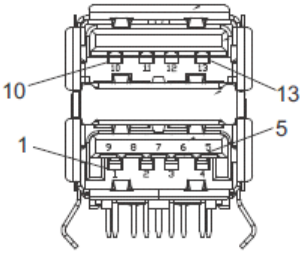


Figure 3-3: USB 3.2 Connector Pin Definition

Pin	Signal	Pin	Signal
1	P_+5V0_A_CON_USB3_1	10	P_+5V0_A_CON_USB3_2
2	CON_USB2_D1_N	11	CON_USB2_D2_N
3	CON_USB2_D1_P	12	CON_USB2_D2_P
4	GND	13	GND
5	CON_USB3_RX1_N	14	CON_USB3_RX2_N
6	CON_USB3_RX1_P	15	CON_USB3_RX2_P
7	GND	16	GND
8	CON_USB3_TX1_N	17	CON_USB3_TX2_N
9	CON_USB3_TX1_P	18	CON_USB3_TX2_P
G1	GND	G2	GND
G3	GND	G4	GND

Table 3-3: USB 3.2 Connector Pin Definition

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3.1.3 USB 3.0 + USB 2.0 Combo Connector

USB 3.0 Gen1 (5 Gbps) Type-A + USB 2.0 Type-A connectors are provided compatible with SuperSpeed, Hi-Speed, Full-Speed, and Low-Speed USB devices suitable for USB peripherals.

- USB 3.1 connector up to 5Gbps with 1600 mA power and OCP protection
- USB 2.0 connector up to 480 Mbps with 1000 mA power and OCP protection.

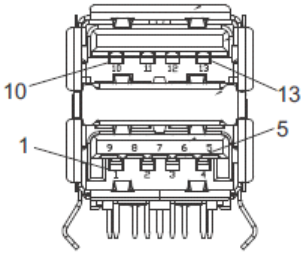


Figure 3-4: USB 3.0 + USB 2 .0 Connector Pin Definition

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Pin	Signal
1	P_+5V_USB3
2	CN_U2_P1_N
3	CN_U2_P1_P
4	GND
5	CN_U3_RX1_N
6	CN_U3_RX1_P
7	GND
8	CN_U3_TX1_N
9	CN_U3_TX1_P
10	P_+5V_USB2
11	CN_U2_P2_N
12	CN_U2_P2_P
13	GND
G1	GND
G2	GND
G3	GND
G4	GND

Table 3-4: USB 3.0 + USB 2 .0 Connector Pin Definition

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3.1.4 DisplayPort Connector

One DisplayPort connector, supporting the DP++ standard specification, can connect to VGA, DVI, HDMI, and DisplayPort with a DisplayPort to VGA adapter cable, DisplayPort to DVI adapter cable, or DisplayPort to HDMI adapter cable, or a DisplayPort cable, with DP1.4 support for resolutions up to 5120 x 3200 at 60Hz.

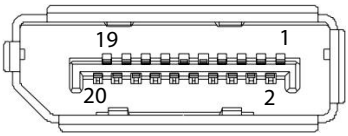


Figure 3-5: DisplayPort Connector Pin Definition

Pin	Signal	Pin	Signal
1	CON_DDI1_TX0_P	11	GND
2	GND	12	CON_DDI1_TX3_N
3	CON_DDI1_TX0_N	13	CON_DDI1_DDC_AUX_SEL
4	CON_DDI1_TX1_P	14	CON_DDI1_CONFIG_2
5	GND	15	CON_DDI1_I2CCLK_AUX_P
6	CON_DDI1_TX1_N	16	GND
7	CON_DDI1_TX2_P	17	CON_DDI1_I2CCLK_AUX_N
8	GND	18	CON_DDI1_HPD
9	CON_DDI1_TX2_N	19	GND
10	CON_DDI1_TX3_P	20	P_+3V3_DP1

Table 3-5: DisplayPort Pin Definition

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3.1.5 Gigabit Ethernet Port

Two 2.5 Gigabit Intel® Ethernet Controller i225 Series (V, IT or LM) RJ45 connectors support up to 1000/100/10 Mbit/s connections.

- The V version supports up to 2.5GbE (without TSN, selected for a Standard Operating Temperature SKU)
- The IT version supports the TSN feature (Linux OS) at maximum 2.5GbE connection (selected for Extreme Rugged Operating Temperature SKU)
- GbE0_SDP available if TSN support is enabled
- Other combinations supported on a by-project basis. Contact your ADLINK sales representative for more information.

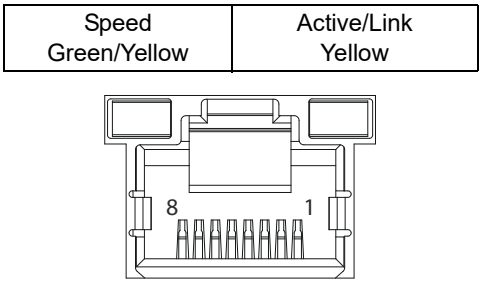


Figure 3-6: Ethernet Port and LEDs

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Pin	Signal
R1	L_GBE1_MDI0_P
R2	L_GBE1_MDI0_N
R3	L_GBE1_MDI1_P
R4	L_GBE1_MDI1_N
R5	Cap to GND
R6	Cap to GND
R7	L_GBE1_MDI2_P
R8	L_GBE1_MDI2_N
R9	L_GBE1_MDI3_P
R10	L_GBE1_MDI3_N
L1	L_GBE1_LED1_LINK/ACT-L
L2	LINK_ACT_LED
L3	L_GBE1_LINK100-L
L4	L_GBE1_LINK1000-L
G1	GND
G2	GND

Table 3-6: Ethernet Port Pin Definition

LED	Color	Status	Description
Active/Link	Yellow	On	LAN is connected
		Blinking	LAN is initializing
Speed	None	Off	10/100 Mbps
	Green	On	1000 Mbps
	Yellow	On	2500 Mbps

Table 3-7: Active/Link and Speed LED Indicators

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3.2 Internal I/O Connectors

WARNING:

Installation of add-on devices must be carried out by ADLINK service personnel only. Users must not disassemble the device themselves.

L'installation de périphériques complémentaires doit être effectuée uniquement par le personnel de service ADLINK. Les utilisateurs ne doivent pas démonter l'appareil eux-mêmes.

3.2.1 Mainboard Connector Locations

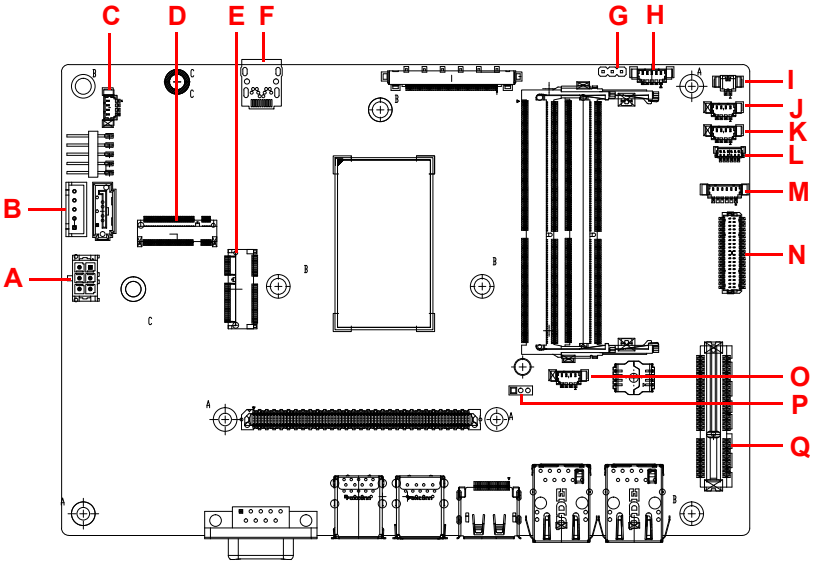


Figure 3-7: Mainboard Connectors (Top)

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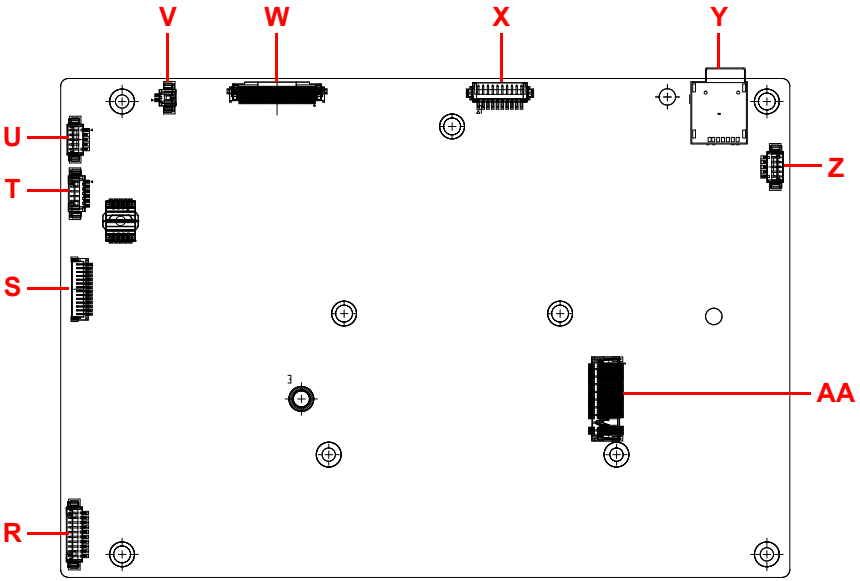


Figure 3-8: Mainboard Connectors (Bottom)

A	Power connector	**N**	Key connector (optional)
B	2.5” SATA data & power	**O**	Fan connector
C	Touchscreen	**P**	Clear CMOS Jumper (JP1501)
D	M.2 3042, B Key for 4G/5G	**Q**	PCIe Gen4 x4 slot
E	M.2 2230, A/E Key for WiFi/BT	**R**	COM2 wafer
F	Mini DP connector	**S**	LED wafer
G	USB 3.1 Power (S5/S0) Jumper (JP7)	**T**	I2C connector 1
H	PWR & RST wafer	**U**	I2C connector 2
I	Buzzer	**V**	RTC Battery wafer
J	Line-out & Mic-in	**W**	DB40 connector
K	Speaker	**X**	GPIO wafer
L	USB 2.0	**Y**	Nano SIM Card Socket
M	Volume & Backlight wafer (optional)	**Z**	Backup battery connector (optional)
		AA	M.2 2280 SATA SSD connector

Table 3-8: Mainboard Connector Legend

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3.2.2 Power Connector

The 6-pin power connector connects an AC/DC power supply adapter, DC to DC power module and battery, with AT and ATX power modes (AT mode start is controlled by BIOS).

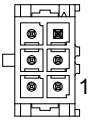


Figure 3-9: Power Connector Pin Definition

Pin	Signal
1	GND
2	GND
3	GND
4	PWR_CONN_IN
5	PWR_CONN_IN
6	PWR_CONN_IN

Table 3-9: Power Connector Pin Definition

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3.2.3 SATA Data & Power Connectors

The SATA data and power connectors are used to connect an internal 2.5” HDD.

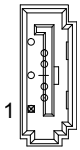


Figure 3-10: SATA Data Connector Pin Definition

Pin	Signal
1	GND
2	SATA_TX1_P
3	SATA_TX1_N
4	GND
5	SATA_RX1_N
6	SATA_RX1_P
7	GND

Table 3-10: SATA Data Connector Pin Definition

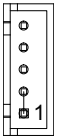


Figure 3-11: SATA Power Connector Pin Definition

Pin	Signal
1	NC
2	GND
3	P_+5V_S0
4	GND
5	P_+3V3_S0

Table 3-11: SATA Power Connector Pin Definition

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3.2.4 Touchscreen Connector

The USB 2.0 connector supports a PCAP touchscreen.

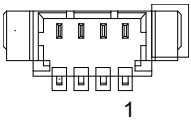


Figure 3-12: Touchscreen Connector Pin Definition

Pin	Signal
1	GND
2	TSC_D+
3	TSC_D-
4	P5V_U2_TOU

Table 3-12: Touchscreen Connector Pin Definition

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3.2.5 M.2 3042 Connector

The M.2 B key port supports standard USB3.1 and USB2.0 for 4G/5G module.

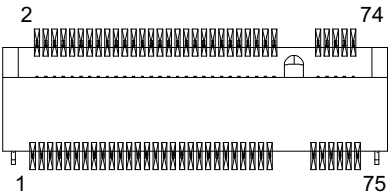


Figure 3-13: M.2 3042 Connector Pin Definition

Pin	Signal	Pin	Signal
1	M2B_CONFIG_3	2	P_+3V3_NGFF_B
3	GND	4	P_+3V3_NGFF_B
5	GND	6	FULL_CARD_POWER_OFF
7	U2_USB1_P	8	W_DISABLE1
9	U2_USB1_N	10	NC
11	GND	20	NC
21	M2B_CONFIG_0	22	NC
23	NC	24	NC
25	NC	26	NC
27	NC	28	NC
29	U3_USB1_RX_N_R	30	M2_UIM_RST
31	U3_USB1_RX_P_R	32	M2_UIM_CLK
33	GND	34	M2_UIM_DATA
35	U3_USB1_TX_N_R	36	P_+3V3_UIM_M2
37	U3_USB1_TX_P_R	38	NC
39	GND	40	NC
41	NC	42	NC
43	NC	44	NC
45	GND	46	NC
47	NC	48	NC
49	NC	50	M2B_PLTRST_BUF-L

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Pin	Signal	Pin	Signal
51	GND	52	NC
53	NC	54	NC
55	NC	56	NC
57	GND	58	NC
59	NC	60	NC
61	NC	62	NC
63	NC	64	NC
65	NC	66	M2_UIM1_DET
67	WWAN_RESET-L	68	NC
69	M2B_CONFIG_1	70	P_+3V3_NGFF_B
71	GND	72	P_+3V3_NGFF_B
73	GND	74	P_+3V3_NGFF_B
75	M2B_CONFIG_2		

Table 3-13: M.2 3042 Connector Pin Definition

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3.2.6 M.2 2230 Connector

The M.2 E key port supports standard USB for a WiFi/Bluetooth module.

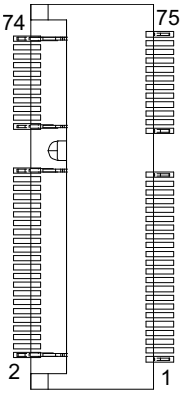


Figure 3-14: M.2 2230 Connector Pin Definition

Pin	Signal	Pin	Signal
1	M2B_CONFIG_3	2	P_+3V3_NGFF_B
3	GND	4	P_+3V3_NGFF_B
5	GND	6	FULL_CARD_POWER_OFF
7	U2_USB1_P	8	W_DISABLE1
9	U2_USB1_N	10	NC
11	GND	20	NC
21	M2B_CONFIG_0	22	NC
23	NC	24	NC
25	NC	26	NC
27	NC	28	NC
29	U3_USB1_RX_N_R	30	M2_UIM_RST
31	U3_USB1_RX_P_R	32	M2_UIM_CLK
33	GND	34	M2_UIM_DATA
35	U3_USB1_TX_N_R	36	P_+3V3_UIM_M2
37	U3_USB1_TX_P_R	38	NC
39	GND	40	NC
41	NC	42	NC

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Pin	Signal	Pin	Signal
43	NC	44	NC
45	GND	46	NC
47	NC	48	NC
49	NC	50	M2B_PLTRST_BUF-L
51	GND	52	NC
53	NC	54	NC
55	NC	56	NC
57	GND	58	NC
59	NC	60	NC
61	NC	62	NC
63	NC	64	NC
65	NC	66	M2_UIM1_DET
67	WWAN_RESET-L	68	NC
69	M2B_CONFIG_1	70	P_+3V3_NGFF_B
71	GND	72	P_+3V3_NGFF_B
73	GND	74	P_+3V3_NGFF_B
75	M2B_CONFIG_2		

Table 3-14: M.2 2230 Connector Pin Definition

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3.2.7 Mini DisplayPort Connector

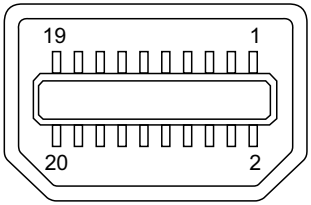


Figure 3-15: Mini DisplayPort Pin Definition

Pin	Signal
1	GND
2	CON_TCP2_HPD
3	CON_TCP2_TX0_P
4	CON_TCP2_DDC_AUX_SEL
5	CON_TCP2_TX0_N
6	GND
7	GND
8	GND
9	CON_TCP2_TX1_P
10	CON_TCP2_TX3_P
11	CON_TCP2_TX1_N
12	CON_TCP2_TX3_N
13	GND
14	GND
15	CON_TCP2_TX2_P
16	CON_TCP2_I2CCLK_AUX_P
17	CON_TCP2_TX2_N
18	CON_TCP2_I2CCLK_AUX_N
19	GND
20	P_+3V3_DP2

Table 3-15: Mini DisplayPort Pin Definition

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3.2.8 USB 3.1 Power (S5/S0) Jumper (JP7)



Figure 3-16: USB 3.1 Power (S5/S0) Jumper (JP7) Pin Definition

JP7 USB S5/S0 Power	
1-2	+5V_A (Default)
2-3	+5V_S0

Table 3-16: USB 3.1 Power (S5/S0) Jumper (JP7)

3.2.9 Power & Reset Connector

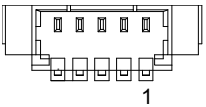


Figure 3-17: Power & Reset Connector Pin Definition

Pin	Signal
1	P_+3V3_A
2	PWRBTN-L_R
3	SYS_RESET-L_R
4	SIG_PWRLED-L
5	GND

Table 3-17: Power & Reset Connector Pin Definition

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3.2.10 Buzzer Connector

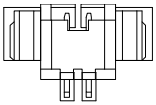


Figure 3-18: Buzzer Connector Pin Definition

Pin	Signal
1	P_+5V_S0
2	N40235133

Table 3-18: Buzzer Connector Pin Definition

3.2.11 Mic-in & Line-out Connector

The Mic-in/Line-out supports connecting to speakers via cable.

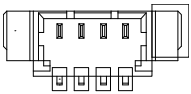


Figure 3-19: Mic-in & Line-out Connector Pin Definition

Pin	Signal
1	CON_MIC1_IN
2	CON_LINE1_OUT_L
3	CON_LINE1_OUT_R
4	AGND_AUDIO

Table 3-19: Mic-in & Line-out Connector Pin Definition

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3.2.12 Speaker Connector

The speaker connector supports 2 2x 2W speakers via cable.

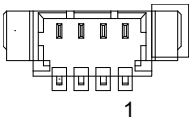


Figure 3-20: Speaker Connector Pin Definition

Pin	Signal
1	AMP_L+
2	AMP_L-
3	AMP_R+
4	AMP_R-

Table 3-20: Speaker Connector Pin Definition

3.2.13 USB 2.0 Connector

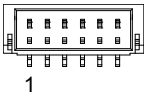


Figure 3-21: USB 2.0 Connector Pin Definition

Pin	Signal
1	P5V_U2_CAM
2	CN_U2_P8_N
3	CN_U2_P8_P
4	GND
5	NC
6	NC

Table 3-21: USB 2.0 Connector Pin Definition

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3.2.14 Volume & Backlight Control Connector

Controls volume and adjusts display brightness.

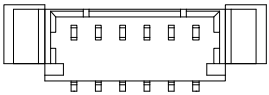


Figure 3-22: Volume & Backlight Control Connector Pin Definition

Pin	Signal
1	P_+3V3_S0
2	EC_BTN_33
3	EC_BTN_34
4	EC_BTN_35
5	EC_BTN_36
6	GND

Table 3-22: Volume & Backlight Control Connector Pin Definition

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3.2.15 Key Connector (Optional)

The key connector supports 32 physical keys and 5 control keys with the following default values:

- Directions: ↑, ↓, ←, →
- Numbers: 0 to 9
- Functions: Enter, ESC, TAB, Backspace, Delete, Clear, PagUp, PagDn
- Hot keys: F1 - F10

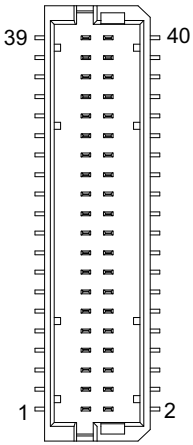


Figure 3-23: Key Connector Pin Definition

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Pin	Signal	Function Value	Key Code	Pin	Signal	Function Value	Key Code
1	GND	N/A	N/A	2	P_+3V3_S0	N/A	N/A
3	EC_BTN_17	^	48h	4	EC_BTN_1	Tab	0Fh
5	EC_BTN_18	V	50h	6	EC_BTN_2	Backspace	0Eh
7	EC_BTN_19	>	4Dh	8	EC_BTN_3	Delete	53h
9	EC_BTN_20	<	4Bh	10	EC_BTN_4	Space	39h
11	EC_BTN_21	0	0Bh	12	EC_BTN_5	Page up	49h
13	EC_BTN_22	1	02h	14	EC_BTN_6	Page down	51h
15	EC_BTN_23	2	03h	16	EC_BTN_7	F1	3Bh
17	EC_BTN_24	3	04h	18	EC_BTN_8	F2	3Ch
19	EC_BTN_25	4	5Ch	20	EC_BTN_9	F3	3Dh
21	EC_BTN_26	5	06h	22	EC_BTN_10	F4	3Eh
23	EC_BTN_27	6	07h	24	EC_BTN_11	F5	3Fh
25	EC_BTN_28	7	08h	26	EC_BTN_12	F6	40h
27	EC_BTN_29	8	09h	28	EC_BTN_13	F7	41h
29	EC_BTN_30	9	0Ah	30	EC_BTN_14	F8	42h
31	EC_BTN_31	Enter	1Ch	32	EC_BTN_15	F9	43h
33	EC_BTN_32	ESC	01h	34	EC_BTN_16	F10	44h
35	EC_BTN_37	Power	N/A	36	N/C		
37	N/C		N/A	38	P_+3V3_A	N/A	N/A
39	N/C		N/A	40	P_+3V3_A	N/A	N/A
G1	GND	N/A	N/A	G2	GND	N/A	N/A

Table 3-23: Key Connector Pin Definition

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3.2.16 Fan Connectors

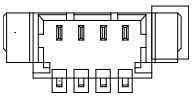


Figure 3-24: Fan Connector Pin Definition

Pin	Signal
1	GND
2	FAN_PWR_IN (12V)
3	BMC_FAN0_IN
4	BMC_FAN0_OUT

Table 3-24: Fan Connector Pin Definition

3.2.17 Clear CMOS Jumper (JP1501)

Under conditions in which the SP2-TGL fails to boot, clearing the BIOS content stored in CMOS and restoring the default settings may be effective. To clear CMOS (JP1501), short Pin 2 and Pin 3 and wait for 5 seconds. Remove the jumper cap and short Pin 1 and Pin 2.



Figure 3-25: Clear CMOS Jumper (JP1501) Pin Definition

Clear CMOS	
2-3	Clear CMOS
1-2	N/A (default)

Table 3-25: Clear CMOS Jumper (JP1501)

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3.2.18 PCIe Gen4 x4 Connectors (Optional)

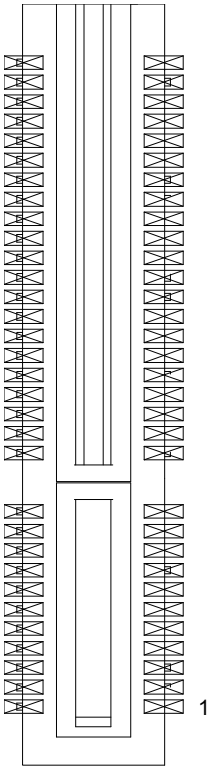


Figure 3-26: PCIe Gen4 x4 Connector Pin Definition

Pin	Side B Connector		Side A Connector	
	Name	Description	Name	Description
1	+12V	+12 volt power	PRSNT#1	Hot plug presence detect
2	+12V	+12 volt power	+12V	+12 volt power
3	+12V	+12 volt power	+12V	+12 volt power
4	GND	Ground	GND	Ground
5	SMCLK	SMBus clock	JTAG2	TCK

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Pin	Side B Connector		Side A Connector	
	Name	Description	Name	Description
6	SMDAT	SMBus data	JTAG3	TDI
7	GND	Ground	JTAG4	TDO
8	+12V	+12V power	JTAG5	TMS
9	JTAG1	+TRST#	+3.3V	+3.3 volt power
10	3.3Vaux	3.3 volt power	+3.3V	+3.3 volt power
11	WAKE#	Link Reactivation	PERST#	Reset
Mechanical Key				
12	RSVD	Reserved	GND	Ground
13	GND	Ground	REFCLK+	Reference Clock
14	HSOp(0)	Transmitter Lane 0,	REFCLK-	Differential pair
15	HSOn(0)	Differential pair	GND	Ground
16	GND	Ground	HSIp(0)	Receiver Lane 0,
17	PRSNT#2	Hotplug detect	HSIn(0)	Differential pair
18	GND	Ground	GND	Ground
19	HSOp(1)	Transmitter Lane 1,	RSVD	Reserved
20	HSOn(1)	Differential pair	GND	Ground
21	GND	Ground	HSIp(1)	Receiver Lane 1,
22	GND	Ground	HSIn(1)	Differential pair
23	HSOp(2)	Transmitter Lane 2,	GND	Ground
24	HSOn(2)	Differential pair	GND	Ground
25	GND	Ground	HSIp(2)	Receiver Lane 2,
26	GND	Ground	HSIn(2)	Differential pair
27	HSOp(3)	Transmitter Lane 3,	GND	Ground
28	HSOn(0)	Differential pair	GND	Ground
29	GND	Ground	HSIp(3)	Receiver Lane 3,
30	RSVD	Reserved	HSIn(3)	Differential pair
31	PRSNT#2	Hot plug detect	GND	Ground
32	GND	Ground	RSVD	Reserved

Table 3-26: PCIe Gen4 x4 Connector Pin Definition

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3.2.19 COM2 Connector

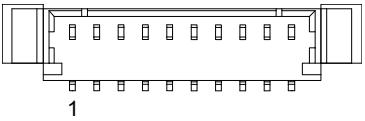


Figure 3-27: COM2 Connector Pin Definition

Pin	Signal
1	COM2_DCD-L_CN
2	COM2_RXD_CN
3	COM2_TXD_CN
4	COM2_DTR-L_CN
5	GND
6	COM2_DSR-L_CN
7	COM2_RTS-L_CN
8	COM2_CTS-L_CN
9	COM2_RI-L_CN
10	NC

Table 3-27: COM2 Connector Pin Definition

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3.2.20 LED Connector

The LED connector supports up to 10 LEDs.

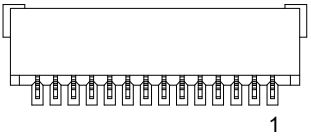


Figure 3-28: LED Connector Pin Definition

Pin	Signal
1	GND
2	CN_STDBY_PWR
3	CN_GP3_LED-L
4	CN_GP2_LED-L
5	CN_GP1_LED-L
6	P_+3V3_A
7	CN_COM2_SOUT_LED_L
8	CN_COM2_SIN_LED_L
9	CN_COM1_SOUT_LED_L
10	CN_COM1_SIN_LED_L
11	CN_SATA_LED-L_R
12	P_+3V3_S0
13	CN_WDT_LED-L
14	P_+3V3_A
15	GND
16	GND

Table 3-28: LED Connector Pin Definition

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Pin	Function	Color	Remarks
10	COM Tx for COM 1	LED blinks when COM data is transferring	HW control
9	COM Rx for COM 1	LED blinks when COM data is transferring	HW control
8	COM Tx for COM 2	LED blinks when COM data is transferring	HW control
7	COM Rx for COM 2	LED blinks when COM data is transferring	HW control
13	Watch Dog LED	One Red color LED onboard	BMC control
11	SATA LED	One Red color LED onboard	SOC control
2	Standby Power	ON when system is on standby	HW control
5	User defined		SOC control
4	User defined		SOC control
3	User defined		SOC control

Table 3-29: LED Connector Pin Functions

3.2.21 I2C Connector 1 & 2

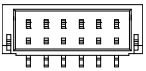


Figure 3-29: I2C Connector 1 & 2 Pin Definition

Pin	Signal
1	P_+5V_I2C
2	P_+3V3_I2C
3	DIO_I2C4_SDA
4	DIO_I2C4_SCL
5	DIO_I2C1_INT
6	GND

Table 3-30: I2C Connector 1 & 2 Pin Definition

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3.2.22 RTC Battery Wafer

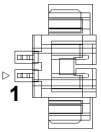


Figure 3-30: RTC Battery Wafer Pin Definition

Pin	Signal
1	P_+VCC_RTC_CN_A
2	GND

Table 3-31: RTC Battery Wafer Pin Definition

3.2.23 DB40 Connector

This connector is particular useful during carrier design and bring up phase. It offers access to the following critical parts of the module:

- Test points measurement of internal power rails
- I2C bus for BIOS POST code readout
- SPI BIOS programming interface
- Embedded Controller programming interface

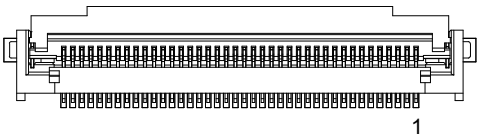


Figure 3-31: DB40 Connector Pin Definition

Pin	Signal
1	RESVD
2	SMC_STATUS
3	BIOS_MODE
4	SEL_BIOS

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Pin	Signal
5	POSTWDT_DIS#
6	SUS_S5#
7	SUS_S4#
8	SUS_S3#
9	CB_PWROK
10	CB_RESET#
11	SYS_RESET#
12	PWRBTN#
13	OCD0B
14	OCD0A
15	CLK
16	DATA
17	RESET_IN#
18	FUMD0
19	RXD6
20	TXD6
21	GND
22	3.3V_A
23	3.3V_SMC
24	LPC_AD0
25	LPC_AD1
26	LPC_AD2
27	LPC_AD3
28	LPC_FRAME#
29	CLK33_LPC
30	RST#
31	BIOS_DIS0
32	GND
33	3V3_LPC
34	SPI_BIOS_CLK
35	SPI_BIOS_MOSI
36	SPI_BIOS_MISO
37	SPI_BIOS_CS1#

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Pin	Signal
38	SPI_BIOS_CS0#
39	GND
40	VCC_SPI_IN

Table 3-32: DB40 Connector Pin Definition

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3.2.24 GPIO Connector

SP2-TGL provides 4 channels of non-isolation digital input and 4 channels of non-isolation digital output circuits.

4-channel Digital Input

- VIH: 2.9 to 3.3V
- VIL: 0 to 0.15V

4-channel Digital Output

- Output type: open drain N-channel
- MOSFET driver with internal pull-high of 200Ω resistance
- Source/Sink current for all channels: 22mA
- VOH: 2.21 to 3.3V
- VOL: 0 to 0.55V

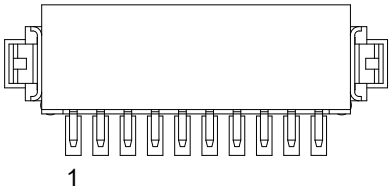


Figure 3-32: GPIO Connector Pin Definition

Pin	Signal Name
1	P_+3V3_S0
2	WFR_GPIO_1_R
3	WFR_GPIO_2_R
4	WFR_GPIO_3_R
5	WFR_GPIO_4_R
6	WFR_GPIO_5_R
7	WFR_GPIO_6_R
8	WFR_GPIO_7_R
9	WFR_GPIO_8_R
10	GND

Table 3-33: GPIO Connector Pin Definition

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Pin	Signal	PCH GPIO	Default Value	Input/Output Voltage Range
1	P_+3V3_S0			
2	GPIO_1	GPP_B3	Output High	VIH: 2.9V VIL: 0.15V VOH: 2.211V VOL: 0.55V
3	GPIO_2	GPP_B4	Output Low	VIH: 2.9V VIL: 0.15V VOH: 2.211V VOL: 0.55V
4	GPIO_3	GPP_E3	Output High	VIH: 2.9V VIL: 0.15V VOH: 2.211V VOL: 0.55V
5	GPIO_4	GPP_E7	Output Low	VIH: 2.9V VIL: 0.15V VOH: 2.211V VOL: 0.55V
6	GPIO_5	GPP_A14	Output High	VIH: 2.9V VIL: 0.15V VOH: 2.211V VOL: 0.55V
7	GPIO_6	GPP_A15	Output Low	VIH: 2.9V VIL: 0.15V VOH: 2.211V VOL: 0.55V
8	GPIO_7	GPP_A21	Output High	VIH: 2.9V VIL: 0.15V VOH: 2.211V VOL: 0.55V
9	GPIO_8	GPP_A22	Output Low	VIH: 2.9V VIL: 0.15V VOH: 2.211V VOL: 0.55V
10	GND			

Table 3-34: GPIO Connector Pin Voltage

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3.2.25 Nano SIM Card Connector

The Nano SIM connector provides 4G/5G communication functionality.

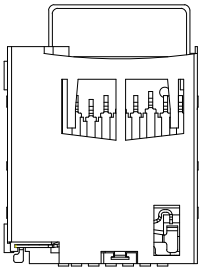


Figure 3-33: Nano SIM Connector Pin Definition

Pin	Signal
C1	P_+3V3_UIM_M2
C2	M2_UIM_RST
C3	M2_UIM_CLK_R
CD	M2_UIM1_CD
C5	GND
C6	M2_UIM_VPP
C7	M2_UIM_DATA
G1	GND
G2	GND
G3	GND
G4	GND

Table 3-35: Nano SIM Connector Pin Definition

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3.2.26 Backup Battery Connector (Optional)

An optional backup battery connector is available. Contact ADLINK to for more information.

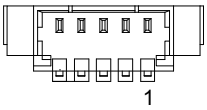


Figure 3-34: Backup Battery Connector Pin Definition

Pin	Signal
1	CHG_PWR
2	GND
3	CHG_SMBCLK
4	CHG_SMBDAT
5	SMB_ALERT-L_R

Table 3-36: Backup Battery Connector Pin Definition

3.2.27 M.2 2280 SATA SSD Connector

The M.2 B+M key supports a SATA SSD.

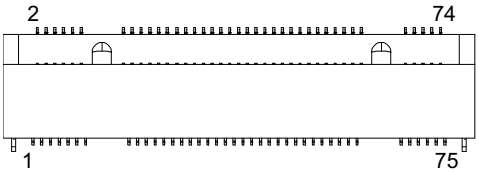


Figure 3-35: M.2 2280 Connector Pin Definition

Pin	Signal	Pin	Signal
1	NC	2	P_+3V3_S0
3	GND	4	P_+3V3_S0
5	NC	6	NC
7	NC	8	NC
9	GND	10	NC
11	NC	12	P_+3V3_S0

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Pin	Signal	Pin	Signal
13	NC	14	P_+3V3_S0
15	GND	16	P_+3V3_S0
17	NC	18	P_+3V3_S0
19	NC	20	NC
21	NC	22	NC
23	NC	24	NC
25	NC	26	NC
27	GND	28	NC
29	NC	30	NC
31	NC	32	NC
33	GND	34	NC
35	NC	36	NC
37	NC	38	PCH_DEVSLP0
39	GND	40	NC
41	SATA_RX0_P	42	NC
43	SATA_RX0_N	44	NC
45	GND	46	NC
47	SATA_TX0_N	48	NC
49	SATA_TX0_P	50	NC
51	GND	52	NC
53	NC	54	NC
55	NC	56	NC
57	GND	58	NC
67	NC	68	NC
69	NC	70	P_+3V3_S0
71	GND	72	P_+3V3_S0
73	GND	74	P_+3V3_S0
75	NC	-	-
G1	GND	G2	GND
N1	NC	N2	NC

Table 3-37: M.2 2280 Connector Pin Definition

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4 BIOS Setup

BIOS can be configured via the BIOS Setup Utility that is invoked during BIOS boot phase. The BIOS configuration is kept in NVRAM which is the same hardware part where the BIOS is stored. All settings will remain after the system is powered down.



BIOS options used in this manual are for reference only, and are subject to change. Users can download the latest BIOS version from the ADLINK website.



Changing BIOS settings may lead to unexpected system behavior and the possible inability to boot.

4.1 BIOS Setup Menu

The BIOS Setup Utility is invoked by pressing <ESC> or <DEL> when the system boots. A system reboot is required when changes are made in the BIOS Setup Utility.

The BIOS Setup Utility includes the following hotkeys.

- <F1>: General help
- <F8>: Load previous BIOS values
- <F9>: Load BIOS default values
- <F10>: Save & Exit the Setup Utility

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Menu Selection Bar

The Menu Selection Bar is located at the top of the screen. It displays the top level menus available to the user.

- Main Menu
- Advanced Menu
- Chipset Menu
- Security Menu
- Boot Menu
- Save & Exit Menu

Menu Conventions

The appearance of the setup menus and items listed in this chapter are based on a VT100 terminal connection via serial console with the following menu conventions.

- Using color

  The default BIOS setup fields are black. The BIOS setup fields currently not used are grey. The display strings are black.

- Using brackets

  Editable menu options are marketed with square brackets, '[' and ']'.

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4.2 Menu Structure

This section presents the six primary menus of the BIOS Setup Utility. Use the following tables as a quick reference for the contents of the BIOS Setup Utility. The remainder of this chapter describe the submenus and options for each menu item. The default settings are presented in bold, and the function of each setting is described in the right hand column of the table.

Main	Advanced
- BIOS Information - System Information - Board Information	- CPU Configuration ► - Graphics Configuration ► - Power Management ► - System Management ► - Thermal Management ► - Watchdog Timer ► - Super IO Configuration ► - Serial Console Redirection ► - Network Stack Configuration ► - Trusted Computing ► - Engineering Mode Configuration ► - USB Configuration ►

Chipset	Security
- System Agent (SA) Configuration ► - PCH-IO Configuration ►	- Secure Boot menu

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Boot	Save & Exit
- Boot Configuration	- Save Changes and Exit
- UEFI Hard Disk Drive BBS Priorities	- Discard Changes and Exit
- UEFI NVME Drive BBS Priorities	- Save Changes and Reset
- UEFI CDROM/DVD Drive BBS Priorities	- Discard Changes and Reset
- UEFI SD Drive BBS Priorities	- Save Options
- UEFI USB Hard Disk Drive BBS Priorities	- Save Changes
- UEFI USB CDROM/DVD Drive BBS Priorities	- Discard Changes
- UEFI USB Key Drive BBS Priorities	- Restore Defaults
- UEFI USB Floppy Drive BBS Priorities	- Save as User Defaults
- UEFI USB Lan Drive BBS Priorities	- Restore User Defaults
- UEFI NETWORK Drive BBS Priorities	- Boot Override
	- Launch EFI Shell from filesystem device


NOTE:

- ► indicates a submenu
- Gray text indicates info only
- **Bold text** indicates a default setting

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4.3 Main Menu

This menu provides read-only information about your system and also allows you to set the System Date and Time. Refer to the tables below for details of the submenus and settings.

4.3.1 Main > BIOS Information

Feature	Options	Description
BIOS Vendor	Info only	BIOS Vendor
BIOS Version	Info only	BIOS Version.
Build Date	Info only	BIOS build date
MRC Version	Info only	MRC Version
GOP Version	Info only	GOP Version
ME FW Version	Info only	ME FW Version
EC Version	Info only	EC FW Version

4.3.2 Main > System Information

Feature	Options	Description
Project Name	Info only	Project Name
CPU Board Version	Info only	CPU Board Version
CPU Brand String	Info only	CPU Brand String
CPU Frequency	Info only	CPU Frequency
Total Memory	Info only	Total Memory
Memory Frequency	Info only	Memory Frequency
PCH SKU	Info only	PCH SKU
FM Board	Info only	FM Board

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4.3.3 Main > Board Information

Feature	Options	Description
Serial Number	Info only	Serial Number
Manufacturing Date	Info only	Manufacturing Date
Last Repair Date	Info only	Last Repair Date
Runtime Statistics	Info only	Runtime Statistics
Total Runtime	Info only	Total Runtime
Current Runtime	Info only	Current Runtime
Power Cycles	Info only	Power Cycles
Boot Cycles	Info only	Boot Cycles
Boot Reason	Info only	Boot Reason

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4.4 Advanced Menu

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

4.4.1 Advanced > CPU Configuration

Feature	Options	Description
Type	Info only	Displays the Processor Type
ID	Info only	Displays the Processor ID
Package	Info only	Displays the Processor Package
Microcode Revision	Info only	CPU Microcode Revision
Speed	Info only	Displays the Processor Speed.
L1 Data Cache	Info only	Displays the Processor L1 Data Cache size.
L1 Instruction Cache	Info only	Displays the Processor L1 Instruction Cache size.
L2 Cache	Info only	Displays the Processor L2 Cache size.
L3 Cache	Info only	Displays the Processor L3 Cache size.
L4 Cache	Info only	Displays the Processor L4 eDRAM size.
VMX	Info only	VMX Supported or Not
SMX/TXT	Info only	SMX/TXT Supported or Not
Intel(R) SpeedStep(tm)	Disabled **Enabled**	Allows more than two frequency ranges to be supported.
Turbo Mode	Disabled **Enabled**	Enables/Disables processor Turbo Mode (requires EMTTM enabled). AUTO means enabled.
C states	Disabled **Enabled**	Enables/Disables CPU Power Management. Allows CPU to go to C states when not 100% utilized.
Enhanced C-states	Disabled **Enabled**	Enables/Disables C1E. When enabled, CPU will switch to minimum speed when all cores enter C-State.
C-State Auto Demotion	Disabled **C1**	Configure C-State Auto Demotion
C-State Un-demotion	Disabled **C1**	Configure C-State Un-demotion

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Feature	Options	Description
Package C-State Demotion	Disabled **Enabled**	Package C-State Demotion
Package C-State \ Un-demotion	Disabled **Enabled**	Package C-State Un-demotion
DTS SMM	Disabled **Enabled** Critical Temp Reporting (Out Of spec.)	Disabled: ACPI thermal management uses EC reported temperature values.

4.4.2 Advanced > Graphics Configuration

Feature	Options	Description
LVDS	Info only	
eDP/LVDS	Disabled **Enabled**	Enables/Disables eDP/LVDS
LFP Panel Type	Auto **640x480** 800x600 1024x768 1280x1024 LVDS1 1400x1050 LVDS2 1600x1200 1366x768 1680x1050 1920x1200 1440x900 1600x900 1280x800 1920x1080 2048x1536	Select LFP panel used by Internal Graphics Device by selecting the appropriate setup item.
FM Board DDI port	No Device DisplayPort HDMI **DisplayPort with HDMI/DVI Compatible**	DDI port 1 functions as DisplayPort or HDMI

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Feature	Options	Description
Data format and Color Depth	**Auto** VESA 24 bpp JEIDA 24 bpp JEIDA/vesa 18 bpp	Data format and Color Depth select
LVDS Output Mode	**Auto** Dual LVDS bus Single LVDS bus	Single/Dual mode select
DE Polarity	**Active High** Active Low	DE Polarity select
Vsync Polarity	**Active High** Active Low	Vsync Polarity select
Hsync Polarity	**Active High** Active Low	Hsync Polarity select
Spreading depth	No Spreading 0.5% 1.0% 1.5% 2.0% **2.5%**	Clock frequency center spreading depth.

4.4.3 Advanced > Power Management

Feature	Options	Description
Enable ACPI Auto Configuration	**Disabled** Enabled	Enables/Disables BIOS ACPI Auto Configuration.
Enable Hibernation	Disabled **Enabled**	Enables/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.
PCI Wake	Disabled **Enabled**	Enables/Disables PCIe wake function

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Feature	Options	Description
RI Wake	Disabled **Enabled**	Enables/Disables RI wake Function.
RTC Wake system from S5	**Disabled** Fixed Time Dynamic Time	Enables/Disables System wake on alarm event. Select FixedTime, system will wake on the hr::min::sec specified. Select DynamicTime, System will wake on the current time + Increase minute(s)
Wake up hour	[Max-Value, Min-Value, Step-Value] = [0x17, **0x00**, 0x01]	Range: 0-23 hr
Wake up minute	[Max-Value, Min-Value, Step-Value] = [0x3B, **0x00**, 0x01]	Range: 0-59 min
Wake up second	[Max-Value, Min-Value, Step-Value] = [0x3B, **0x00**, 0x01]	Range: 0-59 sec
Wake up minute increase	[Max-Value, Min-Value, Step-Value] = [0x05, 0x01, **0x01**]	Range: 1-5 min
Emulation AT/ATX	**Emulation AT** ATX	Select Emulation AT or ATX function. If this option is set to [Emulation AT], BIOS will report no suspend functions to ACPI OS. On Windows XP, the OS will show a shutdown message during system shutdown.

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4.4.4 Advanced > Power Management > Power Consumption

Feature	Options	Description
Power Consumption	Info only	
Current Input Current	Info only	Current Input Current
Current Input Power	Info only	Current Input Power
VIN	Info only	VIN
5VSBY	Info only	5VSBY
RTC	Info only	RTC
AIN3	NA	AIN3
AIN4	NA	AIN4
AIN5	NA	AIN5
AIN6	NA	AIN6
AIN7	NA	AIN7
AIN8	NA	AIN8
AIN9	NA	AIN9
AIN10	NA	AIN10
AIN11	NA	AIN11
AIN12	NA	AIN12
AIN13	NA	AIN13
AIN14	NA	AIN14
AIN15	NA	AIN15

4.4.5 Advanced > System Management

Feature	Options	Description
EC Version	Info only	Version of EC Firmware
SEMA Firmware	Info only	Version of SEMA Firmware
Build Date	Info only	Build Date of SEMA Firmware
SEMA Bootloader	Info only	Version of SEMA Bootloader
Build Date	Info only	Build Date of SEMA Bootloader

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4.4.6 Advanced > System Management > SEMA Features

Feature	Options	Description
SEMA Features	Info only	
Uptime & Power Cycles Counter	Info only	Uptime & Power Cycles Counter
System Restart Event	Info only	System Restart Event
1024 Bytes User-Flash	Info only	1024 Bytes User-Flash
Watchdog	Info only	Watchdog
Temperatures	Info only	Temperatures
Voltage Monitor	Info only	Voltage Monitor
Display Backlight control	Info only	Display Backlight control
Power-Up Watchdog	Info only	Power-Up Watchdog
Power Monitor (current sense)	Info only	Power Monitor (current sense)
Boot Counter	Info only	Boot Counter
5V Input-Voltage	Info only	5V Input-Voltage
4mR Rsense for Input-Voltage	Info only	4mR Rsense for Input-Voltage
CPU Fan	Info only	CPU Fan
System Fan 1	Info only	System Fan 1
AT/ATX mode	Info only	AT/ATX mode
ACPI Thermal Trigger	Info only	ACPI Thermal Trigger
Backlight restore	Info only	Backlight restore
DTS register available	Info only	DTS register available
System Fan 2	Info only	System Fan 2
TIVA BMC	Info only	TIVA BMC
Board2 Temperature	Info only	Board2 Temperature
SEMA Error Log	Info only	SEMA Error Log
Soft Fan	Info only	Soft Fan

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4.4.7 Advanced > System Management > Flags

Feature	Options	Description
BMC Flags	Info only	BMC Flags
BIOS Select	Info only	BIOS Select
ATX/AT-Mode	Info only	ATX/AT-Mode
Exception Code	Info only	Exception Code

4.4.8 Advanced > System Management > SEMA > Temperature

Feature	Options	Description
CPU Temperature ►	Sub-Menu	
Current	Info only	Current CPU temperature
Startup	Info only	Startup CPU temperature
Min	Info only	Min. CPU temperature
Max	Info only	Max. CPU temperature
Board Temperatures ►	Sub-Menu	
Current	Info only	Current Board temperature
Startup	Info only	Startup Board temperature
Min	Info only	Min. Board temperature
Max	Info only	Max. Board temperature
System Fan Speed	Info only	System Fan Speed

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4.4.9 Advanced > Watchdog Timer

Feature	Options	Description
Power-Up Watchdog	**Disabled** Enabled	Enbles/Disables the Watchdog Timer
Timeout	[Max-Value, Min-Value, Step-Value] = [**0xFFFF**, 0x0018, 0x0001]	The time the Power Up Watchdog should wait until it resets the system.
RunTime Watchdog	**Disabled** Enabled	The RunTime Watchdog resets the system after a certain amount of time after power up.
Timeout	[Max-Value, Min-Value, Step-Value] = [0xFFFF, **0x0018**, 0x0001]	The time the Power Up Watchdog should wait until it resets the system.
ATTENTION: Pressing F12 during start up disables the Power Up Watchdog.	Info only	

4.4.10 Advanced > Super IO Configuration

Feature	Options	Description
Super IO Chip	Info only	

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4.4.11 Advanced > Super IO Configuration > Serial Port 1 Configuration

Feature	Options	Description
Serial Port	Disabled **Enabled**	Enables/Disables the serial port (COM)
Device Settings	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	Selects optimal settings for Super IO Device
COM1 Control	**RS232** RS422 RS485	Sets COM1 mode as RS-232, RS-422 or RS-485

4.4.12 Advanced > Super IO Configuration > Serial Port 2 Configuration

Feature	Options	Description
Serial Port	Disabled **Enabled**	Enables/Disables the serial port (COM)
Device Settings	IO=2F8h; IRQ=3	
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	Selects optimal settings for Super IO Device
COM2 Control	**RS232** RS422 RS485	Sets COM2 mode as RS-232, RS-422 or RS-485

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4.4.13 Advanced > Super IO Configuration > Serial Port 3 Configuration

Feature	Options	Description
Serial Port	**Disabled** Enabled	Enables/Disables the serial port (COM)
Device Settings	Reset Required	
Change Settings	Auto IO=3E8h; IRQ=7 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 IO=220h; IRQ=3,4,5,6,7,9,10,11,12 IO=228h; IRQ=3,4,5,6,7,9,10,11,12	Selects optimal settings for Super IO Device

4.4.14 Advanced > Super IO Configuration > Serial Port 4 Configuration

Feature	Options	Description
Serial Port	**Disabled** Enabled	Enables/Disables the serial port (COM)
Device Settings	Reset Required	
Change Settings	Auto IO=3E8h; IRQ=7 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 IO=220h; IRQ=3,4,5,6,7,9,10,11,12 IO=228h; IRQ=3,4,5,6,7,9,10,11,12	Selects optimal settings for Super IO Device

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4.4.15 Advanced > Serial Console Redirection

Feature	Options	Description
COM0		
Console Redirection	**Disabled** Enabled	Enables/Disables console redirection on COM0 port.
COM1		
Console Redirection	**Disabled** Enabled	Enables/Disables console redirection on COM1 port.
COM2		
Console Redirection	**Disabled** Enabled	Enables/Disables console redirection on COM2 port.
COM3		
Console Redirection	**Disabled** Enabled	Enables/Disables console redirection on COM3 port.

4.4.16 Advanced > Console Redirection > COM 0 > Console Redirection Settings

Feature	Options	Description
Terminal Type	VT100 VT100Plus VT-UTF8 **ANSI**	Emulation: ANSI: Extended ASCII character set. VT100: ASCII character set. VT100Plus: 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 both connected systems. Long or noisy lines may require lower speeds.
Data Bits	7 **8**	Data Bits.

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Feature	Options	Description
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
VT-UTF8 Combo Key Support	Disabled **Enabled**	Enable 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/Disables extended terminal resolution
Putty KeyPad	**VT100** LINUX XTERMR6 SCO ESCN VT400	Select FunctionKey and KeyPad on Putty.

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4.4.17 Advanced > Console Redirection > COM 1 > Console Redirection Settings

Feature	Options	Description
Terminal Type	VT100 VT100Plus VT-UTF8 **ANSI**	Emulation: ANSI: Extended ASCII character set. VT100: ASCII character set. VT100Plus: 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 both connected systems. 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.

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Feature	Options	Description
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
VT-UTF8 Combo Key Support	Disabled **Enabled**	Enable 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/Disables extended terminal resolution
Putty KeyPad	**VT100** LINUX XTERMR6 SCO ESCN VT400	Select FunctionKey and KeyPad on Putty.

4.4.18 Advanced > Console Redirection > COM 2 > Console Redirection Settings

Feature	Options	Description
Terminal Type	VT100 VT100Plus VT-UTF8 **ANSI**	Emulation: ANSI: Extended ASCII character set. VT100: ASCII character set. VT100Plus: 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 both connected systems. Long or noisy lines may require lower speeds.
Data Bits	7 **8**	Data Bits.

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Feature	Options	Description
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
VT-UTF8 Combo Key Support	Disabled **Enabled**	Enable 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/Disables extended terminal resolution
Putty KeyPad	**VT100** LINUX XTERMR6 SCO ESCN VT400	Select FunctionKey and KeyPad on Putty.

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4.4.19 Advanced > Console Redirection > COM 3 > Console Redirection Settings

Feature	Options	Description
Terminal Type	VT100 VT100Plus VT-UTF8 **ANSI**	Emulation: ANSI: Extended ASCII character set. VT100: ASCII character set. VT100Plus: 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 both connected systems. 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.

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Feature	Options	Description
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
VT-UTF8 Combo Key Support	Disabled **Enabled**	Enable 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/Disables extended terminal resolution
Putty KeyPad	**VT100** LINUX XTERMR6 SCO ESCN VT400	Select FunctionKey and KeyPad on Putty.

4.4.20 Advanced > Miscellaneous > Network Stack Configuration

Feature	Options	Description
Network Stack	**Disabled** Enabled	Enables/Disables UEFI Network Stack
Ipv4 PXE Support	**Disabled** Enabled	Enables/Disables IPv4 PXE boot support. If disabled, IPv4 PXE boot support will not be available.
Ipv6 PXE Support	**Disabled** Enabled	Enables/Disables IPv6 PXE boot support. If disabled, IPv6 PXE boot support will not be available.
PXE boot wait time	[Max-Value, Min-Value, Step-Value] = [0x05, **0x00**, 0x01]	Wait time in seconds to press ESC key to abort PXE boot. Use either +/- or numeric keys to set the value.

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4.4.21 Advanced > Trusted Computing > TPM 1.2 Configuration

Feature	Options	Description
Configuration	Info only	
Security Device Support	Disabled **Enabled**	Enables/Disables BIOS support for security device. OS will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
TPM State	Disabled **Enabled**	Enables/Disables Security Device. The computer will reboot in order to change State of the Device.
Pending Operation	**None** TPM Clear	Schedule an Operation for the Security Device. The computer will reboot in order to change State of the Device.
Security Device Support	Disabled **Enabled**	Enables/Disables BIOS support for security device. OS will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
TCM State	Disabled **Enabled**	Enables/Disables Security Device. The computer will reboot in order to change State of the Device.
Pending Operation	**None** TPM Clear	Schedule an Operation for the Security Device. The computer will reboot in order to change State of the Device.
Device Select	TPM 1.2 TPM 2.0 **Auto**	TPM 1.2 will restrict support to TPM 1.2 devices, 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
Current Information	Info only	
TPM Enabled Status	N/A, reset required	
TPM Active Status	N/A, reset required	

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Feature	Options	Description
TPM Owner Status	N/A, reset required	
TPM Enabled Status	N/A, reset required	
TPM Active Status	N/A, reset required	
TPM Owner Status	N/A, reset required	

4.4.22 Advanced > TPM 2.0 Configuration

Feature	Options	Description
IFX		
7.85		
Security Device Support	Disabled **Enabled**	Enables/Disables BIOS support for security device. OS will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
Active PCR banks	N/A, reset required	
Available PCR banks	N/A, reset required	
SHA-1 PCR Bank	**Disabled** Enabled	Enables/Disables SHA-1 PCR Bank
SHA256 PCR Bank	Disabled **Enabled**	Enables/Disables SHA256 PCR Bank
SHA384 PCR Bank	**Disabled** Enabled	Enables/Disables SHA384 PCR Bank
SHA512 PCR Bank	**Disabled** Enabled	Enables/Disables SHA512 PCR Bank
SM3_256 PCR Bank	**Disabled** Enabled	Enables/Disables SM3_256 PCR Bank
SM3_256 PCR Band	**Disabled** Enabled	Enables/Disables SM3_256 PCR Bank

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Feature	Options	Description
Pending operation	**None** TPM Clear	Schedule an Operation for the Security Device. NOTE: Your Computer will reboot during restart in order to change State of Security Device.
Platform Hierarchy	Disabled **Enabled**	Enables/Disables Platform Hierarchy
Storage Hierarchy	Disabled **Enabled**	Enables/Disables Storage Hierarchy
Endorsement Hierarchy	Disabled **Enabled**	Enables/Disables Endorsement Hierarchy
TPM2.0 UEFI Spec Version	TCG_1_2 **TCG_2**	Select the TCG2 Spec Version Support
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.
Device Select	TPM 1.2 TPM 2.0 **Auto**	TPM 1.2 will restrict support to TPM 1.2 devices, 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.

4.4.23 Advanced > USB Configuration

Feature	Options	Description
XHCI Hand-off	**Enabled** Disabled	This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by the XHCI driver.
USB Mass Storage Driver Support	Disabled **Enabled**	Enables/Disables USB Mass Storage Driver Support.
USB hardware delays and time-outs:		
USB transfer time-out	1 sec 5 sec 10 sec **20 sec**	The time-out value for Control, Bulk, and Interrupt transfers.

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Feature	Options	Description
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 the default value: 100 ms for a Root port, for a Hub port the delay is taken from the Hub descriptor.
Device power-up delay in seconds	[Max-Value, Min-Value, Step-Value] = [0x28, 0x01, 0x01]	Delay range is 1 to 40 seconds, in one second increments.

4.4.24 Advanced > Engineering Mode Configuration

Feature	Options	Description
Reset before POST	Disabled **Enabled**	Enables/Disables reset events before POST.
- Count of reset events	[Max-Value, Min-Value, Step-Value] = [0x0A, 0x01, **0x01**]	Number of reset event before POST (Note: this option is disabled when **Reset before POST** is disabled)
- Delay time	[Max-Value, Min-Value, Step-Value] = [0x2710, **0x0001**, 0x0001]	Set the delay time before generating a Reset event if timing needs adjustment (ms)
- Reset Type	**Cold Reset** Warm Reset	Select a warm or cold reset.

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4.5 Chipset

4.5.1 Chipset > System Agent (SA) Configuration

Feature	Options	Description
VT-d	Supported	

4.5.2 Chipset > System Agent (SA) Configuration > Memory Configuration

Feature	Options	Description
Memory RC Version	Info only	
Memory Speed	Info only	
Memory Timings (tCL-tRCD-tRP-tRAS)	Info only	
Controller 0 Channel 0 Slot 0	Info only	
Controller 0 Channel 0 Slot 1	Info only	
Maximum Memory Frequency	**Auto**, 1067, 1200, 1333, 1467, 1733, 1867, 2133, 2267, 2533, 2667, 2933, 3067, 3333, 3467, 3733, 3867, 4133, 4267, 4533, 4667, 4933, 5067, 5333, 5467, 5733, 5867, 6133, 6267, 6533, 6667, 6933, 7067, 7467, 7733, 7867, 8000, 8133, 8267, 1400, 1500, 1700, 1800, 1900, 2100, 2200, 2300, 2500, 2600, 2700, 2900, 3000, 3100, 3300, 3400, 3500, 3700, 3800, 3900, 4100, 4200, 4300, 4500, 4600, 4700, 4900, 5000, 5100, 5300, 5400, 5500, 5700, 5800, 5900, 6100, 6200, 6300, 6500, 6600, 6700, 6900, 7000, 7100, 7300, 7400, 7500, 7700, 7800, 7900, 8400, 8400, 8400, 1600, 2000, 2400, 2800, 3200, 3600, 4000, 4400, 4800, 5200, 5600, 6000, 6400, 6800, 7200, 7600, 8400	Maximum Memory Frequency in Mhz

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Feature	Options	Description
Max TOLUD	**Dynamic**, 1 GB, 1.25 GB, 1.5 GB, 1.75 GB, 2 GB, 2.25 GB, 2.5 GB, 2.75 GB, 3 GB, 3.25 GB, 3.5 GB	Maximum Value of TOLUD. Dynamic assignment would adjust TOLUD automatically based on largest MMIO length of installed graphics controller.

4.5.3 Chipset > System Agent (SA) Configuration > Graphics Configuration

Feature	Options	Description
GTT Size	2MB 4MB **8MB**	Sets GTT Size
Aperture Size	128MB **256MB** 512MB 1024MB	Sets Aperture Size
DVMT Pre-Allocated	0M 32M 64M 96M 128M 160M 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.

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Feature	Options	Description
DVMT Total Gfx Mem	128M **256M** MAX	DVMT5.0 Total Graphic Memory size used by the Internal Graphics Device.
VDD Enable	Disabled **Enabled**	Enables/Disables forcing of VDD in the BIOS

4.5.4 Chipset > System Agent (SA) Configuration > VDM Configuration

Feature	Options	Description
Enable VMD controller	**Disabled** Enabled	Enables/Disables VMD controller
Enable VMD Global Mapping	**Disabled** Enabled	Enables/Disables VMD Global Mapping.
Map this Root Port under VMD	**Disabled** Enabled	Maps/UnMaps this Root Port to VMD
Root Port BDF details		SATA Controller
RAID0	Disabled **Enabled**	Enables/Disables RAID0 support
RAID1	Disabled **Enabled**	Enables/Disables RAID1 support
RAID5	Disabled **Enabled**	Enables/Disables RAID5 support

4.5.5 Chipset > System Agent (SA) Configuration > PCI Express Configuration

Feature	Options	Description
PCI Express Clock Gating	Disabled **Enabled**	Enables/Disables PCI Express Clock Gating for each root port.
Fia Programming	Disabled **Enabled**	Enables/Disables loading Fia Configuration for each root port.
PCI Express Power Gating	Disabled **Enabled**	Enables/Disables PCI Express Power Gating for each root port.

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Feature	Options	Description
Compliance Test Mode	Disabled **Enabled**	Enable when using Compliance Load Board
PCIe function swap	Disabled **Enabled**	When Disabled, prevents PCIE rootport function swap. If any function other than Oth is enabled, Oth will become visible.
CDR Relock for PEG60	Disabled **Enabled**	Enables/Disables CDR Relock
NewFOM for PEG60	Disabled **Enabled**	Enables/Disables New FOM
CDR Relock for PEG10	Disabled **Enabled**	Enables/Disables CDR Relock
NewFOM for PEG10	Disabled **Enabled**	Enables/Disables New FOM
Assertion on Link Down GPIOs	**Disabled** Enabled	GPIO Assertion on Link Down
Enable ClockReq Messaging	**Disabled** Enabled	Enables/Disables ClockReq Messaging
PCI Express Slot Selection	M2 **CEMx4 Slot**	Selects the PCIe M2 or CEMx4 slot
PCIE Resizable BAR Support	**Disabled** Enabled	Enables/Disables PCIE Resizable BAR Support
Enable RST GPIO Delay	Disabled **Enabled**	Enables/Disables RST GPIO Delay
RST GPIO Delay	100	RST GPIO Delay (ms)
SA0XC	Disabled **Enabled**	
> PCI Express Root Port 1		

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4.5.6 Chipset > PCH-IO Configuration > PCI Express Configuration

Feature	Options	Description
Legacy IO Low Latency	**Disabled** Enabled	Set to enable low latency of legacy IO. Some systems require lower IO latency irrespective of power. This is a tradeoff between power and IO latency.
DMI Link ASPM Control	**Disabled** L0s L1 L0sL1 Auto	The control of Active State Power Management of the DMI Link.
Port8xh Decode	**Disabled**, Enabled	Enables/Disables PCI Express Port8xh Decode.
Port8xh Decode Port#	[Max-Value, Min-Value, Step-Value] = [0x17, **0x00**, 0x01]	Selects PCI Express Port8xh Decode Root Port. User to ensure port availability.
Peer Memory Write Enable	**Disabled** Enabled	Enables/Disables Peer Memory Write
Compliance Test Mode	**Disabled** Enabled	Enable when using Compliance Load Board
> PCI Express Root Port 5		
> PCI Express Root Port 6		
> PCI Express Root Port 7		
> PCI Express Root Port 8		

4.5.7 Chipset > PCH-IO Configuration > SATA and RST Configuration

Feature	Options	Description
SATA Controller(s)	Disabled **Enabled**	Enables/Disables SATA Device.

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Feature	Options	Description
SATA Test Mode	**Disabled** Enabled	Enables/Disables Test Mode (Loop Back).
>Software Feature Mask Configuration		
Aggressive LPM Support	Disabled **Enabled**	Enables/Disables 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		
Software Preserve		
Port 0	Disabled **Enabled**	Enables/Disables SATA Port
Hot Plug	**Disabled** Enabled	Designates this port as Hot Pluggable
Configured as eSATA	Hot Plug supported	
External	**Disabled** Enabled	Marks this port as external.
Spin Up Device	**Disabled** Enabled	If enabled for any ports, Staggerred 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	Identifies if the SATA port is connected to a Solid State Drive or Hard Disk Drive.
Topology	**Unknown** ISATA Direct Connect Flex M2	SATA topology
SATA Port 0 DevSlp	Disabled **Enabled**	Enables/Disables SATA Port 0 DevSlp. For DevSlp to work, both the hard drive and SATA port need to support the DevSlp function, otherwise unexpected behavior might happen. Check board design before enabling it.

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Feature	Options	Description
DITO Configuration	**Disabled** Enabled	Enables/Disables DITO Configuration
DITO Value	625	
DM Value	15	
Port 1	Disabled **Enabled**	Enables/Disables SATA Port
Hot Plug	**Disabled** Enabled	Designates this port as Hot Pluggable
Configured as eSATA	Hot Plug supported	
External	**Disabled** Enabled	Marks this port external.
Spin Up Device	**Disabled** Enabled	If enabled for any port, 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	Identifies if the SATA port is connected to a Solid State Drive or Hard Disk Drive.
Topology	**Unknown** ISATA Direct Connect Flex M2	SATA topology
SATA Port 1 DevSlp	Disabled **Enabled**	Enables/Disables SATA Port 0 DevSlp. For DevSlp to work, both the hard drive and SATA port need to support the DevSlp function, otherwise unexpected behavior might happen. Check board design before enabling it.
DITO Configuration	**Disabled** Enabled	Enables/Disables DITO Configuration
DITO Value	625	
DM Value	15	

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4.5.8 Chipset > PCH-IO Configuration > USB Configuration

Feature	Options	Description
xDCI Support	**Disabled** Enabled	Enables/Disables 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
USB3 Link Speed Selection	GEN1 **GEN2**	This option is to select USB3 Link Speed GEN1 or GEN2
USB Port Disable Override	**Disabled** Select Per-Pin	Selectively Enables/Disables the corresponding USB port from reporting a Device Connection to the controller.
USB SS Physical Connector #0	Disabled **Enabled**	Enables/Disables this USB Physical Connector (physical port). Once disabled, any USB devices plugged into the connector will not be detected by BIOS or OS.
USB SS Physical Connector #1	Disabled **Enabled**	
USB SS Physical Connector #2	Disabled **Enabled**	
USB SS Physical Connector #3	Disabled **Enabled**	
USB HS Physical Connector #0	Disabled **Enabled**	
USB HS Physical Connector #1	Disabled **Enabled**	
USB HS Physical Connector #2	Disabled **Enabled**	
USB HS Physical Connector #3	Disabled **Enabled**	
USB HS Physical Connector #4	Disabled **Enabled**	
USB HS Physical Connector #5	Disabled **Enabled**	
USB HS Physical Connector #6	Disabled **Enabled**	
USB HS Physical Connector #7	Disabled **Enabled**	

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Feature	Options	Description
USB HS Physical Connector #8	Disabled **Enabled**	Enables/Disables this USB Physical Connector (physical port). Once disabled, any USB devices plugged into the connector will not be detected by BIOS or OS.
USB HS Physical Connector #9	Disabled **Enabled**	

4.5.9 Chipset > PCH-IO Configuration > Miscellaneous Configuration

Feature	Options	Description
RTC Memory Lock	Disabled **Enabled**	Enabling will lock bytes 38h-3Fh in the lower/upper 128-byte bank of RTC RAM
BIOS Lock	**Disabled** Enabled	Enables/Disables the PCH BIOS Lock Enable feature. Required to be enabled to ensure SMM protection of flash.
State After G3	**S0 State** S5 State	Specifies what state to go to when power is re-applied after a power failure (G3 state).

4.5.10 Chipset > PCH-IO Configuration > HD Audio Configuration

Feature	Options	Description
HD Audio	Disabled **Enabled**	Controls detection of the HD-Audio device.
Audio Output Selection	Speaker-out **Line-out**	Audio Output Selection

4.5.11 Chipset > PCH-IO Configuration > SerialIO Configuration

Feature	Options	Description
I2C3 Controller	Disabled **Enabled**	Enables/Disables Seriallo Controller
I2C4 Controller	Disabled **Enabled**	

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4.6 Security

Feature	Options	Description
Minimum length	3	
Maximum length	20	

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4.7 Boot

4.7.1 Boot > Boot Configuration

Feature	Options	Description	
Setup Prompt Timeout	[Max-Value, Min-Value, Step-Value] = [0xFFFF, **0x0001**, 0x0001]	Number of seconds to wait for setup activation key. 65535 (0xFFFF) means indefinite waiting.	
Bootup NumLock State	On **Off**	Selects the keyboard NumLock state.	
Quiet Boot	Disabled **Enabled**	Enables/Disables Quiet Boot option.	
Fast Boot	**Disabled** Enabled	Enables/Disables boot with initialization of a minimal set of devices required to launch active boot option. Has no effect for BBS boot options.	
Boot Option #1	Hard Disk NVME CD/DVD SD USB Hard Disk USB CD/DVD USB Key USB Floppy USB Lan Network Disabled	**Hard Disk**	Sets the system boot order
Boot Option #2		**NVME**	
Boot Option #3		**CD/DVD**	
Boot Option #4		**SD**	
Boot Option #5		**USB Hard Disk**	
Boot Option #6		**USB CD/DVD**	
Boot Option #7		**USB Key**	
Boot Option #8		**USB Floppy**	
Boot Option #9		**USB Lan**	
Boot Option #10		**Network**	

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4.8 Save & Exit

Feature	Options	Description
Save Changes and Exit	Yes No	Exits system setup after saving the changes.
Discard Changes and Exit	Yes No	Exits system setup without saving any changes.
Save Changes and Reset	Yes No	Resets the system after saving the changes.
Discard Changes and Reset	Yes No	Resets system setup without saving any changes.
Save Options	Info only	
Save Changes	Yes No	Saves changes done so far to any of the setup options.
Discard Changes	Yes No	Discards changes done so far to any of the setup options.
Restore Defaults	Yes No	Restores/Loads default values for all the setup options.
Save as User Defaults	Yes No	Saves the changes done so far as User Defaults.
Restore User Defaults	Yes No	Restores the User Defaults to all the setup options.
Boot Override	Info only	
Launch EFI Shell from filesystem device		

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5 Driver & Application Installation

After installing the operating system, all related drivers must be installed for the system to function properly. This section describes the drivers needed for Windows operating systems and the procedures to install them. For other operating system support, contact ADLINK for further information.

Visit the ADLINK web site to download drivers.

5.1 Driver Installation Order

Install drivers in the following order.

1. Fully install Microsoft Windows before installing any drivers. Most standard I/O device drivers have been included in Microsoft Windows. For Windows 10 IoT Enterprise users, Administrator privilege is required to install the drivers.

2. Install the chipset driver.
   See “Chipset Driver Installation” on page 106.

3. Install the graphics driver.
   See “Graphics Driver Installation” on page 107.

4. Install the Ethernet driver.
   See “Ethernet Driver Installation” on page 108.

5. Install the Management Engine driver
   See “Management Engine Driver Installation” on page 108.

6. Install the Serial I/O driver.
   See “Serial I/O Driver Installation” on page 109.

7. DI/O Driver Installation
   See “DI/O Driver Installation” on page 109.

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5.2 Chipset Driver Installation

The chipset driver directs the operating system to configure the Intel® chipset components in order to ensure that the following features function properly:

- SATA Storage Support
- USB Support
- Identification of Intel® Chipset Components in the Device Manager

Windows 10 IoT Enterprise must be fully installed and running on the system before installing this software.

To install the chipset driver for the SP2-TGL:

1. Close any running applications.
2. From ADLINK's website, download Windows 10 IoT Enterprise drivers for the SP2-TGL.
3. Execute Setup.exe and follow the on-screen instructions to complete the installation.
4. After the installation is complete, reboot the system.

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5.3 Graphics Driver Installation

The SP2-TGL is equipped with the Intel® Graphics Media Accelerator Driver package, which supports Windows 10 IoT Enterprise.

To install the graphics driver:

1. Close any running applications.
2. From ADLINK's website, download Windows 10 IoT Enterprise drivers for the SP2-TGL.
3. Execute Setup.exe and follow the on-screen instructions to complete the installation.
4. After the installation is complete, reboot the system.

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5.4 Ethernet Driver Installation

To install the driver for the Intel I225 Gigabit Ethernet controller:

1. Close any running applications.
2. From ADLINK's website, download Windows 10 IoT Enterprise drivers for the SP2-TGL.
3. Execute Setup.exe and follow the on-screen instructions to complete the installation.
4. After the installation is complete, reboot the system.

5.5 Management Engine Driver Installation

To install the driver for the ME controller:

1. Close any running applications.
2. From ADLINK's website, download Windows 10 IoT Enterprise drivers for the SP2-TGL.
3. Execute Setup.exe and follow the on-screen instructions to complete the installation.
4. After the installation is complete, reboot the system.

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5.6 Serial I/O Driver Installation

To install the driver for the serial I/O controller:

1. Close any running applications.
2. From ADLINK's website, download Windows 10 IoT Enterprise drivers for the SP2-TGL.
3. Execute Setup.exe and follow the on-screen instructions to complete the installation.
4. After the installation is complete, reboot the system.

5.7 DI/O Driver Installation

Download DI/O drivers from the ADLINK website at:

https://www.adlinktech.com/Products/Panel_PCs_Monitors/Panel_PCs_Monitors/SP2-TGL_Series

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Important Safety Instructions

For user safety, please read and follow all instructions, Warnings, Cautions, and Notes marked in this manual and on the associated device before handling/operating the device, to avoid injury or damage.

- Read these safety instructions carefully.
- Keep the User's Manual for future reference.
- Read the Specifications section of this manual for detailed information on the recommended operating environment.
- It is recommended that the device be installed in Information Technology Rooms that are in accordance with Article 645 of the National Electrical Code and NFPA 75.
- When installing/mounting or uninstalling/removing device is required:
  - Turn off power and unplug any power cords/cables.
  - Reinstall all chassis covers before restoring power.
- To avoid electrical shock and/or damage to device:
  - Keep device away from water or liquid sources.
  - Keep device away from high heat or humidity.
  - Keep device properly ventilated (do not block or cover ventilation openings).
  - Always use recommended voltage and power source settings.
  - Always install and operate device near an easily accessible electrical outlet.
  - Secure the power cord (do not place any object on/over the power cord).
  - Only install/attach and operate device on stable surfaces and/or recommended mountings.
  - The device is powered by an adapter or DC source. Ensure that the adapter or DC source is properly grounded.
- If the device will not be used for long periods of time, turn off and unplug from its power source.
- Never attempt to repair the device, which should only be serviced by qualified technical personnel using suitable tools.

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- A Lithium-type battery may be provided for uninterrupted backup or emergency power.



Risk of explosion if battery is replaced with one of an incorrect type; please dispose of used batteries appropriately.

- The device must be serviced by authorized technicians when:
  - The power cord or plug is damaged
  - Liquid has entered the device interior
  - The device has been exposed to high humidity and/or moisture
  - The device is not functioning or does not function according to the User's Manual
  - The device has been dropped and/or damaged and/or shows obvious signs of breakage
- Disconnect the power supply cord before loosening the thumbscrews and always fasten the thumbscrews with a screwdriver before starting the system up.
- It is recommended that the device be installed only in a server room or computer room where access is:
  - Restricted to qualified service personnel or users familiar with restrictions applied to the location, reasons therefor, and any precautions required
  - Only afforded by the use of a tool or lock and key, or other means of security, and controlled by the authority responsible for the location.

	**BURN HAZARD** Touching this surface could result in bodily injury. To reduce risk, allow the surface to cool before touching.

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Consignes de Sécurité Importante

Pour la sécurité de l'utilisateur, veuillez lire et suivre toutes les instructions, avertissements, mises en garde et notes marqués dans ce manuel et sur l'appareil associé avant de manipuler/ d'utiliser l'appareil, afin d'éviter toute blessure ou tout dommage.

- *Lisez attentivement ces consignes de sécurité*
- *Conservez le manuel de l'utilisateur pour pouvoir le consulter ultérieurement*
- *Lisez la section Spécifications de ce manuel pour des informations détaillées sur l'environnement d'exploitation recommandé*
- *Il est recommandé d'installer l'appareil dans Information Salles technologiques conformes à l'article 645 du Code national de l'électricité et NFPA 75.*
- *Lorsque l'installation/le montage ou la désinstallation/le retrait du périphérique est requis:*
  - *Mettez l'appareil hors tension et débranchez tous les cordons/câbles d'alimentation*
  - *Réinstallez tous les couvercles de châssis avant de rétablir l'alimentation*
- *Pour éviter les chocs électriques et/ou d'endommager l'appareil:*
  - *Tenez l'appareil à l'écart de toute source d'eau ou de liquide.*
  - *Tenez l'appareil à l'écart d'une forte chaleur ou d'une humidité élevée.*
  - *Maintenez l'appareil correctement ventilé (n'obstruer ou ne couvrez pas les ouvertures de ventilation).*
  - *Utilisez toujours les réglages de tension et de source d'alimentation recommandés.*
  - *Installez et utilisez toujours l'appareil près d'une prise de courant facilement accessible.*
  - *Fixez le cordon d'alimentation (ne placez aucun objet sur le cordon d'alimentation).*

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- *Installez/fixez et utilisez l'appareil uniquement sur des surfaces stables et/ou sur les fixations recommandées.*
- *L'ordinateur Smart Touch est alimenté par un adaptateur ou une source CC. Veuillez vous assurer que l'adaptateur ou la source CC doit conserver la connexion à la terre s'il est doté d'une protection.*

- *Si l'appareil ne doit pas être utilisé pendant de longues périodes, éteignez-le et débranchez-le de sa source d'alimentation*
- *N'essayez jamais de réparer l'appareil, qui ne doit être réparé que par un personnel technique qualifié à l'aide d'outils appropriés*
- *Une batterie de type Lithium peut être fournie pour une alimentation de secours ininterrompue ou d'urgence.*



ATTENTION: Risque d'explosion si la pile est remplacée par une autre de type incorrect. Veuillez jeter les piles usagées de façon appropriée.

- *L'appareil doit être entretenu par des techniciens agrees lorsque:*
  - *Le cordon d'alimentation ou la prise est endommagé(e)*
  - *Un liquide a pénétré à l'intérieur de l'appareil.*
  - *L'appareil a été exposé à une forte humidité et/ou de la buée.*
  - *L'appareil ne fonctionne pas ou ne fonctionne pas selon le manuel de l'utilisateur.*
  - *L'appareil est tombé et/ou a été endommagé et/ou présente des signes évidents de dommage.*
- *Débranchez le cordon d'alimentation avant de desserrer les vis à oreilles et serrez toujours les vis à oreilles avec un tournevis avant de mettre le système en marche.*

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- *Il est recommandé d'installer l'appareil uniquement dans une salle de serveurs ou une salle informatique où l'accès est:*
  - *Réservé au personnel de service qualifié ou aux utilisateurs familiarisés avec les restrictions appliquées à l'emplacement, aux raisons de ces restrictions et toutes les précautions requises*
  - *Uniquement autorisé par l'utilisation d'un outil, d'une serrure et d'une clé, ou d'un autre moyen de sécurité, et contrôlé par l'autorité responsable de l'emplacement.*

	***RISQUE DE BRÛLURES*** ***Partie chaude!*** *Ne touchez pas cette surface, cela pourrait entraîner des blessures. Pour éviter tout danger, laissez la surface refroidir avant de la toucher.*

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EMC Compliance

CE Warning

This is a Class B product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

FCC Warning

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the 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 instructions, 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.

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Getting Service

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