SP2-TWL Series | User's Guide

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ADLINK
LEADING EDGE AI COMPUTING

Revision History

Revision	Description	Date	Author
1.0	Initial release	2026-05-28	AL

Preface

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California Proposition 65 Warning: This product can expose you to chemicals including acrylamide, arsenic, benzene, cadmium, Tris(1,3-dichloro-2-propyl)phosphate (TDCPP), 1,4-Dioxane, formaldehyde, lead, DEHP, styrene, DINP, BBP, PVC, and vinyl materials, which are known to the State of California to cause cancer, and acrylamide, benzene, cadmium, lead, mercury, phthalates, toluene, DEHP, DIDP, DnHP, DBP, BBP, PVC, and vinyl materials, which are known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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Safety Instructions

For user safety, please read and follow all Instructions, **WARNING**s, **CAUTION**s, and **NOTE**s marked in this manual and on the associated equipment before handling/operating the equipment.

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

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

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

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).*
  - *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.*
- *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.*
- *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*** *Ne touchez pas cette surface, cela pourrait entraîner des blessures. Pour éviter tout danger, laissez la surface refroidir avant de la toucher.*

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. If not installed and used in accordance with the instructions, it 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 one or more of the following measures to correct the interference:

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

Conventions

The following conventions may be used throughout this manual, denoting special levels of information.

Note: This information adds clarity or specifics to text and illustrations.

Caution: This information indicates the possibility of minor physical injury, component damage, data loss, and/or program corruption.

Warning: This information warns of possible serious physical injury, component damage, data loss, and/or program corruption.

Getting Services

Ask an Expert: https://www.adlinktech.com/en/Askanexpert

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1. Introduction

1.1. Overview

The SP2-TWL Series open-frame panel PC is based on Intel® Core™ Ultra processors, providing flexible I/O options. The SP2-TWL Series is a compact-sized solution that offers efficient capabilities, making it easy to integrate into kiosks and panel PC applications.

1.2. Features

- Intel® Processor N-Series (code name Twin Lake)
- Extensive I/O and function expansion through wire-to-board connectors and custom function modules.
- Comprehensive expansion and customization options for fast and easy integration with all form factors, kiosks, and all-in-one panel PC applications.
- Enhanced protection in case of sudden power outage with support for back-up battery (Optional).
- Pre-compliance EMC testing and high ESD tolerance.
- High reliability in case of power fluctuation, with an optional 9V-36V DC voltage range.
- Simple cabling with optional Power Over Ethernet (60W).
- Supports up to 3 displays, including integrated panel, DisplayPort, and USB Type-C (Optional).

1.3. Package Contents

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 products to ADLINK.

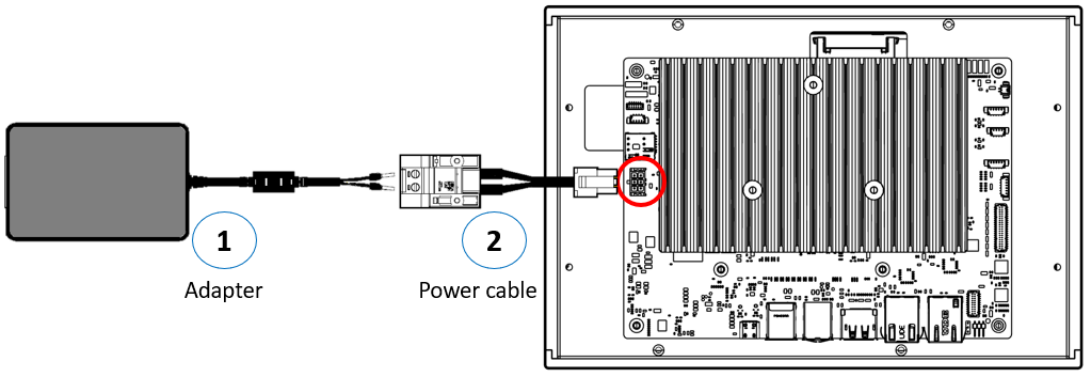
Ensure that the following items are included in the package.

- 1x SP2-TWL Series Smart Panel

1.4. Optional Accessories

Adapter and Power Cables

Item	PN	Remark
60W (12V 5A)	31-62156-0000-A0	
84W (12V 7A)	31-62157-0000-A0	
Power cable	30-21863-0000-A0	Connecting between adapter and mainboard

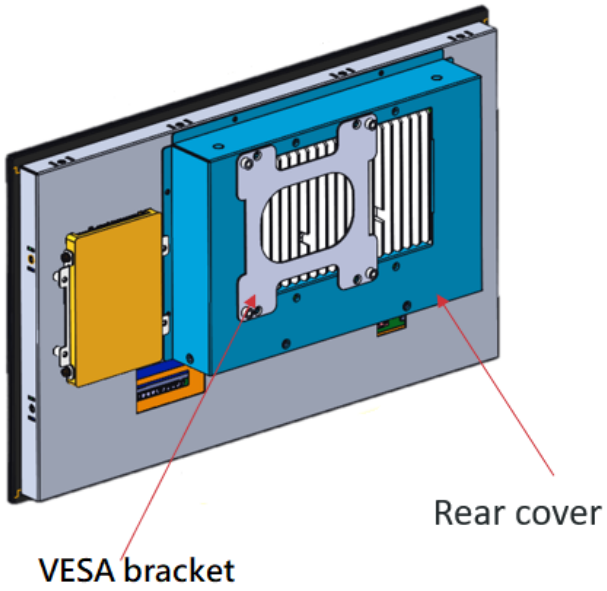


Panel Mounting Clips

Item	PN	Remark
SP2/OM-215_Clip_Kits	91-95337-0010	With 17 pcs clips
SP2/OM-156_Clip_Kits	91-95337-1010	With 14 pcs clips
SP2/OM-101_Clip_Kits	91-95337-2010	With 8 pcs clips

Rear Cover

Item	PN	Remark
SP2-TWL_215 Rear cover	91-95394-100E	
SP2-TWL_101/156 Rear cover	91-95394-100E	
VESA bracket	91-95240-0010	The VESA bracket screws on rear cover



Wireless Modules

Item	Part Number
Wi-Fi kit – ENL-R8852BE	91-95266-400E
LTE module	TBD

Cables

Item	PN	Remark
USB 2.0 cable	30-21348-0000-A0	Wafer to wafer
USB 2.0 dongle	30-21401-0000-A0	Wafer to USB type A female
Audio Mic/Line Out Jack cable	30-22087-0000-A0	Wafer to 2x 3.5φ phone Jack
Power/Reset buttons, LED notification	30-21350-0000-A0	Wafer to 2x buttons and 1x LED
GSPI	30-22282-0000-A0	Wafer to open end cables
Power switch	30-21429-0020-A0	Wafer to power switch
LED cable	30-22249-0000-A0	Wafer to LEDs

GPIO cable	30-21352-0000-A0	Wafer to open cables
I2C cable	30-21353-0000-A0	Wafer to open cables
COM port	30-21862-0010-A0	Wafer to 1x DB9
MIPI CSI cable	TBD	Coaxial cable
Buzzer	23-52111-0A00	Wafer to 1x buzzer
Fan	32-00086-3000-A0	Wafer to 1x 12V fan

Thermal Parts

Item	PN	Remark
Fan	32-00086-3000-A0	Wafer to 1x 12V fan
Fan with heatsink	TBD	1x heatsink, 1x bracket, 1x fan, 4x screws

2. Block Diagram

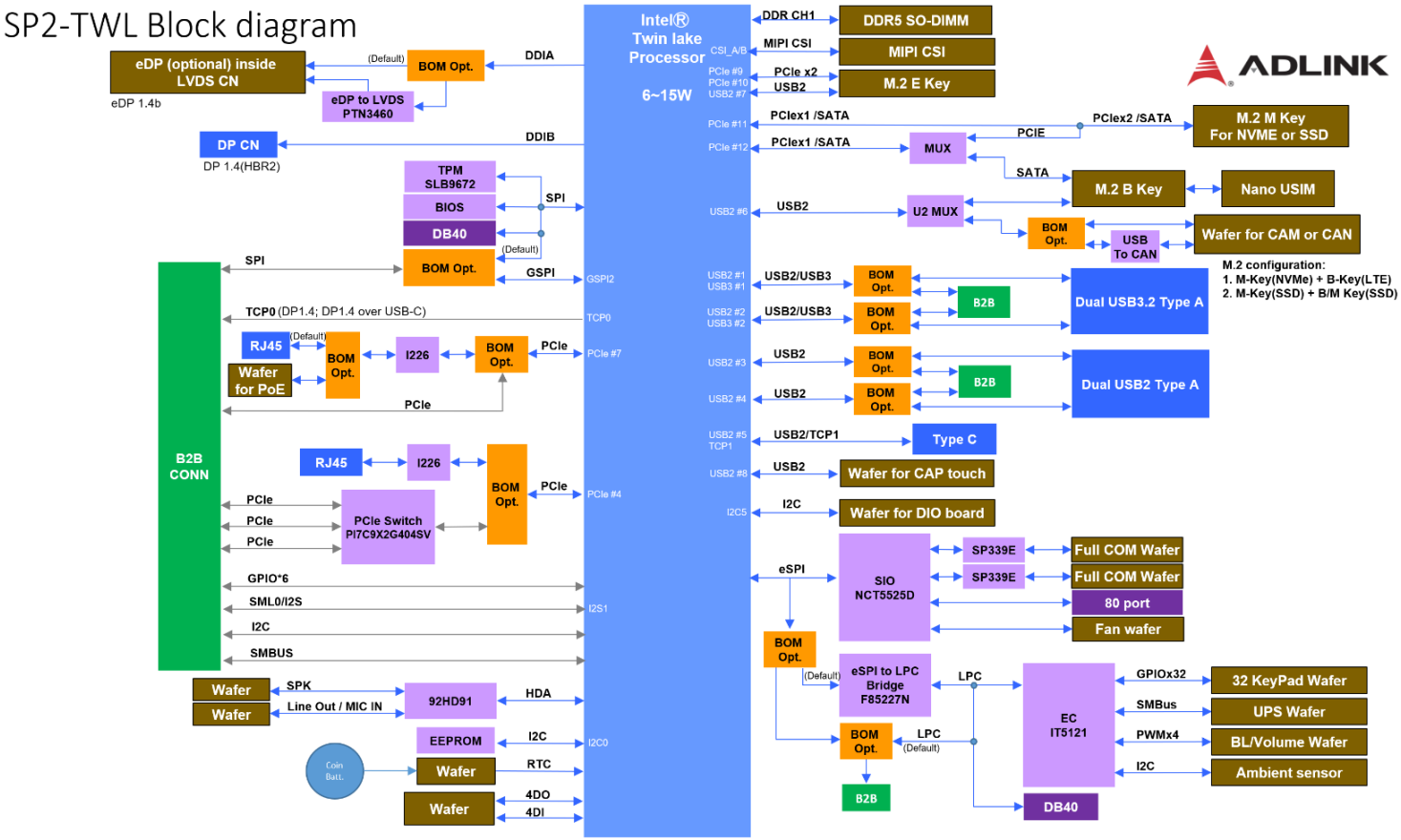


Figure 1 – Module function diagram

3. Specifications

Model		93-P1700-20XX SP2-10WP-TWL	93-P1700-60XX SP2-15WP-TWL	93-P1700-B0XX SP2-21WP-TWL
Processor	Intel® Processor N150, 3.6GHz or Intel® Core™ 3 N355, 3.9GHz	N150		
Memory	1x SODIMM socket, DDR5 4800 MHz up to 16GB	8GB		
Storage	1x M.2 SATA M key 2280 slot, support SATA SSD or 2280 NVME (PCIe Gen2 x2)	128GB SATA SSD		
	1x M.2 B key 2242 SATA SSD			
Chip	EC (Optional)			
	TPM 2.0 (Optional)			
Display	Size	10.1"	15.6"	21.5"
	Interface	LVDS	LVDS	LVDS
	Resolution	1280 x 800	1920 x 1080	1920 x1080
	Contrast Ratio	800:1	1000:1	1000:1
	Brightness (Nits)	400	400	400
	Backlight Life (Hrs)	50000	50000	50000
	Viewing Angle (U/D/R/L)	89/89/89/89	89/89/89/89	89/89/89/89
Touch	Touchscreen	PCAP		
	Surface Hardness	7H		
	Surface Treatment	Anti-Fingerprint		
Ethernet	2x GbE (Intel® I226), RJ-45, WOL LAN 1 up to 2.5GB LAN 2, 1GbE	2x 1 GbE LAN		
USB Ports	2x USB 3.2, Gen 1 (5 Gbps), OCP, Type A	2		
	2x USB 2.0, OCP, Type A	2		
	1x USB 3.2 Gen 1, Type C (optional)			
DisplayPort	1x DisplayPort, DisplayPort++ up to 4096x2304@60Hz	1		
	1x USB Type C, up to 4096x2304@60Hz			
USB / CAN	1x wafer USB 2.0 client or CAN bus	1x USB wafer CAN bus (by BOM option)		
COM	2x wafers RS-232/422/485 programmable, auto flow	2		

MIPI-CSI	1x connector to support MIPI-CSI 1.8V/3.3V/5V support 1x4 lane or 2x2 lane camera	1
I2C Wafer	2x wafers for I2C client	1
Audio (Optional)	1x wafer for buzzer	1
	1x wafer for 2x stereo speaker (2 watts)	
	1x wafer for Mic-in and Line-out	
LED	1x wafer for Watch dog/SATA LED, 1x load reset button, 3x user define LED	1
Expansion	1x M.2 2230 E key for wireless (Wi-Fi/Bluetooth)	1
	1x M.2 3042 B key for 4G module or SSD	1
Keys Wafer	1x for 32 physical keys (Optional)	
	1x LCD backlight up/down and volume up/down	
GPIO	1x wafer 8-pin GPIO	1
SPI	1x wafer for general SPI	1
Buttons	1x wafer for Power/Reset button and 1x LED	1
Fan	1x wafer for 12V system fan	1
Power Input	AT/ATX mode (switch by BIOS)	AT mode
	12V ±5% / 9-36V, both with OVP/UVP protection	12V
	Power saving (power consumption <1W in S5)	Yes
Power Connector	1x 6-pin power connector	1
Backup Batter	1x wafer to support backup battery to remind power (Optional)	
Environmental	Operating Temperature for system	0°C to 60°C
	Storage Temperature	-20°C to 70°C
	Operating Humidity	Up to 95%
	Vibration	5 ~ 500 Hz, 1 Grms for X,Y,Z axes
	Shock	Half sine, 20G, 11ms Refer to IEC 60068-2-27
	IP Rating	Front side IP65
	ESD	Air: ±15kV, Contact: ±8kV, screwing grounding

	Certifications & Compliance	CE/FCC class B FCC CFR Title 47 Part 15 Subpart B EN 55032:2015 + A11:2020; EN 55035:2017 + A11:2020; BS EN 55032:2015 + A11:2020; BS EN 55035:2017 + A11:2020; AS/NZS CISPR 32:2015 + A1:2020 EN 60601-1-2:2015 + A1:2021; IEC 60601-1-2:2014 + A1:2020 BS EN 60601-1-2:2015 + A1:2021 EN IEC 61000-3-2:2019+A1:2021 BS EN IEC 61000-3-2:2019+A1:2021 EN 61000-3-3:2013+A1:2019+A2:2021 BS EN 61000-3-3:2013+A1:2019+A2:2021 EN IEC 61000-6-4:2019 ; EN IEC 61000-6-2:2019 BS EN IEC 61000-6-4:2019 ; BS EN IEC 61000-6-2:2019 EN 50121-3-2:2016+A1:2019 BS EN 50121-3-2:2016+A1:2019		
Software	WDT	Watch Dog Timer supported		
	Operating System	Windows® 11/10, Linux		
Mechanical	Construction	SGCC		
	Dimension (W x L x D)	249.66 x 168.3 x 64.4 ± 2mm	383.15 x 232.79 x 65.1 ± 2 mm	517.46 x 309.19 x 67.6 ± 2 mm
	Weight	2.06 ± 0.2 kg	3.02 ± 0.2 kg	4.85 ± 0.2 kg
	Mounting	1) Panel Mounting 2) VESA mounting, support by a rear cover		

4. Mechanical Layout

All dimensions are in millimetres, unless noted.

4.1. Mechanical Dimensions

4.1.1 SP2-10WP-TWL

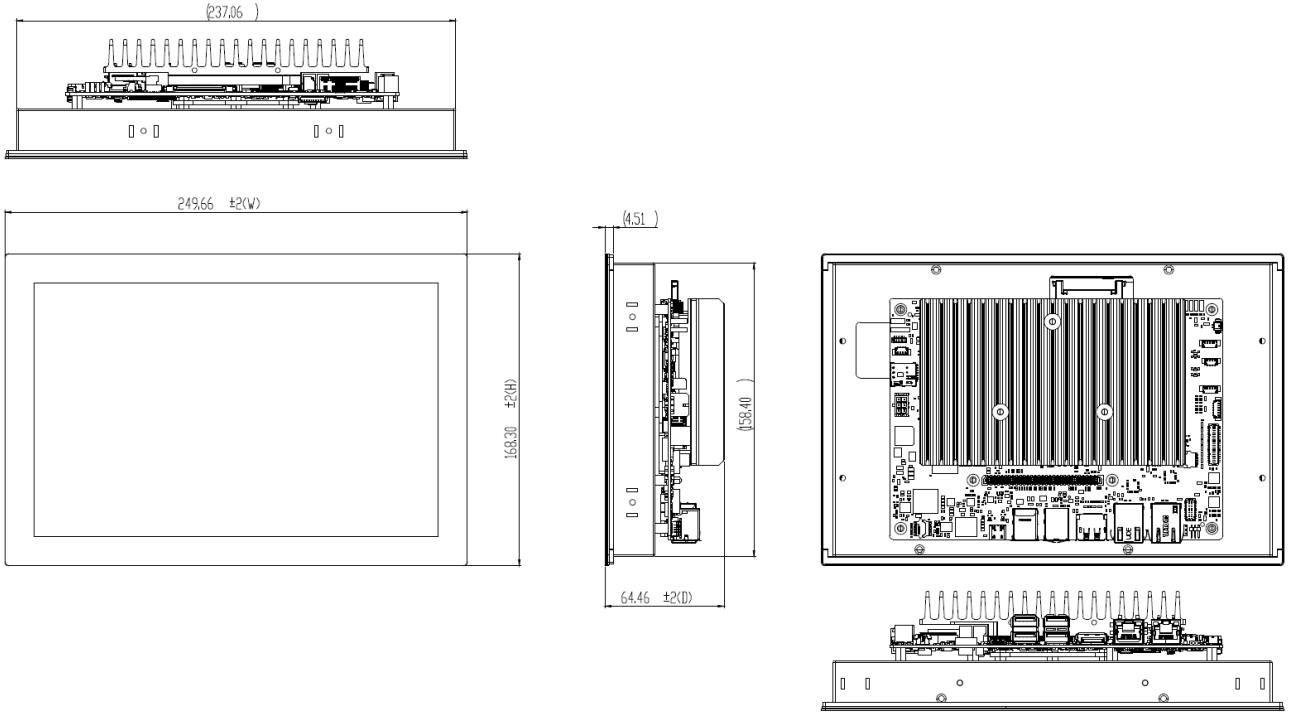


Figure 2 – SP2-10WP-TWL mechanical dimensions

4.1.2 SP2-15WP-TWL

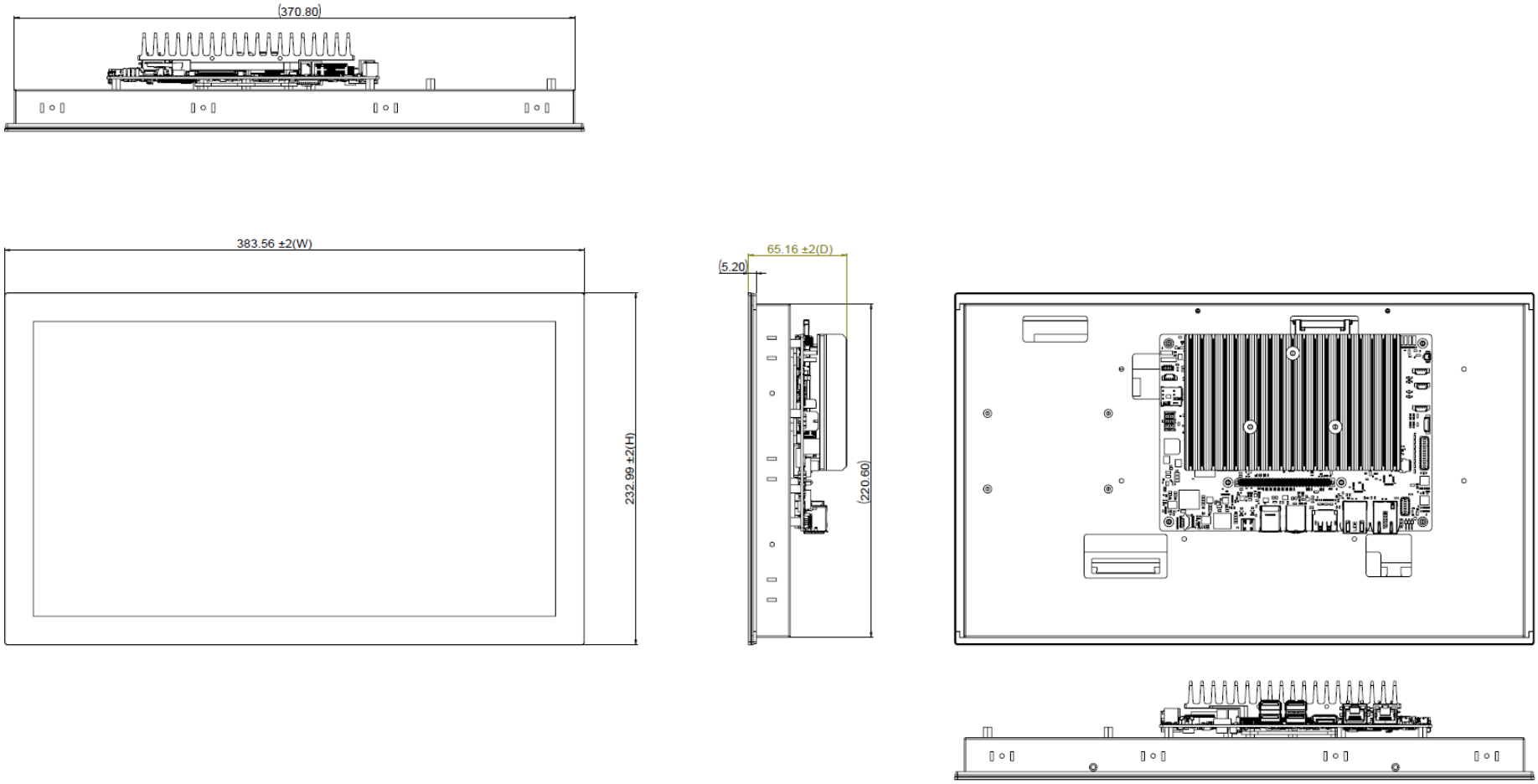


Figure 3 – SP2-15WP-TWL mechanical dimensions

4.1.3 SP2-21WP-TWL

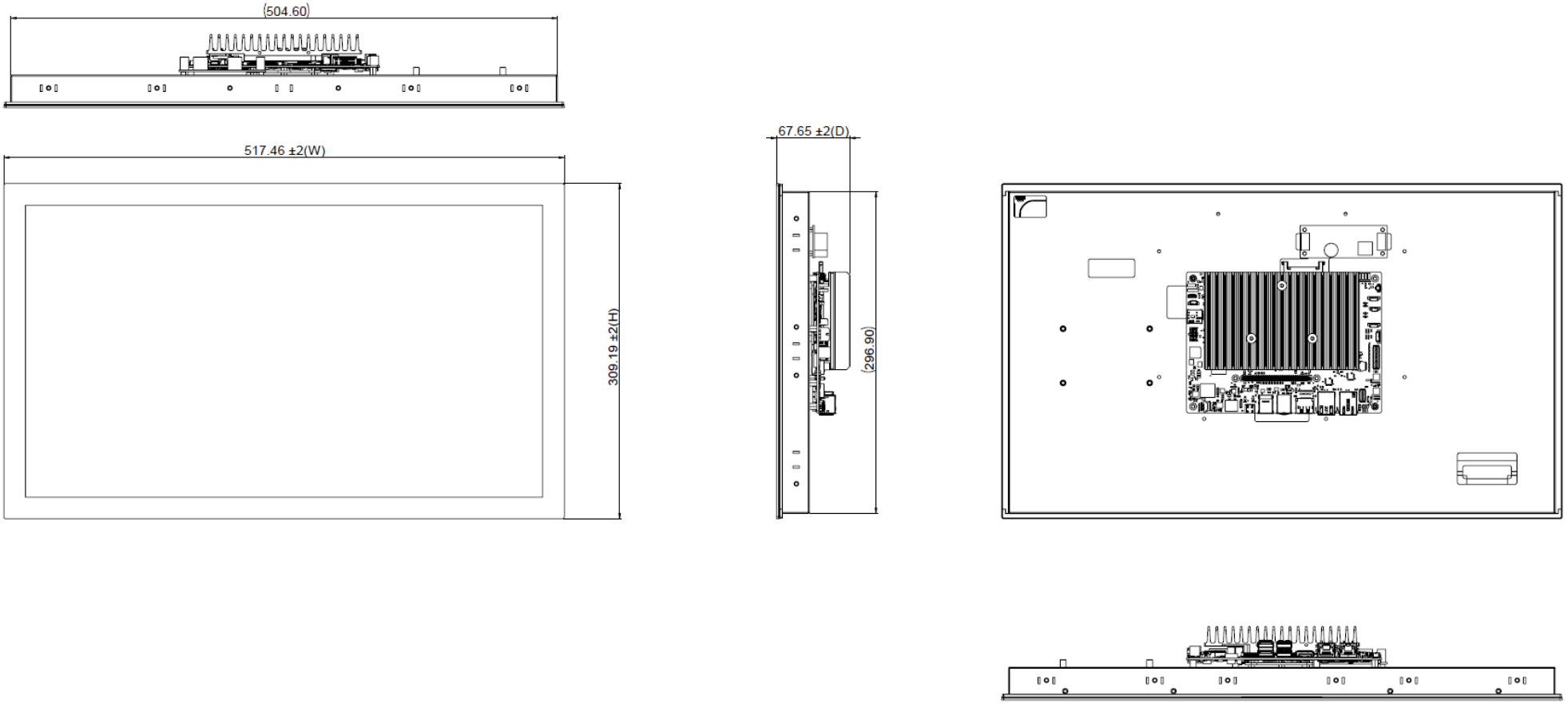


Figure 4 – SP2-21WP-TWL mechanical dimensions

4.2. I/O Panel Connector Locations

SP2-TWL provides comprehensive features that can be extended from internal I/O.

4.2.1 Main Board Locations – Top Side

Features marked in green are optional. Contact ADLINK sales for more information.

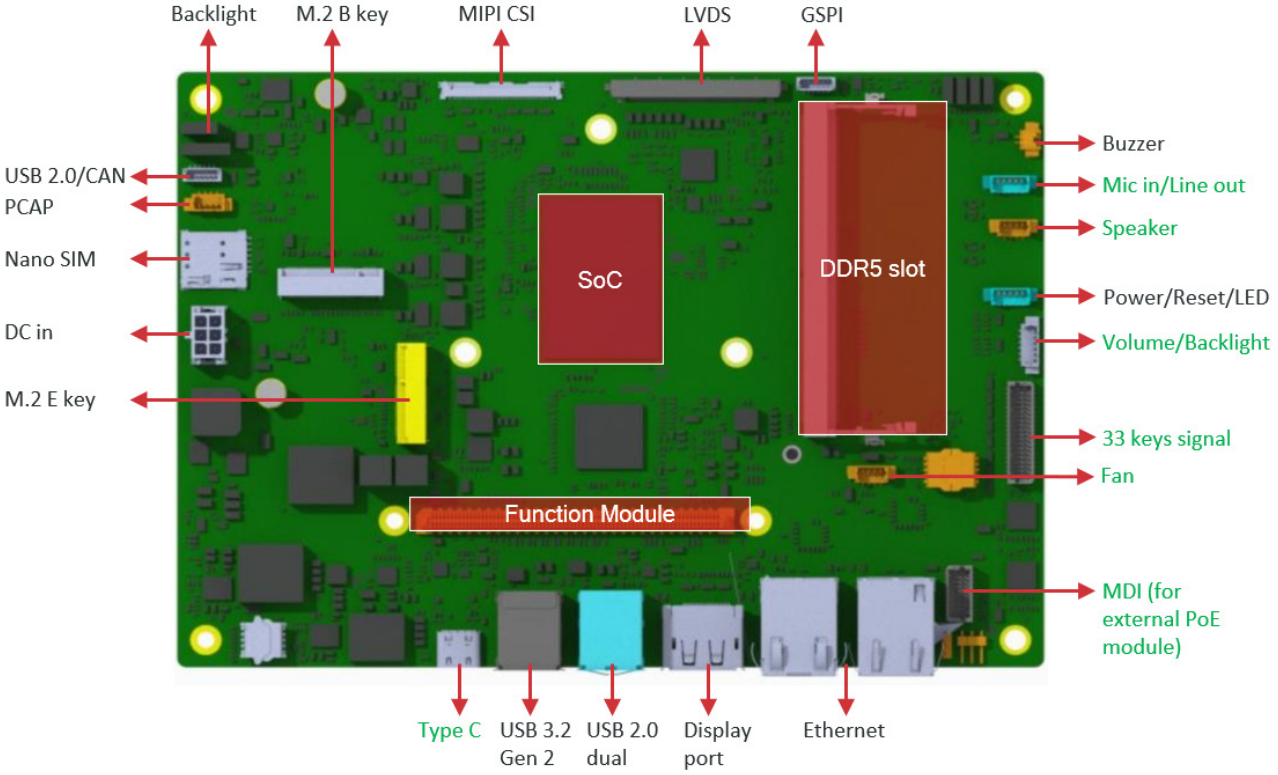


Figure 5 – I/O panel connector locations (Top)

4.2.2 Mainboard Connector Locations – Bottom Side

Features marked in green are optional features. Contact ADLINK sales for more information

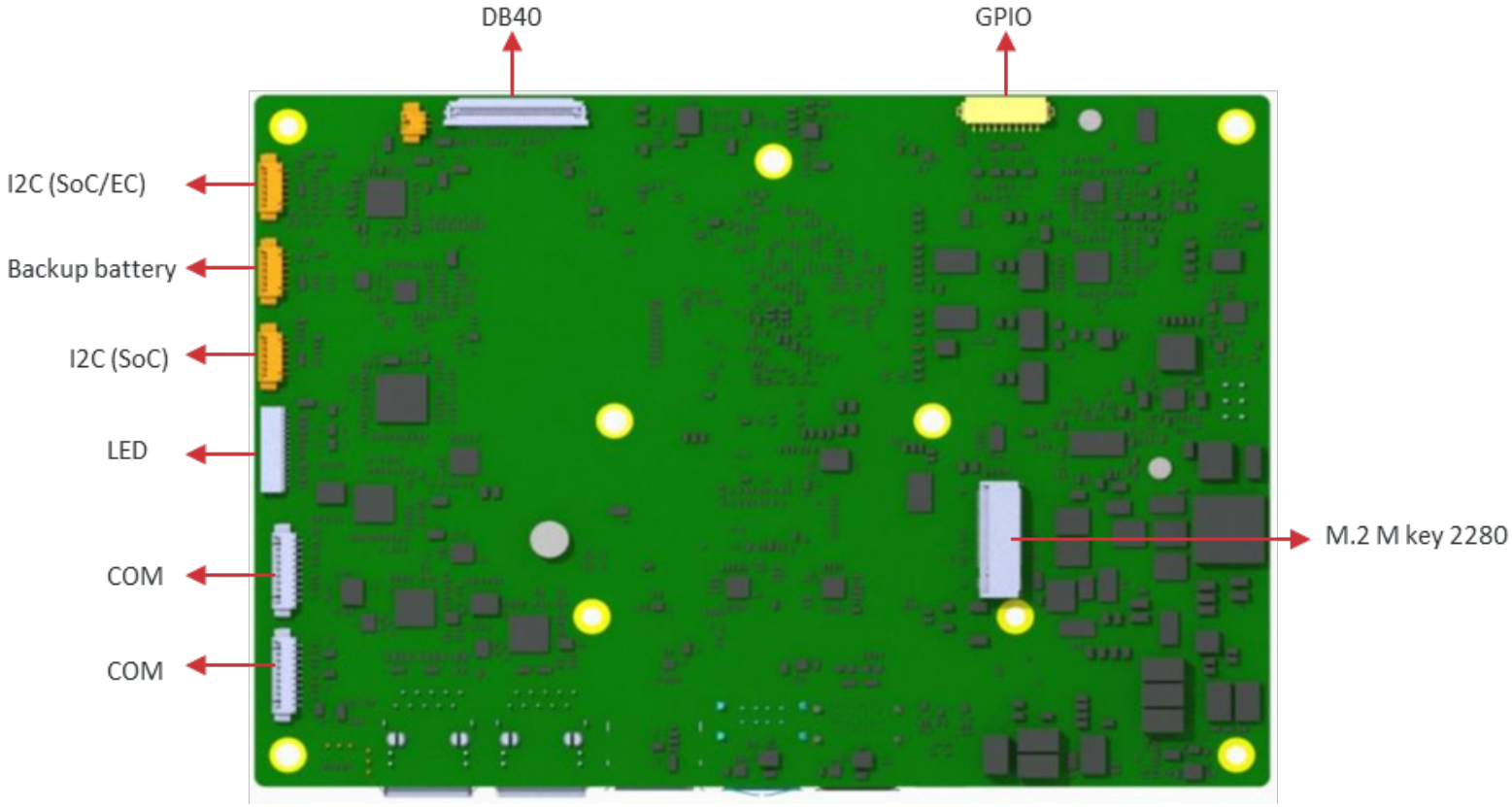


Figure 6 – Mainboard connector locations (Bottom)

5. Thermal Options

5.1. Heatsink Dimensions

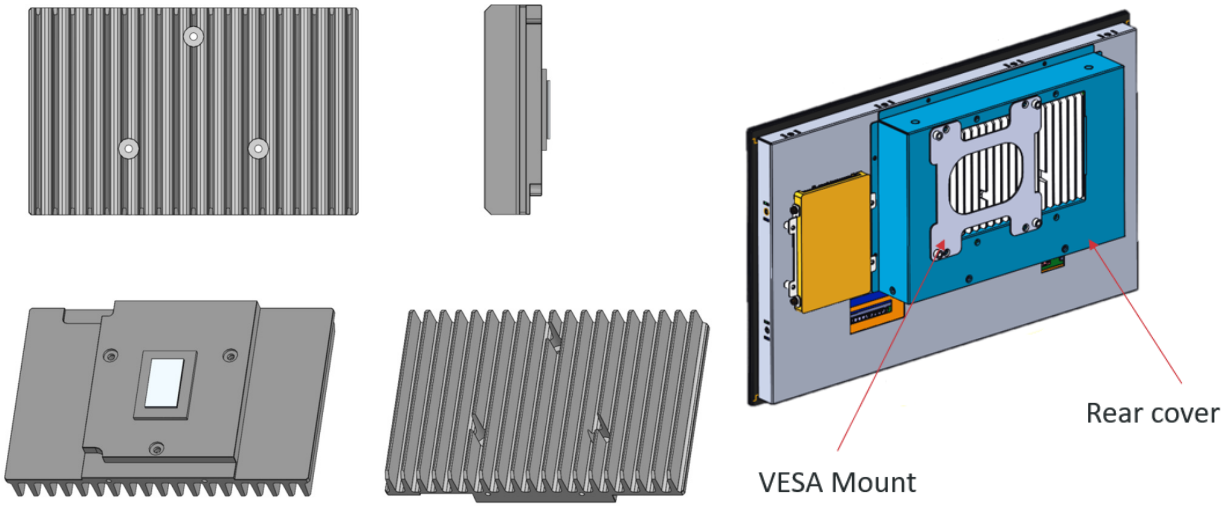


Figure 7 – Module function diagram

Note: All dimensions are in millimeters, unless noted. For compact-size panel PCs or space-constrained applications/equipment, the heatsink will need to be redesigned based on the application requirements.

Caution: Due to radiant heat from the passive heatsink, make sure the heatsink is positioned at least 10 cm from the nearest wall.

5.2. Active Cooling Heatsink

SP2-TWL reserves a fan for extreme environments. The optional fan bracket can be assembled on top of the standard heatsink.

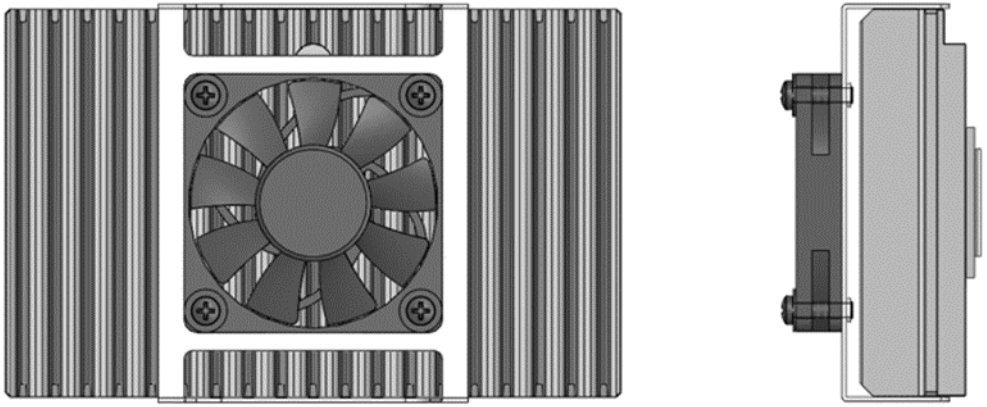
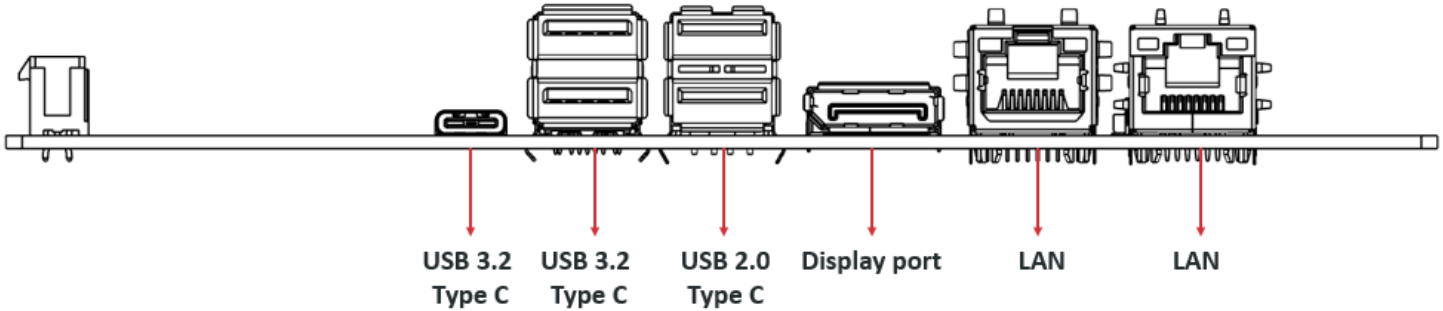


Figure 8 – Active cooling heatsink

6. Pinouts and Connectors



Connector	Manufacturer	MAFG P/N
USB 3.2 Type C	FOXCONN	UT12113-116B2-7H
USB 3.2 Type A dual port	FOXCONN	UAA111C-84161-4H
USB 2.0 Type A dual port	FOXCONN	UB1112C-8FDE-4F
DisplayPort	FOXCONN	3VD51203-3D6A-7H
LAN	UDE	S22-CL-0057
LAN	UDE	RT7-ZZ-0034

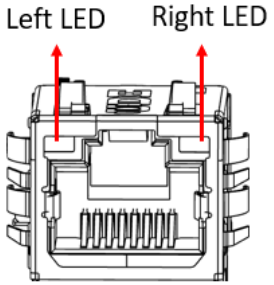
6.1. LAN (I226) LED Status

The right LED indicates the connection status.

LAN(I226) LED Position on Connector

LED Color	Status	Description
Yellow (right LED)	OFF	Ethernet port is disconnected.
	ON	Ethernet port is connected with no activity.
	Flashing	Ethernet port is connected and active.

LAN1/2 Active/Link LED



The Left LED indicates the working speed.
LAN port supports up to 2.5GbE, the default setting is 1GbE.

LED Color	Status	Description
Yellow (left LED)	OFF	10/100 Mbps
	Green	1000 Mbps
	Yellow	2500 Mbps

LAN1/2 Speed LED (2.5G)

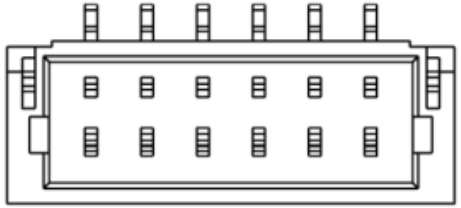
LED Color	Status	Description
Yellow (left LED)	OFF	10 Mbps
	Green	100 Mbps
	Yellow	1000 Mbps

LAN1/2 Speed LED (1G)

6.2. USB 2.0/CAN

The internal wafer supports USB 2.0 or CAN bus. The default setting is USB. Contact ADLINK sales if CAN bus support is required.

Pin	Signal
1	P5V_U2_CAM
2	CN_U2_CAM_N
3	CN_U2_CAM_P
4	GND
5	CON_CAN1_H
6	CON_CAN1_L

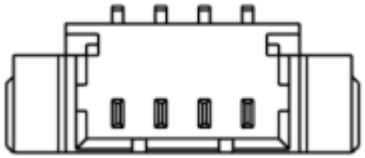


Manufacturer	MAFG P/N
CST	CSI-1181-061R-NH

6.3. PCAP

The internal USB 2.0 connector supports a capacitive touch for panel.

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

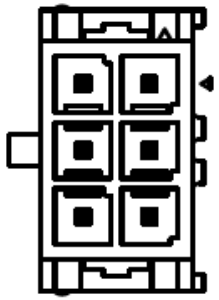


Manufacturer	MAFG P/N
MOLEX	53398-0471

6.4. DC Input Connector

The internal USB 2.0 connector supports a capacitive touch for panel.

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



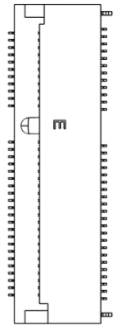
Manufacturer	MAFG P/N
CViLux	CP3506P1V00-NH

6.5. M.2 A/E Key (for Wireless Module)

The M.2 A/E key with gen3 x2 signal

Pin	Signal	Pin	Signal
1	GND	2	P_+3V3_NGFF_E
3	M2E_USB_P	4	P_+3V3_NGFF_E
5	M2E_USB_N	6	NC
7	GND	8	NC
9	NC	10	NC
11	NC	12	NC
13	NC	14	NC
15	NC	16	NC
17	NC	18	GND
19	NC	20	NC
21	NC	22	NC
23	NC	32	NC
33	GND	34	NC
35	PCIE9_M2E_TX_P	36	NC
37	PCIE9_M2E_TX_N	38	TEST POINT
39	GND	40	TEST POINT
41	PCH_PCIE9_RX_P	42	TEST POINT
43	PCH_PCIE9_RX_N	44	NC
Pin	**Signal**	**Pin**	**Signal**
45	GND	46	NC
47	C_PCIECLK3_100M_P	48	NC
49	C_PCIECLK3_100M_N	50	NC
51	GND	52	M2E_PLTRST_BUF-L
53	PCH_CLK_REQ_P3_N	54	Pull up 10K ohm to P_+3V3_NGFF_E
55	PCH_PCIE_M2E_WAKE-L	56	Pull up 10K ohm to P_+3V3_NGFF_E
57	GND	58	PCH_SMB_DAT_A
59	PCIE10_M2E_TX_P	60	PCH_SMB_CLK_A
61	PCIE10_M2E_TX_N	62	PCH_SMB_ALERT_N_3V3
63	GND	64	NC
65	PCH_PCIE10_RX_P	66	NC
67	PCH_PCIE10_RX_N	68	NC
69	GND	70	NC
71	NC	72	P_+3V3_NGFF_E
73	NC	74	P_+3V3_NGFF_E
75	GND		

Manufacturer	MAFG P/N
FOXCONN	2E0BC21-S85BE-7H



6.6. M.2 B Key (for LTE Module or SATA SSD)

The M.2 A/E key with gen3 x2 signal

Pin	Signal	Pin	Signal
1	M2B_CONFIG_3	2	P_+3V3_NGFF_B
3	GND	4	P_+3V3_NGFF_B
5	GND	6	Pull up 10K ohm to P_+3V3_NGFF_B
7	U2_USB6_P_CN	8	Pull up 10K ohm to P_+3V3_NGFF_B
9	U2_USB6_N_CN	10	M2B_SATALED-L
11	GND	20	NC
21	M2B_CONFIG_0	22	NC
23	NC	24	NC
25	NC	26	NC
27	GND	28	NC
29	PCIE3_M2B_RX_N	30	M2_UIM_RST
31	PCIE3_M2B_RX_P	32	M2_UIM_CLK
33	GND	34	M2_UIM_DATA
35	PCIE3_M2B_TX_N	36	P_+3V3_UIM_M2
37	PCIE3_M2B_TX_P	38	NC
39	GND	40	NC
Pin	**Signal**	**Pin**	**Signal**
41	MUX_SATA1_RX_P_R	42	NC
43	MUX_SATA1_RX_N_R	44	NC
45	GND	46	NC
47	MUX_SATA1_TX_N_R	48	NC
49	MUX_SATA1_TX_P_R	50	M2B_PLTRST_BUF-L
51	GND	52	PCH_CLK_REQ_P0_N
53	C_PCIECLK0_100M_N	54	PCH_PCIE_M2B_WAKE-L
55	C_PCIECLK0_100M_P	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		

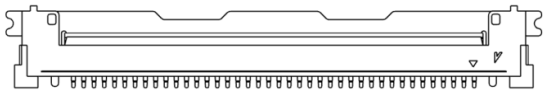
Manufacturer	MAFG P/N
FOXCONN	2E0BC21-S85BB-7H

6.7. MIPI CSI

The MIPI CSI is only support on Linux.

Pin	Signal	Pin	Signal
1	GND	21	MIPI_CSI1_CLK_EN
2	MIPI_CSI1_D2_P	22	MIPI_CSI1_RST_N_1V8
3	MIPI_CSI1_D2_N	23	MIPI_CSI1_RST_N
4	GND	24	GND
5	MIPI_CSI1_D0_N	25	VDD_1V8_MIPI
6	MIPI_CSI1_D0_P	26	GND
7	GND	27	P_3V3_A_MIPI
8	MIPI_CSI1_CLK_N	28	P_3V3_A_MIPI
9	MIPI_CSI1_CLK_P	29	P_+3V8_A_MIPI
10	GND	30	GND
11	MIPI_CSI1_D1_N	31	PCH_I2C2_SDA_1V8
12	MIPI_CSI1_D1_P	32	GND
13	GND	33	PCH_I2C2_SCL_1V8
14	MIPI_CSI1_D3_N	34	GND
15	MIPI_CSI1_D3_P	35	GND
16	GND	36	MIPI_CSI1_MCLK
17	MIPI_CSIA_CLK_N	37	GND
18	MIPI_CSIA_CLK_P	38	P_5V_A_MIPI
19	TEST POINT	39	P_5V_A_MIPI
20	TEST POINT	40	GND

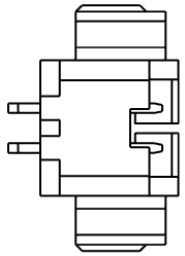
Manufacturer	MAFG P/N
ACES	50473-0400M-001



6.8. Buzzer

The internal USB 2.0 connector supports a capacitive touch for panel.

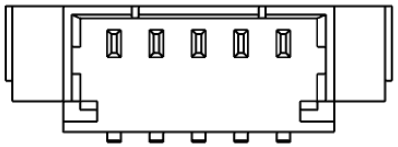
Pin	Signal
1	GSPI_TOUCH_INT-L
2	PCH_GSPI1_MISO_3V3
3	PCH_GSPI1_MOSI_3V3
4	PCH_GSPI1_CS0-L_3V3
5	PCH_GSPI1_CLK_3V3
6	GND



Manufacturer	MAFG P/N
JVE	24W1125A-02M00-01T-1-CF01

6.9. Mic In/Line Out Wafer

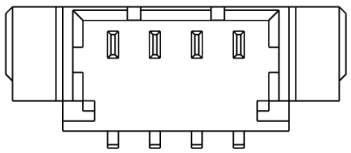
Pin	Signal
1	CON_MIC1_IN
2	CON_LINE1_OUT_L
3	CON_LINE1_OUT_R
4	LINE1_OUT_JD
5	AGND_AUDIO



Manufacturer	MAFG P/N
MOLEX	53398-0571

6.10. Speaker Wafer

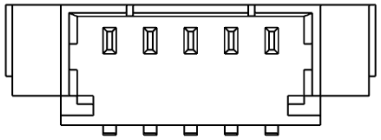
Pin	Signal
1	AMP_L+
2	AMP_L-
3	AMP_L-
4	AMP_R-



Manufacturer	MAFG P/N
MOLEX	53398-0471

6.11. Power/Reset/LED Wafer

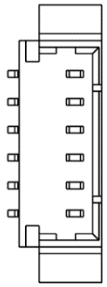
Pin	Signal
1	P_+3V3_A
2	PWRBTN-L_R
3	RSTBTN-L_R
4	SIG_PWRLED-L
5	GND



Manufacturer	MAFG P/N
MOLEX	53398-0571

6.12. Volume/Backlight Wafer

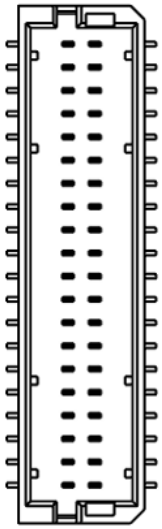
Pin	Signal
1	P_+3V3_S0
2	EC_BTN_33
3	EC_BTN_34
4	EC_BTN_35
5	EC_BTN_36
6	GND



Manufacturer	MAFG P/N
JVE	24W1125A-06S10-01T-0.5-CF01

6.13. 33 Key Signal

Pin	Signal	Pin	Signal
1	GND	2	P_+3V3_S0
3	EC_BTN_17	4	EC_BTN_1
5	EC_BTN_18	6	EC_BTN_2
7	EC_BTN_19	8	EC_BTN_3
9	EC_BTN_20	10	EC_BTN_4
11	EC_BTN_21	12	EC_BTN_5
13	EC_BTN_22	14	EC_BTN_6
15	EC_BTN_23	16	EC_BTN_7
17	EC_BTN_24	18	EC_BTN_8
19	EC_BTN_25	20	EC_BTN_9
21	EC_BTN_26	22	EC_BTN_10
23	EC_BTN_27	24	EC_BTN_11
25	EC_BTN_28	26	EC_BTN_12
27	EC_BTN_29	28	EC_BTN_13
29	EC_BTN_30	30	EC_BTN_14
31	EC_BTN_31	32	EC_BTN_15



Manufacturer	MAFG P/N
HIROSE	DF20EF-40DP-1V(52)

Pin	Signal	Function Value	Pin	Signal	Function Value
1	GND	N/A	2	P_+3V3_S0	N/A
3	EC_BTN_17	Tab	4	EC_BTN_1	↑
5	EC_BTN_18	Backspace	6	EC_BTN_2	↓
7	EC_BTN_19	Delete	8	EC_BTN_3	→
9	EC_BTN_20	Space	10	EC_BTN_4	←
11	EC_BTN_21	Page Up	12	EC_BTN_5	0
13	EC_BTN_22	Page Down	14	EC_BTN_6	1
15	EC_BTN_23	F1	16	EC_BTN_7	2
17	EC_BTN_24	F2	18	EC_BTN_8	3
19	EC_BTN_25	F3	20	EC_BTN_9	4
21	EC_BTN_26	F4	22	EC_BTN_10	5
23	EC_BTN_27	F5	24	EC_BTN_11	6
25	EC_BTN_28	F6	26	EC_BTN_12	7
27	EC_BTN_29	F7	28	EC_BTN_13	8
29	EC_BTN_30	F8	30	EC_BTN_14	9
31	EC_BTN_31	F9	32	EC_BTN_15	Enter
33	EC_BTN_32	F10	34	EC_BTN_16	Esc
35	EC_BTN_37		36	NC	
37	NC		38	P_+3V3_A	
39	NC		40	P_+3V3_A	

6.14. Fan Wafer

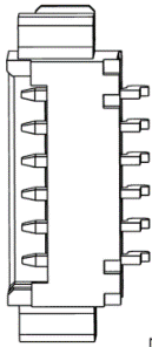
Pin	Signal
1	GND
2	FAN_PWR_IN
3	SIO_FANIN1_CN
4	SIO_PWM_DAC1_CN

Manufacturer	MAFG P/N
MOLEX	53398-0471

6.15. 2nd I2C/SMBus from EC Wafer

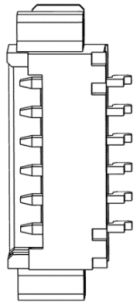
Pin	Signal
1	P_+5V_I2C2
2	P_+3V3_I2C2
3	2ND_SDA
4	2ND_SCL
5	2ND_INT
6	GND

Manufacturer	MAFG P/N
JVE	24W1125A-06M00-01T-1-CF01



6.16. 1st I2C from SoC Wafer

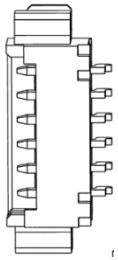
Pin	Signal
1	P_+5V_I2C2
2	P_+3V3_I2C2
3	2ND_SDA
4	2ND_SCL
5	2ND_INT
6	GND



Manufacturer	MAFG P/N
JVE	24W1125A-06M00-01T-1-CF01

6.17. Back Battery Wafer

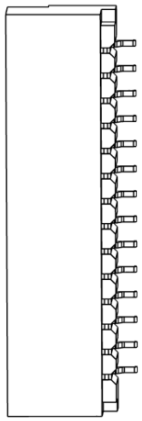
Pin	Signal
1	CHG_PWR
2	GND
3	CHG_SMBCLK
4	CHG_SMBDAT
5	SMB_ALERT-L_R
6	DCIN_DET



Manufacturer	MAFG P/N
JVE	24W1125A-06M00-01T-1-CF01

6.18. LED Wafer

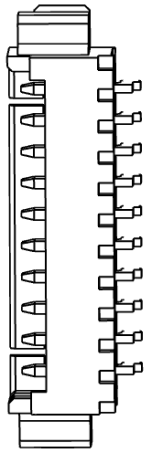
Pin	Signal
1	GND
2	STDBY_PWR
3	GP3_LED-L
4	GP2_LED-L
5	GP1_LED-L
6	P_+3V3_A
7	BIOS_LOAD_DEFAULT_L
8	GND
9	NC
10	NC
11	CN_SATA_LED-L_R
12	P_+3V3_S0
13	CN_WDT_LED-L
14	P_+3V3_A



Manufacturer	MAFG P/N
CST	CSI-1182-141R-NH

6.19. COM 1/COM 2

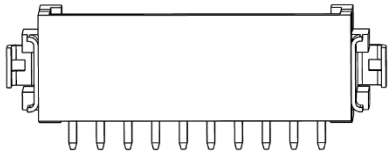
Pin	Signal	RS232	RS422	RS485
1	COM1_DCD-L_CN	DCD#	TXD422-	485DATA-
2	COM1_RXD_CN	RXD	TXD422+	485DATA+
3	COM1_TXD_CN	TXD	RXD422+	NC
4	COM1_DTR-L_CN	DTR#	RXD422-	NC
5	GND	GND	NC	NC
6	COM1_DSR-L_CN	DSR#	NC	NC
7	COM1_RTS-L_CN	RTS#	NC	NC
8	COM1_CTS-L_CN	CTS#	NC	NC
9	COM1_RI-L_CN	RI#	NC	NC
10	NC	NC	NC	NC



Manufacturer	MAFG P/N	ADLINK P/N
MOLEX	53261-1071	61-6AJ03-1100

6.20. GPIO

Pin	Signal
1	P_+3V3_S0
2	CN_DI0
3	CN_DI1
4	CN_DI2
5	CN_DI3
6	CN_DO0
7	CN_DO1
8	CN_DO2
9	CN_DO3
10	GND



Manufacturer	MAFG P/N	ADLINK P/N
HIROSE	DF13-10P-1.25H	61-66J05-1100

This device provides 4 channels of non-isolation digital input and 4 channels of non-isolation digital output circuits.

4-channel Digital Input

- VIH: 2 to 5.25V
- VIL: 0 to 0.8V

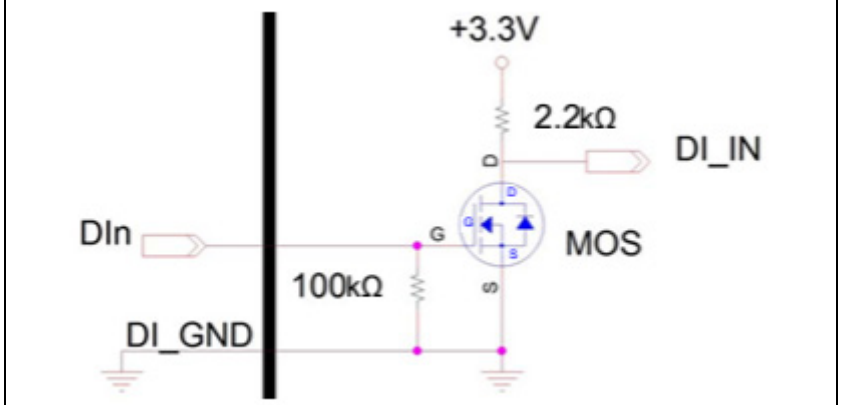
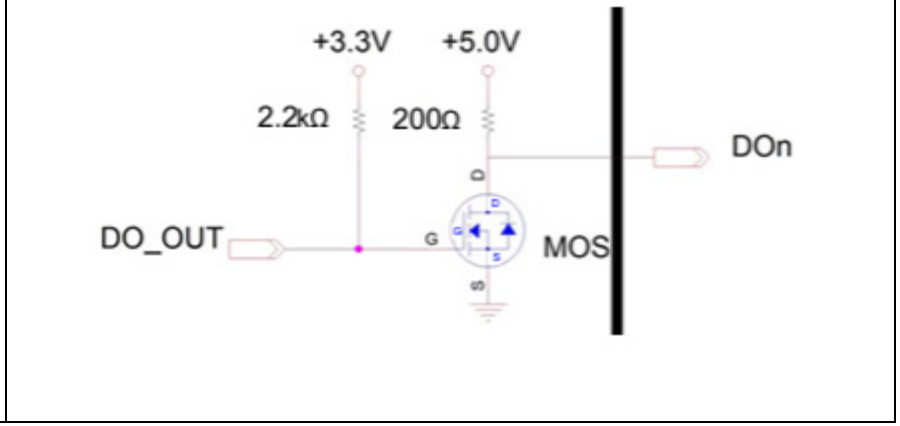
4-channel Digital Output

- Output type: open drain N-channel
- MOSFET driver with internal pull-high of 200Ω resistance
- Source/Sink current for all channels: 22mA
- VOH: 2.4 to 5V
- VOL: 0 to 0.55V

GPIO Connector Pin Voltage

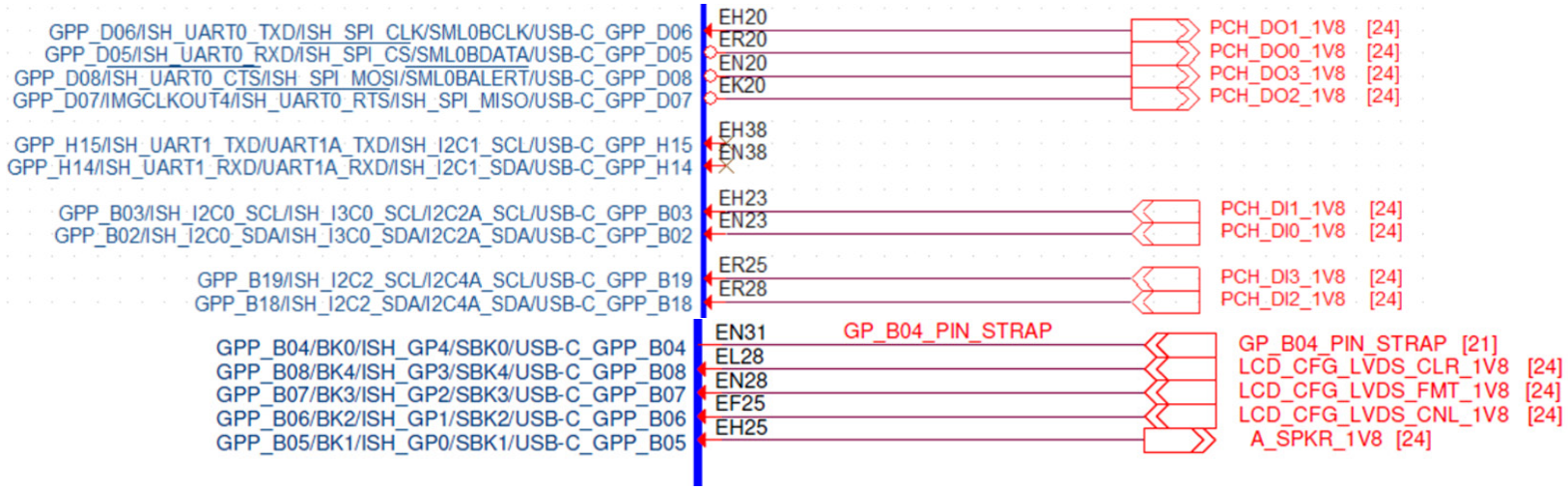
Pin	Signal	PCH GPIO	Default Value	Input/Output Voltage Range
1	P_+3V3_S0			
2	CN_DI0	GP_B02	Input	VIH: 2 V VIL: 0.8V
3	CN_DI1	GP_B03	Input	VIH: 2 V VIL: 0.8V
4	CN_DI2	GP_B18	Input	VIH: 2 V VIL: 0.8V
5	CN_DI3	GP_B19	Input	VIH: 2 V VIL: 0.8V
6	CN_DO0	GP_D05	Output	VOH: 2.4V VOL: 0.55V
7	CN_DO1	GP_D06	Output	VOH: 2.4V VOL: 0.55V
8	CN_DO2	GP_D07	Output	VOH: 2.4V VOL: 0.55V
9	CN_DO3	GP_D08	Output	VOH: 2.4V VOL: 0.55V
10	GND			

Digital Circuit

Digital Input Circuit	Digital Output Circuit
	

GPIO Address

Net name	PCH_GPIO	Address
PCH_DO0_1V8	GPP_D05	0XE0D507E0
PCH_DO1_1V8	GPP_D06	0XE0D507F0
PCH_DO2_1V8	GPP_D07	0XE0D50800
PCH_DO3_1V8	GPP_D08	0XE0D50810
PCH_DI0_1V8	GPP_B02	0XE0D50620
PCH_DI1_1V8	GPP_B03	0XE0D50630
PCH_DI2_1V8	GPP_B18	0XE0D50720
PCH_DI3_1V8	GPP_B19	0XE0D50730

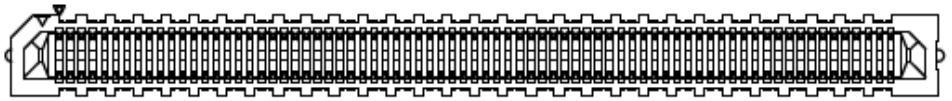


[Bit definition]
Bit 1-Rx state, **1/0** represents **high/low**
Bit -Tx state, set to **1** for output **high**

6.21. Function Module Board Connector

The function module allows customized expandability of the device. Contact your ADLINK representative for details.

Pin	Signal	Pin	Signal
1	P_+12V_A	2	P_+12V_A
3	P_+12V_A	4	P_+12V_A
5	GND	6	GND
7	GND	8	GND
9	P_+5V_A	10	P_+5V_A
11	P_+5V_A	12	P_+5V_A
13	GND	14	GND
15	GND	16	GND
17	P_+3V3_A	18	P_+3V3_A
19	P_+3V3_A	20	P_+3V3_A
21	GND	22	GND
23	GND	24	GND
25	PCH_SLP_S3-L	26	PCH_I2C1_DAT_3V3
27	PCH_PCIE_FM_WAKE-L	28	PCH_I2C1_CLK_3V3
29	GND	30	FM_PRESET-L
31	SOC_FM_PCIECLK2_P	32	PLTRST-L_FM
33	SOC_FM_PCIECLK2_N	34	GND
35	GND	36	PCH_SMB_ALERT_N_3V3
37	SOC_FM_PCIE_RX5_P	38	PCH_SMB_DAT_A
39	SOC_FM_PCIE_RX5_N	40	PCH_SMB_CLK_A
41	GND	42	GND
43	SOC_FM_PCIE_TX5_P	44	FM_U3_TX1_P
45	SOC_FM_PCIE_TX5_N	46	FM_U3_TX1_N
47	GND	48	GND
49	SOC_FM_PCIECLK3_P	50	FM_U3_RX1_P
51	SOC_FM_PCIECLK3_N	52	FM_U3_RX1_N
53	GND	54	GND
55	SOC_FM_PCIE_RX6_P	56	FM_U2_P1_P
57	SOC_FM_PCIE_RX6_N	58	FM_U2_P1_N
59	GND	60	GND
61	SOC_FM_PCIE_TX6_P	62	FM_U3_TX2_P
63	SOC_FM_PCIE_TX6_N	64	FM_U3_TX2_N
65	GND	66	GND



67	SOC_FM_PCIECLK4_P	68	FM_U3_RX2_P
69	SOC_FM_PCIECLK4_N	70	FM_U3_RX2_N
71	GND	72	GND
73	SOC_FM_PCIE_RX7_P	74	FM_U2_P2_P
75	SOC_FM_PCIE_RX7_N	76	FM_U2_P2_N
77	GND	78	GND
79	SOC_FM_PCIE_TX7_P	80	FM_U2_P3_P
81	SOC_FM_PCIE_TX7_N	82	FM_U2_P3_N
83	GND	84	GND
85	SOC_FM_PCIECLK5_P	86	FM_U2_P4_P
87	SOC_FM_PCIECLK5_N	88	FM_U2_P4_N
89	GND	90	GND
91	SOC_FM_PCIE_RX8_P	92	FM_ESPI_LPC_0
93	SOC_FM_PCIE_RX8_N	94	FM_ESPI_LPC_1
95	GND	96	FM_ESPI_LPC_2
97	SOC_FM_PCIE_TX8_P	98	FM_ESPI_LPC_3
99	SOC_FM_PCIE_TX8_N	100	FM_ESPI_CS1_LPC_FRAME-L
101	GND	102	FM_ESPI_CLK_LPC_CLK
103	PCH_CLK_REQ_P4_N_3V3	104	FM_ESPI_ALERT1-L_LPC_SERIRQ
105	PCH_CLK_REQ_P5_N_3V3	106	FM_ESPI_RESET-L_LPC_DRQ
107	GND	108	GND
109	FM_TCP2_TX0_P	110	I2S1_TXD_TCP2_LSK_TXD
111	FM_TCP2_TX0_N	112	I2S1_RXD_TCP2_LSK_RXD
113	GND	114	I2S1_SFRM
115	FM_TCP2_TX1_P	116	I2S1_SCLK_PCH_SML0_DAT
117	FM_TCP2_TX1_N	118	I2S1_MCLK_PCH_SML0_CLK
119	GND	120	GND
121	FM_TCP2_TX2_P	122	USB_OC1_N
123	FM_TCP2_TX2_N	124	USB_OC3_N
125	GND	126	GND
127	FM_TCP2_TX3_P	128	FM_GPIO0
129	FM_TCP2_TX3_N	130	FM_GPIO1
131	GND	132	FM_GPIO2
133	FM_TCP2_I2CCLK_AUX_P_CN	134	GPIO3_SPICS1_MUX
135	FM_TCP2_I2CDAT_AUX_N_CN	136	GPIO4_FIN_IN_MUX
137	GND	138	GPIO3_FIN_OUT_MUX
139	FM_TCP2_DDC_AUX_SEL_CN	140	FM_SPI_MISO

141	FM_TCP2_DDI1_HPD	142	FM_SPI_MOSI
143	GND	144	FM_SPI_CS#
145	PCH_I2C2_DAT_3V3	146	FM_SPI_CLK
147	PCH_I2C2_CLK_3V3	148	GND
149	FM_I2C2_INT_3V3	150	UART_SOC_RI_N

6.22. Clear CMOS header

Under conditions where the device fails to boot, clearing the BIOS contents stored in CMOS and restoring the default settings may be effective. To clear the CMOS, short pins 2 and 3, then wait for 5 seconds. Remove the jumper cap and short pins 1 and 2.

Clear COS Pin Header	
CN1	
(1-2)	NA (Default)
(2-3)	Clear CMOS

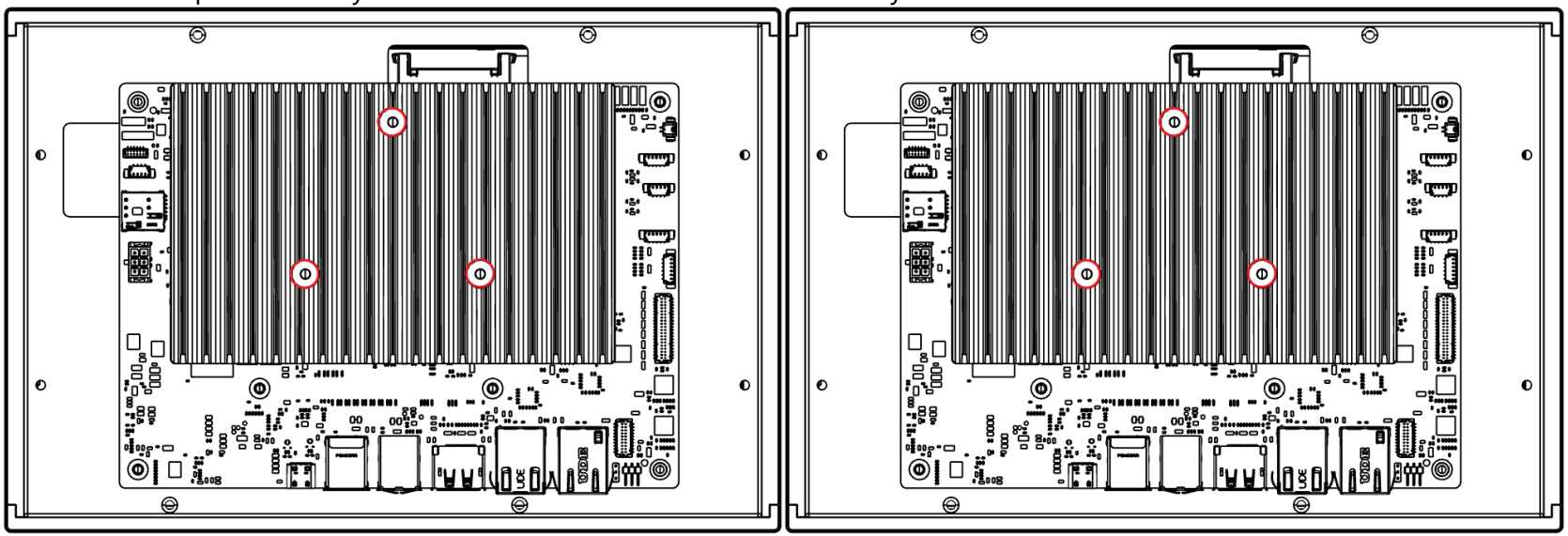
7. Getting Started

Follow the instructions in this chapter to add or change memory; Wi-Fi modules, mounting brackets, and mounting clips.

7.1. Adding or Changing Memory

Follow these steps to add or change memory modules.

1. Remove the 3 screws that attach the heatsink to the mainboard, and then remove the heatsink.
2. Install or swap the memory module in the SODIMM socket as necessary.

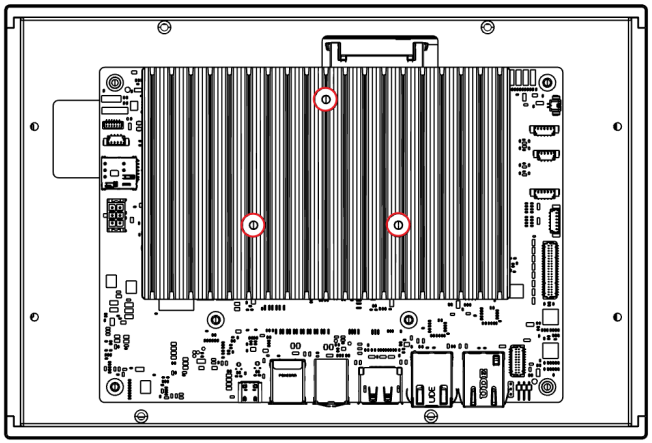


3. Reattach the heat sink to the mainboard with the previously removed screws.

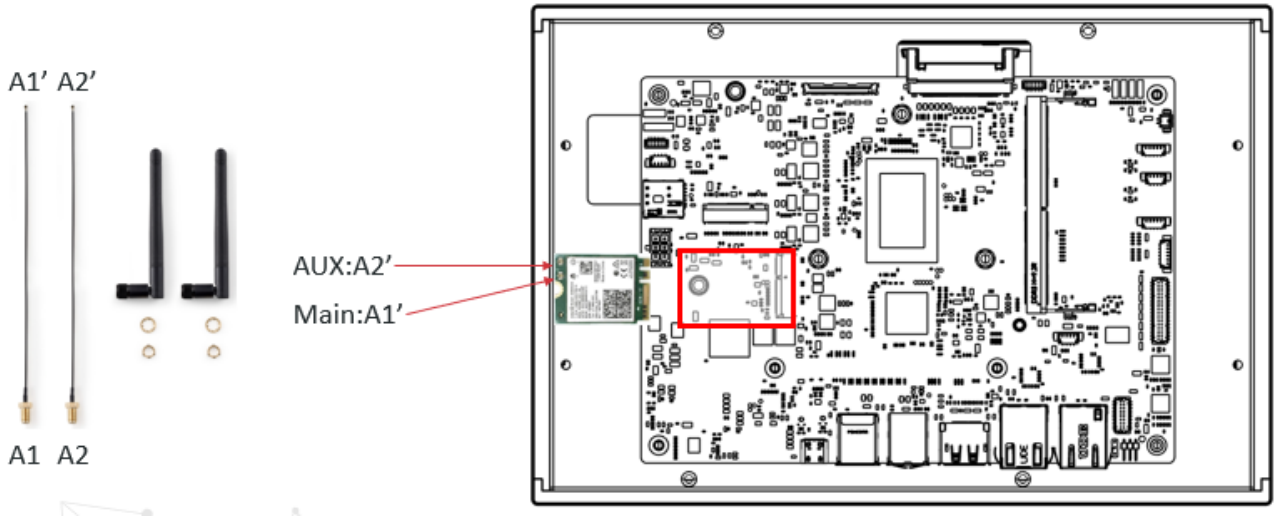
7.2. Installing a Wi-Fi-Module

Follow these steps to add or change a Wi-Fi module.

1. Remove the 3 screws that attach the heatsink to the mainboard, and then remove the heatsink.

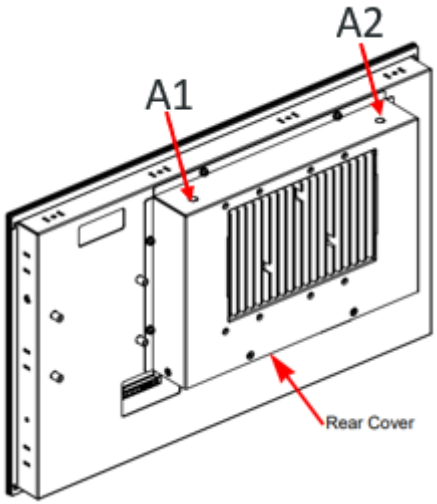


2. Install the Wi-Fi module.



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

4. Install Antennas to rear cover or equipment

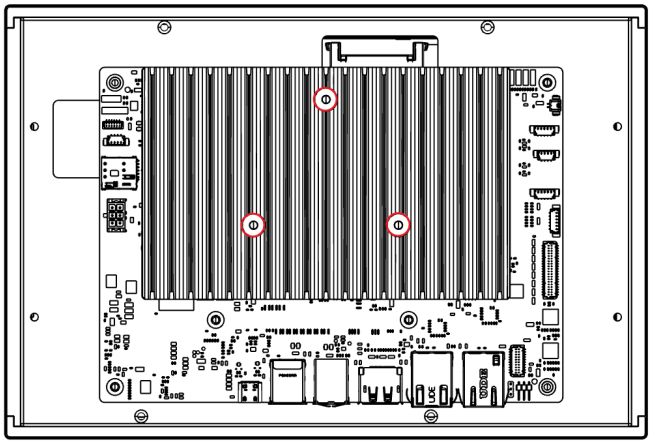


Note: Wi-Fi antennas must be installed on the SP2-TWL Series housing in order for Wi-Fi to function properly.

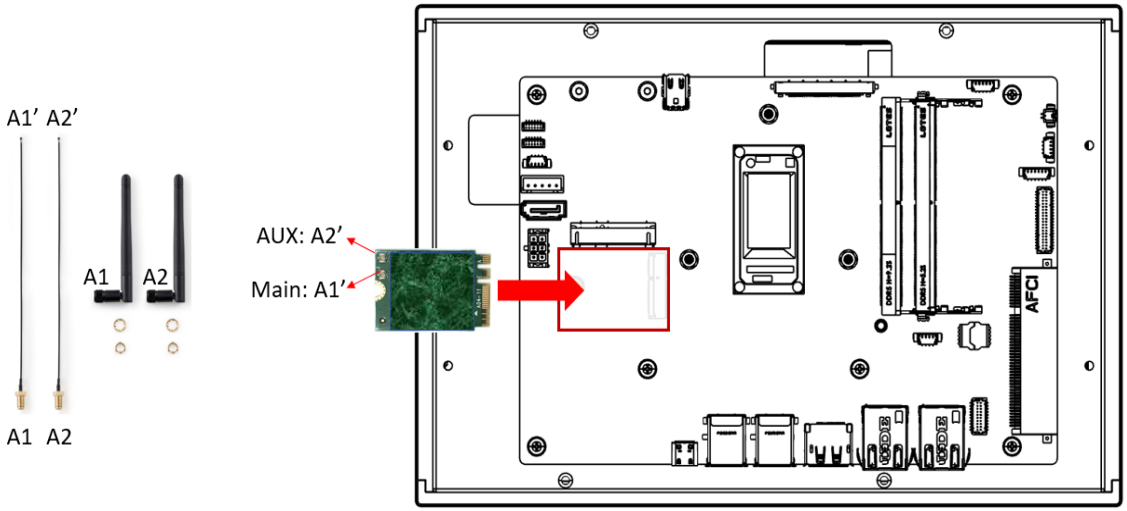
7.3. Installing an LTE Module

Follow these steps to add or change a Wi-Fi module.

1. Remove the 3 screws that attach the heatsink to the mainboard, and then remove the heatsink.

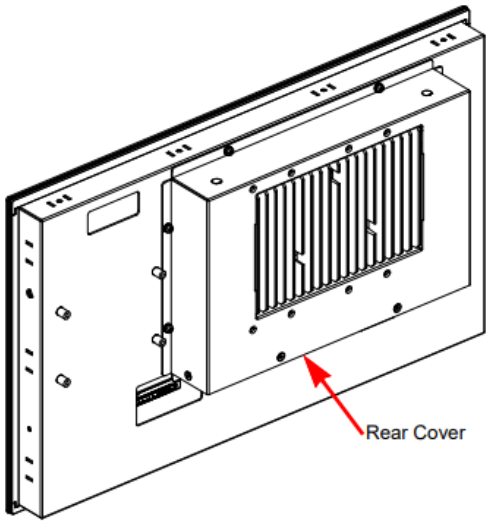


2. Install the LTE module.



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

4. Install Antennas to rear cover or equipment.



Note: LTE antennas must be installed on the SP2-TWL Series housing in order for LTE to function properly.

7.4. Mounting

This section includes details for panel and VESA mounting options.

Note: All dimensions are in millimeters, unless noted.

Warning: 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.

Caution: 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 operations or is still hot from previous use.

7.4.1 Panel Mounting

The SP2-TWL 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.

- **SP2-10WP cutout**

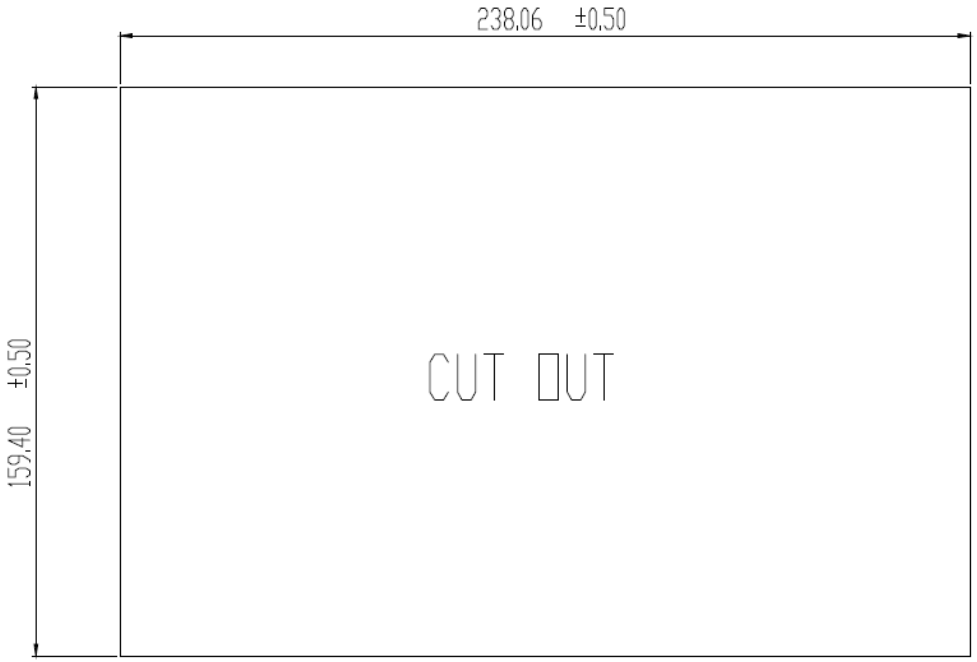


Figure 9 – SP2-10WP cutout dimensions

- **SP2-15WP cutout**

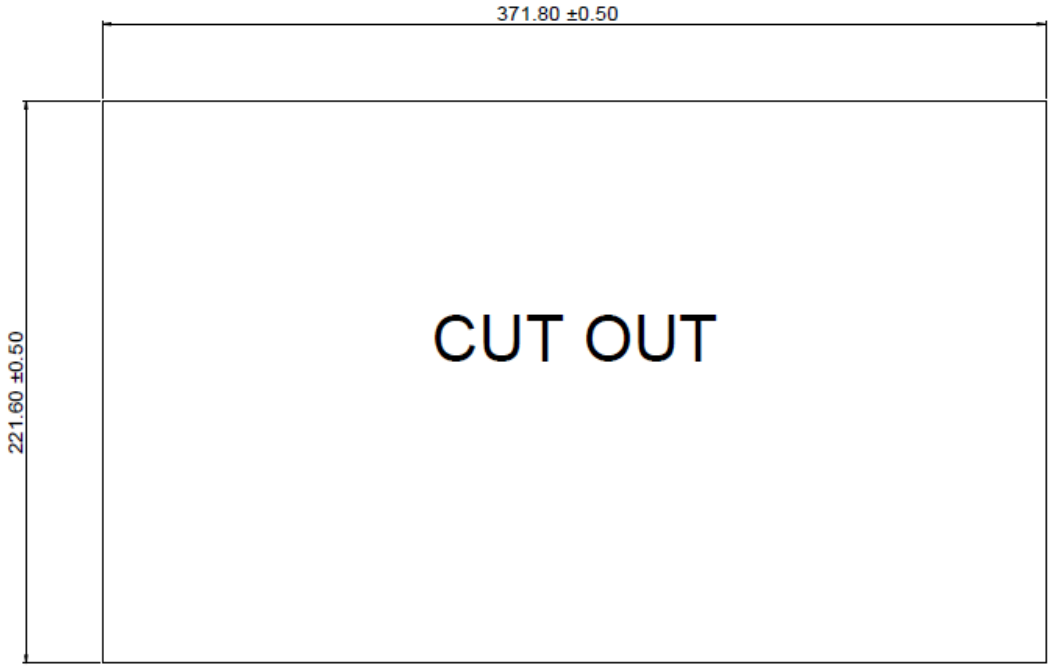


Figure 10 – SP2-15WP cutout dimensions

- **SP2-21WP cutout**

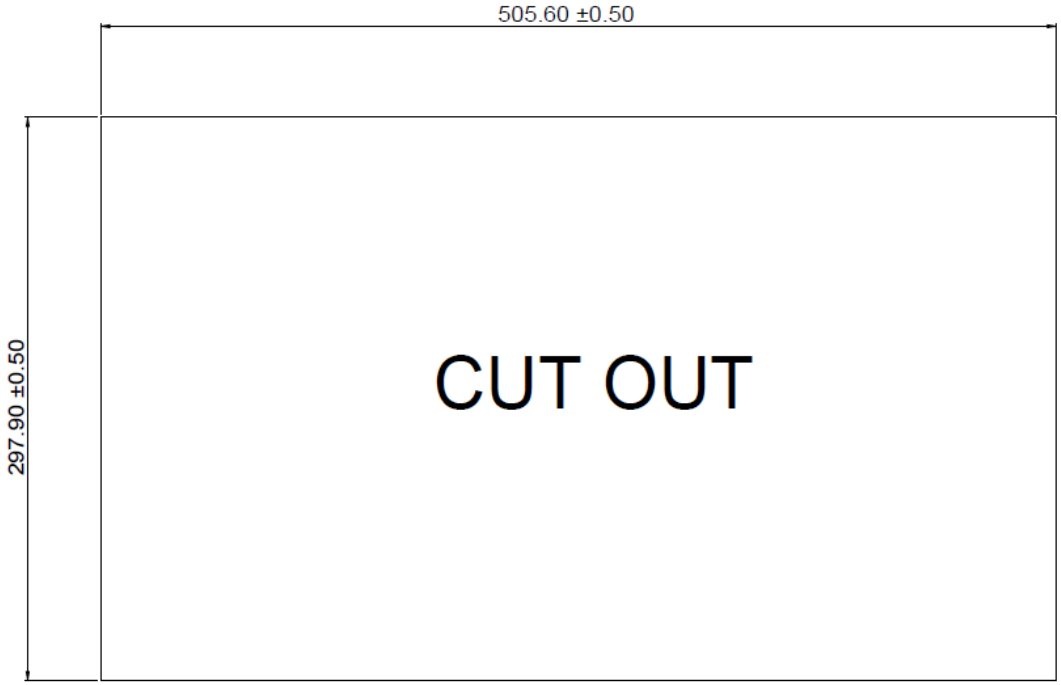
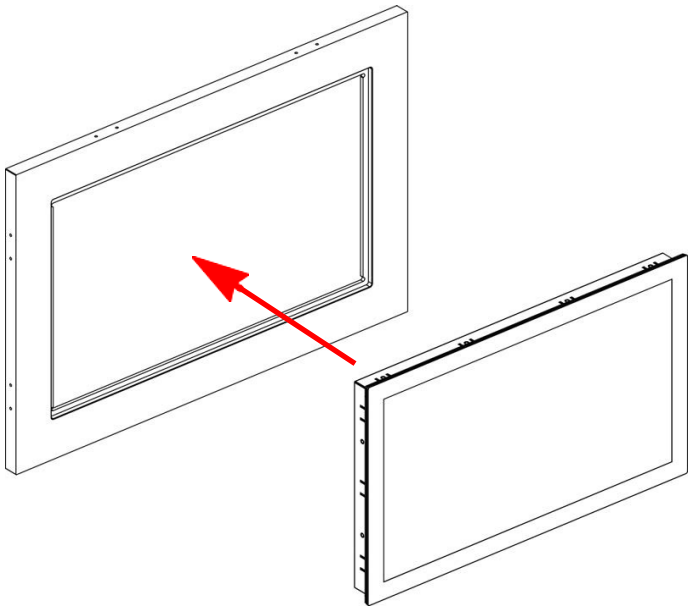


Figure 11 – SP2-21WP cutout dimensions

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.



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.

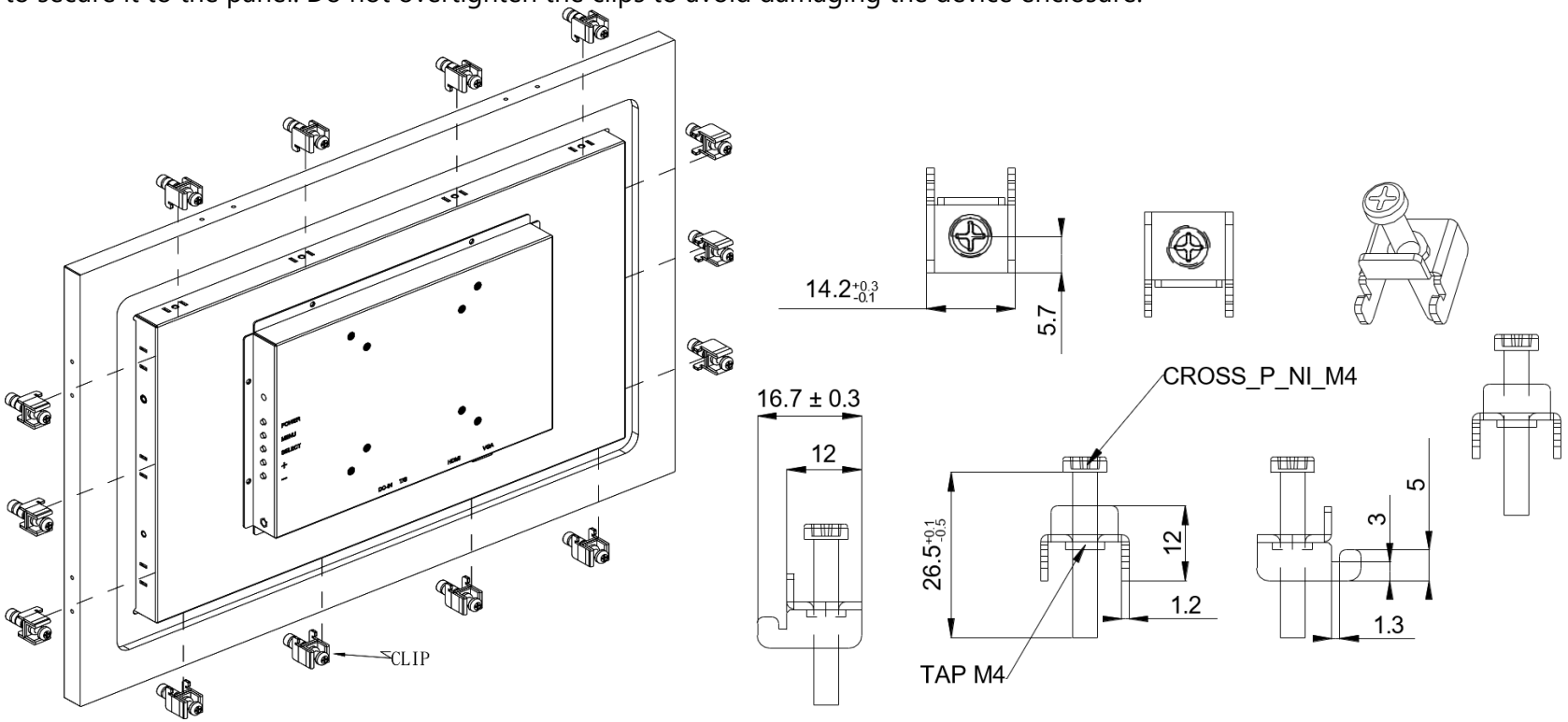


Figure 12 – Mounting clip dimensions

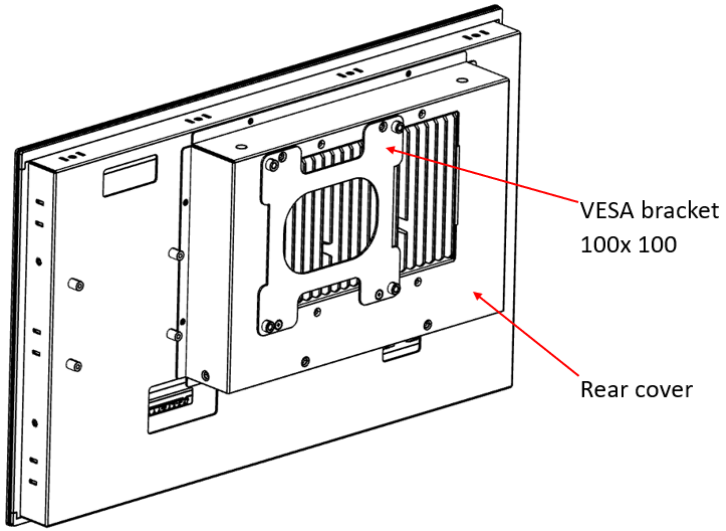
Note: Optional mounting clips sold separately. Contact your ADLINK reseller for details.

7.4.2 VESA Mounting

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

Note: 1. All I/O ports must face down. 2. Optional VESA bracket and M3 screws sold separately. Contact your ADLINK reseller for details.
3. Mounting bracket provides 100 mm x 100 mm VESA mounting and requires 4x M4 screws.

Attach the rear cover to the panel PC with the screws supplied in the kit, then secure the VESA bracket to the rear cover with 4x M3 screws.



8. Driver and 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:

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

9. BIOS Setup

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

Main	Advanced	Chipset	Security	Boot	Save & Exit
BIOS Information System Information Board Information System Date System Time	CPU Configuration ► Power Management ► Graphics Configuration ► Super IO Configuration ► BIOS Watchdog Timer ► Serial Port Console Redirection ► Trusted Computing ► Hardware Monitor ► NVME Configuration ► Network Stack Configuration ► Miscellaneous ►	System Agent (SA) Configuration ► PCH-IO Configuration ►	Password Description Secure Boot Menu ►	Boot Configuration	Save Options Default Options Boot Override

Notes:

► Indicates a submenu
Gray text indicates info only

9.1. Main

The Main Menu provides read-only information about your system and allows you to set the System Date and Time. Refer to the tables below for details about the submenus and settings.

9.1.1 Menu > BIOS Information

Feature	Options	Description
BIOS Vender	Info only	American Megatrends
BIOS Version	Info only	Display Core version
Build Date	Info only	Display compliancy information
MRC Version	Info only	Display compliancy information
GOP Driver Version	Info only	Display Intel Graphic Version
ME FW Version	Info only	Display Intel CSME Version
EC Version	Info only	Display EC version

9.1.2 Menu > System Information

Board Information	Info only	Description
Project Name	Info only	Display Project Name.
CPU Board Version	Info only	Display CPU Signature.
CPU Brand String	Info only	Display CPU Brand Name.
CPU Frequency	Info only	Display CPU frequency
Total Memory	Info only	Display installed memory size.
Memory Frequency	Info only	Display memory frequency.

PCH SKU	Info only	Display PCH Information.
FM Board	Info only	Display FM SKUY

9.1.3 Menu > Board Information

Board Information	Info only	Description
Serial Number	Read only	Display SMC serial Number
Manufacturing Date	Read only	Display SMC manufacturing date.
Last Repair Date	Read only	Display SMC last repair date.

9.1.4 Menu > System Date and Time

Feature	Options	Description
System Date	Weekday, MM/DD/YYYY	Requires the alpha-numeric entry of the day of the week, day of the month, calendar month, and all 4 digits of the year, indicating the century and year (Fri XX/XX/20XX)
System Time	HH/MM/SS	Presented as a 24-hour clock setting in hours, minutes, and seconds
Access Level	Info only	

9.2. Advanced

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

9.2.1 Advanced > CPU Configuration

Feature	Options	Description
ID	Info only	
Brand String	Info only	
Microcode Revision	Info only	
L1 Data Cache	Info only	
L1 Instruction Cache	Info only	
L2 Cache	Info only	
L3 Cache	Info only	
VMX	Info only	
SMX/TXT	Info only	
Turbo Mode	Disabled, **Enabled**	Enable/Disable processor Turbo Mode (requires EMTTM enabled too). AUTO means enabled.
C States	**Disabled**, Enabled	Enable/Disable CPU Power Management. Allows CPU to go to C states when it's not 100% utilized.
Intel Trusted Execution Technology	**Disabled**, Enabled	Enables utilization of additional hardware capabilities provided by Intel (R) Trusted Execution Technology. Changes require a full power cycle to take effect.

9.2.2 Advanced > Power Management

Feature	Options	Description
Enable Hibernation	Disabled, **Enabled**	Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may not be effective with some operating systems.
ACPI Sleep State	Suspend Disabled, **S3 (Suspend to RAM)**	Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.
ERP	**Disabled**, Enabled	Energy-Related Products
State After G3	**S0 State**, S5 State	Specify what state to go to when power is re-applied after a power failure (G3 state).

9.2.3 Advanced > Graphics Configuration

Feature	Options	Description
Nxp configuration	Info Only	
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 Polaity select
Hsync Polarity	**Active High** Active Low	Hsync Polaity select

Spreading depth	No Spreading 0.5% 1.0% 1.5% 2.0% **2.5%**	Clock frequency center spreading depth.
Integrated Display Configuration	Info only	
eDP/LVDS	Disabled **Enabled**	Enable/Disable eDP/LVDS
LFP Panel Type	VBIOS Default 640x480 800x600 1024x768 1280x1024 1400x1050 LVDS1 1400x1050 LVDS2 1600x1200 1366x768 1680x1050 1920x1200 1440x900 1600x900 1024x768 **1280x800** 1920x1080 2048x1536	Select LFP panel used by Internal Graphics Device by selecting the appropriate setup item.
DDI port 1	No Device, Display Port, HDMI, **DisplayPort with HDMI/DVI Compatible**	Select LVDS Backlight control function.

9.2.4 Advanced > Super I/O Configuration

Feature	Options	Description
Super IO Configuration	Info only	
NCT5525D Super IO Configuration	submenu	
NCT5104S Super IO Configuration	submenu	

9.2.4.1. Advanced > Super I/O Configuration > NCT5525D Super I/O Configuration

Feature	Options	Description
NCT5525D Super IO Configuration	Info only	
Super IO Chip	Info only	
Serial Port 1 Configuration	submenu	
Serial Port 2 Configuration	submenu	

9.2.4.1.1. Advanced > Super I/O Configuration > NCT5525D Super I/O Configuration > Serial Port 1 Configuration

Feature	Options	Description
Serial Port 1 Configuration	Info only	
Serial Port	Disabled **Enabled**	Enable or Disable Serial Port (COM).
Device Settings	Info only	
Device Mode	**RS232**	Change the Serial Port mode

Feature	Options	Description
	RS485 RS422	

9.2.4.1.2. Advanced > Super I/O Configuration > NCT5525D Super I/O Configuration > Serial Port 2 Configuration

Feature	Options	Description
Serial Port 1 Configuration	Info only	
Serial Port	Disabled **Enabled**	Enable or Disable Serial Port (COM).
Device Settings	Info only	
Device Mode	**RS232** RS485 RS422	Change the Serial Port mode

9.2.4.2. Advanced > Super I/O Configuration > NCT5104D Super I/O Configuration

Feature	Options	Description
NCT5104D Super IO Configuration	Info only	
Super IO Chip	Info only	
Serial Port 1 Configuration	submenu	
Serial Port 2 Configuration	submenu	

9.2.4.2.1. Advanced > Super I/O Configuration > NCT5104D Super I/O Configuration > Serial Port 1 Configuration

Feature	Options	Description
Serial Port 1 Configuration	Info only	
Serial Port	Disabled **Enabled**	Enable or Disable Serial Port (COM).
Device Settings	Info only	
COM1 Control	**RS232** RS485 RS422	Select COM1 mode, RS232, RS422 or RS485

9.2.4.2.2. Advanced > Super I/O Configuration > NCT5104D Super I/O Configuration > Serial Port 2 Configuration

Feature	Options	Description
Serial Port 2 Configuration	Info only	
Serial Port	Disabled **Enabled**	Enable or Disable Serial Port (COM).
Device Settings	Info only	
COM2 Control	**RS232** RS485 RS422	Select COM2 mode, RS232, RS422 or RS485

9.2.4.2.3. Advanced > Super I/O Configuration > NCT5104D Super I/O Configuration > Serial Port 3 Configuration

Feature	Options	Description
Serial Port 3 Configuration	Info only	
Serial Port	Disabled **Enabled**	Enable or Disable Serial Port (COM).
Device Settings	Info only	

9.2.4.2.4. Advanced > Super I/O Configuration > NCT5104D Super I/O Configuration > Serial Port 4 Configuration

Feature	Options	Description
Serial Port 4 Configuration	Info only	
Serial Port	Disabled **Enabled**	Enable or Disable Serial Port (COM).
Device Settings	Info only	

9.2.5 Advanced > BIOS Watchdog Timer

Feature	Options	Description
BIOS Watchdog Timer	**Info only**	
BIOS POST watchdog	**Disabled,** Second Mode, Minute Mode	1. Disable: Disable WatchDog Timer; 2. Second Mode: Enable Watchdog Timer in second mode; 3. Minute Mode: Enable Watchdog Timer in minute mode.

9.2.6 Advanced > Serial Console Redirection

Feature	Options	Description
Console Redirection	**Disabled,** Enabled	To enable or disable console redirection of COMx.
Console Redirection Settings	Submenu	The settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.

9.2.6.1. Advanced > Serial Port Console > Console Redirection Settings

Feature	Options	Description
COM0	Info only	
Console Redirection Settings	Info only	
Terminal Type	VT100 VT100+ VT-UTF8 **ANSI**	Emulation: ANSI: Extended ASCII char set. VT100: ASCII char set. VT100+: Extends VT100 to support color, function keys, etc. VT-UTF8: Uses UTF8 encoding to map Unicode chars onto 1 or more bytes.
Bits per second	9600 19200 38400 57600 **115200**	Selects serial port transmission speed. The speed must be matched on the other side. Long or noisy lines may require lower speeds.
Data Bits	7 **8**	Data Bits.
Parity	**None** Even Odd Mark Space	A parity bit can be sent with the data bits to detect some transmission errors. Even: parity bit is 0 if the num of 1's in the data bits is even. Odd: parity bit is 0 if num of 1's in the data bits is odd. Mark: parity bit is always 1. Space: Parity bit is always 0. Mark and Space Parity do not allow for error detection.

Feature	Options	Description
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.

9.2.7 Advanced > Trusted Computing

Feature	Options	Description
Security Device Support	**Disable**, Enable	Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.

9.2.8 Advanced > Hardware Monitor

Feature	Options	Description
System temperature	Info Only	
CPU temperature	Info Only	
SYSTEM FAN Speed	Info Only	
5V_S0	Info Only	
VCCCORE	Info Only	
VCC3V	Info Only	
VSB3V	Info Only	
VBAT	Info Only	
AVSB	Info Only	
Smart Fan Function	Submenu	Smart Fan function setting

9.2.8.1. Advanced > Hardware Monitor > Smart Fan Function

Feature	Options	Description
System Fan Setting	Submenu	

9.2.8.1.1. Advanced > Hardware Monitor > Smart Fan Function > MXM / System Fan settings

Feature	Options	Description
Fan Mode	Manual mode, SMART FAN IV	Fan control mode select
Manual PWM	128	Fan will work with this Manual PWM Value(0~255 for 0%~100%)

9.2.9 Advanced > NVMe Configuration

Feature	Options	Description
Seg:Bus:Dev:Func	Info only	
Model Number	Info only	
Total Size	Info only	
Vendor ID	Info only	
Device ID	Info only	
Namespace	Info only	
Self Test Option	**Short** Extended	Select either Short or Extended Self Test. Short option will take couple of minutes and extended option will take several minutes to complete.
Self Test Action	**Controller Only Test** Controller and NameSpace Test	Select either to test Contoller alone or Controller and NameSpace. Selecting Controller and Namespace option will take lot longer to complete the test.

Feature	Options	Description
Run Device Self Test		Perform device self test for the corresponding Option and Action selected by user.Pressing 'Esc' key will abort the test. Result shown below is the recent result logged in the device.

9.2.10 Advanced > Network Stack Configuration

Feature	Options	Description
Network Stack	**Disabled** Enabled	Enable/Disable UEFI network stack.
Ipv4 PXE Support	**Disabled** Enabled	Enable/Disable IPv4 PXE boot support. If disabled, IPv4 PXE boot support will not be available.
Ipv6 PXE Support	**Disabled** Enabled	Enable/Disable IPv6 PXE boot support. If disabled, IPv6 PXE boot support will not be available.
PXE boot wait time	**0**	Wait time in seconds to press ESC key to abort the PXE boot. Use either +/- or numeric keys to set the value.

9.2.11 Advanced > Miscellaneous

Feature	Options	Description
Miscellaneous	Info only	
M.2 Configuration Mode	NVMe X2 + LTE NVMe X1 + SATA + USB to wafer or CAN **SATA + SATA + USB to wafer or CAN**	This setting configures M.2 M-Key + B-Key operation mode. If configured to M.2 M-Key NVMe + M.2 B-Key SATA mode, NVMe bandwidth will be limited to X1. USB will switch between CAN and LTE(M.2 B-Key) accordingly.
BIOS Lock	**Disabled** Enabled	Enable/Disable the PCH BIOS Lock Enable feature. Required to be enabled to ensure SMM protection of flash.

9.3. Chipset

Feature	Options	Description
System Agent (SA) Configuration	submenu	
PCH-IO Configuration	submenu	

9.3.1 Chipset > System Agent (SA) Configuration

Feature	Options	Description
Memoru Configuration	submenu	Memory Configuration
MIPI Camera Configuration	submenu	MIPI Camera Configuration
IPU Device (B0:D5:F0)	Enabled**, Disabled**	Enable/Disable SA IPU Device
VT-d	**Enabled,** Disabled	VT-d capability
Above 4GB MMIO BIOS assignment	**Enabled,** Disabled	Enable/Disable above 4GB MemoryMappedIO BIOS assignment\n\nThis is enabled automatically when Aperture Size is set to 2048MB.

9.3.1.1. Chipset > System Agent (SA) Configuration > Memory Configuration

Feature	Options	Description
Memory RC Version	Info only	
Memory Frequency	Info only	
tCL-tRCD-tRP-tRAS	Info only	
MC 0 Ch 0 DIMM 0	Info only	
Size	Info only	
Number of Ranks	Info only	
Manufacturer	Info only	

9.3.1.2. Chipset > System Agent (SA) Configuration > MIPI Camera Configuration

Feature	Options	Description
CVF Support	**Disabled**, Enabled	Disables/Enables CVF using either Native IOs or USB IOs Expansion.
CLK_EN Initial Status	**High** Low	Set CLK_EN GPIO(GPP_S4) initial status
Control Logic 1	**Disabled**, Enabled	Control Logic 1
Control Logic options	submenu	Control logic options
Control Logic 2	**Disabled**, Enabled	Control logic 2
Control Logic options	submenu	Control logic options
Control Logic 3	**Disabled**, Enabled	Control Logic 1
Control Logic options	submenu	Control logic options
Control Logic 4	**Disabled**, Enabled	Control logic 2
Control Logic options	submenu	Control logic options
Camera1	**Disabled**, Enabled	Camera1
Link options	submenu	Link options
Camera2	**Disabled**, Enabled	Camera2
Link options	submenu	Link options
Camera3	**Disabled**, Enabled	Camera1
Link options	submenu	Link options
Camera4	**Disabled**, Enabled	Camera2
Link options	submenu	Link options

9.3.1.2.1. Chipset > System Agent (SA) Configuration > MIPI Camera Configuration > Control Logic Options

Feature	Options	Description
Control Logic Type	**Discrete** PMIC_TPS68470 PMIC_UP6641 PMIC_HDMI2MIPI_LT6911UXC PMIC_USER0 PMIC_USER1	Control Logic Type
CRD Version	PTC CRD-G Kilshon-PPV **CRD-D** CRD-G2 LT6911UXC-V1	CRD Version
Input Clock	24 MHz 26 MHz 20 MHz **19.2 MHz**	Input Clock
PCH Clock Source	**IMGCLKOUT_0** IMGCLKOUT_1 IMGCLKOUT_2 IMGCLKOUT_3 IMGCLKOUT_4	This optionspecifies which IMGCLKOUT is chosen
Number of GPIO Pins	**1**	Number of GPIO pins
GPIO n	Info only	
GPIO Pad Number	**15**	GPIO Pad Number
Group Number	**Group B**, Group A, Group C, Group D, Group E, Group F, Group H, Group R, Group S, Group T, Group U	Group Number
Function	**Reset**, Power_En, Clock_En, PLED_En, Strobe_En,	Function

	Handshake_En, Ready_Status, HDMI_Detect	
Active Value	0, **1**	Active Value
Initial Value	0, **1**	Initial Value

9.3.1.2.2. Chipset > System Agent (SA) Configuration > MIPI Camera Configuration > Link Options

Feature	Options	Description
Sensor Model	IMX135, OV5693, IMX179, OV8858, OV2740, OV9728, IMX188, IMX208, OV5670, OV8865, HM2051, OV2742, OV9234, OV8856,OV16860, IMX362, OVTID858, IMX488, OVTI01AS, OV01A10, OV5678, OV9738, HIMAX11B1, LONTIUM, **User Defined** Select MIPI Camera Sensor Model.	Select MIPI Camera
Custom HID	APPROISP	User defined _HID for Link0. Default is "APPROISP" for ADLINK.
Lanes Clock division	**4 4 2 2**, 4 4 3 1, 4 4 4 0, 8 0 2 2, 8 0 3 1, 8 0 4 0	Select MIPI Camera lanes and clock division.
CRD Version	PTC (0x10), CRD-G, Kilshon PPV , **CRD-D**, CRD-G2	CRD Version
GPIO control	No Control Logic, **Control Logic 1**, Control Logic 2, Control Logic 3, Control Logic 4	GPIO control
Physical location	Front, **Back**	Camera position
Flash support	Driver Default, **Disabled**, Enabled	Flash Support
Privacy LED	**Driver Default**, ILEDA 16mA, ILEDB 2mA, 4mA, 8mA, 16mA	Privacy LED
Rotation	**0**, 90, 180, 270	Rotation
PPR Value	10	PPR value of sensor
PPR Unit	A	PPR unit of sensor
Module Name	appro_isp	Camera Module Name
MIPI port	1	LinkUsed
LaneUsed	x1, x2, x3, **x4**, x8	LaneUsed
PortSpeed	0,1, **2**, 3, 4, 5, 6	PortSpeed: 0:Sensor Default, 1:<416Mbps, 2:<1.5Gbps, 3:<2Gbps, 4:<2.5Gbps, 5:<4Gbps, 6:>4Gbps

MCLK	19200000	MCLK
EEPROM Type	ROM_OTP ROM_EEPROM_16K_64 ROM_EEPROM_16K_16 ROM_OTP_ACPI_ACPI ROM_ACPI ROM_EEPROM_BRCA016GWZ ROM_EEPROM_24AA32 ROM_EEPROM_24C64 ROM_EEPROM_DW9806B ROM_EEPROM_CAT24C16 ROM_EEPROM_CAT24C64 ROM_EEPROM_24AA16 **ROM_NONE** ROM_EEPROM_CAT24C08	EEPROM Type 0x00: ROM_NONE 0x01: ROM_OTP 0x02: ROM_EEPROM_16K_64 0x03: ROM_EEPROM_16K_16 0x04: ROM_OTP_ACPI_ACPI 0x05: ROM_ACPI 0x06: ROM_EEPROM_BRCA016GWZ 0x07: ROM_EEPROM_24AA32 0x08: ROM_EEPROM_CAT24C08 0x09: ROM_M24C64 0x0A: ROM_DW9806B 0x10: ROM_EEPROM_CAT24C16 0x11: ROM_EEPROM_CAT24C64 0x12: ROM_EEPROM_24AA16
VCM Type	**VCM_NONE** VCM_AD5823 VCM_AD5816 VCM_DW9719 VCM_DW9718 VCM_DW9806B VCM_WV517S VCM_LC898122XA VCM_LC898212AXB VCM_RESERVED1 VCM_RESERVED2 VCM_BU64297GWZ VCM_DW9714 VCM_AK7371	VCM Type 0x00: VCM_NONE 0x01: VCM_AD5823 0x02: VCM_DW9714 0x03: VCM_AD5816 0x04: VCM_DW9719 0x05: VCM_DW9718 0x06: VCM_DW9806B 0x07: VCM_WV517S 0x08: VCM_LC898122XA 0x09: VCM_LC898212AXB 0x0F: VCM_AK7371 0x10: VCM_BU64297GWZ
Number of I2C Components	1	Number of I2C Components
I2C Channel	I2C0, I2C1, **I2C2**, I2C4, I2C3, I2C5, I2C6, I2C7	I2C Channel
Device 0	Info Only	
I2C Address	1F	
Device Type	**Sensor**, VCM, EEPROM, EEPROM_EXT1, EEPROM_EXT2, EEPROM_EXT3,	Device Type

	EEPROM_EXT4, EEPROM_EXT5, EEPROM_EXT6, EEPROM_EXT7 IO Expander Flash	
Flash Driver Selection	**Disabled**, External, Internal PMIC	Select the Flash Driver as External of Internal PMIC

9.3.2 Chipset > PCH-I/O Configuration

Feature	Options	Description
PCI Express Configuration	Submenu	
SATA Configuration	Submenu	
USB Configuration	Submenu	
HD Audio Configuration	Submenu	

9.3.2.1. Chipset > PCH-I/O Configuration > PCI Express Configuration

Feature	Options	Description
PCI Express Root Port P3	Submenu	Control the PCI Express Root Port.
PCI Express Root Port P4	Submenu	Control the PCI Express Root Port.
PCI Express Root Port P7	Submenu	Control the PCI Express Root Port.
PCI Express Root Port P9	Submenu	Control the PCI Express Root Port.

9.3.2.1.1. Chipset > PCH-I/O Configuration > PCI Express Configuration > PCI Express Root Port 3

Feature	Options	Description
PCI Express Root Port 3	Disabled, **Enabled**	Control the PCI Express Root Port.
PCIe Speed	**Auto**, Gen1, Gen2, Gen3, Gen4	Configure PCIe Speed
Detect Non-Compliance Device	**Disabled**, Enabled	Detect Non-Compliance PCI Express Device. If enable, it will take more time at POST time.

9.3.2.1.2. PCH-I/O Configuration > PCI Express Configuration > PCI Express Root Port 4

Feature	Options	Description
PCI Express Root Port 3	Disabled, **Enabled**	Control the PCI Express Root Port.
PCIe Speed	**Auto**, Gen1, Gen2, Gen3, Gen4	Configure PCIe Speed
Detect Non-Compliance Device	**Disabled**, Enabled	Detect Non-Compliance PCI Express Device. If enable, it will take more time at POST time.

9.3.2.1.3. PCH-I/O Configuration > PCI Express Configuration > PCI Express Root Port 7

Feature	Options	Description
PCI Express Root Port 3	Disabled, **Enabled**	Control the PCI Express Root Port.
PCIe Speed	**Auto**, Gen1, Gen2, Gen3, Gen4	Configure PCIe Speed
Detect Non-Compliance Device	**Disabled**, Enabled	Detect Non-Compliance PCI Express Device. If enable, it will take more time at POST time.

9.3.2.1.4. PCH-I/O Configuration > PCI Express Configuration > PCI Express Root Port 9

Feature	Options	Description
PCI Express Root Port 3	Disabled, **Enabled**	Control the PCI Express Root Port.
PCIe Speed	**Auto**, Gen1, Gen2, Gen3, Gen4	Configure PCIe Speed
Detect Non-Compliance Device	**Disabled**, Enabled	Detect Non-Compliance PCI Express Device. If enable, it will take more time at POST time.

9.3.2.2. Chipset > PCHI-I/O Configuration > SATA Configuration

Feature	Options	Description
SATA Controller(s)	Disabled, **Enabled**	Enable/Disable SATA Device
Serial ATA Port 0	Info Only	
Software Preserve	Info Only	
Port 0	Disabled, **Enabled**	Enable or Disable SATA Port
Serial ATA Port 1	Info Only	
Software Preserve	Info Only	
Port 1	Disabled, **Enabled**	Enable or Disable SATA Port

9.3.2.3. Chipset > PCHI-I/O Configuration > USB Configuration

Feature	Options	Description
USB Port Disable Override	**Disabled**, Select Per-Pin	Selectively Enable/Disable the corresponding USB port from reporting a Device Connection to the controller.
USB SS Physical Connector #0	Disabled, **Enabled**	Enable/Disable this USB Physical Connector (physical port). Once disabled, any USB devices plug into the connector will not be detected by BIOS or OS.
USB HS Physical Connector #0	Disabled, **Enabled**	Enable/Disable this USB Physical Connector (physical port). Once disabled, any USB devices plug into the connector will not be detected by BIOS or OS.
USB HS Physical Connector #3	Disabled, **Enabled**	Enable/Disable this USB Physical Connector (physical port). Once disabled, any USB devices plug into the connector will not be detected by BIOS or OS.
USB HS Physical Connector #4	Disabled, **Enabled**	Enable/Disable this USB Physical Connector (physical port). Once disabled, any USB devices plug into the connector will not be detected by BIOS or OS.
USB HS Physical Connector #5	Disabled, **Enabled**	Enable/Disable this USB Physical Connector (physical port). Once disabled, any USB devices plug into the connector will not be detected by BIOS or OS.
USB HS Physical Connector #6	Disabled, **Enabled**	Enable/Disable this USB Physical Connector (physical port). Once disabled, any USB devices plug into the connector will not be detected by BIOS or OS.
USB HS Physical Connector #7	Disabled, **Enabled**	Enable/Disable this USB Physical Connector (physical port). Once disabled, any USB devices plug into the connector will not be detected by BIOS or OS.

9.3.2.4. Chipset > PCHI-I/O Configuration > HD Audio Configuration

Feature	Options	Description
HD Audio	Disabled, **Enabled**	Control Detection of the HD-Audio device. Disabled = HDA will be unconditionally disabled. Enabled = HDA will be unconditionally enabled.

9.4. Security

Feature	Options	Description
Administrator Password	Enter password	Set Administrator Password
User Password	Enter password	Set User Password
Secure Boot	submenu	

9.4.1 Security > Secure Boot Menu

Feature	Options	Description
Secure Mode	Info only	
Secure Boot	**Disabled** Enabled	Secure Boot feature is Active if Secure Boot is Enabled, platform Key (PK) is enrolled and the System is in User mode, The mode change requires platform reset
Secure Boot Mode	**Standard** Custom	Secure Boot mode options: Standard or Custom. In Custom mode, Secure Boot Policy variables can be configured by a physically present user without full
Restore Factory Keys	Info only	Force System to User Mode. Install factory default Secure Boot key databases
Reset To Setup Mode	Info only	
Expert Key Management		Enables expert users to modify Secure Boot Policy variables without full authentication

9.5. Boot

9.5.1 Boot Configuration

Feature	Options	Description
Boot Configuration	Info only	
Setup Prompt Timeout	**1**	Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.
Bootup NumLock State	On **Off**	Select the keyboard NumLock state
Quiet Boot	Disabled **Enabled**	Enables or disables Quiet Boot option
Fast Boot	Disabled **Enabled**	Enables or disables boot with initialization of a minimal set of devices required to launch active boot option. Has no effect for BBS boot options.
SATA Support	**Last Boot SATA Devices Only** All Sata Devices	If Last Boot SATA Devices Only, Only last boot SATA device will be available in Post. If All Sata Devices, all SATA devices will be available in OS and Post.
NVME Support	Disabled **Enabled**	If Disabled, NVMe device will be skipped.
VGA Support	Auto **EFI Driver**	If Auto, only install Legacy OpRom with Legacy OS and logo would NOT be shown during post. Efi driver will still be installed with EFI OS.
USB Support	Disabled **Full Initial** Partial Initial	If Disabled, all USB devices will NOT be available until after OS boot. If Partial Initial, USB Mass Storage and specific USB port/device will NOT be available before OS boot. If Enabled, all USB devices will be available in OS and Post.
PS2 Devices Support	Disabled **Enabled**	If Disabled, PS2 devices will be skipped.
NetWork Stack Driver Support	**Disabled** Enabled	If Disabled, NetWork Stack Driver will be skipped.
Redirection Support	Disabled **Enabled**	If disable, Redirection function will be disabled.

9.6. Save & Exit

9.6.1 Save Options

Feature	Options	Description
Save Changes and Exit		Exit system setup after saving the changes.
Discard Changes and Exit		Exit system setup without saving any changes.
Save Changes and Reset		Reset the system after saving the changes.
Discard Changes and Reset		Reset system setup without saving any changes.
Save Options	Info only	
Save Changes		Save changes done so far to any of the setup options.
Discard Changes		Discard Changes done so far to any of the setup options.
Restore Defaults		Restore/Load Default values for all the setup options.
Save as User Defaults		Save the changes done so far as User Defaults.
Restore User Defaults		Restore the User Defaults to all the setup options.