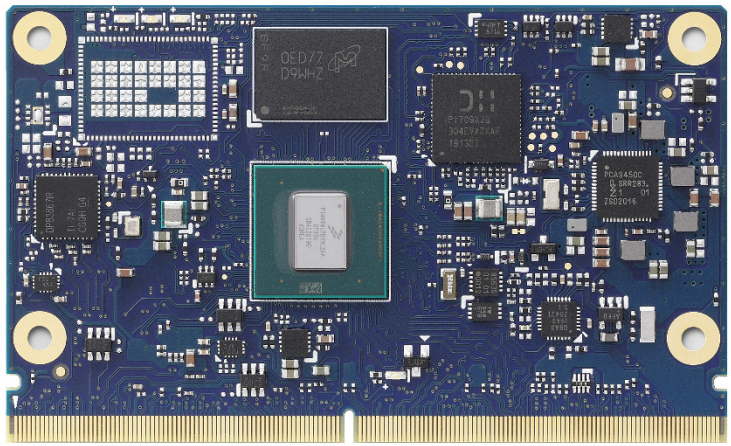
LEC-IMX8M Plus

User's Guide



SMARC module

Revision:	Rev. 1.8
Date:	2025-11-04
Part Number:	50M-72512-1080

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Revision History

Revision	Description	Date	Author
1.0	Initial release	2023-04-20	CC
1.1	I2C pin info corrected	2023-06-14	CC
1.2	Pin-to-controller mapping updated	2024-06-06	CC
1.3	Thermal solution illustration updated	2024-10-23	CC
1.4	Pin-to-controller mapping updated	2024-11-28	AL
1.5	Video, extension busses, and system storage updated	2025-04-09	AL
1.6	Pinout and signal descriptions updated	2025-07-18	AL
1.7	Pinout and signal descriptions updated	2025-10-30	AL
1.8	Specifications updated	2025-11-04	AL

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Preface

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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 this manual for future reference.
- Read the specifications section of this manual for detailed information on the operating environment of this equipment.
- Turn off power and unplug any power cords/cables when installing/mounting or un-installing/removing equipment.
- To avoid electrical shock and/or damage to equipment:
- Keep equipment away from water or liquid sources;
- Keep equipment away from high heat or high humidity;
- Keep equipment properly ventilated (do not block or cover ventilation openings);
- Make sure to use recommended voltage and power source settings;
- Always install and operate equipment near an easily accessible electrical socket outlet;
- Secure the power cord (do not place any object on/over the power cord);
- Only install/attach and operate equipment on stable surfaces and/or recommended mountings;
- If the equipment will not be used for long periods of time, turn off the power source and unplug the equipment.

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.

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1. Introduction

1.1 LEC-iMX8M Plus

ADLINK LEC-iMX8MP is a SMARC module based on NXP iMX8M Plus (4-core Arm Cortex-A53) processor with an optional Neural Processing Unit (NPU) operating at up to 2.3 TOPS. It is the first SMARC Revision 2.1 module focusing on machine learning and vision, advanced multimedia, and industrial IoT, and with high reliability. The module also supports dual-image signal processors and 2x camera inputs for an effective vision system, and is especially suited for applications such as smart home, smart city, and industrial 4.0.

1.2 The SMARC Form Factor

The SMARC ("Smart Mobility ARChitecture") is a versatile small form factor Computer on Module definition targeting applications that require low power and high performance at low costs. Typically under 6W, the modules often utilize ARM and other alternative low-power option CPUs, and are used in many familiar handheld devices, such as tablet computers and smart phones.

Two module sizes are defined in SMARC: 82 mm x 50 mm and 82 mm x 80 mm.

The module PCBs have 314 edge fingers that mate with a low-profile 314 pin 0.5 mm pitch right angle connector (the connector is sometimes identified as a 321 pin connector, with 7 pins used by the key).

SMARC modules are used as building blocks for portable and stationary embedded systems. The core CPU and support circuits, including DRAM, boot flash, power sequencing, CPU power supplies, GBE and a single channel LVDS display transmitter are concentrated on the module. Modules are used with application-specific carrier boards that implement other features such as audio codecs, touch controllers, wireless devices, etc.

The modular approach allows scalability, faster time to market and upgradability while still maintaining low costs, low power, and small physical size.

SGeT STANDARDIZATION GROUP FOR EMBEDDED TECHNOLOGIES

SMARC module and carrier specifications are available online at: https://www.sget.org/standards/smarc.html

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2. Specifications

2.1 Core System

SoC

NXP iMX8M Plus series, available with standard (0°C to 70°C) or extreme rugged (-40°C to 85°C) operating temperature

- i.MX8M-plus Quad NPU 4x Arm Cortex-A53 at 1.6 to 1.8GHz, 1x Arm Cortex-M7, NPU, GPU, VPU Decode/Encode
- i.MX8M-plus Quad 4x Arm Cortex-A53 at 1.6 to 1.8GHz, 1x Arm Cortex-M7, GPU, VPU Decode/Encode
- i.MX8M-plus QuadLite 4x Arm Cortex-A53 at 1.6 to 1.8GHz, 1x Arm Cortex-M7

L2 Cache

32KB I-cache, 32KB D-cache (A53), 512KB L2 Cache (ECC)

Memory

2/4/8GB LPDDR4 memory down (inline ECC)

Security

- CryptoAuthentication™ Device, Microchip ATECC608A (optional)
- Cryptographic co-processor with secure hardware-based key storage
- Protected storage for up to 16 Keys, certificates or data
- ECDH: FIPS SP800-56A Elliptic Curve Diffie-Hellman
- NIST standard P256 elliptic curve support
- SHA-256 & HMAC hash including off-chip context save/restore
- AES-128: encrypt/decrypt, galois field multiply for GCM
- TPM 2.0 Device, ST Microelectronics ST33HTPH2X32AHD5 (optional)
- Compliant with Trusted Computing Group (TCG) Trusted Platform Module (TPM) Library specifications 2.0, Level 0, Revision 138 and TCG PC Client Specific TPM Platform Specifications 1.03
- Fault-tolerant firmware loader that keeps the TPM fully functional when the loading process is interrupted (self-recovery)
- SP800-193 compliant for protection, detection, and recovery requirements

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2.2 Video

LEC-iMX8M Plus supports 1K-capable HDMI 2.0a, a single/dual channel 24-bit LVDS, and a 4-lane DSI.

GPU Core

Vivante GC7000UL 3D GC520L 2D

GPU/VPU Features

GPU: 2 shaders, OpenGL ES 1.1, 2.9, 3.0, OpenCL 1.2, OpenGL 3.0, and Vulkan, up to 1080p FHD resolutions
VPU : 1080p60 HEVC/H.265, H.264, VP9 Decoder | 1080p60 AVC/H.264/ HEVC/H.265 encoder

NPU (optional)

2.3 TOP/s Neural Network performance
Keyword detect, noise reduction, beamforming, Speech recognition (i.e., Deep Speech 2), Image recognition (i.e. ResNet-50)

HDMI

HDMI 2.0a supporting resolutions up to 4K at 60Hz

LVDS

LVDS single/dual channel 24-bit at max. 1920×080 at 60Hz

MIPI DSI

DSI 4 lanes at max. 1080p@60fps display output (multiplexed with LVDS signal)

Camera Support

Compatible with MIPI Alliance Interface specification v2.1
2x MIPI-CSI2 camera inputs, 1x 4-lane and 1x 2-lane

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2.3 Audio

Supports I2S audio codec interface, audio ADC and DAC (located on carrier)

2.4 Dual Ethernet

Primary LAN

Gigabit Ethernet controller with support for TSN in addition to Energy Efficient Ethernet (EEE), Ethernet AVB, and IEEE 1588

Supports 10/100/1000Mbps data transfer rates, both full-duplex and half-duplex

Secondary LAN

Gigabit Ethernet controller with support for Energy Efficient Ethernet (EEE), Ethernet AVB, and IEEE 1588

Supports 10/100/1000Mbps data transfer rates, both full-duplex and half-duplex

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2.5 1216 M.2 LGA Wi-Fi (optional)

Optional Wi-Fi LGA module support

In case of non-populated part, the footprint is still there and visible

Only Azurewave AW-CM276NF has been validated during DVT but other M.2 LGA modules could also be compatible if they use the same standard interfaces, as listed below

- SDIO0 (main Wi-Fi interface)
- UART1 (main Bluetooth interface)
- PCM (Bluetooth audio transfer interface)

- **Note** : AW-CM276F has been pre-certified by Azurewave for several countries and regions, ADLINK can assist in final device certification if applicable. FCC ID: UAY-W8997-M1216

2.6 Extension Busses

PCIe

2x PCI Express Gen2 x1 interfaces or 1x PCI Express Gen3 (BOM option)

USB

CT temp 2x USB 3.0/2.0, 3x USB 2.0, 1x USB2.0 OTG

ER temp 1x USB 3.0, 1x USB2.0 OTG

UART

4x UART interface SER0, SER2 (Tx/Rx/CTS/RTS) and SER1, SER3(optional) (Tx/Rx)

7- or 8-bit data words, 1 or 2 stop bits, programmable parity (even, odd, or none)

Programmable baud rates up to 4 Mbps.

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CAN bus

2x CAN2.0B only or mixed CAN2.0B and CAN FD mode, data bit rate of up to 8 Mbps

SPI

2x SPI

I2S

I2S interface (codec on carrier)

I2C

5x I2C interfaces

Supports 7-bit and 10-bit address mode

Software programmable clock frequency:

- 100 kbit/s in Standard-mode,
- 400 kbit/s in Fast-mode
- 1 Mbit/s in Fast-mode Plus

GPIO

14x GPIO with interrupt

2.7 Board Controller

BMC lite for power sequence

SEMA BMC Error Code

Exception Code	Error Code
0	NOERROR
2	NO_VIN
3	NO_SDM_RESIN_N
4	NO_SDM_RESIN_N

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2.8 System Storage

SDIO

1x SDIO (4-bit) compatible up to version 3.0.

eMMC

Soldered on module 16GB to 256GB (build option), available in either standard or -40 to 85°C temperature range

Compatible with eMMC specification 5.1

2.9 SEMA® Board Management Controller

Voltage/current monitoring, boot configuration, logistics and forensic information, flat panel control, watchdog timer

2.10 Debug Header

30-pin multipurpose flat cable connector for use with optional DB-30 debug module

Provides JTAG, BMC access; UART, power test points; diagnostic LEDs, Power, Reset, Boot configuration

2.11 Boot Modes

eMMC and SD card boot modes are supported

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2.12 Power

Supply Voltage

4.75V – 5.25V

2.13 Mechanical and Environmental

Form Factor

SGET SMARC Specifications v2.1

Dimension

SMARC small size module, 82mm x 50mm

Operating Temperature

Standard: 0°C to 60°C

Rugged: -40°C to 85°C (optional)

Humidity

5-90% RH operating, non-condensing

5-95% RH storage (and operating with conformal coating)

Shock and Vibration

IEC 60068-2-64 and IEC-60068-2-27, MIL-STD-202 F, Method 213B, Table 213-I,

Condition A and Method 214A, Table 214-I, Condition D

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3. Block Diagram

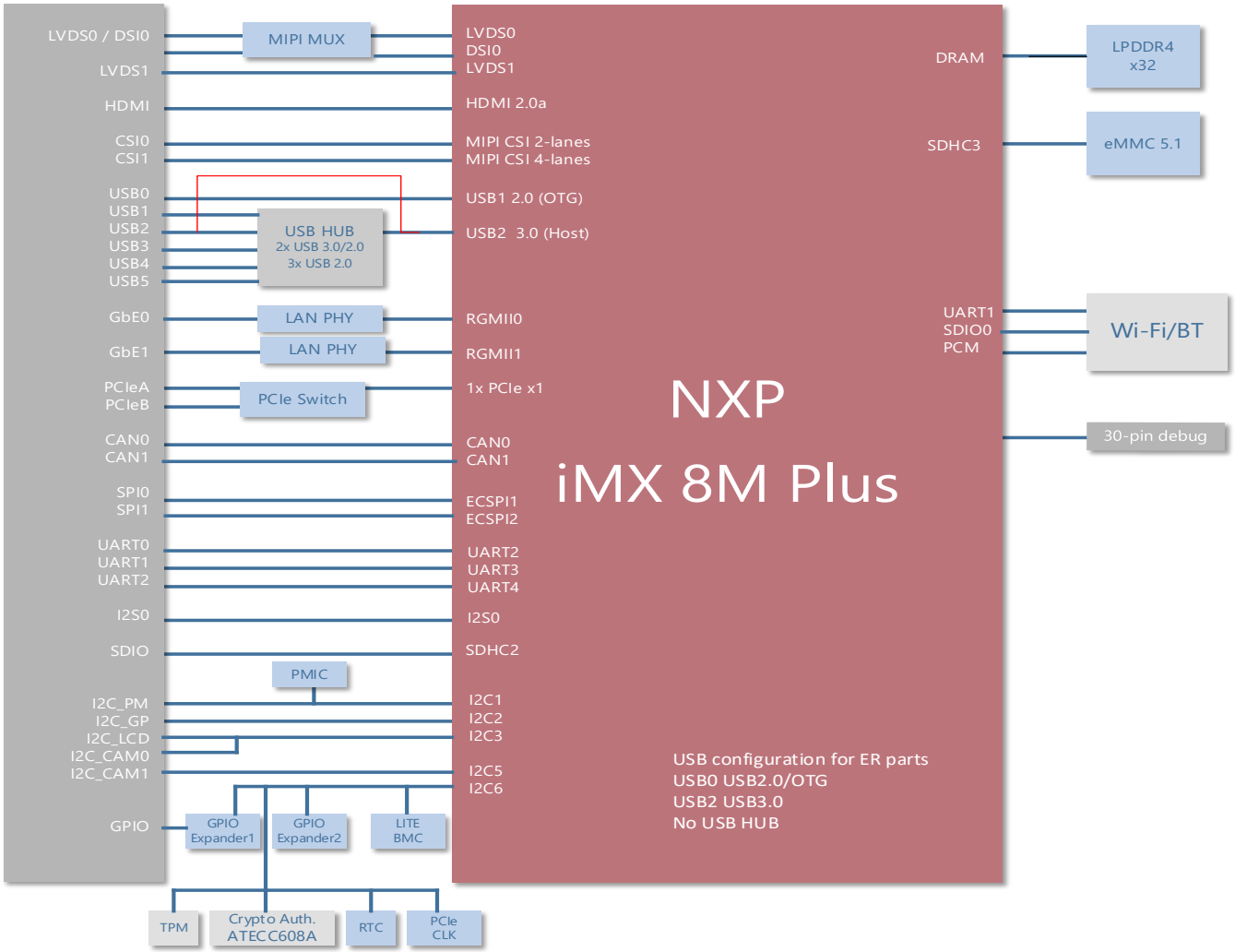


Figure 1 – Module function diagram

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4. Pinout and Signal Descriptions

4.1 Pin Summary

The below table is a comprehensible list of all signal pins on the MXM 3 connector in the standard specification SMARC 2.1.

Those signals not supported on LEC-iMX8M plus are strikethrough ~~STRIKETHROUGH~~

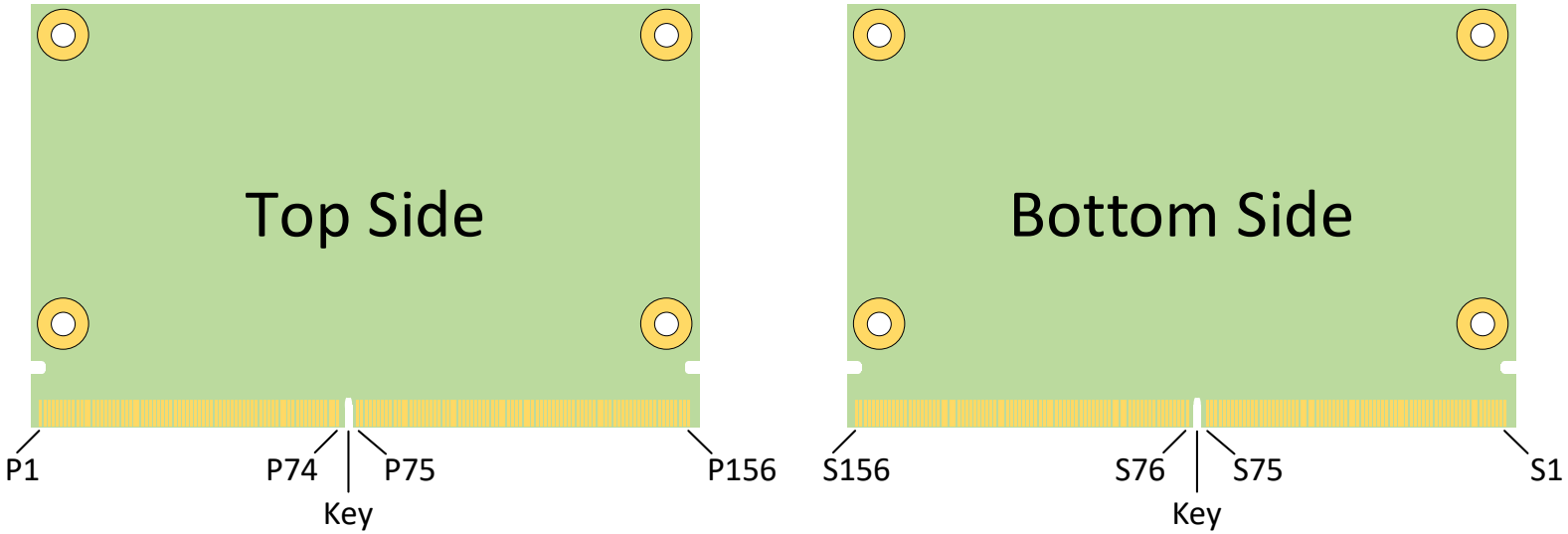


Figure 2 – Module top/botom side pin numbering

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P-Pin	Primary (Top) Side
P1	SMB_ALERT_1V8#
P2	GND
P3	CSI1_CK+
P4	CSI1_CK-
P5	GBE1_SDP
P6	GBE0_SDP
P7	CSI1_RX0+
P8	CSI1_RX0-
P9	GND
P10	CSI1_RX1+
P11	CSI1_RX1-
P12	GND
P13	CSI1_RX2+
P14	CSI1_RX2-
P15	GND
P16	CSI1_RX3+
P17	CSI1_RX3-
P18	GND
P19	GBE0_MDI3-
P20	GBE0_MDI3+
P21	GBE0_LINK100#
P22	GBE0_LINK1000#
P23	GBE0_MDI2-
P24	GBE0_MDI2+
P25	GBE0_LINK_ACT#
P26	GBE0_MDI1-
P27	GBE0_MDI1+
P28	GBE0_CTREF
P29	GBE0_MDI0-
P30	GBE0_MDI0+
P31	~~SPI0_CS1~~
P32	GND
P33	SDIO_WP
P34	SDIO_CMD

S-Pin	Secondary (Bottom) Side
S1	~~CSI1_TX+~~ / I2C_CAM1_CK
S2	~~CSI1_TX-~~ / I2C_CAM1_DAT
S3	GND
S4	~~RSVD~~
S5	~~CSI0_TX-~~ / I2C_CAM0_CK
S6	CAM_MCK
S7	~~CSI0_TX+~~ / I2C_CAM0_DAT
S8	CSI0_CK+
S9	CSI0_CK-
S10	GND
S11	CSI0_RX0+
S12	CSI0_RX0-
S13	GND
S14	CSI0_RX1+
S15	CSI0_RX1-
S16	GND
S17	GBE1_MDI0+
S18	GBE1_MDI0-
S19	GBE1_LINK100#
S20	GBE1_MDI1+
S21	GBE1_MDI1-
S22	GBE1_LINK1000#
S23	GBE1_MDI2+
S24	GBE1_MDI2-
S25	GND
S26	GBE1_MDI3+
S27	GBE1_MDI3-
S28	GBE1_CTREF
S29	~~PCIE_D_TX+ / SERDES_1_TX+~~
S30	~~PCIE_D_TX- / SERDES_1_TX-~~
S31	GBE1_LINK_ACT#
S32	~~PCIE_D_RX+ / SERDES_1_RX+~~
S33	~~PCIE_D_RX- / SERDES_1_RX-~~
S34	GND
S35	USB4+

P-Pin	Primary (Top) Side
P35	SDIO_CD#
P36	SDIO_CK
P37	SDIO_PWR_EN
P38	GND
P39	SDIO_D0
P40	SDIO_D1
P41	SDIO_D2
P42	SDIO_D3
P43	SPI0_CS0#
P44	SPI0_CK
P45	SPI0_DIN
P46	SPI0_DO
P47	GND
P48	~~SATA_TX+~~
P49	~~SATA_TX-~~
P50	GND
P51	~~SATA_RX+~~
P52	~~SATA_RX-~~
P53	GND
P54	~~ESPI_CS0#~~ / SPI1_CS0#
P55	~~ESPI_CS1# / SPI1_CS1#~~
P56	~~ESPI_CK~~ / SPI1_CK
P57	~~ESPI_IO_1~~ / SPI1_DIN
P58	~~ESPI_IO_0~~ / SPI1_DO
P59	GND
P60	USB0+
P61	USB0-
P62	USB0_EN_OC#
P63	USB0_VBUS_DET
P64	USB0_OTG_ID
P65	USB1+
P66	USB1-
P67	USB1_EN_OC#
P68	GND
P69	USB2+

S-Pin	Secondary (Bottom) Side
S36	USB4-
S37	~~USB3_VBUS_DET~~
S38	AUDIO_MCK
S39	I2S0_LRCK
S40	I2S0_SDOUT
S41	I2S0_SDIN
S42	I2S0_CK
S43	~~ESPI_ALERT0#~~
S44	~~ESPI_ALERT1#~~
S45	~~MDIO_CLK~~
S46	~~MDIO_DAT~~
S47	GND
S48	I2C_GP_CK
S49	I2C_GP_DAT
S50	~~HDA_SYNC / I2S2_LRCK~~
S51	~~HDA_SDO / I2S2_SDOUT~~
S52	~~HDA_SDI / I2S2_SDIN~~
S53	~~HDA_CK / I2S2_CK~~
S54	~~SATA_ACT#~~
S55	USB5_EN_OC
S56	~~ESPI_IO_2~~
S57	~~ESPI_IO_3~~
S58	~~ESPI_RESET#~~
S59	USB5+
S60	USB5-
S61	GND
S62	USB3_SSTX+
S63	USB3_SSTX-
S64	GND
S65	USB3_SSRX+
S66	USB3_SSRX-
S67	GND
S68	USB3+
S69	USB3-
S70	GND

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P-Pin	Primary (Top) Side
P70	USB2-
P71	USB2_EN_OC#
P72	~~RSVD~~
P73	~~RSVD~~
P74	USB3_EN_OC#
	Key
P75	PCIE_A_RST#
P76	USB4_EN_OC#
P77	PCIE_B_CKREQ#
P78	PCIE_A_CKREQ#
P79	GND
P80	~~PCIE_C_REFCK+~~
P81	~~PCIE_C_REFCK-~~
P82	GND
P83	PCIE_A_REFCK+
P84	PCIE_A_REFCK-
P85	GND
P86	PCIE_A_RX+
P87	PCIE_A_RX-
P88	GND
P89	PCIE_A_TX+
P90	PCIE_A_TX-
P91	GND
P92	HDMI_D2+ / ~~DP1_LANE0+~~
P93	HDMI_D2- / ~~DP1_LANE0-~~
P94	GND
P95	HDMI_D1+ / ~~DP1_LANE1+~~
P96	HDMI_D1- / ~~DP1_LANE1-~~
P97	GND
P98	HDMI_D0+ / ~~DP1_LANE2+~~
P99	HDMI_D0- / ~~DP1_LANE2-~~
P100	GND
P101	HDMI_CK+ / ~~DP1_LANE3+~~

S-Pin	Secondary (Bottom) Side
S71	USB2_SSTX+
S72	USB2_SSTX-
S73	GND
S74	USB2_SSRX+
S75	USB2_SSRX-
	Key
S76	PCIE_B_RST#
S77	~~PCIE_C_RST#~~
S78	~~PCIE_C_RX+ / SERDES_2_RX+~~
S79	~~PCIE_C_RX- / SERDES_2_RX-~~
S80	GND
S81	~~PCIE_C_TX+ / SERDES_2_TX+~~
S82	~~PCIE_C_TX- / SERDES_2_TX-~~
S83	GND
S84	PCIE_B_REFCK+
S85	PCIE_B_REFCK-
S86	GND
S87	PCIE_B_RX+
S88	PCIE_B_RX-
S89	GND
S90	PCIE_B_TX+
S91	PCIE_B_TX-
S92	GND
S93	~~DP0_LANE0+~~
S94	~~DP0_LANE0-~~
S95	~~DP0_AUX_SEL~~
S96	~~DP0_LANE1+~~
S97	~~DP0_LANE1-~~
S98	~~DP0_HPD~~
S99	~~DP0_LANE2+~~
S100	~~DP0_LANE2-~~
S101	GND
S102	~~DP0_LANE3+~~

P-Pin	Primary (Top) Side
P102	HDMI_CK- / ~~DP1_LANE3-~~
P103	GND
P104	HDMI_HPD / ~~DP1_HPD~~
P105	HDMI_CTRL_CK / ~~DP1_AUX+~~
P106	HDMI_CTRL_DAT / ~~DP1_AUX-~~
P107	~~DP1_AUX_SEL~~
P108	GPIO0 / CAM0_PWR#
P109	GPIO1 / CAM1_PWR#
P110	GPIO2 / CAM0_RST#
P111	GPIO3 / CAM1_RST#
P112	GPIO4 / ~~HDA_RST#~~
P113	GPIO5 / PWM_OUT
P114	GPIO6 / TACHIN
P115	GPIO7
P116	GPIO8
P117	GPIO9
P118	GPIO10
P119	GPIO11
P120	GND
P121	I2C_PM_CK
P122	I2C_PM_DAT
P123	BOOT_SEL0#
P124	BOOT_SEL1#
P125	BOOT_SEL2#
P126	RESET_OUT#
P127	RESET_IN#
P128	POWER_BTN#
P129	SER0_TX
P130	SER0_RX
P131	SER0_RTS#
P132	SER0_CTS#
P133	GND
P134	SER1_TX
P135	SER1_RX
P136	SER2_TX

S-Pin	Secondary (Bottom) Side
S103	~~DP0_LANE3-~~
S104	~~USB3_OTG_ID~~
S105	~~DP0_AUX+~~
S106	~~DP0_AUX-~~
S107	LCD1_BKLT_EN
S108	LVDS1_CK+/~~eDP1_AUX+/ DSI1_CLK+~~
S109	LVDS1_CK- / ~~eDP1_AUX- / DSI1_CLK-~~
S110	GND
S111	LVDS1_0+ / ~~eDP1_TX0+ / DSI1_D0+~~
S112	LVDS1_0- / ~~eDP1_TX0- / DSI1_D0-~~
S113	~~eDP1_HPD / DSI1_TE~~
S114	LVDS1_1+ / ~~eDP1_TX1+ / DSI1_D1+~~
S115	LVDS1_1- / ~~eDP1_TX1- / DSI1_D1-~~
S116	LCD1_VDD_EN
S117	LVDS1_2+ / ~~eDP1_TX2+ / DSI1_D2+~~
S118	LVDS1_2- / ~~eDP1_TX2- / DSI1_D2-~~
S119	GND
S120	LVDS1_3+ / ~~eDP1_TX3+ / DSI1_D3+~~
S121	LVDS1_3- / ~~eDP1_TX3- / DSI1_D3-~~
S122	LCD1_BKLT_PWM
S123	GPIO13
S124	GND
S125	LVDS0_0+ / ~~eDP0_TX0+~~ / DSI0_D0+
S126	LVDS0_0- / ~~eDP0_TX0-~~ / DSI0_D0-
S127	LCD0_BKLT_EN
S128	LVDS0_1+ / ~~eDP0_TX1+~~ / DSI0_D1+
S129	LVDS0_1- / ~~eDP0_TX1-~~ / DSI0_D1-
S130	GND
S131	LVDS0_2+/~~eDP0_TX2+~~/ DSI0_D2+
S132	LVDS0_2- / ~~eDP0_TX2-~~ / DSI0_D2-
S133	LCD0_VDD_EN
S134	LVDS0_CK+/~~eDP0_AUX~~/ DSI0_CLK+
S135	LVDS0_CK-/~~eDP0_AUX-~~/ DSI0_CLK-
S136	GND
S137	LVDS0_3+ / ~~eDP0_TX3+~~ / DSI0_D3+

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P-Pin	Primary (Top) Side
P137	SER2_RX
P138	SER2_RTS#
P139	SER2_CTS#
P140	SER3_TX
P141	SER3_RX
P142	GND
P143	CAN0_TX
P144	CAN0_RX
P145	CAN1_TX
P146	CAN1_RX
P147	VDD_IN

S-Pin	Secondary (Bottom) Side
S138	LVDS0_3- / ~~eDP0_TX3-~~ / DSI0_D3-
S139	I2C_LCD_CK
S140	I2C_LCD_DAT
S141	LCD0_BKLT_PWM
S142	GPIO12
S143	GND
S144	~~eDP0_HPD~~ / DSI0_TE
S145	WDT_TIME_OUT#
S146	PCIE_WAKE#
S147	VDD_RTC
S148	LID#

P-Pin	Primary (Top) Side
P148	VDD_IN
P149	VDD_IN
P150	VDD_IN
P151	VDD_IN
P152	VDD_IN
P153	VDD_IN
P154	VDD_IN
P155	VDD_IN
P156	VDD_IN

S-Pin	Secondary (Bottom) Side
S149	SLEEP#
S150	VIN_PWR_BAD#
S151	CHARGING#
S152	CHARGER_PRSNT#
S153	CARRIER_STBY#
S154	CARRIER_PWR_ON
S155	FORCE_RECOV#
S156	BATLOW#
S157	TEST#
S158	GND

Note: DSI0 is pin-shared with LVDS0

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4.2 Signal Terminology Descriptions

Meaning of the terms used for signal description tables. Signals described in the specification but not supported on the LEC-iMX8M Plus are marked with strikethrough ~~STRIKETHROUGH~~

Term	Description
I	Input to the module
O	Output from the module
O OD	Open drain output from the module
I OD	Open drain input to the module, with mandatory PU (pull up) on module
OD	Open drain
I/O	Bi-directional Input/Output
PU	PU (pull-up) resistor on module
PD	PD (pull-down) resistor on module
VDD_IN	Main power source from carrier to module
CMOS	Logic input or output
GBE MDI	Differential analog signaling for Gigabit Media Dependent Interface
LVDS DP	Low Voltage Differential Signal for DisplayPort interface
LVDS D-PHY	Low Voltage Differential Signal for MIPI CSI-2 cameras and DSI displays
LVDS M-PHY	Low Voltage Differential Signal for MIPI CSI-3 cameras
LVDS LCD	Low Voltage Differential Signal for LCD displays
LVDS PCIE	Low Voltage Differential Signal for PCIe
LVDS SATA	Low Voltage Differential Signal for SATA
TMDS HDMI	Transition Minimized Differential Signal for HDMI displays
USB	DC coupled differential signaling for traditional (non-Superspeed) USB signals
USB SS	Differential signal for SuperSpeed USB signals
USB VBUS 5V	5V tolerant input for USB VBUS detection
3.3V	3.3V Power Domain: Active while CARRIER_PWRON is high and CARRIER_SBY# is NOT active (i.e. both signals are high)
1.8V	1.8V Power Domain: Active while CARRIER_PWRON is high and CARRIER_SBY# is NOT active (i.e. both signals are high)
3.3Vsb	3.3V Power Domain: Active while CARRIER_PWRON is high (regardless of CARRIER_SBY#)
1.8Vsb	1.8V Power Domain: Active while CARRIER_PWRON is high (regardless of CARRIER_SBY#)

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4.3 Signal Description by Function

4.3.1 The First Display Interface

The first display interface is a group of 30-pins that is split into channel 0 and channel 1. The SMARC specification allows support for dual channel LVDS ports, 2 separate single channel LVDS ports, 2 MIPI DSI ports of 4 lanes each or 2 eDP ports 4 lanes each. A mix of different display types such as DSI and eDP is also permitted. Below tables show which display ports are supported on this particular module.

Pin #	LVDS Name	MIPI DSI Name	eDP Name
S125	LVDS0_0+	DSI0_D0+	~~eDP0_TX0+~~
S126	LVDS0_0-	DSI0_D0-	~~eDP0_TX0-~~
S128	LVDS0_1+	DSI0_D1+	~~eDP0_TX1+~~
S129	LVDS0_1 -	DSI0_D1-	~~eDP0_TX1-~~
S131	LVDS0_2+	DSI0_D2+	~~eDP0_TX2+~~
S132	LVDS0_2-	DSI0_D2-	~~eDP0_TX2-~~
S137	LVDS0_3+	DSI0_D3+	~~eDP0_TX3+~~
S138	LVDS0_3-	DSI0_D3-	~~eDP0_TX3-~~
S134	LVDS0_CK+	DSI0_CLK+	~~eDP0_AUX+~~
S135	LVDS0_CK-	DSI0_CLK-	~~eDP0_AUX-~~
S133	LCD0_VDD_EN	LCD0_VDD_EN	~~LCD0_VDD_EN~~
S127	LCD0_BKLT_EN	LCD0_BKLT_EN	~~LCD0_BKLT_EN~~
S141	LCD0_BKLT_PWM	LCD0_BKLT_PWM	~~LCD0_BKLT_PWM~~
S144		DSI0_TE	~~eDP0_HPD~~
S139	I2C_LCD_CK	I2C_LCD_CK	~~I2C_LCD_CK~~
S140	I2C_LCD_DAT	I2C_LCD_DAT	~~I2C_LCD_DAT~~

Pin #	LVDS Name	MIPI DSI Name	eDP Name
S111	LVDS1_0+	~~DSI1_D0+~~	~~eDP1_TX0+~~
S112	LVDS1_0-	~~DSI1_D0-~~	~~eDP1_TX0-~~
S114	LVDS1_1+	~~DSI1_D1+~~	~~eDP1_TX1+~~
S115	LVDS1_1 -	~~DSI1_D1-~~	~~eDP1_TX1-~~
S117	LVDS1_2+	~~DSI1_D2+~~	~~eDP1_TX2+~~
S118	LVDS1_2-	~~DSI1_D2-~~	~~eDP1_TX2-~~
S120	LVDS1_3+	~~DSI1_D3+~~	~~eDP1_TX3+~~
S121	LVDS1_3-	~~DSI1_D3-~~	~~eDP1_TX3-~~
S108	LVDS1_CK+	~~DSI1_CLK+~~	~~eDP1_AUX+~~
S109	LVDS1_CK-	~~DSI1_CLK-~~	~~eDP1_AUX-~~
S116	LCD1_VDD_EN	~~LCD1_VDD_EN~~	~~LCD1_VDD_EN~~
S107	LCD1_BKLT_EN	~~LCD1_BKLT_EN~~	~~LCD1_BKLT_EN~~
S122	LCD1_BKLT_PWM	~~LCD1_BKLT_PWM~~	~~LCD1_BKLT_PWM~~
S113		~~DSI1_TE~~	~~eDP1_HPD~~

Note:
1. LVDS0/LVDS1 are standard supported on the module.
2. DSI0 can be used but will disable the LVDS0 port, DSI1 is not supported.

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4.3.1.1 LVDS0/LVDS1 mode

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PU / PD	Comments
LVDS0_0+ LVDS0_0- LVDS0_1+ LVDS0_1 - LVDS0_2+ LVDS0_2- LVDS0_3+ LVDS0_3-	S125 S126 S128 S129 S131 S132 S137 S138	Primary LVDS channel differential pair data lines	O LVDS LCD		Runtime		
LVDS0_CK+ LVDS0_CK-	S134 S135	Primary LVDS channel differential pair clock lines	O LVDS LCD		Runtime		
LCD0_VDD_EN	S133	Primary LVDS channel power enable, active high	O CMOS	1.8V	Runtime		
LCD0_BKLT_EN	S127	Primary LVDS channel backlight enable, active high	O CMOS	1.8V	Runtime		
LCD0_BKLT_PWM	S141	Primary LVDS channel brightness control through pulse width modulation (PWM)	O CMOS	1.8V	Runtime		
LVDS1_0+ LVDS1_0- LVDS1_1+ LVDS1_1 - LVDS1_2+ LVDS1_2- LVDS1_3+ LVDS1_3-	S111 S112 S114 S115 S117 S118 S120 S121	Secondary LVDS channel differential pair data lines	O LVDS LCD		Runtime		
LVDS1_CK+ LVDS1_CK-	S108 S109	Secondary LVDS channel differential pair clock lines.	O LVDS LCD		Runtime		
LCD1_VDD_EN	S116	Secondary panel power enable, active high	O CMOS	1.8V	Runtime		
LCD1_BKLT_EN	S107	Secondary panel backlight enable, active high	O CMOS	1.8V	Runtime		

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Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PU / PD	Comments
LCD1_BKLT_PWM	S122	Secondary panel brightness control through pulse width modulation (PWM)	O CMOS	1.8V	Runtime		
I2C_LCD_DAT	S140	DDC data line used for flat panel detection and control	I/O OD CMOS	1.8V	Runtime	PU 2k2	
I2C_LCD_CK	S139	DDC clock line used for flat panel detection and control	O OD CMOS	1.8V	Runtime	PU 2k2	

4.3.1.2 DSI mode

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PU / PD	Comments
DSI0_D0+ DSI0_D0- DSI0_D1+ DSI0_D1- DSI0_D2+ DSI0_D2- DSI0_D3+ DSI0_D3-	S125 S126 S128 S129 S131 S132 S137 S138	Primary DSI panel differential pair data lines	O LVDS D-PHY		Runtime		Build option
DSI0_CLK+ DSI0_CLK-	S134 S135	Primary DSI panel differential pair clock lines.	O LVDS D-PHY		Runtime		Build option
LCD0_VDD_EN	S133	Primary panel power enable, active high	O CMOS	1.8V	Runtime		
LCD0_BKLT_EN	S127	Primary panel backlight enable, active high	O CMOS	1.8V	Runtime		
LCD0_BKLT_PWM	S141	Primary panel brightness control through pulse width modulation (PWM)	O CMOS	1.8V	Runtime		
DSI0_TE	S144	Primary DSI panel tearing effect signal	I CMOS	1.8V	Runtime	PD 1M	
I2C_LCD_DAT	S140	DDC data line used for flat panel detection and control	I/O OD CMOS	1.8V	Runtime	PU 2k2	
I2C_LCD_CK	S139	DDC clock line used for flat panel detection and control	O OD CMOS	1.8V	Runtime	PU 2k2	

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4.3.2 Second & Third Display Interfaces

Pin #	HDMI signal names	DP++ signal names
P92	HDMI_D2+	~~DP1_LANE0+~~
P93	HDMI_D2-	~~DP1_LANE0-~~
P95	HDMI_D1+	~~DP1_LANE1+~~
P96	HDMI_D1-	~~DP1_LANE1-~~
P98	HDMI_D0+	~~DP1_LANE2+~~
P99	HDMI_D0-	~~DP1_LANE2-~~
P101	HDMI_CK+	~~DP1_LANE3+~~
P102	HDMI_CK-	~~DP1_LANE3-~~
S105	HDMI_CTRL_CK	~~DP1_AUX+~~
S106	HDMI_CTRL_DAT	~~DP1_AUX-~~
P104	HDMI_HPD	~~DP1_HPD~~
P107	-	~~DP1_AUX_SEL~~

Pin #	DP++ signal names
P92	~~DP0_LANE0+~~
P93	~~DP0_LANE0-~~
P95	~~DP0_LANE1+~~
P96	~~DP0_LANE1-~~
P98	~~DP0_LANE2+~~
P99	~~DP0_LANE2-~~
P101	~~DP0_LANE3+~~
P102	~~DP0_LANE3-~~
S105	~~DP0_AUX+~~
S106	~~DP0_AUX-~~
P104	~~DP0_HPD~~
P107	~~DP0_AUX_SEL~~

Note: DisplayPort is not supported on both second and third display interfaces

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4.3.2.1 HDMI

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PU / PD	Comments
HDMI_D2+ HDMI_D2- HDMI_D1+ HDMI_D1- HDMI_D0+ HDMI_D0-	P92 P93 P95 P96 P98 P99	HDMI port, differential pair data lines	O TMDS HDMI		Runtime		
HDMI_CK+ HDMI_CK-	P101 P102	HDMI port, differential pair clock lines	O TMDS HDMI		Runtime		
HDMI_CTRL_CK	P105	I2C_CLK line dedicated to HDMI	O OD COMS	1.8V	Runtime	PU 100K	Level shifter FET and 5V PU resistor shall be placed between the module and the HDMI connector.
HDMI_CTRL_DAT	P106	I2C_DAT line dedicated to HDMI	I/O OD COMS	1.8V	Runtime	PU 100K	Level shifter FET and 5V PU resistor shall be placed between the module and the HDMI connector.
HDMI_HPD	P104	HDMI Hot plug active high detection signal that serves as an interrupt request	I CMOS	1.8V	Runtime	PD 1M	Module must tolerate high level in stand-by mode

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4.3.3 MIPI Camera Support

4.3.3.1 MIPI CSI0

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PU / PD	Comments
CSI0_RX0+ CSI0_RX0- CSI0_RX1+ CSI0_RX1-	S11 S12 S14 S15	CSI0 differential input (point to point)	I LVDS D-PHY / I LVDS M-PHY		Runtime		
CSI0_CK+ CSI0_CK-	S8 S9	CSI0 differential clock intput (point to point)	I LVDS D-PHY		Runtime		
I2C_CAM0_DAT / ~~CSI0_TX-~~	S7	I2C data for serial camera data support link or differential data lane	I/O OD CMOS / O LVDS M-PHY	1.8V	Runtime	PU 2.2K	MIPI-CSI 2.0 uses I2C_CAM0_DAT MIPI-CSI 3.0 uses CSI0_TX-
I2C_CAM0_CK / ~~CSI0_TX+~~	S5	I2C clock for serial camera data support link or differential data lane	O OD CMOS / O LVDS M-PHY	1.8V	Runtime	PU 2.2K	MIPI-CSI 2.0 uses I2C_CAM0_CK MIPI-CSI 3.0 uses CSI0_TX+
CAM0_PWR# / GPIO0	P108	Camera 0 Power Enable, active low output.	O CMOS	1.8V	Runtime		Shared with GPIO0
CAM0_RST# / GPIO2	P110	Camera 0 Reset, active low output	O CMOS	1.8V	Runtime		Shared with GPIO2
CAM_MCK	S6	Master clock output	O CMOS	1.8V	Runtime		This signal is used by both CSI0 and CSI1

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4.3.3.2 MIPI CSI1 (Camera)

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PU / PD	Comments
CSI1_RX0+ CSI1_RX0- CSI1_RX1+ CSI1_RX1- CSI1_RX2+ CSI1_RX2- CSI1_RX3+ CSI1_RX3-	P7 P8 P10 P11 P13 P14 P16 P17	CSI1 differential input (point to point)	I LVDS D-PHY / I LVDS M-PHY		Runtime		
CSI1_CK+ CSI1_CK-	P3 P4	CSI1 differential clock input (point to point)	I LVDS D-PHY		Runtime		
I2C_CAM1_DAT / ~~CSI1_TX-~~	S2	I2C data for serial camera data support link or differential data lane	I/O OD CMOS / O LVDS M-PHY	1.8V	Runtime	PU 2.2K	MIPI-CSI 2.0 mode uses I2C_CAM1_DAT MIPI-CSI 3.0 mode uses CSI1_TX-
I2C_CAM1_CK / ~~CSI1_TX+~~	S1	I2C clock for serial camera data support link or differential data lane	O OD CMOS / O LVDS M-PHY	1.8V	Runtime	PU 2.2K	MIPI-CSI 2.0 mode uses I2C_CAM1_CK MIPI-CSI 3.0 mode uses CSI1_TX+
CAM1_PWR# / GPIO1	P109	Camera 1 Power Enable, active low output.	O CMOS	1.8V	Runtime		Shared with GPIO1
CAM1_RST# / GPIO3	P111	Camera 1 Reset, active low output	O CMOS	1.8V	Runtime		Shared with GPIO3
CAM_MCK	S6	Master clock output	O CMOS	1.8V	Runtime		This signal is used by both CSI0 and CSI1

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4.3.4 I2S (Audio)

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PU / PD	Comments
I2S0_LRCK	S39	I2S0 Left & Right synchronization clock	I/O CMOS	1.8V	Runtime		Module Output if CPU acts in Master Mode Module Input if CPU acts in Slave Mode
I2S0_SDOUT	S40	I2S0 Digital audio Output	O CMOS	1.8V	Runtime		
I2S0_SDIN	S41	I2S0 Digital audio Input	I CMOS	1.8V	Runtime		
I2S0_CK	S42	I2S0 Digital audio clock	I/O CMOS	1.8V	Runtime		Module Output if CPU acts in Master Mode Module Input if CPU acts in Slave Mode
~~I2S2_LRCK~~	~~S50~~	~~I2S2 Left & Right synchronization clock~~	~~I/O CMOS~~	~~1.8V~~	~~Runtime~~	-	~~Module Output if CPU acts in Master Mode~~ ~~Module Input if CPU acts in Slave Mode~~
~~I2S2_SDOUT~~	~~S51~~	~~I2S2 Digital audio Output~~	~~O CMOS~~	~~1.8V~~	~~Runtime~~	-	-
~~I2S2_SDIN~~	~~S52~~	~~I2S2 Digital audio Input~~	~~I CMOS~~	~~1.8V~~	~~Runtime~~	-	-
~~I2S2_CK~~	~~S53~~	~~I2S2 Digital audio clock~~	~~I/O CMOS~~	~~1.8V~~	~~Runtime~~	-	~~Module Output if CPU acts in Master Mode~~ ~~Module Input if CPU acts in Slave Mode~~
AUDIO_MCK	S38	Master clock output to I2S codec(s)	O CMOS	1.8V	Runtime	-	-

Note: support for I2S1 signalling pins has been removed during update to SMARC 2.0 specification

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4.3.5 USB Ports

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PU / PD	Comments
USB0+ USB0-	P60 P61	USB differential data pairs for port 0	I/O USB	USB	Standby		From SOC
USB0_EN_OC#	P62	USB over-current sense for port 0	I/O OD CMOS	3.3Vsb / 3.3V	Standby	PU 10k	Pulled low by Module OD driver to disable USB0 power. Pulled low by Carrier OD driver to indicate over-current situation.
USB0_VBUS_DET	P63	USB port 0 host power detection, when this port is used as a device.	I USB VBUS 5V	USB VBUS 5V	Standby		Can be connected to a USB client port VBUS pin
USB0_OTG_ID	P64	Input pin to announce OTG device insertion on USB 2.0 port	I CMOS	3.3Vsb / 3.3V	Standby		
USB1+ USB1-	P65 P66	USB differential data pairs for port 1	I/O USB	USB	Standby		From USB HUB
USB1_EN_OC#	P67	USB over-current sense for port 1	I/O OD CMOS	3.3Vsb / 3.3V	Standby	PU 10k	Pulled low by Module OD driver to disable USB0 power. Pulled low by Carrier OD driver to indicate over-current situation.
USB2+ USB2-	P69 P70	USB differential data pairs for port 2	I/O USB	USB	Standby		From USB HUB
USB2_SSRX+ USB2_SSRX-	S74 S75	Receive signal differential pairs for SuperSpeed on port 2	I USB SS	USB SS	Standby	-	
USB2_SSTX+ USB2_SSTX-	S71 S72	Transmit signal differential pairs for SuperSpeed on port 2	O USB SS	USB SS	Standby	-	
USB2_EN_OC#	P71	USB over-current sense for port 2	I/O OD CMOS	3.3Vsb / 3.3V	Standby	PU 10k	Pulled low by Module OD driver to disable USB0 power. Pulled low by Carrier OD driver to indicate over-current situation.

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Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PU / PD	Comments
USB3+ USB3-	S68 S69	USB differential data pairs for port 3	I/O USB	USB	Standby		From USB HUB
USB3_SSRX+ USB3_SSRX-	S65 S66	Receive signal differential pairs for SuperSpeed on port 3	I USB SS	USB SS	Standby		
USB3_SSTX+ USB3_SSTX-	S62 S63	Transmit signal differential pairs for SuperSpeed on port 3	O USB SS	USB SS	Standby		
USB3_EN_OC#	P74	USB over-current sense for port 3	I/O OD CMOS	3.3Vsb / 3.3V	Standby	PU 10k	Pulled low by Module OD driver to disable USB0 power. Pulled low by Carrier OD driver to indicate over-current situation.
~~USB3_VBUS_DET~~	~~S37~~	~~USB port 3 host power detection, when this port is used as a device.~~	~~I USB VBUS 5V~~	~~USB VBUS 5V~~	~~Standby~~	-	-
~~USB3_OTG_ID~~	~~S104~~	~~Input pin to announce OTG device insertion on USB 3.0 port~~	~~I CMOS~~	~~3.3Vsb / 3.3V~~	~~Standby~~	-	-
USB4+ USB4-	S35 S36	USB differential data pairs for port 4	I/O USB	USB	Standby		
USB4_EN_OC#	P76	USB over-current sense for port 4	I/O OD CMOS	3.3Vsb / 3.3V	Standby	PU 10k	Pulled low by Module OD driver to disable USB0 power. Pulled low by Carrier OD driver to indicate over-current situation.
USB5+ USB5-	S59 S60	USB differential data pairs for port 5	I/O USB	USB	Standby		
USB5_EN_OC#	S55	USB over-current sense for port 5	I/O OD CMOS	3.3Vsb / 3.3V	Standby	PU 10k	Pulled low by Module OD driver to disable USB0 power. Pulled low by Carrier OD driver to indicate over-current situation.

Note:
1. USB0 is directly connected to the SoC. USB1/2/3/4/5 share bandwidth through a HUB.
2. Extreme rugged (-ER) parts have no USB hub populated.

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4.3.6 PCIe Ports

The module supports 2x PCIe Gen 2.1 ports (PCIE_A and PCIE_B).

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PU / PD	Comments
PCIE_A_TX+ PCIE_A_TX-	P89 P90	Differential PCIe link A transmit data pair	O LVDS PCIE		Runtime		Series AC coupled on module
PCIE_A_RX+ PCIE_A_RX-	P86 P87	Differential PCIe link A receive data pair	I LVDS PCIE		Runtime		Series AC coupled off module
PCIE_A_REFCK+ PCIE_A_REFCK-	P83 P84	Differential PCIe Link A reference clock output	O LVDS PCIE		Runtime		
PCIE_A_RST#	P75	PCIe Port A reset output	O CMOS	3.3V	Runtime		
PCIE_A_CKREQ#	P78	PCIe Port A clock request	I OD CMOS	3.3V	Runtime	PU > 10K	No need for this signal because module provides onboard PCIe clock
PCIE_B_TX+ PCIE_B_TX-	S90 S91	Differential PCIe link B transmit data pair	O LVDS PCIE		Runtime		Series AC coupled on module
PCIE_B_RX+ PCIE_B_RX-	S87 S88	Differential PCIe link B receive data pair	I LVDS PCIE		Runtime		Series AC coupled off module
PCIE_B_REFCK+ PCIE_B_REFCK-	S84 S85	Differential PCIe Link B reference clock output	O LVDS PCIE		Runtime		
PCIE_B_RST#	S76	PCIe Port B reset output	O CMOS	3.3V	Runtime		
PCIE_B_CKREQ#	P77	PCIe Port B clock request	I OD CMOS	3.3V	Runtime	PU > 10K	No need for this signal because module provides onboard PCIe clock
~~PCIE_C_TX+ PCIE_C_TX-~~	~~S81 S82~~	~~Differential PCIe link C transmit data pair~~	~~O LVDS PCIE~~	-	~~Runtime~~	-	~~Series AC coupled on module~~
~~PCIE_C_RX+ PCIE_C_RX-~~	~~S78 S79~~	~~Differential PCIe link C receive data pair~~	~~I LVDS PCIE~~	-	~~Runtime~~	-	~~Series AC coupled off module~~
~~PCIE_C_REFCK+ PCIE_C_REFCK-~~	~~P80 P81~~	~~Differential PCIe Link C reference clock output~~	~~O LVDS PCIE~~	-	~~Runtime~~	-	-

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Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PU / PD	Comments
~~PCIE_C_RST#~~	~~S77~~	~~PCIe Port C reset output~~	~~O CMOS~~	~~3.3V~~	~~Runtime~~	-	-
~~PCIE_D_TX+~~ ~~PCIE_D_TX-~~	~~S29~~ ~~S30~~	~~Differential PCIe link D transmit data pair~~	~~O LVDS PCIE~~	-	~~Runtime~~	-	~~Series AC coupled on module~~
~~PCIE_D_RX+~~ ~~PCIE_D_RX-~~	~~S32~~ ~~S33~~	~~Differential PCIe link D receive data pair~~	~~I LVDS PCIE~~	-	~~Runtime~~	-	~~Series AC coupled off module~~
PCIE_WAKE#	S146	PCIe wake up interrupt to host – common to PCIe links A, B, C, D	I OD CMOS	3.3V	Runtime	PU 10k	

Note: Module provides PCIe clock generators for PCIE_A and PCIE_B so no external clock source on the carrier is needed

4.3.7 SATA Ports

This design does not support SATA ports

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4.3.8 LAN Ports

4.3.8.1 First LAN Port

The first LAN port is derived from the SoC's RGMII0 interface

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PU / PD	Comments
GBE0_MDI0+ GBE0_MDI0- GBE0_MDI1+ GBE0_MDI1- GBE0_MDI2+ GBE0_MDI2- GBE0_MDI3+ GBE0_MDI3-	P30 P29 P27 P26 P24 P23 P20 P19	Gigabit Ethernet Controller 0: Media Dependent Interface Differential Pairs 0, 1, 2, 3. The MDI can operate in 1000, 100, and 10Mbit/sec modes. Some pairs are unused in some modes according to the following: 1000 / 100 / 10 MDI[0]+/- B1_DA+/- TX+/- TX+/- MDI[1]+/- B1_DB+/- RX+/- RX+/- MDI[2]+/- B1_DC+/- MDI[3]+/- B1_DD+/-	GBE MDI		Standby		Twisted pair signals for external transformer.
GBE0_LINK100#	P21	Link Speed Indication LED for GBE 0 100Mbps	O OD CMOS	3.3V	Standby		Shall be able to sink 24mA or more Carrier LED current
GBE0_LINK1000#	P22	Link Speed Indication LED for GBE 0 1000Mbps	O OD CMOS	3.3V	Standby		Shall be able to sink 24mA or more Carrier LED current
GBE0_LINK_ACT#	P25	Link / Activity Indication LED Driven low on Link (10, 100 or 1000 mbps) Blinks on Activity	O OD CMOS	3.3V	Standby		Shall be able to sink 24mA or more Carrier LED current
GBE0_CTREF	P28	Center-Tap reference voltage for Carrier board Ethernet magnetic (if required by the Module GBE PHY)	Analog	0 to 3.3V max	Standby	-	-
GBE0_SDP	P6	IEEE 1588 Trigger Signal. For hardware implementation of PTP (precision time protocol)	IO CMOS	3.3V	Standby		

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4.3.8.2 Second LAN Port

The Second LAN port is derived from the SoC's RGMII1interface

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PU / PD	Comments
GBE1_MDI0+ GBE1_MDI0- GBE1_MDI1+ GBE1_MDI1- GBE1_MDI2+ GBE1_MDI2- GBE1_MDI3+ GBE1_MDI3-	S17 S18 S20 S21 S23 S24 S26 S27	Gigabit Ethernet Controller 1: Media Dependent Interface Differential Pairs 0, 1, 2, 3. The MDI can operate in 1000, 100, and 10Mbit/sec modes. Some pairs are unused in some modes according to the following: 1000 100 10 MDI[0]+/- B1_DA+/- TX+/- TX+/- MDI[1]+/- B1_DB+/- RX+/- RX+/- MDI[2]+/- B1_DC+/- MDI[3]+/- B1_DD+/-	GBE MDI		Standby		Twisted pair signals for external transformer.
GBE1_LINK100#	S19	Link Speed Indication LED for GBE 1 100Mbps	O OD CMOS	3.3V	Standby		Shall be able to sink 24mA or more Carrier LED current
GBE1_LINK1000#	S22	Link Speed Indication LED for GBE 1 1000Mbps	O OD CMOS	3.3V	Standby		Shall be able to sink 24mA or more Carrier LED current
GBE1_LINK_ACT#	S31	Link / Activity Indication LED Driven low on Link (10, 100 or 1000 mbps) Blinks on Activity	O OD CMOS	3.3V	Standby		Shall be able to sink 24mA or more Carrier LED current
GBE1_CTREF	S28	Center-Tap reference voltage for Carrier board Ethernet magnetic `(if required by the Module GBE PHY)`	Analog	0 to 3.3V max	Standby		
GBE1_SDP	P5	IEEE 1588 Trigger Signal. For hardware implementation of PTP (precision time protocol)	IO CMOS	3.3V	Standby		

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4.3.9 SDIO

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PU / PD	Comments
SDIO_D0 SDIO_D1 SDIO_D2 SDIO_D3	P39 P40 P41 P42	SDIO Data lines. These signals operate in push-pull mode.	I/O CMOS	1.8V or 3.3V	Runtime		SDIO controller will detect SD Cards voltage level (1.8V for UHS-I and 3.3V for standard) and adjust its I/O voltage level accordingly
SDIO_WP	P33	SDIO Write Protect. This signal denotes the state of the write-protect tab on SD cards.	I OD CMOS	3.3V	Runtime	PU 10k	Pulled up on module
SDIO_CMD	P34	SDIO Command/Response. This signal is used for card initialization and for command transfers. During initialization mode this signal is open drain. During command transfer this signal is in push-pull mode.	I/O CMOS	1.8V or 3.3V	Runtime		SDIO controller will detect SD Cards voltage level (1.8V for UHS-I and 3.3V for standard) and adjust its I/O voltage level accordingly
SDIO_CD#	P35	SDIO Card Detect. This signal indicates when a SDIO/MMC card is present.	I OD CMOS	3.3V	Runtime	PU 10k	Pulled up on module
SDIO_CK	P36	SDIO Clock. With each cycle of this signal a one-bit transfer on the command and each data line occurs.	O CMOS	1.8V or 3.3V	Runtime		
SDIO_PWR_EN	P37	SDIO Power Enable. This signal is used to enable the power being supplied to a SD/MMC card device.	O CMOS	3.3V	Runtime		should be driven low in STB Mode by the module

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4.3.10 SPI and ESPI

4.3.10.1 SPI0

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PU / PD	Comments
SPI0_CS0#	P43	SPI0 Master Chip Select 0	O CMOS	1.8V	Standby		This signal can be used to select carrier SPI as boot device
~~SPI0_CS1#~~	~~P31~~	~~SPI0 Master Chip Select 1~~	~~O CMOS~~	~~1.8V~~	~~Standby~~		
SPI0_CK	P44	SPI0 Clock	O CMOS	1.8V	Standby		
SPI0_DIN	P45	SPI0 Master input / Slave output	I CMOS	1.8V	Standby		also referred to as MISO
SPI0_DO	P46	SPI0 Master output / Slave input	O CMOS	1.8V	Standby		also referred to as MOSI

SPI1_CS0#	P54	SPI1 Master Chip Select 0	O CMOS	1.8V	Standby	-	See ESPI
~~SPI1_CS1#~~	~~P55~~	~~SPI1 Master Chip Select 1~~	~~O CMOS~~	~~1.8V~~	~~Standby~~	-	~~See ESPI~~
SPI1_CK	P56	SPI1 Clock	O CMOS	1.8V	Standby	-	See ESPI
SPI1_DIN	P57	SPI1 Master input / Slave output	I CMOS	1.8V	Standby	-	See ESPI
SPI1_DO	P58	SPI1 Master output / Slave input	O CMOS	1.8V	Standby	-	See ESPI

Note: SPI0/1 is free to use on the carrier.

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4.3.10.2 ESPI

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PU / PD	Comments
~~ESPI_CS0#~~	~~P54~~	~~ESPI1 Master Chip Select 0~~	~~O CMOS~~	~~1.8V~~	~~Standby~~	-	
~~ESPI_CS1#~~	~~P55~~	~~ESPI1 Master Chip Select 1~~	~~O CMOS~~	~~1.8V~~	~~Standby~~	-	
~~ESPI_CK~~	~~P56~~	~~ESPI Master Clock output~~	~~O CMOS~~	~~1.8V~~	~~Standby~~	-	
~~ESPI_RESET#~~	~~S58~~	~~ESPI Reset~~	~~O CMOS~~	~~1.8V~~	~~Standby~~	-	~~Reset the eSPI interface for both master and slaves.~~ ~~eSPI Reset# is typically driven from eSPI master to eSPI slaves~~
~~ESPI_ALERT0#~~ ~~ESPI_ALERT1#~~	~~S43~~ ~~S44~~	~~ESPI ALERT~~	~~I OD CMOS~~	~~1.8V~~	~~Standby~~	-	~~This pin is used by eSPI slave to request service from eSPI.master.Alert# is an open-drain output from the slave.~~ ~~This pin is optional for Single Master-Single Slave configuration where I/O[1] can be used to signal the Alert event.~~
~~ESPI_IO_0~~ ~~ESPI_IO_1~~ ~~ESPI_IO_2~~ ~~ESPI_IO_3~~	~~P58~~ ~~P57~~ ~~S56~~ ~~S57~~	~~ESPI Master Data Input / Output.~~	~~I/O CMOS~~	~~1.8V~~	~~Standby~~	-	~~ESPI_IO_0 can also be used as SPI1_DO (MOSI)~~ ~~ESPI_IO_1 can also be used as SPI1_DIN (MISO)~~ ~~In Single I/O mode, ESPI_IO_0 is the eSPI master output / eSPI slave input (MOSI) whereas ESPI_IO_1 is the SPI master input / eSPI slave output (MISO).~~

Note: On NXP i.MX8M Plus, part SPI is used

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4.4 General Purpose I2C

The SMARC specification supports a total of 6 different I2C busses on its pinout. Most of these busses are designated for specific functions such as I2C for camera management, I2C for EDID on HDMI, LVDS panels or I2C for PMIC. Only one I2C bus is marked as General purpose

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PU / PD	Comments
I2C_GP_DAT	S49	General purpose I2C data signal	I/O OD CMOS	1.8V	Runtime	PU 2k2	
I2C_GP_CK	S48	General purpose I2C clock signal	O OD CMOS	1.8V	Runtime	PU 2k2	

Most of the other I2C busses are described in their designated function tables as opposed to a combined list.

Below is an overview of all I2C busses and where to find them.

Name	Pin #	Description	Where to find
I2C_LCD_DAT	S140	DDC data line used for flat panel detection and control	LVDS / DSI / eDP tables
I2C_LCD_CK	S139	DDC clock line used for flat panel detection and control	LVDS / DSI / eDP tables
HDMI_CTRL_CK	P105	I2C_CLK line dedicated to HDMI	HDMI table
HDMI_CTRL_DAT	P106	I2C_DAT line dedicated to HDMI	HDMI table
I2C_CAM0_DAT	S7	I2C data for serial camera data support link	MIPI CSI table
I2C_CAM0_CK	S5	I2C clock for serial camera data support link	MIPI CSI table
I2C_CAM1_DAT	S2	I2C data for serial camera data support link	MIPI CSI table
I2C_CAM1_CK	S1	I2C clock for serial camera data support link	MIPI CSI table
I2C_PM_DAT	P122	Power management I2C bus DATA (SMBus for x86)	Power and System Management
I2C_PM_CK	P121	Power management I2C bus CLK (SMBus for x86)	Power and System Management

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4.4.1 GPIO

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PU / PD	Comments
GPIO0 / CAM0_PWR#	P108	General purpose I/O pin 0.	I/O CMOS	1.8V	Runtime	PU 470K on the Module.	Default use is GPIO0, alternative use is Camera 0 Power Enable - active low, through DTS
GPIO1 / CAM1_PWR#	P109	General purpose I/O pin 1.	I/O CMOS	1.8V	Runtime	PU 470K on the Module	Default use is is GPIO1 alternative use is Camera 1 Power Enable - active low, through DTS
GPIO2 / CAM0_RST#	P110	General purpose I/O pin 2.	I/O CMOS	1.8V	Runtime	PU 470K on the Module	Default use is GPIO2, alternative use is Camera 0 Reset - active low, through DTS
GPIO3 / CAM1_RST#	P111	General purpose I/O pin 3.	I/O CMOS	1.8V	Runtime	PU 470K on the Module	Default use is GPIO3, alternative use is Camera 1 Reset - active low, through DTS
GPIO4 / ~~HDA_RST#~~	P112	General purpose I/O pin 4.	I/O CMOS	1.8V	Runtime	PU 470K on the Module	
GPIO5 / PWM_OUT	P113	General purpose I/O pin 5.	I/O CMOS	1.8V	Runtime	PU 470K on the Module	
GPIO6 / TACHIN	P114	General purpose I/O pin 6.	I/O CMOS	1.8V	Runtime	PU 470K on the Module	
GPIO7	P115	General purpose I/O pin 7.	I/O CMOS	1.8V	Runtime	PU 470K on the Module	
GPIO8	P116	General purpose I/O pin 8.	I/O CMOS	1.8V	Runtime	PU 470K on the Module	
GPIO9	P117	General purpose I/O pin 9.	I/O CMOS	1.8V	Runtime	PU 470K on the Module	
GPIO10	P118	General purpose I/O pin 10.	I/O CMOS	1.8V	Runtime	PU 470K on the Module	
GPIO11	P119	General purpose I/O pin 11.	I/O CMOS	1.8V	Runtime	PU 470K on the Module	
GPIO12	S142	General purpose I/O pin 12	I/O CMOS	1.8V	Runtime	PU 470K on the Module	
GPIO13	S123	General purpose I/O pin 13	I/O CMOS	1.8V	Runtime	PU 470K on the Module	

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4.4.2 UART

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PU / PD	Comments
SER0_TX	P129	Asynchronous serial data output port 0	O CMOS	1.8V	Runtime		
SER0_RX	P130	Asynchronous serial data input port 0	I CMOS	1.8V	Runtime	PU 100k	
SER0_RTS#	P131	"Request to Send" handshake line for port 0	O CMOS	1.8V	Runtime		
SER0_CTS#	P132	"Clear to Send" handshake line for port 0	I CMOS	1.8V	Runtime	PU 100k	
SER1_TX	P134	Asynchronous serial data output port 1	O CMOS	1.8V	Runtime		
SER1_RX	P135	Asynchronous serial data input port 1	I CMOS	1.8V	Runtime	PU 100k	
SER2_TX	P136	Asynchronous serial data output port 2	O CMOS	1.8V	Runtime	-	-
SER2_RX	P137	Asynchronous serial data input port 2	I CMOS	1.8V	Runtime	PU 100k	-
SER2_RTS#	P138	"Request to Send" handshake line for port 2	O CMOS	1.8V	Runtime	-	-
SER2_CTS#	P139	"Clear to Send" handshake line for port 2	I CMOS	1.8V	Runtime	PU 100k	-
SER3_TX	P140	Asynchronous serial data output port 3	O CMOS	1.8V	Runtime	-	
SER3_RX	P141	Asynchronous serial data input port 3	I CMOS	1.8V	Runtime	-	

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4.4.3 CAN Bus

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PU / PD	Comments
CAN0_TX	P143	CAN port 0 Transmit output	O CMOS	1.8V	Runtime		
CAN0_RX	P144	CAN port 0 Receive input	I CMOS	1.8V	Runtime		
CAN1_TX	P145	CAN port 1 Transmit output	O CMOS	1.8V	Runtime		
CAN1_RX	P146	CAN port1 Receive input	I CMOS	1.8V	Runtime		

4.4.4 Miscellaneous

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PU / PD	Comments
TEST#	S157	Held low by Carrier to invoke Module vendor specific test function(s).	I CMOS	1.8V	Runtime	PU on Module. Driven by OD on Carrier	Module must implement PU but actual value is depended on particular module design. Carrier Board should leave this pin floating for normal operation
WDT_TIME_OUT#	S145	Watch-Dog-Timer Output, low active.	O CMOS	1.8V	Runtime		Driven only during runtime

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4.4.5 Power and System Management

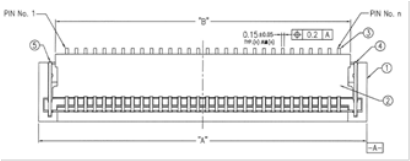
Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PU / PD	Comments
BATLOW#	S156	Battery low indication to Module. Carrier to float the line in inactive state.	I OD CMOS	1.8V	Standby / Sleep	PU 10K	Driven by OD on Carrier. Pulled up on module.
CARRIER_PWR_ON	S154	Carrier board circuits (apart from power management and power path circuits) should not be powered up until the Module asserts the CARRIER_PWR_ON signal.	O CMOS	1.8Vsb / 1.8V	Standby		1.8Vsb is only used for signaling, not a power source to the module
CARRIER_STBY#	S153	The Module shall drive this signal low when the system is in a standby power state.	O CMOS	1.8Vsb / 1.8V	Standby		
CHARGER_PRSNT#	S152	Held low by Carrier if DC input for battery charger is present.	I OD CMOS	1.8V	Standby / Sleep	PU 10K	Driven by OD on Carrier. Pulled up on module.
CHARGING#	S151	Held low by Carrier during battery charging. Carrier to float the line when charge is complete.	I OD CMOS	1.8V	Standby / Sleep	PU 10K	Driven by OD on Carrier. Pulled up on module.
VIN_PWR_BAD#	S150	Power bad indication from Carrier board. Module and Carrier power supplies (other than Module and Carrier power supervisory circuits) shall not be enabled while this signal is held low by the Carrier.	I OD CMOS	VDD_IN	Runtime	PU 10K	Driven by OD on Carrier Module must implement PU but actual value is depended on particular module design.
SLEEP#	S149	Sleep indicator from Carrier board. May be sourced from user Sleep button or Carrier logic. Carrier to float the line in in-active state.Active low, level sensitive. Should be de-bounced on the Module.	I OD CMOS	1.8V	Standby	PU 10K	Driven by OD on Carrier. Pulled up on module.
LID#	S148	Lid open/close indication to Module. Low indicates lid closure (which system may use to initiate a sleep state). Carrier to float the line in in-active state. Active low, level sensitive. Should be de-bounced on the Module.	I OD CMOS	1.8V	Standby	PU 10K	Driven by OD on Carrier. Pulled up on module.
POWER_BTN#	P128	Power-button input from Carrier board. Carrier to float the line in in-active state. Active low, level sensitive. Should be debounced on the Module.	I OD CMOS	1.8V	Sleep	PU 10K	Driven by OD on Carrier. Pulled up on module.

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Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PU / PD	Comments
RESET_OUT#	P126	General purpose reset output to Carrier board.	O CMOS	1.8V	Standby		
RESET_IN#	P127	Reset input from Carrier board. Carrier drives low to force a Module reset, floats the line otherwise.	I OD CMOS	1.8V	Standby	PU 10K	Driven by OD on Carrier. Pulled up on module.
I2C_PM_DAT	P122	Power management I2C bus DATA	I/O OD CMOS	1.8V	Standby / Sleep	PU 2k2	On x86 systems these serve as SMB DATA. Pulled up on module.
I2C_PM_CK	P121	Power management I2C bus CLK	O OD CMOS	1.8V	Standby / Sleep	PU 2k2	On x86 systems these serve as SMB CLK. Pulled up on module.
SMB_ALERT_1V8#	P1	SMBus Alert# (interrupt) signal	I OD CMOS	1.8V	Standby / Sleep	PU 2k2	only used on x86 design

4.4.6 DB30 Multipurpose Connector

FPC Connector: HIROSE,FH12-30S-0.5SH(55)



DB30 connector brings out the following type of signals

SPI0 bus

JTAG to SOC

Boot Select strap pins

BMC programming interface

Serial port

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4.4.7 Boot Select

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PU / PD	Comments
BOOT_SEL0# BOOT_SEL1# BOOT_SEL2#	P123 P124 P125	Input straps determine the Module boot	I OD CMOS	1.8Vsb	Standby	PU 10K	Driven by OD on Carrier. Pulled up on module. Only booting from EMMc and SDcard is supported
FORCE_RECOV#	S155		I OD CMOS	1.8Vsb	Standby	PU 10K	Driven by OD on Carrier. Pulled up on module. Low on this pin allows non-protected segments of Module boot device to be rewritten / restored from an external USB Host on Module USB0. The Module USB0 operates in Client Mode when in the Force Recovery function is invoked. Pulled high on the Module. For SOCs that do not implement a USB based Force Recovery functions, then a low on the Module FORCE_RECOV# pin may invoke the SOC native Force Recovery mode – such as over a Serial Port. For x86 systems this signal may be used to load BIOS defaults. Pulled up on Module. Driven by OD part on Carrier.

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4.4.8 Power

Name	Pin #	Description	I/O Type	Power Rail / Tolerance	PU / PD	Comments
VDD_IN	P147, P148, P149, P150, P151, P152, P153, P154, P155, P156	Module power input voltage 4.75 min to 5.25V max	P Not defined within Signal Terminolgy Descriptions. Should we define a specific rail?	3 to 5.25V / 5V		
GND	P2, P9, P12, P15, P18, P32, P38, P47, P50, P53, P59, P68, P79, P82, P85, P88, P91, P94, P97, P100, P103, P120, P133, P142, S3, S10, S16, S25, S34, S47, S61, S64, S67, S70, S73, S80, S83, S86, S89, S92, S101, S110, S119, S124, S130, S136, S143, S158	Module signal and power return, and GND reference	P Not defined within Signal Terminolgy Descriptions. Should we define a specific rail?	Ground		
VDD_RTC	S147	Low current RTC circuit backup power – 3.0V nominal. May be sourced from a Carrier based Lithium cell or Super Cap.	P Not defined within Signal Terminolgy Descriptions. Should we define a specific rail?	[2 to 3.25] / 3.25V		

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4.5 SMARC Pin-to-controller Mapping

	SMARC Signal Name	Module Direction	Module Termination	Type/Tolerance	Controller	Controller Pin Name	I/O Mux default	Power Rail
P1	SMB_ALERT#	In/OD	PU-2.2K	GPIO / 1.8V	GPIO Expander (U2606)	I/O14	-	VDD_1V8
P2	GND	-	-	-	-	-	-	-
P3	CSI1_CK+	In	-	CSI D-PHY	i.MX 8MP	MIPI_CSI2_CLK_P	-	VDD_MIPI_1P8
P4	CSI1_CK-	In	-	CSI D-PHY	i.MX 8MP	MIPI_CSI2_CLK_N	-	VDD_MIPI_1P8
P5	GBE1_SDP	In/Out	-	GPIO/3.3V	DP83867 (U1601)	GPIO_0	-	VDD_3V3
P6	GBE0_SDP	In/Out	-	GPIO/3.3V	DP83867 (U1501)	GPIO_0	-	VDD_3V3
P7	CSI1_RX0+	In	-	CSI D-PHY	i.MX 8MP	MIPI_CSI2_D0_P	-	VDD_MIPI_1P8
P8	CSI1_RX0-	In	-	CSI D-PHY	i.MX 8MP	MIPI_CSI2_D0_N	-	VDD_MIPI_1P8
P9	GND	-	-	-	-	-	-	-
P10	CSI1_RX1+	In	-	CSI D-PHY	i.MX 8MP	MIPI_CSI2_D1_P	-	VDD_MIPI_1P8
P11	CSI1_RX1-	In	-	CSI D-PHY	i.MX 8MP	MIPI_CSI2_D1_N	-	VDD_MIPI_1P8
P12	GND	-	-	-	-	-	-	-
P13	CSI1_RX2+	In	-	CSI D-PHY	i.MX 8MP	MIPI_CSI2_D2_P	-	VDD_MIPI_1P8
P14	CSI1_RX2-	In	-	CSI D-PHY	i.MX 8MP	MIPI_CSI2_D2_N	-	VDD_MIPI_1P8
P15	GND	-	-	-	-	-	-	-
P16	CSI1_RX3+	In	-	CSI D-PHY	i.MX 8MP	MIPI_CSI2_D3_P	-	VDD_MIPI_1P8
P17	CSI1_RX3-	In	-	CSI D-PHY	i.MX 8MP	MIPI_CSI2_D3_N	-	VDD_MIPI_1P8
P18	GND	-	-	-	-	-	-	-
P19	GBE0_MDI3-	Bi-Dir	-	GBE MDI	DP83867 (U1501)	TD_M_D	-	VDDIO
P20	GBE0_MDI3+	Bi-Dir	-	GBE MDI	DP83867 (U1501)	TD_P_D	-	VDDIO
P21	GBE0_LINK100#	Out/OD	-	GPIO / 3.3V	DP83867 (U1501)	LED_1	-	VDDIO
P22	GBE0_LINK1000#	Out/OD	-	GPIO / 3.3V	DP83867 (U1501)	LED_2	-	VDDIO

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	SMARC Signal Name	Module Direction	Module Termination	Type/Tolerance	Controller	Controller Pin Name	I/O Mux default	Power Rail
P23	GBE0_MDI2-	Bi-Dir	-	GBE MDI	DP83867 (U1501)	TD_M_C	-	VDDIO
P24	GBE0_MDI2+	Bi-Dir	-	GBE MDI	DP83867 (U1501)	TD_P_C	-	VDDIO
P25	GBE0_LINK_ACT#	Out/OD	-	GPIO / 3.3V	DP83867 (U1501)	LED_0	-	VDDIO
P26	GBE0_MDI1-	Bi-Dir	-	GBE MDI	DP83867 (U1501)	TD_M_B	-	VDDIO
P27	GBE0_MDI1+	Bi-Dir	-	GBE MDI	DP83867 (U1501)	TD_P_B	-	VDDIO
P28	GBE0_CTREF	PWR	-	-	-	-	-	-
P29	GBE0_MDI0-	Bi-Dir	-	GBE MDI	DP83867 (U1501)	TD_M_A	-	VDDIO
P30	GBE0_MDI0+	Bi-Dir	-	GBE MDI	DP83867 (U1501)	TD_P_A	-	VDDIO
P31	SPI0_CS1#	-	-	-	N.C.	N.C.	-	-
P32	GND	-	-	-	-	-	-	-
P33	SDIO_WP	In/OD	PU-10K	SD2 / 3.3V	i.MX 8MP	SD2_WP	ALT5	NVCC_SD2
P34	SDIO_CMD	Bi-Dir	-	SD2 / 3.3V	i.MX 8MP	SD2_CMD	ALT5	NVCC_SD2
P35	SDIO_CD#	In/OD	PU-10K	SD2 / 3.3V	i.MX 8MP	SD2_CD	ALT5	NVCC_SD2
P36	SDIO_CK	Out	-	SD2 / 3.3V	i.MX 8MP	SD2_CLK	ALT5	NVCC_SD2
P37	SDIO_PWR_EN	Out	-	GPIO / 3.3V	i.MX 8MP	SD2_RESET	ALT5	NVCC_SD2
P38	GND	-	-	-	-	-	-	-
P39	SDIO_D0	Bi-Dir	-	SD2 / 3.3V	i.MX 8MP	SD2_DATA0	ALT5	NVCC_SD2
P40	SDIO_D1	Bi-Dir	-	SD2 / 3.3V	i.MX 8MP	SD2_DATA1	ALT5	NVCC_SD2
P41	SDIO_D2	Bi-Dir	-	SD2 / 3.3V	i.MX 8MP	SD2_DATA2	ALT5	NVCC_SD2
P42	SDIO_D3	Bi-Dir	-	SD2 / 3.3V	i.MX 8MP	SD2_DATA3	ALT5	NVCC_SD2
P43	SPI0_CS0#	Out	-	SPI / 1.8V	i.MX 8MP	ECSPI1_SS0	ALT5	NVCC_ECSPI_HDMI
P44	SPI0_CK	Out	-	SPI / 1.8V	i.MX 8MP	ECSPI1_SCLK	ALT5	NVCC_ECSPI_HDMI
P45	SPI0_DIN	In	-	SPI / 1.8V	i.MX 8MP	ECSPI1_MISO	ALT5	NVCC_ECSPI_HDMI

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	SMARC Signal Name	Module Direction	Module Termination	Type/Tolerance	Controller	Controller Pin Name	I/O Mux default	Power Rail
P46	SPI0_DO	Out	-	SPI / 1.8V	i.MX 8MP	ECSPI1_MOSI	ALT5	NVCC_ECSPI_HDMI
P47	GND	-	-	-	-	-	-	-
P48	SATA_TX+	-	-	-	N.C.	N.C.	-	-
P49	SATA_TX-	-	-	-	N.C.	N.C.	-	-
P50	GND	-	-	-	-	-	-	-
P51	SATA_RX+	-	-	-	N.C.	N.C.	-	-
P52	SATA_RX-	-	-	-	N.C.	N.C.	-	-
P53	GND	-	-	-	-	-	-	-
P54	ESPI_CS0# / SPI1_CS0#	Out	-	SPI / 1.8V	i.MX 8MP	ECSPI2_SS0	ALT5	NVCC_ECSPI_HDMI
P55	ESPI_CS1# / SPI1_CS1#	-	-	-	N.C.	N.C.	-	-
P56	ESPI_CK / SPI1_CK	Out	-	SPI / 1.8V	i.MX 8MP	ECSPI2_SCLK	ALT5	NVCC_ECSPI_HDMI
P57	ESPI_IO_1 / SPI1_DIN	In	-	SPI / 1.8V	i.MX 8MP	ECSPI2_MISO	ALT5	NVCC_ECSPI_HDMI
P58	ESPI_IO_0 / SPI1_DO	Out	-	SPI / 1.8V	i.MX 8MP	ECSPI2_MOSI	ALT5	NVCC_ECSPI_HDMI
P59	GND	-	-	-	-	-		
P60	USB0+	Bi-Dir	-	USB	i.MX 8MP	USB1_D_P		VDD_USB_3P3
P61	USB0-	Bi-Dir	-	USB	i.MX 8MP	USB1_D_N		VDD_USB_3P3
P62	USB0_EN_OC#	In/Out OD	PU-10K	GPIO / 1.8V	i.MX 8MP	SAI1_TXD6	ALT5	NVCC_SAI1_SAI5
P63	USB0_VBUS_DET	PWR	-	USB	i.MX 8MP	USB1_VBUS	-	VDD_USB_3P3
P64	USB0_OTG_ID	In	-	USB	i.MX 8MP	USB1_ID	-	VDD_USB_3P3
P65	USB1+	Bi-Dir	-	USB	USB Hub (FL5500)	D_DP4	-	VDD_3V3_HUB
P66	USB1-	Bi-Dir	-	USB	USB Hub (FL5500)	D_DM4	-	VDD_3V3_HUB
P67	USB1_EN_OC#	In/Out OD	PU-10K	GPIO / 3.3V	USB Hub (FL5500)	X_GPIO_BUS_4	-	VDD_3V3_HUB

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	SMARC Signal Name	Module Direction	Module Termination	Type/Tolerance	Controller	Controller Pin Name	I/O Mux default	Power Rail
P68	GND	-	-	-	-	-		
P69	USB2+	Bi-Dir	-	USB	USB Hub (FL5500)	D_DP0	-	VDD_3V3_HUB
P70	USB2-	Bi-Dir	-	USB	USB Hub (FL5500)	D_DM0	-	VDD_3V3_HUB
P71	USB2_EN_OC#	In/Out OD	PU-10K	GPIO / 3.3V	USB Hub (FL5500)	X_OVC	-	VDD_3V3_HUB
P72	RSVD	-	-	-	N.C.	N.C.		
P73	RSVD	-	-	-	N.C.	N.C.		
P74	USB3_EN_OC#	In/Out OD	PU-10K	GPIO / 3.3V	USB Hub (FL5500)	X_GPIO_BUS_1	-	VDD_3V3_HUB
P75	PCIE_A_RST#	Out	-	GPIO / 3.3V	PCIe Switch (PI7C9X2G304EV)	DWNRST_1		VDD_3V3
P76	USB4_EN_OC#	In/Out OD	PU-10K	GPIO / 3.3V	USB Hub (FL5500)	X_GPIO_BUS_5	-	VDD_3V3_HUB
P77	PCIE_B_CKREQ#	In/Out OD	PU-10K	GPIO / 3.3V	PCIe Switch (PI7C9X2G304EV)	CLKREQ_1	-	VDD_3V3
P78	PCIE_A_CKREQ#	In/Out OD	PU-10K	GPIO / 3.3V	PCIe Switch (PI7C9X2G304EV)	CLKREQ_2	-	VDD_3V3
P79	GND	-	-	-	-	-	-	-
P80	PCIE_C_REFCK+	Out	-	-	N.C.	N.C.	-	-
P81	PCIE_C_REFCK-	Out	-	-	N.C.	N.C.	-	-
P82	GND	-	-	-	-	-	-	-
P83	PCIE_A_REFCK+	Out	-	PCIe	PCIe Switch (PI7C9X2G304EV)	REFCLKO_P1	-	VDD_3V3
P84	PCIE_A_REFCK-	Out	-	PCIe	PCIe Switch (PI7C9X2G304EV)	REFCLKO_N1	-	VDD_3V3
P85	GND	-	-		-	-	-	-
P86	PCIE_A_RX+	In	-	PCIe	PCIe Switch (PI7C9X2G304EV)	PERP1	-	VDD_3V3
P87	PCIE_A_RX-	In	-	PCIe	PCIe Switch (PI7C9X2G304EV)	PERN1	-	VDD_3V3

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P88	GND	-	-	-	-	-	-	-
P89	PCIE_A_TX+	Out	Serial-0.1uF	PCIe	PCIe Switch (PI7C9X2G304EV)	PETP1	-	VDD_3V3
P90	PCIE_A_TX-	Out	Serial-0.1uF	PCIe	PCIe Switch (PI7C9X2G304EV)	PETN1	-	VDD_3V3

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	SMARC Signal Name	Module Direction	Module Termination	Type/Tolerance	Controller	Controller Pin Name	I/O Mux default	Power Rail
P91	GND	-	-	-	-	-		
P92	HDMI_D2+ / DP1_LANE0+	Out	-	HDMI	i.MX 8MP	HDMI_TX2_P	-	VDD_HDMI_1P8
P93	HDMI_D2- / DP1_LANE0-	Out	-	HDMI	i.MX 8MP	HDMI_TX2_N	-	VDD_HDMI_1P8
P94	GND	-	-	-	-	-	-	-
P95	HDMI_D1+ / DP1_LANE1+	Out	-	HDMI	i.MX 8MP	HDMI_TX1_P		VDD_HDMI_1P8
P96	HDMI_D1- / DP1_LANE1-	Out	-	HDMI	i.MX 8MP	HDMI_TX1_N		VDD_HDMI_1P8
P97	GND	-	-	-	-	-	-	-
P98	HDMI_D0+ / DP1_LANE2+	Out	-	HDMI	i.MX 8MP	HDMI_TX0_P	-	VDD_HDMI_1P8
P99	HDMI_D0- / DP1_LANE2-	Out	-	HDMI	i.MX 8MP	HDMI_TX0_N	-	VDD_HDMI_1P8
P100	GND	-	-	-	-	-	-	-
P101	HDMI_CK+ / DP1_LANE3+	Out	-	HDMI	i.MX 8MP	HDMI_TXC_P	-	VDD_HDMI_1P8
P102	HDMI_CK- / DP1_LANE3-	Out	-	HDMI	i.MX 8MP	HDMI_TXC_N	`	VDD_HDMI_1P8
P103	GND	-	-	-	-	-	-	-
P104	HDMI_HPD / DP1_HPD	In	PD-1M	HDMI	i.MX 8MP	HDMI_HPD	ALT5	NVCC_ECSPI_HDMI
P105	HDMI_CTRL_CK /	Out	PU-100K	HDMI	i.MX 8MP	HDMI_DDC_SCL	ALT5	NVCC_ECSPI_HDMI
	DP1_AUX+							
P106	HDMI_CTRL_DAT /	Bi-Dir	PU-100K	HDMI	i.MX 8MP	HDMI_DDC_SDA	ALT5	NVCC_ECSPI_HDMI
	DP1_AUX-							
P107	DP1_AUX_SEL	-	-	-	-	-	-	-
P108	GPIO0 / CAM0_PWR#	In/Out	PU-470K	GPIO / 1.8V	i.MX 8MP	NAND_DATA00	ALT5	NVCC_NAND

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	SMARC Signal Name	Module Direction	Module Termination	Type/Tolerance	Controller	Controller Pin Name	I/O Mux default	Power Rail
P109	GPIO1 / CAM1_PWR#	In/Out	PU-470K	GPIO / 1.8V	i.MX 8MP	NAND_DATA01	ALT5	NVCC_NAND
P110	GPIO2 / CAM0_RST#	In/Out	PU-470K	GPIO / 1.8V	i.MX 8MP	GPIO1_IO06	ALT0	NVCC_GPIO1
P111	GPIO3 / CAM1_RST#	In/Out	PU-470K	GPIO / 1.8V	i.MX 8MP	GPIO1_IO07	ALT0	NVCC_GPIO1
P112	GPIO4 / HDA_RST#	In/Out	PU-470K	GPIO / 1.8V	GPIO Expander (U2605)	I/O0	-	VDD_1V8
P113	GPIO5 / PWM_OUT	In/Out	PU-470K	GPIO / 1.8V	GPIO Expander (U2605)	I/O1	-	VDD_1V8
P114	GPIO6 / TACHIN	In/Out	PU-470K	GPIO / 1.8V	GPIO Expander (U2605)	I/O2	-	VDD_1V8
P115	GPIO7	In/Out	PU-470K	GPIO / 1.8V	GPIO Expander (U2605)	I/O3	-	VDD_1V8
P116	GPIO8	In/Out	PU-470K	GPIO / 1.8V	GPIO Expander (U2605)	I/O4	-	VDD_1V8
P117	GPIO9	In/Out	PU-470K	GPIO / 1.8V	GPIO Expander (U2605)	I/O5	-	VDD_1V8
P118	GPIO10	In/Out	PU-470K	GPIO / 1.8V	GPIO Expander (U2605)	I/O6	-	VDD_1V8
P119	GPIO11	In/Out	PU-470K	GPIO / 1.8V	GPIO Expander (U2605)	I/O7	-	VDD_1V8
P120	GND	-	-	-	-	-		
P121	I2C_PM_CK	Out	PU-2.2K	I2C / 1.8	i.MX 8MP	I2C1_SCL	ALT5	NVCC_I2C_UART
P122	I2C_PM_DAT	Bi-Dir	PU-2.2K	I2C / 1.8	i.MX 8MP	I2C1_SDA	ALT5	NVCC_I2C_UART
P123	BOOT_SEL0#	In/OD	PU-10k	GPIO / 1.8V	BMC	PB3	-	P_+1V8SMC
P124	BOOT_SEL1#	In/OD	PU-10k	GPIO / 1.8V	BMC	PB5	-	P_+1V8SMC
P125	BOOT_SEL2#	In/OD	PU-10k	GPIO / 1.8V	BMC	PA2	-	P_+1V8SMC
P126	RESET_OUT#	Out	-	GPIO / 1.8V	BMC	PC4	-	P_+1V8SMC
P127	RESET_IN#	In/OD	PU-10K	GPIO / 1.8V	BMC	PC12	-	P_+1V8SMC
P128	POWER_BTN#	In/OD	PU-10K	GPIO / 1.8V	BMC	PA11	-	P_+1V8SMC
P129	SER0_TX	Out	-	UART / 1.8V	i.MX 8MP	UART2_TXD	ALT5	NVCC_I2C_UART

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	SMARC Signal Name	Module Direction	Module Termination	Type/Tolerance	Controller	Controller Pin Name	I/O Mux default	Power Rail
P130	SER0_RX	In	PU-100K	UART / 1.8V	i.MX 8MP	UART2_RXD	ALT5	NVCC_I2C_UART
P131	SER0_RTS#	Out	-	UART / 1.8V	i.MX 8MP	SD1_DATA4	ALT5	NVCC_SD1
P132	SER0_CTS#	In	PU-100K	UART / 1.8V	i.MX 8MP	SD1_DATA5	ALT5	NVCC_SD1
P133	GND	-	-	-	-	-	-	-
P134	SER1_TX	Out	-	UART / 1.8V	i.MX 8MP	NAND_CE0_B	ALT5	NVCC_NAND
P135	SER1_RX	In	PU-100K	UART / 1.8V	i.MX 8MP	NAND_ALE	ALT5	NVCC_NAND
P136	SER2_TX	Out	-	UART / 1.8V	i.MX 8MP	UART4_TXD	ALT5	NVCC_I2C_UART
P137	SER2_RX	In	PU-100K	UART / 1.8V	i.MX 8MP	UART4_RXD	ALT5	NVCC_I2C_UART
P138	SER2_RTS#	Out	-	UART / 1.8V	i.MX 8MP	NAND_DATA03	ALT5	NVCC_NAND
P139	SER2_CTS#	In	PU-100K	UART / 1.8V	i.MX 8MP	NAND_DATA02	ALT5	NVCC_NAND
P140	SER3_TX	Out	-	UART / 1.8V	i.MX 8MP	UART1_TXD	ALT5	NVCC_I2C_UART
P141	SER3_RX	In	PU-100K	UART / 1.8V	i.MX 8MP	UART1_RXD	ALT5	NVCC_I2C_UART
P142	GND	-	-	-	-	-	-	-
P143	CAN0_TX	Out	-	CAN / 1.8V	i.MX 8MP	SPDIF_TX	ALT5	NVCC_SAI2_SAI3_SPDIF
P144	CAN0_RX	In	-	CAN / 1.8V	i.MX 8MP	SPDIF_RX	ALT5	NVCC_SAI2_SAI3_SPDIF
P145	CAN1_TX	Out	-	CAN / 1.8V	i.MX 8MP	SAI5_RXD3	ALT5	NVCC_SAI1_SAI5
P146	CAN1_RX	In	-	CAN / 1.8V	i.MX 8MP	SAI2_MCLK	ALT5	NVCC_SAI2_SAI3_SPDIF
P147	VDD_IN	PWR	-	-	From Carrier board	-	-	4.75 ~ 5.25 V
P148	VDD_IN	PWR	-	-	From Carrier board	-	-	4.75 ~ 5.25 V
P149	VDD_IN	PWR	-	-	From Carrier board	-	-	4.75 ~ 5.25 V
P150	VDD_IN	PWR	-	-	From Carrier board	-	-	4.75 ~ 5.25 V
P151	VDD_IN	PWR	-	-	From Carrier board	-	-	4.75 ~ 5.25 V
P152	VDD_IN	PWR	-	-	From Carrier board	-	-	4.75 ~ 5.25 V
P153	VDD_IN	PWR	-	-	From Carrier board	-	-	4.75 ~ 5.25 V
P154	VDD_IN	PWR	-	-	From Carrier board	-	-	4.75 ~ 5.25 V
P155	VDD_IN	PWR	-	-	From Carrier board	-	-	4.75 ~ 5.25 V
P156	VDD_IN	PWR	-	-	From Carrier board	-	-	4.75 ~ 5.25 V
	SMARC Signal Name	Module Direction	Module Termination	Type/Tolerance	Controller	Controller Pin Name	I/O Mux default	Power Rail

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S1	CSI1_TX+ / I2C_CAM1_CK	In	PU-2.2K	I2C / 1.8	i.MX 8MP	SAI5_RXD0	ALT5	NVCC_SAI1_SAI5
S2	CSI1_TX- / I2C_CAM1_DAT	Bi-Dir	PU-2.2K	I2C / 1.8	i.MX 8MP	SAI5_MCLK	ALT5	NVCC_SAI1_SAI5
S3	GND	-	-	-	-	-	-	-
S4	RSVD	In	-	-	N.C.	N.C.	-	-
S5	CSI0_TX- / I2C_CAM0_CK	Out	PU-2.2K	I2C / 1.8	i.MX 8MP	I2C3_SCL	ALT5	NVCC_I2C_UART
S6	CAM_MCK	Out	-	GPIO / 1.8V	i.MX 8MP	GPIO1_IO15	ALT0	NVCC_GPIO1
S7	CSI0_TX+ / I2C_CAM0_DAT	Bi-Dir	PU-2.2K	I2C / 1.8	i.MX 8MP	I2C3_SDA	ALT5	NVCC_I2C_UART
S8	CSI0_CK+	In	-	MIPI-CSI	i.MX 8MP	MIPI_CSI1_CLK_P	-	VDD_MIPI_1P8
S9	CSI0_CK-	In	-	MIPI-CSI	i.MX 8MP	MIPI_CSI1_CLK_N	-	VDD_MIPI_1P8
S10	GND	-	-	-	-	-	-	-
S11	CSI0_RX0+	In	-	MIPI-CSI	i.MX 8MP	MIPI_CSI1_D0_P	-	VDD_MIPI_1P8
S12	CSI0_RX0-	In	-	MIPI-CSI	i.MX 8MP	MIPI_CSI1_D0_N	-	VDD_MIPI_1P8
S13	GND	-	-	-	-	-	-	-
S14	CSI0_RX1+	In	-	MIPI-CSI	i.MX 8MP	MIPI_CSI1_D1_P	-	VDD_MIPI_1P8
S15	CSI0_RX1-	In	-	MIPI-CSI	i.MX 8MP	MIPI_CSI1_D1_N	-	VDD_MIPI_1P8
S16	GND	-	-	-	-	-	-	-
S17	GBE1_MDI0+	Bi-Dir	-	GBE MDI	DP83867 (U1601)	TD_P_A	-	VDDIO
S18	GBE1_MDI0-	Bi-Dir	-	GBE MDI	DP83867 (U1601)	TD_M_A	-	VDDIO
S19	GBE1_LINK100#	Out	-	GPIO / 3.3V	DP83867 (U1601)	LED_1	-	VDDIO
S20	GBE1_MDI1+	Bi-Dir	-	GBE MDI	DP83867 (U1601)	TD_P_B	-	VDDIO
S21	GBE1_MDI1-	Bi-Dir	-	GBE MDI	DP83867 (U1601)	TD_M_B	-	VDDIO
S22	GBE1_LINK1000#	Out	-	GPIO / 3.3V	DP83867 (U1601)	LED_2	-	VDDIO
	SMARC Signal Name	Module Direction	Module Termination	Type/Tolerance	Controller	Controller Pin Name	I/O Mux default	Power Rail

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S23	GBE1_MDI2+	Bi-Dir	-	GBE MDI	DP83867 (U1601)	TD_P_C	-	VDDIO
S24	GBE1_MDI2-	Bi-Dir	-	GBE MDI	DP83867 (U1601)	TD_M_C	-	VDDIO
S25	GND	-	-	-	-	-	-	-
S26	GBE1_MDI3+	Bi-Dir	-	GBE MDI	DP83867 (U1601)	TD_P_D	-	VDDIO
S27	GBE1_MDI3-	Bi-Dir	-	GBE MDI	DP83867 (U1601)	TD_M_D	-	VDDIO
S28	GBE1_CTREF	PWR	-	-	-	-	-	-
S29	PCIE_D_TX+ / SERDES_1_TX+	-	-	-	N.C.	N.C.	-	-
S30	PCIE_D_TX- / SERDES_1_TX-	-	-	-	N.C.	N.C.	-	-
S31	GBE1_LINK_ACT#	Out	-	GPIO / 3.3V	DP83867 (U1601)	LED_0	-	-
S32	PCIE_D_RX+ / SERDES_1_RX+	-	-	-	N.C.	N.C.	-	-
S33	PCIE_D_RX- / SERDES_1_RX-	-	-	-	N.C.	N.C.	-	-
S34	GND	-	-	-	-	-		
S35	USB4+	Bi-Dir	-	USB	USB Hub (FL5500)	D_DP5	-	-
S36	USB4-	Bi-Dir	-	USB	USB Hub (FL5500)	D_DM5	-	-
S37	USB3_VBUS_DET	-	-	-	N.C.	N.C.	-	-
S38	AUDIO_MCK	Out	-	SAI / 1.8V	i.MX 8MP	SAI3_MCLK	ALT5	NVCC_SAI2_SAI3_SPDIF
S39	I2S0_LRCK	Bi-Dir	-	SAI / 1.8V	i.MX 8MP	SAI3_TXFS	ALT5	NVCC_SAI2_SAI3_SPDIF
S40	I2S0_SDOUT	Out	-	SAI / 1.8V	i.MX 8MP	SAI3_TXD	ALT5	NVCC_SAI2_SAI3_SPDIF
S41	I2S0_SDIN	In	-	SAI / 1.8V	i.MX 8MP	SAI3_RXD	ALT5	NVCC_SAI2_SAI3_SPDIF
S42	I2S0_CK	Bi-Dir	-	SAI / 1.8V	i.MX 8MP	SAI3_TXC	ALT5	NVCC_SAI2_SAI3_SPDIF
S43	ESPI_ALERT0#	-	-	-	N.C.	N.C.	-	-
	SMARC Signal Name	Module Direction	Module Termination	Type/Tolerance	Controller	Controller Pin Name	I/O Mux default	Power Rail

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S44	ESPI_ALERT1#	-	-	-	N.C.	N.C.	-	-
S45	MDIO_CLK	-	-	-	N.C.	N.C.	-	-
S46	MDIO_DAT	-	-	-	N.C.	N.C.	-	-
S47	GND	-	-	-	-	-	-	-
S48	I2C_GP_CK	Out	PU-2.2K	I2C / 1.8	i.MX 8MP	I2C2_SCL	ALT5	NVCC_I2C_UART
S49	I2C_GP_DAT	Bi-Dir	PU-2.2K	I2C / 1.8	i.MX 8MP	I2C2_SDA	ALT5	NVCC_I2C_UART
S50	HDA_SYNC / I2S2_LRCK	-	-	-	N.C.	N.C.	-	-
S51	HDA_SDO / I2S2_SDOUT	-	-	-	N.C.	N.C.	-	-
S52	HDA_SDI / I2S2_SDIN	-	-	-	N.C.	N.C.	-	-
S53	HDA_CK / I2S2_CK	-	-	-	N.C.	N.C.	-	-
S54	SATA_ACT#	-	-	-	N.C.	N.C.	-	-
S55	USB5_EN_OC#	In/Out OD	PU-10K	GPIO / 3.3V	USB Hub (FL5500)	X_GPIO_BUS_2	-	VDD_3V3_HUB
S56	ESPI_IO_2	-	-	-	N.C.	N.C.	-	-
S57	ESPI_IO_3	-	-	-	N.C.	N.C.	-	-
S58	ESPI_RESET#	-	-	-	N.C.	N.C.	-	-
S59	USB5+	Bi-Dir	-	USB	USB Hub (FL5500)	D_DP2	-	VDD_3V3_HUB
S60	USB5-	Bi-Dir	-	USB	USB Hub (FL5500)	D_DM2	-	VDD_3V3_HUB
S61	GND	-	-	-	-	-	-	-
S62	USB3_SSTX+	Out	Serial-0.1uF	USB	USB Hub (FL5500)	D_SSTXP_1_1	-	VDD_3V3_HUB
S63	USB3_SSTX-	Out	Serial-0.1uF	USB	USB Hub (FL5500)	D_SSTXN_1_1	-	VDD_3V3_HUB
S64	GND	-	-	-	-	-	-	-
S65	USB3_SSRX+	In	-	USB	USB Hub (FL5500)	D_SSRXP_1_1	-	VDD_3V3_HUB
S66	USB3_SSRX-	In	-	USB	USB Hub (FL5500)	D_SSRXN_1_1	-	VDD_3V3_HUB
S67	GND	-	-	-	-	-	-	-

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S68	USB3+	Bi-Dir	-	USB	USB Hub (FL5500)	D_DP1	-	VDD_3V3_HUB
	SMARC Signal Name	Module Direction	Module Termination	Type/Tolerance	Controller	Controller Pin Name	I/O Mux default	Power Rail
S69	USB3-	Bi-Dir	-	USB	USB Hub (FL5500)	D_DM1	-	VDD_3V3_HUB
S70	GND	-	-	-	-	-	-	-
S71	USB2_SSTX+	Out	Serial-0.1uF	USB	USB Hub (FL5500)	D_SSTXP_1_0	-	VDD_3V3_HUB
S72	USB2_SSTX-	Out	Serial-0.1uF	USB	USB Hub (FL5500)	D_SSTXN_1_0	-	VDD_3V3_HUB
S73	GND	-	-	-	-	-	-	-
S74	USB2_SSRX+	In	-	USB	USB Hub (FL5500)	D_SSRXP_1_0	-	VDD_3V3_HUB
S75	USB2_SSRX-	In	-	USB	USB Hub (FL5500)	D_SSRXN_1_0	-	VDD_3V3_HUB
S76	PCIE_B_RST#	Out	-	GPIO / 3.3V	PCIe Switch (PI7C9X2G304EV)	DWNRST_2		VDD_3V3
S77	PCIE_C_RST#	-	-	-	N.C.	N.C.	-	-
S78	PCIE_C_RX+ / SERDES_2_RX+	-	-	-	N.C.	N.C.	-	-
S79	PCIE_C_RX- / SERDES_2_RX-	-	-	-	N.C.	N.C.	-	-
S80	GND	-	-	-	-	-	-	-
S81	PCIE_C_TX+ / SERDES_2_TX+	-	-	-	N.C.	N.C.	-	-
S82	PCIE_C_TX- / SERDES_2_TX-	-	-	-	N.C.	N.C.	-	-
S83	GND	-	-	-	-	-	-	-
S84	PCIE_B_REFCK+	Out	-	PCIe	PCIe Switch (PI7C9X2G304EV)	REFCLKO_P2	-	VDD_3V3
S85	PCIE_B_REFCK-	Out	-	PCIe	PCIe Switch (PI7C9X2G304EV)	REFCLKO_N2	-	VDD_3V3
S86	GND	-	-		-	-	-	-

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S87	PCIE_B_RX+	In	-	PCIe	PCIe Switch (PI7C9X2G304EV)	PERP2	-	VDD_3V3
	SMARC Signal Name	Module Direction	Module Termination	Type/Tolerance	Controller	Controller Pin Name	I/O Mux default	Power Rail
S88	PCIE_B_RX-	In	-	PCIe	PCIe Switch (PI7C9X2G304EV)	PERN2	-	VDD_3V3
S89	GND	-	-	-	-	-	-	-
S90	PCIE_B_TX+	Out	Serial-0.1uF	PCIe	PCIe Switch (PI7C9X2G304EV)	PETP2	-	VDD_3V3
S91	PCIE_B_TX-	Out	Serial-0.1uF	PCIe	PCIe Switch (PI7C9X2G304EV)	PETN2	-	VDD_3V3
S92	GND	-	-	-	-	-	-	-
S93	DP0_LANE0+	-	-	-	N.C.	N.C.	-	-
S94	DP0_LANE0-	-	-	-	N.C.	N.C.	-	-
S95	DP0_AUX_SEL	-	-	-	N.C.	N.C.	-	-
S96	DP0_LANE1+	-	-	-	N.C.	N.C.	-	-
S97	DP0_LANE1-	-	-	-	N.C.	N.C.	-	-
S98	DP0_HPD	-	-	-	N.C.	N.C.	-	-
S99	DP0_LANE2+	-	-	-	N.C.	N.C.	-	-
S100	DP0_LANE2-	-	-	-	-	-	-	-
S101	GND	-	-	-	-	-	-	-
S102	DP0_LANE3+	-	-	-	N.C.	N.C.	-	-
S103	DP0_LANE3-	-	-	-	N.C.	N.C.	-	-
S104	USB3_OTG_ID	-	-	-	N.C.	N.C.	-	-
S105	DP0_AUX+	-	-	-	N.C.	N.C.	-	-
S106	DP0_AUX-	-	-	-	N.C.	N.C.	-	-
S107	LCD1_BKLT_EN	Out	PD-10K	GPIO / 1.8V	i.MX 8MP	GPIO1_IO00	ALT0	NVCC_GPIO1
S108	LVDS1_CK+ / eDP1_AUX+ / DSI1_CLK+	Out	-	LVDS	i.MX 8MP	LVDS1_CLK_P	-	VDD_LVDS_1P8
S109	LVDS1_CK- / eDP1_AUX- / DSI1_CLK-	Out	-	LVDS	i.MX 8MP	LVDS1_CLK_N	-	VDD_LVDS_1P8

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S110	GND	-	-	-	-	-	-	-
	SMARC Signal Name	Module Direction	Module Termination	Type/Tolerance	Controller	Controller Pin Name	I/O Mux default	Power Rail
S111	LVDS1_0+ / eDP1_TX0+ / DSI1_D0+	Out	-	LVDS	i.MX 8MP	LVDS1_D0_P	-	VDD_LVDS_1P8
S112	LVDS1_0- / eDP1_TX0- / DSI1_D0-	Out	-	LVDS	i.MX 8MP	LVDS1_D0_N	-	VDD_LVDS_1P8
S113	eDP1_HPD / DSI1_TE	-	-	-	N.C.	N.C.	-	-
S114	LVDS1_1+ / eDP1_TX1+ / DSI1_D1+	Out	-	LVDS	i.MX 8MP	LVDS1_D1_P	-	VDD_LVDS_1P8
S115	LVDS1_1- / eDP1_TX1- / DSI1_D1-	Out	-	LVDS	i.MX 8MP	LVDS1_D1_N	-	VDD_LVDS_1P8
S116	LCD1_VDD_EN	Out		GPIO / 1.8V	i.MX 8MP	GPIO1_IO05	ALT0	NVCC_GPIO1
S117	LVDS1_2+ / eDP1_TX2+ / DSI1_D2+	Out	-	LVDS	i.MX 8MP	LVDS1_D2_P	-	VDD_LVDS_1P8
S118	LVDS1_2- / eDP1_TX2- / DSI1_D2-	Out	-	LVDS	i.MX 8MP	LVDS1_D2_N	-	VDD_LVDS_1P8
S119	GND	-	-	-	-	-	-	-
S120	LVDS1_3+ / eDP1_TX3+ / DSI1_D3+	Out	-	LVDS	i.MX 8MP	LVDS1_D3_P	-	VDD_LVDS_1P8
S121	LVDS1_3- / eDP1_TX3- / DSI1_D3-	Out	-	LVDS	i.MX 8MP	LVDS1_D3_N	-	VDD_LVDS_1P8
S122	LCD1_BKLT_PWM	Out		GPIO / 1.8V	i.MX 8MP	GPIO1_IO01	ALT0	NVCC_GPIO1
S123	GPIO13	In/Out	PU-470K	GPIO / 1.8V	GPIO Expander (U2605)	I/O9	-	VDD_1V8
S124	GND	-	-	-	-	-	-	-

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	SMARC Signal Name	Module Direction	Module Termination	Type/Tolerance	Controller	Controller Pin Name	I/O Mux default	Power Rail
S125	LVDS0_0+ / eDP0_TX0+ / DSI0_D0+	Out	-	DSI/LVDS	i.MX 8MP	MIPI_DSI1_D0_P/ LVDS0_D0_P	-	VDD_MIPI_1P8/ VDD_LVDS_1P8
S126	LVDS0_0- / eDP0_TX0- / DSI0_D0-	Out	-	DSI/LVDS	i.MX 8MP	MIPI_DSI1_D0_N/ LVDS0_D0_N	-	VDD_MIPI_1P8/ VDD_LVDS_1P8
S127	LCD0_BKLT_EN	Out	PD-10K	GPIO / 1.8V	i.MX 8MP	GPIO1_IO10	ALT0	NVCC_GPIO1
S128	LVDS0_1+ / eDP0_TX1+ / DSI0_D1+	Out	-	DSI/LVDS	i.MX 8MP	MIPI_DSI1_D1_P/ LVDS0_D1_P	-	VDD_MIPI_1P8/ VDD_LVDS_1P8
S129	LVDS0_1- / eDP0_TX1- / DSI0_D1-	Out	-	DSI/LVDS	i.MX 8MP	MIPI_DSI1_D1_N/ LVDS0_D1_N	-	VDD_MIPI_1P8/ VDD_LVDS_1P8
S130	GND	-		-	-	-	-	-
S131	LVDS0_2+ / eDP0_TX2+ / DSI0_D2+	Out	-	DSI/LVDS	i.MX 8MP	MIPI_DSI1_D2_P/ LVDS0_D2_P	-	VDD_MIPI_1P8/ VDD_LVDS_1P8
S132	LVDS0_2- / eDP0_TX2- / DSI0_D2-	Out	-	DSI/LVDS	i.MX 8MP	MIPI_DSI1_D2_N/ LVDS0_D2_N	-	VDD_MIPI_1P8/ VDD_LVDS_1P8
S133	LCD0_VDD_EN	Out	-	GPIO / 1.8V	i.MX 8MP	GPIO1_IO13		NVCC_GPIO1
S134	LVDS0_CK+ / eDP0_AUX+ / DSI0_CLK+	Out	-	DSI/LVDS	i.MX 8MP	MIPI_DSI1_CLK_P/ LVDS0_CLK_P	-	VDD_MIPI_1P8/ VDD_LVDS_1P8
S135	LVDS0_CK- / eDP0_AUX- / DSI0_CLK-	Out	-	DSI/LVDS	i.MX 8MP	MIPI_DSI1_CLK_N/ LVDS0_CLK_N	-	VDD_MIPI_1P8/ VDD_LVDS_1P8
S136	GND	-		-	-	-	-	-
S137	LVDS0_3+ / eDP0_TX3+ / DSI0_D3+	Out	-	DSI/LVDS	i.MX 8MP	MIPI_DSI1_D3_P/ LVDS0_D3_P	-	VDD_MIPI_1P8/ VDD_LVDS_1P8
	SMARC Signal Name	Module Direction	Module Termination	Type/Tolerance	Controller	Controller Pin Name	I/O Mux default	Power Rail

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S138	LVDS0_3- / eDP0_TX3- / DSI0_D3-	Out	-	DSI/LVDS	i.MX 8MP	MIPI_DSI1_D3_N/ LVDS0_D3_N	-	VDD_MIPI_1P8/ VDD_LVDS_1P8
S139	I2C_LCD_CK	Out	PU-2.2K	I2C / 1.8	i.MX 8MP	I2C3_SCL	ALT5	NVCC_I2C_UART
S140	I2C_LCD_DAT	Bi-Dir	PU-2.2K	I2C / 1.8	i.MX 8MP	I2C3_SDA	ALT5	NVCC_I2C_UART
S141	LCD0_BKLT_PWM	Out	-	GPIO / 1.8V	i.MX 8MP	GPIO1_IO11	ALT0	NVCC_GPIO1
S142	GPIO12	In/Out	PU-470K	GPIO / 1.8V	GPIO Expander (U2605)	I/O8	-	VDD_1V8
S143	GND	-	-	-	-	-	-	-
S144	eDP0_HPD / DSI0_TE	In	PD-1M	SAI / 1.8V	i.MX 8MP	SAI3_RXC	ALT5	NVCC_SAI2_SAI3_SPDIF
S145	WDT_TIME_OUT#	Out	-	GPIO / 1.8V	BMC	PC7	-	P_+1V8SMC
S146	PCIE_WAKE#	In/OD	PU-10K	GPIO / 1.8V	i.MX 8MP	I2C4_SDA	ALT5	NVCC_I2C_UART
S147	VDD_RTC	PWR	-	PWR	-	-	-	-
S148	LID#	In/OD	PU-10K	SAI / 1.8V	i.MX 8MP	SPDIF_EXT_CLK	ALT5	NVCC_SAI2_SAI3_SPDIF
S149	SLEEP#	In/OD	PU-10K	GPIO / 1.8V	GPIO Expander (U2606)	I/O0	-	VDD_1V8
S150	VIN_PWR_BAD#	In/OD	PU-10K	PWR	Buck IC (TPS74801DRCR_TI)	EN		VIN_SHUNT
S151	CHARGING#	In/OD	PU-10K	GPIO / 1.8V	GPIO Expander (U2606)	I/O1	-	VDD_1V8
S152	CHARGER_PRSNT#	In/OD	PU-10K	GPIO / 1.8V	GPIO Expander (U2606)	I/O2	-	VDD_1V8
S153	CARRIER_STBY#	Out	-	GPIO / 1.8V	BMC	PB1	-	P_+1V8SMC
S154	CARRIER_PWR_ON	Out	-	GPIO / 1.8V	BMC	PB6	-	P_+1V8SMC
S155	FORCE_RECOV#	In	PU-10K	GPIO / 1.8V	BMC	PA8	-	P_+1V8SMC
S156	BATLOW#	In	PU-10K	GPIO / 1.8V	GPIO Expander (U2606)	I/O3	-	VDD_1V8
S157	TEST#	In	PU-vendor specific value	GPIO / 1.8V	GPIO Expander (U2606)	I/O13	-	VDD_1V8
S158	GND	-	-	-	-	-	-	-

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5. Software Support

5.1 Uboot / Yocto

Yocto source code and compiling instructions available at https://github.com/adlink

5.2 Ubuntu

Build instructions and source code available at https://github.com/adlink

5.3 Android

Android source code and compiling instructions available at https://github.com/adlink

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6. Mechanical

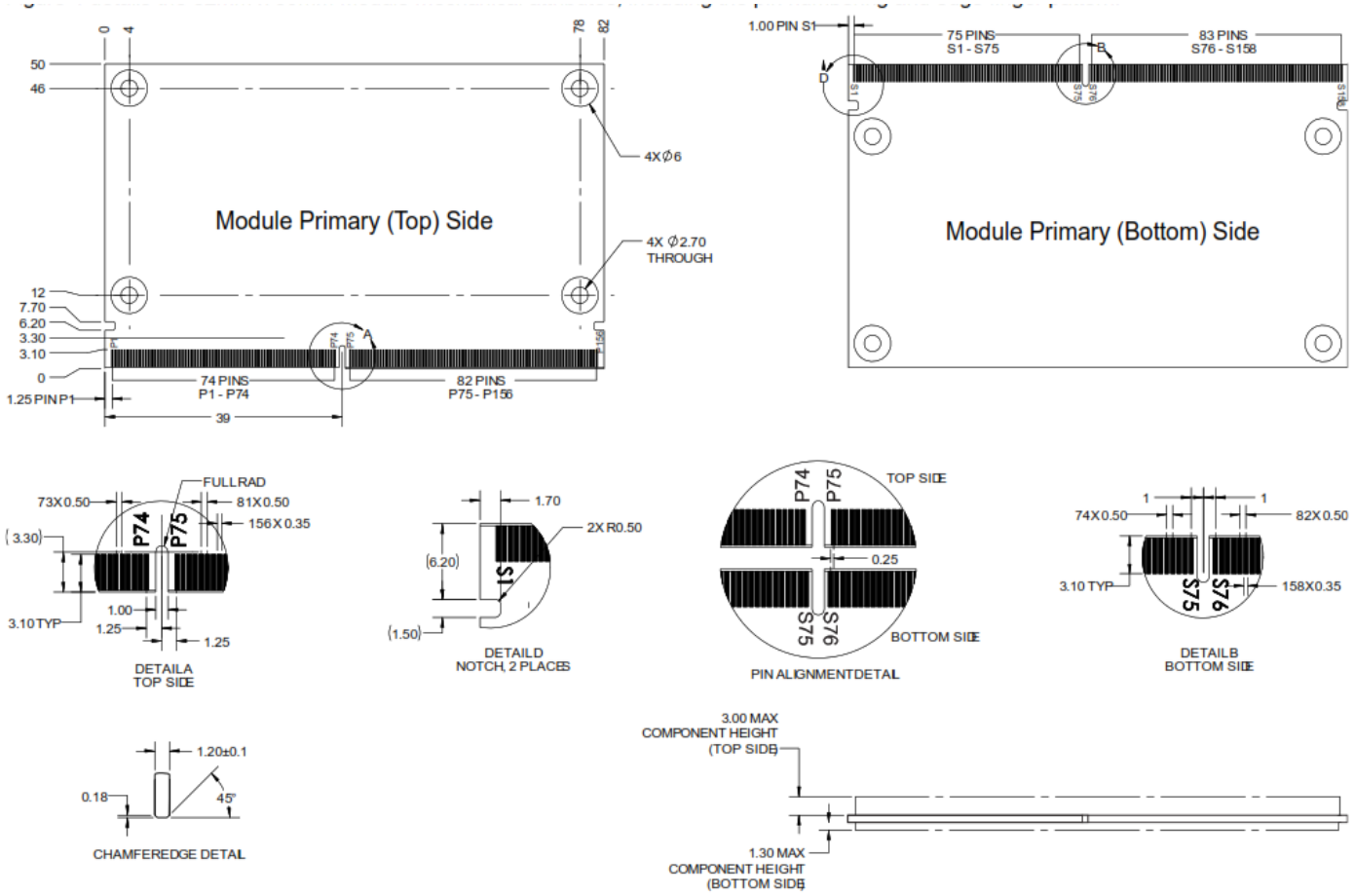
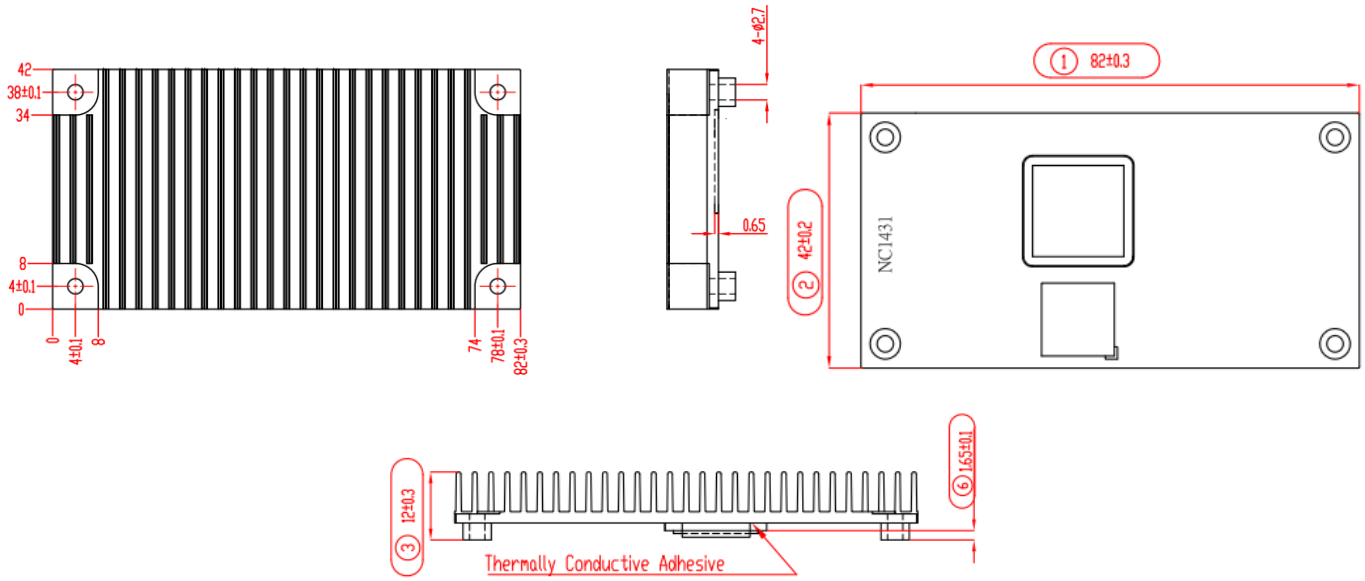


Figure 3 – Mechanical dimensions

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7. Thermal Solutions

For optimal performance, LEC-IMX8M Plus has to be cooled by a passive heatsink / heat-spreader (optionally available for ordering)



HTS-sIMX8MP	Heatspreader for LEC-iMX8MP
THS-sIMX8MP	Low profile heatsink for LEC-iMX8MP

Figure 4 – Thermal solutions

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