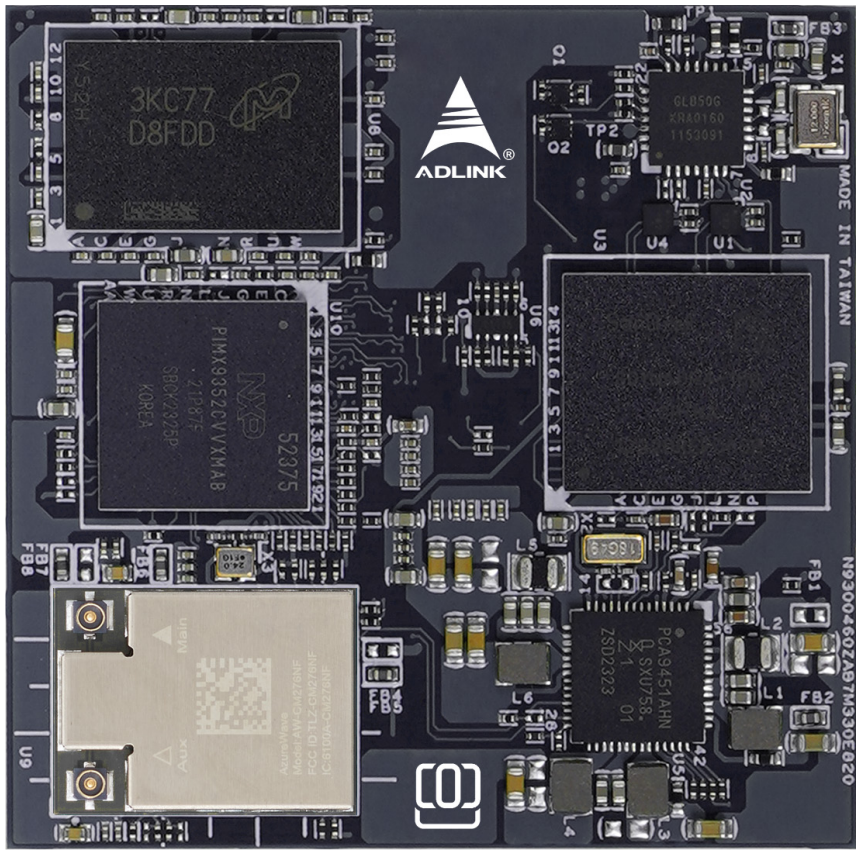
OSM-IMX93

User's Guide



OPEN STANDARD MODULE ™

Revision:	Rev. 1.1
Date:	2025-11-06
Part Number:	50M-76102-1010

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Revision History

Revision	Description	Date	Author
1.0	Initial release	2025-08-14	AL
1.1	Specifications, block diagram, and pinouts and signal descriptions updated	2025-11-06	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.

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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. The OSM Form Factor

The OSM ("Open Standard Module") Open Standard Module™ specification facilitates the development, production, and distribution of embedded modules tailored for renowned MCU32, ARM, and x86 architectures. This standard is increasingly relevant for IoT applications, as it merges the benefits of modular embedded computing with the growing demands for cost efficiency, compactness, and versatile interfaces.

The modules serve as building blocks for portable and stationary embedded systems. They integrate the core CPU and support circuits, including DRAM, boot flash, power sequencing, and CPU power supplies. The modules are used with application-specific carrier boards to implement features such as audio CODECs, touch controllers, wireless devices, PHY, and more. The modular design not only promotes scalability and fast time to market but also ensures upgradability, all while maintaining low costs, low power consumption, and a compact physical size.



OSM module and carrier specifications are available online at: https://sget.org/standards/osm/

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1.2. Latest OSM SGET Documents to be Used

OSM 1.0 / 1.1

Note: This module is compliant with 1.1 specs

1.3. Module Feature List

Memory: LPDDR4 0.5 to 2GB

eMMC: BGA 32 to 128 GB

WIFI / BT: Industry-standard M.2 1216 footprint available; **connected via SDIO** interface

GPIOs: 14x available GPIOs

LAN: Dual RGMII interfaces

POWER: NXP PMIC solution

Graphics: Connects DSI and LVDS to the carrier

USB: Provides OTG straight from SoC; includes a 2nd USB straight from SOC

AUDIO: I^2S to the carrier

CAN: Supports 2x CAN FD direct from SOC

BOOT SELECT: Booting from SD-card and eMMC is supported

SECURITY: Features built in HAB

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2. Specifications

2.1. Core System

CPU

2x ARM Cortex-A55 @1.7 GHz | 1x Cortex M33 @250Mhz | Arm® Ethos™ U-65 microNPU
ARM Cortex-A55 MP Core processors are high-performance and optimized for low power consumption.

Memory

0.5 up to 2GB LPDDR4-solder down memory

L2 Cache

64KB system L2 cache per core

Security

Arm® TrustZone® EdgeLock® secure enclave

2.2. Video

2.2.1 GPU

GPU Core

No discrete GPU in the i.MX93 parts

Graphics Feature Support

1x 1080p60 MIPI-DSI (4-lane, 1.5Gbps/lane) with PHY
1x 720p60 LVDS (4-lane)

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2.2.2 Display Interface Support

MIPI DSI

1x MIPI DSI 4 lane compliant to MIPI-DSI standard v1.2

Maximum resolution 1080p60 with 24-bit RGB

LVDS

4 channel LVDS port resolutions up to 720p60

HDMI

Not available

2.3. Camera

One 2-lane MIPI CSI2 camera input

2.4. Audio

I^2S to carrier

2.5. Dual Wired Ethernet

Primary LAN

RGMII 10/100/1000 Ethernet interface

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

Secondary LAN

RGMii10/100/1000 Ethernet interface

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

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2.6. Wi-Fi/Bluetooth

Optional M.2 12-16 industry-standard footprint, supporting solder down modules for SDIO/UART.

2.7. Expansion Buses

USB
3x USB 2.0, 1x USB 2.0 OTG (Optional USB hub available)

UART
4x UART interfaces (UART A/B has TX/RX/CTS/RTS; C has TX/RX; plus 1x console)

CAN bus
2x CAN: Supports CAN FD mode with a data bit rate up to 8 Mbps

SPI
2x SPI

I²S
1x I²S interface with audio resolution from 16-bits to 32-bits and sample rate up to 192KHz (see Audio Codec support)

I²C
2x I²C interfaces

- Supports for 7-bit mode

- Software programmable clock frequency of 100 kbit/s in Standard-mode, 400 kbit/s in Fast-mode or 1 Mbit/s in Fast-mode Plus

GPIO
14x GPIO with interrupt

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2.8. System Storage

SDIO

1x SDIO (4-bit) compatible with SD3.0 to carrier

eMMC

32 GB, 64 GB, 128 GB (build option)

Compatible with eMMC specifications 5.0 and 5.1

2.9. FAN Control

None, only passive cooling is needed.

2.10. Power

Power Modes

ON / OFF / SUSPEND

Power on / off behavior same as x86 AT (always boot)

Voltage Input

5.0V +/- 5%

Operating Temperatures (vs power input)

Standard Operating Temperature:	0 to 60°C	Commercial grade BOM (memory, eMMC, SOC)
Extreme Rugged Operating Temperature:	-40 to +85°C	Industrial grade BOM (memory, eMMC, SOC)

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2.11. Mechanical and Environmental

Environmental Humidity

- 5-90% RH operating, non-condensing
- 5-95% RH storage (and operating with conformal coating)

EMI

EN55022 Class B inside an enclosure

Shock and Vibration

HALT Testing, including test report confirming the extended operating temperature range during and after vibration. A separate shock test report in accordance with MIL-STD-202F, Method 213B, Table 213-I, Condition A.

IN ADDITION: When installed on a baseboard, the device shall operate under 18 sawtooth mechanical shocks
(3 shocks in each direction) with a peak acceleration of 40g for a duration of 18 ms each, and 75g for a duration of 6 ms each.

Capable of supporting random vibration: MIL-STD-202F, Method 214A, Table 214-I, Condition D. If HALT testing shows equal or better performance, a separate vibration test report is not necessary.

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3. Block Diagram

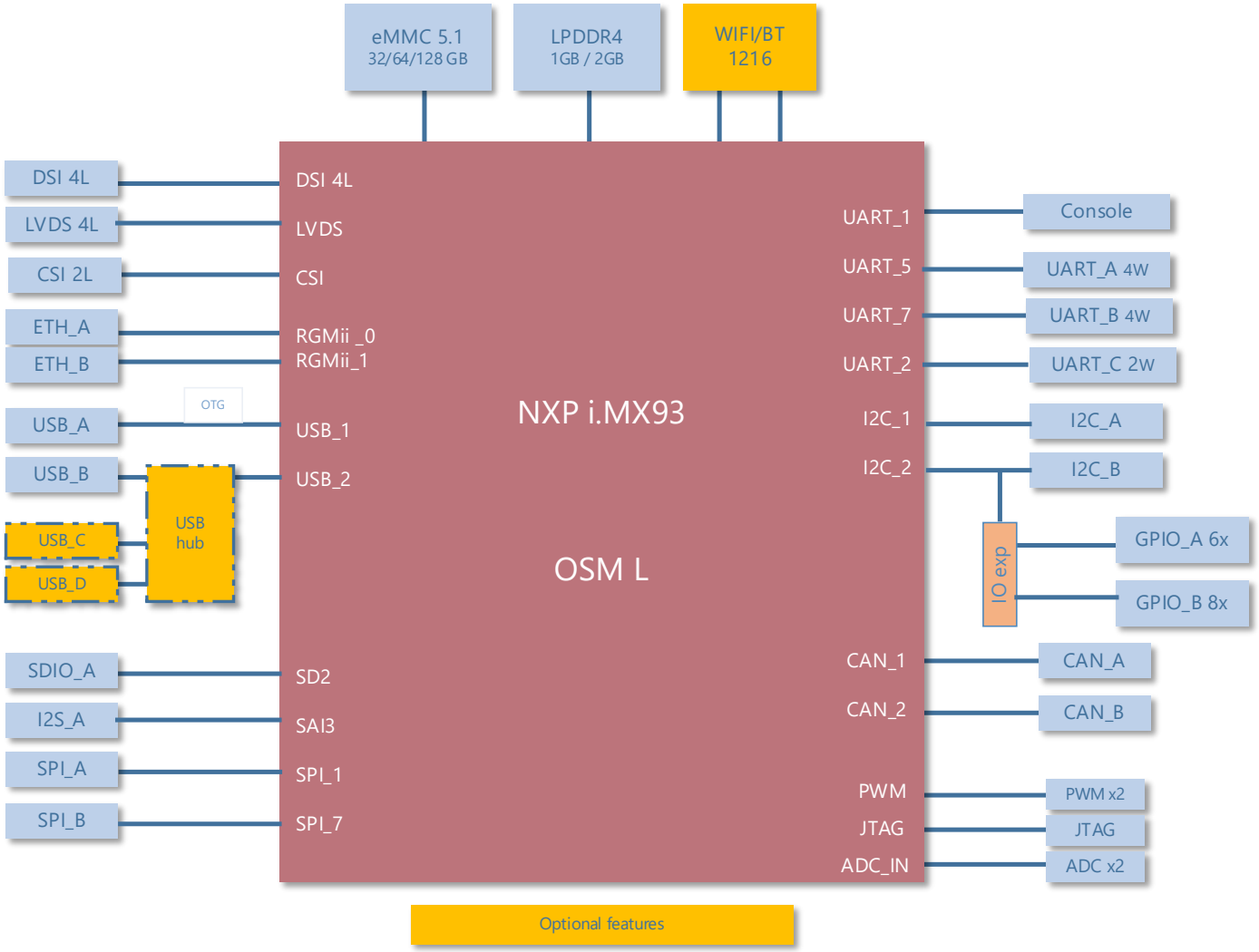


Figure 1 – Module function diagram

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4. Pinout and Signal Descriptions

4.1. Pin Summary

- Size-0 – "Zero": 30 mm x 15 mm
- Size-S – "Small": 30 mm x 30 mm
- Size-M – "Medium": 30 mm x 45 mm
- Size-L – "Large": 45 mm x 45 mm

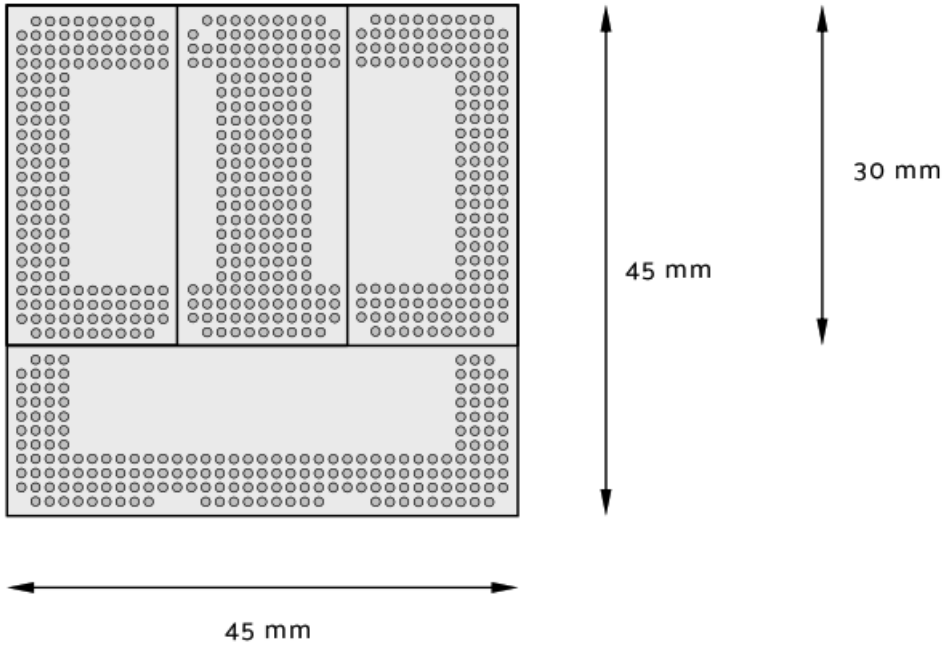


Figure 2 – Module size grid

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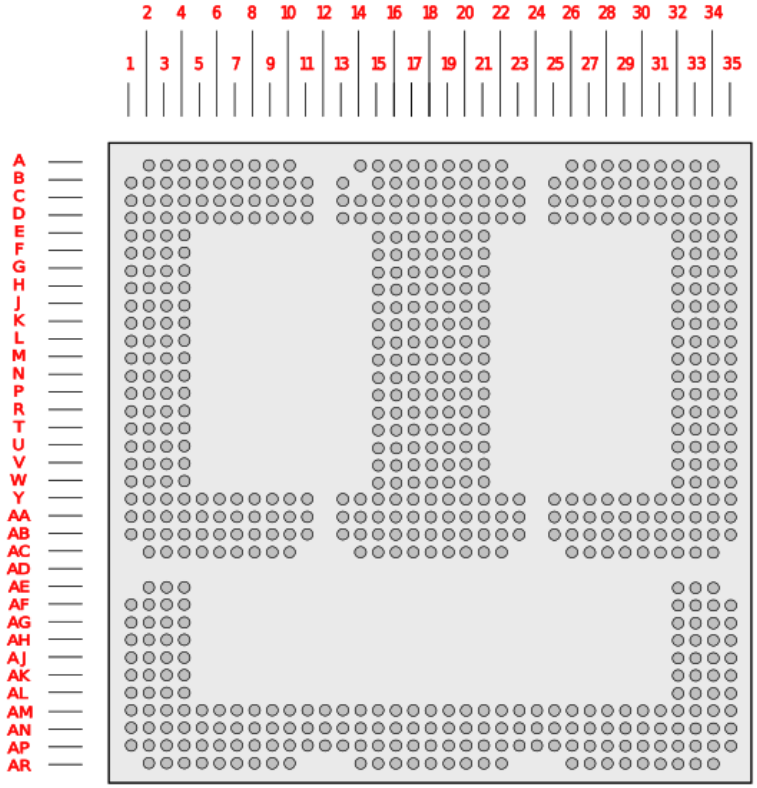


Figure 3 – Module pinout grid

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4.2. Signal Terminology Descriptions

The following information provides descriptions of the terms used in the signal description table:

Term	Description
I	Input to the Module
O	Output from the Module
I/O	Bi-directional input/output
OD	Open drain
PU	PU (pull-up) resistor
PD	PD (pull-down) resistor
CMOS	Logic input or output
GBE MDI	Differential analogue signaling for gigabit media dependent interface
DP	Low voltage differential signal for DisplayPort interface
D-PHY	Low voltage differential signal for MIPI CSI-2 cameras and DSI displays
M-PHY	Low voltage differential signal for MIPI CSI-3 cameras
LVDS	Low voltage differential signal for LCD displays
PCIE	Low voltage differential signal for PCIe
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
VDD_IN	Main power source from Carrier to Module
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 standby power domain: Active while CARRIER_PWRON is high (regardless of CARRIER_SBY#)
1.8Vsb	1.8V standby power domain: Active while CARRIER_PWRON is high (regardless of CARRIER_SBY#)
Sleep	Module is in its lowest power state
Runtime	Module is full on. CARRIER_PWRON is high and CARRIER_SBY# is NOT active (i.e., both signals are high)
Standby	Module is in standby state or higher

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4.3. Signal Description by Function

4.3.1 LVDS Display Interface

For information on LVDS support for a single channel with 4 lanes, please refer to the details below:

Contact Name	Contact Acronym	Functional Description	I/O Type	I/O Level	PU / PD	Comments
LVDS_I2C_CLK	AM11	DDC clock line used for flat panel detection and control	O OD CMOS	1.8V	PU 2k2	
LVDS_I2C_DAT	AM12	DDC data line used for flat panel detection and control	I/O OD CMOS	1.8V	PU 2k2	
LVDS_VDD_EN	AN14	LVDS channel power enable, active high	O CMOS	1.8V		
LVDS_BL_PWM	AN22	LVDS channel brightness control through pulse width modulation	O CMOS	1.8V		
LVDS_BL_EN	AN23	LVDS channel backlight enable, active high	O CMOS	1.8V		
LVDS_A_CLK_P	AN13	LVDS channel A differential pair clock lines	O LVDS LCD			
LVDS_A_CLK_N	AN12	LVDS channel A differential pair clock lines	O LVDS LCD			
LVDS_A_LANE0_P	AP18	LVDS channel A differential pair data lines	O LVDS LCD			
LVDS_A_LANE0_N	AP17	LVDS channel A differential pair data lines	O LVDS LCD			
LVDS_A_LANE1_P	AR16	LVDS channel A differential pair data lines	O LVDS LCD			
LVDS_A_LANE1_N	AR15	LVDS channel A differential pair data lines	O LVDS LCD			
LVDS_A_LANE2_P	AP15	LVDS channel A differential pair data lines	O LVDS LCD			
LVDS_A_LANE2_N	AP14	LVDS channel A differential pair data lines	O LVDS LCD			
LVDS_A_LANE3_P	AP12	LVDS channel A differential pair data lines	O LVDS LCD			
LVDS_A_LANE3_N	AP11	LVDS channel A differential pair data lines	O LVDS LCD			

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4.3.1.1. DSI0 Mode

Contact Name	Contact Acronym	Functional Description	I/O Type	I/O Level	PU / PD	Comments
DSI_DATA0_N	AB11	DSI differential output (point to point)	O LVDS D-PHY			
DSI_DATA0_P	AB10	DSI differential output (point to point)	O LVDS D-PHY			
DSI_DATA1_N	AC9	DSI differential output (point to point)	O LVDS D-PHY			
DSI_DATA1_P	AC8	DSI differential output (point to point)	O LVDS D-PHY			
DSI_DATA2_N	AC6	DSI differential output (point to point)	O LVDS D-PHY			
DSI_DATA2_P	AC5	DSI differential output (point to point)	O LVDS D-PHY			
DSI_DATA3_N	AB5	DSI differential output (point to point)	O LVDS D-PHY			
DSI_DATA3_P	AB4	DSI differential output (point to point)	O LVDS D-PHY			
DSI_CLOCK_N	AB8	DSI differential clock output (point to point)	O LVDS D-PHY			
DSI_CLOCK_P	AB7	DSI differential clock output (point to point)	O LVDS D-PHY			
~~DSI_TE~~	~~AA3~~	~~DSI panel tearing effect signal~~	~~I CMOS~~	~~1.8V~~	-	
DISP_VDD_EN / GPIO_C_4	F3	Primary Display power enable, active high	O CMOS	1.8V		
DISP_BL_EN / GPIO_C_5	F4	Primary Display backlight enable, active high	O CMOS	1.8V		
DISP_BL_PWM / PWM_0	E18	Primary Display brightness control through pulse width modulation	O CMOS	1.8V		

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4.3.1.2. eDP0 / eDP1 Mode

NA

4.3.1.3. HDMI Mode

NA

4.3.1.4. DP++ Mode

NA

4.3.2 MIPI Camera Support

4.3.2.1. CSI (2 Lanes)

Contact Name	Contact Acronym	Functional Description	I/O Type	I/O Level	PU / PD	Comments
CSI_DATA0_N	C1	CSI differential input (point to point)	I LVDS D-PHY/ I LVDS M-PHY			
CSI_DATA0_P	B1	CSI differential input (point to point)	I LVDS D-PHY / I LVDS M-PHY			
CSI_DATA1_N	A2	CSI differential input (point to point)	I LVDS D-PHY / I LVDS M-PHY			
CSI_DATA1_P	A3	CSI differential input (point to point)	I LVDS D-PHY / I LVDS M-PHY			
~~CSI_DATA2_N~~	~~A5~~	~~CSI differential input (point to point)~~	~~I LVDS D-PHY / I LVDS M-PHY~~			
~~CSI_DATA2_P~~	~~A6~~	~~CSI differential input (point to point)~~	~~I LVDS D-PHY / I LVDS M-PHY~~			

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~~CSI_DATA3_N~~	~~B6~~	~~CSI differential input (point to point)~~	~~I LVDS D-PHY / I LVDS M-PHY~~			
~~CSI_DATA3_P~~	~~B7~~	~~CSI differential input (point to point)~~	~~I LVDS D-PHY / I LVDS M-PHY~~			
CSI_CLOCK_N	B3	CSI differential clock input (point to point)	I LVDS D-PHY			
CSI_CLOCK_P	B4	CSI differential clock input (point to point)	I LVDS D-PHY			
CAM_MCK	C2	Master clock output	O CMOS	1.8V		
I2C_CAM_SDA / CSI_TX_N	C3	I2C data for serial camera data support link or differential data lane	I/O OD CMOS / O LVDS M- PHY	1.8V	PU 2.2K	MIPI-CSI 2.0 mode uses I2C_CAM_SDA MIPI-CSI 3.0 mode uses CSI_TX_N
I2C_CAM_SCL / CSI_TX_P	C4	I2C clock for serial camera data support link or differential data lane	I/O OD CMOS / O LVDS M-PHY	1.8V	PU 2.2K	MIPI-CSI 2.0 mode uses I2C_CAM_SCL MIPI-CSI 3.0 mode uses CSI_TX_P
CAM_PWR / GPIO_C_6	G3	Camera 0 Power Enable, active high output.	O CMOS	1.8V		
CAM_RST# / GPIO_C_7	G4	Camera 0 reset, active low output	O CMOS	1.8V		

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4.3.3 Audio Interfaces

4.3.3.1. I²S0

Contact Name	Contact Acronym	Functional Description	I/O Type	I/O Level (Size-0 only, optional)	I/O Level (>Size-0)	PU / PD	Comments
I²S_A_DATA_IN	V21	I²S A Digital audio Input	I/O CMOS	VCC_OUT_IO	1.8V		
I²S_A_DATA_OUT	W21	I²S A Digital audio Output	I/O CMOS	VCC_OUT_IO	1.8V		
~~I²S_B_DATA_IN~~	~~V19~~	~~I²S B Digital audio Input~~	~~I/O CMOS~~	~~VCC_OUT_IO~~	~~1.8V~~	-	-
~~I²S_B_DATA_OUT~~	~~W19~~	~~I²S B Digital audio Output~~	~~I/O CMOS~~	~~VCC_OUT_IO~~	~~1.8V~~	-	-
I²S_MCLK	V18	Master clock output to I²S codec(s)	I/O CMOS	VCC_OUT_IO	1.8V		
I²S_LRCLK	W18	I²S Left & Right synchronization clock	I/O CMOS	VCC_OUT_IO	1.8V		Module Output if CPU acts in Master Mode; Module Input if CPU acts in Slave Mode
I²S_BITCLK	W20	I²S Digital audio clock	I/O CMOS	VCC_OUT_IO	1.8V		Module Output if CPU acts in Master Mode; Module Input if CPU acts in Slave Mode

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4.3.4 USB Ports

Contact Name	Contact Acronym	Functional Description	I/O Type	I/O Level	PU / PD	Comments
USB_A_D_N	AB13	USB differential data pairs for port A	I/O USB	USB		
USB_A_D_P	AC14	USB differential data pairs for port A	I/O USB	USB		
USB_A_ID	AB14	Input Contact to announce OTG device insertion on USB 2.0 port	I OD CMOS	1.8V	PU 10k	
~~USB_A_OC#~~	~~AC15~~	~~USB over-current for port A~~	~~I OD CMOS~~	~~1.8V~~	~~PU 10k~~	-
USB_A_VBUS	AB16	USB port 0 port power detection	I USB VBUS 5V	USB VBUS 5V		
USB_A_EN	AC16	Power (enabled) for USB VBUS voltage	O CMOS	1.8V		
USB_B_D_N	AB23	USB differential data pairs for port B	I/O USB	USB		
USB_B_D_P	AC22	USB differential data pairs for port B	I/O USB	USB		
~~USB_B_ID~~	~~AB22~~	~~Input Contact to announce OTG device insertion on USB 2.0 port~~	~~I OD CMOS~~	~~1.8V~~	~~PU 10k~~	-
USB_B_OC#	AC21	USB over-current for port B	I OD CMOS	1.8V	PU 10k	
~~USB_B_VBUS~~	~~AB20~~	~~USB port 0 port power detection~~	~~I USB VBUS 5V~~	~~USB VBUS 5V~~	-	-
USB_B_EN	AC20	Power (enabled) for USB VBUS voltage	O CMOS	1.8V		

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4.3.5 Optional USB Ports (Active Only with Onboard USB Hub)

Contact Name	Contact Acronym	Functional Description	I/O Type	I/O Level	PU / PD	Comments
USB_C_D_N	D11	USB differential data pairs for port C	I/O USB	USB		
USB_C_D_P	D10	USB differential data pairs for port C	I/O USB	USB		
USB_C_OC#	C8	USB over-current for port C	I OD CMOS	1.8V	PU 10k	
USB_C_EN	C10	Enables power to USB VBUS voltage line	O CMOS	1.8V		
USB_D_D_N	D26	USB differential data pairs for port D	I/O USB	USB		
USB_D_D_P	D25	USB differential data pairs for port D	I/O USB	USB		
USB_D_OC#	C28	USB over-current for port D	I OD CMOS	1.8V	PU 10k	
USB_D_EN	C26	Enables power to USB VBUS voltage line	O CMOS	1.8V		

4.3.6 PCIe

NA

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4.3.7 Dual LAN Ports

4.3.7.1. GBE0 (RGMII)

Contact Name	Contact Acronym	Functional Description	I/O Type	I/O Level	PU / PD	Comments
~~ETH_A_(R)(G)MII_CRS~~	~~E16~~	~~Carrier Sense port A~~	~~I CMOS~~	~~1.8V~~	-	-
~~ETH_A_(R)(G)MII_COL~~	~~F15~~	~~Collision detects (half speed only) port A~~	~~I CMOS~~	~~1.8V~~	-	-
ETH_A_(S)(R)(G)MII_TXD0	H15	Transmit data bit 0 (transmitted first) port A	O CMOS	1.8V		_P when used as differential
ETH_A_(S)(R)(G)MII_TXD1	G15	Transmit data bit 1 port A	O CMOS	1.8V		_N when used as differential
ETH_A_(S)(R)(G)MII_TXD2	H16	Transmit data bit 2 port A	O CMOS	1.8V		_P when used as differential
ETH_A_(S)(R)(G)MII_TXD3	G16	Transmit data bit 3 port A	O CMOS	1.8V		_N when used as differential
ETH_A_(R)(G)MII_TX_EN(_ER)	K16	Transmit enable (Error) port A	O CMOS	1.8V		
ETH_A_(R)(G)MII_TX_CLK	J15	Transmit clock port A	I/O CMOS	1.8V		
ETH_A_(S)(R)(G)MII_RXD0	K15	Receive data bit 0 (received first) port A	I CMOS	1.8V		_P when used as differential
ETH_A_(S)(R)(G)MII_RXD1	L15	Receive data bit 1 port A	I CMOS	1.8V		_N when used as differential
ETH_A_(R)(G)MII_RXD2	N15	Receive data bit 2 port A	I CMOS	1.8V		
ETH_A_(R)(G)MII_RXD3	P15	Receive data bit 3 port A	I CMOS	1.8V		
~~ETH_A_(R)(G)MII_RX_ER~~	~~L16~~	~~Receive error port A~~	~~I CMOS~~	~~1.8V~~	-	-
ETH_A_(R)(G)MII_RX_DV(_ER)	M15	Receive data valid port A	I CMOS	1.8V		
ETH_A_(R)(G)MII_RX_CLK	R15	Receive clock port A	I/O CMOS	1.8V		
~~ETH_A_SDP~~	~~N16~~	~~Ethernet port A System Defined Contact~~	~~O CMOS~~	~~1.8V~~	-	-
ETH_MDIO	T15	Management bus data signal for Ethernet	I/O CMOS	1.8V		Can be used for all ETH ports or for A exclusively
ETH_MDC	T16	Management bus clock signal for Ethernet	O CMOS	1.8V		Can be used for all ETH ports or for A exclusively
ETH_IOPWR	M17	ETH voltage is used to provide the IO voltage level for all Ethernet interfaces.	P	1.8V		Minimum current: 100mA

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4.3.7.2. GBE1 (RGMII)

Contact Name	Contact Acronym	Functional Description	I/O Type	I/O Level	PU / PD	Comments
~~ETH_B_(R)(G)MII_CRS~~	~~D2~~	~~Carrier Sense port B~~	~~I CMOS~~	~~1.8V~~	-	-
~~ETH_B_(R)(G)MII_COL~~	~~E1~~	~~Collision detects (half speed only) port B~~	~~I CMOS~~	~~1.8V~~	-	-
ETH_B_(S)(R)(G)MII_TXD0	G1	Transmit data bit 0 (transmitted first) port B	O CMOS	1.8V		_P when used as differential
ETH_B_(S)(R)(G)MII_TXD1	F1	Transmit data bit 1 port B	O CMOS	1.8V		_N when used as differential
ETH_B_(S)(R)(G)MII_TXD2	G2	Transmit data bit 2 port B	O CMOS	1.8V		_P when used as differential
ETH_B_(S)(R)(G)MII_TXD3	F2	Transmit data bit 3 port B	O CMOS	1.8V		_N when used as differential
ETH_B_(R)(G)MII_TX_EN(_ER)	J2	Transmit enable (Error) port B	O CMOS	1.8V		
ETH_B_(R)(G)MII_TX_CLK	H1	Transmit clock port B	I/O CMOS	1.8V		
ETH_B_(S)(R)(G)MII_RXD0	J1	Receive data bit 0 (received first) port B	I CMOS	1.8V		_P when used as differential
ETH_B_(S)(R)(G)MII_RXD1	K1	Receive data bit 1 port B	I CMOS	1.8V		_N when used as differential
ETH_B_(R)(G)MII_RXD2	M1	Receive data bit 2 port B	I CMOS	1.8V		
ETH_B_(R)(G)MII_RXD3	N1	Receive data bit 3 port B	I CMOS	1.8V		
~~ETH_B_(R)(G)MII_RX_ER~~	~~K2~~	~~Receive error port B~~	~~I CMOS~~	~~1.8V~~	-	-
ETH_B_(R)(G)MII_RX_DV(_ER)	L1	Receive data valid (Error) port B	I CMOS	1.8V		
ETH_B_(R)(G)MII_RX_CLK	P1	Receive clock port B	I/O CMOS	1.8V		
~~ETH_B_SDP~~	~~M2~~	~~Ethernet port B System Defined Contact~~	~~O CMOS~~	~~1.8V~~	-	
ETH_B_MDIO	C7	Management bus data signal for Ethernet B	I/O CMOS	1.8V		Optional use
ETH_B_MDC	C6	Management bus clock signal for Ethernet B	O CMOS	1.8V		Optional use

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4.3.8 SDIO Card (4-Bit)

The carrier SDIO card ***can*** be selected as the boot device.

Contact Name	Contact Acronym	Functional Description	I/O Type	I/O Level	PU / PD	Comments
SDIO_A_CMD	E20	SDIO A 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		
SDIO_A_CLK	F21	SDIO A Clock: With each cycle of this signal, a one-bit transfer occurs on the command and each data line.	O CMOS	1.8V or 3.3V		
SDIO_A_D0	G20	SDIO A Data lines: These signals operate in push-pull mode.	I/O CMOS	1.8V or 3.3V		
SDIO_A_D1	G21	SDIO A Data lines: These signals operate in push-pull mode.	I/O CMOS	1.8V or 3.3V		
SDIO_A_D2	H20	SDIO A Data lines: These signals operate in push-pull mode.	I/O CMOS	1.8V or 3.3V		
SDIO_A_D3	H21	SDIO A Data lines: These signals operate in push-pull mode.	I/O CMOS	1.8V or 3.3V		
SDIO_A_CD#	J21	SDIO A Card Detect: This signal indicates when a SDIO/MMC card is present.	I OD CMOS	1.8V or 3.3V	PU 10k	

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~~SDIO_A_WP~~	~~D20~~	~~SDIO A Write Protect: This signal denotes the state of the write- protect tab on SD cards.~~	~~I OD CMOS~~	~~1.8V or 3.3V~~	~~PU 10k~~	~~Tie to GND on carrier, if not used~~
SDIO_A_PWR_EN	D21	SDIO A Power Enable: This signal is used to enable the power being supplied to a SD/MMC card device.	O CMOS	1.8V or 3.3V		
~~SDIO_A_IOPWR~~	~~C20~~	~~DIO A Voltage:. It is used to provide the IO Voltage Level~~	~~P~~	~~1.8V or 3.3V~~	-	~~Minimum current: 100mA~~

4.3.9 SPI Interfaces

4.3.9.1. SPI A/B

Contact Name	Contact Acronym	Functional Description	I/O Type	I/O Level (>Size-0)	PU / PD	Comments
SPI_A_SDI_(IO0)	U15	SPI A Serial Data Input	IO CMOS	1.8V		Alternate use: Quad SPI IO0
SPI_A_SDO_(IO1)	V15	SPI A Serial Data Output	IO CMOS	1.8V		Alternate use: Quad SPI IO1
~~SPI_A_/WP_(IO2)~~	~~W16~~	~~SPI A Write Protect~~	~~IO CMOS~~	~~1.8V~~	-	~~Alternate use: Quad SPI IO2~~
~~SPI_A_/HOLD_(IO3)~~	~~W15~~	~~SPI A Suspends Serial Input~~	~~IO CMOS~~	~~1.8V~~	-	~~Alternate use: Quad SPI IO3~~
SPI_A_CS0#	Y15	SPI A Master Chip Select 0	O CMOS	1.8V		
~~SPI_A_CS1# / GPIO_A_6~~	~~K17~~	~~SPI A Master Chip Select 1~~	~~O CMOS~~	~~1.8V~~	-	-
SPI_A_SCK	U16	SPI A Serial Data Clock	O CMOS	1.8V		
SPI_B_SDI	Y22	SPI B Serial Data Input	I CMOS	1.8V		
SPI_B_SDO	Y23	SPI B Serial Data Output	O CMOS	1.8V		

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SPI_B_CS0#	AA23	SPI B Master Chip Select 0	O CMOS	1.8V		
~~SPI_B_CS1# / GPIO_A_7~~	~~L17~~	~~SPI B Master Chip Select 1~~	~~O CMOS~~	~~1.8V~~	-	-
SPI_B_SCK	Y21	SPI B Serial Data Clock	O CMOS	1.8V		
~~SPI_C_SDI~~	~~C29~~	~~SPI C Serial Data Input~~	~~I CMOS~~	~~1.8V~~		
~~SPI_C_SDO~~	~~D30~~	~~SPI C Serial Data Output~~	~~O CMOS~~	~~1.8V~~		
~~SPI_C_CS0#~~	~~C30~~	~~SPI C Master Chip Select 0~~	~~O CMOS~~	~~1.8V~~		
~~SPI_C_CS1# / GPIO_D_7~~	~~Y33~~	~~SPI C Master Chip Select 1~~	~~O CMOS~~	~~1.8V~~		
~~SPI_C_SCK~~	~~D29~~	~~SPI C Serial Data Clock~~	~~O CMOS~~	~~1.8V~~		

4.3.10 GPIO

Contact Name	Contact Acronym	Functional Description	I/O Type	I/O Level (>Size-0)	PU / PD	Comments
GPIO_A_0	D17	General purpose I/O Contact A0	I/O CMOS	1.8V		
GPIO_A_1	E17	General purpose I/O Contact A1	I/O CMOS	1.8V		
GPIO_A_2	F17	General purpose I/O Contact A2	I/O CMOS	1.8V		
GPIO_A_3	G17	General purpose I/O Contact A3	I/O CMOS	1.8V		
GPIO_A_4	H17	General purpose I/O Contact A4	I/O CMOS	1.8V		
GPIO_A_5	J17	General purpose I/O Contact A5	I/O CMOS	1.8V		
GPIO_B_0	D19	General purpose I/O Contact B0	I/O CMOS	1.8V		
GPIO_B_1	E19	General purpose I/O Contact B1	I/O CMOS	1.8V		
GPIO_B_2	F19	General purpose I/O Contact B2	I/O CMOS	1.8V		

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GPIO_B_3	G19	General purpose I/O Contact B3	I/O CMOS	1.8V		
GPIO_B_4	H19	General purpose I/O Contact B4	I/O CMOS	1.8V		
GPIO_B_5	J19	General purpose I/O Contact B5	I/O CMOS	1.8V		
GPIO_B_6	K19	General purpose I/O Contact B6	I/O CMOS	1.8V		
GPIO_B_7	L19	General purpose I/O Contact B7	I/O CMOS	1.8V		

4.3.11 CAN Bus

Contact Name	Contact Acronym	Functional Description	I/O Type	I/O Level (Size- 0 only, optional)	I/O Level (>Size-0)	PU / PD	Comments
CAN_A_TX	AC17	CAN port A transmits output	O CMOS	VCC_OUT_IO	1.8V		
CAN_A_RX	AB17	CAN port A receives input	I CMOS	VCC_OUT_IO	1.8V		
CAN_B_TX	AC19	CAN port B transmits output	O CMOS	VCC_OUT_IO	1.8V		
CAN_B_RX	AB19	CAN port B receives input	I CMOS	VCC_OUT_IO	1.8V		

4.3.12 ADC

Contact Name	Contact Acronym	Functional Description	I/O Type	I/O Level	PU / PD	Comments
ADC_0	M18	Analog Digital Converter 0	Analog	0V – 1.8V		
ADC_1	N18	Analog Digital Converter 1	Analog	0V – 1.8V		

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4.3.13 Power + Boot Select

Contact Name	Contact Acronym	Functional Description	I/O Type	I/O Level	PU / PD	Comments
VCC_2_TEST[2]	M19	Module power voltage test point	P			
VCC_3_TEST	Y16	Module power voltage test point	P			
VCC_4_TEST	Y20	Module power voltage test point	P			
VCC_IN_5V	Y17	Module power input voltage of 5V – Primary voltage rail for size S, M, and L modules	P			Tolerance: 5V +-5%
VCC_IN_3V3	Y19	Module power input voltage of 3.3V – Primary voltage rail for 0 size modules	P			Tolerance: 3.3V +- 5%
~~V_BAT~~	~~AA18, AB18~~	~~Module power input battery voltage~~	~~P~~	-	-	-
GND	D18, E15, E21, F16, F20, J16, J20, L18, M16, M20, P18, R16, R20, V16, V20, Y18, AA14, AA17, AA19, AA22, AB15, AB21	Module signal and power return, and GND reference	P			
SYS_RST#	U17	Reset input from the carrier board. The carrier drives low to force a module reset, floats the line otherwise.	I OD CMOS	1.8V	PU 10K	
CARRIER_PWR_EN	V17	Carrier board circuits should not be powered up until the module asserts the CARRIER_PWR_EN signal	O CMOS	1.8V		

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VCC_OUT_IO	U18	Can provide IO voltage level for several interfaces to connect	P	1.8V/3.3V		Only applicable in size 0 – minimum current: 100mA; All other sizes or features are not applicable: NC
~~RTC_PWR~~	~~W17~~	~~Low current RTC circuit backup power – 3.0V nominal. May be sourced from a Carrier based Lithium cell or Super Cap.~~	~~P~~	-	-	-
BOOT_SEL0#	U19		I OD CMOS	1.8V	PU 10k	The boot medium is the choice of the module vendor.
BOOT_SEL1#	R18		I OD CMOS	1.8V	PU 10k	The boot medium is the choice of the module vendor.
FORCE_RECOVERY#	T17	When the signal is low on the carrier board, the module enters recovery mode.	I OD CMOS	1.8V	PU 10k	The recovery mode should be specified by module vendor.
VCC_5_TEST	Y3	Module power voltage test point	P			
VCC_6_TEST	C5	Module power voltage test point	P			
VCC_IN_5V	Y8, Y9, Y10, Y11	Module power input voltage of 5V	P			Tolerance: 5V +-5%
GND	A4, A7, A10, B2, B5, B8, B9, C11, D1, D5, D8, E2, H2, H4, L2, L4, P2, P4, R1, U2, U4, V1, W3, Y2, AA1, AA4, AA7, AA8, AA10, AA11, AB3, AB6, AB9, AC4, AC7,	Module signal and power return, and GND reference	P			

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	AC10					
PWR_BTN#	AA9	Power-button input from the carrier board. The carrier floats the line in the inactive state. Active low, level sensitive. Should be de-bounced on the module.	I OD CMOS	1.8 to 5V	PU 10K	
~~VCC_7_TEST~~	~~AA33~~	~~Module power voltage test point~~	~~P~~	-	-	-
~~VCC_8_TEST~~	~~B29~~	~~Module power voltage test point~~	~~P~~	-	-	-
VCC_IN_5V	Y25, Y26, Y27, Y28	Module power input voltage of 5V	P			Tolerance: 5V +-5%
GND	C25, C32, C35, D28, D34, F33, F35,	Module signal and power return and GND reference	P			
	G34, H32, J33, J35, K34, M35, N34,					
	T34, W34, AA25, AA26, AA27, AA28,					
	AA32, AB28, AB31, AB34, AC27, AC30,					
	AC33					
VCC_IN_5V	AE4, AF4, AG4, AH3, AH4, AJ3, AJ4,	Module power input voltage of 5V	P			Tolerance: 5V -0.05

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	AK4					
GND	AE2, AE34, AF35, AG3, AH2, AH34, AJ35, AK3, AL2, AL34, AM13, AM16, AM19, AM22, AM35, AN3, AN6, AN9, AN11, AN15, AN18, AN21, AN33, AP2, AP5, AP8, AP13, AP16, AP19, AP22, AP25, AP28, AP31, AP34, AR14, AR17, AR20, AR26, AR29, AR32	Module signal and power return, and GND reference	P			

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5. Software Support

5.1. Yocto

Available on ADLINK GitHub Site (https://github.com/ADLINK/meta-adlink-nxp)

- Yocto meta layer with u-boot, kernel, root filesystem and middleware (MRAA/UPM library) recipes
- Yocto binary image for quick evaluation.
- A user guide to build BSP & deploy binary image

5.2. SEMA

NA

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6. Mechanical

6.1. Module Dimensions

Module OSM L Size 45x 45mm

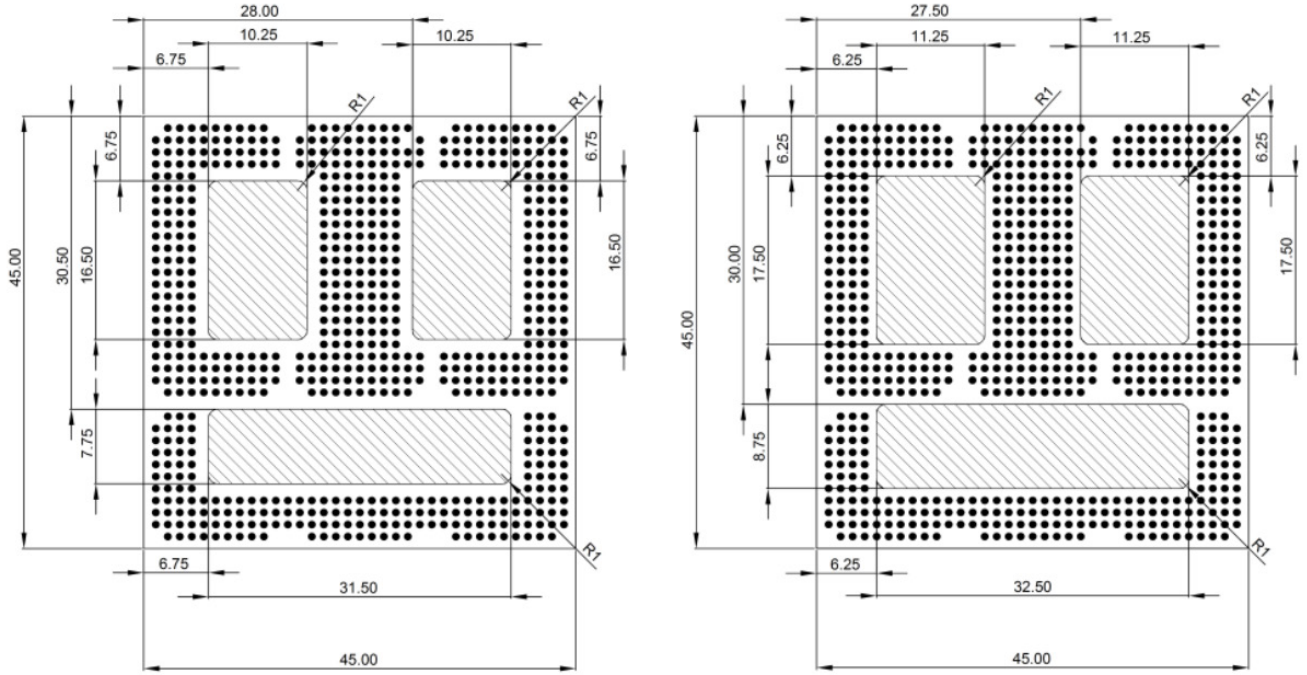


Figure 4 – Placement and cut-out area – Size (L)

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7. Thermal Solutions

7.1. Heatspreader: HTS

To be defined on the carrier.

7.2. Heatsink: THS

To be defined on the carrier.

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