

SOM-M8370 / SOM-M8390

SMARC System On Module User's Guide

MEDIATEK



Rev.1.00

Table of Contents

SMARC (SMART MOBILITY ARCHITECTURE) OVERVIEW 1

INTRODUCTION 2

FEATURES 3

SPECIFICATIONS 4

 SYSTEM 4

 DISPLAY 5

 CAMERA 5

 AUDIO 5

 NETWORK 5

 PCIE 5

 I/O 6

 OPERATION SYSTEMS 6

 POWER 6

 DIMENSIONS 6

 ENVIRONMENTAL 7

BLOCK DIAGRAM 8

PINOUT AND DESCRIPTION 9

 PIN NUMBERING 9

 PINOUT MAPPING 10

Primary (Top) Side..... 10

 SECONDARY (BOTTOM) SIDE 26

FUNCTIONAL SIGNAL DESCRIPTION 40

 DISPLAY 40

MIPI-DSI0 40

MIPI-DSI1/eDP 40

DisplayPort 41

HD-Display 41

 CAMERA 41

MIPI-CSI0A 41

MIPI-CSI0B (CN2900) 42

MIPI-CSI1 42

 NETWORKING 43

GBE0 43

GBE1 43

 PCIE 43

PCIE_A (1 Lane)..... 43

 USB 44

USB0 44

USB1 44

USB2 44

USB3 44

USB5 44

UART 45

UART0..... 45

UART1..... 45

UART2..... 45

UART3..... 45

AUDIO 45

I2S..... 45

I/Os..... 46

SDIO (SD Card)..... 46

SPI_0 (Boot Device)..... 46

SPI1 46

CAN Bus 46

I2C0..... 46

I2C1..... 46

GPIOs..... 47

Miscellaneous..... 47

POWER 47

MECHANICAL.....48

 SMARC SHORT SIZE DIMENSIONS..... 48

 CARRIER CONNECTOR 49

 CONNECTOR PIN NUMBERING CONVENTION 49

SMARC (Smart Mobility ARChitecture)

Overview

The **SMARC (Smart Mobility ARChitecture)** specification defines a **compact and highly versatile Computer-on-Module (COM)** standard optimized for embedded applications requiring **low power consumption, cost efficiency, and high computational performance**.

SMARC modules are primarily based on **Arm® System-on-Chip (SoC)** architectures, similar to those employed in mobile and tablet platforms. However, alternative **low-power x86 or RISC-based SoCs** may also be adopted, depending on system requirements. The overall **power envelope typically remains below 6 watts**, supporting energy-efficient and thermally constrained designs.

Two standardized form factors are defined within the SMARC specification:

- **82 mm × 50 mm (Short Size)**
- **82 mm × 80 mm (Full Size)**

Each module features a **314-pin edge connector** with **0.5 mm pitch**, interfacing with a corresponding low-profile right-angle connector on the carrier board.

SMARC modules are designed as **core processing elements** within both portable and stationary embedded platforms. The modules integrate essential system components, including:

- Central Processing Unit (CPU)
- System memory (DRAM)
- Boot flash storage
- Power sequencing and CPU power supply circuitry
- Gigabit Ethernet (GbE) interface
- MIPI-DSI display interface
- MIPI-CSI camera interface

These core functions are complemented by an **application-specific carrier board**, which extends system capabilities by incorporating peripherals such as **audio codecs, video display ports, camera interfaces**, and other domain-specific interfaces.

The **modular design approach** of SMARC enables **scalability, reduced development time**, and **enhanced product longevity** through seamless upgradability. This architecture allows designers to achieve a balance of **compact physical dimensions, low system cost**, and **optimized power efficiency**, while maintaining flexibility across diverse embedded computing applications.

Introduction

The **SERA SOM-M8370** and **SERA SOM-M8390** are high-performance SMARC standard System-on-Modules (SOMs) designed to meet the growing demands of intelligent edge computing. Powered by the **MediaTek Genio 510** and **Genio 700** SoCs, these modules feature a heterogeneous CPU architecture with **2× Arm Cortex-A78** and **4×/6× Cortex-A55** cores, combining outstanding processing performance with energy efficiency. The integrated **AI Processing Unit (APU)** delivers up to **2.8 TOPS** on the Genio 510 and **4.0 TOPS** on the Genio 700, enabling advanced on-device AI functions such as object recognition, motion tracking, and speech analysis.

Engineered for the next generation of **IoT, robotics, and automation applications**, the SOM-M8370/M8390 series supports **up to three camera interfaces**, allowing multi-sensor visual processing for use cases like autonomous drones, service robots, smart surveillance, and industrial vision systems. The modules' **low-power design** and **compact form factor** make them ideal for space-constrained or battery-powered environments that require continuous AI performance at the edge.

Compliant with the **SMARC 2.1 specification**, the SOM-M8370 and SOM-M8390 provide a comprehensive range of interfaces including **PCIe, USB 3.0/2.0, MIPI-CSI, MIPI-DSI, I²C, SPI, UART**, and **Gigabit Ethernet**. These

interfaces ensure seamless connectivity and flexibility for diverse embedded system designs. Moreover, the **pin-to-pin compatibility** between the Genio 510 and Genio 700 platforms allows developers to easily scale their solutions or upgrade to higher-performance systems without redesigning carrier boards, thereby shortening development cycles and optimizing product cost.

With powerful AI acceleration, multi-camera support, and extensive peripheral connectivity, the SERA SOM-M8370 and SOM-M8390 deliver a robust and scalable solution for **industrial automation, smart logistics, retail, and defense applications**. Combining SERA's reliable hardware design with MediaTek's advanced Genio platform, these SOMs empower developers to create intelligent, efficient, and future-ready edge devices for a wide range of industries.

Features

A high-performance multi-core AI processor with dedicated visual processing engine for a wide variety of computer vision applications, including facial recognition, object/people identification, collision warning, driver monitoring, gesture and posture detection, image segmentation.

Rich IO for peripherals, including scanners, card readers, sensors, factory equipment, network connectivity.

- SOM-M8370 (Genio 510): Dual-Core ARM Cortex-A78@2.0GHz + Quad-Core ARM Cortex-A55@2.0GHz.
- SOM-M8390 (Genio 700): Dual-Core ARM Cortex-A78@2.2GHz + Hexa-Core ARM Cortex-A55@2.0GHz.
- SOM-M8370 (Genio 510): 2.8 TOPS APU system.
- SOM-M8390 (Genio 700): 4.0 TOPS APU system
- SMARC Revision 2.1 compliant.
- 8GB LPDDR4X.
- 32GB eMMC Flash
- 2 x 4-Lane MIPI-DSI
- Supports HD-Display and DisplayPort up to 4K/60Hz
- Supports two GbE ports
- Supports 2 x 2-Lane MIPI-CSI and 1 x 4-Lane MIPI-CSI interfaces
- 2 x USB 3.0 / 3 x USB 2.0 interfaces
- 2x2 Dual Band WiFi 6 and Bluetooth 5.4 (*optional*)
- Support Linux Yocto / Android

Specifications

System

CPU	SOM-M8370	Dual-core Arm® Cortex®-A78 processor@2.0GHz Quad-core Arm Cortex-A55 processor@2.0GHz
	SOM-M8390	Dual-core Arm® Cortex®-A78 processor@2.2GHz Hexa-core Arm Cortex-A55 processor@2.0GHz
GPU	SOM-M8370	Arm Mali™-G57 MC2 3D Graphics Accelerator (GPU)@950MHz with Vulkan® 1.1, OpenGL ES 3.2 and OpenCL™ 2.2
	SOM-M8390	Arm Mali™-G57 MC3 3D Graphics Accelerator (GPU)@950MHz with Vulkan® 1.1, OpenGL ES 3.2 and OpenCL™ 2.2
APU	SOM-M8370	Single-core AI Processor Unit (APU) Cadence® Tensilica®VP6 processor with AI Accelerator (AIA) APU System up to 2.8 TOPS
	SOM-M8390	Single-core AI Processor Unit (APU) Cadence® Tensilica®VP6 processor with AI Accelerator (AIA) APU System up to 4 TOPS
DSP	SOM-M8370/SOM-M8390	Single-core Cadence HiFi 5 Audio Engine DSP@800MHz
Memory	SOM-M8370/SOM-M8390	Onboard 8GB LPDDR4X SDRAM
Storage	SOM-M8370/SOM-M8390	Onboard 32GB eMMC 5.1 SD Card (SDIO 3.0)
Video	SOM-M8370	Video encoding: 4K@30 fps with HEVC/H.264 Video decoding: 4K@60 fps with AV1/VP9/HEVC/H.264
	SOM-M8390	Video encoding: 4K@30 fps with HEVC/H.264 Video decoding: 4K@75 fps with AV1/VP9/HEVC/H.264

Display

GPU	SOM-M8370	Arm Mali™-G57 MC2 3D Graphics Accelerator (GPU)@950MHz with Vulkan® 1.1, OpenGL ES 3.2 and OpenCL™ 2.2
	SOM-M8390	Arm Mali™-G57 MC3 3D Graphics Accelerator (GPU)@950MHz with Vulkan® 1.1, OpenGL ES 3.2 and OpenCL™ 2.2
HD-Display	SOM-M8370/SOM-M8390	1 x HD-Display 2.0, 4K60fps, supports VRR and HDR metadata
DisplayPort	SOM-M8370/SOM-M8390	1 x DP 1.4, 1 x eDP 1.2 (Shared with one of the MIPI-DSI interfaces)
MIPI-DSI	SOM-M8370/SOM-M8390	2 x 4-Lane MIPI-DSI (One shared with the eDP interface)

Camera

MIPI-CSI	SOM-M8370/SOM-M8390	1 x 4-Lane MIPI-CSI 2 x 2-Lane MIPI-CSI (one onboard connector, one via SMARC pins) <i>Among the three available MIPI-CSI interfaces, only two interfaces can be operated simultaneously.</i>
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Audio

I2S	SOM-M8370/SOM-M8390	1 x I2S
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Network

Ethernet	SOM-M8370/SOM-M8390	2 x Gigabit Ethernet
WiFi/Bluetooth	SOM-M8370/SOM-M8390	2x2 Dual-band WiFi 6 / Bluetooth 5.4 (<i>optional</i>)

PCIe

PCIe	SOM-M8370/SOM-M8390	1 x PCIe Gen2 1-Lane
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I/O

USB	SOM-M8370/SOM-M8390	2 x USB3.1 Gen1, 3 x USB 2.0
SDIO	SOM-M8370/SOM-M8390	1 x 4-Lane SDIO
UART	SOM-M8370/SOM-M8390	2 x 4-wire UART 2 x 2-wire UART
CAN Bus	SOM-M8370/SOM-M8390	1 x CAN2.0B
I2C	SOM-M8370/SOM-M8390	1 x I2C
GPIO	SOM-M8370/SOM-M8390	14 x GPIO

Operation Systems

Yocto	SOM-M8370/SOM-M8390	Yocto 4.0.17 Kirkstone (LTS 2026)
Android		Android 14, Android 15
Ubuntu		Ubuntu 22.04
ROS2		humble (~2027)

Power

Power	SOM-M8370/SOM-M8390	5VDC +/- 5%
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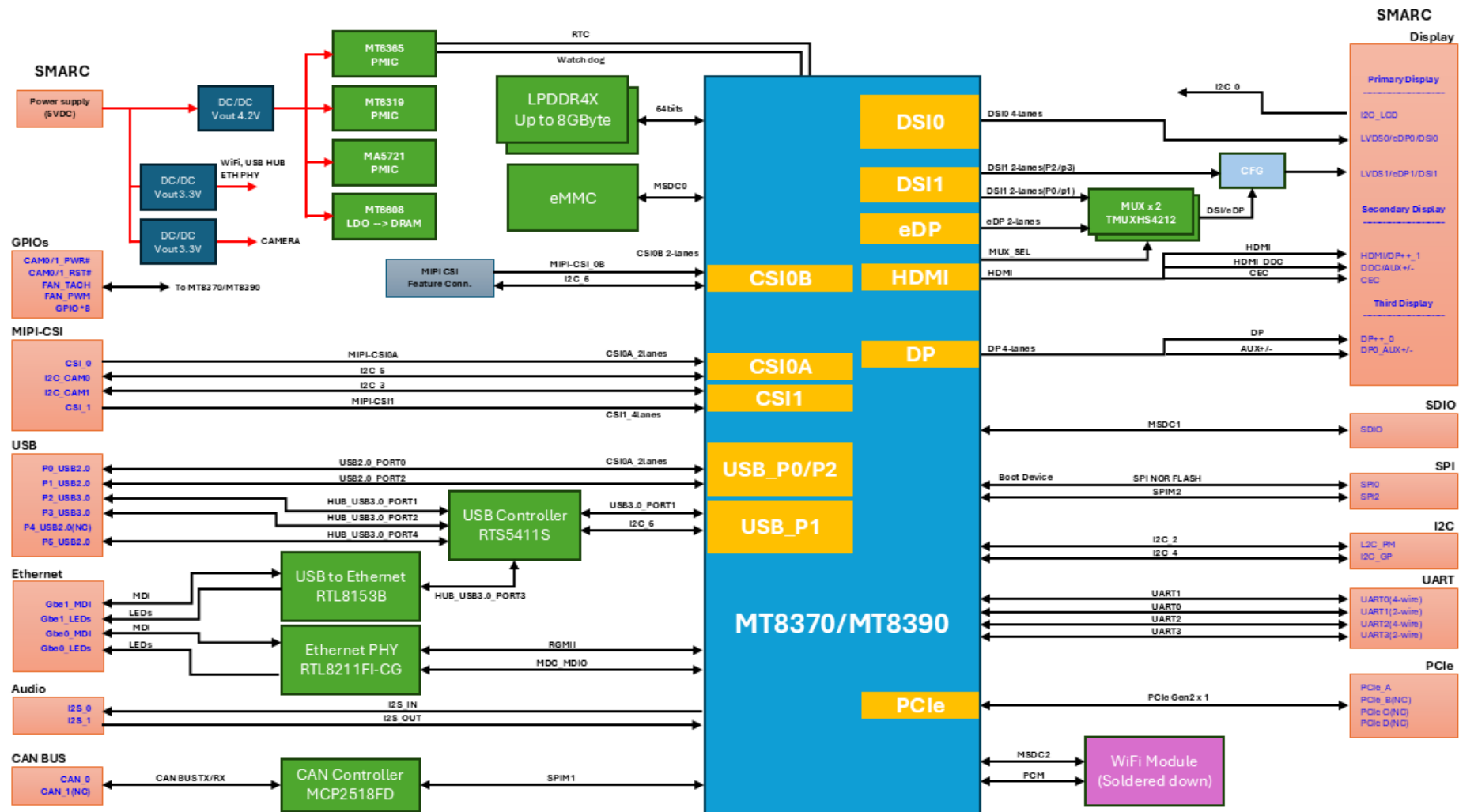
Dimensions

Form factor	SOM-M8370/SOM-M8390	SMARC v2.1, Short size
Dimensions	SOM-M8370/SOM-M8390	82 x 50 mm

Environmental

Operating Temperature	SOM-M8370/SOM-M8390	0 to 60°C
Humidity	SOM-M8370/SOM-M8390	5-90% RH operating, non-condensing

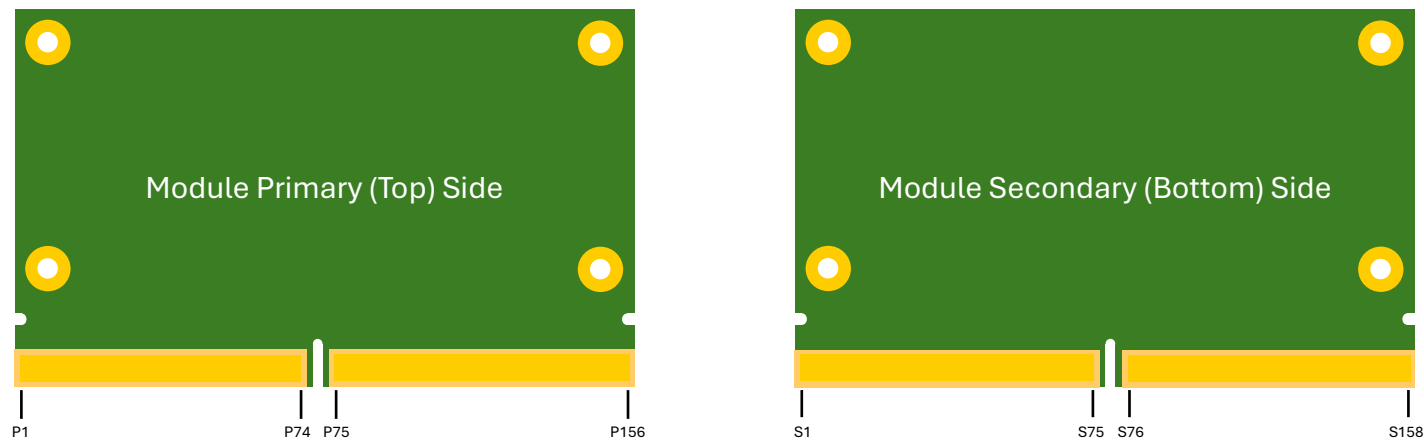
Block Diagram



Pinout and Description

Pin Numbering

"The pin assignments are defined according to the SMARC 2.1 standard specification.



Pinout Mapping

Primary (Top) Side

SMARC Pin No.	SMARC PIN Name	CPU PIN / Multiplexing	I/O Type	I/O Level	Comments
P1	SMB_ALERT#	N/A			
P2	GND	N/A			
P3	CSI1_CK+	CSI1A_L2P_T1B	AIO D-PHY	1.2V	MIPI-CSI1 4-Lane
P4	CSI1_CK-	CSI1A_L2N_T1C	AIO D-PHY	1.2V	MIPI-CSI1 4-Lane
P5	GBE1_SDP	N/A			
P6	GBE0_SDP	N/A			
P7	CSI1_RX0+	CSI1A_L1P_T0C	AIO D-PHY	1.2V	MIPI-CSI1 4-Lane
P8	CSI1_RX0-	CSI1A_L1N_T1A	AIO D-PHY	1.2V	MIPI-CSI1 4-Lane
P9	GND	N/A			
P10	CSI1_RX1+	CSI1B_L0P_T0A	AIO D-PHY	1.2V	MIPI-CSI1 4-Lane
P11	CSI1_RX1-	CSI1B_L0N_T0B	AIO D-PHY	1.2V	MIPI-CSI1 4-Lane
P12	GND	N/A			
P13	CSI1_RX2+	CSI1A_L0P_T0A	AIO D-PHY	1.2V	MIPI-CSI1 4-Lane
P14	CSI1_RX2-	CSI1A_L0N_T0B	AIO D-PHY	1.2V	MIPI-CSI1 4-Lane
P15	GND	N/A			
P16	CSI1_RX3+	CSI1B_L1P_T0C	AIO D-PHY	1.2V	MIPI-CSI1 4-Lane
P17	CSI1_RX3-	CSI1B_L1N_T1A	AIO D-PHY	1.2V	MIPI-CSI1 4-Lane
P18	GND	N/A			
P19	GBE0_MDI3-	RTL8211_MDI3-	DIO MDI		From RTL8211

SMARC Pin No.		("red" for default setting)			
Primary (Top) Side	SMARC PIN Name	CPU PIN / Multiplexing	I/O Type	I/O Level	Comments
P20	GBE0_MDI3+	RTL8211_MDI3+	DIO MDI		From RTL8211
P21	GBE0_LINK100#	RTL8211_LED1	DO	3.3V	From RTL8211
P22	GBE0_LINK1000#	RTL8211_LED2	DO	3.3V	From RTL8211
P23	GBE0_MDI2-	RTL8211_MDI2-	DIO MDI		From RTL8211
P24	GBE0_MDI2+	RTL8211_MDI2+	DIO MDI		From RTL8211
P25	GBE0_LINK_ACT#	RTL8211_LED0	DO	3.3V	From RTL8211
P26	GBE0_MDI1-	RTL8211_MDI1-	DIO MDI		From RTL8211
P27	GBE0_MDI1+	RTL8211_MDI1+	DIO MDI		From RTL8211
P28	GBE0_CTREF	N/A			
P29	GBE0_MDI0-	RTL8211_MDI0-	DIO MDI		From RTL8211
P30	GBE0_MDI0+	RTL8211_MDI0+	DIO MDI		From RTL8211
P31	SPI0_CS1#	N/A			
P32	GND	N/A			
P33	SDIO_WP	GPIO: GPIO70 SPI: SPIM0_CLK SPI: SCP_SPI0_CK DMIC: DMIC3_DAT CAM: CMVREF1	DI	1.8V	SDIO I/F
P34	SDIO_CMD	GPIO: GPIO163 SDIO: MSDC1_CMD SPDIF: SPDIF_OUT	DIO	1.8V	SDIO I/F

SMARC Pin No.	SMARC PIN Name	CPU PIN / Multiplexing	I/O Type	I/O Level	Comments
P35	SDIO_CD#	GPIO: GPIO120 I2S: I2SO2_D3 I2S: I2SIN_D3 UART: URXD3 TDMIN: TDMIN_DI I2S: I2SO1_BCK	DI	1.8V	SDIO I/F
P36	SDIO_CK	GPIO: GPIO164 SDIO: MSDC1_CLK SPDIF: SPDIF_IN0	DO	1.8V	SDIO I/F
P37	SDIO_PWR_EN	GPIO: GPIO4 GPIO: TP_GPIO4_AO SPDIF: SPDIF_IN2 I2S: I2SO1_MCK DMIC: DMIC4_DAT I2S: I2SIN_D1 I2S: I2SO2_D1	DO	1.8V	SDIO I/F
P38	GND	N/A			
P39	SDIO_D0	GPIO: GPIO165 SDIO: MSDC1_DAT0 SPDIF: SPDIF_IN1	DIO	1.8V	SDIO I/F
P40	SDIO_D1	GPIO: GPIO166 SDIO: MSDC1_DAT1 SPDIF: SPDIF_IN2	DIO	1.8V	SDIO I/F

SMARC Pin No.	SMARC PIN Name	CPU PIN / Multiplexing	I/O Type	I/O Level	Comments
P41	SDIO_D2	GPIO: GPIO167 SDIO: MSDC1_DAT2 PWM: PWM_0	DIO	1.8V	SDIO I/F
P42	SDIO_D3	GPIO: GPIO168 SDIO: MSDC1_DAT3 PWM: PWM_0 CLK: CLKM0	DIO	1.8V	SDIO I/F
P43	SPI0_CS0#	GPIO: GPIO126 DMIC: DMIC1_DAT SPI: SPINOR_CS TDMIN: TDMIN_BCK TCSYS: LVTS_SDO	DIO	1.8V	SPI NOR not to support
P44	SPI0_CK	GPIO: GPIO125 DMIC: DMIC1_CLK SPI: SPINOR_CK TDMIN: TDMIN_MCK TCSYS: LVTS_FOUT	DIO	1.8V	SPI NOR not to support
P45	SPI0_DIN	GPIO: GPIO128 DMIC: DMIC2_CLK SPI: SPINOR_IO1 TDMIN: TDMIN_DI TCSYS: LVTS_SCF	DIO	1.8V	SPI NOR not to support

SMARC Pin No.	SMARC PIN Name	CPU PIN / Multiplexing	I/O Type	I/O Level	Comments
P46	SPI0_DO	GPIO: GPIO127 DMIC: DMIC1_DAT_R SPI: SPINOR_IO0 TDMIN: TDMIN_LRCK TCSYS: LVTS_26M	DIO	1.8V	SPI NOR not to support
P47	GND	N/A			
P48	SATA_TX+	N/A			
P49	SATA_TX-	N/A			
P50	GND	N/A			
P51	SATA_RX+	N/A			
P52	SATA_RX-	N/A			
P53	GND	N/A			
P54	ESPI_CS0# / SPI1_CS0# / QSPI_CS0#	GPIO: GPIO79 SPI: SPIM2_CSB SCPI: SCP_SPI2_CS I2S: I2SO1_MCK UART: UTXD2 UART: TP_UTXD2_AO PCM: PCM_SYNC	DO	1.8V	SPI I/F
P55	ESPI_CS1# / SPI1_CS1# / QSPI_CS1#	N/A			

SMARC Pin No.	SMARC PIN Name	CPU PIN / Multiplexing	I/O Type	I/O Level	Comments
P56	ESPI_CK / SPI1_CK / QSPI_CK	GPIO: GPIO80 SPI: SPIM2_CLK SCPI: SCP_SPI2_CK I2S: I2SO1_BCK UART: URXD2 UART: TP_URXD2_AO PCM: PCM_CLK	DO	1.8V	SPI I/F
P57	ESPI_IO_1 / SPI1_DIN / QSPI_IO_1	GPIO: GPIO82 SPI: SPIM2_MISO SCPI: SCP_SPI2_MI I2S: I2SO1_D0 UART: UCTS2 UART: TP_UCTS2_AO PCM: PCM_DI	DI	1.8V	SPI I/F
P58	ESPI_IO_0 / SPI1_DO / QSPI_IO_0	GPIO: GPIO81 SPI: SPIM2_MOSI SCPI: SCP_SPI2_MO I2S: I2SO1_WS UART: URTS2 UART: TP_URTS2_AO PCM: PCM_DO	DO	1.8V	SPI I/F
P59	GND	N/A			
P60	USB0+	USB_DP_P0	DIO	3.3V	P0 USB
P61	USB0-	USB_DM_P0	DIO	3.3V	P0 USB

SMARC Pin No.	SMARC PIN Name	CPU PIN / Multiplexing	I/O Type	I/O Level	Comments
P62	USB0_EN_OC#	GPIO: GPIO84 USB: USB_DRVVBUS	DIO	3.3V	P0 USB
P63	USB0_VBUS_DET	GPIO: GPIO85 USB: VBUSVALID	DI	5V	P0 USB
P64	USB0_OTG_ID	GPIO: GPIO83 USB: IDDIG	DI		P0 USB
P65	USB1+	USB_DP_P2	DIO	3.3V	P2 USB
P66	USB1-	USB_DM_P2	DIO	3.3V	P2 USB
P67	USB1_EN_OC#	USB1_EN_OC#	DIO	3.3V	
P68	GND	N/A			
P69	USB2+	DSP1_DP	DIO	3.3V	From RTS5411S P1
P70	USB2-	DSP1_DM	DIO	3.3V	From RTS5411S P1
P71	USB2_EN_OC#	HUB1_EN_OC#	DI	3.3V	From RTS5411S P1
P72	RSVD	N/A			
P73	RSVD	N/A			
P74	USB3_EN_OC#	HUB2_EN_OC#	DI	3.3V	From RTS5411S P2
P75	PCIE_A_RST#	GPIO: GPIO48 PCIE: PERSTN	DO	3.3V	PCIE
P76	USB4_EN_OC#	N/A			
P77	PCIE_B_CKREQ#	N/A			
P78	PCIE_A_CKREQ#	GPIO: GPIO49 PCIE: CLKREQN	DIO	3.3V	PCIE
P79	GND	N/A			
P80	PCIE_C_REFCK+	N/A			

SMARC Pin No.	SMARC PIN Name	CPU PIN / Multiplexing	I/O Type	I/O Level	Comments
P81	PCIE_C_REFCK-	N/A			
P82	GND	N/A			
P83	PCIE_A_REFCK+	PCIEG2_CLK_P	DO	1.2V	PCIE
P84	PCIE_A_REFCK-	PCIEG2_CLK_N	DO	1.2V	PCIE
P85	GND	N/A			
P86	PCIE_A_RX+	PCIEG2_LN0_RXP	DI	1.2V	PCIE
P87	PCIE_A_RX-	PCIEG2_LN0_RXN	DI	1.2V	PCIE
P88	GND	N/A			
P89	PCIE_A_TX+	PCIEG2_LN0_TXP	DO	1.2V	PCIE
P90	PCIE_A_TX-	PCIEG2_LN0_TXN	DO	1.2V	PCIE
P91	GND	N/A			
P92	HDMI_D2+ / DP1_LANE0+	HDMITX21_CH2_P	DO	1.8V	HD-Display
P93	HDMI_D2- / DP1_LANE0-	HDMITX21_CH2_M	DO	1.8V	HD-Display
P94	GND	N/A			
P95	HDMI_D1+ / DP1_LANE1+	HDMITX21_CH1_P	DO	1.8V	HD-Display
P96	HDMI_D1- / DP1_LANE1-	HDMITX21_CH1_M	DO	1.8V	HD-Display
P97	GND	N/A			
P98	HDMI_D0+ / DP1_LANE2+	HDMITX21_CH0_P	DO	1.8V	HD-Display

SMARC Pin No.	SMARC PIN Name	CPU PIN / Multiplexing	I/O Type	I/O Level	Comments
P99	HDMI_D0- / DP1_LANE2-	HDMITX21_CH0_M	DO	1.8V	HD-Display
P100	GND	N/A			
P101	HDMI_CK+ / DP1_LANE3+	HDMITX21_CLK_P	DO	1.8V	HD-Display
P102	HDMI_CK- / DP1_LANE3-	HDMITX21_CLK_M	DO	1.8V	HD-Display
P103	GND	N/A			
P104	HDMI_HPD / DP1_HPD	HDMITX_HTPLG	DI	1.8V	HD-Display
P105	HDMI_CTRL_CK / DP1_AUX+	HDMITX_SCL	DIO	1.8V	HD-Display
P106	HDMI_CTRL_DAT / DP1_AUX-	HDMITX_SDA	DIO	1.8V	HD-Display
P107	DP1_AUX_SEL	HDMITX_CEC	DIO	1.8V	HD-Display
P108	GPIO0 / CAM0_PWR#	GPIO: GPIO18 GPIO:TP_GPIO2_AO CAM:CMFLASH0 CAM:CMVREF4 TDMIN:TDMIN_MCK UART:UTXD1 UART:TP_UTXD1_AO	DIO	1.8V	MIPI-CSI0A_PWR ENABLE

SMARC Pin No.		("red" for default setting)			
Primary (Top) Side	SMARC PIN Name	CPU PIN / Multiplexing	I/O Type	I/O Level	Comments
P109	GPIO1 / CAM1_PWR#	GPIO: GPIO20 GPIO:TP_GPIO4_AO CAM:CMFLASH2 CLK:CLKM2 TDMIN:TDMIN_LRCK UART:URTS1 UART:TP_URTS1_AO	DIO	1.8V	MIPI-CSI1_PWR ENABLE
P110	GPIO2 / CAM0_RST#	GPIO: GPIO19 GPIO: TP_GPIO3_AO CAM: CMFLASH1 CAM: CMVREF5 TDMIN: TDMIN_BCK UART: URXD1 UART: TP_URXD1_AO	DIO	1.8V	MIPI-CSI0A_RESETN
P111	GPIO3 / CAM1_RST#	GPIO: GPIO21 GPIO:TP_GPIO5_AO CAM:CMFLASH3 CLK:CLKM3 TDMIN:TDMIN_DI UART:UCTS1 UART:TP_UCTS1_AO	DIO	1.8V	MIPI-CSI1_RESETN
P112	GPIO4 / HDA_RST#	GPIO: GPIO14 GPIO: TP_GPIO6_AO SPI: SPIM4_MOSI HDMI: HDMITX20_SCL	DIO	1.8V	

SMARC Pin No.	SMARC PIN Name	CPU PIN / Multiplexing	I/O Type	I/O Level	Comments
P113	GPIO5 / PWM_OUT	GPIO: GPIO9 GPIO: TP_GPIO1_AO SPI: SPIM3_MOSI TDMIN: TDMIN_LRCK DMIC: DMIC2_CLK CAM: CMFLASH0 PWM: PWM_0	DIO	1.8V	
P114	GPIO6 / TACHIN	GPIO: GPIO43 KP: KPCOL1 DP: DP_TX_HPD CAM: CMFLASH2	DIO	1.8V	
P115	GPIO7	GPIO: GPIO10 GPIO: TP_GPIO2_AO SPI: SPIM3_MISO TDMIN: TDMIN_DI DMIC: DMIC2_DAT CAM: CMFLASH1 PWM: PWM_1	DIO	1.8V	
P116	GPIO8	GPIO: GPIO44 KP: KPROW0	DIO	1.8V	

SMARC Pin No.	SMARC PIN Name	CPU PIN / Multiplexing	I/O Type	I/O Level	Comments
P117	GPIO9	GPIO: GPIO86 USB: IDDIG_1P UART: UTXD1 UART: URTS2 PWM: PWM_2 GPIO: TP_GPIO4_AO AUXIF: AUXIF_ST0	DIO	1.8V	
P118	GPIO10	GPIO: GPIO11 GPIO: TP_GPIO3_AO SPDIF: SPDIF_OUT I2S: I2SO1_D0 DMIC: DMIC2_DAT_R CAM: CMVREF6	DIO	1.8V	
P119	GPIO11	GPIO: GPIO87 USB: USB_DRVVBUS_1P UART: URXD1 UART: UCTS2 PWM: PWM_3 GPIO: TP_GPIO5_AO AUXIF: AUXIF_CLK0	DIO	1.8V	
P120	GND	N/A			
P121	I2C_PM_CK	GPIO: GPIO59 I2C: SCL2 I2C: SCP_SCL0 I2C: SCP_SCL1	DO	1.8V	

SMARC Pin No.	SMARC PIN Name	CPU PIN / Multiplexing	I/O Type	I/O Level	Comments
P122	I2C_PM_DAT	GPIO: GPIO60 I2C: SDA2 I2C: SCP_SDA0 I2C: SCP_SDA1	DIO	1.8V	
P123	BOOT_SEL0#	N/A			
P124	BOOT_SEL1#	N/A			
P125	BOOT_SEL2#	N/A			
P126	RESET_OUT#	GPIO: GPIO15 GPIO: TP_GPIO7_AO SPI: SPIM4_MISO HDMI: HDMITX20_SDA	DIO	1.8V	
P127	RESET_IN#	SYSRSTB	DI	1.8V	SYSTEM RESET KEY
P128	POWER_BTN#	PWRKEY	DI	1.8V	POWER KEY
P129	SER0_TX	GPIO: GPIO0 GPIO: TP_GPIO0_AO SPI: SPIM5_CSB UART: UTXD1 DMIC: DMIC3_CLK I2S: I2SIN_MCK I2S: I2SO2_MCK	DO	1.8V	UART P0

SMARC Pin No.		("red" for default setting)			
Primary (Top) Side	SMARC PIN Name	CPU PIN / Multiplexing	I/O Type	I/O Level	Comments
P130	SER0_RX	GPIO: GPIO1 GPIO: TP_GPIO1_AO SPI: SPIM5_CLK UART: URXD1 DMIC: DMIC3_DAT I2S: I2SIN_BCK I2S: I2SO2_BCK	DI	1.8V	UART P0
P131	SER0_RTS#	GPIO: GPIO02 GPIO: TP_GPIO2_AO SPI: SPIM5_MOSI UART: URTS1 DMIC: DMIC3_DAT_R I2S: I2SIN_WS I2S: I2SO2_WS	DI	1.8V	UART P0
P132	SER0_CTS#	GPIO: GPIO3 GPIO: TP_GPIO3_AO SPI: SPIM5_MISO UART: UCTS1 DMIC: DMIC4_CLK I2S: I2SIN_D0 I2S: I2SO2_D0	DO	1.8V	UART P0
P133	GND	N/A			

SMARC Pin No.	SMARC PIN Name	CPU PIN / Multiplexing	I/O Type	I/O Level	Comments
P134	SER1_TX	GPIO: GPIO31 UART: UTXD0 UART: TP_UTXD1_AO UART: TP_UTXD2_AO	DO	1.8V	Console port
P135	SER1_RX	GPIO: GPIO32 UART: URXD0 UART: TP_URXD1_AO UART: TP_URXD2_AO	DI	1.8V	Console port
P136	SER2_TX	GPIO: GPIO35 UART: UTXD2 UART: URTS1 UART: TP_URTS1_AO UART: TP_UTXD2_AO	DO	1.8V	UART P2
P137	SER2_RX	GPIO: GPIO36 UART: URXD2 UART: UCTS1 UART: TP_UCTS1_AO UART: TP_URXD2_AO	DI	1.8V	UART P2
P138	SER2_RTS#	GPIO: GPIO33 UART: UTXD1 UART: URTS2 UART: TP_UTXD1_AO	DI	1.8V	UART P2

SMARC Pin No.	SMARC PIN Name	CPU PIN / Multiplexing	I/O Type	I/O Level	Comments
P139	SER2_CTS#	GPIO: GPIO34 UART: URXD1 UART: UCTS2 UART: TP_URXD1_AO	DO	1.8V	UART P2
P140	SER3_TX	GPIO: GPIO73 SPI: SPIM0_MIO2 UART: UTXD3 DMIC: DMIC4_DAT CLK: CLKM0 CAM: CMVREF4	DO	1.8V	UART P3
P141	SER3_RX	GPIO: GPIO74 SPI: SPIM0_MIO3 UART: URXD3 DMIC: DMIC4_DAT_R CLK: CLKM1 CAM: CMVREF5	DI	1.8V	UART P3
P142	GND	N/A			
P143	CAN0_TX	TXCAN	DO	1.8V	From MCP2518FDT-E/QBB
P144	CAN0_RX	RXCAN	DI	1.8V	From MCP2518FDT-E/QBB
P145	CAN1_TX	N/A			
P146	CAN1_RX	Reserved for HOMEKEY from MT6365			Reserved Function
P147	VDD_IN	Vin	POWER	5V	
P148	VDD_IN	Vin	POWER	5V	
P149	VDD_IN	Vin	POWER	5V	

SMARC Pin No.	("red" for default setting)				
Primary (Top) Side	SMARC PIN Name	CPU PIN / Multiplexing	I/O Type	I/O Level	Comments
P150	VDD_IN	Vin	POWER	5V	
P151	VDD_IN	Vin	POWER	5V	
P152	VDD_IN	Vin	POWER	5V	
P153	VDD_IN	Vin	POWER	5V	
P154	VDD_IN	Vin	POWER	5V	
P155	VDD_IN	Vin	POWER	5V	
P156	VDD_IN	Vin	POWER	5V	

Secondary (Bottom) Side

SMARC Pin No.	("red" for default setting)				
Secondary (Bottom) Side	SMARC PIN Name	CPU PIN / Multiplexing	I/O Type	I/O Level	Comments
S1	CSI1_TX+ / I2C_CAM1_CK	GPIO: GPIO61 I2C: SCL3 I2C: SCP_SCL0 I2C: SCP_SCL1	DO	1.8V	MIPI-CSI1_I2C_SCL
S2	CSI1_TX- / I2C_CAM1_DAT	GPIO: GPIO62 I2C: SDA3 I2C: SCP_SDA0 I2C: SCP_SDA1	DIO	1.8V	MIPI-CSI1_I2C_SDA
S3	GND	N/A			
S4	RSVD	GPIO: GPIO24 CAM: CMMCLK2 PWM: PWM_3 EDP: EDP_TX_HPD	DIO	1.8V	MIPI-CSI0A_MCLK

SMARC Pin No.	SMARC PIN Name	CPU PIN / Multiplexing	I/O Type	I/O Level	Comments
S5	CSI0_TX+ / I2C_CAM0_CK	GPIO: GPIO65 I2C: SCL5 I2C: SCP_SCL0 I2C: SCP_SCL1	DO	1.8V	MIPI-CSI0A_I2C_SCL
S6	CAM_MCK	CMMCLK1			MIPI-CSI1_MCLK
S7	CSI0_TX- / I2C_CAM0_DAT	GPIO: GPIO66 I2C: SDA5 I2C: SCP_SDA0 I2C: SCP_SDA1	DIO	1.8V	MIPI-CSI0A_I2C_SDA
S8	CSI0_CK+	CSI0A_L1P_T0C	AIO D-PHY	1.2V	MIPI-CSI0A 2-Lane
S9	CSI0_CK-	CSI0A_L1N_T1A	AIO D-PHY	1.2V	MIPI-CSI0A 2-Lane
S10	GND	N/A			
S11	CSI0_RX0+	CSI0A_L0P_T0A	AIO D-PHY	1.2V	MIPI-CSI0A 2-Lane
S12	CSI0_RX0-	CSI0A_L0N_T0B	AIO D-PHY	1.2V	MIPI-CSI0A 2-Lane
S13	GND	N/A			
S14	CSI0_RX1+	CSI0A_L2P_T1B	AIO D-PHY	1.2V	MIPI-CSI0A 2-Lane
S15	CSI0_RX1-	CSI0A_L2N_T1C	AIO D-PHY	1.2V	MIPI-CSI0A 2-Lane
S16	GND	N/A			
S17	GBE1_MDI0+	RTL8153_MDI0+	DIO MDI		From RTL8153
S18	GBE1_MDI0-	RTL8153_MDI0-	DIO MDI		From RTL8153
S19	GBE1_LINK100#	RTL8153_LED1	DO	3.3V	From RTL8153
S20	GBE1_MDI1+	RTL8153_MDI1+	DIO MDI		From RTL8153
S21	GBE1_MDI1-	RTL8153_MDI1-	DIO MDI		From RTL8153
S22	GBE1_LINK1000#	RTL8153_LED2	DO	3.3V	From RTL8153

SMARC Pin No.	SMARC PIN Name	CPU PIN / Multiplexing	I/O Type	I/O Level	Comments
S23	GBE1_MDI2+	RTL8153_MDI2+	DIO MDI		From RTL8153
S24	GBE1_MDI2-	RTL8153_MDI2-	DIO MDI		From RTL8153
S25	GND	N/A			
S26	GBE1_MDI3+	RTL8153_MDI3+	DIO MDI		From RTL8153
S27	GBE1_MDI3-	RTL8153_MDI3-	DIO MDI		From RTL8153
S28	GBE1_CTREF	N/A			
S29	PCIE_D_TX+ / ERDES_0_TX+	N/A			
S30	PCIE_D_TX- / SERDES_0_TX-	N/A			
S31	GBE1_LINK_ACT#	RTL8153_LED0	DO	3.3V	From RTL8153
S32	PCIE_D_RX+ / SERDES_0_RX+	N/A			
S33	PCIE_D_RX- / SERDES_0_RX-	N/A			
S34	GND	N/A			
S35	USB4+	N/A			
S36	USB4-	N/A			
S37	USB3_VBUS_DET	N/A			
S38	AUDIO_MCK	GPIO: GPIO114 I2S: I2SO2_MCK I2S: I2SIN_MCK	DIO	1.8V	

SMARC Pin No.		("red" for default setting)			
Secondary (Bottom) Side	SMARC PIN Name	CPU PIN / Multiplexing	I/O Type	I/O Level	Comments
S39	I2S0_LRCK	GPIO: GPIO109 I2S: I2SIN_WS I2S: SPLIN_BCK DMIC: DMIC4_DAT CAM: CMVREF6 AUXIF: AUXIF_ST1	DIO	1.8V	
S40	I2S0_SDOUT	N/A			
S41	I2S0_SDIN	GPIO: GPIO110 I2S: I2SIN_D0 SPLIN: SPLIN_D0 DMIC: DMIC4_DAT_R CAM: CMVREF7 AUXIF: AUXIF_CLK1	DI	1.8V	
S42	I2S0_CK	GPIO: GPIO108 I2S: I2SIN_BCK SPLIN: SPLIN_LRCK DMIC: DMIC4_CLK CAM: CMVREF5 AUXIF: AUXIF_CLK0	DIO	1.8V	
S43	ESPI_ALERT0#	N/A			
S44	ESPI_ALERT1#	N/A			
S45	MDIO_CLK	N/A			
S46	MDIO_DAT	N/A			
S47	GND	N/A			

SMARC Pin No.	SMARC PIN Name	CPU PIN / Multiplexing	I/O Type	I/O Level	Comments
S48	I2C_GP_CK	GPIO: GPIO63 I2C: SCL4	DO	1.8V	
S49	I2C_GP_DAT	GPIO: GPIO64 I2C: SDA4	DIO	1.8V	
S50	HDA_SYNC / I2S2_LRCK	GPIO: GPIO116 I2S: I2SO2_WS I2S: I2SIN_WS	DIO	1.8V	
S51	HDA_SDO / I2S2_SDOUT	GPIO: GPIO117 I2S: I2SO2_D0 I2S: I2SIN_D0	DO	1.8V	
S52	HDA_SDI / I2S2_SDIN	N/A			
S53	HDA_CK / I2S2_CK	GPIO: GPIO115 I2S: I2SO2_BCK I2S: I2SIN_BCK	DIO	1.8V	
S54	SATA_ACT#	N/A			
S55	USB5_EN_OC#	HUB4_EN_OC#	DIO	3.3V	From RTS5411S P4
S56	ESPI_IO_2 / QSPI_IO_2	N/A			
S57	ESPI_IO_3 / QSPI_IO_3	N/A			
S58	ESPI_RESET#	N/A			
S59	USB5+	DSP4_DP	DIO		From RTS5411S P4
S60	USB5-	DSP4_DM	DIO		From RTS5411S P4

SMARC Pin No.	("red" for default setting)				
Secondary (Bottom) Side	SMARC PIN Name	CPU PIN / Multiplexing	I/O Type	I/O Level	Comments
S61	GND	N/A			
S62	USB3_SSTX+	DSP2_SSTX+	DO		From RTS5411S P2
S63	USB3_SSTX-	DSP2_SSTX-	DO		From RTS5411S P2
S64	GND	N/A			
S65	USB3_SSRX+	DSP2_SSRX+	DI		From RTS5411S P2
S66	USB3_SSRX-	DSP2_SSRX-	DI		From RTS5411S P2
S67	GND	N/A			
S68	USB3+	DSP2_DP	DIO		From RTS5411S P2
S69	USB3-	DSP2_DM	DIO		From RTS5411S P2
S70	GND	N/A			
S71	USB2_SSTX+	DSP1_SSTX+	DO		From RTS5411S P1
S72	USB2_SSTX-	DSP1_SSTX-	DO		From RTS5411S P1
S73	GND	N/A			
S74	USB2_SSRX+	DSP1_SSRX+	DI		From RTS5411S P1
S75	USB2_SSRX-	DSP1_SSRX+	DI		From RTS5411S P1
S76	PCIE_B_RST#	N/A			
S77	PCIE_C_RST#	N/A			
S78	PCIE_C_RX+ / SERDES_1_RX+	N/A			
S79	PCIE_C_RX- / SERDES_1_RX-	N/A			
S80	GND	N/A			
S81	PCIE_C_TX+ / SERDES_1_TX+	N/A			

SMARC Pin No.	SMARC PIN Name	CPU PIN / Multiplexing	I/O Type	I/O Level	Comments
S82	PCIE_C_TX- / SERDES_1_TX-	N/A			
S83	GND	N/A			
S84	PCIE_B_REFCK+	N/A			
S85	PCIE_B_REFCK	N/A			
S86	GND	N/A			
S87	PCIE_B_RX+	N/A			
S88	PCIE_B_RX-	N/A			
S89	GND	N/A			
S90	PCIE_B_TX+	N/A			
S91	PCIE_B_TX-	N/A			
S92	GND	N/A			
S93	DP0_LANE0+	DP_LN0_TXP	AIO	1.2V	DP
S94	DP0_LANE0-	DP_LN0_TXN	AIO	1.2V	DP
S95	DP0_AUX_SEL	N/A	DI		DP
S96	DP0_LANE1+	DP_LN1_TXP	AIO	1.2V	DP
S97	DP0_LANE1-	DP_LN1_TXN	AIO	1.2V	DP
S98	DP0_HPD	DPTX_HPD	DI		DP
S99	DP0_LANE2+	DP_LN2_TXP	AIO	1.2V	DP
S100	DP0_LANE2-	DP_LN2_TXN	AIO	1.2V	DP
S101	GND	N/A			
S102	DP0_LANE3+	DP_LN3_TXP	AIO	1.2V	DP
S103	DP0_LANE3-	DP_LN3_TXN	AIO	1.2V	DP
S104	USB3_OTG_ID	N/A			

SMARC Pin No.	SMARC PIN Name	CPU PIN / Multiplexing	I/O Type	I/O Level	Comments
S105	DP0_AUX+	DPAUXP	AIO	1.2V	DP
S106	DP0_AUX	DPAUXN	AIO	1.2V	DP
S107	LCD1_BKLT_EN	GPIO: GPIO72 SPI: SPIM0_MISO SPI: SCP_SPI0_MI DMIC: DMIC4_CLK CAM: CMVREF3	DO	1.8V	
S108	LVDS1_CK+ / eDP1_AUX+ / DSI1_CLK+	MUX_AUXP_CKP			From TMUXHS4212
S109	LVDS1_CK- / eDP1_AUX- / DSI1_CLK-	MUX_AUXN_CKN			From TMUXHS4212
S110	GND	N/A			
S111	LVDS1_0+ / eDP1_TX0+ / DSI1_D0+	MUX_DSI_EDP_D0P			From TMUXHS4212
S112	LVDS1_0- / eDP1_TX0- / DSI1_D0-	MUX_DSI_EDP_D0N			From TMUXHS4212

SMARC Pin No.	SMARC PIN Name	CPU PIN / Multiplexing	I/O Type	I/O Level	Comments
S113	eDP1_HPD / DSI1_TE	GPIO: GPIO28 DSI: DSI1_TE DSI: DSI_TE EDP: EDP_TX_HPD CAM: CMVREF3 PWM: PWM_3	DI	1.8V	
S114	LVDS1_1+ / eDP1_TX1+ / DSI1_D1+	MUX_DSI_EDP_D1P			From TMUXHS4212
S115	LVDS1_1- / eDP1_TX1- / DSI1_D1-	MUX_DSI_EDP_D1N			From TMUXHS4212
S116	LCD1_VDD_EN	GPIO: GPIO89 USB: IDDIG_2P UART: URXD2 UART: UCTS1 CLK: CLKM3 GPIO: TP_GPIO7_AO AUXIF: AUXIF_CLK1	DO	1.8V	
S117	LVDS1_2+ / eDP1_TX2+ / DSI1_D2+	DSI1_D2P_T0A			
S118	LVDS1_2- / eDP1_TX2- / DSI1_D2-	DSI1_D2N_T0B			

SMARC Pin No.	SMARC PIN Name	CPU PIN / Multiplexing	I/O Type	I/O Level	Comments
S119	GND	N/A			
S120	LVDS1_3+ / eDP1_TX3+ / DSI1_D3+	DSI1_D3P_T2C			
S121	LVDS1_3- / eDP1_TX3- / DSI1_D3-	DSI1_D3N			
S122	LCD1_BKLT_PWM	GPIO: GPIO30 DISP: DISP_PWM1 DISP: DISP_PWM0 CAM: CMFLASH3 PWM: PWM_1	DO	1.8V	
S123	GPIO13	GPIO: GPIO13 GPIO: TP_GPIO5_AO SPI: SPIM4_CLK HDMI: HDMITX20_CEC	DIO	1.8V	
S124	GND	N/A			
S125	LVDS0_0+ / eDP0_TX0+ / DSI0_D0+	DSI0_D0P_T0C			
S126	LVDS0_0- / eDP0_TX0- / DSI0_D0-	DSI0_D0N_T1A			

SMARC Pin No.	SMARC PIN Name	CPU PIN / Multiplexing	I/O Type	I/O Level	Comments
S127	LCD0_BKLT_EN	GPIO: GPIO45 KP: KPROW1 EDP: EDP_TX_HPD CAM: CMFLASH3 I2S: I2SIN_MCK	DO	1.8V	
S128	LVDS0_1+ / eDP0_TX1+ / DSI0_D1+	DSI0_D1P_T2A			
S129	LVDS0_1- / eDP0_TX1- / DSI0_D1-	DSI0_D1N_T2B			
S130	GND	N/A			
S131	LVDS0_2+ / eDP0_TX2+ / DSI0_D2+	DSI0_D2P_T0A			
S132	LVDS0_2- / eDP0_TX2- / DSI0_D2-	DSI0_D2N_T0B			
S133	LCD0_VDD_EN	GPIO: GPIO111 I2S: I2SIN_D1 I2S: SPLIN_D1 DMIC: DMIC3_CLK SPDIF: SPDIF_OUT	DO	1.8V	

SMARC Pin No.	("red" for default setting)				
Secondary (Bottom) Side	SMARC PIN Name	CPU PIN / Multiplexing	I/O Type	I/O Level	Comments
S134	LVDS0_CK+ / eDP0_AUX+ / DSI0_CLK+	DSI0_CKP_T1B			
S135	LVDS0_CK- / eDP0_AUX- / DSI0_CLK-	DSI0_CKN_T1C			
S136	GND	N/A			
S137	LVDS0_3+ / eDP0_TX3+ / DSI0_D3+	DSI0_D3P_T2C			
S138	LVDS0_3- / eDP0_TX3- / DSI0_D3-	DSI0_D3N			
S139	I2C_LCD_CK	GPIO: GPIO55 I2C: SCL0 I2C: SCP_SCL0 I2C: SCP_SCL1	DO	1.8V	
S140	I2C_LCD_DAT	GPIO: GPIO56 I2C: SDA0 I2C: SCP_SDA0 I2C: SCP_SDA1	DIO	1.8V	
S141	LCD0_BKLT_PWM	GPIO: GPIO29 DISP: DISP_PWM0 DISP: DISP_PWM1	DO	1.8V	

SMARC Pin No.	SMARC PIN Name	CPU PIN / Multiplexing	I/O Type	I/O Level	Comments
S142	GPIO12	GPIO: GPIO12 GPIO: TP_GPIO4_AO SPI: SPIM4_CSB HDMI: HDMITX20_HTPLG	DIO	1.8V	
S143	GND	N/A			
S144	eDP0_HPD / DSI0_TE	GPIO: GPIO26 DSI: DSI_TE DSI: DSI1_TE EDP: EDP_TX_HPD	DI	1.8V	
S145	WDT_TIME_OUT#	GPIO: GPIO100 WDT: WATCHDOG	DO	1.8V	
S146	PCIE_WAKE#	GPIO: GPIO47 PCI: WAKEN	DI	3.3V	PCIE
S147	VDD_RTC	VDD_RTC			
S148	LID#	N/A			
S149	SLEEP#	N/A			
S150	VIN_PWR_BAD#	N/A			
S151	CHARGING#	N/A			
S152	CHARGER_PRSENT#	N/A			
S153	CARRIER_STBY#	N/A			
S154	CARRIER_PWR_ON	N/A			
S155	FORCE_RECOV#	GPIO: GPIO42 KP: KPCOLO	DIO	1.8V	Download Key
S156	BATLOW#	N/A			

SMARC Pin No. ("red" for default setting)					
Secondary (Bottom) Side	SMARC PIN Name	CPU PIN / Multiplexing	I/O Type	I/O Level	Comments
S157	TEST#	N/A			
S158	GND	N/A			

Functional Signal Description

Display

MIPI-DSIO

SMARC PIN#	SMARC PIN Name	CPU PIN / Singal
S125	DSIO_D0+	DSIO_D0P_T0C
S126	DSIO_D0-	DSIO_D0N_T1A
S128	DSIO_D1+	DSIO_D1P_T2A
S129	DSIO_D1-	DSIO_D1N_T2B
S131	DSIO_D2+	DSIO_D2P_T0A
S132	DSIO_D2-	DSIO_D2N_T0B
S137	DSIO_D3+	DSIO_D3P_T2C
S138	DSIO_D3-	DSIO_D3N
S134	DSIO_CLK+	DSIO_CKP_T1B
S135	DSIO_CLK-	DSIO_CKN_T1C
S133	LCD0_VDD_EN	GPIO111
S127	LCD0_BKLT_EN	GPIO45
S141	LCD0_BKLT_PWM	DISP_PWM0
S140	I2C_LCD_DAT	SDA0
S139	I2C_LCD_CK	SCL0
S144	DSIO_TE	DSIO_TE

MIPI-DSI1/eDP

SMARC PIN#	SMARC PIN Name	CPU PIN / Singal
S111	DSI1_D0+ / eDP1_TX0+	DSI1_D0N_T1A
S112	DSI1_D0- / eDP1_TX0-	DSI1_D0P_T0C
S114	DSI1_D1+ / eDP1_TX1+	DSI1_D1P_T2A
S115	DSI1_D1- / eDP1_TX1-	DSI1_D1N_T2B
S117	DSI1_D2+ / eDP1_TX2+	DSI1_D2P_T0A
S118	DSI1_D2- / eDP1_TX2-	DSI1_D2N_T0B
S120	DSI1_D3+ / eDP1_TX3+	DSI1_D3P_T2C
S121	DSI1_D3- / eDP1_TX3-	DSI1_D3N
S108	DSI1_CLK+ / eDP1_AUX+	MUX_AUXP_CKP
S109	DSI1_CLK- / eDP1_AUX-	MUX_AUXN_CKN
S116	LCD1_VDD_EN / LCD1_VDD_EN	GPIO89
S107	LCD1_BKLT_EN	GPIO72
S122	LCD0_BKLT_PWM	DISP_PWM1
S113	DSI1_TE / eDP1_HPD	DSI1_TE
S140	I2C_LCD_DAT	SDA0
S139	I2C_LCD_CK	SCL0

DisplayPort

SMARC PIN#	SMARC PIN Name	CPU PIN / Singal
S93	DP0_LANE0+	DP_LN0_TXP
S94	DP0_LANE0-	DP_LN0_TXN
S96	DP0_LANE1+	DP_LN1_TXP
S97	DP0_LANE1-	DP_LN1_TXN
S99	DP0_LANE2+	DP_LN2_TXP
S100	DP0_LANE2-	DP_LN2_TXN
S102	DP0_LANE3+	DP_LN3_TXP
S103	DP0_LANE3-	DP_LN3_TXN
S105	DP0_AUX+	DPAUXP
S106	DP0_AUX-	DPAUXN
S95	DP0_AUX_SEL	DP_AUX_SEL
S98	DP0_HPD	DPTX_HPD

HD-Display

SMARC PIN#	SMARC PIN Name	CPU PIN / Singal
P92	HDMI_D2+	HDMITX21_CH2_P
P93	HDMI_D2-	HDMITX21_CH2_M
P95	HDMI_D1+	HDMITX21_CH1_P
P96	HDMI_D1-	HDMITX21_CH1_N
P98	HDMI_D0+	HDMITX21_CH0_P
P99	HDMI_D0-	HDMITX21_CH0_N
P101	HDMI_CK+	HDMITX21_CLK_P

SMARC PIN#	SMARC PIN Name	CPU PIN / Singal
P102	HDMI_CK-	HDMITX21_CLK_N
P105	HDMI_CTRL_CK	HDMITX_SCL
P106	HDMI_CTRL_DAT	HDMITX_SDA
P104	HDMI_HPD	HDMITX_HTPLG
P107	DP1_AUX_SEL	HDMITX_CEC

Camera

MIPI-CSIOA

SMARC PIN#	SMARC PIN Name	CPU PIN / Singal
S11	CSIO_RX0+	CSIOA_L0P_T0A
S12	CSIO_RX0-	CSIOA_L0N_T0B
S14	CSIO_RX1+	CSIOA_L2P_T1B
S15	CSIO_RX1-	CSIOA_L2N_T1C
S8	CSIO_CK+	CSIOA_L1P_T0C
S9	CSIO_CK-	CSIOA_L1N_T1A
S5	I2C_CAM0_CK / CSIO_TX+	SCL5
S7	I2C_CAM0_DAT / CSIO_TXS7	SDA5
P110	CAM0_RST#	GPIO19
P108	CAM0_PWR#	GPIO18

MIPI-CSI0B (CN2900)

Future		
Connector	PIN NAME	CPU PIN / Singal
#1	VCC (3.3V)	VCC (3.3V)
#2	VCC (3.3V)	VCC (3.3V)
#3	GND	GND
#4	CSI3_RX0+	CSI0B_L0P_T0A
#5	CSI3_RX0-	CSI0B_L0P_T0B
#6	GND	GND
#7	CSI3_RX1+	CSI0B_L2P_T1B
#8	CSI3_RX1-	CSI0B_L2N_T1C
#9	GND	GND
#10	N.C.	N.C.
#11	N.C.	N.C.
#12	CAM3_RST#	GPIO8
#13	N.C.	N.C.
#14	N.C.	N.C.
#15	GND	GND
#16	CSI3_CK+	CSI0B_L1P_T0C
#17	CSI3_CK-	CSI0B_L1N_T1A
#18	GND	GND
#19	I2C_CAM3_CK/CSI3_TX+	SCL6
#20	I2C_CAM3_DAT/CSI3_TX-	SDA6
#21	CAM3_PWR#	GPIO112
#22	CAM3_MCK	CMMCLK0

Future		
Connector	PIN NAME	CPU PIN / Singal
#23	ME1(GND)	GND
#24	ME2(GND)	GND

MIPI-CSI1

SMARC PIN#	SMARC PIN Name	CPU PIN / Singal
P7	CSI1_RX0+	CSI1A_L1P_T0C
P8	CSI1_RX0-	CSI1A_L1N_T1A
P10	CSI1_RX1+	CSI1B_L0P_T0A
P11	CSI1_RX1-	CSI1B_L0N_T0B
P13	CSI1_RX2+	CSI1A_L0P_T0A
P14	CSI1_RX2-	CSI1A_L0N_T0B
P16	CSI1_RX3+	CSI1B_L1P_T0C
P17	CSI1_RX3-	CSI1B_L1N_T1A
P3	CSI1_CK+	CSI1A_L2P_T1B
P4	CSI1_CK-	CSI1A_L2N_T1C
S2	I2C_CAM1_DAT / CSI1_TXS2	SDA3
S1	I2C_CAM1_CK / CSI1_TX+	SCL3
P109	CAM1_PWR#	GPIO20
P111	CAM1_RST#	GPIO21
S6	CAM_MCK	CMMCLK1

Networking

GBE0

SMARC PIN#	SMARC PIN Name	CPU PIN / Singal
P30	GBE0_MDI0+	MDIP0(RTL8211)
P29	GBE0_MDI0-	MDIN0(RTL8211)
P27	GBE0_MDI1+	MDIP1(RTL8211)
P26	GBE0_MDI1-	MDIN1(RTL8211)
P24	GBE0_MDI2+	MDIP2(RTL8211)
P23	GBE0_MDI2-	MDIN2(RTL8211)
P20	GBE0_MDI3+	MDIP3(RTL8211)
P19	GBE0_MDI3-	MDIN3(RTL8211)
P25	GBE0_LINK_ACT#	LED0(RTL8211)
P21	GBE0_LINK100#	LED1(RTL8211)
P22	GBE0_LINK1000#	LED2(RTL8211)

GBE1

SMARC PIN#	SMARC PIN Name	CPU PIN / Singal
S17	GBE1_MDI0+	MDIP0(RTL8153B)
S18	GBE1_MDI0-	MDIN0(RTL8153B)
S20	GBE1_MDI1+	MDIP1(RTL8153B)
S21	GBE1_MDI1-	MDIN1(RTL8153B)
S23	GBE1_MDI2+	MDIP2(RTL8153B)

SMARC PIN#	SMARC PIN Name	CPU PIN / Singal
S24	GBE1_MDI2-	MDIN2(RTL8153B)
S26	GBE1_MDI3+	MDIP3(RTL8153B)
S27	GBE1_MDI3-	MDIN3(RTL8153B)
S31	GBE1_LINK_ACT#	LED0(RTL8153B)
S19	GBE1_LINK100#	LED1(RTL8153B)
S22	GBE1_LINK1000#	LED2(RTL8153B)

PCIE

PCIE_A (1 Lane)

SMARC PIN#	SMARC PIN Name	CPU PIN / Singal
P89	PCIE_A_TX+	PCIE_LN0_TXP
P90	PCIE_A_TX-	PCIE_LN0_TXN
P86	PCIE_A_RX+	PCIE_LN0_RXP
P87	PCIE_A_RX-	PCIE_LN0_RXN
P83	PCIE_A_REFCK+	PCIE_CKP
P84	PCIE_A_REFCK-	PCIE_CKN
P75	PCIE_A_RST#	PCIE_PERESET_N
P78	PCIE_A_CKREQ#	PCIE_CLKREQ_N
S146	PCIE_WAKE#	PCIE_WAKE_N

USB

USB0

SMARC PIN#	SMARC PIN Name	CPU PIN / Singal
P60	USB0+	USB_DP_P0
P61	USB0-	USB_DM_P0
P62	USB0_EN_OC#	USB0_DRV_VBUS
P63	USB0_VBUS_DET	USB0_VBUS_VALID
P64	USB0_OTG_ID	USB0_IDDIG

USB1

SMARC PIN#	SMARC PIN Name	CPU PIN / Singal
P65	USB1+	USB_DP_P2
P66	USB1-	USB_DM_P2
P67	USB1_EN_OC#	USB2_DRV_VBUS

USB2

SMARC PIN#	SMARC PIN Name	CPU PIN / Singal
P69	USB2+	DSP1_DP(RTS5411S)
P70	USB2-	DSP1_DM(RTS5411S)
S74	USB2_SSRX+	DSP1_SSRX+(RTS5411S)
S75	USB2_SSRX-	DSP1_SSRX-(RTS5411S)

SMARC PIN#	SMARC PIN Name	CPU PIN / Singal
S71	USB2_SSTX+	DSP1_SSTX+(RTS5411S)
S72	USB2_SSTX-	DSP1_SSTX-V
P71	USB2_EN_OC#	OCP1(RTS5411S)

USB3

SMARC PIN#	SMARC PIN Name	CPU PIN / Singal
S68	USB3+	DSP2_DP(RTS5411S)
S69	USB3-	DSP2_DM(RTS5411S)
S65	USB3_SSRX+	DSP2_SSRX+(RTS5411S)
S66	USB3_SSRX-	DSP2_SSRX-(RTS5411S)
S62	USB3_SSTX+	DSP2_SSTX+(RTS5411S)
S63	USB3_SSTX-	DSP2_SSTX-(RTS5411S)
P74	USB3_EN_OC#	OCP2(RTS5411S)

USB5

SMARC PIN#	SMARC PIN Name	CPU PIN / Singal
S59	USB5+	DSP4_DP(RTS5411S)
S60	USB5-	DSP4_DM(RTS5411S)
S55	USB5_EN_OC#	OCP4(RTS5411S)

UART

UART0

SMARC PIN#	SMARC PIN Name	CPU PIN / Singal
P134	SER1_TX	UART0_TXD
P135	SER1_RX	UART0_RXD

UART1

SMARC PIN#	SMARC PIN Name	CPU PIN / Singal
P129	SER0_TX	UART1_TXD
P130	SER0_RX	UART1_RXD
P131	SER0_RTS#	UART1_RTS
P132	SER0_CTS#	UART1_CTS

UART2

SMARC PIN#	SMARC PIN Name	CPU PIN / Singal
P136	SER2_TX	UART2_TXD
P137	SER2_RX	UART2_RXD
P138	SER2_RTS#	UART2_RTS
P139	SER2_CTS#	UART2_CTS

UART3

SMARC PIN#	SMARC PIN Name	CPU PIN / Singal
P140	SER3_TX	UART3_TXD
P141	SER3_RX	UART3_RXD

Audio

I2S

SMARC PIN#	SMARC PIN Name	CPU PIN / Singal
S38	AUDIO_MCK	I2SO2_MCK
S39	I2S0_LRCK	I2SIN_WS
S40	I2S0_SDOUT	I2SO2_D0
S41	I2S0_SDIN	I2SIN_D0
S42	I2S0_CK	2SIN_BCK

I/Os

SDIO (SD Card)

SMARC PIN#	SMARC PIN Name	CPU PIN / Singal
P39	SDIO_D0	MSDC1_DAT0
P40	SDIO_D1	MSDC1_DAT1
P41	SDIO_D2	MSDC1_DAT2
P42	SDIO_D3	MSDC1_DAT3
P34	SDIO_CMD	MSDC1_CMD
P35	SDIO_CD#	MSDC1_INSI
P36	SDIO_CK	MSDC1_CLK
P37	SDIO_PWR_EN	SDIO_PWR_EN
P33	SDIO_WP	SDIO_WP

SPI_0 (Boot Device)

SMARC PIN#	SMARC PIN Name	CPU PIN / Singal
P43	SPI0_CS0#	SPINORCS
P44	SPI0_CK	SPINORCK
P45	SPI0_DIN	SPINOR_IO1
P46	SPI0_DO	SPINOR_IO1

SPI1

SMARC PIN#	SMARC PIN Name	CPU PIN / Singal
P54	SPI1_CS0#	SPIM2_CSB
P56	SPI1_CK	SPIM2_CLK
P57	SPI1_DIN	SPIM2_MISO
P58	SPI1_DO	SPIM2_MOSI

CAN Bus

SMARC PIN#	SMARC PIN Name	CPU PIN / Singal
P143	CAN0_TX	TXCAN(MCP2518FDT-E)
P144	CAN0_RX	RXCAN(MCP2518FDT-E)

I2C0

SMARC PIN#	SMARC PIN Name	CPU PIN / Singal
P121	I2C_PM_CK	SCL2
P122	I2C_PM_DAT	SDA2

I2C1

SMARC PIN#	SMARC PIN Name	CPU PIN / Singal
S48	I2C_GP_CK	SCL4
S49	I2C_GP_DAT	SDA4

GPIOs

SMARC PIN#	SMARC PIN Name	CPU PIN / Singal
P112	GPIO4 / HDA_RST#	GPIO14
P113	GPIO5 / PWM_OUT	PWM_0
P114	GPIO6 / TACHIN	GPIO43
P115	GPIO7	PWM_1
P116	GPIO8	GPIO44
P117	GPIO9	PWM_2
P118	GPIO10	GPIO11
P119	GPIO11	PWM_3
S142	GPIO12	GPIO12
S123	GPIO13	GPIO13

Miscellaneous

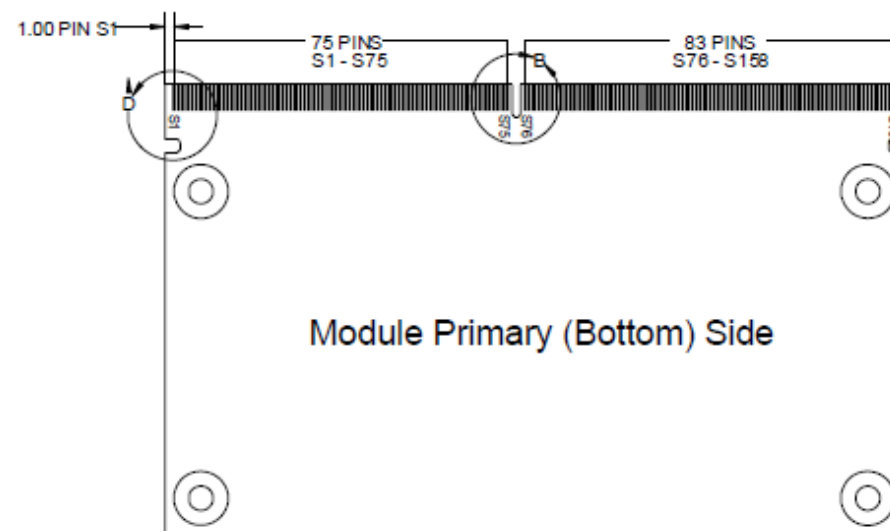
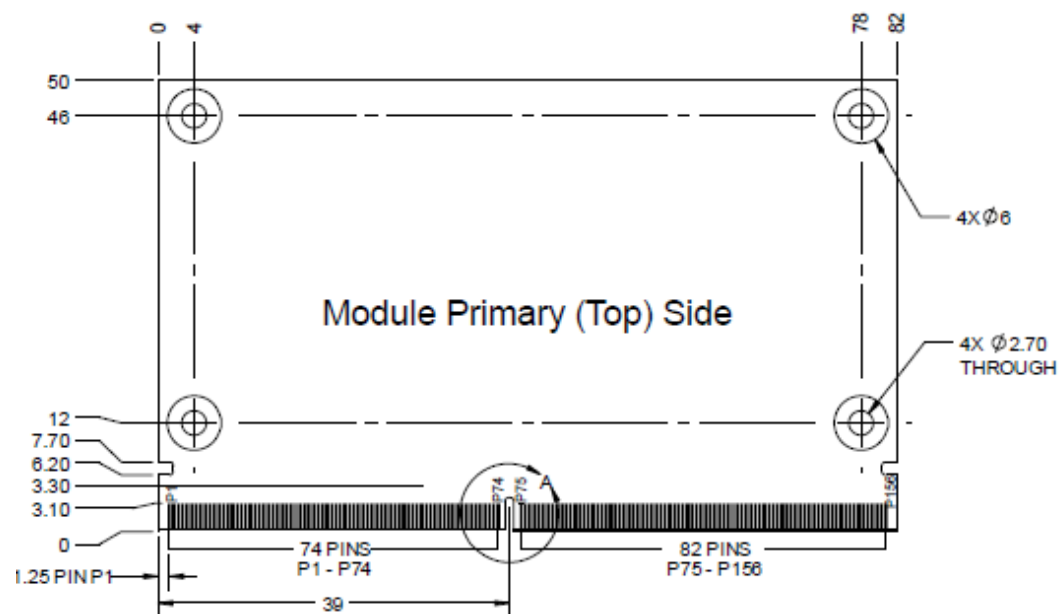
SMARC PIN#	SMARC PIN Name	CPU PIN / Singal
S155	FORCE_RECOV#	GPIO42
S145	WDT_TIME_OUT#	PMIC_WATCHDOG
P146	CAN1_RX	HOMEKEY(MT6365)
P128	POWER_BTN#	PWRKEY(MT6365)
P127	RESET_IN#	SYSRSTB(MT6365)
P126	RESET_OUT#	GPIO15
S147	VDD_RTC	VDD_RTC

Power

SMARC PIN#	SMARC PIN Name	CPU PIN / Singal
P147,P148,P149 P150,P151,P152 P153,P154,P155 P156	VDD_IN	VIN_5V
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	GND	GND
S147	VDD_RTC	VDD_RTC

Mechanical

SMARC Short Size Dimensions



Carrier Connector

The Carrier Board connector is a 314 pin 0.5mm pitch right angle part designed for use with 1.2mm thick mating PCBs with the appropriate edge finger pattern. The connector is commonly used for MXM3 graphics cards. The SMARC Module uses the connector in a way quite different from the MXM3 usage.

Vendor	Vendor P/N	Stack Height	Body Height	Contact Plating	Pin Style	Body Color
Foxconn	AS0B821-S43B - *H	1.5mm	4.3mm	Flash	Std	Black
Foxconn	AS0B821-S43N - *H	1.5mm	4.3mm	Flash	Std	Ivory
Foxconn	AS0B826-S43B - *H	1.5mm	4.3mm	10 u-in	Std	Black
Foxconn	AS0B826-S43N - *H	1.5mm	4.3mm	10 u-in	Std	Ivory
JAE	MM70-314B2-1-R500	1.5mm	4.3mm	0.1 u-meter	Std	Black
Aces	91781-314 2 8-001	2.7mm	5.2mm	3 u-in	Std	Black
Foxconn	AS0B821-S55B - *H	2.7mm	5.5mm	Flash	Std	Black
Foxconn	AS0B821-S55N - *H	2.7mm	5.5mm	Flash	Std	Ivory
Foxconn	AS0B826-S55B - *H	2.7mm	5.5mm	10 u-in	Std	Black
Foxconn	AS0B826-S55N - *H	2.7mm	5.5mm	10 u-in	Std	Ivory
Foxconn	AS0B821-S78B - *H	5.0mm	7.8mm	Flash	Std	Black
Foxconn	AS0B821-S78N - *H	5.0mm	7.8mm	Flash	Std	Ivory
Foxconn	AS0B826-S78B - *H	5.0mm	7.8mm	10 u-in	Std	Black
Foxconn	AS0B826-S78N - *H	5.0mm	7.8mm	10 u-in	Std	Ivory
Yamaichi	CN113-314-2001	5.0mm	7.8mm	0.3 u-meter	Std	Black

Other, taller stack heights **may** be available from these and other vendors. Stack heights as tall as 11mm are shown on the Aces web site.

Note: Many of the vendor drawings for the connectors listed above show a PCB footprint pattern for use with an MXM3 graphics card. This footprint, and the associated pin numbering, is not suitable for SMARC use. The MXM3 standard gangs large groups of pins together to provide ~80W capable power paths needed for X86 graphics cards. The SMARC Module “ungangs” these pins to allow more signal pins. Footprint and pin numbering information for application of this 314 pin connector to SMARC is given in the sections below.

Connector Pin Numbering Convention

The Module pins are designated as P1 – P156 on the Module Primary (Top) side, and S1 – S158 on the Module Secondary (Bottom) side. There is a total of 314 pins on the Module. The connector is sometimes identified as a 321 pin connector, but 7 pins are lost to the key (4 on the primary side and 3 on secondary side).

The Secondary (Bottom) side faces the Carrier Board when a normal or standard Carrier connector is used. Some connector vendors offer “reverse” pin-out connectors, which effectively flip the Module over such that the Module Primary side would face the Carrier Board.

The SMARC Module pins are deliberately numbered as P1 – P156 and S1 – S158 for clarity and to differentiate the SMARC Module from MXM3 graphics Modules, which use the same connector but use the pins for very different functions. MXM3 cards and MXM3 baseboard connectors use a different pin numbering scheme.

This section is referenced from the SMARC Specification v2.1, with copyright owned by SGET.

The SMARC module specification is available at <https://www.sget.org/standards/smarc.html>

MEMO

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