MSC SM2S-IMX93

NXP® i.MX 93 Arm®
Cortex®-A55 / M33

⛶	82 x 50 mm
♨	2-4 W
🌡	-40 +85

SMARC module

NXP
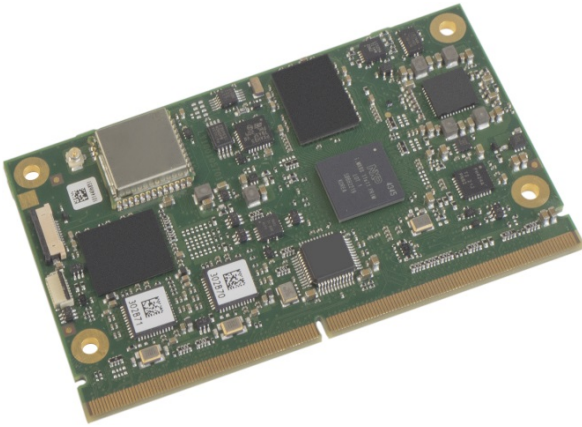
Description

The MSC SM2S-IMX93 SMARC 2.1.1 module family is highly scalable and equipped with i.MX 93 Applications Processors manufactured by NXP. The processors integrate Arm Cortex-A55 cores, bringing performance and energy efficiency to Linux-based edge applications and the Arm Ethos-U65 microNPU, enabling developers to create more capable, cost-effective and energy-efficient machine learning (ML) applications. The i.MX 93 processors deliver advanced security with integrated EdgeLock secure enclave and an efficient pixel pipeline to perform 2D graphics processing to realize cost-effective GUI solutions.

The MSC SM2S-IMX93 provides fast and low power LPDDR4 memory technology with inline ECC support, combined with up to 256GB eMMC Flash memory. Various interfaces for embedded applications such as Dual Gigabit Ethernet, USB 2.0, CAN-FD, single-channel LVDS or MIPI DSI and MIPI CSI for connecting a camera are available. An on-board Wireless Module is provided as assembly options. The typical design power ranges from 2 W to 4 W.

The module is compliant with the new SMARC 2.1.1 standard, allowing easy integration with SMARC baseboards. For evaluation and design-in of the SM2S-IMX93 module, Avnet Embedded provides a development platform and a starter kit. Support for Linux is available (Android support available on request).

Highlights

- Single or Dual core Arm Cortex-A55 Applications Processors up to 1.7GHz
- Arm Cortex-M33 Real Time Processor at 250MHz
- Arm Ethos™-U65 microNPU with 256 MACs/Cycle
- Pixel processing pipeline (PXP) engine
- Up to 2GB LPDDR4 SDRAM with inline ECC
- Up to 256GB eMMC Flash
- Single-channel LVDS / MIPI-DSI x4 (optional)
- MIPI CSI-2 Camera Interface
- 4x USB 2.0 Host interfaces
- 1x USB 2.0 Host/Device interface
- 2x Gigabit Ethernet
- Wireless Module (optional)
- 1x MMC/SD/SDIO interface
- 2x CAN-FD interfaces
- 2x I2S Audio interfaces

- 14x GPIO
- UART, SPI, I2C
- SMARC 2.1.1 Compliant
- Energy Flex Architecture
- Optimized design for low power applications

Technical Data - MSC SM2S-IMX93

Technology	Arm
Formfactor	SMARC Short Size
CPU	NXP i.MX 93 Arm Cortex-A55 Applications Processors - i.MX 9352, dual-core, NPU, 1.5 - 1.7GHz - i.MX 9332, dual-core, 1.5 - 1.7GHz - i.MX 9351, single-core, NPU, 1.5 - 1.7GHz - i.MX 9331, single-core, 1.5 - 1.7GHz Arm Cortex-M33 Real Time Processor at 250MHz Arm Ethos-U65 microNPU with 256 MACs/Cycle
Chipset	SOC
RAM	Up to 2GB 3700MT/s LPDDR4 SDRAM, soldered, inline ECC support
Flash	Up to 256GB eMMC Flash
Storage Interfaces	1x MMC/SD/SDIO
USB	1x USB 2.0 Host/Client, 4x USB 2.0 Host or 1x USB 2.0 Host/Client, 1x USB 2.0 Host (optional)
Serial Interfaces	2x UART with 2-wire hand shake 2x UART w/o hand shake
Bus Interfaces	4x I2C up to 400 Kbit/s 2x CAN-FD / CAN 2.0B 2x SPI (with two chip selects)
Display Controller	Pixel processing pipeline (PXP) engine to support 2D image processing (i.e. Blending/Composition, Rotation, Resize, Color Space Conversion) no 3D Graphics Processing Unit (GPU) no Video Processing Unit (VPU)
Display Interfaces	Single-channel LVDS interface, 18 or 24 bit, up to 1366x768 @ 60fps or MIPI-DSI Display Interface, 4 lanes, up to 1920x1080 @ 60fps (optional)
Network Interface	2x 10/100/1000BASE-T Ethernet (one interface with TSN/1588 support) HD Wireless Module SPB209A with 802.11ac / Bluetooth 5.0, soldered (optional)
Audio Interface	1x I2S Audio
Security Device	Advanced Security, Safety, and Reliability integrated in the SOC Integrated EdgeLock secure enclave enables autonomous management of security functions, including runtime attestation, silicon root of trust, reusable certifications, trust provisioning, and fine-grain key management augmented by extensive crypto services for advanced attack resistance Trusted Platform Module (TPM) 2.0 (optional)

Miscellaneous	Watchdog Timer for system reset (programmable, 1s … 600s)
	RTC / temperature compensated (optional)
	14x GPIO, configurable as input or output, interrupt capable
	64kbit ID EEPROM on I2C bus
	MIPI CSI-2 camera interface (CSI0, 2-lane) or MIPI CSI-2 camera interface (CSI1, 2-lane)
Feature Highlights	SMARC 2.1.1 compatible
Firmware	uboot
OS Support	Linux Board Support Package Android Board Support Package (on request)
Power Requirement	Power Supply +5V +/-5%, 5V Standby Power Consumption 2-4 W typ. (depending on CPU and optional features)
Environment	Temperature Range: Commercial: 0° … 70°C (operating) -20° … 85°C (storage) Extended: -25° … 85°C (operating) -40° … 85°C (storage) Industrial: -40° … 85°C (operating) -40° … 85°C (storage) Humidity: 5 … 95% (operating, non-condensing) 5 … 95% (storage, non-condensing)
Dimensions	82 x 50 mm
Certificates	UL / CE
Cooling	Heatspreader
Carrier	MSC SM2-MB-EP1 MSC SM2-MB-EP5

SMARC

Order Reference - MSC SM2S-IMX93

Order Number	Description	Reference	Cat*
96665	SMARC module based on NXP i.MX 9352, Dual Core Cortex-A55 processor at 1.5GHz, NPU, 2GB LPDDR4, 32GB eMMC Flash, 2x GbE LAN, 4x USB2.0 Host, 1x USB2.0 Host/Device, BT/WLAN, TPM, LVDS, MIPI CSI-2 Camera input (CSI1, 2 lane); industrial temperature -40...+85°C (Engineering Sample - get in touch with your sales representative)	MSC SM2S-IMX93-DC-15N02C1I ES2 PCBES	OR
96663	SMARC module based on NXP i.MX 9352, Dual Core Cortex-A55 processor at 1.5GHz, NPU, 1GB LPDDR4, 16GB eMMC Flash, 2x GbE LAN, 1x USB2.0 Host, 1x USB2.0 Host/Device, LVDS, MIPI CSI-2 Camera input (CSI0, 2 lane); industrial temperature -40...+85°C (Engineering Sample - get in touch with your sales representative)	MSC SM2S-IMX93-DC-04N02B0I ES2 PCBES	OR
96664	SMARC module based on NXP i.MX 9352, Dual Core Cortex-A53 processor at 1.5GHz, NPU, 1GB DDR4, 16GB eMMC Flash, 2x GbE LAN, 4x USB2.0 Host, 1x USB2.0 Host/Device, MIPI-DSI, MIPI CSI-2 Camera input (CSI0, 2 lane); industrial temperature -40...+85°C (Engineering Sample - get in touch with your sales representative)	MSC SM2S-IMX93-DC-04N08A0I ES2 PCBES	OR

*COM products are divided in two categories, „PV" (preferred variant) and „OR" (on request).

SMARC

Accessories

Order Number	Description	Reference
	Carrier Options	
68488	SMARC 2.0 Embedded Platform with PCI Express x4 slot, GbE, SATA, USB 3.0, USB 2.0, USB 2.0 OTG, RS232, CAN, SPI, eSPI, SMBus, I2C and GPIO interface, LVDS/eDP, DisplayPort and HDMI display interface, regulated backlight supply, HD/I2S audio interface, MIPI CSI-2 camera interface, mini PCI Express card slot, SD card slot, fan connector, CMOS battery, Mini-ITX form factor (170 x 170 mm), ATX power connector and single 12V/24V power jack, commercial temperature range 0..+70°C	MSC SM2-MB-EP1-001 PCBFTX
83977	SMARC 2.x compatible embedded platform (146 x 80mm), 10-36V input voltage, 3x RS232, 2x CAN, dual RJ45 LAN with LED (1 x LAN i210) , 1x M.2 2280 Key M slot, mPCIe slot, 1x USB 3.0 Type A, 1x USB 2.0 Type A, 1x USB 2.0 internal, 1x USB 2.0 Host/Device, 2x SPI, I²C, 8 GPIO on FC, 1x HDMI, LVDS/eDP/DSI on JILI30 connector, SD Card Slot, regulated backlight supply, I2S Audio, 1W Mono, camera connector, RTC battery. Industrial temperature range -40..+85°C, Arm full version	MSC SM2S-MB-EP5-002 PCBFTX
83981	SMARC 2.x compatible embedded platform (146 x 80mm), 10-36V input voltage, 2x UART, 1x RS232, 2x CAN, 1x RJ45 LAN with LED, 1x USB 2.0 Type A, 1x USB3.0 Type A, 1x USB 2.0 internal, 1x USB 2.0 Host/Device, 2x SPI, 12 GPIO on FC, 1x HDMI , SD Card Slot, LVDS/eDP/DSI on JILI30 connector, regulated backlight supply, RTC battery. Industrial temperature range -40..+85°C, Arm slim version	MSC SM2S-MB-EP5-004 PCBFTX
	Cooling Options	
97153	Heatspreader for SM2S-IMX93 module, consisting of a single-piece aluminum plane and thermal pad for contact to the processor, with 2.7mm through-hole standoffs	MSC SM2S-IMX93-01 HSP-001
	Other Accessories	
82479	Debug Console (UART) Adapter for i.MX6-based Qseven and nanoRISC modules, with 8-pin FFC cable to connect COM module to 9-pin D-Sub connector	MSC Debug Console Adapter
68948	Debug Adapter for i.MX6-based Qseven, SMARC and nanoRISC modules, with 10-pin FFC cable to connect to COM module, adapter provides headers for JTAG connection to Lauterbach and/or Goepel debuggers	MSC JTAG Adapter FFC 10-pin
	Starter Kits	
97502	SMARC 2.0 Starterkit for NXP i.MX 9 based Modules. Includes MSC SM2-MB-EP1 Baseboard, Heatspreader/Heatsink, SD Card with USB Card Reader, Power Supply and suitable cable kit. The StarterKit does not include the MSC SM2S-IMX93 or SM2S-IMX91 module. Please order your choice of module separately.	MSC SM2-SK-IMX9-EP1-KIT001 BRDFTX