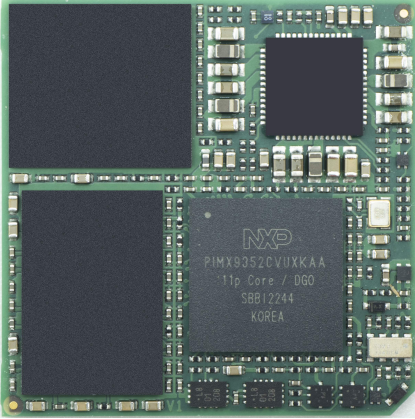




## MSC OSM-SF-IMX93

NXP<sup>®</sup> i.MX 93 Arm<sup>®</sup>  
Cortex<sup>®</sup>-A55 / M33



 30 x 30 mm

 2-4 W

 -40 +85



## Description

The MSC OSM-SF-IMX93 is based on the new OSM 1.1 standard (Size-S) "Small" for completely machine processible low-cost embedded computer modules during soldering, assembly and testing.

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 2D graphics processing unit (GPU).

MSC OSM-SF-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 (RGMII), USB 2.0, 2x CAN-FD, MIPI-DSI and MIPI CSI-2 (2-lane) for connecting a camera are available. The typical design power ranges from 2 W to 4 W.

The module is compliant with the new OSM 1.1 standard (OSM-SF). For evaluation and design-in of the new OSM-SF-IMX93 module, MSC provides a development platform and a starter kit. A Yocto based Linux Board Support Package is available (Android support 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
- MIPI-DSI x4, Single-channel LVDS (opt. on RGB)
- MIPI CSI-2 Camera Interface
- 1x USB 2.0 Host interface
- 1x USB 2.0 Host/Device interface
- 2x Gigabit Ethernet (RGMII)
- 2x SD/SDIO interfaces
- 2x CAN-FD interfaces
- 1x I2S Audio interface
- 4x UART, 2x SPI, 4x I2C
- 20x GPIO
- 2x ADC inputs (12-bit)
- Optimized design for low power applications
- OSM 1.1 (SF) Compliant, 322 Pin, RM 1,25 mm

## Technical Data - MSC OSM-SF-IMX93

|                           |   |
|---------------------------|---|
| <b>Technology</b>         | Arm   |
| <b>Formfactor</b>         | OSM-MF, 322 Pin, RM 1,25 mm   |
| <b>CPU</b>                | <p>NXP i.MX 93 Arm Cortex-A55 Applications Processors</p> <ul style="list-style-type: none"> <li>- i.MX 9352, dual-core, NPU, 1.5 - 1.7GHz</li> <li>- i.MX 9332, dual-core, 1.5 - 1.7GHz</li> <li>- i.MX 9351, single-core, NPU, 1.5 - 1.7GHz</li> <li>- i.MX 9331, single-core, 1.5 - 1.7GHz</li> </ul> <p>Arm Cortex-M33 Real Time Processor at 250MHz<br/>Arm Ethos-U65 microNPU with 256 MACs/Cycle</p> |
| <b>Chipset</b>            | SOC   |
| <b>RAM</b>                | Up to 2GB 3700MT/s LPDDR4 SDRAM, soldered, inline ECC support   |
| <b>Flash</b>              | Up to 256GB eMMC Flash  |
| <b>Storage Interfaces</b> | 2x MMC/SD/SDIO  |
| <b>USB</b>                | 1x USB 2.0 Host/Client, 1x USB 2.0 Host   |
| <b>Serial Interfaces</b>  | <p>1x UART Console with Rx, Tx only</p> <p>1x UART with 2-wire hand shake</p> <p>2x UART w/o hand shake</p>   |
| <b>Bus Interfaces</b>     | <p>2x I2C up to 400 Kbit/s</p> <p>2x SPI (with two chip selects)</p> <p>2x CAN-FD /CAN 2.0B</p>   |
| <b>Display Controller</b> | <p>Pixel processing pipeline (PXP) engine to support 2D image processing (i.e. Blending/ Composition, Rotation, Resize, Color Space Conversion)</p> <p>no 3D Graphics Processing Unit (GPU)</p> <p>no Video Processing Unit (VPU)</p>   |
| <b>Display Interfaces</b> | <p>MIPI-DSI Display Interface, 4 lanes, up to 1920x1080 @ 60fps</p> <p>Single-channel LVDS interface, 18 or 24 bit, up to 1366x768 @ 60fps (opt. on RGB Pins)</p>   |
| <b>Network Interface</b>  | 2x Ethernet, (RGMII interface)  |
| <b>Audio Interface</b>    | 1x I2S Audio  |
| <b>Security Device</b>    | <p>Advanced Security, Safety, and Reliability integrated in the SOC</p> <p>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</p>                               |

|                           |  |
|---------------------------|--|
| <b>Miscellaneous</b>      | Watchdog Timer for system reset (programmable, 1s ... 600s)<br><br>RTC<br><br>20x GPIO, configurable as input or output, interrupt capable<br>2x PWM<br>2x ADC inputs (12-bit)<br><br>MIPI CSI-2 camera interface (2 lane)   |
| <b>Feature Highlights</b> | OSM, Size-S compatible   |
| <b>Firmware</b>           | uboot  |
| <b>OS Support</b>         | Linux Board Support Package<br>Android Board Support Package (on request)  |
| <b>Power Requirement</b>  | Power Supply +5V +/-5%<br>Power Consumption 2-4 W typ. (depending on CPU)  |
| <b>Environment</b>        | Temperature Range:<br>Commercial: 0° ... 70°C (operating) -20° ... 85°C (storage)<br>Extended: -25° ... 85°C (operating) -40° ... 85°C (storage)<br>Industrial: -40° ... 85°C (operating) -40° ... 85°C (storage)<br><br>Humidity:<br>5 ... 95% (operating, non condensing)<br>5 ... 95% (storage, non-condensing) |
| <b>Dimensions</b>         | 30 x 30 mm   |
| <b>Certificates</b>       | UL /CE   |
| <b>Carrier</b>            | MSC SM2F-OSM-AD-001  |

## Order Reference - MSC OSM-SF-IMX93

| Order Number | Description   | Reference                                    | Cat* |
|--------------|---|--|------|
| 111852       | OSM 1.1 module based on NXP i.MX 9352, Dual Core Cortex-A55 processor at 1.5GHz, NPU, 2GB LPDDR4, 16GB eMMC Flash, 2x GbE (RGMII), 1x USB2.0 Host, 1x USB2.0 Host/Device, 20x GPIO, MIPI-DSI, LVDS (on RGB interface), MIPI CSI-2 Camera input, 2x CAN-FD, industrial temperature -40...+85°C     | MSC<br>OSM-SF-IMX93-DC-14N0A001<br>PCBFTX    | PV   |
| 111801       | OSM 1.1 module based on NXP i.MX 9352, Dual Core Cortex-A55 processor at 1.5GHz, NPU, 1GB LPDDR4, 8GB eMMC Flash, 2x GbE (RGMII), 1x USB2.0 Host, 1x USB2.0 Host/Device, 20x GPIO, MIPI-DSI, LVDS (on RGB interface), MIPI CSI-2 Camera input, 2x CAN-FD, industrial temperature -40...+85°C      | MSC<br>OSM-SF-IMX93-DC-03N0A001<br>PCBFTX    | PV   |
| 111853       | OSM 1.1 module based on NXP i.MX 9332, Dual Core Cortex-A55 processor at 1.5GHz, no NPU, 1GB LPDDR4, 8GB eMMC Flash, 2x GbE (RGMII), 1x USB2.0 Host, 1x USB2.0 Host/Device, 20x GPIO, MIPI-DSI, LVDS (on RGB interface), MIPI CSI-2 Camera input, 2x CAN-FD, extended temperature -25...+85°C     | MSC<br>OSM-SF-IMX93-DCL-03N0A00E<br>PCBFTX   | PV   |
| 111854       | OSM 1.1 module based on NXP i.MX 9331, Single Core Cortex-A55 processor at 1.5GHz, no NPU, 512MB LPDDR4, 4GB eMMC Flash, 2x GbE (RGMII), 1x USB2.0 Host, 1x USB2.0 Host/Device, 20x GPIO, MIPI-DSI, LVDS (on RGB interface), MIPI CSI-2 Camera input, 2x CAN-FD, extended temperature -25...+85°C | MSC<br>OSM-SF-IMX93-SCL-92N0A00E<br>PCBFTX   | PV   |
| 98572        | OSM 1.1 module based on NXP i.MX 9352, Dual Core Cortex-A55 processor at 1.5GHz, NPU, 1GB LPDDR4, 16GB eMMC Flash, soldered on SM2F-OSM-AD-001  | MSC<br>SM2F-OSM-AD-93D1G160-001<br>ES2 PCBES | OR   |
| 98574        | OSM 1.1 module based on NXP i.MX 9352, Dual Core Cortex-A55 processor at 1.5GHz, NPU, 512MB LPDDR4, 4GB eMMC Flash, soldered on SM2F-OSM-AD-001   | MSC<br>SM2F-OSM-AD-93D05G40-001<br>ES2 PCBES | OR   |

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

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