



## MSC SM2S-ZUSP

Xilinx<sup>®</sup> Zynq<sup>®</sup> UltraScale+<sup>™</sup> MPSoC



 82 x 50 mm

 5-15 W

 -40 +85



## Description

The MSC SM2S-ZUSP module is based on Xilinx Zynq UltraScale+ MPSoC and supports ZU2, ZU3, ZU4 or ZU5 FPGA complexity.

Zynq UltraScale+ MPSoC devices provide 64-bit processor scalability while combining real-time control with soft and hard engines for graphics, video, waveform, and packet processing. Integrating an ARM<sup>®</sup>-based system for advanced analytics and on-chip programmable logic for task acceleration creates unlimited possibilities for applications including 5G Wireless, next generation ADAS, Internet-of-Things, Industrial Automation, Medical, Transportation and Robotics.

MSC SM2S-ZUSP offers dual-core or quad-core ARM Cortex<sup>™</sup>-A53 processors in combination with dual ARM Cortex-R5 real time processors and ARM Mali<sup>™</sup>-400 GPU. It provides DDR4 SDRAM with optional ECC, dedicated DDR4 SDRAM for the Programmable Logic, up to 64GB eMMC Flash memory, Dual Gigabit Ethernet, PCI Express, USB 3.0, an on-board Wireless Module as well as an extensive set of interfaces for embedded applications.

The module is compliant with the new SMARC<sup>™</sup> 2.0 standard, allowing easy integration with SMARC baseboards. For evaluation and design-in of the SM2S-ZUSP module, MSC provides a development platform and a starter kit. Support for Linux is available (Android support on request).

## Highlights

- Dual or Quad core ARM Cortex-A53 Application Processors up to 1.5GHz
- Dual core ARM Cortex-R5 Real-Time Processors up to 600MHz
- Mali-400 MP2 Graphics Processor (optional)
- H.264 / H.265 Video Codec (optional)
- Up to 8GB DDR4 SDRAM, ECC support (optional)
- Up to 2GB DDR4 SDRAM for FPGA (optional)
- Up to 64GB eMMC Flash
- SATA-III interface (6Gbps)
- DisplayPort interface
- Dual-channel LVDS interface (optional)
- MIPI CSI-2 Camera Interface (optional)
- Up to 2x PCI Express x2 Gen. 3
- Up to 1x USB 3.0/2.0 Host interface
- Up to 3x USB 2.0 Host interface
- 1x USB 2.0 Host/Device interface
- Gigabit Ethernet (single or dual)
- Wireless Module (optional)
- 1x MMC/SD/SDIO interface
- 2x CAN interface
- UART, SPI, I2C
- Rich FPGA I/O
- SMARC 2.0 Compliant

## Technical Data - MSC SM2S-ZUSP

<b>Technology</b>	ARM
<b>Formfactor</b>	SMARC Short Size
<b>CPU</b>	<p>Xilinx UltraScale+ ZU2CG, ZU3CG, ZU4CG or ZU5CG MPSoC with</p> <ul style="list-style-type: none"> <li>- Dual core ARM Cortex-A53 MPCore Application Processor up to 1.3GHz</li> <li>- Dual core ARM Cortex-R5 MPCore Real-Time Processor up to 533MHz</li> </ul> <p>Xilinx UltraScale+ ZU2EG, ZU3EG, ZU4EG, ZU5EG, ZU4EV or ZU5EV MPSoC with</p> <ul style="list-style-type: none"> <li>- Quad core ARM Cortex-A53 MPCore Application Processor up to 1.5GHz</li> <li>- Dual core ARM Cortex-R5 MPCore Real-Time Processor up to 600MHz</li> </ul>
<b>Chipset</b>	SOC
<b>RAM</b>	<p>Up to 8GB DDR4-2400 SDRAM, soldered, ECC support (optional)</p> <p>Up to 2GB DDR4-2133 SDRAM, soldered, for Programmable Logic (optional)</p>
<b>Flash</b>	<p>Up to 64GB eMMC Flash</p> <p>QSPI NOR Boot Flash</p>
<b>Storage Interfaces</b>	<p>1x MMC/SD/SDIO</p> <p>1x SATA-III (6Gbps)</p>
<b>USB</b>	<p>1x USB 3.0/2.0 Host, 3x USB 2.0 Host, 1x USB 2.0 Host/Client or</p> <p>1x USB 3.0/2.0 Host, 2x USB 2.0 Host, 1x USB 2.0 Host/Client (option w/ WLAN) or</p> <p>1x USB 3.0 Host, 1x USB 2.0 Host, 1x USB 2.0 Host/Client (option w/o Hub)</p>
<b>Serial Interfaces</b>	<p>1x UART with 2-wire hand shake</p> <p>1x UART w/o hand shake</p>
<b>Bus Interfaces</b>	<p>1x PCI Express x1 Gen. 2 (5Gbps) using ZU2/3 devices</p> <p>2x PCI Express x2 Gen. 3 (8Gbps) using ZU4/5 devices</p> <p>2x CAN 2.0B</p> <p>2x SPI (with two chip selects)</p> <p>3x I2C up to 400 Kbit/s</p>
<b>Display Controller</b>	<p>ARM Mali-400 MP2 Graphics Processing Unit (EG/EV only)</p> <p>Multicore 2D/3D graphic acceleration at 667MHz</p> <p>OpenGL ES 1.1 / 2.0 and OpenVG 1.0 / 1.1 support</p> <p>Video Codec Unit (EV only)</p> <p>Supports H.265 (HEVC) / H.264 (AVC) standards</p> <p>Simultaneous encode and decode at 8Kx4K (15fps) or 4Kx2K (60fps)</p>
<b>Display Interfaces</b>	<p>Dual-channel 18/24 bit LVDS interface</p> <p>(optional, dependent on implementation in Programmable Logic)</p> <p>DisplayPort 1.2a (4096x2160 @ 30Hz)</p> <ul style="list-style-type: none"> <li>- support 1 lane using ZU2/3 devices</li> <li>- support 2 lanes using ZU2/3 devices (optional, variant w/o PCI Express)</li> <li>- support 2 lanes using ZU4/5 devices</li> </ul>
<b>Network Interface</b>	<p>Up to 2x 10/100/1000BASE-T Ethernet (optional)</p> <p>HD Wireless Module SPB228, MU-MIMO 2x2 with 802.11 ac/a/b/g/n and Bluetooth/BLE support, soldered (optional)</p>

<b>Audio Interface</b>	optional, dependent on implementation in Programmable Logic
<b>Security Device</b>	Advanced Security, Safety, and Reliability integrated in the MPSoC
<b>Miscellaneous</b>	Watchdog Timer for system reset (programmable, 1s ... 600s)  12x GPIO, configurable as input or output  60x FPGA I/O for customer use (optional, dependent on implementation in Programmable Logic)  2kbit ID EEPROM on I2C bus  MIPI CSI-2 Camera Interface (optional, dependent on implementation in Programmable Logic)
<b>Feature Highlights</b>	SMARC 2.0 compliant
<b>OS Support</b>	Linux Board Support Package Android Board Support Package (on request)
<b>Power Requirement</b>	Power Supply +5V +/-5%, 5V Standby Power Consumption TBD typ. (depending on MPSoC and PL)
<b>Environment</b>	Temperature Range: 0°C ... +85°C operating extended -40°C ... +85°C operating industrial -40°C ... +85°C storage  Humidity: 5 ... 95% (operating, non condensing) 5 ... 95% (storage, non-condensing)
<b>Dimensions</b>	82 x 50 mm
<b>Certificates</b>	UL / CE
<b>Cooling</b>	Heatspreader Heatsink
<b>Carrier</b>	MSC SM2-MB-EP1 MSC SM2-MB-EPZed (included in the Starterkit)

## Order Reference - MSC SM2S-ZUSP

Order Number	Description	Reference	Cat*
83216	SMARC 2.0 module with Xilinx Zynq UltraScale+ ZU2EG-1 (1,2GHz), Quad core ARM Cortex-A53, 2GB DDR4, no DDR4-PL, 16GB eMMC, Single GbE LAN, 1x PCIE, 1x SATA, 1x USB 3.0 Host, 1x USB 2.0 Host, 1x USB 2.0 Host/Device, DP 1-lane; extended temperature 0..85°C	MSC SM2S-ZUSP-2EG1-14N0130E PCBFTX	PV
91716	SMARC 2.0 module with Xilinx Zynq UltraScale+ ZU2EG-1 (1,2GHz), Quad core ARM Cortex-A53, 4GB DDR4, 2GB DDR4-PL, 16GB eMMC, Dual GbE LAN, 1x PCIE, 1x SATA, 1x USB 3.0 Host, 1x USB 2.0 Host, 1x USB 2.0 Host/Device, DP 1-lane, extended temperature 0..85°C	MSC SM2S-ZUSP-2EG1-24101A0E PCBFTX	PV
83218	SMARC 2.0 module with Xilinx Zynq UltraScale+ ZU3EG-2 (1,3GHz), Quad core ARM Cortex-A53, 2GB DDR4, no DDR4-PL, 16GB eMMC, Dual GbE LAN, 1x PCIE, 1x SATA, 1x USB 3.0/2.0 Host, 3x USB 2.0 Host, 1x USB 2.0 Host/Device, DP 1-lane; industrial temperature -40..85°C	MSC SM2S-ZUSP-3EG2-14N01A0I PCBFTX	PV
83220	SMARC 2.0 module with Xilinx Zynq UltraScale+ ZU5EV-2 (1,3GHz), Quad core ARM Cortex-A53, 4GB DDR4 with ECC, 2GB DDR4-PL, 32GB eMMC, Dual GbE LAN, 4x PCIE, 1x SATA, 1x USB 3.0/2.0 Host, 2x USB 2.0 Host, 1x USB 2.0 Host/Device, BT/WLAN, DP 2-lane; industrial temperature -40..85°C	MSC SM2S-ZUSP-5EV2-25111E0I PCBFTX	PV

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

## Accessories

Order Number	Description	Reference
<b>Carrier Options</b>		
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
<b>Cooling Options</b>		
1144640	Passive Heatsink for SM2S-ZUSP module, consisting of a single-piece aluminium pin cooler and thermal pad for contact to the processor, with 2.7mm through-hole standoffs	MSC SM2S-ZUSP-01 HSI-001
1144629	Heatspreader for SM2S-ZUSP module, consisting of a single-piece aluminium plane and thermal pad for contact to the processor, with 2.7mm through-hole standoffs	MSC SM2S-ZUSP-01 HSP-001
<b>Other Accessories</b>		
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
<b>Starter Kits</b>		
77581	Starter Kit for MSC SM2S-ZUSP modules. Includes special MSC SM2-MB-EPZed Baseboard for easy access to all FPGA I/O signals, Heatspreader, SD Card with USB Card Reader, Power Supply and suitable cable kit. The Starter Kit does not include the MSC SM2S-ZUSP module. Please order your choice of MSC SM2S-ZUSP-xyz module separately.	MSC SM2-SK-ZUSP-EP1-KIT001 BRDFTX

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