OSM

Era of Micro Computing

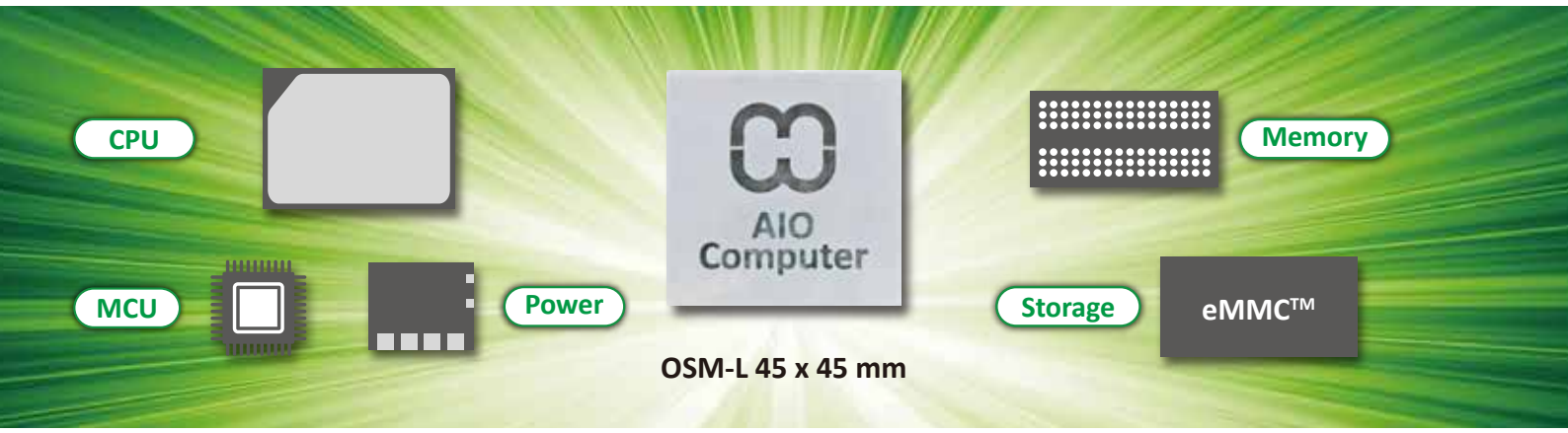
OPEN STANDARD MODULE

OSM SOLUTION GUIDE

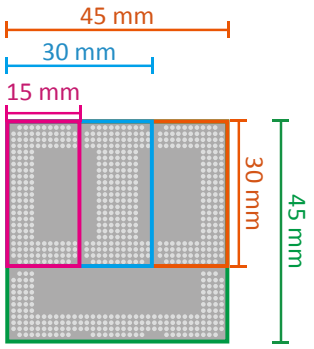
WHAT IS OSM

MiTwell provide compact solder-on modules compliant with the OSM standard, featuring standardized hardware and software interfaces. These modules improve the functionality of Computer-On-Modules by leveraging MiTwell's expertise in manufacturing and software development.

OPEN STANDARD MODULE ™



Size	Zero	Small	Medium	Large
Form Factor	30 x 15 mm	30 x 30 mm	30 x 45 mm	45 x 45 mm
Pinouts	188	332	476	662



The all-new standard of OSM is available in four versatile sizes: Size Zero, Small, Medium, and Large, ranging from 15x30mm to 45 x 45 mm. The four different form factors can seamlessly complement and expand upon each other, meeting various application needs.

WHY OSM

Miniaturized Standard Module

Ultra-low Power Consumption

Daily Life Applications

IC Packaging Process Adopted

Multiple Embedded Interfaces

Scalable Form Factors

Designed for rugged industrial environments, this compact and scalable solderable module delivers reliable performance. It supports a variety of video interfaces, including LVDS and DisplayPort, as well as low-speed interfaces such as PCIe, Ethernet, USB, and up to 40 GPIO. This versatility makes it ideal for a wide range of embedded applications.

Interface	Size-0	Size-S	Size-M	Size-L	
LVDS	0	0	1	0	Video Interfaces
Display Port	0	0	2	2	
RGB	0	1	1	1	
CSI	0	1	1	1	
DSI	0	1	1	1	
PCIe x 1	0	1	2	2	High-speed Interfaces
PCIe x 4	0	0	2	0	
Ethernet	1	2	5	3	
USB	2	3	4	4	
GPIO	16	24	32	40	Low-speed Interfaces

THE GOAL OF OSM

Shorten Test & Verification

Standardized interfaces and pin definitions simplify design, accelerate verification, enable easy integration, and reduce R&D efforts.

Multi-Platform Support

Supports multiple processor architectures and OS , pin-to-pin compatibility enables flexible configuration and easy upgrades.

Versatile Application

Ideal for a wide range of applications, including smart cities, retail environments, edge AI solutions, and industrial automation.

Conservation & Sustainability

Highly integrated design reduces component use and waste, lowers power consumption, and provides eco-friendly, sustainable solutions.

OSM SOLUTIONS

From Micron, RISC to CISC Versatile Solutions

- Intel ASL/ADL-N
- NXP i.MX 93
- NXP i.MX8M Plus
- MTK G510/700
- MTK G520/720
- TI AM3354
- ESWIN EIC7700X
- Qualcomm QCS6490

Target Business

Embedded

OSM Market

- ESWIN EIC7700X
- Intel ASL
- MTK Genio 510
- Qualcomm
- TI AM33/77
- NXP i.MX 93 i.MX8 Plus

Vertical Market

ODM Project

3.5”

Mini-ITX

Rugged System

Compact Industrial System

7.5 x 7.5 cm Box System

10 x 10 cm Box System

Replace Market

Fast Market Connection

SMARC

Qseven

▶ OSM-L with MediaTek Genio 700/510 Processor

MOSM-MM20E

- MediaTek Genio 700/510 with A78+A55 up to 2.2 GHz
- NPU with up to 3.2 TOPS
- Onboard 4GB LPDDR4 memory and 32GB storage
- Multiple video outputs
- Legacy I/O and high-speed interfaces
- OSM standard v1.1, size-L (45 x 45 mm), 662 pins

General	
CPU	MediaTek Genio 700/510 with 2x A78 2.0 GHz + up to 6x A55 2.0 GHz
Memory	1x onboard LPDDR4, up to 3733MT/s 8GB by project
Mass Storage	1x 32GB onboard eMMC 5.1 flash 64GB by project
Power Input	5V DC
OS	Embedded Linux (Yocto distribution) / Ubuntu v22.04

Mechanical	
Form Factor	SGeT OSM Specification v1.1 OSM size L 662 pins
Dimension	45 (L) x 45 (W) mm

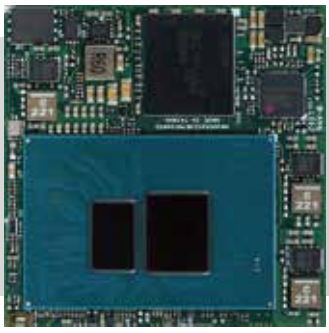
Mechanical and Environmental	
Operating Temperature	-20°C to +85°C
Humidity	5 to 95% RH, non-condensing

Basic I/O Interface	
Audio	1x I2S
PCI	1x PCIe x1 (Gen3)
USB	3x USB 2.0 (2 port with dual role) 1x USB 3.0
Display	1x HDMI or DP 1x MIPI-DSI
Video	Integrated in CPU
Camera	1x 4 lanes MIPI-CSI
Ethernet	1x GbE LAN (RGMII)
Legacy I/O	3x GPIO, 2x I2C, 3x UART 2x SPI, 2x CAN Bus, 2x SDIO (4bit) 2x ADC, 4x PWM, 1x JTAG

▶ OSM-L with Intel Amston Lake Processor Series

MOSM-M105

- Intel® Amston Lake family processor
- Onboard LPDDR5 memory up to 8G
- x86 software and hardware ecosystem supported
- Legacy I/O and high-speed interface implemented
- Support PCIe, USB 3.0, 1x GbE, DP and HDMI display
- OSM standard v1.1, size-L (45 x 45 mm), 662 pins



General	
CPU	Intel Atom® x7000RE Processor Series (default: x7211RE, 3.2GHz)
Memory	1x 8GB onboard LPDDR5 memory, 4800MT/s
Mass Storage	N/A (designed on carrier board)
Power Input	5V DC
OS	Win 10, Win 10 IoT Win 11, Win 11 IoT

Mechanical	
Form Factor	SGeT OSM Specification v1.1 OSM size L 662 pins
Dimension	45 (L) x 45 (W) mm

Mechanical and Environmental	
Operating Temperature	-20°C to +85°C
Humidity	5 to 95% RH, non-condensing

Basic I/O Interface	
Audio	1x HDA
PCI	2x PCIe x1 , 1x PCIe x2, 2x PCIe x1 (swap SATA)
USB	2x USB 2.0 2x USB 3.0
Display	1x DP++/HDMI 1x eDPx2
Video	N/A
Camera	N/A
Ethernet	1x GbE LAN (SGMII)
Legacy I/O	17x GPIO, 2x I2C, 4x UART 2x SPI, 1x eMMC, 2x ADC, 4x PWM, 1x eSPI

NXP i.MX 93 Family Processor OSM Module

MOSM-M330E

- NXP i.MX 93 with Dual Arm® Cortex®-A55 processor
- NPU with up to 0.5 TOPS
- Onboard 2GB LPDDR4 memory and 16GB storage
- Legacy I/O and high-speed interfaces
- OSM standard v1.1, size-L (45 x 45 mm), 662 pins

General	
CPU	NXP i.MX 93 with Dual Core Cortex-A55
Memory	2G onboard LPDDR4, 3733MT/s
Mass Storage	16GB onboard eMMC 5.1 flash 32GB/64GB by project
Power Input	5V DC
OS	Embedded Linux (Yocto distribution)

Mechanical	
Form Factor	SGeT OSM Specification v1.1 OSM size L 662 pins
Dimension	45 (L) x 45 (W) mm

Mechanical and Environmental	
Operating Temperature	-20°C to +85°C
Humidity	5 to 95% RH, non-condensing

Basic I/O Interface	
Audio	1 x I2S
PCI	N/A
USB	4x USB 2.0 (1 port with OTG)
Display	1x 24bit LVDS single channel 1x MIPI-DSI
Video	2D Graphic only
Camera	1x 2-lanes MIPI-CSI
Ethernet	2x GbE LAN (RGMII) (1 port with TSN)
Legacy I/O	14x GPIO, 2x I2C, 3x UART(2xRTS/CTS) 2x SPI, 2xCAN Bus, 1x SD card 2x ADC, 1x PWM, 1x JTAG

NXP i.MX8M Plus OSM Module

MOSM-M320E

- NXP i.MX8M Plus with quad Arm® Cortex®-A53 processor
- NPU with up to 2.3 TOPS
- Onboard 2GB LPDDR4 memory and 16GB storage
- Multiple video outputs
- Legacy I/O and high-speed interfaces
- OSM standard v1.1,size-L (45 x 45 mm), 662 pins

General	
CPU	NXP i.MX8M Plus with Quad core Cortex-A53
Memory	2G onboard LPDDR4, 3733MT/s 4GB/8GB by project
Mass Storage	16GB onboard eMMC 5.1 flash 32GB/64GB by project
Power Input	5V DC
OS	Embedded Linux (Yocto distribution)

Mechanical	
Form Factor	SGeT OSM Specification v1.1 OSM size L 662 pins
Dimension	45 (L) x 45 (W) mm

Mechanical and Environmental	
Operating Temperature	-20°C to +85°C
Humidity	5 to 95% RH, non-condensing

Basic I/O Interface	
Audio	1x I2S
PCI	1x PCIe x1 (Gen3)
USB	4x USB2.0 (1 port with dual role) 1x USB3.0
Display	1x 24bit LVDS dual channel 1x HDMI 1x MIPI DSI
Video	Integrated in CPU
Camera	1x MIPI-CSI
Ethernet	2x GbE LAN (RGMII)
Legacy I/O	8x GPIO, 1x I2C, 4x UART(2xRTS/CTS) 2x SPI, 2x CAN Bus, 2x SDIO (4bit) 2x ADC, 4x PWM, 1x JTAG

NXP i.MX 93 Family Processor OSM-S Module

MOSM-MN30E-S

- NXP i.MX93, Dual-Core Arm® Cortex®A55+M33 processor
- NPU with up to 0.5 TOPS
- Onboard 2GB LPDDR4 memory and 16GB storage
- Legacy I/O and high-speed interfaces
- OSM standard v1.2, size-S (30 x 30 mm), 332 pins

General	
CPU	NXP i.MX93, Dual-Core Arm® Cortex®A55+M33
Memory	2G onboard LPDDR4, 3733MT/s
Mass Storage	16GB onboard eMMC 5.1 flash up to 64GB
Power Input	5V DC
OS	Embedded Linux (Yocto distribution)

Mechanical	
Form Factor	OSM Standard v1.2 OSM size-S 332 pins
Dimension	30 (L) x 30 (W) mm

Mechanical and Environmental	
Operating Temperature	-20°C to +85°C
Humidity	5 to 95% RH, non-condensing

Basic I/O Interface	
Audio	1 x I2S
USB	2x USB 2.0 (1 port with OTG)
Display	1x MIPI DSI
Video	Integrated in CPU
Camera	1x 2-lanes MIPI-CSI
Ethernet	2x GbE LAN (RGMII) (1 port with TSN)
Legacy I/O	8x GPIO, 2x I2C, 3x UART (2xRTS/CTS) 2x SPI, 2xCAN Bus, 2x SDIO 2x ADC, 2x PWM, 1x JTAG

TI Sitara AM3354 Family Processor OSM Module

MOSM-M400E

- TI AM3354 family processor
- Up to onboard 1GB memory and 32GB storage
- Legacy I/O and high-speed interfaces
- OSM standard v1.1,size-L (45 x 45 mm), 662 pins

General	
CPU	NXP i.MX 93 with Dual core Cortex-A55
Memory	2G onboard LPDDR4, 3733MT/s
Mass Storage	16GB onboard eMMC 5.1 flash 32GB/64GB by project
Power Input	5V DC
OS	Embedded Linux (Yocto distribution)

Mechanical	
Form Factor	SGeT OSM Specification v1.1 OSM size L 662 pins
Dimension	45 (L) x 45 (W) mm

Mechanical and Environmental	
Operating Temperature	-20°C to +85°C
Humidity	5 to 95% RH, non-condensing

Basic I/O Interface	
Audio	1 x I2S
PCIe	N/A
USB	4x USB2.0 (1 port with OTG)
Display	1x 24bit LVDS single channel 1x MIPI DSI
Video	2D Graphic only
Camera	1x 2-lanes MIPI-CSI
Ethernet	2x GbE LAN (RGMII) (1 port with TSN)
Legacy I/O	14x GPIO, 2x I2C, 3x UART(2xRTS/CTS) 2x SPI, 2xCAN Bus, 1x SD card 2x ADC, 1x PWM, 1x JTAG

OSM-L Module with ESWIN EIC7700X RISC-V Processor

MOSM-ME00E

- ESWIN EIC7700X 4 x SiFive P550 1.4–1.8 GHz
- NPU with up to 19.95 TOPS INT8
- Onboard 8GB LPDDR5 memory and 64GB storage
- Multiple video outputs including HDMI 2.0 and MIPI-DSI
- Latest OSM-L Standard v1.2, LGA grid array with 662 pins

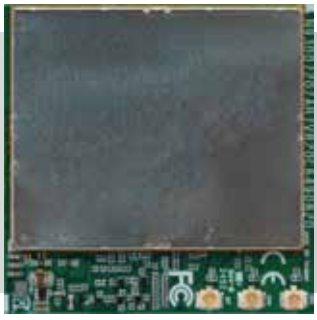
General	
CPU	ESWIN EIC7700X 4x SiFive P550 1.4–1.8 GHz
Memory	2x onboard LPDDR5 up to 32G (default: 8GB)
Mass Storage	1x onboard eMMC 5.1 flash up to 128G (default: 64GB) 1x SATAIII
Power Input	5V DC
OS	Linux Debian OS
Mechanical	
Form Factor	SGeT OSM Specification v1.2 OSM size L 662 pins
Dimension	45 (L) x 45 (W) mm
Mechanical and Environmental	
Operating Temperature	-20°C to +85°C
Humidity	5 to 95% RH, non-condensing

Basic I/O Interface	
Audio	1 x I2S
PCIe	1x PCIe x4 (Gen3)
USB	1x USB 2.0 2x USB 3.0
Display	1x HDMI or DP 1x MIPI-DSI
Camera	2x 4-lanes MIPI-CSI
Ethernet	1x GbE LAN (RGMII)
Legacy I/O	3x GPIO, 2x I2C, 4x UART(with 1x console) 1x SPI, 2x SDIO (4bit), 4x PWM, 1x JTAG

OSM-L Module with Qualcomm QCS6490 Processor

MOSM-MQ00P

- Qualcomm QCS6490 processor with 8 cores up to 2.7GHz
- Qualcomm® AI Engine with up to 12.5 TOPS
- Onboard 4GB LPDDR5 memory and 32GB UFS storage
- Supports 4K@60FPS decoding and 4K@30FPS encoding
- Multiple video inputs with up to five MIPI CSI interfaces
- Latest OSM-L Standard v1.2, LGA grid array with 662 pins



General	
CPU	Qualcomm QCS6490 with 1x Kryo Gold plus, 3x Kryo Gold, 4x Kryo Silver up to 2.7GHz
Memory	1x onboard LPDDR4 up to 32G (default: 8GB)
Mass Storage	1x UFS2.2 128GB
Power Input	5V DC
OS	Android 13 Linux Ubuntu, Yocto
Mechanical	
Form Factor	SGeT OSM Specification v1.2 OSM size L 662 pins
Dimension	45 (L) x 45 (W) mm
Mechanical and Environmental	
Operating Temperature	-20°C to +85°C
Humidity	5 to 95% RH, non-condensing

Basic I/O Interface	
Audio	1 x I2S
PCIe	1x PCIe x1 (Gen3)
USB	1 x USB 3.1 with DP 1x USB2.0 1x Micro USB
Display	1x DP with USB-C ALT mode 1x DP or HDMI 1x MIPI DSI
Camera	2x 4-lanes MIPI-CSI
Ethernet	1x GbE LAN (RGMII)
Legacy I/O	2x GPIO, 2x I2C, 3x UART (with 1x console) 2x SPI, 1x SDIO (4bit), 1x JTAG

OPEN STANDARD MODULE ™

The idea of all Open Standard Modules™ is to create a new, future proof and versatile standard for small-size, low-cost embedded computer modules, combining the following key characteristics:

- Completely machine processable during soldering, assembly and testing
- Different possible packages for direct PCB soldering without connector
- Pre-defined soft- and hardware interfaces
- Open-Source in soft- and hardware

The Open Standard Module™ specification allows developing, producing and distributing embedded modules for the most popular MCU32, ARM and x86 architectures. For a growing number of IoT applications this standard helps to combine the advantages of modular embedded computing with increasing requirements regarding costs, space and interfaces.

About MiTwell

MiTwell, Inc., founded in 2015, is a dedicated Advanced EAI Solutions Provider specializing in embedded AI solutions. We offer design, development, manufacturing, and integration services for system computers and peripherals. In the evolving AI landscape, MiTwell delivers cutting-edge intelligent modules and reliable, versatile system solutions, empowering customers to navigate market demands and challenges with confidence.

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