OSM

Era of Micro Computing

OPEN STANDARD MODULE

OSM SOLUTIONS GUIDE

WHAT IS OSM?

In recent years, the development of AI technology and the diverse needs of smart devices makes the embedded systems not only emphasize mobility and compact figure, but also the modularization of computing cores, which is the most important factor to meet customer needs.

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

1. Completely machine processible during soldering, assembly and testing
2. Different possible packages for direct PCB soldering without connector
3. Pre-defined software and hardware interfaces
4. Open-Source in software and hardware

With flexible expandability, all OSM modules ranging from 15x30mm to 45x45mm have the same pin position, which meet various needs of the carrier board design. Most of compact RISCs and other peripheral chips such as WIFI communication chip can be easily designed on OSM modules. OSM satisfies both the CISC and RISC computing core designs. No matter communication requirements, high-speed computing, low-speed monitoring and multi-point control, using OSM architecture will be the best choice for embedded systems.

OSM adopts a universal size design, built with different computing chips, to form a series of micro system modules to meet the different needs of various embedded systems. For time-critical project development, there are lots of converters, carrier boards, and system boards available in the market development, but with several specially designed fixtures, engineers can also quickly to reduce the complexity of engineering development. Soldering process maybe a headache during also quickly swap out modules for test validation. Without connectors and the features of quick module replacement are necessary to build a robust and miniaturized embedded system, so OSM will quickly become the mainstream of embedded system applications.

THE GOAL OF OSM

Simple is Beauty

Under the trend of edge computing, in addition to the diversification of functional support and the improvement of computing power, the appearance and size of the system tend to be miniaturized. When the size of the system is reduced, the overall cost can be reduced. And the proper selection of SOM can lower the system power consumption. In order to achieve the benefits of system miniaturization and the convenience of quick module replacement, the choice of computing core will be the main key. Among them, OSM will be the best integration solution of many modules at present.

The computing core of an edge computer has many choices. The OSM module has better advantages than the others. Firstly, OSM is the smallest among choices of current standard modules, which can reach to 30x15mm. Secondly, the OSM module is soldered on the carrier instead of using an edge connector, which provides more stable system architecture. Finally, the function and performance are considered to FIT the environment when design with the OSM module, therefore, it can achieve low power consumption.

The module selected as the core of the computer is because of the convenience of replacement. At present, there are four commonly used modules in the industrial computer market: COM Express, Qseven, SMARC and OSM. The differences of above four modules depends on the size of the board,the way of connecting the backplane, the availability and quantity to support various interface. The largest is COM Express which can support the most complete functions. However, the size of the board can be as large as 125 x 95mm, which cannot meet the trend of miniaturization and mobility.

WHY OSM

Less is More, Fit is Enough

With the evolution of ICT, the application of industrial computers has shifted from traditional monitoring to intelligent operation. Industrial control systems now can collect and analyze data to make real-time intelligent judgments, enable the operation of smart factories. To achieve this, integrating Soft-PLC with the appropriate hardware platform is the best option. With the evolution of new processors, both ARM-based RISC and X86-based CISC can effectively carry out tasks in smart factory operation. However, what matters the most in industrial applications is not ICT technology, but field and safety regulations. Therefore, when selecting industrial control systems, the following key points should be taken into account.

Thermal is the main concern

The current industry trend is to replace fans with large heat sinks to improve the system's MTBF, but this design may raise concerns about weight and cost. Therefore, optimizing heat issues through software and using lightweight embedded controllers have always been the direction of system design.

Stability is the top priority in embedded control

The main goal of edge computing is for each part to perform its own function, and to optimize the edge devices using the most stable industrial control system. This approach reduces the workload on the main system and ensures smooth completion of tasks. Therefore, stability is the most critical factor to consider when selecting a control unit. To achieve stable performance, the system's characteristics must have limitations. Power consumption constraints, trade-offs between functionality and efficiency are all related determining factors.

The heat dissipation of ES must be limited

Based on the requirements of the field application, the heat dissipation capability should be balanced with cost, size, and computing power to achieve the goal of being FIT (Functional, Inexpensive, and Timely). A well-designed system should aim to provide a "less is more, fit is enough" product by using system design thinking to satisfy customers demand and make them succeed.

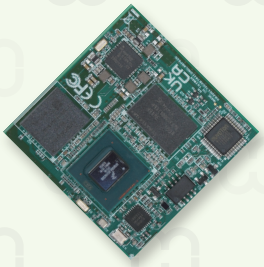
Small is the key to success for embedded systems

Miniaturization is a characteristic of the IC era. If heat dissipation issues can be managed and system functionality requirements can be limited as appropriate, then the system design should be as small as possible to be installed in any field and achieve the appeal of being "truly embedded."

Intel
Apollo Lake

Intel
Elkhart Lake

TI
Sitara AM3354



NXP
i.MX8M Plus

As to Qseven and SMARC, although the size is like a business card, the assembly methods and interface distribution are gradually unable to meet the huge demand of large-scale edge computing as well as miniaturization. OSM satisfies both miniaturization and mobility at the same time, with 662 connection points under the largest area of 45x45mm, which fully meets the design requirements of industrial computers, whether it is RISC or CISC.

Edge computing has a wide range of applications, and it is used in different fields. Therefore, in the design of edge computing systems, different modules are often used with different baseboards, assembly methods, and functional interfaces to meet different transmission requirements and environmental tolerance.

The performance required by the edge computing system is to meet the needs of customers. It must be stable, simple, easy to use, miniaturized and easy to maintain. Such an optimized system can reduce design complexity and development costs, also to achieve the goal of time-to-market.

Intel® Apollo Lake family processor OSM module

MIES-MOL100

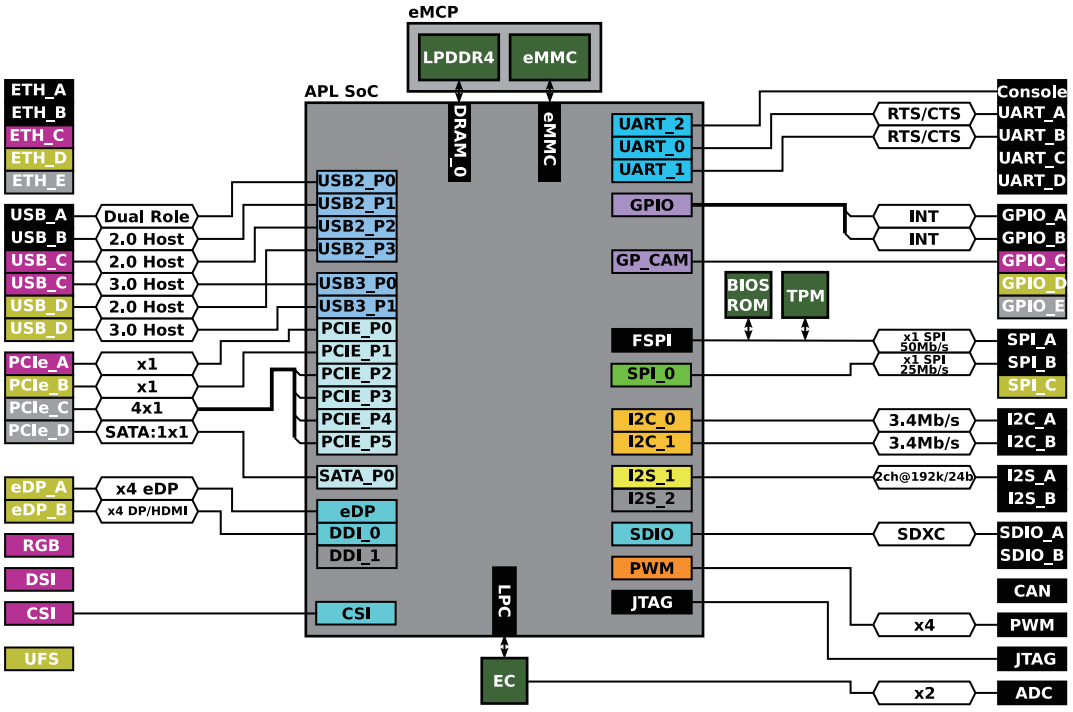
- Intel® Apollo Lake family processor
- Up to on board 4GB memory and 64GB storage
- X86 software and hardware eco-system supported
- Legacy I/O and high-speed interface implemented
- OSM size-L form factor (45mm x 45mm)
- LGA grid array with 662 contacts

Specifications ▼

General	
CPU	Intel® Apollo Lake family processor
Memory	On board LPDDR4 2GB/4GB (Option) eMCP
Mass Storage	On board 32GB/64GB (Option) eMCP
Power Input	Standard Input: 5V DC
OS	Windows® 10 IoT Enterprise/ Linux
Basic I/O Interface	
Audio	I2S interface
PCI Express	1x PCI Express x4 Gen2 2x PCI Express x1 Gen2
USB	4x USB2.0 (1port with dual role)/ 2x USB3.0
Display	1x eDP (4 lane)/1xDDI (DP/HDMI, BOM select)
SATA	1x SATA3.0
Camera	1x CSI
Legacy I/O	8x GPIO (1 for camera interface), 1x I2S, 2x I2C, 3x UART (2x RTS/CTS), 2x SPI (1x FSPI), 1x SDIO, 2x ADC, 4x PWM, 1x JTAG

Video	
Graphics	Intel® HD Graphics 500
Environmental	
Storage Temperature	-40°C ~ 85°C
Operating Temperature	0°C ~ 70°C for N series -40°C ~ 85°C for E series
Relative Humidity	5 %~ 95 % (non-condensing)
Mechanical	
Form Factor	OSM size L
Dimension	45mm (L) x 45mm (W)
Optional Accessories	
Converter Board	MW provides Convert Board for OSM-L to other standard modules, including SMARC, Qseven, COMe Mini and PCIe/104

Function Block Diagram ▼



Intel® Elkhart Lake family processor OSM module

MIES-MOL200

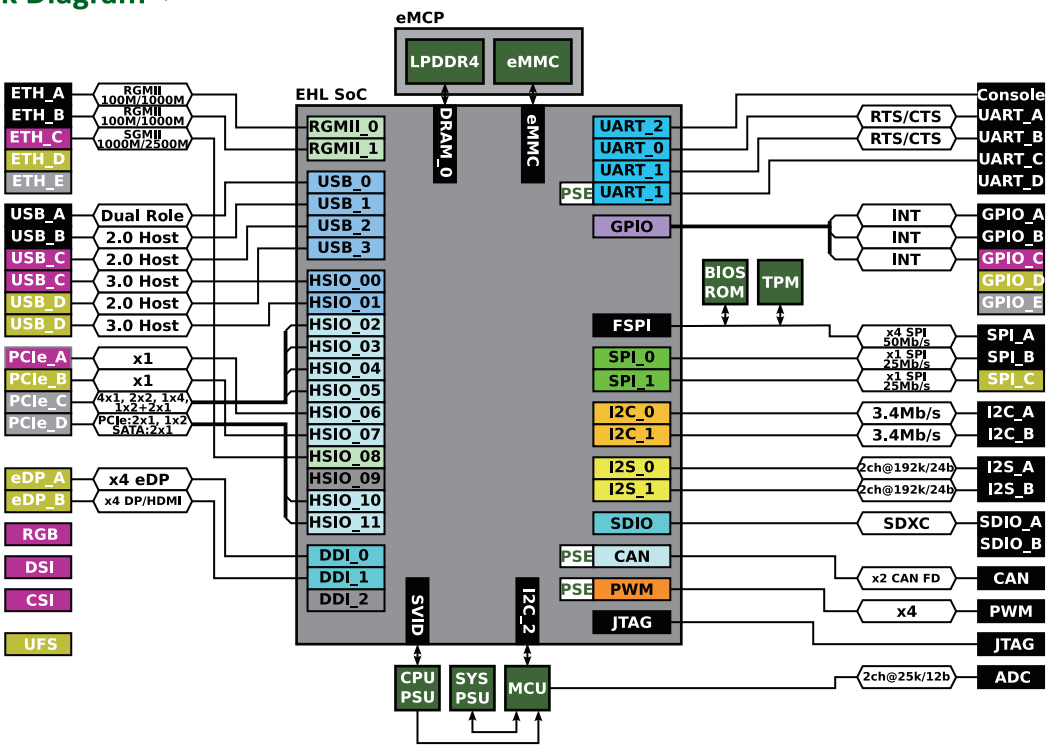
- Intel® Elkhart Lake family processor
- Up to on board 4GB memory and 64GB storage
- X86 software and hardware eco-system supported
- Legacy I/O and high-speed interface implemented
- OSM size-L form factor (45mm x 45mm)
- LGA grid array with 662 contacts

Specifications ▾

General	
CPU	Intel® Elkhart Lake family processor
Memory	On board LPDDR4x 2GB/4GB (Option) eMCP
Mass Storage	On board 32GB/64GB (Option) eMCP
Power Input	Standard Input: 5V DC
OS	Windows® 10 IoT Enterprise/ Linux
Basic I/O Interface	
Audio	I2S interface
PCI Express	1x PCI Express x4 Gen3 2x PCI Express x1 Gen3
USB	4x USB2.0 (1port with dual role)/ 2x USB3.1
Display	1x eDP (4 lane)/1x DDI (DP/HDMI, BOM select)
SATA	2x SATA3.0
Ethernet	3x GbE LAN (2x RGMII/1x SGMII)
Legacy I/O	9x GPIO, 2x I2C, 4x UART (2x RTS/CTS), 3x SPI (1x FSPI), 1x CAN Bus, 1x SDIO, 2x ADC, 2x I2S, 4x PWM, 1x JTAG

Video	
Graphics	Intel® UHD Graphics
Environmental	
Storage Temperature	-40°C ~ 85°C
Operating Temperature	0°C ~ 70°C for N, J series -40°C ~ 85°C for X series
Relative Humidity	5 %~ 95 % (non-condensing)
Mechanical	
Form Factor	OSM size L
Dimension	45mm (L) x 45mm (W)
Optional Accessories	
Converter Board	MW provides Convert Board for OSM-L to other standard modules, including SMARC, Qseven, COMe Mini and PCIe/104

Function Block Diagram ▾



TI Sitara AM3354 family processor OSM module

MIES-MOLAM3354

- TI AM3354 family processor
- Up to on board 1GB memory and 32GB storage
- Multiple video output supported
- Legacy I/O and high-speed interface implemented
- OSM size-L form factor (45mm x 45mm)
- LGA grid array with 662 contacts

Specifications ▾

General	
CPU	TI Sitara AM3354 family processor
Memory	On board 1GB DDR3
Mass Storage	Support 32GB eMMC
Power Input	Standard Input: 5V DC
OS	Linux
Basic I/O Interface	
Audio	1x I2S
USB	2x USB2.0
Display	1x 18bit LCD (RGB)
Ethernet	2x GbE LAN (2x RGMII)
Legacy I/O	23x GPIO, 2x I2C/1x I2S, 3x UART (1 for console), 1x SPI, 1x CAN Bus, 1x SDIO, 2x PWM, 2x ADC, 1x JTAG
Video	
Graphics	Integrated in CPU

Environmental	
Storage Temperature	-40°C ~ 85°C
Operating Temperature	-40°C ~ 85°C
Relative Humidity	5 %~ 95 % (non-condensing)
Mechanical	
Form Factor	OSM size L
Dimension	45mm (L) x 45mm (W)
Optional Accessories	
Converter Board	MW provides Convert Board for OSM-L to other standard modules, including SMARC, Qseven, COMe Mini and PCIe/104

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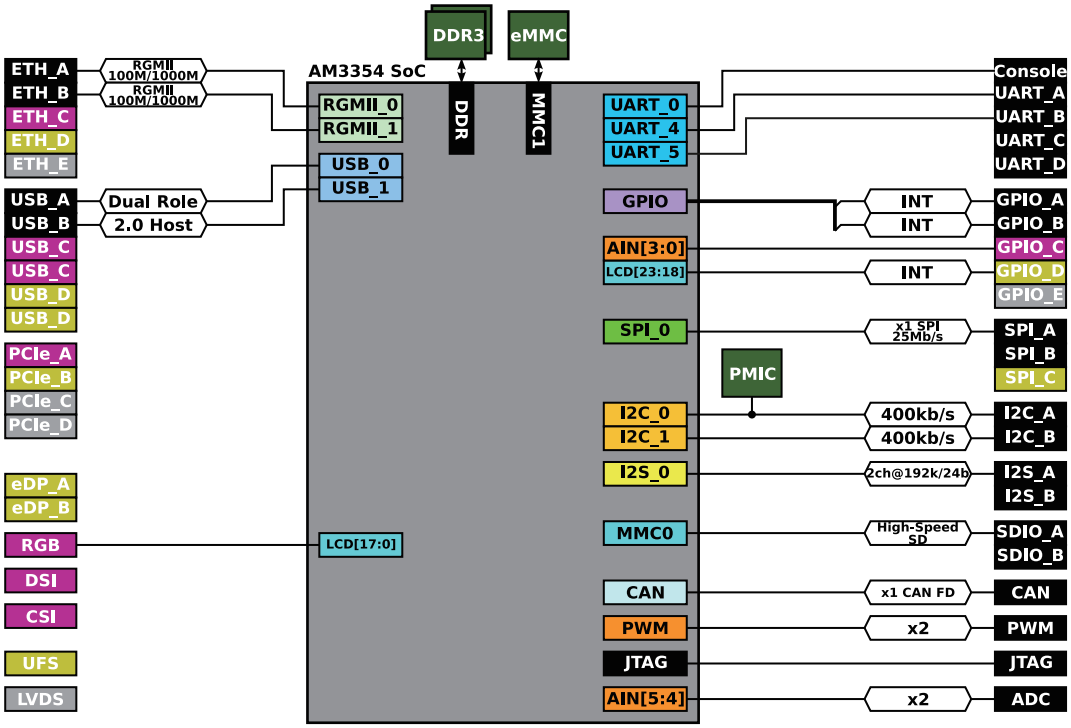
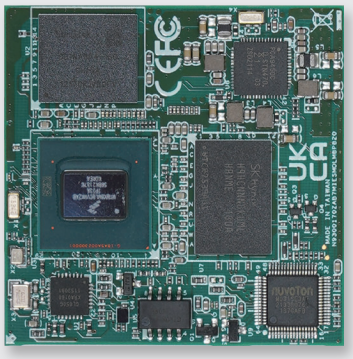


NXP i.MX8M Plus family processor OSM module

MIES-MOLM8P



- NXP i.MX8M Plus family processor
- Up to on board 8GB memory and 64GB storage
- Multiple video output supported
- Legacy I/O and high-speed interface implemented
- OSM size-L form factor (45mm x 45mm)
- LGA grid array with 662 contacts

Specifications ▾

General	
CPU	NXP i.MX8M Plus family processor
Memory	On board LPDDR4 2GB (option 4GB/8GB)
Mass Storage	On board 16GB eMMC (option 32GB/64GB)
Power Input	Standard Input: 5V DC
OS	Linux
Basic I/O Interface	
Audio	I2S interface
PCI Express	1x PCI Express x1 Gen3
USB	4x USB2.0 (1port with dual role)/ 1x USB3.0
Display	1x dual LVDS, 1x HDMI, 1x MIPI DSI
Camera	1x CSI
Ethernet	2x GbE LAN (2x RGMII)
Legacy I/O	8x GPIO, 2x I2C, 4x UART (2x RTS/CTS), 2x SPI, 2x CAN Bus, 2x SDIO, 2x ADC, 1x I2S, 4x PWM, 1x JTAG

Video	
Graphics	Integrated in CPU
Environmental	
Storage Temperature	-40°C ~ 85°C
Operating Temperature	-40°C ~ 85°C
Relative Humidity	5 %~ 95 % (non-condensing)
Mechanical	
Form Factor	OSM size L
Dimension	45mm (L) x 45mm (W)
Optional Accessories	
Converter Board	MW provides Convert Board for OSM-L to other standard modules, including SMARC, Qseven, COMe Mini and PCIe/104

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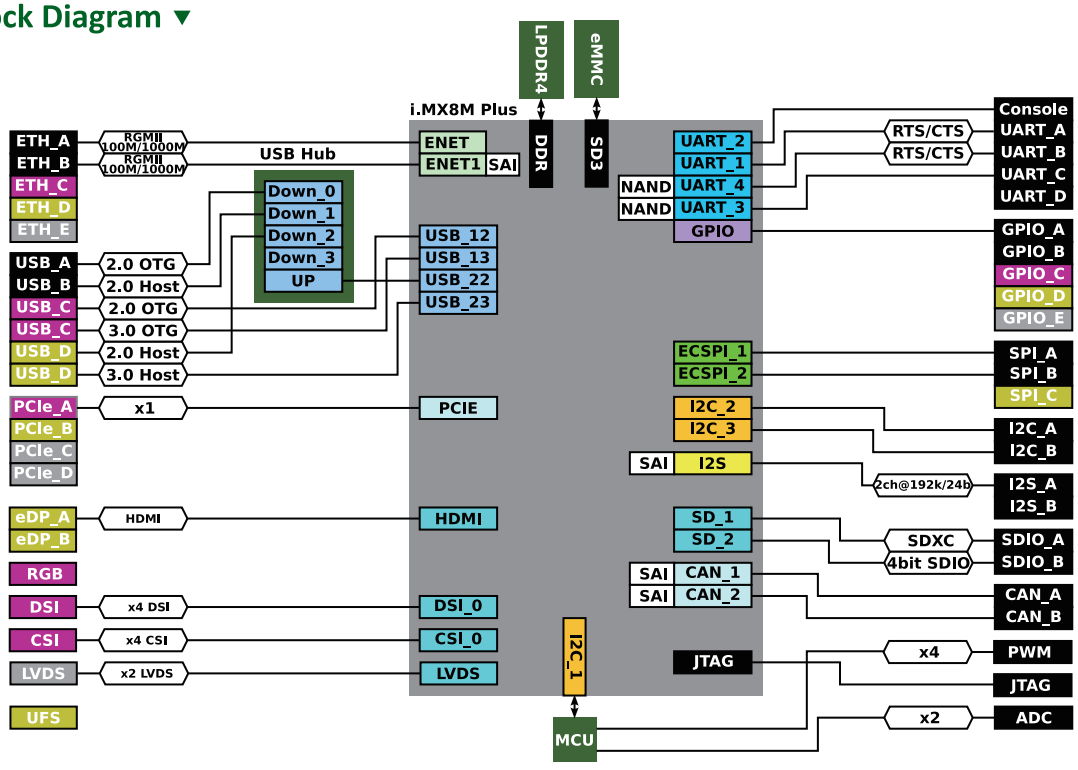

OPEN STANDARD MODULE™

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.

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