OSM

Inside Every Edge

Compact AI Compute
Multi-Scenario Deployment
Industrial-Grade Reliability

STANDARDIZED. SCALABLE. READY FOR REAL-WORLD AI.

MiTwell OSM Ecosystem : Your

AI Performance

◆ *No Lock-In. No Redesign. No Compromise.*

- Local LLM
- Image/Voice Assistant
- Multimedia Edge Device

Advanced

10 TOPS
#UFS #Wifi 6 #4K 60

8 TOPS
#4x CSI #2x PCIe

7.1 TOPS
#UFS #Wifi 6 #LPDDR5

- Smart City Infrastructure
- Healthcare/Medical
- AI Powered Retail/ POS

Mainstream

6 TOPS
#High CP #Android

MediaTek Genio 360

4 TOPS
#Visual AI #Size M

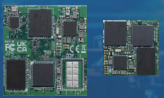
3.2 TOPS
#HDMI #LPDDR4

- Smart Living
- Devices Controller
- Smart Sensors

Basic

2.3 TOPS
#Low Power #Android

0.5 TOPS
#Cost #Control



NXP i.MX 93

RENESAS / MEDIATEK / NXP / Qualcomm / RISC-V®

ur Scalable Edge AI Architecture

20 TOPS
#Graphic #RISC-V
ESWIN (RISC-V)
EIC7700X

12 TOPS
#WoA #US #Android
Qualcomm
QCS6490

MediaTek
Genio 520

10 TOPS
#UFS #Wifi 6 #4K 60
MediaTek
Genio 720

Renesas
RZ/V2H

MediaTek
Genio 420

Renesas
RZ/V2N

3.5 TOPS
#WoA #Android
Qualcomm
QCS5430

MediaTek
Genio 510

NXP
i.MX 8M Plus

2 TOPS
#Industrial OS #Security
NXP
i.MX 95

Non-NPU
#x86 #Win
Intel
Amston Lake

Watt

Why OSM

As the industry's first solderable BGA mini module standard by SGET, OSM revolutionizes embedded design. OSM's largest size L delivers up to 662 LGA contacts in a footprint 58% smaller than existing standards. With direct PCB mounting, OSM enables cost-efficient automated assembly and robust industrial-grade durability. It’s massive I/O bandwidth, ake OSM effortlessly empowers advanced edge AI applications across automotive, medical, and harsh environments.

Ultra-Compact

Shock & Vibration Resistant

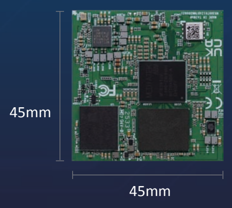
Modular & Upgradable

High AI Performance

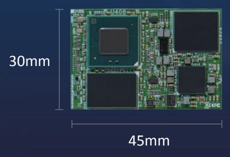
Rich I/O intergration

Compatible Ecosystem

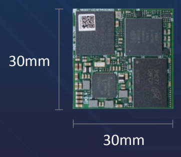
OSM-L



OSM-M



OSM-S



PLATFORMS

arm

intel

RISC-V

Why MiTwell

MiTwell supports your OSM journey from modules and carrier boards to systems and embedded software services. Partnering with 6 leading silicon vendors: MediaTek, NXP, Renesas, Qualcomm, ESWIN, and Intel, MiTwell offers the full package solutions for a wide range of embedded applications.

Module

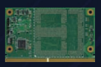
MOSM-MM30U

MOSM-MR30E-M

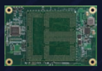
MOSM-MN30E-S

Converter

Oseven



SMARC



COMe Mini

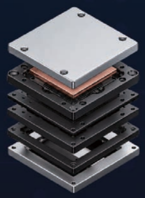
PC/104

Carrier

3.5"

PICO-ITX

Socket



OSM-L EVK Socket

System

MIWA

PICO

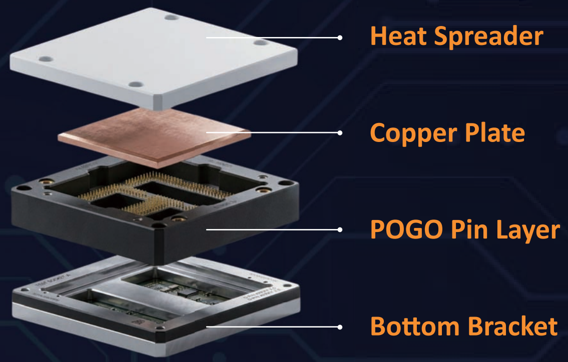
3.5”

Mini-ITX

OSM Universal Socket

Traditional OSM testing requires soldering the module onto a carrier board first — one mistake, and both the module and the board are scrapped.

The MiTwell Universal Socket changes that by using POGO pins to deliver full OSM functionality without a single drop of solder — so you validate first, commit later. Modular, reusable, and up to 70% cheaper than traditional test sockets.



Stackable Modular Design

Highly Customizable Architecture

Integrated Copper Heat Spreader

Precision Mechanical Alignment

Full-Stack Software & Firmware Service

Beyond hardware, MiTwell supports customers with full-stack software and firmware services that reduce integration complexity, shorten development cycles, and enable faster deployment of OSM-based edge AI applications.

Application

- AI Edge Integration

Metalayer

- Android HAL & Framework
- OTA Integration

BSP

- BIOS/UEFI Customization
- OS BSP Customization
- Secure Boot & Chain-of-Trust
- Wireless & Wired Connectivity

Embedded OSM

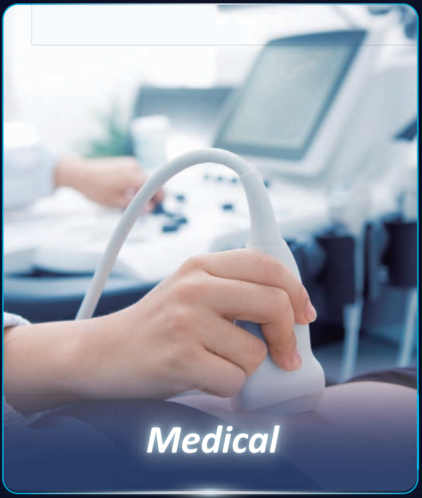
Application Markets

Edge intelligence rising across industries

OSM modules' compact form factor, standardized interfaces, and long-term supply availability make them ideal for edge AI deployments across diverse industries — enabling faster time-to-market without sacrificing reliability or scalability.

Industrial Automation

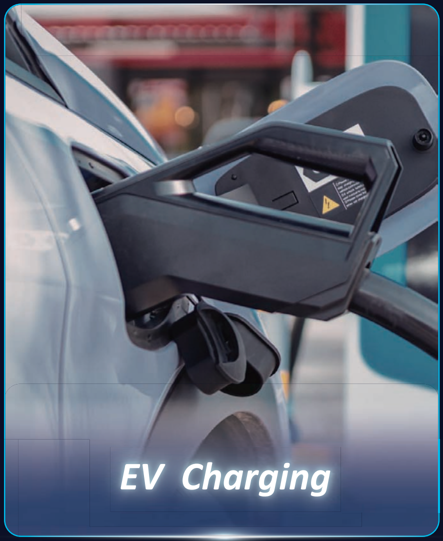
Consumer IoT



Medical

Automotive & ADAS

POS



EV Charging

Aerospace & Drone

Drone

Edge AI transforms drones from remote-controlled vehicles into autonomous intelligent systems — capable of acting without cloud dependency or ground-station relay.
Key applications enabled by on-device AI:

- **Obstacle Avoidance**
  Ereal-time visual inference for truly autonomous flight safety.
- **GPS-Denied Navigation**
  Sensor fusion maintains positioning in tunnels, indoors, and jammed environments.
- **In-Flight Image Analysis**
  Crop disease detection, powerline inspection, and disaster search-and-rescue processed on-board, cutting response time dramatically.
- **Predictive Flight Monitoring**
  Continuous anomaly detection reduces crash risk.

OSM modules make this real: ultra-compact form factor, vibration-resistant SMT design, and low-power NPU — purpose-built for the physical demands of airborne edge computing.

AGV/AMR

Modern AGV/AMR deployment requires simultaneous multi-camera perception, sensor fusion, and on-board AI inference — workloads that demand a consolidated, reliable compute foundation. OSM modules bring these capabilities together on a single vibration-resistant platform, enabling NPU-accelerated object detection andsynchronized LiDAR-camera-IMU data streams within a battery-friendly power envelope.

As fleets scale, OSM-powered AGV/AMRs extend their value further — functioning as mobile data nodes that preprocess spatial data at the edge and continuously refresh digital twin platforms, without burdening network bandwidth. OSM's scalable sizing lets designers match compute to application needs across product tiers, all on the same carrier board.

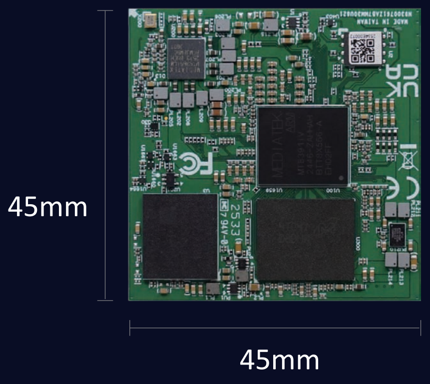
House Appliances

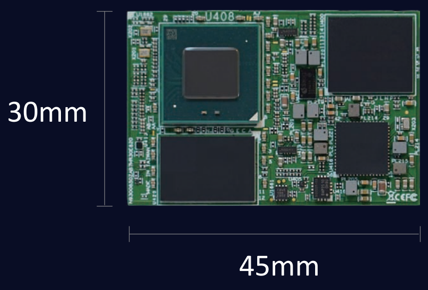
OSM modules give appliance makers a direct path to embedded Edge AI. With onboard NPUs, OSM-powered devices run AI inference locally — no cloud dependency, no latency — enabling personalized settings that adapt to individual user habits, on-device voice recognition, predictive maintenance through real-time sensor monitoring, and seamless integration with smart home ecosystems.

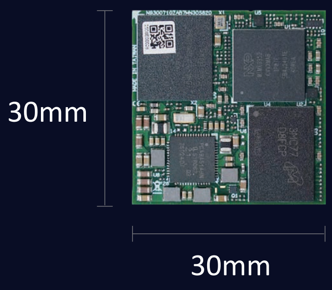
For appliance brands, OSM's solder-on SMT design eliminates connectors, delivering meaningful BOM cost reductions at consumer-scale volumes. Its standardized architecture enables carrier board reuse across product lines, accelerating time-to-market for every new model.

Open Standard Module

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 processible during soldering, assembly and testing

Different possible packages for direct PCB soldering without connector

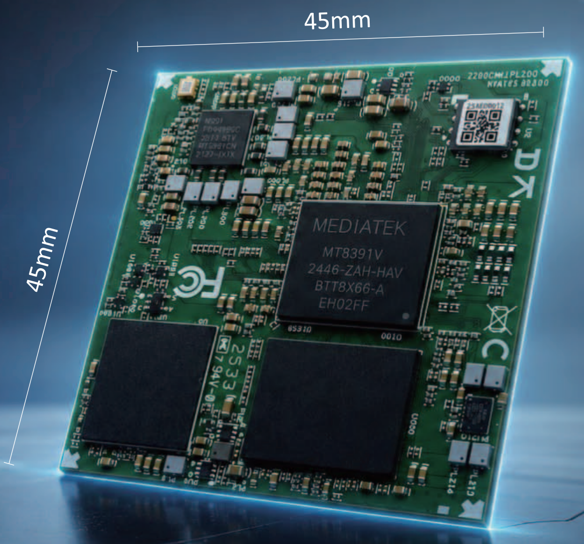
Pre-defined soft- and hardware interfaces

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.

OSM format	Dimensions	Pins
Size-Zero	30 x 15 mm	188
Size-S	30 x 30 mm	332
Size-M	45 x 30 mm	476
Size-L	45 x 45 mm	662



OSM Module Specifications		MediaTek		
Category	**Item**	**MOSM-MM30U**	**MOSM-MM20E**	**MOSM-MM10E**
General	**OSM Standard**	v1.2 Support OSM Size-L SoC module	v1.1 Support OSM Size-L SoC module	v1.2 Support OSM Size-L SoC module
	CPU	MediaTek Genio 720 2x A78 2.6 GHz + 6x A55 2.0 GHz MediaTek Genio 520 2x A78 2.2 GHz + 6x A55 2.0 GHz MediaTek Genio 420 2x A78 1.8 GHz + 6x A55 1.8 GHz	MediaTek Genio 700 2 x A78 2.2 GHz + 6 x A55 2.0 GHz MediaTek Genio 510 2 x A78 2.0 GHz + 4 x A55 2.0 GHz	MediaTek Genio 360 1x Cortex-A76 2.0 GHz + 5x Cortex-A55 2.0 GHz
	Storage	1x 128GB 3.1 UFS 256GB by project	1x 32GB onboard eMMC 5.1 flash 64GB by project	1x 32GB eMMC 5.1 flash SPI NOR (supports boot)
	Memory	1x 8GB onboard LPDDR5 16GB by project	1x 4GB onboard LPDDR4, 3733MT/s 8GB by project	1x 4GB onboard LPDDR4, 3733MT/s 8GB by project
	Power Input	5V DC	5V DC	5V DC
	Operating Systems	Linux (Yocto-based) Embedded Linux (Yocto-based)	Android 13 Embedded Linux (Yocto distribution)	Linux (HLOS)
I/O Interface	**Audio**	2x I^2S	1x I^2S	2x I^2S
	PCIe	1x PCIe Gen2	1x PCIe (Gen3)	1x PCIe Gen2 (1-lane RC mode)
	USB	Detail 3x USB2.0/ (1 port with dual role) 2x USB3.0	3x USB2.0/ (2 ports with dual role) 1x USB3.0	1x USB3.2 Gen1 DRD (up to 5 Gbps) 2x USB2.0 Host
	Display	2x eDP (1x supports Type-C ALT mode) 1x LVDS or DSI (optional)	1x HDMI or DP 1x MIPI DSI 1x DSI	2x MIPI DSI 4-lane 1x eDP 1.2 / DP 1.4 1x LVDS (share-pin with DSI)
	Video	Integrated in SoC	Integrated in CPU	Integrated in SoC
	Camera	2x MIPI CSI 4-lanes	1x MIPI CSI 4-lanes	2x MIPI CSI 4-lane (D-PHY 2.5 Gbps / C-PHY 2.5 Gsps)
	Ethernet	1x GbE LAN (RGMII)	1x GbE LAN (RGMII)	1x GbE MAC (RGMII), 10/100/1000 Mbps
	Other Legacy I/O	4x UART(1x console), 3x GPIO(1 for DMIC/touch) 2x SPI, 2x I2C, 2x SDIO (4-bit), 2x ADC 3x PWM, 1x JTAG	3x GPIO, 2x I2C, 3x UART 2x SPI, 2x CAN Bus, 2x SDIO (4bit) 2x ADC, 4x PWM, 1x JTAG	3x UART, 1x UART console, 2x I2C, 2x SPI, 2x SDIO, 2x ADC, 3x PWM, 1x JTAG, 1x CAN-FD, 5x GPIO
Mechanical	**Form Factor**	SGeT OSM Specification v1.2 OSM Size-L 662 pins	SGeT OSM Specification v1.1 OSM Size-L 662 pins	SGeT OSM Specification v1.2 OSM Size-L 662 pins
	Dimension	45 mm (L) x 45 mm (W)	45 mm (L) x 45 mm (W)	45 mm (L) x 45 mm (W)
Environmental	**Operating Temperature**	-20°C to 85°C	-20°C to 85°C	-20°C to 85°C
	Relative Humidity	5 % to 95 % RH (non-condensing)	5 % to 95 % RH (non-condensing)	5 % to 95 % RH (non-condensing)

OSM Module Specifications		NXP		
Category	**Item**	**MOSM-M320E**	**MOSM-M330E**	**MOSM-MN30E-S**
General	OSM Standard	v1.1 Support OSM Size-L SoC module	v1.1 Support OSM Size-L SoC module	v1.2 OSM Size-S SoC module
	CPU	NXP i.MX 8M Plus with Quad core Cortex-A53	NXP i.MX 93 with Quad core Cortex-A55	NXP i.MX93, Dual-Core Arm® Cortex®A55+M33
	Storage	16GB onboard eMMC 5.1 flash 32GB/64GB by project	16GB onboard eMMC 5.1 flash 32GB/64GB by project	16GB onboard eMMC 5.1 flash
	Memory	2GB onboard LPDDR4, 3733 MT/s 4GB/8GB project-dependent	2GB onboard LPDDR4, 3733 MT/s	2GB onboard LPDDR4, 3733 MT/s
	Power Input	5V DC	5V DC	5V DC
	Operating Systems	Embedded Linux (Yocto-based)	Embedded Linux (Yocto-based)	Embedded Linux (Yocto-based)
I/O Interface	Audio	1x I2S	1x I^{2}S	1x I^{2}S
	PCIe	1x PCIe x1 (Gen3)		
	USB	4x USB2.0/ (1 port with dual role) 1x USB3.0	4x USB2.0/ (1 port with OTG)	2x USB2.0/ (1 port with OTG)
	Display	1x 24bit LVDS single channel 1x HDMI, 1x MIPI DSI	1x 24bit LVDS single channel 1x MIPI DSI	1x MIPI DSI
	Video	Integrated in CPU	2D Graphic only	
	Camera	1x CSI	1x CSI 2-lane	1x MIPI-CSI (2 lanes)
	Ethernet	2x GbE LAN (RGMII)	2x GbE LAN (RGMII) (1 port with TSN)	2x GbE LAN (RGMII) (1 port with TSN)
	Other Legacy I/O	8x GPIO, 1x I^{2}C, 4x UART(2xRTS/CTS), 2x SPI, 2xCAN Bus, 2x SDIO (4bit), 2x ADC, 4x PWM, 1x JTAG	14x GPIO, 2x I2C, 3x UART(2xRTS/CTS), 2x SPI, 2xCAN Bus, 2x SD card, 2x ADC, 1x PWM, 1x JTAG	8x GPIO, 2x I2C, 3x UART(2xRTS/CTS) 2x SPI, 2xCAN Bus, 2x SDIO 2x ADC, 2x PWM, 1x JTAG
Mechanical	Form Factor	SGeT OSM Specification v1.1 OSM Size-L 662 pins	SGeT OSM Specification v1.1 OSM Size-L 662 pins	SGeT OSM Standard v1.2 OSM Size-S 332 pins
	Dimension	45 mm (L) x 45 mm (W)	45 mm (L) x 45 mm (W)	30 mm (L) x 30 mm (W)
Environmental	Operating Temperature	-20°C to 85°C	-40°C to 85°C	-20°C to 85°C
	Relative Humidity	5 % to 95 % RH (non-condensing)	5 % to 95 % RH (non-condensing)	5 % to 95 % RH (non-condensing)

OSM Module Specifications		NXP	Qualcomm	ESWIN
Category	**Item**	**MOSM-MN50E**	**MOSM-MQ01E**	**MOSM-ME00E**
General	**OSM Standard**	v1.2 Support OSM Size-L SoC module	v1.2 OSM Size-L SoC module	v1.2 Support OSM Size-L
	CPU	i.MX95 w/ 6 Core ARM Cortex-A55 + ARM Cotex-M7 + ARM Cotex-M33	Qualcomm QCS6490 with 1x Kryo Gold plus, 3x Kryo Gold, 4x Kryo Silver up to 2.7GHz	ESWIN EIC7700X 4x SiFive P550 1.4–1.8 GHz
	Storage	eMMC 32GB	(see Memory & Storage)	1x onboard eMMC 5.1 flash up to 128GB (default: 64GB) 1x SATAIII
	Memory	4G onboard LPDDR5	1x onboard LPDDR5 8G+ 64GB eMMC	2x onboard LPDDR5 up to 32GB (default: 8GB)
	Power Input	5V DC	5V DC	5V DC
	Operating Systems	Linux Yocto	Win 11 IoT Android 13 Linux Ubuntu, Yocto	Linux Debian OS
I/O Interface	**Audio**	3x SAI interfaces	1x I2S	1x I2S
	PCIe	2x PCIe Gen3 x1	1x PCIe x1 (Gen3)	1x PCIe x4 (Gen3)
	USB	1x USB OTG 1x USB 2.0	1 x USB 3.1 with DP 1x USB2.0 1x Micro USB	1x USB2.0 2x USB3.0
	Display	1x 4-lane MIPI DSI with data supplied by the LCDIF	1x DP with USB-C ALT mode 1x DP or HDMI 1x MIPI DSI	1x HDMI or DP 1x MIPI DSI
	Video	Integrated in SoC		
	Camera	1x 4-lane MIPI CSI-2 camera input		2x 4-lanes CSI
	Ethernet	2x Gigabit Ethernet controller with support for TSN in addition to EEE, Ethernet AVB and IEEE 1588	1x GbE LAN (RGMII)	1x GbE LAN (RGMII)
	Other Legacy I/O	3x UART(1x console), 24x GPIO, 2x SPI 1x SDIO, 1x CAN, 2x PWM, 3x I2C	2x GPIO, 2x I2C, 3x UART(with 1x console) 2x SPI, 1x SDIO (4bit), 1x JTAG	3x GPIO, 2x I2C, 4x UART(with 1x console) 1x SPI, 2x SDIO (4bit), 1x4 PWM, 1x JTAG
Mechanical	**Form Factor**	SGeT OSM Specification v1.1 OSM size L 662 pins	SGeT OSM Specification v1.2 OSM Size-L 662 pins	SGeT OSM Specification v1.2 OSM Size-L 662 pins
	Dimension	45 mm (L) x 45 mm (W)	45 mm (L) x 45 mm (W)	45 mm (L) x 45 mm (W)
Environmental	**Operating Temperature**	-20°C to 85°C		-20°C to 85°C
	Relative Humidity	10 %~ 90 % RH (non-condensation)		5 % to 95 % RH (non-condensing)

OSM Module Specifications		Rockchip		Intel
Category	**Item**	**MK00E**	**MK10E**	**MOSM-M105**
General	**OSM Standard**	v1.1 Support OSM Size-L SoC module	v1.1 Support OSM Size-L SoC module	v1.1 Support OSM Size-L SoC module
	CPU	RockchipRK3566, Quad-core Arm Cortex-A55 up to 1.8GHz	Rockchip RK3568J, Quad-core ARM Cortex-A55	Intel Atom® x7000RE Series Processor (default: x7211RE, 3.2GHz)
	Storage	eMMC 5.1 16GB onboard (up to 128GB optional)	16GB eMMC (up to 128GB Optional)	N/A (designed on carrier board)
	Memory	LPDDR4 2GBonboard(up to 8GB optional)	2GB (up to 8GB optional)	1x 8GB onboard LPDDR5 memory, 4800 MT/s
	Power Input	5V DC	5V DC	5V DC
	Operating Systems	Embedded Linux (Yocto-based), Android	Android, Linux (Yocto/Debian)	Win 10, Win 10 IoT Win 11, Win 11 IoT
I/O Interface	**Audio**	1 x SPDIF, for audio output 1 x 8ch I^{2}S /TDM, 1×8ch PDM, 1×2ch I^{2}S/PCM	2 x 8ch I^{2}S/TDM, 1×8ch PDM, 2×2ch I^{2}S/PCM, 1x8ch SPDIF	1x HDA
	PCIe	1x PCIe	1x PCIe	2 × PCIe x1, 1 × PCIe x2 (1 × PCIe x1 shared with SATA)
	USB	1x USB HOST 3.0, 1 x USB OTG 2.0, 2 x USB Host 2.0	1x USB HOST 3.0, 1x USB OTG 2.0, 2x USB Host 2.0	4x USB2.0 2x USB3.0
	Display	Support eDP/ MIPI-DSI interface, Resolution up to 1920×1080	Support HDMI/eDP/MIPI-DSI interface, Resolution up to 4K@60Hz	1x DP++/HDMI 1x eDPx2
	Video		4K 60fps video decoding (H.265, H.264, VP9, etc.) / 1080P video encoding	
	Camera	1x MIPI CSI	1x 4-lane MIPI CSI	1x GbE LAN (SGMII)
	Ethernet	RJ45, 1000M,optional WiFi/BT via SDIO	2 x RJ45, 1000 Mbps Gigabit Ethernet (optional WiFi & Bluetooth via SDIO3.0)	17x GPIO, 2x I^{2}C, 4x UART, 2x SPI, 1x eMMC, 2x ADC, 4x PWM, 1x eSPI
	Other Legacy I/O	I2C, UART, SPI, SDIO3.0, USB2.0, PWM, RMII, I2S (Support 8-way digitalmicrophone array input)	I2C, UART, SPI, SDIO3.0, USB3.0, USB2.0, PWM, CAN, RMII, I2S (Support 8-way digital microphone array input)	SGeT OSM Specification v1.1 OSM Size-L 662 pins
	Form Factor	SGeT OSM Specification v1.1 OSM Size-L 662 pins	SGeT OSM Specification v1.1 OSM Size-L 662 pins	
Mechanical	**Dimension**	45 mm (L) x 45 mm (W)	45 mm (L) x 45 mm (W)	45 mm (L) x 45 mm (W)
	Operating Temperature	0°C to60°C	-40°C to 85°C	-20°C to 85°C
Environmental	**Relative Humidity**	5 % to 95 % RH (non-condensing)		5 % to 95 % RH (non-condensing)

MOSM EVK Specifications	R400 (OSM-L Mini-ITX EVK)	R220 (OSM-L 3.5" EVK)	R221 (OSM-L 3.5" EVK)	R120 (OSM-L PICO-ITX EVK)
Form Factor	OSM to mini ITX 170 mm (L) x 170 mm (W)	3.5" 146 mm (L) x 102 mm (W)	3.5" 146 mm (L) x 102 mm (W)	PICO-ITX 100 mm (L) x 72 mm (W)
Power Input	Standard Input : 15V-30V	9~36V power input	9~36V power input	9~36V power input
Display	2x eDP to display expansion board (Support DP or HDMI or eDP) 1xRGB to DF13 connector 2 channel LVDS (18/24 bit) 1x DSI to HDMI	1 × MIPI-DSI (4-lane) to HDMI 1 x LVDS DF13 connector	1 × MIPI-DSI (4-lane) 1 x DP	1 × MIPI-DSI (4-lane) 1 x DP
USB	1x micro USB 2.0 (support OTG) 1x USB 2.0 2x USB 3.0	1x USB OTG (micro USB) 2x USB 2.0 Type-A	1x USB OTG (micro USB) 1x USB 3.0 Type-A	1x USB OTG (micro USB) 1x USB 3.0 Type-A 1x USB 3.0 Type-A
Ethernet	1x SGMII with TSN 4x GbE Lan RGMII (for ARM only)	2x RJ45 RGMII GbE LAN		
GPIO	5x GPIO group (8 bit per group)	2 x GPIO	1 x GPIO	
I2C	2x I^{2}C	2x I^{2}C		
UART	1x UART to USB (console) 3x UART to header 1x UART to M.2 Key-E	3x UART (1x console)	4x UART (1x console)	
Audio	1 x I2S(HDA) to header 1 x I2S(HDA) to M.2 Key-E	I^{2}S with combo jack	I^{2}S with combo jack	I^{2}S with combo jack
Expansion	2x M.2 Key-M 2280 1x M.2 Key-E 2242 1x SPI to Flash Socket 1x SPI to Header 1x mikro bus (UART, SPI) 2x CAN to header 4xPWM to header 1x JTAG to header 2x ADC to header	2x I^{2}C, 1x SDIO for SD card 2x SPI, 1x ADC, 1x PWM 1x MIPI-CSI, 2x CANBUS	1x eDP_A for eDP or HDMI add-on card 2x GbE, 1x SDIO for SD card 1x SPI, 2x ADC, 1x JTAG 1x LVDS connector	1x eDP_A for eDP or HDMI add-on card

MiTwell

About MiTwell

Founded in 2015, MiTwell, Inc. is an advanced embedded AI solutions provider specializing in OSM modules, edge AI platforms, system computers, and hardware-software integration.

From module design to system deployment, MiTwell delivers compact, scalable, and industrial-grade solutions for smart cities, industrial automation, medical systems, transportation, agriculture, and autonomous applications.

With full-stack engineering expertise, MiTwell helps customers accelerate development and bring reliable edge AI products to market with confidence.

✉ info@mitwell.com.tw

🌐 www.mitwell.com.tw

📍 No.55, Ln. 6, Chenglin Rd., Tucheng Dist.,
New Taipei City 236, Taiwan

Website

Linkedin

Facebook