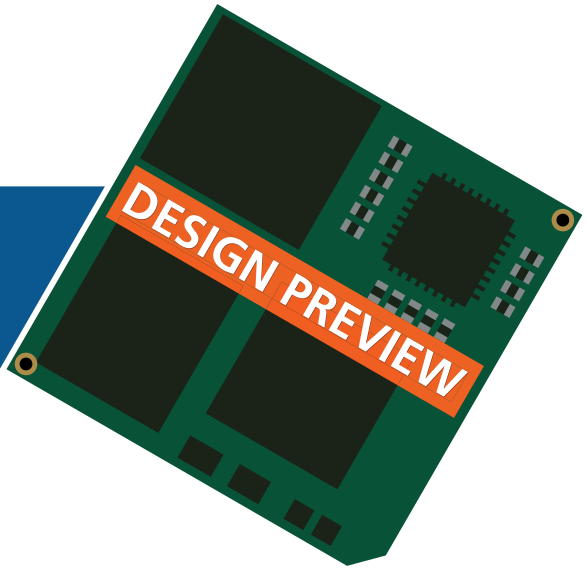
Toradex
Swiss. Embedded. Computing.

OSM iMX91
PRODUCT BRIEF



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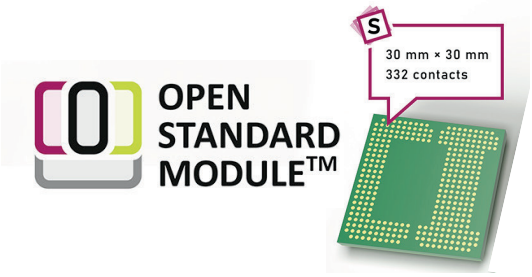
OSM iMX91 Product Brief

Toradex OSM - Compact, Solderable, High-Volume ready SoMs

The OSM Size-S form factor delivers a compact 30 × 30 mm footprint with a fully solderable, connector-less BGA interface. Designed to be completely machine-processable during soldering, assembly, and testing, OSM enables space-efficient designs, ideal for cost-optimized and high-volume products.

If your application demands miniaturization, long-term reliability, and a solderable SoM, OSM modules are a strong fit, enhanced by Toradex's high quality, industrial reliability, and comprehensive documentation and support.



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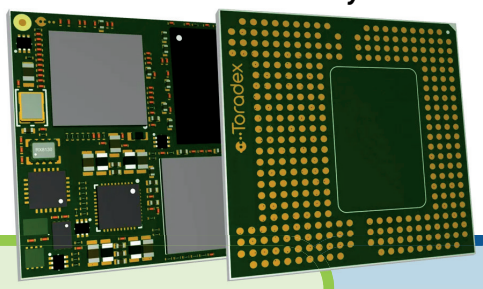
Is Solderable For You?

Selecting a solderable SoM is not only about product requirements, it also depends on your production capabilities. OSM modules are best suited for manufacturing lines equipped with automated SMT (Surface-Mount Technology) and reflow processes. If your factory supports these workflows, OSM provides an efficient, scalable integration path.

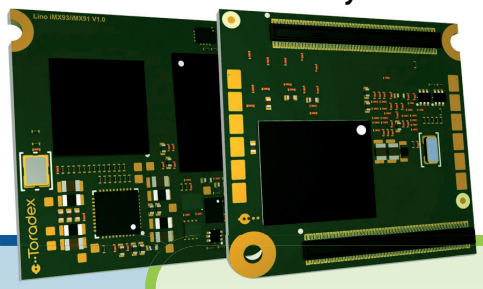
If your production process relies on manual assembly, requires easier handling during development, or benefits from a pluggable module for prototyping or field replacement, the Lino family is a better fit. It offers similar compactness through 2x100-pin board-to-board connectors with stacking heights down to 1.5 mm.

Features / Form Factor	Toradex OSM Modules	Toradex Lino Modules
Form Factor	Solderable, OSM Size-S	Board-to-board, Lino
Manufacturing Process	SMT and reflow processes	Manual assembly
SoM Physical Size	30x30mm, Ultra-compact design	
Production Volume	High volume projects	

Toradex OSM Family



Toradex Lino Family



Solderable interface:
Eliminates connectors, enabling fully automated production.

Leverage Your Own Automated Line:
Uses existing soldering and inspection equipment for seamless integration.

Treat Soldering Like a Component:
Mounts directly to your PCB using standard SMT and reflow processes.

Compact Design Fit:
Enables ultra-small enclosures and sleek product layouts.

Perfect for High-Volume Projects:
Fully machine-processable for scalable and repeatable production.

Seamless software integration:
Powered by Torizon OS and Torizon Cloud.

Board-to-board connector:
Simplifies integration, enables easy module upgrades and serviceability.

Simpler manufacturing infrastructure::
Less demanding process control and complexity, reducing production costs.

Flexible Prototyping:
Swap modules during development to test performance or configurations quickly.

OSM Family SoMs

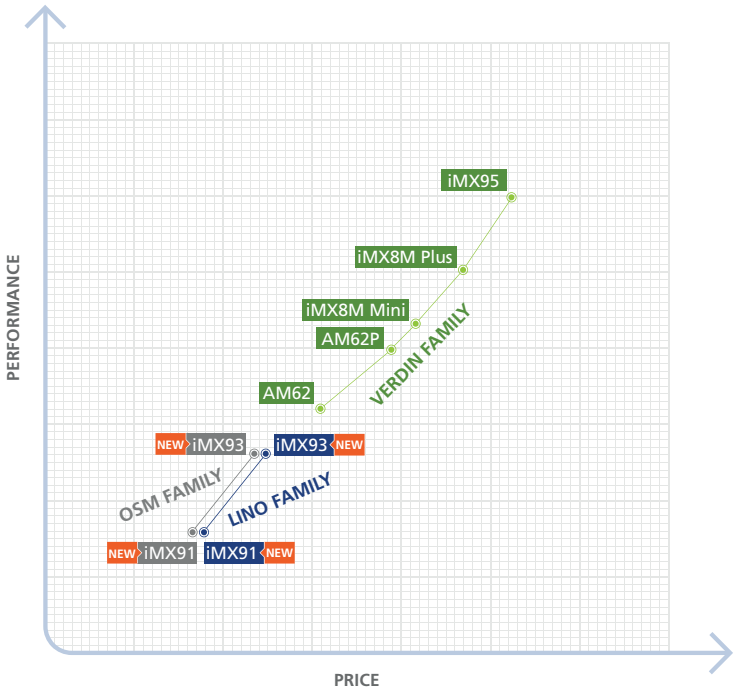
The **OSM family** delivers efficient, secure, and modern processing in a rugged, **solderable form factor** designed for **space-constrained devices** and **high volume applications**. Built on NXP's i.MX 9 processors, it provides a stable and scalable platform for long-life designs that demand compact size and reliable performance, optimized for machine-assembled production lines.

With multiple modules sharing the same industry-standard OSM footprint and software ecosystem, the family offers effortless scalability, from streamlined control solutions to AI-enabled connected devices, without relying on bulky connectors or custom mechanical designs.

Features / SoMs	OSM iMX91	OSM iMX93
Form Factor	Solderable, OSM Size-S	
SoM Physical Size	30x30mm	
Number of pins	332 BGA pins	
CPU	1× Arm Cortex-A55 (up to 1.4 GHz)	Up to 2× Arm Cortex-A55 (up to 1.7 GHz)
MCU	-	1× Cortex-M33 (250 MHz)
RAM Technology	LPDDR4 (up to 2.4 GT/s)	LPDDR4 (up to 3.7 GT/s)
Storage Technology	On-module eMMC	
Connectivity	Dual Ethernet (with TSN), 2× CAN FD, USB 2.0 (OTG + Host), I²C, I³C, SPI, UART, PWM, GPIO, ADC, SDIO/SD/MMC, I²S	
NPU	-	0.5 TOPS
Multimedia	Headless design for compact controllers and gateways	MIPI DSI display, LVDS, MIPI CSI-2 camera and 2D graphics acceleration
Typical use cases	Industrial controllers, PLCs, IoT gateways, smart sensors	HMIs, smart vision nodes, AI-enabled controllers, connected IPCs

Each **OSM SoM** is positioned to offer a straightforward and seamless scalability path. The **OSM iMX91** provides an efficient, reliable entry point for control-focused designs, while the **OSM iMX93** adds multimedia processing and edge AI acceleration for more feature-rich devices.

Unified by the same **compact, solderable OSM form factor** and software ecosystem, they deliver a consistent, connector-less platform that simplifies scaling product lines and ensures long-term design continuity.

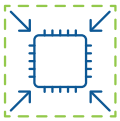


Interfaces Overview

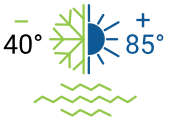
The **OSM iMX91 System on Module (SoM)** combines efficiency, scalability, and industrial reliability in a compact, solderable form factor. Based on the **NXP i.MX 91** processor, it integrates a single Arm® Cortex®- A55 core and the EdgeLock® Secure Enclave, delivering the right balance of performance, connectivity, and security for control-oriented systems.

Designed for **industrial controllers, PLCs, smart sensors, and IoT gateways**, the OSM iMX91 streamlines development with its **solderable, connector-less design**, on-module LPDDR4 memory, eMMC storage, and a robust set of industrial interfaces, all supported by Toradex's long-term software ecosystem.

Open Standard Module™ (OSM)


Ultra-Compact and Solderable

Optimized for Edge & Industrial IoT



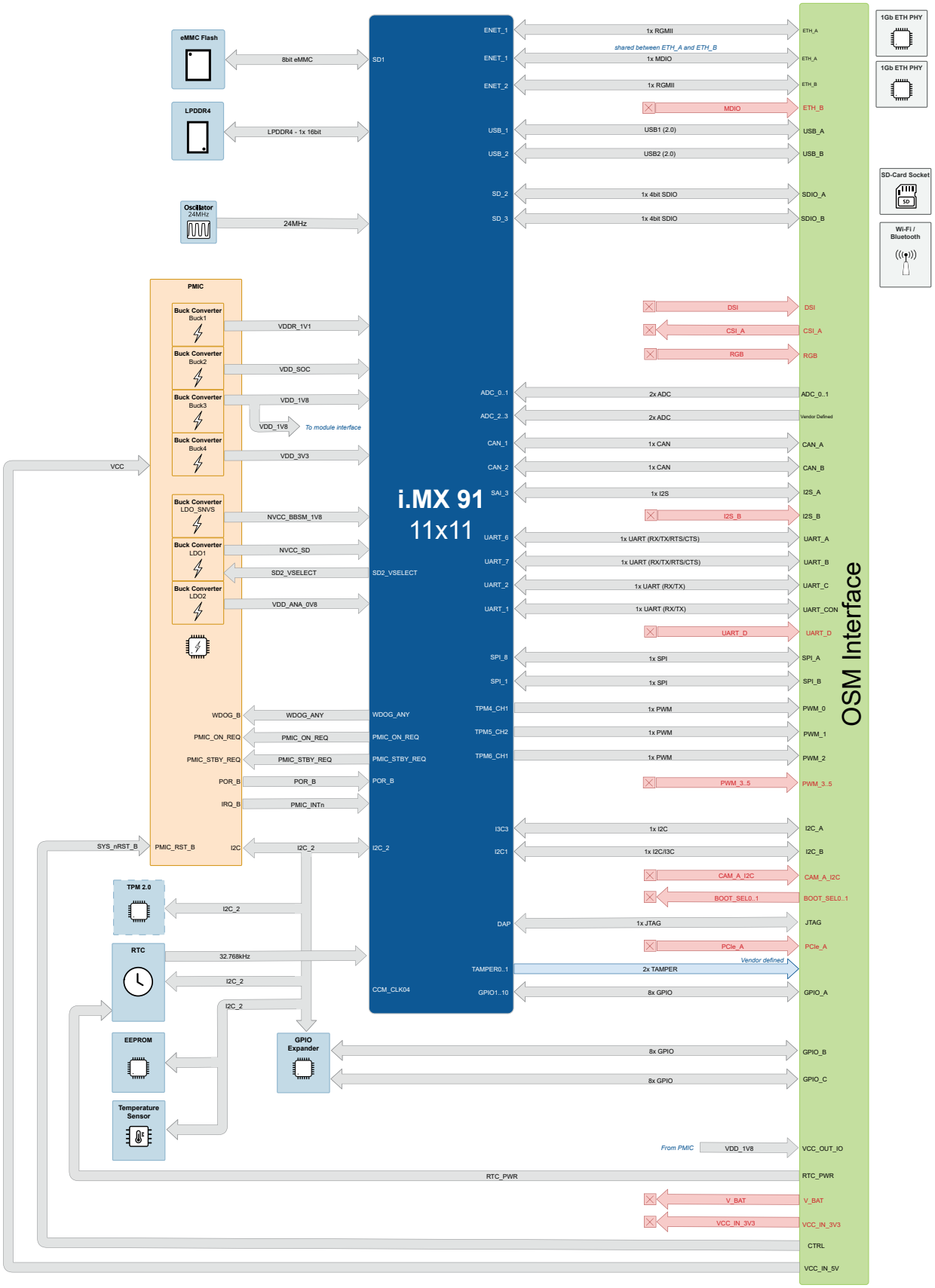
Industrial Reliability

The table below summarizes the main interfaces and configuration options of the OSM iMX91.

Features	**Total** (up to)
Analog	
Analog Input (ADC)	2
Audio	
I2S	1
Camera	
MIPI CSI-2	N/A
Display	
MIPI DSI	N/A
LVDS (dual channel)	N/A
Low speed	
I2C	2
SPI	2
UART Console	1
UART (Rx/Tx only, 2x with RTS/CTS)	4
PWM	3
CAN FD	2
GPIO	24
JTAG	1
Network	
RGMII (Gigabit Ethernet)	2
Storage	
SD/SDIO/MMC	2
USB	
USB 2.0 (Host/OTG, 1x Serial downloader)	2

Contact us for more information, or visit our website product page: OSM iMX91 product page.

Block Diagram



Legend

- Solid gray line arrow: always available
- Solid blue line arrow: available on MSP pins
- Dashed gray line arrow: assembly option
- Blue arrow: vendor defined
- Red arrow: Interface not available

- Interface — System-on-Module Interface
- PMIC — Power Management IC (PMIC)
- Component — Built-in component
- Component — Built-in component - assembly option
- Component — Not on module
- SoC — System-on-Chip

OSM iMX91 Product Brief

Configuration Overview

The OSM iMX91 SoM delivers reliable performance for industrial and IoT applications that demand efficiency, scalability and long-term availability. Its solderable, connector-less form factor enables robust, compact integration within a 30×30mm PCB footprint, ideal for space-constrained designs. With multiple configuration options for memory and storage, developers can tailor the module to their specific system requirements.

The first configuration to be released is shown in the table below: OSM iMX91 Solo 2GB IT.

Family	iMX91 Segment	A-Core Qty	RAM	eMCC	Temp. Sensor	TPM	Temperature
OSM-IMX91	3	1	-2G	-16G	-T	-T	-IT

Additional configurations will be developed over time. In the meanwhile, the tables below summarize the available configuration elements and how they can be combined. Use the *"Configuration Inputs"* tables to fill in the open fields from "*NPI part number table*" in order to build the desired configuration.

For additional specific requirements or tailored options, please, get in touch with us.

Note: The New Product Introduction (NPI) part number nomenclature shown below does not reflect volume or sellable part numbers from Toradex. They should only be used to communicate your desired configuration.

NPI part number table

Family	iMX91 Segment	A-Core Qty	RAM	eMCC	Temp. Sensor	TPM	Temperature
OSM-IMX91							

Configuration Inputs

iMX91 Segment	Description	A-Cores Qty	Max Frequency	DRR Speed
3	Full Featured	1	1.4 GHz	2.4 GT/s
2	Reduced	1	800 MHz	1.6 GT/s

RAM Density	
-256M	256 MB
-512M	512 MB
-1G	1 GB
-2G	2 GB

eMMC Capacity	
-4G	4 GB
-8G	8 GB
-16G	16 GB
-32G	32 GB
-64G	64 GB
-128G	128 GB
-256G	256 GB

Temperature Sensor	
-T	Assembled
-N	**Not** assembled

TPM	
-T	TPM 2.0 assembled
-N	TPM 2.0 **not** assembled

Temperature	
-IT	Industrial (-40°C to 85°C)
-ET	Extended (-25°C to 85°C)
-CT	Commercial (0°C to 70°C)

Contact us for more information, or visit our website product page: OSM iMX91 product page.

OSM iMX91 Product Brief

Torizon™ | Easily Develop, Manage and Secure Your Linux Devices

Torizon is a ready-to-use Linux-based ecosystem that simplifies the development, management, and security of embedded devices. Built on a robust Linux foundation, it accelerates time-to-market with a production-grade software stack and no vendor lock-in.

Designed for reliability at scale, Torizon offers secure over-the-air updates, real-time capabilities, and streamlined device management throughout the product lifecycle. It empowers you to build, deploy, and maintain Linux devices with confidence.

Fast time-to-market
Ready-to-use Linux distribution

Open Source
Based on open software, no lock-in

Simple updates
Built-in, automotive-grade, over-the-air update capabilities

Real-time
Optimized real-time option

Secure
Frequent updates, accessible security features

Device Monitoring

Subsystem Updates

Remote Access

Remote Updates

Secure by Default

To explore the full potential of the Torizon ecosystem, visit Torizon.io

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