NXP Platinum Partner

PHYTEC

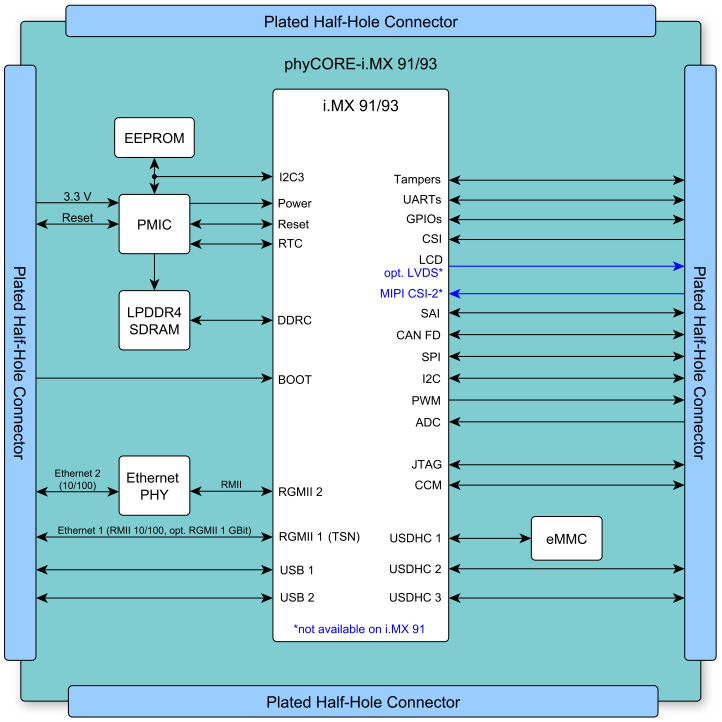
phyCORE®-i.MX 91/93

Arm® Cortex®-A55/-M33

The module based on the i.MX 91 or i.MX 93 processor from NXP offers high computing performance with low power consumption. At just 36 mm x 36 mm, equipped with an Arm® Ethos™-U65 microNPU (only i.MX 93) and NXP's innovative Energy Flex architecture, the module enables the development of more powerful, cost-effective and energy-efficient ML applications, e.g. for IoT applications. The fully industrial phyCORE-i.MX 91/93 SOM features a price-optimized bill of material. Direct Solder Connect technology makes the module suitable for high-volume production and significantly reduces the manufacturing cost. Pin compatibility between the phyCORE-i.MX 6UL/ULL and phyCORE-STM32MP13x enables the development of scalable applications in terms of price/performance ratio. Two platforms support the SoM. The phyBOARD-Segin, which demonstrates compatibility with our STM32MP13x and i.MX 6UL modules, and the phyBOARD-Nash, which supports all the features of the phyCORE-i.MX 93 without prioritising pin compatibility.

Pin compatible

phyCORE®



i.MX 93 Processor

- Cost-efficient, scalable NXP i.MX 93, Cortex®-A55 supports up to 1.7 GHz frequence or NXP i.MX 91 with up to 1.4 GHz frequence
- Cortex®-M33 MCU (up to 250 MHz) for real-time and safety-critical applications
- Powerful AI thanks to Arm® Ethos™-U65 microNPU
- Arm® NEON™ SIMD extension for acceleration of multimedia and signal processing algorithms
- 3.3 V/ 1.8 V tolerant I/Os, advanced low-power modes
- Advanced hardware security
  - Integrated EdgeLock® Secure Enclave
  - Tamper, WDT, temperature and voltage monitoring

Module Features

- Up to 256 GB TLC eMMC
- On-board Ethernet PHY and voltage conversion
- 159-pin DSC layout supports Dual LAN, USB, UART, CAN FD, I²S /SAI, 12-bit ADC, LCD, camera, etc.
- Dimensions 36 mm x 36 mm, profile ca. 3 mm
- Available on reel or tray for optimized assembly

Your Advantages

- Production-ready Linux® BSP
- Reference design for FCC / CE certification
- Only one device design for different performance configurations (with phyBOARD-Segin)
- Product Life-Cycle Management program

www.phytec.eu/en/phycore-imx-91-93

Technical Data

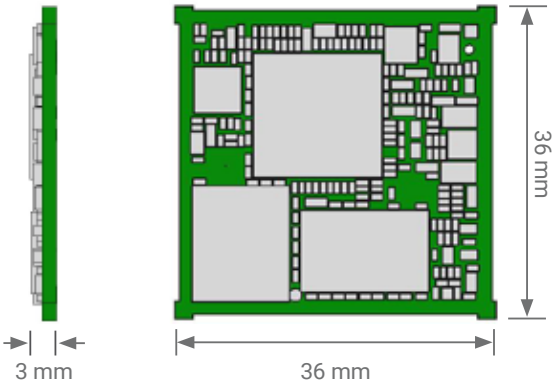
Module Configuration

SOC	
Processor	i.MX 91 / i.MX 93
Core	1x / up to 2x 64-bit Arm® Cortex®-A55
Coprocessor	Arm® Cortex®-M33
Clock frequency	up to 1.4 GHz / 1.7 GHz (A55); up to 250 MHz (M33)
Cache	L1: 64 kB (A55), 32 kB (M33); L2: 256 kB / 64 kB per core (A55)
Internal RAM	364 kB / 640 kB SRAM
Processor extension	Arm® NEON™ and Arm® TrustZone®
AI / ML	Arm® Ethos™-U65 microNPU
HW Security	Secure boot, TrustZone®, SNVS, SRTC, EdgeLock® secure enclave
HW Crypto Accelerator	yes
Features printed in blue are only available on the i.MX 93	
ON-BOARD MEMORY	
Flash	up to 256 GB TLC eMMC
LPDDR4	512 MB up to 2 GB 16-bit bus width
EEPROM	4 kB up to 32 kB
PHYSICAL PROPERTIES	
Dimensions	36 mm x 36 mm x 3 mm
Weight	tbd.
Operating temperature	-40 °C to +85 °C
Humidity	95 % rF non condensing
Operating voltage	3.3 V
Power consumption typ.	tbd.
Connector	159 solder pads, 1 mm pitch
SOFTWARE	
Operating system	Linux® (Yocto based)

Module Interfaces

MAXIMUM INTERFACES*,**	
Ethernet	1x 10/100 Mbit/s (on-board PHY), 1x RMII (optional RGMII with TSN)
USB	2x 2.0 host / OTG
UART	up to 8
CAN	up to 2 CAN FD
I²C	up to 8 (2x I3C)
SPI	up to 8
MMC/SD/ SDIO	up to 2
PWM	up to 24
A/D	up to 3x 12-bit
Display	1x parallel up to 24-bit, optional 1x LVDS
Audio	3x I²S/SAI, 1x S/PDIF, PDM input
Camera	1x MIPI CSI-2, optional 1x parallel 10-bit
Debugging	JTAG

* Due to multiplexing, not all interfaces may be fully available.
** Due to the exclusive use of individual interfaces on the module, the maximum number may differ from the processor specification.



phyBOARD®-Segin or phyBOARD®-Nash

Pin compatibility or full support of the phyCORE-i.MX 93

	phyBOARD-Segin (pin compatibility)	phyBOARD-Nash (full support)
SOC		
Processor	i.MX 91 / i.MX 93	i.MX 93
Memory	8 GB MLC eMMC, 1 GB LPDDR4 RAM, 4 kByte EEPROM	32 GB TLC eMMC, 2 GB LPDDR4 RAM, 4 kByte EEPROM
INTERFACES		
Ethernet	2x 10/100BASE-T	1x 10/100BASE-T, 1x 10/100/1000BASE-T
USB	1x USB 2.0 OTG (Micro-AB) 1x USB 2.0 host (Type-A)	1x USB 2.0 OTG (Micro-AB) 4x USB 2.0 host (2x Type-A, expansion, con. A/V con.)
Serial	1x RS-232 (w. CTS, RTS) or RS-485 (pin header 2x5), 1x CAN FD (pin header 2x5)	1x RS-232 (w. CTS, RTS) or RS-485 (full duplex) (pin header 2x5), 2x CAN FD (1x pin header 2x5, 1x Exp. Con.)
Display	24-bit parallel (A/V-connector)	LVDS, (1366x768p60 or 1280x800p60) (A/V-connector)
Camera	-	MIPI CSI-2 (phyCAM-M)
Audio	Stereo Line IN/OUT (pin header 2x6), Speaker (1x2 Molex SPOX)	SAI (A/V-connector)
Debugging	JTAG (at expansion connector)	JTAG (pin header 2x5), 2x Debug UART (via USB-C)
Other	I²C, SPI, SD, ADC, WD, Tamper, GPIO (expansion connector)	I²C, I³C, WD, SD, ADC, Tamper, GPIO (expansion connector)
MISCELLANEOUS		
MMC/SD/SDIO	microSD Card Slot	microSD Card Slot
Dimensions	100 mm x 72 mm (Pico-ITX)	160 mm x 77 mm
Supply Voltage	3.3 V, 5 V, 12 V to 24 V	12 V - 24 V ±10 %, USB-C PD
I/O Voltage	3.3 V	1.8 V, 3.3 V