



# 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 of the end application.

Pin compatibility between the phyCORE-i.MX 6UL/ULL and phyCORE-STM32MP13x enables the development of scalable applications in terms of price/performance ratio.

## i.MX 93 Prozessor

- Cost-efficient, scalable NXP i.MX 93, Cortex®-A55 supports up to 1.7 GHz frequency
- 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

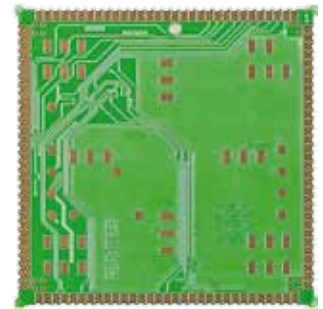
- Advanced security with integrated EdgeLock® Secure Enclave
- Tamper, WDT, temperature and voltage monitoring

## Integrated functionality

- Up to 256 GB TLC eMMC
- On-board Ethernet PHY and voltage conversion
- 159-pin DSC layout supports Dual LAN, Dual USB, Dual CAN FD, UART, I²S /SAI, 12-bit ADC, parallel LCD, camera, etc.
- Dimensions 36 mm x 36 mm , low profile (ca. 3 mm )

## Development advantages

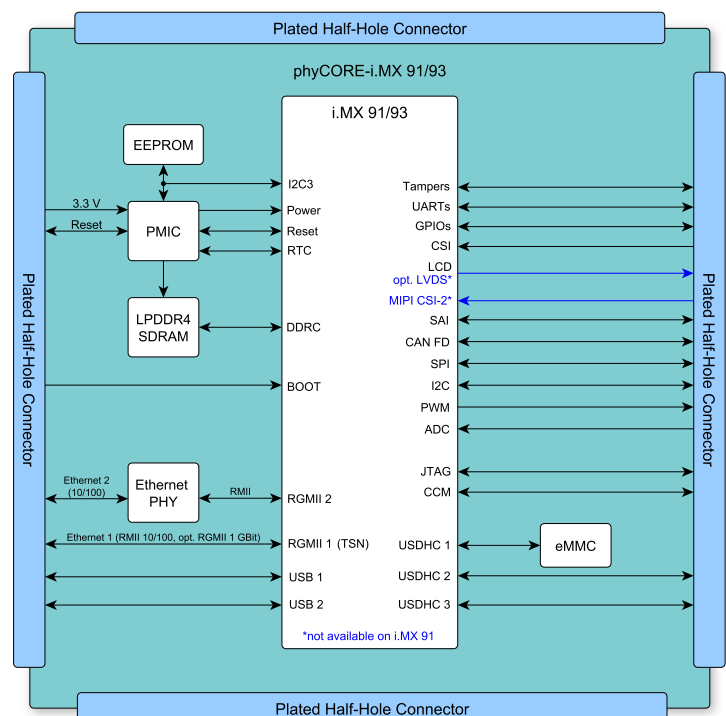
- Ready adapted Linux® operating system
- FCC / CE product reference design
- Only one device design for different performance configurations
- Global Technical Support



phyCORE®



Pin compatible



[www.phytec.eu/en/phycore-imx-93](http://www.phytec.eu/en/phycore-imx-93)

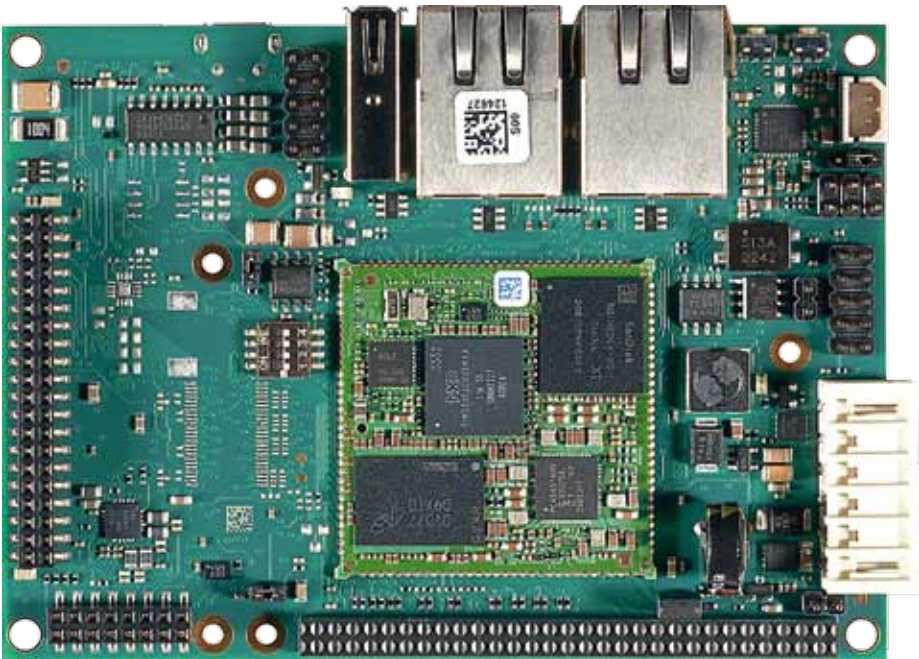
Technical Data

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);<br>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 |                                                                    |
| EXT. 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)                                               |

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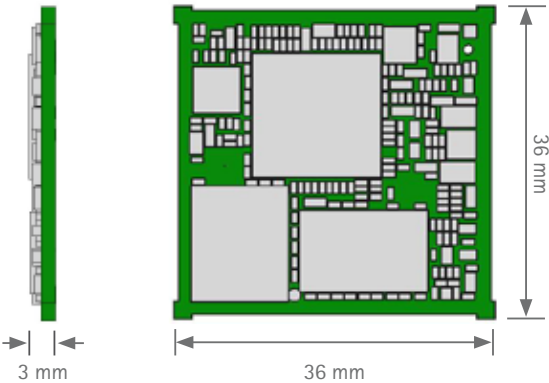
Development platform or powerful, industry-compatible SBC



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.



| INTERFACES       |                                                       |
|------------------|-------------------------------------------------------|
| Ethernet         | 2x 10/100BASE-T                                       |
| USB              | 1x USB 2.0 OTG (Micro-AB)<br>1x USB 2.0 host (Type-A) |
| Seriell          | 1x RS-232 or RS-485,<br>1x CAN (2x pin header 2x5)    |
| Display          | 18-bit parallel via A/V-expansion board PEB-AV-02     |
| Debugging        | JTAG via PEB-EVAL-01 adapter                          |
| Other            | I²C, SPI, Tamper, GPIO<br>(Expansion pin header)      |
| MISCELLANEOUS    |                                                       |
| MMC/SD/SDIO      | microSD Card Slot                                     |
| Control elements | 3x LED, 2x button                                     |
| Dimensions       | 100 mm x 72 mm (Pico-ITX)                             |
| Supply Voltage   | 12 V to 24 V                                          |