phyFLEX-i.MX 91/93 FPSC

High computing power and low energy consumption at an affordable price

The phyFLEX-i.MX 91/93 FPSC can be equipped with either the i.MX 91 or the i.MX 93 from NXP's i.MX 9x family. Thanks to NXP's innovative Energy Flex architecture, the module offers high computing power with low-energy consumption with both processors. The integrated EdgeLock® Secure Enclave enables security features such as lifecycle management, tamper detection, secure booting, and a simplified path to certification.

Thanks to scalability in the FPSC standard, product variants and upgrades are possible during the product lifecycle without redesigning the carrier board. Pin compatibility with phyFLEX modules in the FPSC Gamma feature set allows new projects to choose one of the platforms after evaluating performance requirements. It is even possible to develop different end product variants with different performance classes and features, in terms of price/performance ratio scalable applications. The phyFLEX-i.MX 91/93 FPSC offers upgrade paths, scalable computing power, and access to the latest technologies, while ensuring and improving the longevity of products and applications.
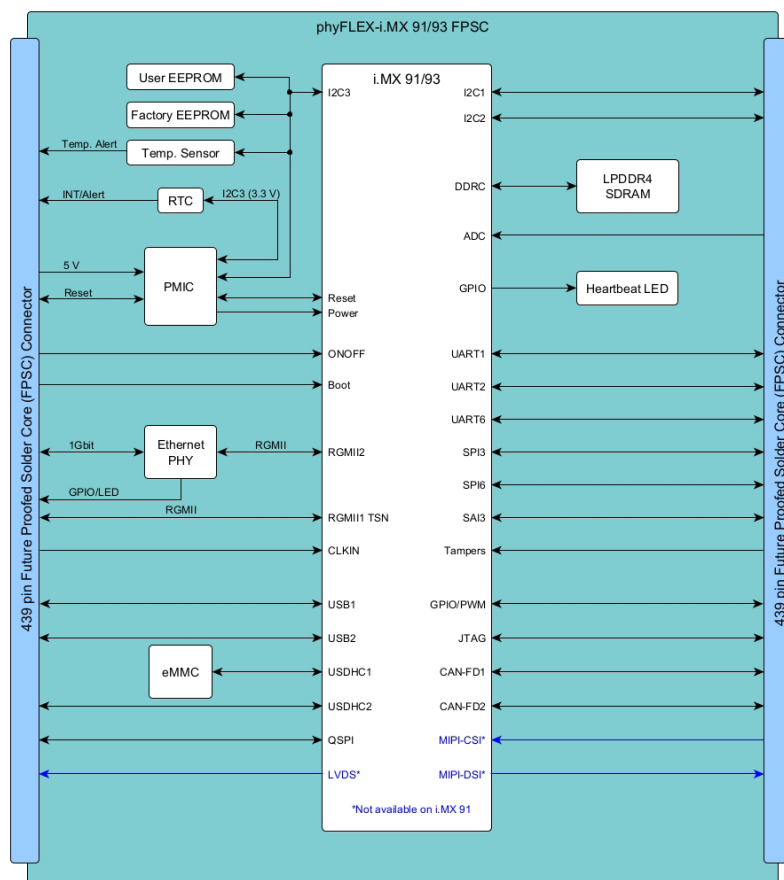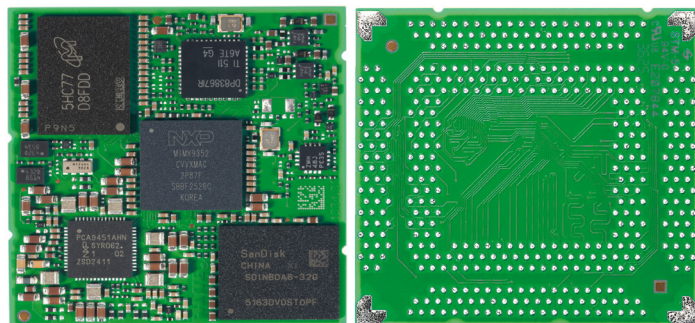
The fully industrial-grade System on Module is characterized by its price-optimized bill of materials. FTGA soldering technology makes the module suitable for high-volume production and significantly reduces the manufacturing costs of the end application.

i.MX 91/93 Processor
- Robust FTGA soldering module, compatible with NXP i.MX 91 or i.MX 93.
- i.MX 91, 1x ARM® Cortex®-A55 with up to 1,5GHz
- i.MX 93, 2x ARM® Cortex®-A55 with up to 1,7 GHz; M-Core real-time MCU; NPU for AI acceleration
- With display interface:
  - i.MX 91: parallel
  - i.MX 93: MIPI-DSI and LVDS optional
- Thanks to FPSC, it's pin-compatible with all phyFLEX SoMs (phyFLEX-STM32MP2x, AM62Lx, i.MX 8M Plus, or i.MX 95).

Module Features
- Industrial interfaces: Gigabit Ethernet, CAN FD, UART
- Embedded Security: EdgeLock® Secure Enclave, Secure Boot, Cryptography and more
- Integrated RAUC client
- Fully customized Linux operating system (Yocto)
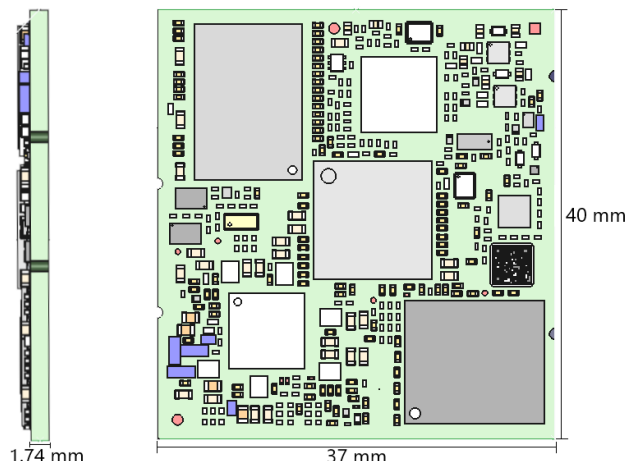- Optional Software Lifecycle Management (SLCM)

Technical Data

Module Configuration

Processor	NXP i.MX 91/93
Core(s)	**i.MX 91** - 1x 64-bit Arm® Cortex®-A55 **i.MX 93** - up to 2x 64-bit Arm® Cortex®-A55
Additional Core(s)	**i.MX 93** - Arm® Cortex®-M33
Clock frequency	**i.MX 91** - up to 1.4 GHz (A55) **i.MX 93** - up to 1.7 GHz (A55), up to 250 MHz (M33)
L1 Cache	**i.MX 91** - 32 kB instruction / 32 kB data (A55) **i.MX 93** - 32 kB instruction / 32 kB data (A55), 32 kB (M33)
L2 Cashe	**i.MX 91** - L2: 256 kB (A55) **i.MX 93** - 64 kB per core (A55)
Processor Extension	Arm® NEON™ and Arm® TrustZone®
HW Security	Secure boot, TrustZone®, SNVS, SRTC, Edge-Lock® secure enclave
HW Crypto Accelerator	**i.MX 91** - yes **i.MX 93** - yes

EXT. MEMORY

eMMC	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	37 mm x 40 mm x 2 mm
Weight	tbd.
Operating temperature	-40 °C to +85 °C
Humidity	95 % RH non condensing
Operating voltage	5.0 V
I/O voltage	1.8 V, 3.3 V
Power consumption typ.	tbd.
PCB connection	FTGA with FPSC--Gamma 1.1 footprint, 1.27 mm pitch

SOFTWARE

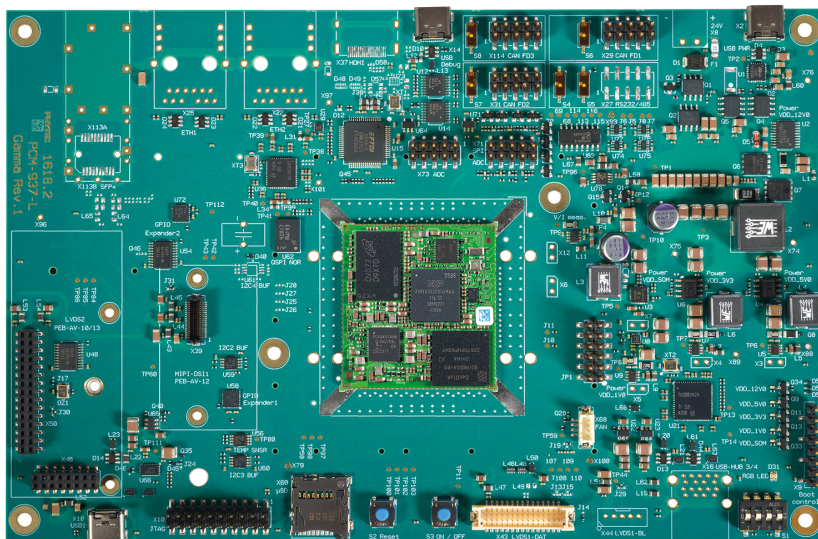|	
Operating system	Linux (Yocto based)

Module Interfaces

Ethernet	1x 10/100 Mbit/s (on-board PHY) / 1x GbE (RMII) (optional RGMII with TSN Support)
USB	2x 2.0 host / OTG
UART	3x, up to 8x
CAN	2x CAN FD
I²C	2x , up to 8x
I3C	1x
SPI	2x (+1x QSPI), up to 8x (+1x QSPI)
MMC/SD/SDIO	2x
PWM	2x , up to 24x
Display	**i.MX 91** - up to 24 bit parallel (1366x768p60 or (280x800p60) **i.MX 93** -1x MIPI DSI: up to 1920x1200p60 **(optional LVDS (both 1366x768p60 or 1280x800p60)),** up to 24 bit parallel (1366x768p60 or 1280x800p60)
Camera	**i.MX 91** - 1x parallel up to 10-bit **i.MX 93** - 1x MIPI CSI-2 (1080p60), 1x parallel up to 10-bit

Blue font indicates the maximum number or additional interfaces when pin compatibility according to the FPSC standard is NOT required

1.74 mm | 37 mm | 40 mm

Libra Development Board FSPC

Versatile Development Platform for FPSC Modules

INTERFACES

Ethernet	2x 1 GbE (all RJ45) (TSN support)
USB	1x USB 2.0 (Type-A), 1x USB 2.0 (Type-C)
Serial	1x RS-232 or RS-485, 2x CAN FD (3x pin header 2x5)
Display	1x LVDS
Debugging	JTAG (Expansion sockets) 1x USB 2.0 Debug (Type-C)
Various	I²C, SPI, GPIO, ADC (Expansion connectors)

MISCELLANEOUS

MMC/SD/SDIO	microSD Card Slot
User Control	3x LED, 1x RGB LED, 2x button
Dimensions	230 mm x 140 mm
Supply Voltage	24 V or USB-C