i.MX RT1180 Crossover MCUs Industry 4.0 Network Solution

The i.MX RT1180 crossover MCU family includes a Gb Time Sensitive Networking (TSN) Switch to enable real-time rich networking for both TSN-based and industrial real-time communications. The i.MX RT1180 supports multiple protocols to bridge communication between existing systems and future Industry 4.0 applications.

Product highlights

Designed for efficiency

- Dual core architecture offering 800 MHz Arm® Cortex®-M7 and Cortex®-M33 @ 300 MHz for ultimate design flexibility

- Improved real-time execution through large low latency Tightly Coupled Memories (TCM) and embedded shared memories

- Designed for power efficiency with use cases starting from 250 mW across industrial environments

- Scalable and seamless host/companion chip communication going up to 1Gbps without an on-board PHY helps reduce power and cost in industrial designs. High-speed 16-bit Analog to Digital converters, advanced timer/PWM and Delta-Sigma demodulators to supporting multi-axis motor control

Multiprotocol Networking

- Crossover MCU with an integrated Gb Time Sensitive Network (TSN) to support multiple communication protocols

  - Real-time industrial ethernet protocols such as Profinet, Ethernet/IP, EtherCAT, CC-Link IE Field, HSR, and more

  - Latest generation of TSN standards compliant to IEC 60802 for Industrial Automation

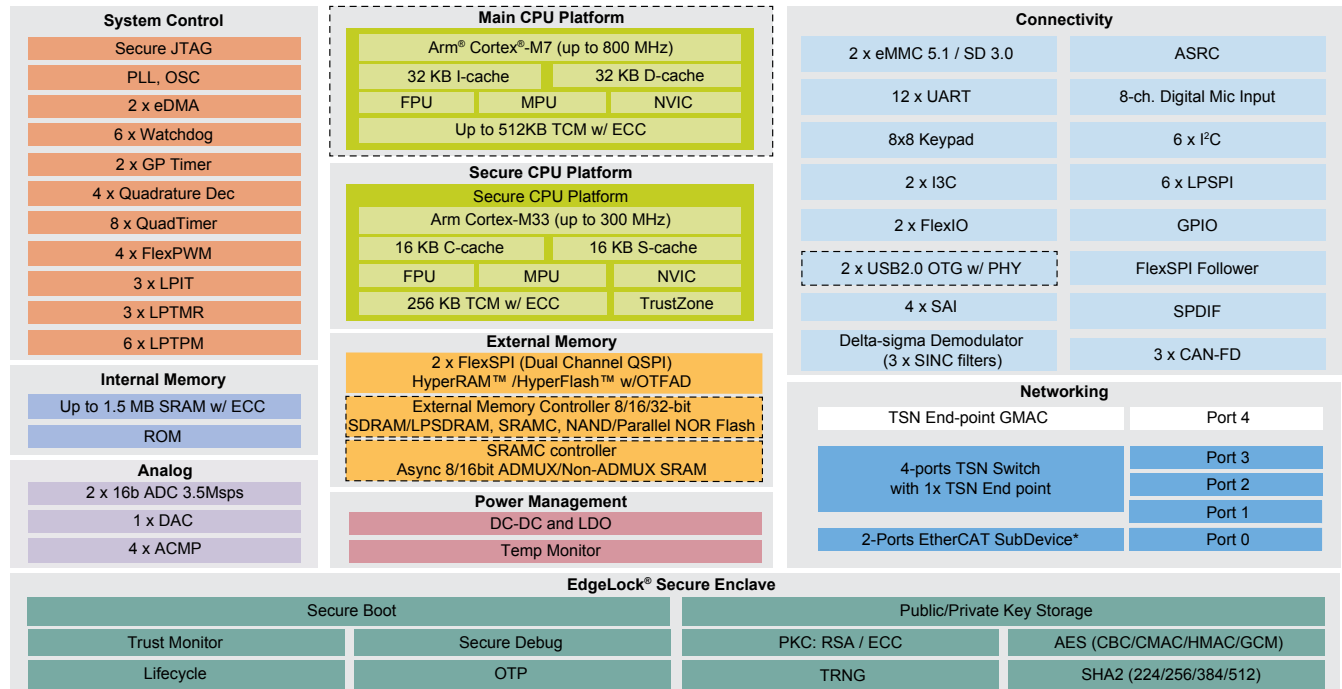 - TSN based protocols such as OPC UA Pub-Sub, Profinet over TSN and CC-Link IE TSN

Advanced security

- Trusted Resource Domain Controller (TRDC)

- TrustZone®-M (TZ-M) on Cortex-M33

- Physical Unclonable Function (PUF)

- EdgeLock® secure enclave

- Providing component level foundation for IEC 62443 system compliance

Target applications

- Industrial control

- Compact motion control

- Industrial networking and gateway

- Network companion

- AC/Servo drives

- Automotive: In-vehicle networking

i.MX RT1180 Block Diagram

System Control
- Secure JTAG
- PLL, OSC
- 2 x eDMA
- 6 x Watchdog
- 2 x GP Timer
- 4 x Quadrature Dec
- 8 x QuadTimer
- 4 x FlexPWM
- 3 x LPIT
- 3 x LPTMR
- 6 x LPTPM

Internal Memory
- Up to 1.5 MB SRAM w/ ECC
- ROM

Analog
- 2 x 16b ADC 3.5Msps
- 1 x DAC
- 4 x ACMP

Main CPU Platform
- Arm® Cortex®-M7 (up to 800 MHz)
- 32 KB I-cache
- 32 KB D-cache
- FPU | MPU | NVIC
- Up to 512KB TCM w/ ECC

Secure CPU Platform
- Secure CPU Platform
- Arm Cortex-M33 (up to 300 MHz)
- 16 KB C-cache
- 16 KB S-cache
- FPU | MPU | NVIC
- 256 KB TCM w/ ECC | TrustZone

External Memory
- 2 x FlexSPI (Dual Channel QSPI) HyperRAM™ /HyperFlash™ w/OTFAD
- External Memory Controller 8/16/32-bit SDRAM/LPSDRAM, SRAMC, NAND/Parallel NOR Flash
- SRAMC controller Async 8/16bit ADMUX/Non-ADMUX SRAM

Power Management
- DC-DC and LDO
- Temp Monitor

Connectivity
- 2 x eMMC 5.1 / SD 3.0 | ASRC
- 12 x UART | 8-ch. Digital Mic Input
- 8x8 Keypad | 6 x I²C
- 2 x I3C | 6 x LPSPI
- 2 x FlexIO | GPIO
- 2 x USB2.0 OTG w/ PHY | FlexSPI Follower
- 4 x SAI | SPDIF
- Delta-sigma Demodulator (3 x SINC filters) | 3 x CAN-FD

Networking
- TSN End-point GMAC | Port 4
- 4-ports TSN Switch with 1x TSN End point | Port 3 | Port 2 | Port 1
- 2-Ports EtherCAT SubDevice* | Port 0

EdgeLock® Secure Enclave
- Secure Boot | Public/Private Key Storage
- Trust Monitor | Secure Debug | PKC: RSA / ECC | AES (CBC/CMAC/HMAC/GCM)
- Lifecycle | OTP | TRNG | SHA2 (224/256/384/512)

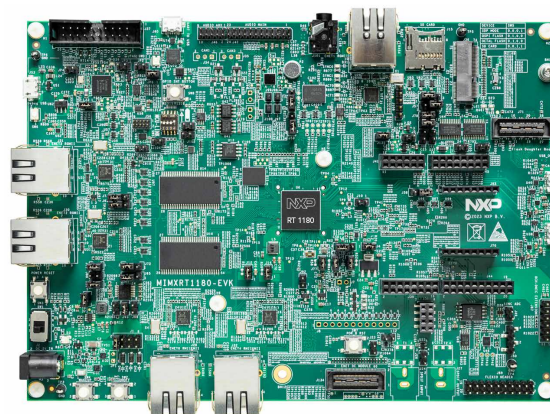* 2-ports can be selected from Port 0 to Port 4

Available on certain products within the family

i.MX RT1180 – Family comparison

	i.MX RT1189	i.MX RT1187	i.MX RT1186	i.MX RT1182	i.MX RT1181
Cortex M7	800 MHz	800 MHz	800 MHz	–	–
Cortex M33	300 MHz	300 MHz	300 MHz	300 MHz	300 MHz
TCM	512 KB + 256 KB w ECC	512 KB + 256 KB w ECC	512 KB + 256 KB w ECC	256 KB w ECC	256 KB w ECC
Total OCRAM	1.5 MB w ECC	1.5 MB w ECC	1.5 MB w ECC	1 MB w ECC	1 MB w ECC
GPIO	173	173	120	82	82
External memory	SEMC 1x 32 b, FLEXSPI x2, SRAMC	SEMC 1x 32 b, FLEXSPI x2, SRAMC	SEMC 1x 16 b FLEXSPI x2, SRAMC	FLEXSPI x2, SRAMC	FLEXSPI x2, SRAMC
TSN switch	4+1 port(5x 1 Gbps)	4+1 port(5x 1 Gbps)	2+1 port(3x 1 Gbps)	2+1 port(3x 1 Gbps)	2+1 port(3x 1 Gbps)
EtherCAT SubDevice	Yes	No	Yes	Yes	No
USB	USB 2.0 OTG x2 w PHY	USB 2.0 OTG x2 w PHY	USB 2.0 OTG x1 w PHY	–	–
LPUART	12	12	8	8	8
LPI2C	6	6	4	3	3
CAN FD	3	3	2	2	2
QTimer	8	8	8	4	4
LPTPM	6	6	4	2	2
LPTMR	3	3	3	1	1
SINC Filter	3x 4-ch.	3x 4-ch.	1-ch.+2-ch.+4-ch.	–	–
16b ADC	2	2	2	1	1
ACMP	4	4	1	1	1
Package	289 BGA	289 BGA	196 BGA	144 BGA	144 BGA

i.MX RT1180 EVK Specifications

Processor	• MIMXRT1189CVM8B (289 MAPBGA, 14 x 14 mm, 0.8 mm pitch)
Memory and Mass Storage	• SDRAM 256 Mb, 200MHz • 4 Mbit LPSPI Flash • 512 Mbit Hyper Flash • 128 Mbit Quad SPI Flash • TF Card Slot
Audio	• 3.5 mm Audio Stereo Headphone Jack • Board-Mounted Microphone • Left & Right Speaker Out Connectors • SPDIF Interface(unpopulated) • Audio Extension connector
Connectivity	• 10/100 Mbit/s Ethernet Connector. PHY Chip: RTL8201FI-VC-CG • 10/100/1000 Mbit/s Ethernet Connector. PHY Chip: RTL8211FDI-CG • 2x Micro-USB OTG connectors • 2x CAN Bus Connector • ARDUINO® interface, M.2 interface, Flash daughter card, Mikro-e, 8CH DMIC
Debug	• JTAG 20-pin Connector (SWD by default) • MCU-Link: LPC55S69JEV98
Sensor	• FXLS8974CFR3: 3-Axis Accel
User Indicator	• Power Status, Reset, USER LED
PCB	• 7.677-inch x 5.511-inch (19.5cm x 14cm), 6-layer board

Get started now

The i.MX RT1180 evaluation kit (EVK) helps you take your design to the next level by reducing complexity and accelerating time to market.

Software and tools

NXP's MCUXpresso software and tools offer comprehensive development solutions designed to optimize, ease and accelerate embedded system development of applications based on Cortex-M core devices from NXP, including its general purpose, crossover and Bluetooth-enabled MCUs.

Visit nxp.com/iMXRT1180

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