



Powering the next generation of voice-assisted end nodes

i.MX RT600 Family of Crossover Processors

Combining a high-performance Tensilica® Hi-Fi 4 audio DSP core with added real-time functionality from the Arm® Cortex®-M33 core, the i.MX RT600 family of crossover processors is designed to unlock the potential of ML/AI end nodes with a secure, power-optimized embedded processor.

THE CROSSOVER PROCESSOR MARKET

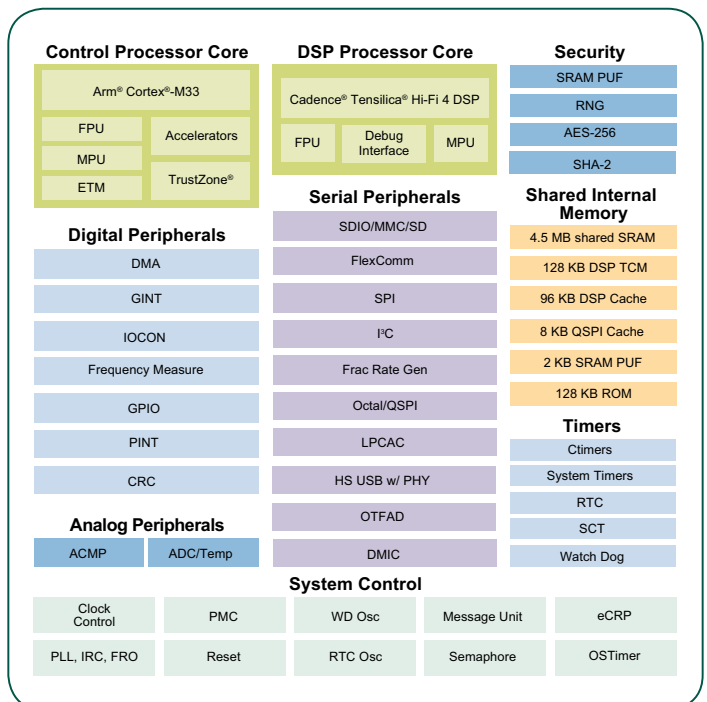
Drawing on its expertise as a leading supplier of both applications processors and microcontrollers (MCUs), NXP® introduces the i.MX RT600 family, a unique new class of crossover processors that strikes the best balance between power optimization and high-performance capabilities. These processors, optimized for audio, voice and machine learning solutions, enable a wide range of consumer and IoT applications.

- ▶ Greater performance
- ▶ Real-time operation
- ▶ Richer integration
- ▶ Hardened security

TARGET APPLICATIONS

- ▶ Audio subsystem
- ▶ ML-based edge applications
- ▶ Voice recognition consumer electronics
- ▶ Voice UI-enabled IoT devices

i.MX RT600 FAMILY BLOCK DIAGRAM



MCU NEXT-GENERATION CORE + HIGH-PERFORMANCE AUDIO DSP INTEGRATION

- ▶ **Move fast, react fast** with real-time microcontroller domain
- ▶ **Create advanced audio and voice recognition systems** with a breakthrough DSP engine
- ▶ **Connect and protect** with a high level of security

PERFORMANCE HIGHLIGHTS

- ▶ Highly optimized Cadence Tensilica Hi-Fi 4 Audio DSP Engine
 - Featuring emerging multichannel object-based audio standards
 - Ideal for DSP-intensive applications
- ▶ High-performing Cortex-M33 core
 - Next-generation core based on the Arm v8-M architecture
 - Hardware co-processors provide accelerated support for additional DSP algorithms and cryptography
- ▶ Extensive memory resources
 - Up to 4.5 MB accessible to both cores and both DMA engines to simplify development complexity
 - 128 KB tightly-coupled memory (TCM) for the exclusive use of the DSP core

USABILITY HIGHLIGHTS

Design Flexibility

- ▶ Improved power efficiency
 - Wide dynamic voltage and performance range
 - Simplified power modes with fast wake-up and low leakage
 - Configurable blocks of memory for individual power gating and retention

Feature	i.MX RT685
Control Processor Core/Speed	Arm® Cortex®-M33 up to 300 MHz
DSP Processor Core/Speed	Tensilica® Hi-Fi 4 up to 600 MHz
On-chip RAM	Up to 4.5 MB
DSP TCM	128 KB
DSP Cache	96 KB
SDIO	2 x SDIO, 1 supports eMMC5.0 w/ HS400
Octal/Quad SPI	1 x up to 100 MB per second
DMA Engine	2 x with 35 channels each
USB with PHY	1 x high-speed host/device
High-Speed SPI	1 x up to 50 MHz
Serial Interfaces	8 x FlexComm interfaces with support up to 8 x SPI, 8 x I ² C, 8 x UART, 4 x I ² S channels (total 8 instances)
I3C	1 x Master/Slave
DMIC	Up to 8 channels
GPIO	Up to 228
Security	SRAM PUF, RNG, AES256, SHA-2, Secure Boot, RNG
ADC	1 x 12-bit 1 Msamples/s
ACMP	4
Cap Touch / Temperature Sensor	1/1
SCTimer	1 x 32-bit
Multi-rate Timer	1 x 24-bit
OS Event Timer	1 x 64-bit
GP Timer / WDOG	5/2
Reduced-Power Modes	Sleep mode, deep-sleep mode and deep power-down mode
Package	VFBGA176
Operating Temperature	0 to 70 °C

- ▶ Advanced audio subsystem interfaces
 - DMIC interface supporting eight channels and voice activation detect
 - Up to 8 x I²S interfaces for high-performance, multichannel audio
- ▶ External memory interface options
 - Octal/Quad SPI with cache and dynamic decryption
- ▶ Numerous connectivity and communication interfaces
 - SDIO for Wi-Fi®-enabled streaming
 - High-speed USB device/host and high-speed SPI interfaces

Advanced Security

- ▶ Arm TrustZone®-M for asset protection
 - System-wide, secure resource isolation for trusted hardware
- ▶ Secure boot mechanism with SRAM PUF or OTP-based unique key for hardware based root of trust
- ▶ Symmetric and asymmetric cryptography acceleration
 - AES-256, SHA2-256
 - ECC and RSA
- ▶ Octal/Quad SPI interface with a real-time decryption engine
- ▶ Secure debug authentication

www.nxp.com/iMXRT600

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