Fact Sheet

i.MX RT500, i.MX RT600 and i.MX RT700
Ultra Low-power Crossover MCUs

Powering the next generation of portable HMI, ML/AI, voice and audio applications

NXP is redefining what microcontrollers can do at the edge with our i.MX RT500, i.MX RT600 and i.MX RT700 families of secure and embedded crossover MCUs. These products integrate a high-speed Arm® Cortex®-M33 core with DSP for IoT edge applications, AI acceleration and rich multimedia capabilities.

The crossover MCU market

Drawing on its expertise as a leading supplier of both applications processors and microcontrollers (MCUs), i.MX RT500, i.MX RT600 and i.MX RT700 MCUs offer the ideal balance of power optimization and high-performance capabilities. These crossover MCUs deliver high-performance, real-time processing, operate with low power, feature rich integration of advanced peripherals and incorporate advanced security to meet the demands of modern embedded applications.

Target applications

- AI glasses
- Wearables
- Smart home controls
- Personal health and fitness
- Handheld devices
- Hearables and speakers
- Audio processing devices
- Smart appliances
- Energy management
- Secure IoT gateways
- Speech recognition
- Voice control
- Voice over IP (VoIP)

MCU + DSP = unlimited capabilities

Take advantage of the integrated DSP technology and enhance your design with audio features, voice capabilities and sensor processing, all while maintaining low power consumption.

The Cadence® Tensilica® HiFi 4, HiFi 1 and Fusion DSPs provide the right level of high performance audio digital signal processing power and include algorithm-specific operations for a fully programmable approach that provides maximum flexibility. All Cadence Tensilica DSPs support multiple existing and developing standards, as well as specific algorithms.

Vivid graphics

The i.MX RT500 and RT700 family modernizes HMI for the low-power market by providing vivid graphics with its integrated 2.5D GPU. Graphics development is made easy with NXP software support, combined with an extensive list of partner solutions.

Software and tools

i.MX RT500, i.MX RT600 and i.MX RT700 are supported by robust enablement, including a comprehensive offering of evaluation kits, expansion boards and tools, to reduce development effort and speed time-to-market.

MCUXpresso suite and leading third-party software/tools

- MCUXpresso for Visual Studio Code (VS Code) from NXP, featuring enhanced Zephyr and Matter environments, and highly integrated GitHub CI/CD development flow support
- Out of the box support for IAR Embedded Workbench and ARM Keil® MDK for Arm core development
- Cadence Tensilica Xplorer IDE for Hifi DSP development
- Debug probes including NXP's MCU-Link, J-Link from Segger, P&E Micro and Lauterbach
- FreeMASTER debug tool for advanced debug visualization and control of real-time applications

Drivers and OS support

- MCUXpresso SDK drivers and middleware examples
- FreeRTOS™ ready drivers and application examples
- Zephyr RTOS support

AI/ML and DSP support

- TensorFlow, ONNX, and PyTorch models supported with LiteRT and ExecuTorch backends for CPUs, DSPs and NPUs
- Arm CMSIS-NN kernels
- Cadence DSP NN kernels for AI offloading
- Optimized general purpose DSP libraries for HiFi cores
- eIQ AI software, including eIQ AI Toolkit, eIQ Time Series Studio and eIQ Model Creator (i.MX RT700 only)

Voice and audio

- Various audio codecs, distributed and licensed for customer production use on specific NXP devices
- Advanced, optimized front end wake word detection (VoiceSpot) and command recognition (VIT)
- Conversa full-duplex voice processing with ML noise reduction for improved call quality in noisy environments
- Enhanced Audio Processing (EAP) for audio playback

Graphics

- Open source LVGL graphics library support complemented by NXP's unique GUI design guider tool
- Premium high performance graphics tools and library from AMETEK Crank, Embedded Wizard and Qt

i.MX RT500, i.MX RT600 and i.MX RT700 MCU families—Standard key features

Feature	i.MX RT500	i.MX RT600	i.MX RT700
Core/speed	Arm Cortex-M33 @ 275 MHz + Cadence Tensilica Fusion F1 DSP* @ 275 MHz	Arm Cortex-M33 @ 300 MHz + Cadence Tensilica HiFi 4 DSP @ 600 MHz	Arm Cortex-M33 @325 MHz + Cadence® Tensilica® HiFi 4 @ 325 MHz, Arm Cortex-M33 @250 MHz + Cadence® Tensilica® HiFi 1 @ 250 MHz
Cache	2 x 32 KB (FlexSPI)	32 KB (FlexSPI), 96 KB (DSP)	96 KB (HiFi 4 DSP), two 32KB (XSPI Cache), two 32KB (XCACHE's)
SRAM	Up to 5 MB	4.5 MB	Up to 7.5 MB
Quad/Octal SPI HyperBus	2 x dual-channel, on-the-fly decryption (on 1 x FlexSPI)	1 x dual-channel, on-the-fly decryption	Three XSPI (octal/quad) Flash interfaces and x16 PSRAM memories, Inline prince encryption (IPED)
Neural Processing Unit	N/A	N/A	eIQ Neutron NPU for ML acceleration
SDIO	2 x uSDHC, supporting SD, SDIO, eMMC	2 x uSDHC, supporting SD, SDIO, eMMC	2 x uSDHC, supporting SD, SDIO, eMMC
USB with PHY	1 x HS/FS	1 x HS/FS	1 x HS/FS/LS (USB0), eUSB (USB1)
Graphics*	2.5D GPU with vector graphics acceleration	-	2.5D GPU with OpenVG API and vector graphics acceleration
Camera	8/10/16-bit parallel (FlexIO)	-	8/10/16-bit parallel (FlexIO)
LCD	8/10/16/18/24-bit parallel (FlexIO) + LCD Interface + MIPI DSI	-	8/10/16/18/24-bit parallel (FlexIO) + LCD Interface + MIPI DSI
Security	AES-256, SHA, Secure Boot, SRAM PUF, TRNG	AES-256, SHA, Secure Boot, SRAM PUF, TRNG	AES-128/192/256, SHA2-224/256/384/512, TRNG, Secureboot, Secure firmware update
UART/SPI/I2C/I3C/I2S/ FlexIO	Up to 12 x FlexComm (config. as I2C/UART/SPI/I2S) + 1 x FlexIO + 2 x HS SPI + 2 x I3C + 1 x I2C	Up to 8 x FlexComm (config. as I2C/UART/SPI/I2S) + 1 x HS SPI + 1 x I3C + 1 x I2C	Up to 18 x FlexComm (config. as I2C/UART/SPI/I2S) + 2 x HS SPI + 1 x I2C
ADC	12b with 1M sample/s	12b with 1M sample/s	One 16b SAR ADC; one 24b SD ADC
PWM	10 general-purpose/PWM outputs + 8 general-purpose inputs	10 general-purpose/PWM outputs + 8 general-purpose inputs	10 general-purpose/PWM outputs and 8 general-purpose inputs.
DMIC	8-ch.	8-ch.	8-ch.
GPIOs	Up to 136	Up to 147	Up to 217
Packages	249 FOWLP, 141 WLCSP	249 FOWLP, 176 BGA, 114 CSP	256 WLCSP, 324 FOWLP
Temperature (T_a)	Commercial: -20 °C to 85 °C	Commercial: -20 °C to 85 °C	Commercial: -30°C to 85°C

*Product variants without integrated DSP and/or graphics are also available.

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