Transforming interactions in ways you've never imagined

i.MX 8X Family of Applications Processors

Built with a high-level integration to support graphics, video, image processing, audio, and voice functions, the i.MX 8X processor family is ideal for safety-certifiable and efficient performance requirements. Applications for the i.MX 8X processor include industrial automation, HMI, industrial control, robotics, building control, automotive cluster, display audio infotainment, and telematics applications.

TARGET APPLICATIONS

- Automotive—instrument cluster, infotainment, display audio, rear seat entertainment, smart antenna, Vehicle-to-Vehicle (V2X), gateway and camera systems
- Industrial vehicle—avionics cockpit display, in-flight entertainment, train and heavy equipment HMI
- Advanced industrial human machine interface (HMI) and control—PLC, I/O controller, home/building control
- Robotics—drone, mobile service robot
- Building Control—fire and security panel, elevator control, HVAC control
- Healthcare—patient monitor
- Networking—specialty gateway, low-end video conference terminal
- Mobile payment—payment systems
- General-purpose HMI solutions

SAFEGUARD MISSION CRITICAL DISPLAYS AND CONTROL FUNCTIONS

- **Increase your system's accuracy**—The i.MX 8X processor with optional Error Correcting Code (ECC) is the first i.MX product to support Industrial Safety Integrity Level 3 (SIL 3) certification for applications such as programmable logic controller (PLC), input/output (I/O) controller, robotic control and drones.
- **Ensure your display stays up and correct**—SafeAssure® ASIL-B ready hardware protects critical information with fail-over-capable quality of service to any display for constant accessibility.

- **Secure your system with advanced programmable security**—Ensure top-of-the-line security from first boot to securing with the latest cryptography standards (AES, flashless SHE, elliptical curve cryptography, key storage).
- **Improve your system reliability with Fully Depleted Silicon on Insulator (FD-SOI)**—built using 28 nm FD-SOI, the i.MX 8X applications processor dramatically improves mean time between failures (MTBF) and reduces latch-ups due to FD-SOI's inherently high immunity to soft errors.
- **Offload time-critical tasks**—Utilize the Arm® Cortex®-M4F core for time-critical tasks such as backup camera display, audio control and general system monitoring and wakeup.

ADVANCED INTEGRATION

- **Multi-domain voice recognition**—Utilize the Cortex-A35 and Cortex-M4F cores as well as the Tensilica® HiFi 4 DSP for audio pre- and post- processing, key word detection and speech recognition for hands-off interaction. Take advantage of the large library of HiFi optimized audio and voice codecs and audio enhancement software packages.
- **Three screens of independent content**—Develop innovative, multi-screen platforms through the ability to drive up to two 1080p screens, MIPI-DSI or LVDS, and one parallel WVGA display with independent content to reduce system cost.

▸ **Flexible memory options**—Offers LP-DDR4 memory interface for high performance and low standby power, or DDR3L interfaces for lowest system cost. For fast boot from SPI NOR flash, two Quad SPI or one Octal SPI are available as well as support for SD 3.0, eMMC 5.1 and RAW NAND.

LOW-POWER OPTIMIZED PERFORMANCE

▸ **Up to four (4) 1.2 GHz Cortex-A35 processors**—A powerful and power-efficient upgrade path for next-generation solutions. The Cortex-A35 is Arm's most efficient Armv8 core.

▸ **Multiple systems, one processor**—Delivers a high level of integration on one chip, such as the Cortex-A35 applications core, Cortex-M4F real-time processing core, hardware accelerated graphics and video, high performance DSP, and more.

▸ **Optimized power**—Reduce thermal system cost and power usage by shutting down the Cortex-A35 core while the Cortex-M4F core remains active to perform low-level system monitoring tasks.

THE SCALABLE PLATFORM OF CHOICE

NXP developed this highly scalable product family to provide a much-needed migration path for next generation devices. The Cortex-A35 provides full Armv8-A 64-bit support while maintaining seamless backwards compatibility with 32-bit Armv7-A software. The i.MX 8 series continues to build on the industry leading scalability of the i.MX product line. Easily transition between the i.MX 8 family and the i.MX 8X family with its high level of software and hardware reuse across the full range of product capabilities.

▸ **Comprehensive software support**
Android™, Linux®, QNX, Green Hills®, FreeRTOS™ and partner commercial operating systems

▸ **Automotive**
Auto (-40 °C to 125 °C Tj)

▸ **Industrial**
Industrial (-40 °C to 105 °C Tj)

▸ **Consumer qualified**
Consumer (-20 °C to 105 °C Tj)

PIN AND POWER COMPATIBLE

Highly scalable design options allow a single platform to cover multiple products. Pin- and power-compatible packages (in 0.8 pitch) allow for a single PCB platform and different i.MX 8X processors as product needs dictate.

PRODUCT LONGEVITY

When designing with i.MX, you can depend on the quality of the product and the stable, consistent supply of product for your embedded designs through the NXP Product Longevity program.

Visit **www.nxp.com/productlongevity** for details.
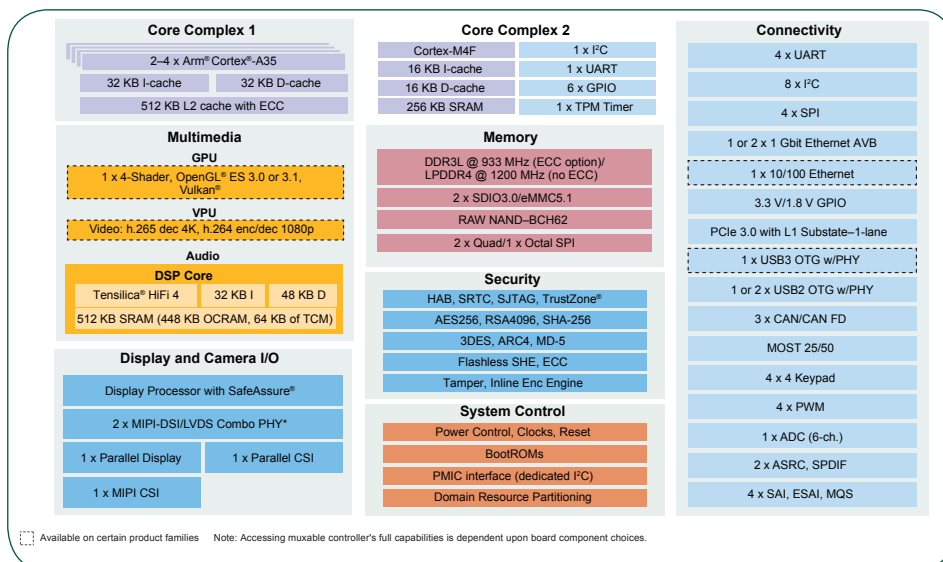
i.MX ECOSYSTEM ALLIANCES

Leveraging the broad Arm community, the i.MX product line builds technology alliances to enable better customer solutions and faster time-to-market. Solutions include:

▸ Tool chains
▸ Software
▸ Codecs
▸ Middleware/applications
▸ Embedded board solutions
▸ System integrators
▸ Training

i.MX 8X FAMILY— DIFFERENTIATED FEATURES

Feature	i.MX 8DualXPlus/ i.MX 8QuadXPlus	i.MX 8DualX
Arm® Core	2 x Cortex-A35 (i.MX 8DualXPlus) 4 x Cortex-A35 (i.MX 8QuadXPlus)	2 x Cortex-A35
Arm Core	1 x Cortex-M4F	1 x Cortex-M4F
DSP Core	Tensilica® HiFi 4 DSP	Tensilica HiFi 4 DSP
DRAM	32-bit DDR3L (ECC option)/ LPDDR4 (no ECC)	16-bit DDR3L\ LPDDR4 (no ECC)
GPU	1 x GC7000Lite Performance Optimized	1 x GC7000Lite Power Optimized
VPU	4K h.265 dec, 1080p h.264 enc/dec	1080p h.264 enc/dec
Ethernet	2 x Gigabit with AVB	1 x Gigabit with AVB 1 x 10/100
USB with PHY	1 x USB 3.0 (can be used as USB 2.0) 1 x USB 2.0	2 x USB 2.0

i.MX 8X FAMILY BLOCK DIAGRAM

Core Complex 1
- 2–4 x Arm® Cortex®-A35
- 32 KB I-cache | 32 KB D-cache
- 512 KB L2 cache with ECC

Multimedia
GPU
- 1 x 4-Shader, OpenGL® ES 3.0 or 3.1, Vulkan®
VPU
- Video: h.265 dec 4K, h.264 enc/dec 1080p
Audio
DSP Core
- Tensilica® HiFi 4 | 32 KB I | 48 KB D
- 512 KB SRAM (448 KB OCRAM, 64 KB of TCM)

Display and Camera I/O
- Display Processor with SafeAssure®
- 2 x MIPI-DSI/LVDS Combo PHY*
- 1 x Parallel Display | 1 x Parallel CSI
- 1 x MIPI CSI

Core Complex 2
- Cortex-M4F | 1 x I²C
- 16 KB I-cache | 1 x UART
- 16 KB D-cache | 6 x GPIO
- 256 KB SRAM | 1 x TPM Timer

Memory
- DDR3L @ 933 MHz (ECC option)/ LPDDR4 @ 1200 MHz (no ECC)
- 2 x SDIO3.0/eMMC5.1
- RAW NAND–BCH62
- 2 x Quad/1 x Octal SPI

Security
- HAB, SRTC, SJTAG, TrustZone®
- AES256, RSA4096, SHA-256
- 3DES, ARC4, MD-5
- Flashless SHE, ECC
- Tamper, Inline Enc Engine

System Control
- Power Control, Clocks, Reset
- BootROMs
- PMIC interface (dedicated I²C)
- Domain Resource Partitioning

Connectivity
- 4 x UART
- 8 x I²C
- 4 x SPI
- 1 or 2 x 1 Gbit Ethernet AVB
- 1 x 10/100 Ethernet
- 3.3 V/1.8 V GPIO
- PCIe 3.0 with L1 Substate–1-lane
- 1 x USB3 OTG w/PHY
- 1 or 2 x USB2 OTG w/PHY
- 3 x CAN/CAN FD
- MOST 25/50
- 4 x 4 Keypad
- 4 x PWM
- 1 x ADC (6-ch.)
- 2 x ASRC, SPDIF
- 4 x SAI, ESAI, MQS

☐ Available on certain product families   Note: Accessing muxable controller's full capabilities is dependent upon board component choices.

* Each single PHY can either be a 1× 4 lane MIPI-DSI or a 1×1 channel LVDS interface for a total of 2 display interfaces. In combination, the two PHYs can be configured to be a single 2-channel LVDS interface.