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Understanding Embedded - Microprocessors

Embedded microprocessors are specialized computing chips designed to perform specific tasks within an embedded system. Unlike general-purpose microprocessors found in personal computers, embedded microprocessors are tailored for dedicated functions within larger systems, offering optimized performance, efficiency, and reliability. These microprocessors are integral to the operation of countless electronic devices, providing the computational power necessary for controlling processes, handling data, and managing communications.

Applications of Embedded - Microprocessors

Embedded microprocessors are utilized across a broad spectrum of applications, making them indispensable in

Details	
Product Status	Active
Core Processor	ARM® Cortex®-A9, ARM® Cortex®-M4
Number of Cores/Bus Width	2 Core, 32-Bit
Speed	200MHz, 800MHz
Co-Processors/DSP	Multimedia; NEON™ MPE
RAM Controllers	LPDDR2, LVDDR3, DDR3
Graphics Acceleration	Yes
Display & Interface Controllers	Keypad, LCD
Ethernet	10/100/1000Mbps (2)
SATA	-
USB	USB 2.0 + PHY (1), USB 2.0 OTG + PHY (2)
Voltage - I/O	1.8V, 2.5V, 2.8V, 3.15V
Operating Temperature	-40°C ~ 105°C (TA)
Security Features	A-HAB, ARM TZ, CAAM, CSU, SNVS, System JTAG, TVDECODE
Package / Case	400-LFBGA
Supplier Device Package	400-MAPBGA (17x17)
Purchase URL	https://www.e-xfl.com/pro/item?MUrl=&PartUrl=mcimx6x2cvn08ab

Consumer, Industrial and Automotive Markets

i.MX 6 Series of Applications Processors

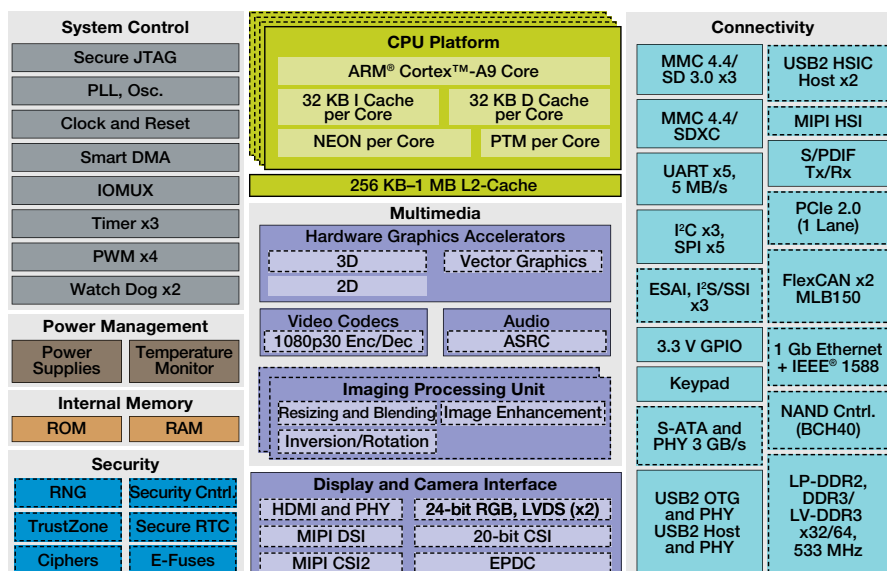## Scalable multicore solutions breaking the boundaries of user experience

Overview

The i.MX 6 series of applications processors unleashes a scalable multicore platform that includes single-, dual- and quad-core families based on the ARM® Cortex™-A9 architecture for next-generation consumer, industrial and automotive applications. By combining the power-efficient processing capabilities of the ARM Cortex-A9 architecture with bleeding edge 3D and 2D graphics, as well as high-definition video, the i.MX 6 series provides a new level of multimedia performance to enable an unbounded next-generation user experience.

i.MX 6 Series Applications Processor Block Diagram

☐ Available on certain product families

Target Applications

- Automotive infotainment
- Digital signage
- E-Readers
- Human-machine interface
- Home energy management systems
- In-flight entertainment
- Intelligent industrial control systems
- IP phones
- IPTV
- Portable medical
- Smartbooks
- Tablets

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The market for intelligent, multimedia-centric, touch-based devices is increasing exponentially. Tomorrow's battery-powered smart devices, auto infotainment and in-flight entertainment systems, medical systems, personal and enterprise class intelligent control and data systems, and new classes of devices never before seen need to present data and user interface choices to the end user primarily through rich sound, video, voice, pictures and touch, rather than keyboards and mice. The need for manufacturers to quickly provide multiple devices to fit specific market segments or niches and provide their customers with a broader range of choices is increasing just as quickly.

The i.MX 6 series was designed specifically to enable this new market by bringing together high-performance scalable multimedia processing, a software-compatible family of five processors and pin*-compatible processor solutions with integrated power management so that a manufacturer can deploy a full portfolio of products with a single hardware design.

Scalable Multicore Solutions

The i.MX 6 series reaches a new level of power versus performance by providing a scalable family of single-, dual- and quad-core processor families based on the ARM Cortex-A9 architecture. Single- and dual-core designs provide cost-effective performance scalability while the flagship i.MX 6Quad processor provides more performance at lower power for the most demanding applications with constrained power budgets.

Five Scalable Families

The **i.MX 6Quad** family encompasses a quad-core platform running up to 1.2 GHz with 1 MB of L2 cache, and 64-bit DDR3 or 2-channel, 32-bit LPDDR2 support. Integrated FlexCAN and MLB busses, PCI Express® and SATA-2 provide excellent connectivity while integration of dual, MIPI display port, MIPI camera port and HDMI v1.4 makes it an

i.MX 6 Series at a Glance

Red indicates change from column to the left

i.MX6SoloLite

- Single ARM® Cortex™-A9 up to 1.0 GHz
- 256 KB L2 cache, Neon, VFPvd16 Trustzone
- 2D graphics
- 32-bit DDR3 and LPDDR2 at 400 MHz
- Integrated EPD controller

i.MX6Solo

- Single ARM Cortex-A9 up to 1.0 GHz
- 512 KB L2 cache, Neon, VFPvd16 Trustzone
- 3D graphics with one shader
- 2D graphics
- 32-bit DDR3 and LPDDR2 at 400 MHz
- Integrated EPD controller
- HDMIv1.4 controller plus PHY
- LVDS controller plus PHY
- PCIe controller plus PHY
- MLB and FlexCan controllers

i.MX6DualLite

- Dual ARM Cortex-A9 up to 1.0 GHz
- 512 KB L2 cache, Neon, VFPvd16 Trustzone
- 3D graphics with one shader
- 2D graphics
- 64-bit DDR3 and 2-channel 32-bit LPDDR2 at 400 MHz
- Integrated EPD controller
- HDMIv1.4 controller plus PHY
- LVDS controller plus PHY
- PCIe controller plus PHY
- MLB and FlexCan controllers

i.MX6Dual

- Dual ARM Cortex-A9 up to 1.2 GHz
- 1 MB L2 cache, Neon, VFPvd16 Trustzone
- 3D graphics with four shaders
- Two 2D graphics engines
- 64-bit DDR3 and 2-channel 32-bit LPDDR2 at 533 MHz
- Integrated SATA-II
- HDMIv1.4 controller plus PHY
- LVDS controller plus PHY
- PCIe controller plus PHY
- MLB and FlexCan controllers

i.MX6Quad

- Quad ARM Cortex-A9 up to 1.2 GHz
- 1 MB L2 cache, Neon, VFPvd16 Trustzone
- 3D graphics with four shaders
- Two 2D graphics engines
- 64-bit DDR3 and 2-channel 32-bit LPDDR2 at 533 MHz
- Integrated SATA-II
- HDMIv1.4 controller plus PHY
- LVDS controller plus PHY
- PCIe controller plus PHY
- MLB and FlexCan controllers

Consumer   Industrial   Automotive

ideal platform for consumer, automotive and industrial multimedia applications.

The **i.MX 6Dual** family provides dual cores running up to 1.2 GHz with 1 MB of L2 cache, and 64-bit DDR3 or 2-channel, 32-bit LPDDR2 support. Leveraging the same integration of the i.MX 6Quad family, the i.MX 6Dual provides a scalable solution for consumer, automotive and industrial applications.

The **i.MX 6DualLite** family introduces dual cores running up to 1.0 GHz with 512 KB of L2 cache, and 64-bit DDR3 or 2-channel, 32-bit LPDDR2 support. With integrated FlexCAN and MLB busses, PCI Express, LVDS, and support for MIPI cameras and displays as well as HDMI v1.4, the device is a great fit for consumer, automotive and industrial multimedia centric applications.

The **i.MX 6Solo** family provides a single core running up to 1.0 GHz with 512 KB of L2 cache and 32-bit DDR3/LPDDR2 support. Integrated LVDS, MIPI display, MIPI camera port, HDMI v1.4, FlexCAN and MLB enables the i.MX 6Solo to be a flexible platform for consumer, automotive and industrial applications.

The **i.MX 6SoloLite** family introduces a single core running up to 1.0 GHz with 256 KB of L2 cache and 32-bit DDR3/LPDDR2 support. Targeted integration of an electronic paper display (EPD) controller makes it an ideal solution for next generation e-readers and other emerging consumer and embedded devices using EPD technology.

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Unbounded User Experience

Next-generation graphics and high-definition video are centric to the i.MX 6 series. The i.MX 6 series supports up to 1080p60 video playback, enabling exceptionally high-quality video with long battery life for devices playing high-definition content. The 3D graphics engine in the top-of the line i.MX 6Quad and i.MX 6Dual processors are capable of providing up to 200 Mt/s, which enables ultra-vivid, realistic graphics critical for gaming, applications which combine the power of the main cores with the until-now-untapped potential of the 3D engine to perform computational tasks. The combined multimedia processing power of the i.MX 6 series enables a new generation of smart devices, digital displays, industrial instrumentation panels and auto and aero infotainment with compelling features such as augmented reality applications, content creation capabilities and multichannel HD video processing for a new level of user experience.

i.MX 6 Series Features

- Scalable single-, dual- and quad-core offerings based on ARM Cortex-A9 up to 1.2 GHz, with ARMv7™, Neon, VFPv3 and Trustzone support

- 32 KB instruction and data L1 caches and 256 KB to 1 MB of L2 cache

- Multi-stream-capable HD video engine delivering 1080p60 decode, 1080p30 encode and 3D video playback in HD in high-performance families

- Superior 3D graphics performance with up to quad shaders performing 200 Mt/s and OpenCL support

- Separate 2D and/or Vertex acceleration engines for an optimal user interface experience

- Stereoscopic image sensor support for 3D imaging

- Integrated market-specific I/Os, which may include HDMI v1.4 with integrated PHY, SD3.0, multiple USB 2.0 ports, Gigabit Ethernet, SATA-II with integrated PHY, PCI Express® with integrated PHY, MIPI CSI, MIPI DSI, MIPI HSI, MLB and FlexCAN for automotive applications

- Comprehensive security features include cryptographic accelerators, high-assurance boot and tamper protection

- Optional integration of an EPD display controller for e-readers and similar applications

i.MX 6 Series Benefits

- Pin-* and software-compatible single-, dual- and quad-core families enable easy design of a broad portfolio of next-generation products

- Ultra-realistic 3D gaming and richer user interfaces enabled by an integrated 3D graphics engine in high-performance families

- Aggressive power management enables HD multi-stream video playback in high-performance families

- Highly integrated family with a broad range of integrated I/Os to reduce design complexity and time to market

*i.MX 6SoloLite is not pin compatible

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Development Tools

Freescale has developed three market-focused Smart Application Blueprint for Rapid Engineering (SABRE) development systems based on i.MX 6 series applications processors. Designed to speed and simplify development, these SABRE systems deliver the advanced technology features required for next-generation multimedia and embedded applications including tablets, e-readers, digital displays, industrial instrumentation and aero and automotive infotainment systems. From hardware accelerators and multimedia codecs to software development tools including board support packages (BSPs), these development systems come highly optimized with the best offerings from Freescale and our technology partners.

The **SABRE platform for smart devices** is based on the i.MX 6Quad and i.MX 6DualLite processor families and can be targeted towards any device requiring an intelligent display, connectivity, low power and amazing user experience. It provides a foundation for enabling new product designs in markets such as portable computing, education, industrial, digital displays, medical and home automation. The SABRE platform for smart devices includes complete hardware design files, BSP for Android™ and Linux®, and a bootable SD card containing an Android BSP image. More information is available at **freescale.com/SABRESDP**.

The **SABRE board for smart devices** introduces developers to quad-core processing and bleeding-edge multimedia and graphics applications on the i.MX 6Quad processor. Developers are able to work with the majority of the i.MX 6Quad processor's primary features while remaining schematically compatible with their i.MX 6Quad, i.MX 6Dual, i.MX 6DualLite and i.MX 6Solo designs. The SABRE board for smart devices includes complete hardware design files, BSP for Android, Linux and Windows® Embedded (via third party) and a bootable SD card containing an Android BSP image. More information is available at **freescale.com/SABRESDB**.

The **SABRE for automotive infotainment** offers a solid foundation for next-generation converged telematics, driver information systems and infotainment platform designs. With a range of highly flexible connectivity options, multiple onboard interfaces and the unique scalability and performance of the i.MX 6 series, the platform offers system designers access to key features required for an end design. The platform is supported by a Linux BSP as well as multiple third party operating systems and reference implementations that allow fast time to market and rapid prototyping. More information is available at **freescale.com/SABREAI**.

For development tools and third-party resources, visit freescale.com/iMX6series

Join fellow i.MX developers online at imxcommunity.org

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