



# i.MX51 Applications Processors

## Consumer and industrial portfolio: i.MX512, i.MX513 and i.MX515

### Overview

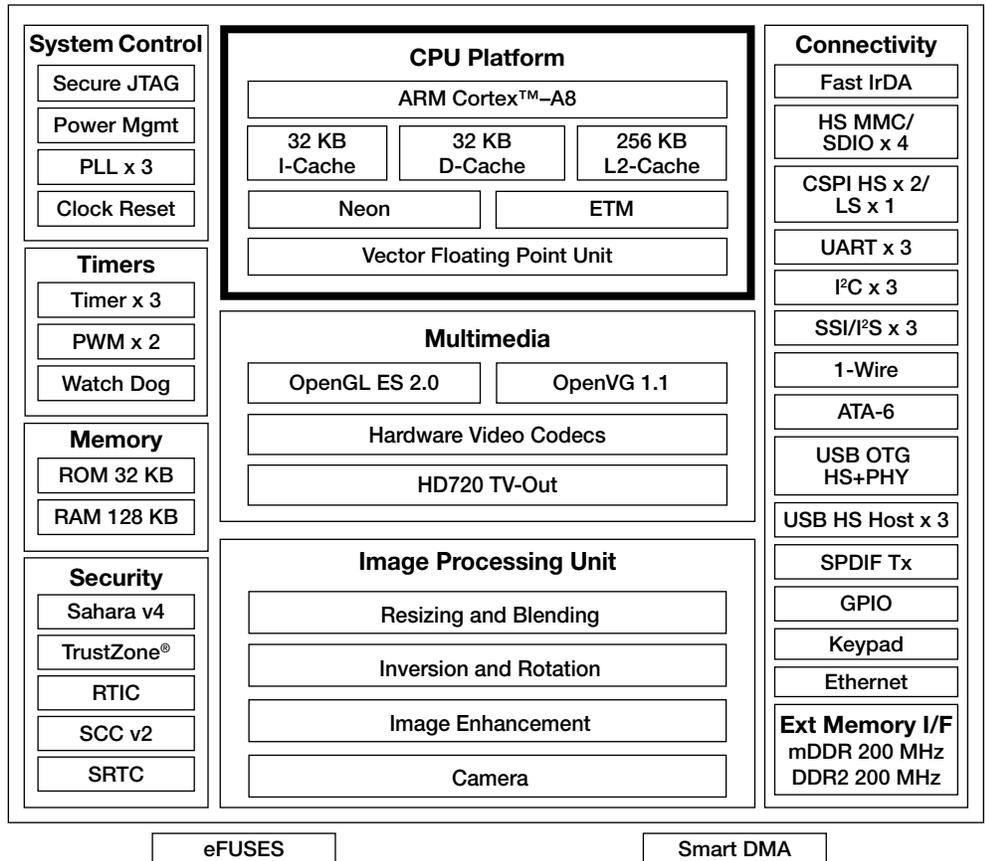
The i.MX51 family of processors represents Freescale's advanced and power-efficient implementation of the ARM Cortex™-A8 core. Freescale's i.MX51 products provide high-performance processing optimized for the lowest power consumption for a number of application spaces where performance and power are critical. The consumer version of the i.MX51 products are targeted to run at 800 MHz while the industrial versions run at 600 MHz. Optimized for low power consumption, this i.MX offering is part of a growing family of multimedia-focused products offering high-performance processing.

### Smartbooks/MID, Gaming Devices/ Consoles, Application processors

These i.MX51 processors balance the performance, power consumption, connectivity and multimedia capabilities necessary to drive the latest industrial and consumer products. These processors are ideal for products that require advanced user interfaces, sophisticated video processing, multiple connectivity options and a high level of system integration. These features are the building blocks to power the next great applications.

The i.MX51 family is targeted to drive customer applications, including smartbooks, mobile Internet devices, ebooks, digital photo frames, gaming devices, human machine interface (HMI) applications, portable navigation devices, portable medical solutions and many others. With Freescale's dynamic voltage and frequency scaling (DVFS), the same core that runs at 800 MHz can scale down to 200 MHz at reduced voltage. This results in significant power reduction for lower MIPS applications.

### i.MX515 Applications Processor



### Target Applications

- Portable media players
- Portable navigation devices
- Home appliances
- Graphical remote controls
- Home automation
- eBooks
- Digital picture frames
- Audio peripherals and accessories
- Simple HMI panels for industrial applications

### Key Features CPU Complex

- 800 MHz ARM Cortex-A8 CPU
- 32 KB instruction and data caches
- Unified 256 KB L2 cache
- NEON SIMD media accelerator
- Vector floating point coprocessor

## Multimedia

- OpenGL® ES 2.0 and OpenVG™ 1.1 hardware accelerators
- Multi-format HD720p video decoder and D1 video encoder hardware engine
- 24-bit primary display support up to WXGA resolution
- 18-bit secondary display support
- Analog HD720p component TV output
- High-quality hardware video de-interlacing
- Image and video resize, inversion and rotation hardware
- Alpha blending and color space conversion
- Video/graphics combining: four planes plus hardware cursor
- Display quality enhancement: color correction, gamut mapping and gamma correction

## External Memory Interface

- mDDR and DDR2 SDRAM, 16/32-bit, 200 MHz
- SLC/MLC NAND flash, 8/16-bit

## Advanced Power Management

- Multiple independent power domains
- Dynamic voltage and frequency scaling
- Dynamic process and temperature compensation
- Proprietary power gating

## Connectivity

- High-Speed USB OTG with PHY
- Three additional High-Speed USB controllers
- Wide array of serial interfaces, including SDIO, SPI, I<sup>2</sup>C and UART
- I<sup>2</sup>S and S/PDIF audio interfaces
- 10/100 Ethernet controller
- P-ATA

## Security

- Security controller, including secure RAM and security monitor
- High assurance boot, JTAG controller and real-time clock

- Cipher and random number generator accelerators
- Run-time integrity checker
- Universal unique identification
- Tamper detection

## General

- 19 mm x 19 mm, 0.8 mm pitch MAPBGA package
- Consumer, consumer extended and automotive temperature grades also available. See the i.MX51 data sheet

## Benefits

- Very high-performance processing and multimedia capabilities
- High level of integration reduces overall system BOM
- Hardware acceleration enables very low power consumption for video and graphics

## Multimedia Powerhouse (i.MX513, i.MX515 only)

The multimedia performance of the i.MX51 processor is boosted by a Multi-Standard Hardware Video Codec, Autonomous Image Processing HD Unit, NEON SIMD, accelerometer and Vector Floating Point coprocessor and a programmable Smart DMA (SDMA) controller.

## Powerful Graphics Acceleration

3-D graphics are the key to mobile game designs. The i.MX515 processor provides an integrated 3-D graphics processing unit that provides an incredible 27 Mtri/sec and effective 664 Mpix/sec (with overdraw). In addition, i.MX515 incorporates a 2-D graphics processing unit to accelerate Adobe® Flash® and OS-windowing system functions.

## Smart Speed™ Technology

Advanced power management features used throughout the i.MX51 processor enable a rich suite of multimedia features and peripherals while maintaining minimum system power consumption in both active and low-power modes. Smart Speed technology enables the designer to deliver a feature-rich product at much lower power consumption than competing products.

## Increased Security

Because the need for advanced security for mobile and hand-held devices continues to increase, the i.MX515 processor delivers hardware enabled security features that support secure e-commerce, digital rights management (DRM), information encryption, secure boot and secure software downloads.

## Freescal Alliance Program

Tap into a powerful ecosystem of Freescale technology alliances for building smarter, better connected solutions. Intended to help you shorten your design cycle and get your products to market faster, these technology alliances provide you with access to rich design tools and peripherals, as well as world-class support and training. For more information, visit [www.freescale.com/alliances](http://www.freescale.com/alliances).

## The i.MX Processor Family

Freescale's i.MX family of applications processors delivers power to the people who demand it—designers like you, and users who crave it for their mobile devices. Designers love the amazing performance i.MX processors achieve at low clock speeds, and the high degree of integration that shortens design times. Consumers love the life-like video and 3-D graphics reproduction, quick response and long, long play times for hours of work or entertainment use. Freescale gives you the power of choice to address all of your embedded designs for the automotive, consumer, industrial and general-purpose markets. The i.MX family supports a range of platforms such as those based on Microsoft Windows® CE, Linux® OS, and a number of leading RTOSs such as QNX.

## Development Tools

Freescale delivers the cost-effective i.MX51 evaluation kit, allowing customers to develop, debug and demonstrate their next great product without compromising performance. As part of our new price, performance and personality series, the evaluation kit is designed to support all the features of the device in a small, single board design to enable designers to complete a development platform at a low price point estimated at \$700USD. The i.MX51 EVK has two optional add-on modules: an LCD module and an expansion board which includes a camera, TV-out, keypad and UART. For more information, visit [www.freescale.com/imx51evk](http://www.freescale.com/imx51evk).

## Learn More:

For current information about Freescale products and documentation, please visit [www.freescale.com/imx51](http://www.freescale.com/imx51).