i.MX233 APPLICATIONS PROCESSOR

32-bit Embedded Microprocessor – Arm®-based Multimedia Applications Processor



OVERVIEW

The i.MX233 applications processor extends NXP's ARM9 portfolio and introduces several unique features such as power management, analog audio, 12-bit ADC's and a touch screen controller that allows customers to eliminate external components, reducing their overall system bill of materials cost. The i.MX233 processor integrates power management technology to manage the power sequencing required by the processor itself and supplies power to other components in the system, such as external memories, from a single Li-Ion battery. Additionally, analog audio features such as the stereo ADC/DAC and amplifiers, plus a mono speaker amplifier provide a complete solution in a single device for multimedia applications. Furthermore, many consumer applications require a rich graphical user interface which is supported with the LCD touch screen controller and basic hardware graphics acceleration with the pixel pipeline processor.

The i.MX233 applications processor is offered in two packages to provide more tailored options for the various target applications.The 169 BGA package provides access to all of the features of the i.MX233 SoC, while the 128 LQFP package provides a subset of these features in order to fit into the smaller pin count package. This smaller package option is ideal for cost-sensitive entry level applications that use small displays, but do not require a touchscreen user interface and have manufacturing restrictions (number of board layers). The feature differences are shown in the block diagram and table.

TARGET APPLICATIONS

- Portable media players
- Portable navigation devices
- Home appliances
- Graphical remote control devices
- Home automation systems
- eBooks
- Digital picture frames
- Audio peripherals and accessories
- VoIP handsets
- Simple human machine interface (HMI) panels for industrial applications

KEY FEATURES CPU

- Arm926EJ-S™ runs up to 454 MHz
- 16 KB I and D L1 Cache

POWER MANAGEMENT

- Integrated DC-DC converter with multiple channel outputs
- Supports Li-Ion batteries
- Direct power from 5V source (USB, wall power or other source)
- Battery charging capability
- On-chip silicon speed and temp sensors

CONNECTIVITY

- High-Speed USB Host / Device with integrated PHY
- UART
- Serial peripheral interfaces (SPI)
- 12-bit Low-Resolution ADC (LRADC)
- 3.3 V general purpose I/O

MULTIMEDIA AND GRAPHICS PROCESSING

- Display controller optimized for up to 24-bit-per-pixel VGA (640 x 480) resolution
- Pixel processing pipeline (PXP) to handle post display frame pre-processing in hardware with minimal memory overhead
- TV Encoder and 10-bit Video DAC out

MEMORY

- Internal 32 KB SRAM
- Support for external DDR1, mDDR
- Support for external NAND with hardware error correction (20-bit BCH or 8-bit Reed Solomon)
- Support for external managed NANDs via SDIO

AUDIO

- Stereo analog audio ADC/DAC
- Stereo headphone amplifier
- 1.5 W mono speaker amplifier output
- S/PDIF digital output
- Serial Audio Interface (I2S)

BENEFITS

The i.MX233 CPU performance and low power 454 MHz Arm9 CPU with ample headroom for many consumer and embedded applications without sacrificing battery life. For plugged in "always on" devices, the low power consumption of the i.MX233 can improve energy efficiency.

SIMPLIFIED DEVELOPMENT

The integration of mixed-signal analog such as power management, analog audio and A/D channels reduces system complexity and speeds time-to-market. In addition, an image processing unit supporting 24-bit VGA displays is integrated to provide rich user interfaces. With a wide range of connectivity options, such as UART, SDIO, USB and I^2C, the i.MX233 processor provides the ability to connect wirelessly to other devices, through the use of off-chip Bluetooth™, Wi-Fi and other wireless protocols.

COST EFFICIENT

The integration of mixed-signal analog such as power management, analog audio and A/D channels eliminates external components thereby reducing overall system bill of materials cost.

OPTIMIZED SYSTEM-ON-CHIP

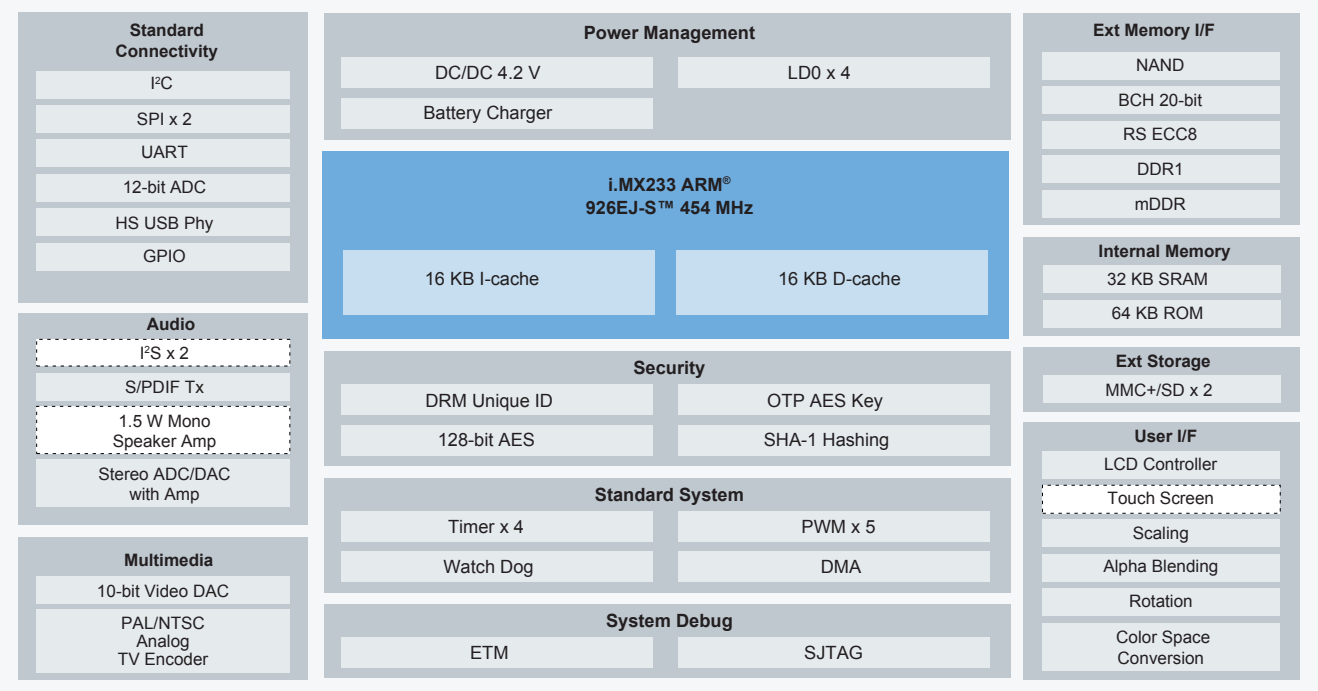
With an Arm9 core operating up to 454 MHz, the i.MX233 processor is designed to maximize performance and extend battery life. An integrated power management system enables efficient MIPS per application while clock gating and multiple low power modes optimize low power performance.

The i.MX233 processor also includes boot from SLC, MLC and managed NANDs capability and supports up to 20-bit BCH or 8-bit Reed Solomon error correction to improve reliability.

DEVELOPMENT TOOLS

NXP delivers the cost-effective i.MX23 evaluation kit without compromising performance and allowing customers to develop, debug and demonstrate the personality of their next great product. The evaluation kit includes support for Linux®, DDR1, NAND, SDIO and USB. An optional display module using a 4.3" WQVGA TFT LCD is also offered.

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Package options		
Part Number	**Temp ranges**	**Package**
MCIMX233DJM4C	-10 °C to +70 °C	169 MAPBGA 0.8 mm
MCIMX233CJM4C	-40 °C to +85 °C	169 MAPBGA 0.8 mm
MCIMX233DAG4C	-10 °C to +70 °C	128 LQFP
MCIMX233CAG4C	-40 °C to +85 °C	128 LQFP

Function	128 LQFP	169 BGA
External Memory Interface	1 chip enable , 64 MB	2 chip enables, 128 MB
General Purpose Media Interface (GPMI)	8-bit data NAND data width	16-bit data NAND data width
LCD Interface (LCDIF)	8-bit serial	8-bit serial, 24-bit parallel
Mono Speaker Amplifier	No	Yes
Serial Audio Interface (I2S)	0	2
A/D Channels	2	6
UARTs	1 Debug UART, 1 App UART	1 Debug UART, 2 App UARTs
Synchronous Serial Ports (SSP)	SSP1 – 4-bit data	SSP1 – 8-bit data
Rotary Encoder	Muxed with PWM, Debug UART	Dedicated
Real Time Clock (RTC)	24 MHz	32 kHz and 24 MHz
PWM Channels	3	5

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