

Freescale Solutions

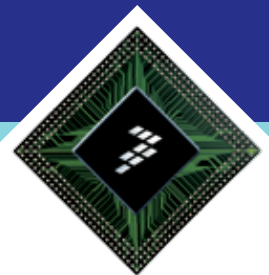
## Embedded Control Solutions Based on ARM® Technology

Kinetis microcontrollers  
i.MX microprocessors



[freescale.com](http://freescale.com)







# A Comprehensive Portfolio of Solutions

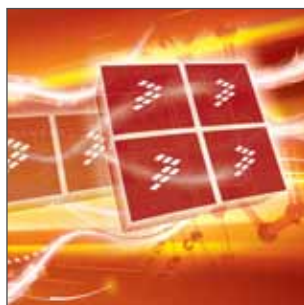
For consumer, industrial and automotive applications

Freescale is the leader in 32-bit embedded control and offers one of the industry's most comprehensive portfolios of solutions based on ARM® technology. Designed with power- and cost-sensitive applications in mind, Freescale's portfolio of Kinetis microcontrollers (MCUs) and i.MX applications processors offers the highest level of integration, the most comprehensive software and hardware enablement and the broadest range of performance within the ARM community today. Whether you are a consumer, industrial or automotive designer, Freescale's Kinetis and i.MX product families have a solution for you.



## **Kinetis Microcontrollers** Design Potential. Realized.

The first broad-market mixed-signal MCU family based on the new DSP-enabled ARM Cortex™-M4 core. Multiple hardware- and software-compatible MCU families with exceptional low-power performance, memory scalability including on-chip FlexMemory (EEPROM) and peripheral integration.



## **i.MX Microprocessors** Your Interface to the World

The most versatile platform for multimedia and display applications, i.MX offers scalability from ARM9™ to Cortex™-A8 microprocessors (MPUs) with market-leading power, performance and integration.

## Broad Portfolio of MCUs and MPUs

Kinetis MCUs start from 32 pins, 50 MHz and 32 KB of embedded flash and span up to 256 pins, 150 MHz and 1 MB of embedded flash, all featuring the ARM Cortex-M4 core. i.MX families start at 400 MIPS with the i.MX2x ARM9-based application processors, and scale up to 1.2 GHz on the ARM Cortex-A9 i.MX 6 Series, which includes the world's first quad core ARM Cortex-A9 with 64-bit memory bus for smart devices.

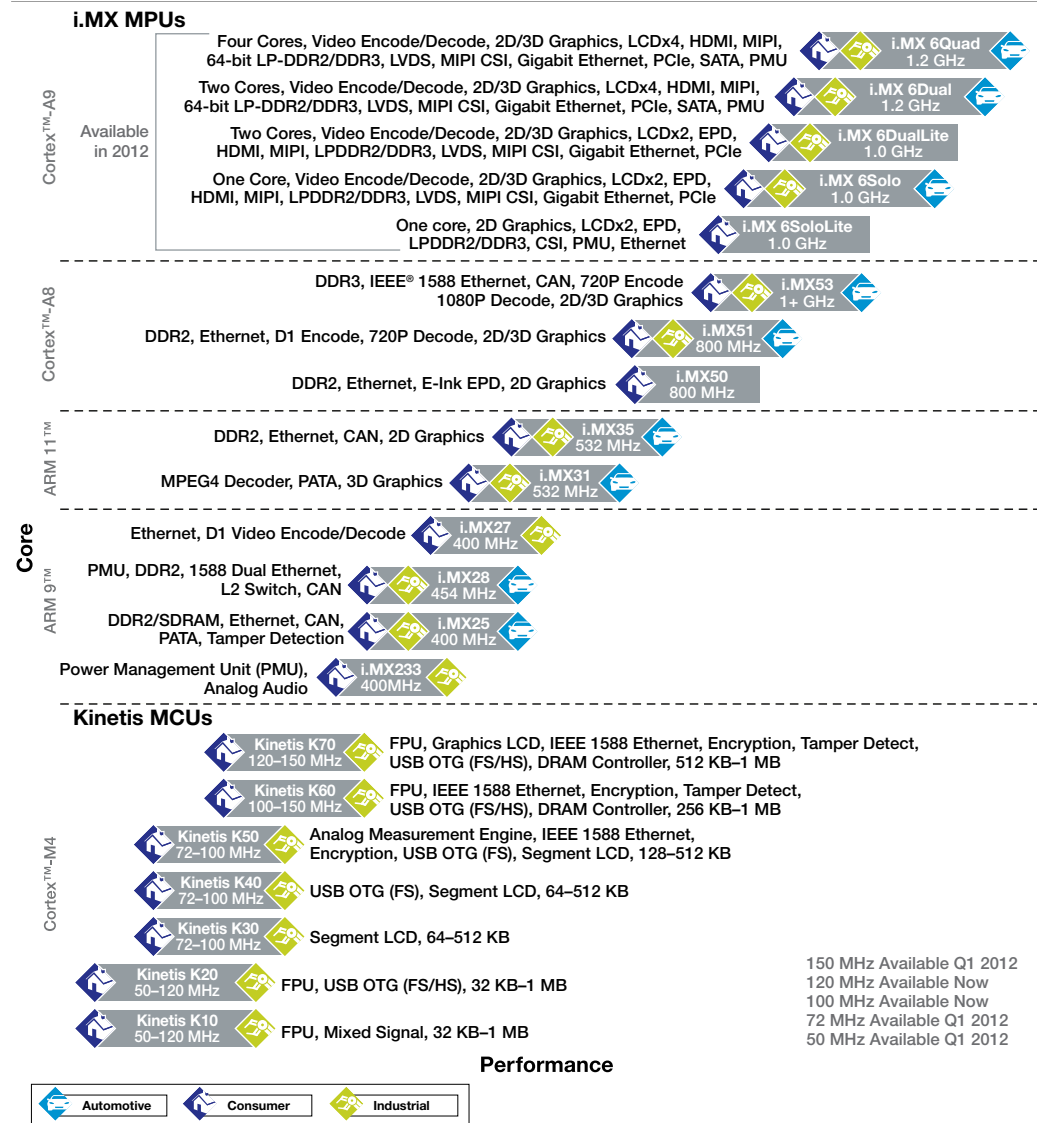
## Comprehensive Software Enablement

When considering time to market, choosing the right software is the most important aspect of designing next-generation 32-bit embedded control applications. Kinetis MCUs come bundled with the CodeWarrior independent development environment (IDE), featuring the powerful Processor Expert graphical user interface (GUI) based auto code generator, and the production-ready MQX™ RTOS to help dramatically reduce development time and cost. i.MX platforms enable the rapid development of a wide range of applications by providing complete software solutions, including Linux®, Windows® CE and Android™ operating systems coupled with a suite of multimedia codecs. In February 2011, Freescale and Mentor Graphics® entered into a unique partnership to enable faster development and lower costs for i.MX customers implementing user interfaces on Android and Linux-based devices: Inflexion™ UI for i.MX processors by Mentor Embedded. Additionally, Kinetis and i.MX are supported by Swell Software's GUI solutions. Swell's PEG Pro, PEG+ and C/PEG product offerings include a GUI library for embedded development that works tightly with real-time operating systems. This allows developers to layout GUI screens and controls using the PEG library and external resources to generate C/C++ code. The PEG WindowBuilder automatically generates C++ source code that is ready to be compiled and linked into any application. Finally, Kinetis and i.MX are supported by ARM third-party ecosystem vendors, including IAR, Keil/ARM, Green Hills and SEGGER.

## Market-Leading Integration

Kinetis MCUs and i.MX MPUs offer the highest levels of peripheral integration available on the market today. Kinetis MCUs combine embedded FlexMemory (configurable, high-endurance

## Freescale Solutions Based on ARM® Technology



EEPROM), high-precision, mixed-signal analog, including fast 16-bit ADCs, 12-bit DACs, programmable gain amplifiers and a broad range of timing, control and communications peripherals, all in a single MCU. The i.MX family includes graphics and video acceleration along with connectivity and power management, enabling maximum performance while minimizing power and cost.

## Energy Efficient and Ultra-Low Power

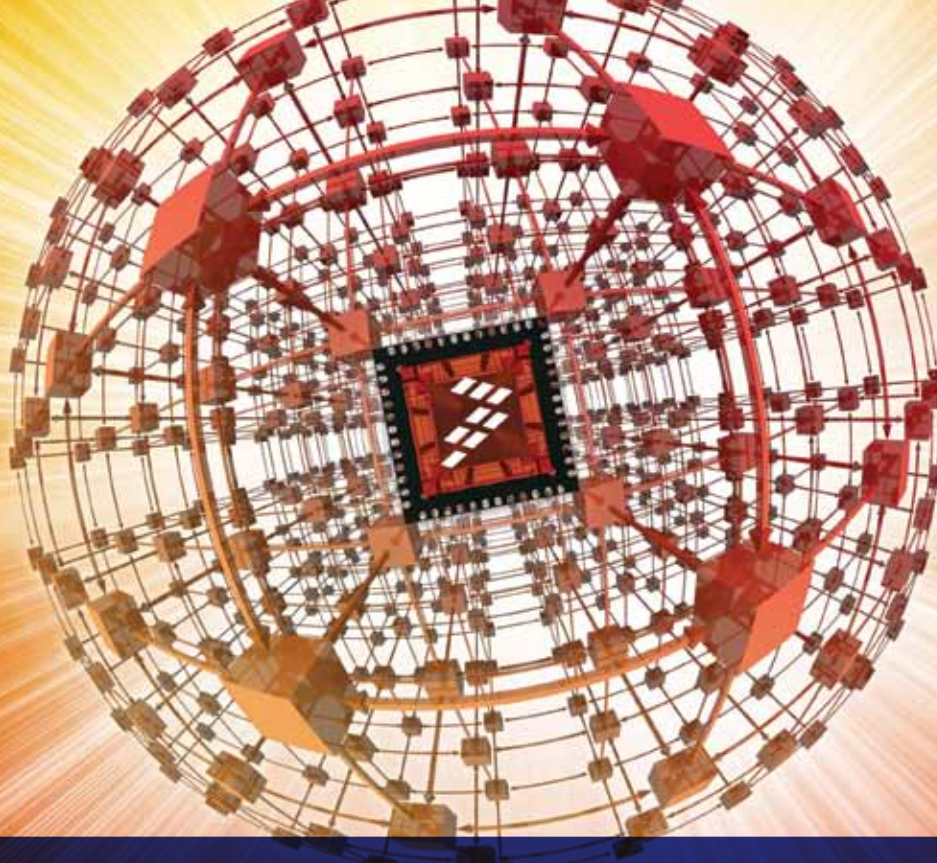
Whether your need is for extended battery life, portable performance, reduced energy costs or compliance with energy standards, the Energy-Efficient Solutions mark highlights selected products that excel in effective implementation of energy-efficient technologies and/or deliver



market-leading performance in the application spaces they are designed to address. Kinetis and i.MX processor families are highly optimized to be energy efficient and certain product families within their portfolios have been awarded the mark. A wide range of flexible power modes extend battery life through stop currents starting at less than 1 µA. Leading-edge process technology and system architectures within both families minimize run currents when operating at full speed.

## Assured Supply

Freescale's Kinetis and i.MX product families contain the right combination of integration, ultra-low power and enablement to help you create your next innovative design in record time. Both families are included in Freescale's Product Longevity Program, which guarantees a minimum of 10-year device availability (15 years for medical and automotive devices), providing peace of mind for the embedded designer.

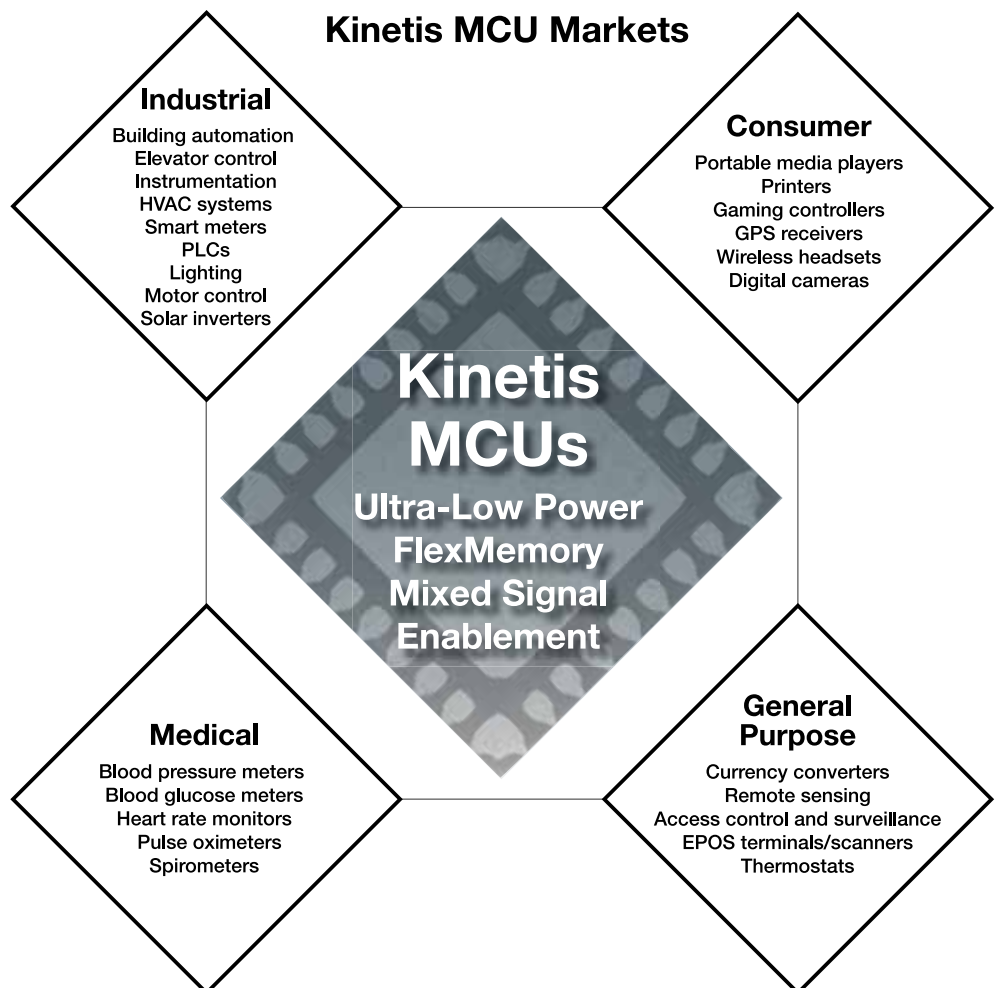


# Kinetis Microcontrollers

## Product families and capabilities

### Design Potential. Realized.

Kinetis is the most scalable portfolio of ARM Cortex-M4 MCUs in the industry. Multiple hardware- and software-compatible MCU families offer exceptional low-power performance, mixed-signal analog and memory scalability, including on-chip FlexMemory/EEPROM. Feature sets range from entry-level to highly integrated and include a wide selection of human-machine interface, connectivity, communications and safety and security peripherals. With Kinetis, value isn't confined just to the MCU. A powerful suite of enablement software consisting of the CodeWarrior IDE, MQX RTOS and complimentary software stacks and drivers comes bundled from Freescale. Add to this a large and well-established software and tool ecosystem from numerous ARM third parties and the result is a portfolio of MCU platforms that delivers exceptional flexibility and value for designers of industrial and consumer products.



# ARM Cortex-M4 Technology

The ARM Cortex-M4 core builds on the legacy of its ARM Cortex™-M3 predecessor and brings an intelligent blend of MCU and DSP features. Supplementing this are a range of Freescale IP blocks that maximize bus bandwidth and flash execution performance enabling CPU frequencies of up to 150 MHz.

## ARMv7ME™ Architecture

- Thumb-2 technology
- DSP and SIMD extensions
- Single cycle MAC (up to 32 x 32 + 64 -> 64)
- Optional single-precision floating point unit (offered on 120/150 MHz K10/20/60/70 MCUs)
- Integrated configurable NVIC
- Backwards compatible with Cortex-M3

## Freescale IP and Innovation

- On-chip cache memory for instructions and data
- Cross-bar switch for concurrent multi-master/slave accesses
- Low-leakage wake-up unit adds flexibility for low-power operation
- Freescale memory protection unit monitors all bus transactions in multi-master systems

# Cortex-M3 Core vs. Cortex-M4 Core

The DSP capabilities of the Cortex-M4 core enable delivery of increased performance and lower power operation across a range of applications.

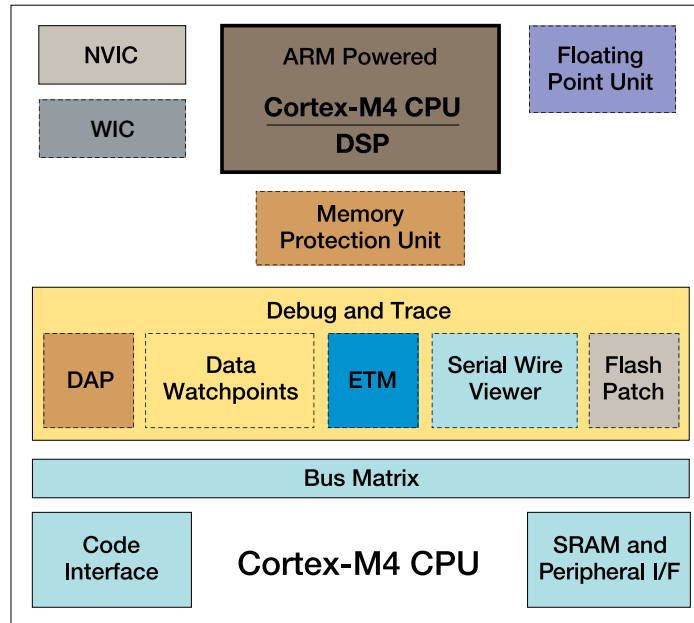
## Audio Processing

- Core loop cycle advantage of 4x to 8x
- Register usage is comparatively less
- Overall cycle advantage of approximately 2x
- Smaller code size further improves performance

## Motor Control

- New DSP-oriented instructions enable new levels of sensorless control
- Faster control loops—more responsive to speed commands and changing loads
- More sophisticated estimators for sensorless control

## ARM® Cortex™-M4 Processor Microarchitecture



Optional

Application	Cortex™ -M3 vs. Cortex™ -M4
Audio—Window Overlap and Add	1.8x–2.6x faster
FIR Filter	2x faster
MP3 Decoder	2x faster
WMA Decoder	1.6x faster
Motor Control—Clarke Transform	5x faster
Motor Control—Park’s Transform	7x faster

Table 1: ARM Cortex-M3 vs. Cortex-M4 performance comparison

## Energy Efficiency

- Chip can be clocked at half (or less) the MHz of Cortex-M3 to accomplish the same workload
- Leads to longer battery life and higher energy efficiency

## Supported Math Functionality

- Vector math (add and subtract)
- Fast math (sine and cosine)
- Interpolation (linear and bilinear)
- Complex math (conjugate and magnitude)
- Statistics (mean and power)

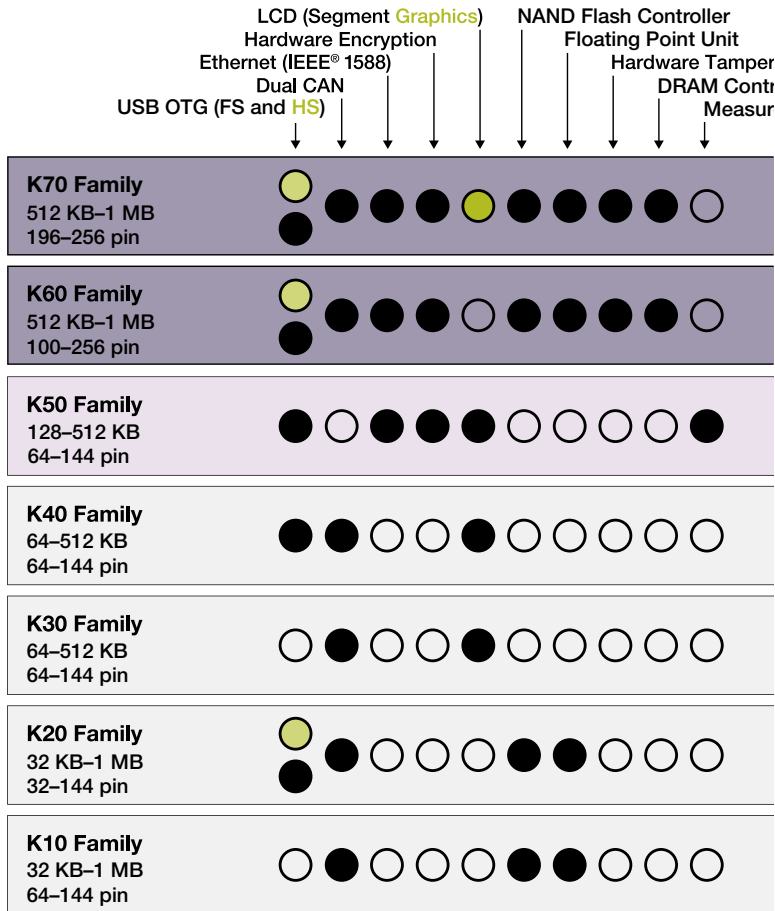
# ARM Cortex-M4 Math and DSP Library

Kinetis devices are supported by an ARM Cortex-M4 Math and DSP software library, available from [onarm.com](http://onarm.com). The library consists of C-callable and operating system-independent functions optimized for the ARM Cortex-M4 core using compiler intrinsics for DSP/SIMD instructions. Separate functions are available for 8-bit, 16-bit, 32-bit integers and 32-bit floating-point values.

## Supported DSP Functionality

- Filtering (FIR and IIR)
- Transforms (complex and real FFT)
- Matrix addition, subtraction, transpose, scaling and inversion
- Controller (PID and field oriented)

## Kinetis MCU Families



Common System IP	Common Analog IP	Common Digital IP	Enableme
ARM® Cortex™-M4 Core + DSP	16-bit ADC	CRC	Bundled ID w/Process Expert
Crossbar Switch, DMA		I <sup>2</sup> C	
90 nm Flash Technology (High Reliability, Fast Access)	12-bit DAC	SAI (I <sup>2</sup> S)	Bundled O (USB, TCP/Security)
FlexMemory w/ EEPROM capability		UART/SPI	
SRAM		Programmable Delay Block	Modular Tool Hardware Development System
Memory Protection Unit		External Bus Interface	Application Software Stacks

## Kinetis MCU Families

The first phase of the Kinetis portfolio contains seven compatible MCU families that contain market-focused and common embedded MCU peripherals. Five performance options are available from 50 to 150 MHz with flash memory ranging from 32 KB to 1 MB and high RAM-to-flash ratios throughout. All families include devices with FlexMemory technology providing on-chip EEPROM capability and/or additional program and data memory. Common peripherals, memory maps and packages both

within families and between families allow easy migration to greater/less memory and functionality. Packages range from the ultra-small footprint 5 mm x 5 mm 32-pin QFN up to the high density 256-pin BGA.

## 90 nm Thin Film Storage (TFS) Flash Memory Technology

Kinetis MCU devices are built from Freescale's new 90 nm TFS flash memory technology. TFS

offers enhanced reliability through its silicon nanocrystal charge storage construction and supports full flash programming and analog peripheral operation down to 1.71V, extending battery life in low-power applications. A variety of sophisticated flash memory access acceleration schemes are employed. These include a flash memory controller which can be configured to perform speculative pre-fetches and supports page buffer, local cache storage and a full-Harvard, full-crossbar architecture which enables enhanced CPU access to memories. Depending on the user code, Kinetis MCUs are capable of running at full frequency with zero wait states. As well as enhancing performance, these features lower MCU power consumption by significantly reducing flash array utilization.

## Mixed-Signal Analog

Kinetis MCUs are rich in mixed-signal analog capability. All families include one or more 16-bit ADC. ADC resolution can be configured from 8 to 16 bits and traded against signal conversion time to satisfy the high-resolution needs of metering and medical applications, or the fast signal processing demands of high accuracy motor control systems. ADC inputs can also be configured as single or differential for maximum noise immunity and dynamic range. Multiple 12-bit DACs, high-speed comparators, programmable gain amplifiers and an on-chip analog voltage reference also contribute to a reduced total system cost and integration effort. The Kinetis K50 family adds to this with an analog measurement engine consisting of 2x op-amps and 2x transimpedance amplifiers (tri-amps) providing advanced signal measurement and conditioning in medical and industrial applications.

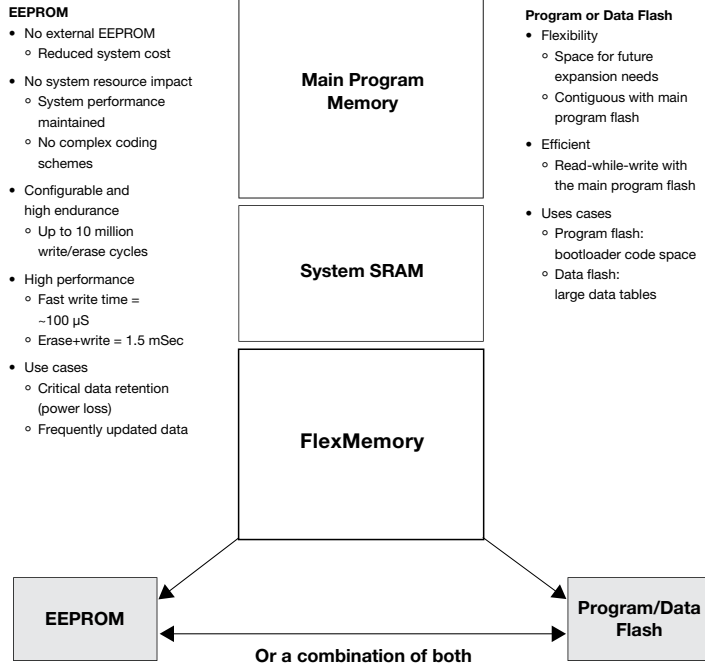
## Ultra-Low Power

Kinetis MCUs include ten flexible low-power operating modes for power profile optimization, power and clock gating, back-biasing and offer 4 μS wake up times from reduced power states. The results are Stop and Run currents of <500 nA and <200 μA/MHz respectively. A low-power RTC and low-leakage wake-up unit add further low-power flexibility, while a low-power timer enables continual system operation in reduced power states.

# FlexMemory: Fast, Flexible, High-Endurance On-Chip EEPROM

FlexMemory provides an extremely versatile and powerful solution for designers who require on-chip EEPROM and/or additional program or data flash memory. When used as high-endurance byte-write/byte-erase EEPROM, FlexMemory can be written to in as little as 100  $\mu$ S, allowing critical system parameters to be captured should a brown-out event occur. The user can also configure the EEPROM array size, endurance, write size and the size of additional program/data flash to suit their application needs. Unlike traditional EEPROM solutions where the endurance is typically limited to several hundred thousand cycles, with FlexMemory endurance figures in excess of 10 million write/erase cycles are possible. In comparison with traditional EEPROM solutions FlexMemory offers greater endurance, faster write/erase times, lower voltage operation and greater flexibility. Being on-chip it also eliminates the costs associated with using external EEPROM ICs, and the software headaches and CPU/flash/RAM resource impact encountered with flash EEPROM emulation schemes.

## FlexMemory

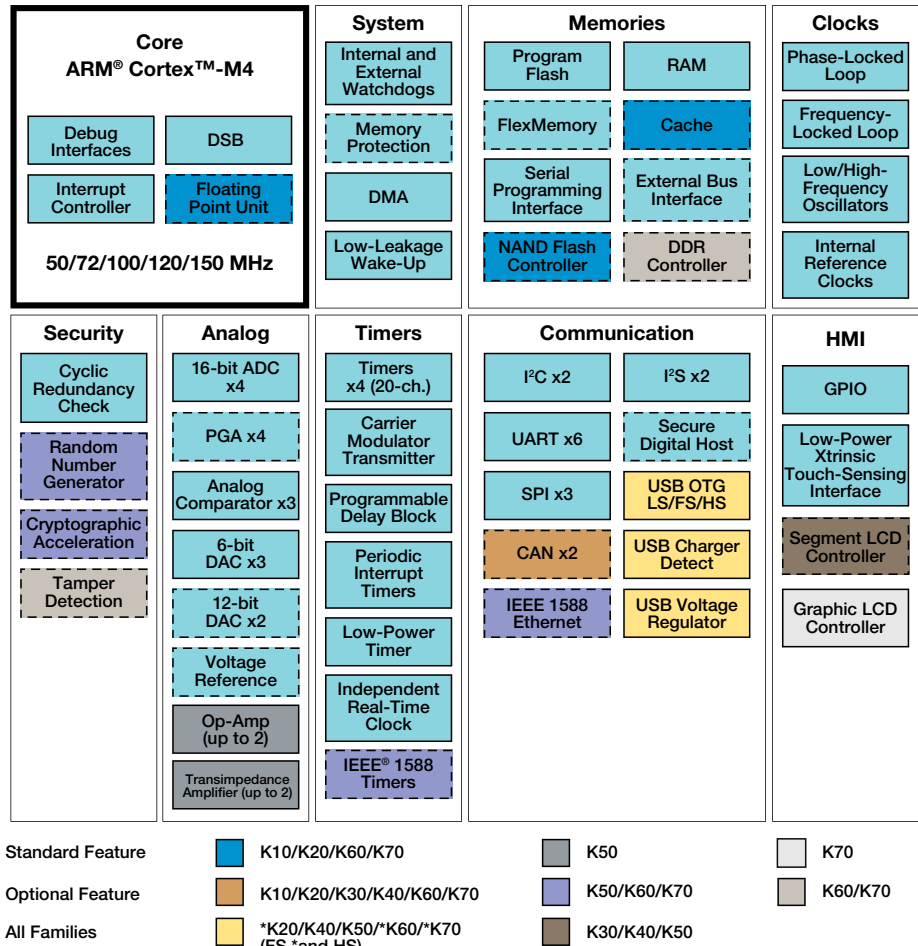


# Multiple Peripheral Options

Designers using Kinetis MCUs can select from a large range of human-machine interface, connectivity, communication, safety, security, and timing and control peripherals. These include an Xtrinsic low-power touch-sensing interface that enables device wake-up via touch from reduced power states, on-chip graphic and segment LCD controllers, USB 2.0 (full- and high-speed) device/host/On-The-Go with device charger detect, Ethernet with IEEE<sup>®</sup> 1588 hardware time stamping and a multitude of serial communication interfaces. For applications that require safety and security functionality cyclic redundancy check, hardware encryption and tamper detection units are also available.

Kinetis MCUs can also interface to a variety of external peripherals and memories for system expansion and data storage including SD, SDIO, MMC or CE-ATA cards, smart graphics displays and a variety of NAND flash and DRAM memories.

## Kinetis Feature Overview



# Kinetis Microcontrollers

## Enablement solutions

### One-Stop Enablement Offering MCU + IDE + Run-Time Software (RTOS)

Kinetis MCUs offer a one-stop-shop for silicon, IDE and RTOS—a unique solution in the industry that enables a simpler, faster and lower cost 32-bit design cycle. Supplementing these are low/no-cost connectivity, motor control, HMI and security stacks and drivers as well as tools from IAR, KEIL and other ARM third-party ecosystem partners.

### CodeWarrior V10 IDE with Processor Expert

Kinetis MCUs come bundled with a complimentary version of the CodeWarrior V10 (Eclipse) IDE which supports up to 128 KB of source code (Special Edition) and includes a unique tool called Processor Expert. This GUI-based auto code generator tool allows the user to build a set of device drivers very quickly and efficiently by encapsulating CPU, peripherals (internal and external) and software functionality into embedded components. The user then configures these pre-written components using a simple GUI and the tool generates highly optimized embedded C-code. Processor Expert is device-aware, preventing errors and conflicts between the drivers and the hardware. One of the most powerful tools of its kind in the market today, Processor Expert can significantly reduce your development time.

### The Freescale Tower System

#### Controller Module

- Tower MCU/MPU board
- Works stand-alone or in Tower System
- Features integrated debugging interface for easy programming and run-control via standard USB cable

#### Secondary Elevator

- Additional and secondary serial and expansion bus signals
- Standardized signal assignments
- Mounting holes and expansion connectors for side-mounting peripheral boards

#### Size

- Tower is approx. 3.5" H x 3.5" W x 3.5" D when fully assembled

#### Primary Elevator

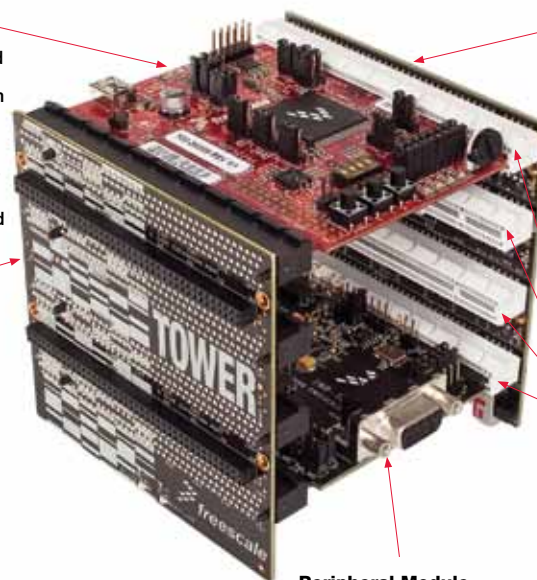
- Common serial and expansion bus signals
- Two 2x80 connectors on backside for easy signal access and side-mounting board (LCD module)
- Power regulation circuitry
- Standardized signal assignments
- Mounting holes

#### Board Connectors

- Four card-edge connectors
- Uses PCI Express® connectors (x16, 90 mm/3.5" long, 164 pins)

#### Peripheral Module

- Examples include serial interface module, memory expansion module and Wi-Fi®



### MQX RTOS

Freescale's full-featured, scalable and proven MQX RTOS is bundled free with Kinetis MCUs and supported by Freescale's CodeWarrior IDE as well as IDEs from IAR and Keil. RTOS use brings communication stacks, graphics drivers, file systems and other code into one cohesive unit. By modularizing tasks it creates projects that are stable, upgradable and easily maintainable. Users can also download MQX-optimized source code versions of Mocana's NanoSSL™ and NanoSSH™ security software from Freescale and redistribute an unlimited number of binary copies in their own solutions, royalty-free. Fully integrated into Freescale's Processor Expert configuration tool, NanoSSL and NanoSSH allow easy implementation and customization through embedded components.

### Tower System

Kinetis MCUs are supported by Freescale's open source Tower System, a modular, expandable development platform that enables rapid prototyping and hardware reuse. Controller modules provide easy-to-use reconfigurable hardware and are compatible with a growing catalogue of peripheral modules with graphics, LCD, WiFi and sensing interfaces. The KwikStik is an ultra-low-cost tool for evaluating, developing and debugging Kinetis MCUs and can be used stand-alone or integrated with the Freescale Tower System. The on-board Segger™ J-Link™ debug interface allows the user to evaluate the on-board K40 MCU or to develop, debug and program their own target hardware based on any Kinetis MCU.



# i.MX Microprocessors

## Product families and capabilities

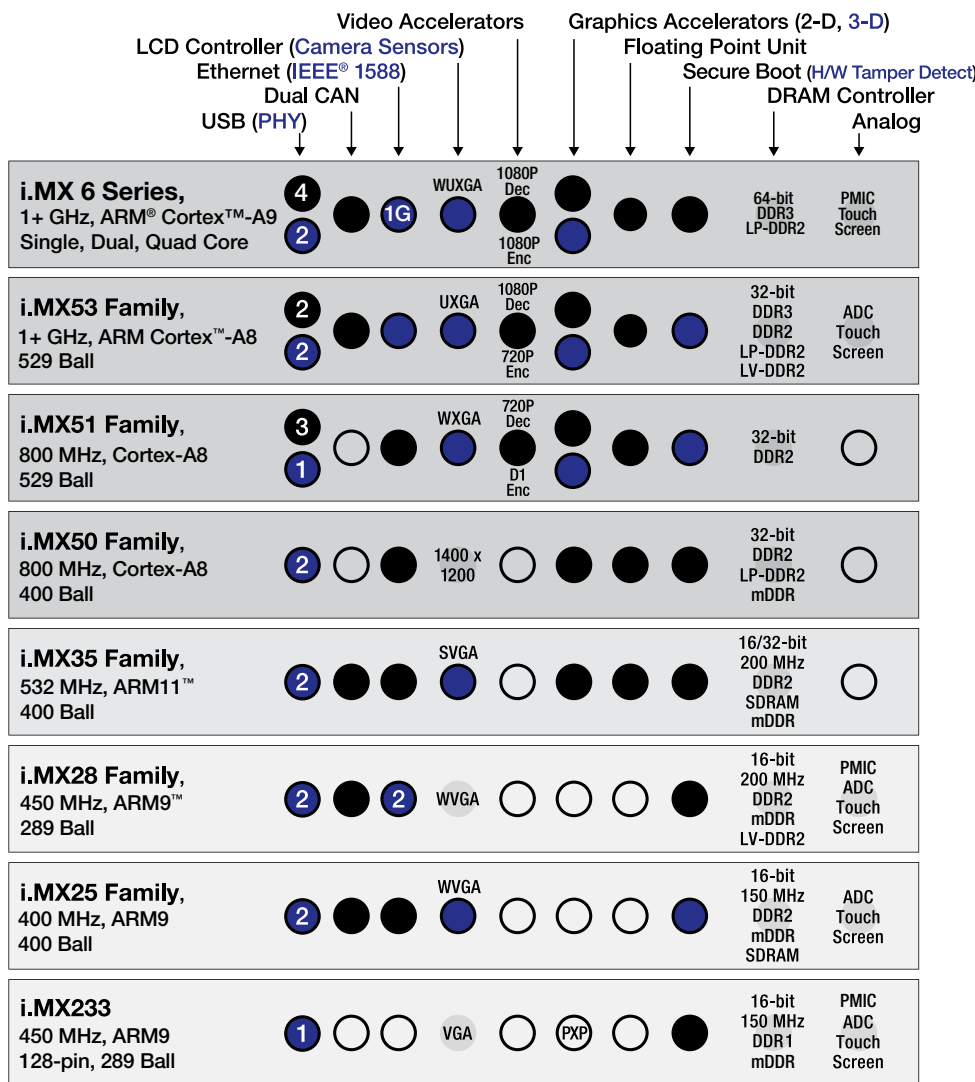
### Smart Devices

Freescale's ARM-based i.MX multimedia applications processors deliver an optimal balance of performance and long battery life for rich multimedia experiences. The i.MX applications processor family supports a wide range of needs through a processor portfolio which is powering smart devices across multiple markets that demand exceptional performance and efficiency.

### i.MX Product Families

The i.MX portfolio consists of families based on the ARM9, ARM11™, Cortex-A8 and Cortex-A9 cores as well as single- and quad-core solutions which address a range of performance, multimedia, power and cost requirements within consumer, industrial, medical and automotive market segments. All i.MX families are built around a common set of system, analog and digital IP blocks and are supported with hardware and software development platforms as well as a vast ecosystem. Families are distinguishable by their performance and peripheral capabilities. The latest i.MX families are shown in the figure on page 11.





1 Number indicates number of modules    PXP— Pixel pipeline for basic graphic processing  
 ○ Indicates not applicable    Available Q3 2012

Common System IP	Common IP	Enablement
32-bit ARM® MPU	I²C	Linux®, Windows® Embedded CE and Android OS
NAND Flash Controller	UART	Multimedia Codecs
SRAM	SPI	Hardware Evaluation/Development System
Dynamic Voltage and Frequency Scaling (DVFS)	SD/MMC/SDIO	Application Software Stacks, Peripheral Drivers and App. Libraries (HMI, USB)
Dynamic Process and Temperature Compensation (DPTS)	Serial Audio (I²S)	Broad Third-Party Ecosystem
Low-Voltage, Low-Power Multiple Operating Modes, Clock Gating	GPIO	
DMA	PWM	
-40°C to +85°C	Timers	
	WDT	
	RTC	

## Multimedia Powerhouse

i.MX application processors have been implementing leading-edge multimedia capabilities for almost a decade by providing direct interfaces to high-end LCDs and cameras, and integrating hardware acceleration for a number of advanced video codecs and graphics standards, enabling up to full HD 1080p video playback and an amazing Flash 10.x experience. Combine that with on-chip features such as the image processing unit (IPU), Pixel Pipeline (PXP) and performance enhancing capabilities such as the NEON SIMD accelerometer and vector floating point coprocessors, and the i.MX devices provide customers with a balanced multimedia solution that offers best-in-class performance for power. The i.MX50x family is the first Cortex-A8 based processor that includes an embedded EPD display controller for e-Paper applications like eReaders.

## Advanced HMI

Display-centric devices across all market segments require an increasingly advanced user interface in order to deliver the richest customer experience. The i.MX application processor portfolio enables this by integrating graphics accelerators to support both 2-D and 3-D graphics in hardware to display on LCDs ranging from QVGA up to WUXGA displays with integrated touch screen capabilities. By using on-chip acceleration, customers can easily add rich graphics, Adobe® Flash acceleration, font rendering and enhanced Web browsing with the provided device drivers and partner application software.

## Energy Efficiency

i.MX multimedia applications processors deliver an optimal balance of performance and long battery life for rich multimedia experiences on the go. Plugged or unplugged, applications designed today must consider the total cost of using energy and the impact any excess power will have on the environment. A mix of integrated power management and companion PMIC solutions from Freescale ensure that the overall solution is optimized for energy efficiency and simplified implementation.

- Multiple independent power domains
- Dynamic voltage and frequency scaling
- Dynamic process and temperature compensation
- Proprietary power gating
- <500 mW run time power under harshest conditions\* (\* Based on i.MX28 silicon)

## Smart Processing Solutions for the Connected World

The i.MX applications processor portfolio provides solutions across multiple market segments. With long product longevity and automotive qualification, i.MX processors are used for infotainment, gateways, connected radio and telematics systems. Customers developing consumer applications take advantage of i.MX integration, low power consumption and extensive software support to get to market quickly and under budget. Today, i.MX plays a critical role in applications such as tablets, smartphones and eReaders. The i.MX portfolio also has broad traction in the embedded market—medical systems such as patient monitoring systems, diagnostics and imaging and smart energy solutions to support the global smart grid transition, industrial factory automation for HMI and industrial control, scanners and building control.

## Connectivity and Communication

The world gets smaller and smaller as the population is now always connected. To support the connected world, the i.MX portfolio features a number of options. These include Ethernet with IEEE 1588 hardware time stamping for real-time industrial control, SD/SDIO/MMC ports for

external portable data storage and connectivity to wireless protocols such as ZigBee®, Wi-Fi® and Bluetooth® modules, USB modules with PHY for field upgradability, portable data storage and multiple serial ports to provide support for various network interfaces such as RS-232 and RS485. Additional connectivity features include I<sup>2</sup>S serial interfaces for connectivity to audio peripherals, dual CAN modules to enable industrial and automotive network bridging and interfaces for external mass storage.

## Reliability, Safety and Security

The i.MX portfolio includes a variety of security features such as high assurance boot, run-time integrity check, secure JTAG, secure storage, secure real-time clock and physical tamper detection. High assurance boot with authenticity checking is used to ensure the correct software is on the correct device and is run every time the chip is reset. When it comes to security, a hardware encryption unit supports several encryption and hashing algorithms for program validation as well as authentication and securing data for transfer and storage. The tamper detection system has integrated sensors for voltage, frequency, temperature and external sensing for physical attack detection. For fail-safe applications, an independently clocked watchdog offers protection against code runaway.

## Support for External Memory

The i.MX application processors can interface to a variety of memories for program and data storage. Depending on the specific processor, external memory support for DRAMs includes 16-bit and/or 32-bit SDRAM, DDR1, DDR2, DDR3, mDDR, LP-DDR2 and LV-DDR2 for flexibility in cost vs. performance and power. For external flash support, i.MX processors can support a variety of NAND flash memories such as SLC, MLC or managed NANDs as well as NOR memories. The i.MX processors also provide error correction functionality to improve the reliability of raw NAND. A parallel bus is supported for interfacing to external memory-mapped peripherals such as FPGAs and ASICs.

## Intelligent Integration

i.MX processors offer extensive peripheral integration, including display, connectivity, analog and security along with standard system features such as timers, pulse width modulators, DMA and debug support. Through this intelligent integration of optimized peripherals along with exceptional product scalability, i.MX processors reduce system-level discrete components, power consumption, board size, development effort and system cost.

Attack Description	Attack Type	i.MX Protection
Circumvent secure applications using the JTAG port	Debug port	Secure JTAG controller
Scan out secret keys and passwords	Debug port	SCC scan protection
Obtain keys from flash memory (on-board memory probing)	Physical	SCC encryption
Replace OS image in flash	Re-flash	High assurance boot
Obtain system keys using “key sniffing” SW running in user mode	SW	MMU, SCC access restriction, RTIC
Obtain system keys using “key sniffing” SW running in kernel mode	SW	RTIC
Attack the OS kernel to obtain privilege mode	SW	RTIC + anti-virus-like software
Use other devices keys	SW/physical	SCC unique key

Table 2: i.MX Security Features



# i.MX Microprocessors

## Enablement solutions

### Accelerated Time to Market with i.MX Enablement

Take your designs to the next level, reduce your design complexity and accelerate your time to market with i.MX hardware and software development solutions. i.MX applications processors are supported by full hardware evaluation and development platforms with a focus on ease of use. These hardware platforms offer developers a price-effective platform to ultimately develop and demonstrate the personality of their next great product without compromising performance. Each hardware platform supports all the key features of the specific i.MX processor it supports.

Design files such as schematics and layout are provided as well as complete software packages to support the hardware platforms. These software packages include full-featured, scalable, optimized and proven operating systems such as Android, Linux and Windows

Embedded CE, along with a broad multimedia software library, including video, audio, speech and image codecs. Complimentary i.MX software packages are available as simple downloads at [freescale.com/iMXtools](http://freescale.com/iMXtools).

Join the growing developer community supporting i.MX applications processors at [imxcommunity.org](http://imxcommunity.org).

### Ecosystem

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, peripherals, world-class support and training.

The i.MX portfolio is supported by a vast ecosystem to provide support for software, hardware and design services.

For software, partners provide RTOS solutions, middleware and application-level software, system integration capabilities and development tool chains.

i.MX is supported by partners who provide integrated, industrial-qualified hardware platforms for a broad range of form factors and solutions that allow developers to focus on the unique parts of their project. In addition, there are multiple partners who can provide design services and solutions. The summary below is a representation of the various types of partners engaged with i.MX.

Operating Systems	System on Module (SOM)/Single Board Computer (SBC)	Middleware/Apps	System Integrators	ODM	IDE/Tool Chain
Genivi	Advantech	Adobe®	Adeneo	Compal	ARM Ltd.
Google Android™	Bluetech	GTK	AllGo	FIC	IAR Systems
Green Hills®	Boundary Devices	IEEE® 1588	BSQUARE	Foxconn	Lauterbach
Linaro	Device Solutions	Mentor Graphics®	ThunderSoft	Inventec	Macraigor Systems
Linux®	Digi International	Microsoft		Kinpo	Timesys®
Microsoft®	iWave	Real®		Pegatron	SEGGER
QNX®	Ka-Ro	Skype®		Perception Digital	
Ubuntu	NovTech	Swell		Quanta Computer	
MQX				Wistron®	

# Kinetis and i.MX

## Design Resources

### Kinetis Microcontrollers

[freescale.com/Kinetis](http://freescale.com/Kinetis)

[freescale.com/kxx](http://freescale.com/kxx) (xx = 10 / 20 / 30 / 40 / 50 / 60 / 70)

[freescale.com/sa](http://freescale.com/sa) (MCU Solutions Advisor)

[freescale.com/CodeWarrior](http://freescale.com/CodeWarrior)

[freescale.com/TWR-K40X256](http://freescale.com/TWR-K40X256)

[freescale.com/TWR-K60N512](http://freescale.com/TWR-K60N512)

[freescale.com/Tower](http://freescale.com/Tower)

[freescale.com/KwikStik](http://freescale.com/KwikStik)

[towergeeks.org](http://towergeeks.org)

[freescale.com/TFS](http://freescale.com/TFS)

### Collateral

*Beyond Bits* Brochure

[freescale.com/BeyondBits](http://freescale.com/BeyondBits)

Kinetis Family Fact Sheets

[freescale.com/Kxx](http://freescale.com/Kxx) (xx = 10 / 20 / 30 / 40 / 50 / 60 / 70)

### i.MX Applications Processors

[freescale.com/iMX](http://freescale.com/iMX)

[freescale.com/iMXtools](http://freescale.com/iMXtools)

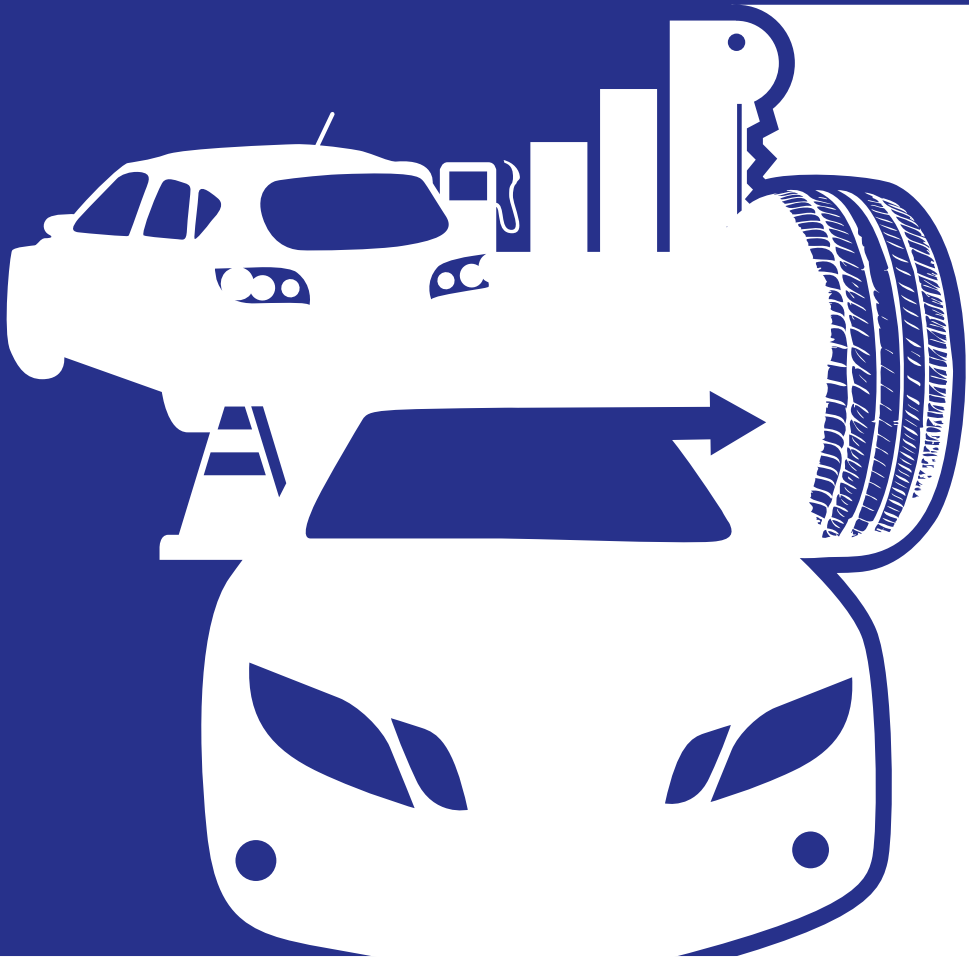
[imxcommunity.org](http://imxcommunity.org)

### Collateral

i.MX Family Comparison Table

[freescale.com/iMX](http://freescale.com/iMX)







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