



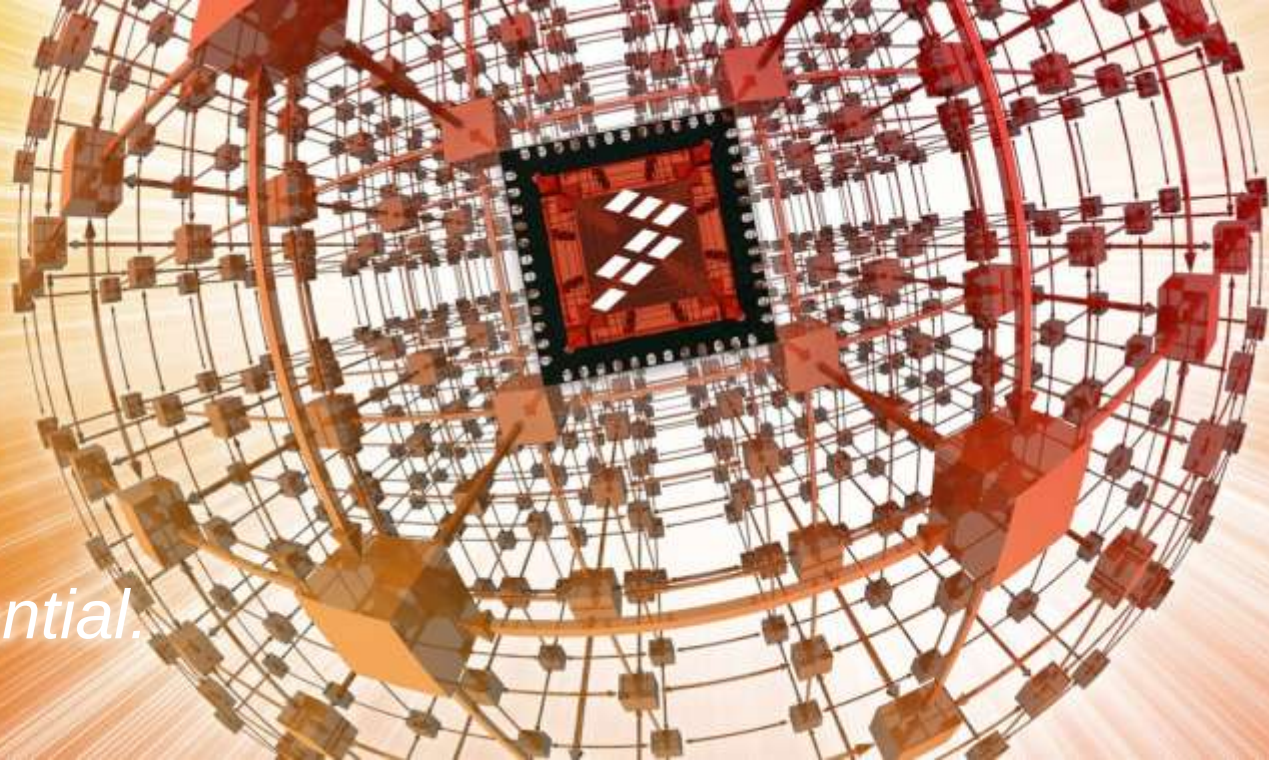
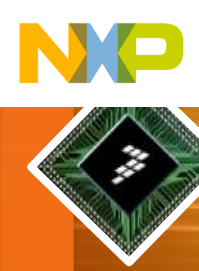
Freescal Kinetis ARM[®] Cortex[™] MCUs Product Update APF-IND-T0796

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Marketing and Business Development



May 2013

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Kinetis

*Design Potential.
Realized*

ARM® Cortex™-M – Over 300 compatible ultra-low power ARM Cortex-M0+ and high-performance ARM Cortex-M4 MCUs with scalable performance, memory and feature integration

Scalability – Entry-level to feature-rich; 8 KB-1MB, 24 pin to 256 pin; Low power & 5V/high EMC, Standard & application-specific

Integration – Huge peripheral choice with high-precision mixed-signal, FlexMemory (EEPROM), wired & wireless connectivity, HMI and security features for consumer and industrial applications

Enablement – Freescale Tower System bundled MQX RTOS and CodeWarrior IDE with Processor Expert auto code generator. Broad third-party support from IAR, KEIL, Green Hills and others



Kinetis General Purpose MCU Families

Kinetis 'L' Series

Ultra-Low Power & Cost

- ARM Cortex-M0+ Core – up to 15% lower power than Cortex-M0 with single cycle peripheral accesses
- Compatible with Kinetis 'K' Series
- Easy to design & debug
- 32-48MHz, 8-256KB, 16-100pin

Kinetis 'K' Series

High Performance & Integration

- ARM Cortex-M4 (DSP/FPU)
- Precision Mixed-Signal, FlexMemory (EEPROM), HMI, Connectivity & Security
- 50-150MHz, 32KB-1MB, 32-256pin

Kinetis 'X' Series

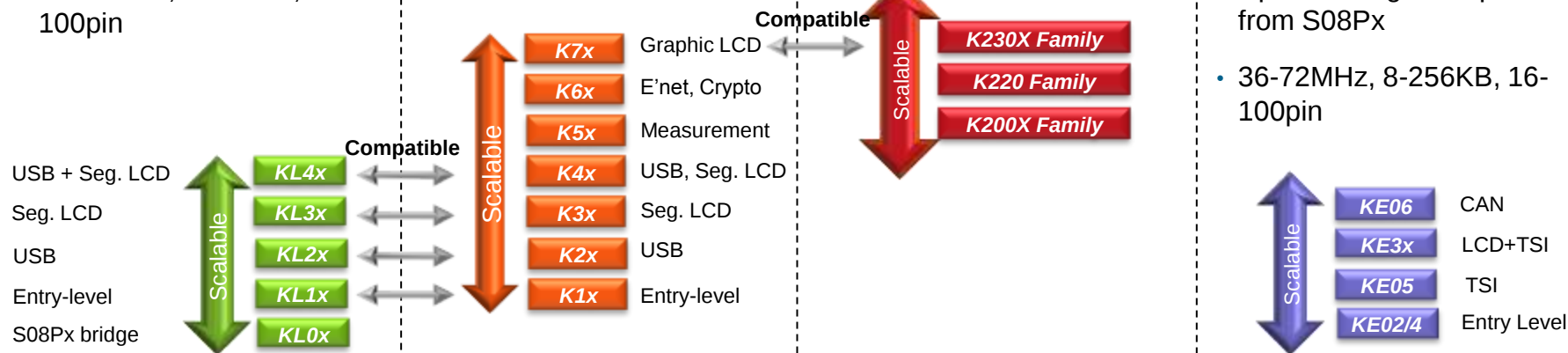
eXtended MCUs

- ARM Cortex-M4 (DSP/FPU)
- Multiple Ethernet, HS USB, Graphics LCD
- Up to 1.5MB RAM
- 150-200MHz, 2-8MB & Flashless, 144-256pin

Kinetis 'E' Series

For Noisy / 5V applications

- ARM Cortex-M0+
- 5V families designed for use in high electrical noise environments
- System safety peripherals for high reliability applications
- Upwards migration path from S08Px
- 36-72MHz, 8-256KB, 16-100pin



Leading Performance - Low Power - Scalability - Industrial-grade reliability & temp

Freescale Bundled IDE, RTOS & Middleware - Rapid prototyping Platform - Broad ARM Ecosystem Support

Kinetis **Application Specific** MCU Families

Kinetis 'W' Series

Wireless Connectivity

- ARM Cortex-M4/M0+
- Sub-1 GHz and 2.4 GHz wireless platforms
- OFDM Ruby Modulation Engine – “Software Defined Radio”
- Leverage “K” series tools for design and debug
- 48-100MHz, 128k to 512KB Flash



Kinetis 'M' Series

Smart Metering

- ARM Cortex M0+, 48Mhz, up to 128KB, 100pin
- Multiple high-precision 4x24-bit $\Sigma\Delta$ ADCs with 2xPGAs
- iRTC
- Hardware Current Transformer phase shift compensation
- Robust Tamper Detection
- Low Power Segment LCD



Kinetis 'V' Series

Motor and Power

- ARM Cortex-Mx Core (DSP/FPU)
- Superior peripherals / sub-systems and performance for Brushless DC to advanced Vector Control applications
- Best In Class Motor/Power Control Enablement
- From 80MHz to 200MHz, up to 1MB, 32-144pin



Leading Performance - Low Power - Scalability - Industrial-grade reliability & temp

Freescale Bundled IDE, RTOS & Middleware - Rapid prototyping Platform - Broad ARM Ecosystem Support



Kinetis K Series



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Kinetis-K: Why ARM Cortex-M4?

Backwards compatible with ARM Cortex-M3

- Does everything the Cortex-M3 does and more **but in less cycles (more energy efficient!)**

New features

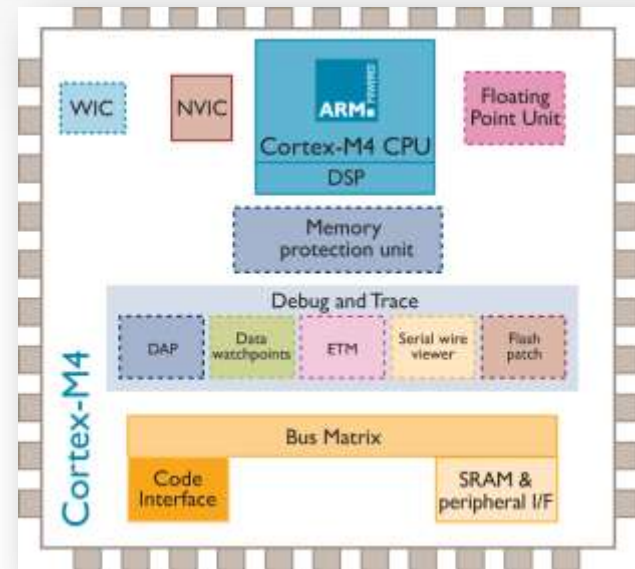
- Single cycle MAC (Up to $32 \times 32 + 64 \rightarrow 64$)
- DSP extensions, Single Precision Floating Point Unit

Freescal IP and Innovation

- Cache, Cross-Bar and DMA for increased throughput
- MPU for system resource protection
- Low-leakage Wake-up Unit for low power operation

Architected for Digital Signal Processing

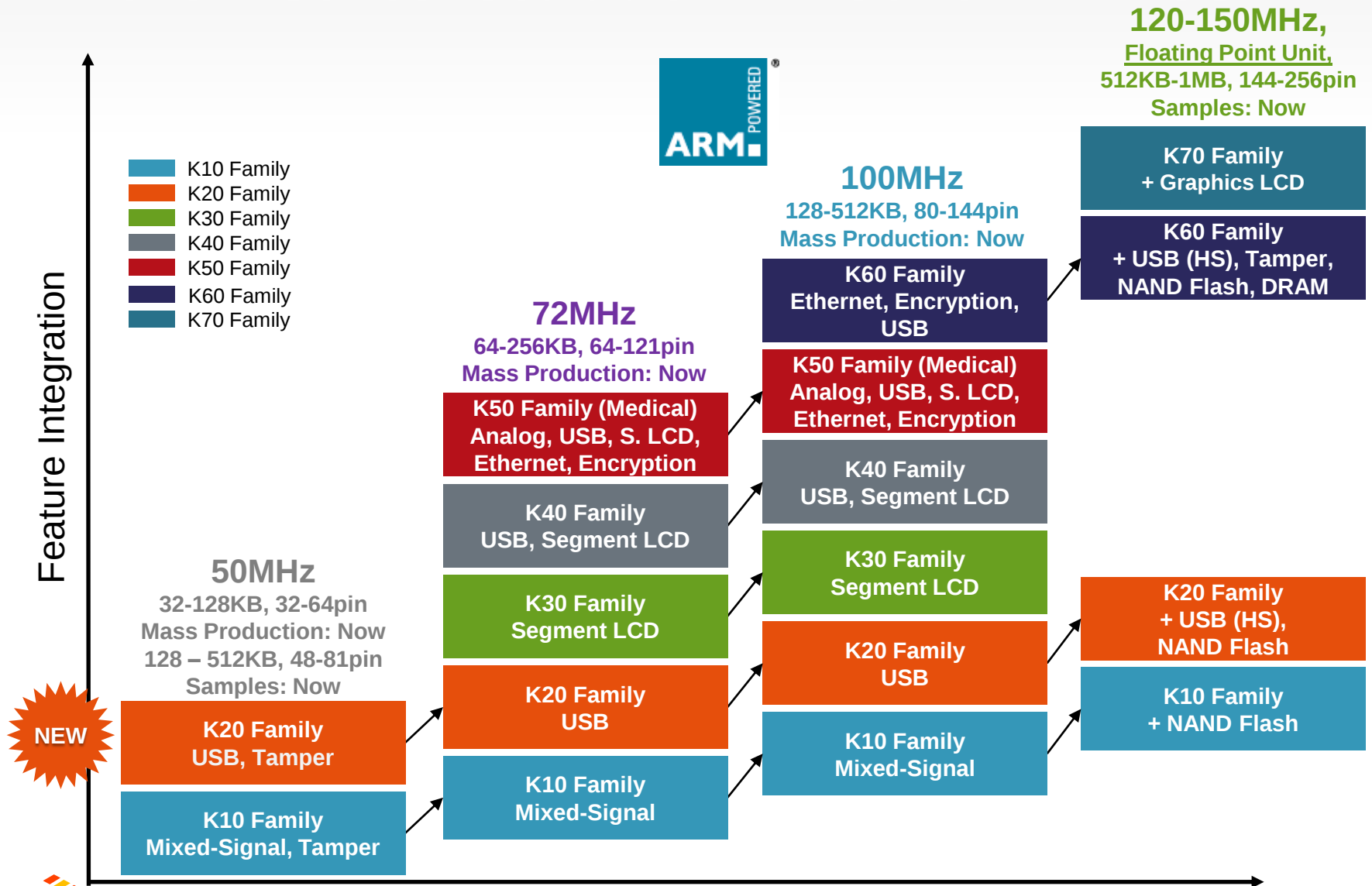
- Motor Control:** advanced algorithms, faster control loops, more responsive to speed commands and changing loads, increased power efficiency
- Automation:** high calculation and algorithm bandwidth at a low cost
- Power management:** designed for low/battery powered systems (CLK @ 0.5x ARM Cortex M3)
- Audio and Video:** 5x performance improvement over software, extended battery operation



Dotted boxes denote optional blocks

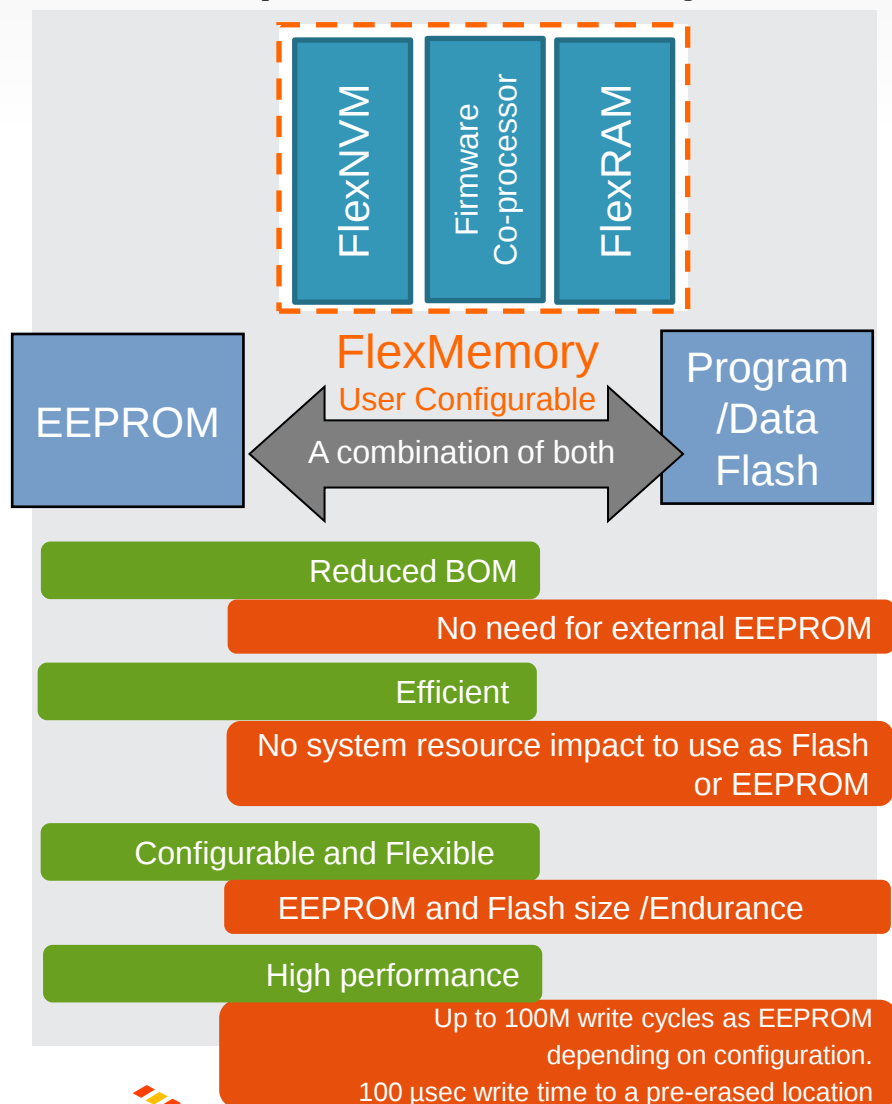
Example	Cortex-M4 speed vs. M3
Audio – Window Overlap and Add	1.8x – 2.6x faster
FIR Filter	2x faster
MP3 Decoder	2x faster
WMA Decoder	1.6x faster
Motor Control – Clarke Transform	5x faster
Motor Control – Park Transform	7x faster

Kinetis K Series: Scalable ARM Cortex-M4 MCU

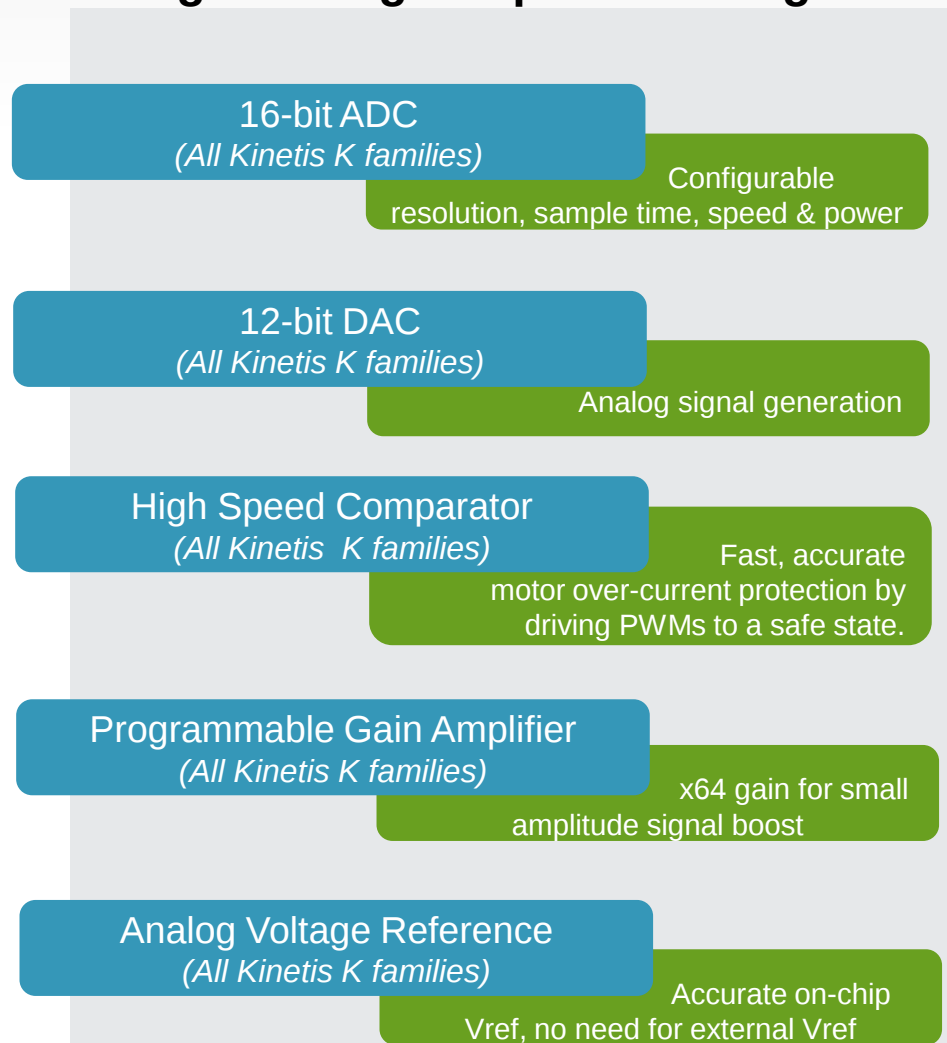


NXP Kinetis K Series Features

Optional FlexMemory



High Analog Peripherals Integration



Kinetis Power Modes

Typical Power Modes in an embedded system	Cortex M4 Power Modes	Kinetis Extended Power Modes	Recovery Time	“Typical” Idd Range
Run	Run	Run	-	From 270uA/MHz
		VLPR	-	From 710uA
Wait	Sleep	Wait	-	Wait from 6.5 mA
		VLPW	4us	VLPW From 450uA
Stop	DeepSleep	Stop	4us	From 302 uA
		VLPS	4us	From 5.1uA
Freescal Adds Low Leakage Wake-up Unit - Enables complete shut-down of core logic, including WIC, further reducing leakage currents in all low power modes - Supports 16 external input pins and 8 internal modules as wakeup sources - Wakeup inputs are activated in LLS or VLLS modes		LLS	4us	2.1 uA - 10uA
		VLLS3	35us	1420 nA - 8uA
		VLLS2	35us	1420 nA - 4uA
		VLLS1	100us+EE restore	690nA – 2uA
		VLLS0		190 nA

Freescale 90nm TFS (Thin Film Storage)

Market Need	Other 90nm NVM Technologies	90nm TFS
Reliability & Performance	- Floating gate bit cells susceptible to charge loss when subject to even microscopic defects - Write times 5-10x greater	- Nanocrystal charge storage technology provides enhanced redundancy and reliability Flash access times of <30ns
Low stop and run currents	- Read, program and erase down to ~2.0V 3x greater run current and 5-10x greater standby currents	Read/program/erase down to 1.71V <1mA operation at low frequency
EEPROM	- No integrated EEPROM capability - Off-chip EEPROM has slower erase + write times (5-10 msec) - Off-chip EEPROM has lower endurance	- FlexMemory user-configurable as EEPROM and/or program flash Write time: ~100usec Erase + write time: 1.5ms Up to 10 Million read/write cycle
Scalability	Area efficiency limited by cell construction	Excellent area efficiency (low-voltage charge pump for programming). Array and analogue area efficiency allow cost-competitive low- and high-density products with single technology

TFS Value = reliability, lower power, EEPROM, scalability

Differentiator: Mixed Signal (High-speed 16-bit ADC)

• Features

- 16-bit Successive Approximation (SAR)
- 1.15V minimum reference
- Differential or Single Ended
- Averaging by 1, 4, 8, 16, or 32
- Automatic Compare Function
- Triggering synchronization w/ DAC
- Configurable sample time, speed/power
- Up to 20 input channels per converter
- 1 μ s conversions (12-bit mode)
- PGA front-end with x64 gain

Performance

- Effective Number of Bits (ENOB)
 - AVG=32 -> (min)14.3b(typ)**14.5b**(4MHz, >2.7V)
 - AVG=16 -> (min)13.8b(typ)14.0b(4MHz, >2.7V)
 - AVG=32 -> (min)12.8b(typ)14.2b(all conditions)
 - AVG=16 -> (min)12.7b(typ)13.8b(all conditions)
- Conversion Time
 - 16b, s.e., 8MHz, avg=1 -> 3.12 μ s
 - 16b, s.e., 4MHz, avg=16 -> 100 μ s
 - 16b, diff., 4MHz, avg=32 -> 272 μ s

• Key Points

- Successive Approximation is much faster than Sigma Delta → Allows monitoring rapidly changing events, channel switching/interleaving, very low power conversions
- With averaging, accuracy as good as SD → Allows accurate measurement of slower or settled signals even while interleaved or switching channels
- Differential input allows much better noise rejection and accuracy than single ended with reduced external components
- **Result is as accurate as SD but much faster meaning lower measurement time**

Kinetis: Connectivity & Communications

IEEE 1588 Compliant
10/100 Ethernet MAC
(K50, K60, K70 families)

USB host/device/OTG
(FS/LS) Controller
(K20, K40, K60, K70 families)

USB host/device/OTG
(HS) Controller
(K20, K60, K70 families)

CAN, UART (ISO7816), DSPI,
IIC, IIS
(All Kinetis families)

Carrier Modulator Transmitter
(All Kinetis Families)

Hardware time stamping provides
precision clock synchronization for
real-time industrial control

- DCD (Device Charger Detect) optimizes charging current/time extending battery life
- Low voltage regulator supplies 120mA at 3.3V for powering ext. components from 5V input

Up to 480 Mbps with external
ULPI PHY

Multiple comms. interfaces for simple and
efficient data exchange, industrial network
bridging and audio interfacing

Infra Red waveform generation
for remote control applications

Kinetis: HMI (Human Machine Interface)

Low Power Touch Sensing
(All Kinetis families)

Low Power Segment LCD
(K30, K40 families)

Graphics LCD
(K70 family)

Audio Interface (DSP + IIS)
(All Kinetis families)

- Low power wake-up via touch
- H/ware module avoids polling method of s/ware implementations

- Blink mode operation reduces power
- Failure detection in s/ware of segment, connector or LCD-to-connector faults

- 8-bit QVGA single-chip
- 24-bit SVGA with ext. memory
- Bus Master – memory to LCD data transfer with no CPU intervention

- ARM CM4 core - fast/efficient processing
- IIS - easy integration of audio processing h/ware

Kinetis: Security

Flash Security
(All Kinetis families)

Memory Protection Unit
(All Kinetis families)

Tamper Detection & battery
back-up
(K60, K70 families)

Cryptographic Acceleration Unit
(K50, K60, K70 families)

H/w Cyclic Redundancy Check
(All Kinetis families)

4-level protection limits access
to flash resources safeguarding
user's IP

Data protection and
increased software reliability

Voltage, frequency, temperature &
external sensing for physical attack
detection

Faster than s/ware implementations with
only minimal CPU intervention
• Wide variety of algorithms supported

Validation of memory contents and
communication data for enhanced
system integrity

Kinetis: External Memory Interfaces

FlexBus
(All Kinetis families)

DRAM Controller
(K60, K70 families)

NAND Flash Controller
(K10, K20, K60, K70 families)

Secure Digital Host Controller
(All Kinetis families)

Connection of ext. memories & peripherals e.g. graphics displays.
• Supports up to 6 chip selects

Connection of DDR, DDR2 and low-power DDR memories

Connection of up to 32-bit ECC current & future NAND types
• ECC management handled in h/ware – minimizes s/ware overhead

Connection of SD, SDIO, MMC or CE-ATA cards for in-application software upgrades, media files or Wi-Fi support

Kinetis: Freescale Enablement Bundle

Freescale Tower System

Kinetis MCU modules from \$69



- Modular, expandable, open-source h/ware development platform for 8/16/32-bit MCUs/MPUs
- Rapid evaluation and prototyping with maximum h/ware reuse
- Supported by a growing range of peripheral plug-in boards (WiFi, sensing, graphics LCD, audio,...)
- www.freescale.com/tower

Open source, reusable hardware platform

Freescale CodeWarrior IDE

Free of charge up to 128KB

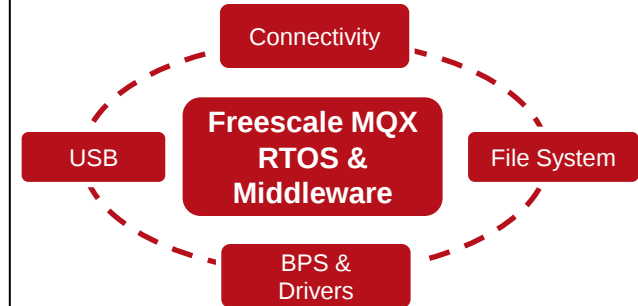


- Eclipse environment
- Includes **Processor Expert code generation wizard**
- Creates MQX-aware drivers
- Build, debug and flash tools
- Software analysis
- Kernel-aware debug
- Special Edition \$0 up to 128KB
- www.freescale.com/codewarrior

Powerful IDE with code generation wizard for \$0

Freescale MQX RTOS

Free of charge (\$95K est. value)



- Full-featured, scalable, proven RTOS with TCP/IP, USB, Graphics, Security and File Systems plug-ins
- Makes application code more stable, more maintainable and easier to upgrade – reduces time-to-market!
- Compatible with CodeWarrior, IAR, Keil & Green Hills IDEs
- www.freescale.com/mqx

Bundled RTOS for \$0

One Stop Shop for Silicon, IDE & RTOS

Processor Modules (\$39-\$119)

8-bit



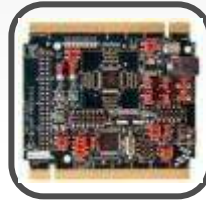
TWR-S08LL64
TWR-S08LH64
TWR-S08JE128
TWR-S08MM128
TWR-S08GW64
TWR-S08UNIV
TWR-S08PT60

16-bit



TWR-S12GN32
TWR-S12G128

DSC



TWR-56F8257

32-bit - ColdFire



TWR-MCF51JE
TWR-MCF51CN
TWR-MCF51MM
TWR-MCF51QM
TWR-MCF5225X
TWR-MCF5441X
TWR-MCF51JF

32-bit - Power Arch



TWR-MPC5125

32-bit Kinetis



TWR-K60N512
TWR-K40X256
TWR-K60D100M
TWR-K40D100M
TWR-K53N512
KWIKSTIK-K40
TWR-K20D50M
TWR-K20D72M
TWR-K21D50M

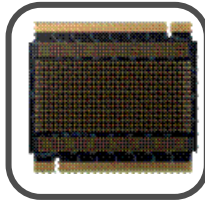
Peripheral Modules (\$15 - \$149)

Serial



TWR-SER
TWR-SER2

Prototyping



TWR-PROTO

Wi-Fi



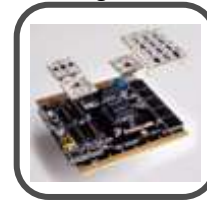
TWR-WIFI-RS2101
TWR-WIFI-G1011MI
TWR-WIFI-AR4100

Memory



TWR-MEM

Sensors &
Plug-Ins



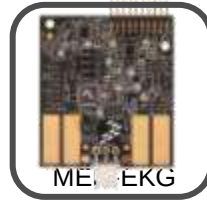
TWR-SENSOR-PAK
TWR-SENSOR-PAK-AUTO
TWRPI-MMA6900
TWRPI-MPL115A

Displays



TWR-LCD

Medical



ME, EKG

Analog



TWR-ADCDAC-LTC

Audio



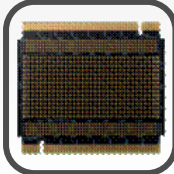
TWR-AUDIO-SGTL

Mesh Networking



TWR-RF-SNAP

Example Tower System Configurations


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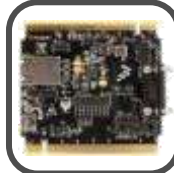
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Medical Prototyping
Solution

TWR-S08MM128 TWR-PROTO TWR-SER TWR-ELEV

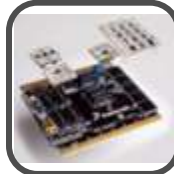
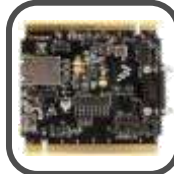

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Motor Control
Solution

TWR-56F8257 TWR-MC-LV3PH TWR-SER TWR-ELEV

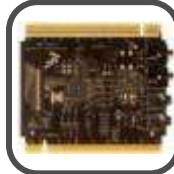

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Sensors
Solution

TWR-MCF5225X TWR-SENSOR-PAK TWR-SER TWR-ELEV

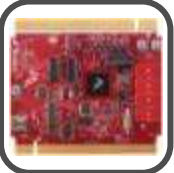

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Multimedia
Solution

TWR-K40X256 TWR-LCD TWR-AUDIO TWR-ELEV


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Wi-Fi
Solution

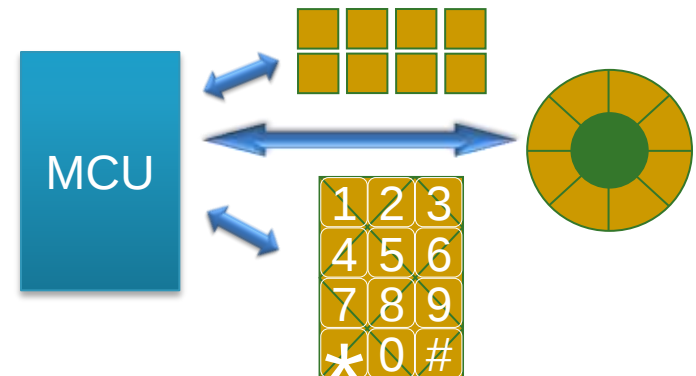
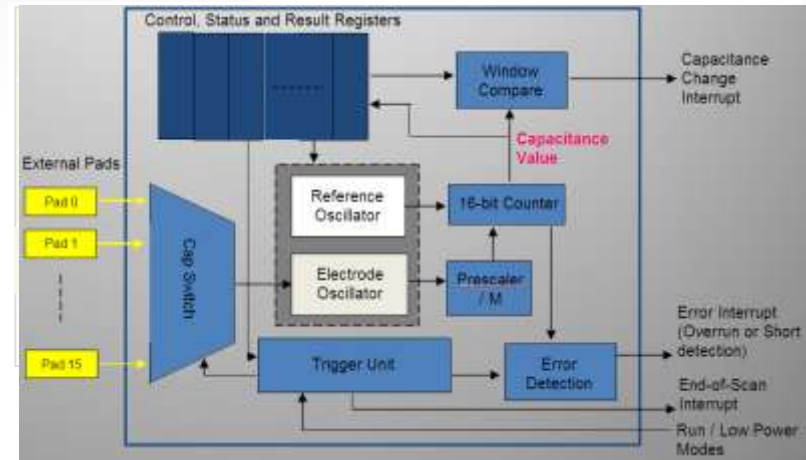
TWRK60N512 TWR-WIFI TWR-MEM TWR-ELEV

Hardware Touch-Sensing Interface (TSI)

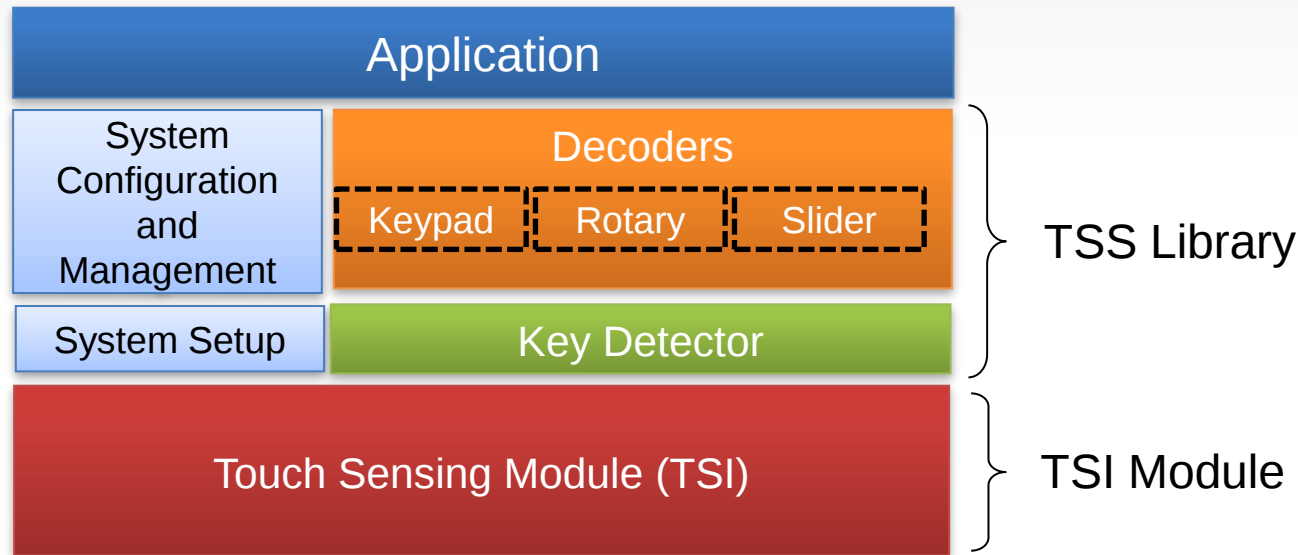
Overview

Capacitive Touch Sense Module

- Current source, configurable from 0.5 uA to 64 uA
- **Up to 16 electrodes, using a single pin per electrode, with individual result registers**
- No need for external components
- Capacitive touch sensing detection across all low power modes – with capability to wake MCU from stop-modes
- Automatic detection of Electrode Capacitance Change with programmable upper and lower threshold
- Automatic periodic scan with configurable duty cycle
- **Low Power Mode current consumption adder of 1-3uA**
- Capacitance measurement resolution down to 0.02pF
- Configurable software or hardware scan trigger
- Compensate temperature and supply voltage variations
- **Fully support Freescale touch sensing software library of button, keyboards, sliders, and rotaries**



Touch Sensing Library, TSS 3.0

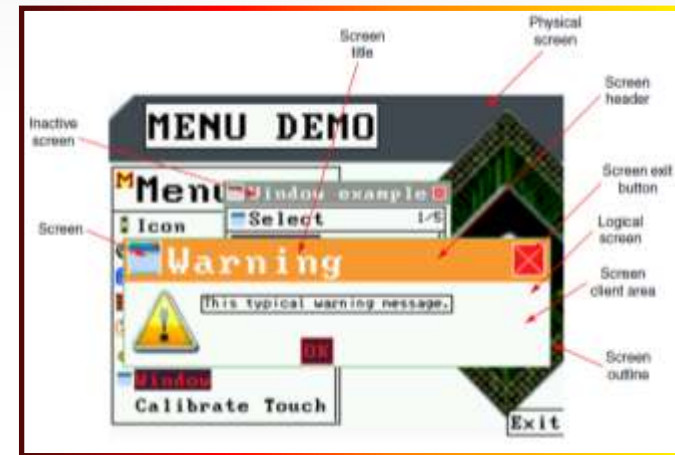


TSS 3.0 Key Features

- Water tolerance algorithm
- Support for S08 TSI (for S08PT and S08RN family)
- MQX support with Kinetis Cortex-M4, M0+
- Auto sensitivity calibration
- Memory usage optimization
- Analog capacitances decoders (slider and rotary)

eGUI: Free Graphics LCD Driver

- Lightweight software component allowing graphics LCD panels to be driven from small microcontrollers
- Structure of driver brings complete software solution for applications needing a colour LCD screen
- Touch screen capability -- organization done by screen with high level objects
- Very light RAM and FLASH footprint
- eGUI version 1.0 + MQX RTOS Support



www.freescale.com/equi

Kinetis: Math/Motor Control Libraries (Fixed Point)

GFLIB – General Function Library	GMCLIB – Motor Control Library	GDFLIB – Digital Filter Library
• Trigonometric (Sine, Cosine, Tangent, Arcsine, Arccosine, Arctangent) • Angle calculation • Square Root. • Sign • Linear Interpolation • Hysteresis function. • Up/Down Ramp • Limitation of the Input Signals • Limitation of the Input Vector • Integrator • Proportional-Integral (PI) controller with and without anti-windup (recurrent and parallel form)	• Clarke Transformation • Inverse Clarke Transformation • Park Transformation • Inverse Park Transformation • DC bus voltage ripple Elimination • PMSM Motor Decoupling • Space Vector Modulation	• 1st and 2nd order IIR filter. • FIR filter. • Moving Average filter.

Available @ http://www.freescale.com/webapp/sps/site/prod_summary.jsp?code=FSLESL



Kinetis L Series



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Kinetis L – The World's 1st Cortex M0+ MCU

32-bit

Energy-efficiency

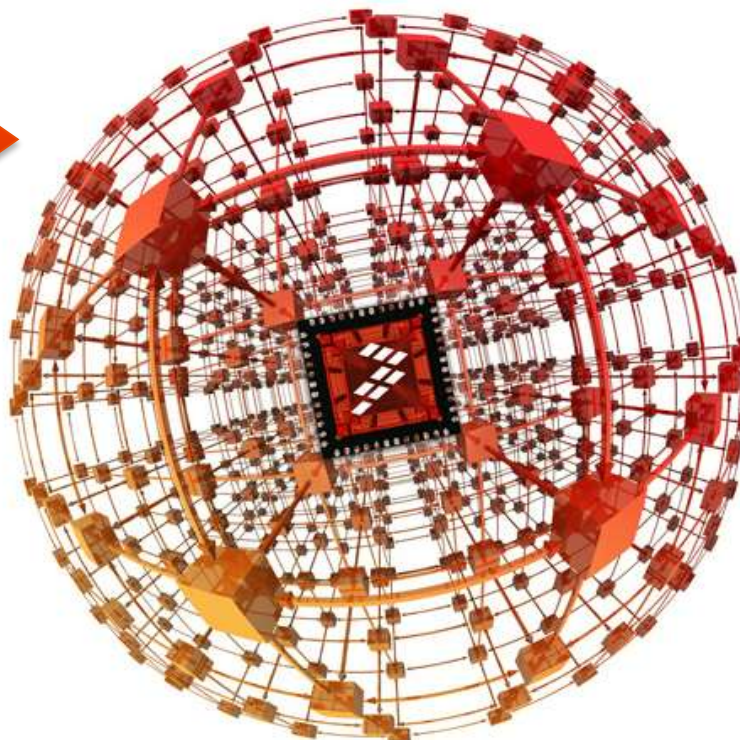
Class-leading
Coremark/mW

Scalability & Integration

Kinetis L to K Series
(Cortex M0+ to M4)

Enablement

Freescale bundle +
ARM ecosystem



8-bit

Ultra Low Static

<1uA

Low cost

From <\$0.50

Ease-of-use

Freedom Platform,
Processor Expert &
MCU Solution
Advisor

Kinetis L Series

The evolution of the entry-level MCU



Going Green



Health & Safety



Net Effect

Why 32-bit Cortex M0+?

8-/16-bit

Performance

- Older, slower architectures & technology
- Increased code size/complexity when performing complex math operations

Energy-Efficiency

- Low energy-efficiency

Low Cost

- 6-35kgates
- Variable code density

Ease-of-Development

- Limited addressable memory
- Simplistic interrupt controllers
- Limited scalability (MHz, flash, features)
- Limited ecosystem support

32-bit ARM Cortex-M0+

Performance

- 2x to 40x more than 8/16-bit, 9% more than Cortex-M0
- Fast 32-bit math processing
- Fast single-cycle access to I/O

Energy-Efficiency

- >2x CoreMark/mA than closest 8/16-bit MCU, +30% / CM0

Low Cost

- 12-35kgates
- Excellent code density

Ease-of-Development

- Linear 4GB address space – no need for paging
- Full-featured interrupt controller – simpler s/w architecture
- Huge scalability – h/w and s/w reuse across end products
- Huge ARM ecosystem – off-the-shelf software/tools/training
- Micro Trace Buffer – lightweight, non-intrusive trace

Kinetis L Series Energy Efficiency

Ultra-efficient processing

- ARM Cortex-M0+ Processor
- 90nm low-power flash technology
- Bit Manipulation Engine
- <50uA/MHz, 3.8CM/mW
- Peripheral Bridge Crossbar
- Zero Wait State Flash Memory Controller

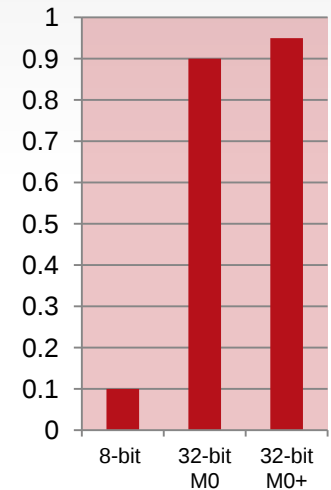
Ultra low-power modes

- 90nm low-leakage flash technology
- Multiple RUN, WAIT and STOP modes
- 4us wake-up from deep sleep modes
- Clock & power gating, low-power boot options
- 2uA Deep Sleep Idd with register retention, LVD active and 4.3us wake-up

Energy-saving peripherals

- Smart peripherals function in deep sleep modes and can make intelligent decisions and process data without waking up the core – ADMA, UART, Timers, ADC, Segment LCD, Touch Sensing...

Energy efficiency



**Most Innovative
Process
Technology**
Kinetis ARM®
Cortex-M4 MCUs



Breakthrough Power Efficiency

	<i>Kinetis Power Modes</i>	<i>Recovery Time</i>	<i>KL25 Measured Idd @ 3V and 25C</i>
Leading Dynamic Power	RUN	-	83uA/MHz*
Innovative low power process technology (C90TFS)	VLPR	-	39uA/MHz**
Low Power focused Platform Design	WAIT	1.6us	3.88mA @ 48MHz
Next Generation Cortex M0+ core	VLPW	1.6us	112uA @ 4MHz
Asynchronous DMA Wake-up (ADMA)	STOP	1.3us	309uA
Energy-saving peripherals are operational with ADMA feature that can wake-up DMA to perform transfer and return to current mode when complete	VLPS	4.2us	2.4uA
Low Leakage Wake-up Unit	LLS	4.3us	1.7uA
Enables complete shut-down of core logic, including AWIC, further reducing leakage currents in all low power modes	VLLS3	39us	1.3uA
Supports 8 external input pins and 8 internal modules as wakeup sources; extends the low power wake-up capability of some internal peripherals to all power modes.	VLLS1	91us	713nA
Wake-up inputs are activated in LLS or VLLS modes	VLLS0	91us	205nA / 411nA

* Compute Operation enabled: 4.0mA @ 48MHz core / 24MHz bus)

** Compute Operation enabled: 156uA @ 4MHz core / 1MHz bus)

Kinetis 'L': ARM Cortex-M0+ MCU

Available 2012

Available 2013

Common Features		Optional Features														
System		Family	Flash	SRAM	Pin Count	Key Features										
ARM Cortex-M0+ Core, 48MHz						USB OTG	Seg LCD	DMA	ADC	DAC	I2S	TSI				
Multiple low-power modes & peripherals, low-power Boot, Clock Gating						KL46	128-256KB	16-32KB	64-121	Y	Y	Y	16-bit	12-bit	Y	Y
1.71-3.6V, -40 to 105°C ^[1]																
Memory						KL36	64-256KB	8-32KB	64-121		Y	Y	16-bit	12-bit	Y	Y
90nm TFS Flash, SRAM		KL34	64KB	8KB	64-100		Y	Y	12-bit							
Internal Memory Security/Protection																
Analog Peripherals		KL26	128-256KB	16-32KB	64-121	Y		Y	16-bit	12-bit	Y	Y				
12/16-Bit ADC, 12-bit DAC		KL25	32-128KB	4-16KB	32-80	Y		Y	16-bit	12-bit		Y				
High-Speed Comparator		KL24	32-64KB	4-8KB	32-80	Y		Y	12-bit							
Serial Interfaces																
UART (Including 1 LPUART)		KL16	256KB	16-32KB	64-80			Y	16-bit	12-bit	Y	Y				
SPI, IIC		KL15	32-128KB	4-16KB	32-80			Y	16-bit	12-bit		Y				
Timers		KL14	32-64KB	4-8KB	32-80			Y	12-bit							
Real Time Clock ^[2]																
16bit Low Power TPMs (GP Timer/PWM)		KL05	8-32KB	1-4KB	24-48			Y	12-bit	12-bit		Y				
Low Power Timers		KL04	8-32KB	1-4KB	24-48			Y	12-bit							
32bit Periodic Interrupt Timer		KL02	8-32KB	1-4KB	16-32				12-bit							

[1] Feature not available on CSP packages

[2] For KL02, use software to support

Kinetis L Series: Entry-level Enablement

Hardware

Freescal Freedom Platform FRDM-KL25Z

www.freescale.com/FRDM-KL25Z

- Low -cost/power platform for entry-level developers (\$12.95 / €10 SRP)
- Integrates a fully featured debugger, that works with all featured tool chains.



Freescal Tower System TWR-KL25Z48M

www.freescale.com/TWR-KL25Z48M

- Modular, open-source development platform with reusable peripheral modules offering connectivity, analog, graphics LCD and motor control functionality



New

IDE & Code Generation

Freescal & 3rd party IDEs

- Freescal CodeWarrior v10.3: **free** 64KB
- Keil MDK: free 32KB
- IAR EWARM: free 32KB
- Atollic TrueStudio: free 8KB
- GCC ARM Embedded via Launchpad.net
- Additional tool support from Code Red and others in Q412

Freescal Processor Expert Code Generator

- **Free** software generation tool for device drivers / start-up code
- 7 steps from project creation to debug – dramatically reduces development time
- Available within CodeWarrior or as a standalone plug-in for IAR/Keil/GNU IDEs

CodeWarrior



GNU



New

Run-Time Software & Product Selector

Freescal MQX Lite RTOS

www.freescale.com/mqx

- **Free**, light-weight MQX kernel customised for small resource MCUs
- Packaged as a Processor Expert component
- Upwards compatible with MQX RTOS



MQX Lite RTOS

Solution Advisor

www.freescale.com/sa

- Web-based interactive MCU selector
- Filters for operating characteristics, packaging, memory configuration & peripherals. Verifies muxing compatibility
- Save, download and print summary reports and pin muxing configurations

Freemius L-Series: HARDWARE Development Platforms

Freedom Platform (FRDM-KL25Z/05Z)

- Ultra low -cost/power development platform
- Form factor compatible with Arduino platform
- Well suited for low-power applications



Tower System (TWR-KL25Z48M)

- Richer feature set
- Standard Tower Controller Module
- Compatible with existing Tower System peripherals





Kinetis Selection

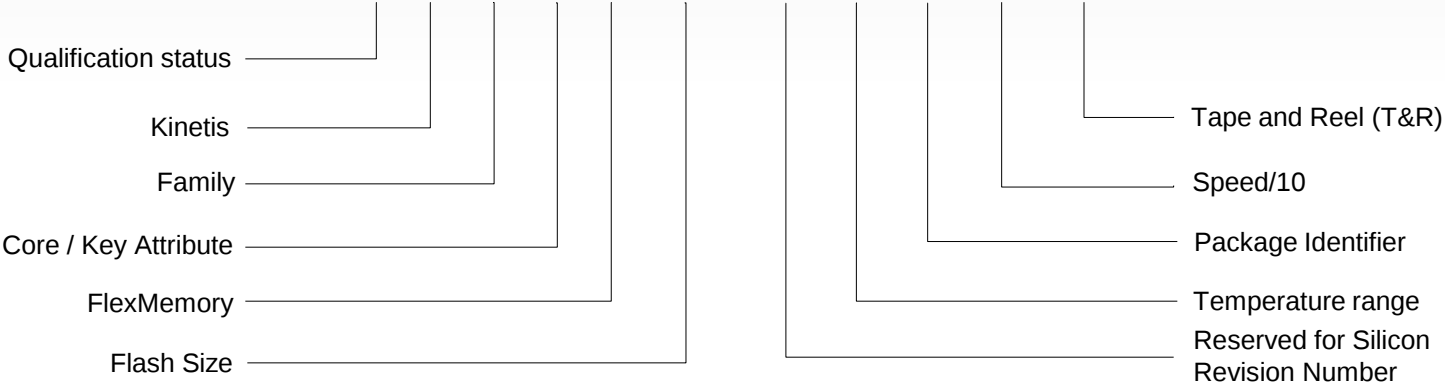


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Kinetis Part Numbering Scheme

M K 20 D X 256 (Z) V LQ 10 (R)



Key Attribute		Memory		Flash Size		Silicon Rev		Temperature		Package		Speed		T&R	
Options	Attribute	Options	Description	Options	Description	Options	Description	Options	Description	Options	Description	Options	Description	Options	Description
D	M4 w/ DSP	N	Non-FlexMemory	8	8KB	Z	Initial Revision	C	-40 to 85C		16TSSOP	4	48MHz	Blank	Non T&R
F	M4 w/ DSP&FPU	X	Flexmemory	16	16KB		2nd Revision	V	-40 to 105C		24QFN	5	50MHz	R	T&R
				32	32KB	A	3rd Revision	M	-40 to 125C		32CSP	7	72MHz		
				64	64KB	B	4th Revision			FM	32QFN	10	100MHz		
				96	96KB	...	...			FT	48QFN	12	120MHz		
				128	128KB					LF	48LQFP	15	150MHz		
				256	256KB							18	180MHz		
				512	512KB					MP	64MAPBGA				
				1M0	1MB					LH	64LQFP				
				1M5	1.5MB					LK	80LQFP				
				2M0	2MB					MB	81MAPBGA				
				2M5	2.5MB					LL	100LQFP				
				...	...					ML	104MAPBGA				
										AB	120WLCSP				
										MC	121MAPBGA				
										AA	143WLCSP				
										LQ	144LQFP				
										MD	144MAPBGA				
										MJ	256MAPBGA				



* 196MAPBGA package removed

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Kinetis K/L Series: Packaging

Common Packages

Kinetis K Series Package

*Proposed

Kinetis L Series Package

*Proposed



32QFN
5 x 5 mm
0.5mm pitch
(K10/20)
(KL0/1/2)



48QFN
7 x 7 mm
0.5mm pitch
(K10/20)
(KL1/2)



32LQFP
7 x 7 mm
0.8mm pitch
(K10/20)
(KL0x)



48LQFP
7 x 7 mm
0.55mm pitch
(K10/20)
(KL0)



64LQFP
10 x 10 mm
0.5mm pitch
(K10/20/30/40/50)
(KL1/2/3/4)



80LQFP
12 x 12 mm
0.5mm pitch
(K10/20/30/40/50)
(KL1/2)



100LQFP
14 x 14 mm
0.5mm pitch
(K10/20/30/40/50/60)
(KL2/3/4)



64MAPBGA
5 x 5 mm
0.5mm pitch
(K10/20)
(KL1*/2*/3*/4*)



121MAPBGA
8 x 8 mm
0.65mm pitch
(K1/2/30/40/50/60)
(KL2/3/4)

Kinetis L Series only



New
20CSP
2x2x0.56 mm
0.4mm pitch
(KL02)



New
25CSP
2.3x2.3x0.56 mm
0.4mm pitch
(KL05*)



New
35CSP
2.55x3x0.56 mm
0.4mm pitch
(KL15*/25*)



New
16QFN
3x3x1 mm
0.5mm pitch
(KL02)



New
24QFN
4 x 4x1 mm
0.5mm pitch
(KL0x)

Kinetis K Series only



New
56CSP
2.9x3.3x0.56 mm
0.4mm pitch
(K10*/20*)



New
90CSP
3.9x4.4x0.56 mm
0.4mm pitch
(K10*/20*)



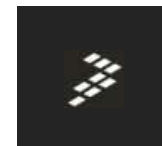
New
121CSP
5.3x5.3x0.56 mm
0.4mm pitch
(K10/20/60)



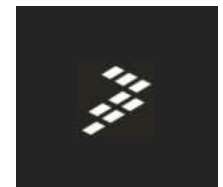
New
143CSP
6.5x5.6x0.56 mm
0.4mm pitch
(K61)



144LQFP
20 x 20 mm
0.5mm pitch
(K10/20/30/40/50/60)



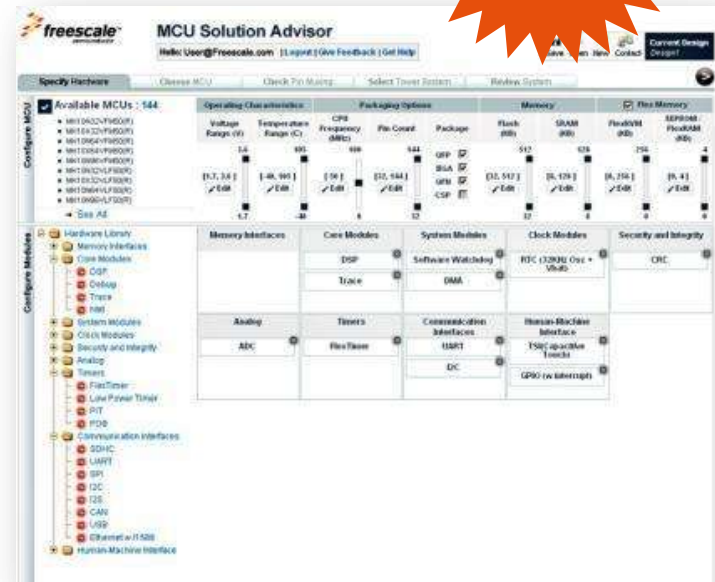
144MAPBGA
13 x 13 mm
1.0mm pitch
(K10/20/30/40/50/60)



256MAPBGA
17 x 17 mm
1.0mm pitch
(K60/70)

Free MCU Solution Advisor: Interactive Product Selector Guide

- **Web-based application** featuring an interactive MCU product selector for 32-bit Kinetis ARM® Cortex™-M4 MCUs.
- **Helps identify best MCU** choice by applying dynamic filters based on:
 - Operating characteristics
 - Packaging options
 - Memory configuration
 - Peripheral hardware library



www.freescale.com/solutionadvisor

