



Target Applications

- Barcode scanners
- Portable media players
- Printers
- Programmable logic controllers

Kinetis K20 Family

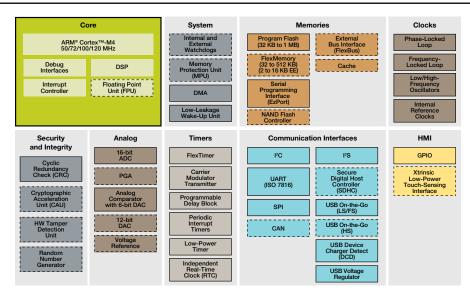
Low-power MCUs with USB On-The-Go

Overview

The Kinetis MCU portfolio consists of multiple pin-, peripheral- and software-compatible MCU families based on the ARM® CortexTM-M4 core. Families are built from innovative 90 nm thin-film storage (TFS) flash technology with unique FlexMemory (EEPROM) capability, and offer industry-leading low-power and mixed-signal analog integration.

The K20 MCU family is pin, peripheral and software compatible the K10 MCU family and adds Full-and High-speed USB 2.0 On-The-Go with device charger detect capability. Devices start from 32 KB of flash in 5 x 5 mm 32 QFN packages extending up to 1 MB in a 144 MAPBGA package with a rich suite of analog, communication, timing and control peripherals. High memory density K20 family devices include a single precision floating point unit and NAND flash controller.

Kinetis K20 Family



Standard Feature Optional Feature



One-Stop Enablement Offering-MCU + IDE + RTOS

Freescale Tower System hardware development environment:

- Integrated development environments
 - Eclipse-based CodeWarrior V10.x IDE and Processor Expert
 - IAR Embedded Workbench
 - Keil MDK
 - CodeSourcery Sourcery G++ (GNU)
- Runtime software and RTOS
 - Math, DSP and encryption libraries
 - Motor control libraries
 - Complimentary bootloaders (USB, Ethernet, RF, serial)
 - o Complimentary Freescale embedded GUI
 - Complimentary Freescale MQX™
 - Cost-effective Nano™ SSL/Nano™ SSH for Freescale MQX RTOS
 - o Micrium uC/OS-III
 - Express Logic ThreadX
 - o SEGGER embOS
 - o freeRTOS
 - Mocana (security)
- Full ARM ecosystem

Features Benefits

- ARM® Cortex™-M4 core with DSP instruction support and optional single precision floating point unit
- Up to 32-channel DMA. Up to 16 KB of cache. Cross bar switch
- Up to 120 MHz core supporting a broad range of processing bandwidth
- Peripheral and memory servicing with reduced CPU loading. Optimized bus bandwidth and flash execution performance. Concurrent multi-master bus accesses for increased bus bandwidth
- USB On-The-Go (Full- and High-Speed) with device charger detect
- Optimized charging current/time for portable USB devices, enabling longer battery life. USB low-voltage regulator supplies up to 120 mA off chip at 3.3 V to power external components from 5 V input Provides memory protection for all cross bar switch masters, increasing

Validates memory contents and communication data, increasing system

Prevents code runaway in fail-safe applications. Drives output pin to safe

Secure data transfer and storage. Faster than software implementations

and with minimal CPU loading. Supports a wide variety of algorithms: DES,

Secure key storage with internal/external tamper detect for unsecured flash,

- Memory protection unit
- Hardware cyclic redundancy check engine
- Independent-clocked COP. External watchdog monitor
- Cryptographic acceleration unit (CAU)
- Hardware tamper detection unit
- Random number generator
- Up to four FlexTimers with up to 20 channels
- Carrier modulator transmitter
- 4-channel, 32-bit periodic interrupt

Wafer level chip scale package

- FlexBus external bus interface Secure digital host controller
- NAND flash controller

SRAM

(WLCSP)

- temperature/clock/supply voltage variations and physical attack General-purpose timers with hardware dead-time insertion and quadrature decoding for motor control
- Infrared waveform generation for remote control applications
- Time base generation for RTOS task scheduler or trigger source for ADC conversion and programmable delay block
- Enables the connection of external memories and peripherals (e.g., graphics displays)

state external components if watchdog event occurs

3DES, AES, MDS, SHA-1, SHA-256

- Connection to SD, SDIO, MMC or CE-ATA cards for in-application software upgrades, file systems or adding Wi-Fi® or Bluetooth® support
- Supports up to 32-bit ECC current and future NAND types with minimal software overhead
- High reliability, fast access program memory with 4-level security protection. Independent flash banks allow concurrent code execution and firmware 32 KB-1 MB flash. Up to 128 KB of
- FlexMemory provides 32 byte-16 KB of user-segmentable byte write/erase 32–512 KB FlexMemory EEPROM. 32-512 KB FlexNVM for extra program code, data or EEPROM backup
 - Maximize board space

software reliability

reliability

- 32-bit M4 performance in small package
- Miniaturization of existing applications

K20 Family Options

	Memory					Feature Options											Packages									
Part Number			(B)		-	ion Unit	ction		la l	_	<u>s</u>		olifier	9		АВ	FM	FT	LF	MP	LH	LK	LL	мс	LQ	MD
	CPU (MHz)	Flash (KB)	Flex NVM (KB)	SRAM (KB) Cache (KB)		Single Precision Floating Point Unit	Memory Protection Unit	CAN	Secure Digital Host Controller NAND Flash Controller		External Bus Interface	12-bit DAC	Prog. Gain Amplifier	5 V Tolerant I/O	Other		32 QFN (5×5)	48 QFN (7×7)	48 LQFP (7 x 7)	64 MAPBGA (5 x 5)	64 LQFP (10 × 10)	80 LQFP (12 x 12)	100 LQFP (14 x 14)	121 BGA (8 × 8)	144 LQFP (20 × 20)	144 BGA (13 x 13)
MK20DN32Vyy5	50	32		8											USB OTG (FS)		J	1	1	1	1					
MK20DN64Vyy5	50	64		16											USB OTG (FS)		J	J	J	J	J					
MK20DN128Vyy5	50	128		16											USB OTG (FS)		J	J	J	Ì	J					
MK20DN512Vyy10	100	512		128			1	1	1		1	1	1	1	USB OTG (FS)							√	1	1	√	$\sqrt{}$
MK20FN1M0Vyy12	120	1 MB		128	16	1	1	1	1	J	J	1	1	J	USB OTG (FS/HS)										1	J
MK20DX32Vyy5	50	32	32	8											USB OTG (FS)		V	1	1	1	1					
MK20DX64Vyy5	50	64	32	16											USB OTG (FS)		1	√	1	1	√					
MK20DX128Vyy5	50	128	32	16											USB OTG (FS)		V	1	1	1	1					
MK20DX64Vyy7	72	64	32	16				1			1	1	1	1	USB OTG (FS)						1	1		1		
MK20DX128Vyy7	72	128	32	32				1			1	1	1	J	USB OTG (FS)						1	1	1	1		
MK20DX256Vyy7	72	256	32	64				1			J	1	1	J	USB OTG (FS)						J	J	1	J		
MK20DX128Vyy10	100	128	128	32			√	1	√		1	1	V	√	USB OTG (FS)										1	$\sqrt{}$
MK20DX256Vyy10	100	256	256	64			√	√	√		J	V	J	✓	USB OTG (FS)							√	1	√	√	\downarrow
MK20FX512Vyy12	120	512	512	128	16	1	1	√	1	- √	1	1	1	√	USB OTG (FS/HS)										V	√
MK20DN512Zyy10R	100	512		128			1	√	V		V	V	V	✓	USB OTG (FS/HS)	√										
MK20DN512ZCyy10R	100	512		128			- √	✓	V		√	√	√	V	USB OTG (FS/HS)	- √										
MK21DX128Vyy5(R)	50	128	64	32								1			HW Encryption and Tamper Detec							V		√		
MK21DX256Vyy5(R)	50	256	64	32								1			HW Encryption and Tamper Detec							V		1		
MK21DN512VLK5(R)	50	512		64								1			HW Encryption and Tamper Detec							V		1		
MK22DX128Vyy5(R)	50	128	64	32								1			USB OTG (FS)				1		1	1		1		
MK22DX256Vyy5(R)	50	256	64	32								J			USB OTG (FS)				J		J	J		J		
MK22DN512VLH5(R)	50	512		64								J			USB OTG (FS)				i i		j	J		J		
viv – pookogo dooignot												•			` ′						<u> </u>			•		

yy = package designator



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Doc Number: KNTSK20FMLYES REV 10