ARM® Cortex®-M0+ core-based processor family for sensorless BLDC and PMSM motor control

Kinetis KV1x MCU Family

The Kinetis KV1x family of microcontrollers is a high-performance, cost-competitive solution for three-phase sensorless BLDC and PMSM motor control applications and the entry point into the Kinetis V series—the first Kinetis microcontroller family specifically designed for motor control.

TARGET APPLICATIONS

- Sensorless BLDC motor control
- Entry-level sensorless PMSM motor control
- Compressors
- Pumps
- Domestic appliances

Built upon the Cortex-M0+ core running at 75 MHz with hardware square root and divide capability, Kinetis KV1x microcontrollers deliver a 27% increase in performance in math-intensive applications versus comparable MCUs, allowing them to target BLDC as well as more computationally demanding PMSM motors. Additional features include integrated FlexCAN, dual 16-bit analog-to-digital controllers (ADCs) sampling at up to 1.2 mega samples per second (MS/s) in 12-bit mode, multiple motor control timers, up to 128 KB of flash memory and a comprehensive enablement suite both from us and third-party resources, including reference designs, software libraries and motor configuration tools.

KINETIS KV1x MCU FAMILY

Part Number	CPU	Pin Count	Package	Flash	SRAM	FlexCAN	FlexTimers
MKV11Z128**	75	64, 48, 32*	LQFP	128	16	1	2 x 6-ch., 4 x 2-ch.
		32	QFN				
MKV10Z128		64, 48, 32*	LQFP			0	
		32	QFN				
MKV11Z64		64, 48, 32*	LQFP	64		1	
		32	QFN				
MKV10Z64**		64, 48, 32*	LQFP			0	
		32	QFN				
MKV10Z32		48, 32	LQFP	32	8	0	1 x 6-ch., 2 x 2-ch.
		32	QFN				
MKV10Z16		48, 32	LQFP	16			
		32	QFN				

*This package is included in the Package Your Way program for Kinetis MCUs. For more details, please visit **www.nxp.com/KPYW.**

These devices include versions enabled by Kinetis Motor Suite. For more information, visit **www.nxp.com/KMS

FEATURES AND BENEFITS

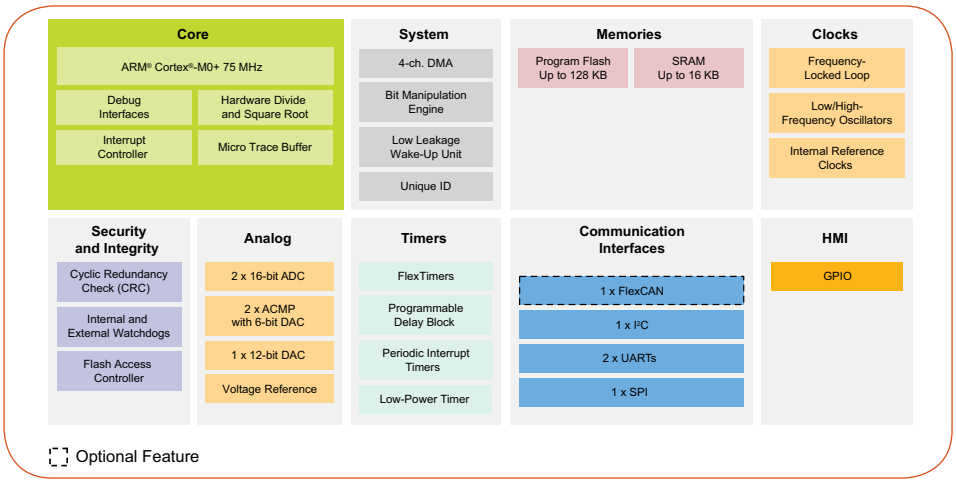
- 75 MHz Cortex-M0+ core with hardware square root and divide block that improves performance in math-intensive applications (e.g., processing of sensorless field-oriented control (FOC) algorithms)
- 2 x 16-bit ADCs with two capture and hold circuits and up to 1.2 MS/s samples rate in 12-bit mode, simultaneous measurement of current and voltage phase, reduced jitter on input values improving system accuracy
- Up to 2 x 6-channel and 4 x 2-channel programmable FlexTimers—High-accuracy PWM generation with integrated power factor correction or speed sensor decoder (incremental decoder/hall sensor)
- 12-bit DAC and 2 x ACMP (analog comparators) for overcurrent and overvoltage fault detection and reduced BOM costs; ADC and ACMP interconnect with PWM and PDB (programmable delay) blocks for real-time hardware control
- 4-channel DMA—reduced CPU loading for improved application performance
- Dual watchdogs—compliance with IEC 60730 safety regulation requirements
- Broad family scalability with hardware and software compatibility—easy migration to more performance, memory and feature integration within the Kinetis V series

DEVELOPMENT TOOLS

Kinetis Motor Suite (KMS)

KMS is a software solution that enables the rapid configuration of motor drive systems, accelerates development of the final motor drive application whilst improving overall motor system performance due to its unique SpinTAC™ enabled speed controller. Tuning and optimization is carried out via a simple graphical user interface that enables a developer to easily identify their motor, tune that motor using just one control dial and build a state machine to control the various speed transitions of the motor.

KINETIS KV1x MCU FAMILY BLOCK DIAGRAM



TWR-KV10Z32 and TWR-KV11Z75M

The Tower System MCU module is a cost-effective, modular development platform that features the KV1x MCU in either a 48 LQFP or 64 LQFP package, integrated OpenSDA debug adapter (requires no external debug interface) and is compatible with the TWR-MC-LV3PH three-phase motor peripheral module.

HVP-MC3PH

The HVP-MC3PH platform enables development of three-phase PMSM, BLDC and ACIM motor control and power factor correction (PFC) solutions in a safe high-voltage environment.

Compatible with the Kinetis KV10 MCU and KV11 MCU (and several other proprietary controllers), input voltage is 85–240 V AC, with output power of the motor stage up to 1 KW, with the ability to drive a 1.2 Hp motor, and 800 watts when utilizing the PFC stage.

FRDM-KV11Z

The FRDM-KV11Z is an ultra-low-cost development platform for Kinetis KV1x MCUs, including those enabled with KMS. The FRDM-KV11Z hardware is form-factor compatible with the Arduino™ R3 pin layout, providing a broad range of expansion board options, including FRDM-MC-LVPMSM and FRDM-MC-LVBLDC for permanent magnet and brushless DC motor control.

Integrated Development Environment (IDE), Software Development Kit (SDK) and Config Tools

Kinetis V series MCUs are supported by MCUXpresso Software and Tools (IDE, SDK, Config Tools). When developing with KMS, Kinetis Design Studio IDE, IAR Embedded Workbench® for ARM, and Kinetis SDK Development Kit v1.3 are the only supported software and development tools.

FreeMASTER

FreeMASTER is a free, simple, yet highly customizable real-time debug monitor and data visualization tool designed for software development that requires real-time data access.

Motor Control Application Tuning Tool (MCAT)

MCAT is a GUI that runs inside of FreeMASTER that helps simplify the motor identification and tuning process for the field-oriented control and trapezoidal control reference designs.

Motor Control Toolbox

Our motor control development toolbox is a comprehensive collection of tools that plug into the MATLAB™/Simulink™ model-based design environment to support rapid application development targeting our MCUs.

Embedded Libraries

- Extensive suite of complimentary software libraries for motor real-time control applications
- Core self-test libraries for simpler IEC 60730 certification

www.nxp.com/Kinetis/Vseries

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