ARM® Cortex®-M4 MCU family for BLDC, PMSM and ACIM motor control

Kinetis KV3x MCU Family

The Kinetis KV3x family of microcontrollers is a high-performance solution for BLDC, PMSM and ACIM motor control applications. Enabled with Kinetis Motor Suite.

TARGET APPLICATIONS

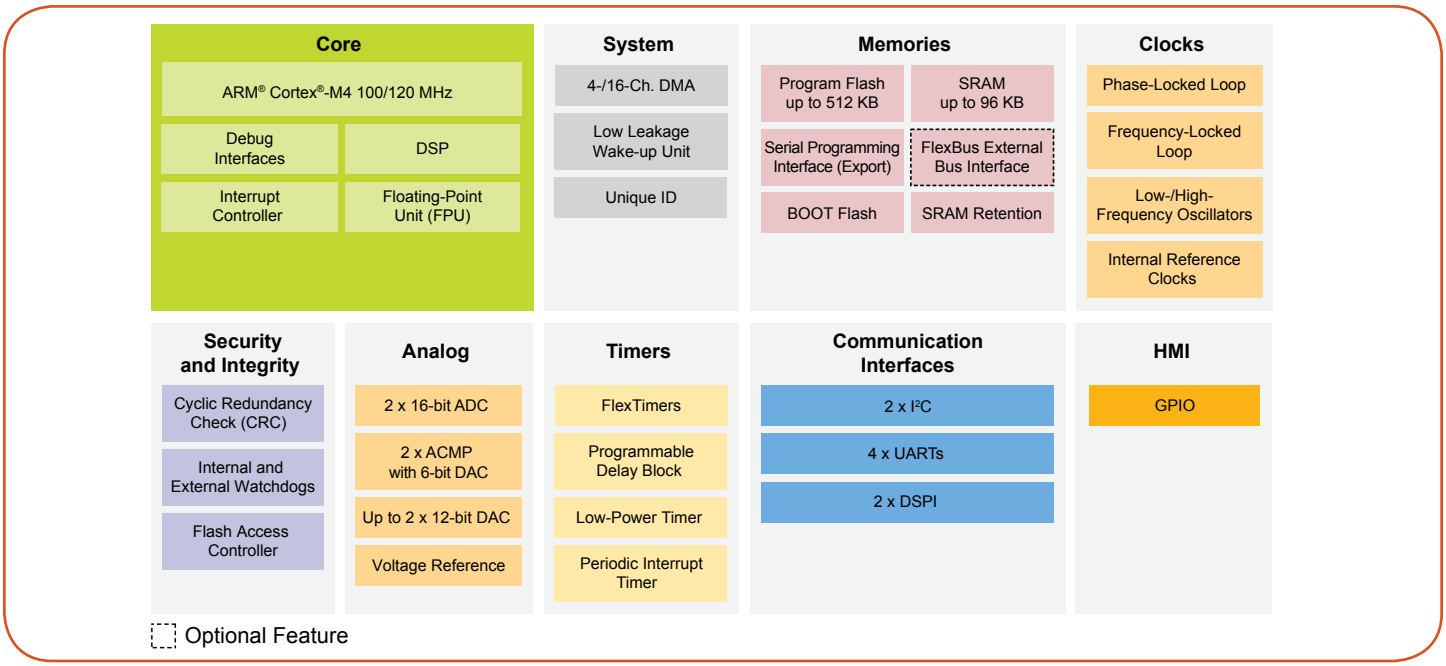
- BLDC motors
- PMSM motors
- ACIM motors

Built upon the Cortex-M4 core running at 100/120 MHz with DSP and floating point unit, it features dual 16-bit analog-to-digital converters (ADCs) sampling at up to 1.2 mega samples per second (MSPS), multiple motor control timers, 64 to 512 KB of flash memory and a comprehensive enablement suite from proprietary and third-party resources, including reference designs, software libraries and motor configuration tools.

FEATURES AND BENEFITS

- 100/120 MHz Cortex-M4 core with DSP and floating point unit—improves performance in math-intensive applications (e.g., processing of sensorless FOC (field oriented control) algorithms)
- 2x 16-bit ADCs with two capture and hold circuits and up to 1.2 MSPS sample rate—simultaneous measurement of current and voltage phase, reduced jitter on input values improving system accuracy
- Up to 2 x 8-channel and 2 x 2-channel programmable FlexTimers—high-accuracy PWM generation with integrated power factor correction or speed sensor decoder (incremental decoder/hall sensor)
- Up to 2 x 12-bit DAC and 2 x ACPMs (analog comparators)—overcurrent and overvoltage fault detection, reduced BOM costs. ADC and ACMP interconnect with PWM and PDB (programmable delay blocks) for real-time hardware control
- 4- or 16-channel DMA—reduced CPU loading for improved application performance
- Dual watchdogs—compliance with IEC 60730 safety regulation requirements

KINETIS KV3x MCU FAMILY BLOCK DIAGRAM



DEVELOPMENT TOOLS

Kinetis Motor Suite (KMS) is a software solution that enables the rapid configuration of motor drive systems, accelerates development of the final motor drive application while 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.

HVP-MC3PH

The 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 HVP-KV31F120M controller card, input voltage is 85–240 V AC, with output power of the motor stage up to 1 KW and the ability to drive a 1.2 Hp motor.

FRDM-KV31F

An ultra-low-cost development platform for Kinetis KV3x MCUs. The FRDM-KV31F hardware is form-factor compatible with the Arduino™ R3 pin layout, providing a broad range of expansion board options.

Combine this with the FRDM-MC-LVPMSM or FRDM-MC-LVBLDC shields and the FRDM-MC-LVMTR to create a fully-enabled development platform for PMSM or BLDC motor control.

TWR-KV31F120M

The Tower System MCU module is a development board that features the KV3x MCU in a 100 LQFP package, integrated OpenSDA debug adapter, and is compatible with the TWR-MC-LV3PH three-phase motor peripheral module.

TWR-MC-LV3PH

The TWR-MC-LV3PH low-voltage, three-phase motor control Tower® System peripheral module provides a complete motor control reference design kit for developing BLDC and PMSM motor solutions, it includes a three-phase motor and motor drive circuitry.

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), as well as, IAR Embedded Workbench® for ARM.

Reference Designs Built on Embedded Motor Control Libraries

- Extensive suite of complimentary reference designs for ACIM, BLDC and PMSM motor control built on NXP's Embedded Software libraries and motor configuration tools.
- Complex real-time control applications
- Core self-test libraries for simpler IEC 60730 certification

FreeMASTER

FreeMASTER is a free and simple, yet highly customizable real-time debug monitor and data visualization tool that enables real-time data access.

Motor Control Toolbox

Motor control development toolbox is a comprehensive collection of tools that plug into MATLAB™/Simulink™ design environment to support rapid application development targeting Kinetis KV MCUs.

KINETIS KV3x MCU FAMILY

PART NUMBER	MAX FREQ. (MHz)	PIN COUNT	PACKAGE	FLASH (KB)	SRAM (KB)	KMS	FLEX.BUS	DMA	PLL or FLL	FLEX TIMERS	DAC
MKV31F512VLL12	120	100	LQFP	512	96	NO	YES	16-ch.	PLL	2 x 8-ch.; 2 x 2-ch.	2
MKV31F512VLH12	120	64	LQFP	512	96	NO	YES	16-ch.	PLL	2 x 8-ch.; 2 x 2-ch.	2
MKV31F512VLL12P	120	100	LQFP	512	96	YES	YES	16-ch.	PLL	2 x 8-ch.; 2 x 2-ch.	2
MKV31F512VLL12Q**	120	100	LQFP	512	96	YES	YES	16-ch.	PLL	2 x 8-ch.; 2 x 2-ch.	2
MKV31F256VLL12	120	100	LQFP	256	48	NO	NO	16-ch.	PLL	1 x 8-ch.; 2 x 2-ch.	1
MKV31F256VLH12	120	64	LQFP	256	48	NO	NO	16-ch.	PLL	1 x 8-ch.; 2 x 2-ch.	1
MKV31F256VLH12P	120	64	LQFP	256	48	YES	NO	16-ch.	PLL	1 x 8-ch.; 2 x 2-ch.	1
MKV31F128VLL10	100	100	LQFP	128	24	NO	NO	4-ch.	FLL	1 x 8-ch.; 2 x 2-ch.	1
MKV31F128VLH10	100	64	LQFP	128	24	NO	NO	4-ch.	FLL	1 x 8-ch.; 2 x 2-ch.	1
MKV31F128VLH10P	100	64	LQFP	128	24	YES	NO	4-ch.	FLL	1 x 8-ch.; 2 x 2-ch.	1
MKV30F128VLH10	100	64	LQFP	128	16	NO	NO	4-ch.	FLL	1 x 8-ch.; 2 x 2-ch.	1
MKV30F128VLF10	100	48	LQFP	128	16	NO	NO	4-ch.	FLL	1 x 8-ch.; 2 x 2-ch.	1
MKV30F128VFM10	100	32	QFN	128	16	NO	NO	4-ch.	FLL	1 x 8-ch.; 2 x 2-ch.	1
MKV30F128VLF10P	100	48	LQFP	128	16	YES	NO	4-ch.	FLL	1 x 8-ch.; 2 x 2-ch.	1
MKV30F64VLH10	100	64	LQFP	64	16	NO	NO	4-ch.	FLL	1 x 8-ch.; 2 x 2-ch.	1
MKV30F64VLF10	100	48	LQFP	64	16	NO	NO	4-ch.	FLL	1 x 8-ch.; 2 x 2-ch.	1
MKV30F64VFM10	100	32	QFN	64	16	NO	NO	4-ch.	FLL	1 x 8-ch.; 2 x 2-ch.	1
MKV30F64VLH10P*	100	64	LQFP	64	16	YES	NO	4-ch.	FLL	1 x 8-ch.; 2 x 2-ch.	1
MKV30F64VLF10P*	100	48	LQFP	64	1	YES	NO	4-ch.	FLL	1 x 8-ch.; 2 x 2-ch.	1

* package your way
** Q suffix indicates KMS enabled ACIM motor device

www.nxp.com/Kinetis/VSeries

Document Number: KV3XFS REV 7