



32-bit Kinetis V Series MCUs

Kinetis KV3x MCU Family

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



Overview

The Kinetis KV3x family of microcontrollers is a high-performance solution for BLDC, PMSM and ACIM motor control applications. 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 Freescale and third-party resources including reference designs, software libraries and motor configuration tools.

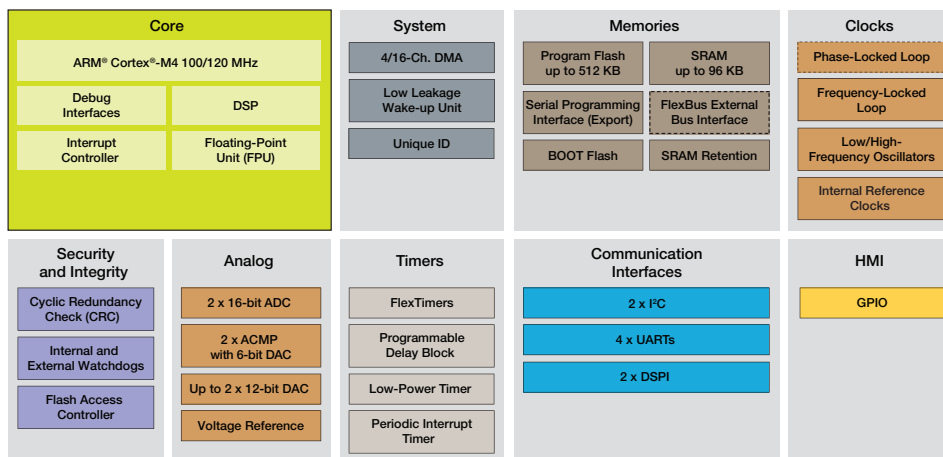
Target Applications

- BLDC motors
- PMSM motors
- AC induction motors

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)

Kinetis KV3x MCU Family Block Diagram



Standard Feature Optional Feature

Kinetis KV3x MCU Family

Part Number	Max. Freq. (MHz)	Pin Count	Package	Flash (KB)	SRAM (KB)	Flex.Bus	DMA	PLL or FLL	FlexTimers	DAC
MKV31F512VLL12	120	100	LQFP	512	96	Yes	16-ch.	PLL	2x8-ch; 2x2-ch	2
MKV31F512VLH12	120	64	LQFP	512	96	Yes	16-ch.	PLL	2x8-ch; 2x2-ch	2
MKV31F256VLL12	120	100	LQFP	256	48	No	16-ch.	PLL	1x8-ch; 2x2-ch	1
MKV31F256VLH12	120	64	LQFP	256	48	No	16-ch.	PLL	1x8-ch; 2x2-ch	1
MKV31F128VLL10	100	100	LQFP	128	24	No	4-ch.	FLL	1x8-ch; 2x2-ch	1
MKV31F128VLH10	100	64	LQFP	128	24	No	4-ch.	FLL	1x8-ch; 2x2-ch	1
MKV30F128VLH10	100	64	LQFP	128	16	No	4-ch.	FLL	1x8-ch; 2x2-ch	1
MKV30F128VLF10	100	48	LQFP	128	16	No	4-ch.	FLL	1x8-ch; 2x2-ch	1
MKV30F128VFM10	100	32	QFN	128	16	No	4-ch.	FLL	1x8-ch; 2x2-ch	1
MKV30F64VLH10	100	64	LQFP	64	16	No	4-ch.	FLL	1x8-ch; 2x2-ch	1
MKV30F64VLF10	100	48	LQFP	64	16	No	4-ch.	FLL	1x8-ch; 2x2-ch	1
MKV30F64VFM10	100	32	QFN	64	16	No	4-ch.	FLL	1x8-ch; 2x2-ch	1

- 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
- Broad family scalability with hardware and software compatibility – Easy migration to more performance, memory and feature integration within the Kinetis V series

Development Tools

HVP-MC3PH

The HVP-MC3PH platform enables development of 3-phase PMSM, BLDC and ACIM motor control and power factor correction (PFC) solutions in a safe high-voltage environment.

Compatible with the Kinetis KV3x MCU (and several other Freescale 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-KV31F

The FRDM-KV31F is 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, including FRDM-MC-LVPMSM and FRDM-MC-LVBLDC for permanent magnet and brushless DC motor control.

TWR-KV31F120M

The TWR-KV31F120M Tower System MCU module is a cost-effective, modular development platform that features the KV3x MCU in a 100 LQFP package, integrated OpenSDA debug adapter (requires no external debug interface) and is compatible with the TWR-MC-LV3PH 3-phase motor peripheral module.

TWR-MC-LV3PH

The TWR-MC-LV3PH low-voltage, 3-phase motor control Tower System peripheral module provides a complete motor control reference design kit for developing BLDC and PMSM motor solutions. Compatible with the KV3x MCU (and several other Freescale controllers), it includes a 3-phase BLDC motor and motor drive circuitry.

Integrated Development Environment (IDE)

Kinetis KV3x MCUs are supported by Freescale Kinetis Design Studio, IAR Embedded Workbench® for ARM and ARM Keil® Microcontroller Development Kit. All IDEs support the Freescale Processor Expert auto code generator—a GUI-based, device-

aware software configuration tool that automatically generates peripheral start-up code and device drivers to dramatically reduce application development time.

Freescale Embedded Motor Control and Power Conversion Libraries

- Extensive suite of complimentary software libraries for motor and power control applications
- A group of algorithms, ranging from basic mathematics operations to advanced transformations and observers, which can easily be incorporated into complex real-time control applications
- Core self-test libraries for simpler IEC 60730 certification

FreeMASTER

Freescale 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 Toolbox

Freescale's 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 Freescale MCUs.

For more information about Kinetis V series MCUs visit www.freescale.com/Kinetis/Vseries

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