High-performance ARM® Cortex®-M4 core-based MCU family for motor and power control applications

Kinetis KV4x MCU Family

The Kinetis KV4x family of microcontrollers (MCUs) is a high-performance solution offering exceptional precision, sensing and control for some of the most demanding applications in motor and power control enabled with Kinetis Motor Suite.

TARGET APPLICATIONS

- BLDC motors
- PMSM motors
- AC induction motors
- Multi-motor control
- Switched mode power supply
- Photovoltaic systems
- Uninterruptible power supply
- Advanced lighting

Built on the ARM Cortex-M4 core running at 168 MHz with DSP and floating-point unit (FPU), it features advanced high-speed and high-accuracy peripherals such as high-resolution pulse-width modulation (PWM) with 312 picosecond resolution, dual 12-bit analog-to-digital converters (ADCs) sampling at 4.1 mega samples per second (MSPS), a total of 30 PWM channels for support of multimotor systems and dual FlexCAN modules. To maximize execution performance a 128-bit wide flash interface is utilized, providing best-in-class execution from the embedded flash memory.

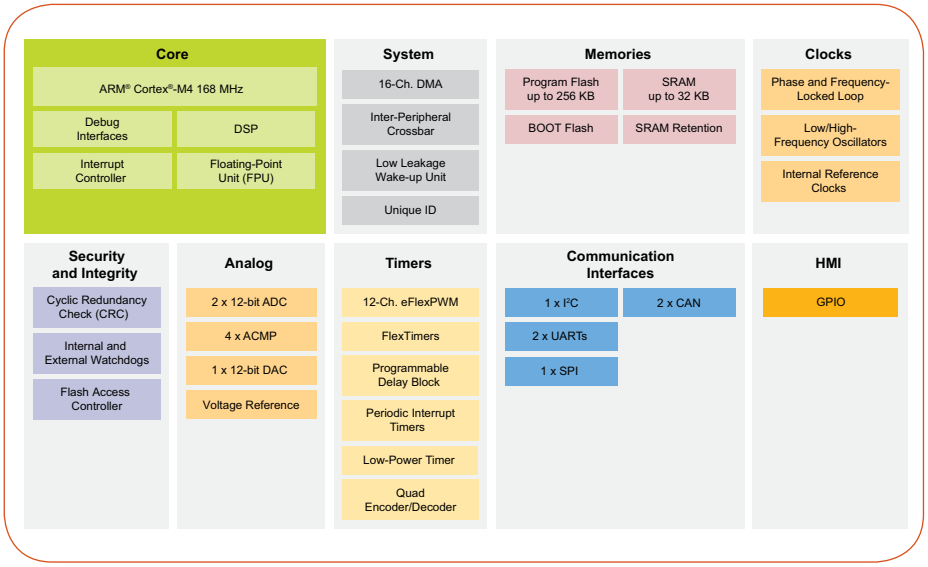
The Kinetis KV4x family of MCUs are supported by a comprehensive enablement suite both from us and third-party resources, including reference designs, software libraries and motor configuration tools.

FEATURES AND BENEFITS

- 168 MHz Cortex-M4 core with DSP, FPU — Improves performance in math-intensive applications (e.g., processing of sensorless field oriented control (FOC) algorithms)
- 128-bit wide flash interface with cache to minimize the number of wait states while executing fast control loops
- 2x 12-bit, 16-channel ADCs with PGAs—4.1 MSPS for digital power conversion and motor control applications

- Up to 12 channel eFlexPWM—up to 312ps resolution for demanding digital power conversion applications
- Up to 2 x 8-channel and 1 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 FlexCAN modules—High-speed, high reliability industrial communication
- Broad family scalability with hardware and software compatibility—Easy migration to more performance, memory and feature integration within the Kinetis V series

KINETIS KV4x 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.

TWR-KV46F168M

The TWR-KV46F168M board is a cost-effective, modular development module that features the Kinetis KV4x MCU in a 100 LQFP package, integrated OpenSDA debug adapter (requires no external debug interface) and is compatible with the Tower System peripheral cards, including TWR-MC-LV3PH 3-phase motor peripheral module.

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 KV4x MCU (and several other of our 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.

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 Kinetis KV4x MCU (and several other of our controllers), it includes a 3-phase BLDC motor and motor drive circuitry.

Integrated Development Environment (IDE)

Kinetis V series MCUs are supported by MCUXpresso Software and Tools (IDE, SDK, Config Tools), Kinetis Design Studio IDE, IAR Embedded Workbench® for ARM and ARM Keil Microcontroller Development Kit. All IDEs support the 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.

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 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.

Reference Designs Built on Embedded Motor Control and Power Conversion 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

KINETIS KV4x MCU FAMILY

Part Number	Freq. (MHz)	Pins	Flash / SRAM	ADC		PWM eFlexPWM		PWM Nano-Edge	PWM FlexTimers			DAC	FlexCAN	
				ADCA	ADCB	PWMA PWMB	PWMX		FTM0	FTM3	FTM1		CAN0	CAN1
MKV46F256VLL16	168	100	256 / 32	18ch	20ch	1x8ch	1x4ch	Yes	1x8ch	1x8ch	1x2ch	1	1	1
MKV46F256VLH16	168	64	256 / 32	13ch	16ch	1x8ch	-	Yes	1x8ch	1x8ch	1x2ch	1	1	1
MKV46F256VLL16P	168	100	256 / 32	18ch	20ch	1x8ch	1x4ch	Yes	1x8ch	1x8ch	1x2ch	1	1	1
MKV46F256VLL16Q**	168	100	256 / 32	18ch	20ch	1x8ch	1x4ch	Yes	1x8ch	1x8ch	1x2ch	1	1	1
MKV46F128VLL16	168	100	128 / 24	18ch	20ch	1x8ch	1x4ch	Yes	1x8ch	1x8ch	1x2ch	1	1	1
MKV46F128VLH16	168	64	128 / 24	13ch	16ch	1x8ch	-	Yes	1x8ch	1x8ch	1x2ch	1	1	1
MKV44F256VLL16	168	100	256 / 32	18ch	20ch	1x8ch	1x4ch	Yes	-	-	-	1	1	1
MKV44F256VLH16	168	64	256 / 32	13ch	16ch	1x8ch	-	Yes	-	-	-	1	1	1
MKV44F128VLL16	168	100	128 / 24	18ch	20ch	1x8ch	1x4ch	Yes	-	-	-	1	1	1
MKV44F128VLH16	168	64	128 / 24	13ch	16ch	1x8ch	-	Yes	-	-	-	1	1	1
MKV44F128VLF16*	168	48	128 / 24	11ch	10ch	1x8ch	-	Yes	-	-	-	1	1	-
MKV44F64VLH16	168	64	64 / 16	13ch	16ch	1x8ch	-	Yes	-	-	-	1	1	1
MKV44F64VLF16*	168	48	64 / 16	11ch	10ch	1x8ch	-	Yes	-	-	-	1	1	-
MKV42F256VLL16	168	100	256 / 32	18ch	20ch	-	-	-	1x8ch	1x8ch	1x2ch	-	1	1
MKV42F256VLH16	168	64	256 / 32	13ch	16ch	-	-	-	1x8ch	1x8ch	1x2ch	-	1	1
MKV42F256VLL16P	168	100	256 / 32	18ch	20ch			-	1x8ch	1x8ch	1x2ch	-	1	1
MKV42F256VLL16Q**	168	100	256 / 32	18ch	20ch	-	-	-	1x8ch	1x8ch	1x2ch	-	1	1
MKV42F256VLH16P	168	64	256 / 32	13ch	16ch			-	1x8ch	1x8ch	1x2ch	-	1	1
MKV42F128VLL16	168	100	128 / 24	18ch	20ch	-	-	-	1x8ch	1x8ch	1x2ch	-	1	1
MKV42F128VLH16	168	64	128 / 24	13ch	16ch	-	-	-	1x8ch	1x8ch	1x2ch	-	1	1
MKV42F128VLF16*	168	48	128 / 24	11ch	10ch	-	-	-	1x8ch	1x8ch	1x2ch	-	1	-
MKV42F128VLF16P*	168	48	128 / 24	11ch	20ch			-	1x8ch	1x8ch	1x2ch	-	1	-
MKV42F64VLH16	168	64	64 / 16	13ch	16ch	-	-	-	1x8ch	1x8ch	1x2ch	-	1	1
MKV42F64VLF16*	168	48	64 / 16	11ch	10ch	-	-	-	1x8ch	1x8ch	1x2ch	-	1	-

* This package is included in the Package Your Way program for Kinetis MCUs. For more details, please visit **www.nxp.com/KPYW**
** Q suffix indicates KMS enabled ACIM motor device

www.nxp.com and www.nxp.com/kinetis/Vseries

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