



Motor control and
power conversion

Kinetis® V Series Real-time Control MCUs

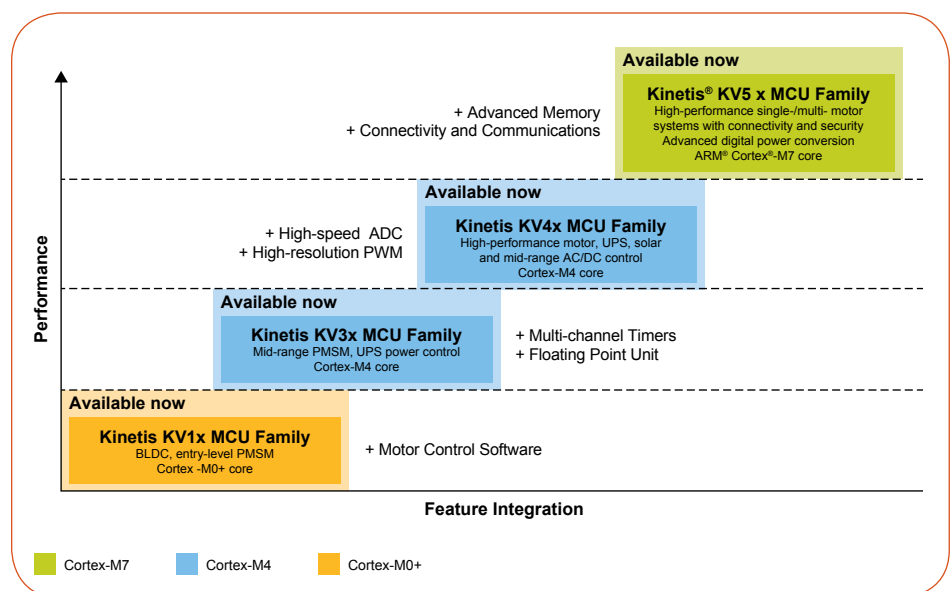
Kinetis® V Series MCUs are based on ARM® Cortex®-M0+, Cortex-M4 and Cortex-M7 cores and are designed for a wide range of BLDC, PMSM and ACIM motor control and digital power conversion applications.

OVERVIEW

NXP's extensive motor and power control expertise together with the latest Cortex-M0+, -M4 and -M7 cores bring secure, connected, high-efficiency motor control and power conversion solutions to the mass market. All families are supported by a full enablement suite from NXP and third-party resources, including reference designs, software libraries and motor configuration tools.

To learn more, visit
www.nxp.com/Kinetis/Vseries and
www.nxp.com/KinetisVTraining.

NEW LEVELS OF PERFORMANCE, RELIABILITY AND POWER EFFICIENCY FOR REAL-TIME CONTROL APPLICATIONS



KEY PERIPHERALS FOR MOTOR AND POWER CONTROL APPLICATIONS

MCU Family	Core	Memory	Motor Control Timers	eFlexPWM	ADC	DAC	ACMP	Comms.	Packages
KV5x	240 MHz CM7 DSP + FPU	512 KB– 1 MB Flash	2 x 8-ch. 2 x 2-ch. FlexTimer	2 x 12-ch. eFlexPWM + Nano- Edge	4 x 12-bit 5 Msps, 1 x 16-bit	1 x 12-bit	4 x ACMP with 6-bit DAC	Ethernet, 3 x CAN	144 pin 100 pin
KV4x	168 MHz CM4 DSP + FPU	64–256 KB Flash	2 x 8-ch. 1 x 2-ch. FlexTimer	12-ch. eFlexPWM + Nano- Edge	2 x 12-bit 4.1 Msps with PGA	2 x 12-bit	4 x ACMP with 6-bit DAC	2 x CAN	100 pin 64 pin 48 pin
KV3x	100/120 MHz CM4 DSP + FPU	64–512 KB Flash	2 x 8-ch. 2 x 2-ch. FlexTimer	–	2 x 16-bit 1.2 Msps	2 x 12-bit	2 x ACMP with 6-bit DAC	–	100 pin 64 pin 48 pin 32 pin
KV1x	75 MHz CM0 + H/W DIV and SQRT	16–128 KB Flash	1 x 6-ch. 2 x 2-ch. FlexTimer	–	2 x 16-bit 1.2 Msps	1 x 12-bit	2 x ACMP with 6-bit DAC	1 x CAN	64 pin 48 pin 32 pin

HARDWARE ENABLEMENT

Name	Description	Power Drivers	Product(s) Supported
NXP® Freedom Development Platform - FRDM-KV11Z (KV1x MCU) - FRDM-KV31F (KV3x MCU)	- Low cost: \$25 (USD) - Low voltage 12–48 V - Initial evaluation - Hobbyist and developing markets - Low-cost reference solutions via Arduino® power stages	- FRDM-MC-LVPMSM: \$55 (USD) 24 V, 5 A, PMSM FOC for sensor and sensorless - FRDM-MC-LVBLDC: \$35 (USD) 12 V, 5 A, 60 W, BLDC FOC for sensor and sensorless - FRDM-MC-LVMTR; \$35 (USD) 12/24 V, 2.3 A, 4000 rpm - Compatible with both FRDM-MC-LVPMSM and FRDM-MC-LVBLDC	Kinetis® KV1x, KV3x MCUs
Tower® System Development Module - TWR-KV11Z75M (KV10/11 MCUs) - TWR-KV31F120M (KV3x MCUs) - TWR-KV46F150M (KV4x MCUs) - TWR-KV58F240M (KV5x MCUs)	- Mid price: ~\$100 (USD) - Low voltage 12-50 V - Prototype development before customer board - Highly scalable with extensive range of plug-in cards supported, including power stage	- TWR-MC-LV3PH \$350 (USD) - Inc's BLDC/PMSM motor - Low voltage 12-24/50 V - Output 8 A, 400 W - Sensor/sensorless - High-quality control Supported architectures: 3PH BLDC and PMSM	Kinetis KV1x, KV3x, KV4x, KV5x MCUs
High-Voltage Platform - HVP-MC3PH (main board) - HVP-KV11Z75 (KV10/11 card) - HVP-KV31F120M (KV3x card) - HVP-KV46F150M (KV4x card) - HVP-KV58F220M (KV5x card)	- Premium solution: \$600 (USD) main board, \$50 (USD) controller cards - End-system application development - Voltage range: 85 to 240 V - Fully integrated power stage with PFC - Fully isolated for maximum safety	- Input: 85 to 220 V - Output: 5 A, 1 kW/800 W - Fully integrated power stage and interleaved PFC - Sensor/sensorless - Isolation for safety - Supported architectures: 3PH BLDC, PMSM and ACIM	Kinetis KV1x, KV3x, KV4x, KV5x MCUs

SOFTWARE ENABLEMENT

Software	Description	Product(s) Supported	More Info
Kinetis® Motor Suite	- Kinetis Motor Suite reduces FOC motor control design time cycle with its simple to use interface and design methodology, increases system performance, and reduces support costs with Active Disturbance Rejections Control (ADRC) - Supports three-phase ACIM, BLDC and PMSM motors via field-oriented control (FOC) algorithm with either low-cost sensorless or high-accuracy sensed velocity and position control implementations - Supports three-phase ACIM motors via FOC algorithm with either low-cost sensorless or high-accuracy sensed velocity control implementations. - Devices that are KMS-enabled are supported by MCUXpresso IDE and SDK, Kinetis Design Studio IDE and IAR Embedded Workbench® for ARM.	Kinetis KV1x, KV3x ,KV4x MCUs	www.nxp.com/KinetisMotorSuite www.nxp.com/KSDK www.nxp.com/KDS
Embedded software libraries	Complementary libraries of software algorithms for math, motor control, power conversion, filters and advanced functions	Kinetis KV1x, KV3x, KV4x, KV5x MCUs	www.nxp.com/RTCESL
Motor control reference designs	Built on NXP's Embedded Software Libraries; incorporating MCAT provides complete applications for three-phase PMSM Sensorless FOC, BLDC Sensorless Trapezoidal and ACIM Sensorless FOC using standard NXP development platforms	Kinetis KV1x, KV3x, KV4x, KV5x MCUs	www.nxp.com/NXPDesigns
FreeMASTER	- Complimentary GUI-based run-time debug monitor and data visualization tool - Replaces debugger in situations when the core cannot be simply stopped; ideal for motor control and power conversion application development	Kinetis KV1x, KV3x, KV4x, KV5x MCUs	www.nxp.com/Freemaster
Motor control development toolbox	MATLAB®/Simulink® modelling environment motor control plug-in tool for automatic code generation supports multiple compilers; FreeMASTER compatible	Kinetis KV1x, KV3x, KV4x, KV5x MCUs	www.nxp.com/MCTOOLBOX
MCUXpresso Software and Tools (IDE, SDK, Config Tools)	A complementary software framework for developing applications using NXP's ARM® Cortex-M®-based MCUs, including reference examples, software development tools, pins and clocks configuration tools	Kinetis KV1x, KV3x, KV4x, KV5x MCUs	www.nxp.com/MCUXpresso

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