



High-performance
ARM® Cortex®-M7-
core-based MCU
family with Ethernet
for real-time control
applications

Kinetis® KV5x MCU Family

The Kinetis KV5x family of microcontrollers (MCUs) is a high-performance solution offering precision, sensing and control for some of the most demanding real-time control in motor and power conversion.

TARGET APPLICATIONS

- ▶ Connected industrial drives
- ▶ Industrial motor control
 - BLDC motors
 - PMSM motors
 - AC induction motors
- ▶ Industrial automation
- ▶ Multi-motor control
- ▶ Switch mode power supply (SMPS)
- ▶ Photovoltaic systems
- ▶ Uninterruptible power supply (UPS)

The Kinetis KV5x family of MCUs is built on the ARM® Cortex®-M7 core running at 240 MHz with a single precision floating point unit. It features advanced high-speed and high-accuracy peripherals such as high-resolution pulse-width modulation (PWM) with as low as 260 picosecond resolution, four 12-bit analog-to-digital converters (ADCs) sampling at 5 mega samples per second (MSPS), a total of 44 PWM channels for support of multi-motor systems with PFC, three FlexCAN modules and optional Ethernet communications. NXP and third-party resources support the Kinetis KV5x MCU with

a comprehensive enablement suite that includes reference designs, software libraries and motor configuration tools.

FEATURES AND BENEFITS

- ▶ High-performance 240 MHz ARM Cortex-M7 core combined with a high level of analog and digital integration targeted at real-time control applications
- ▶ Up to 1 MB flash and 256 KB RAM, 16 KB instruction cache and 8 KB data cache
- ▶ 256 KB of RAM includes 64 KB of ITCM RAM ensuring maximum CPU performance of fast control loops with minimal latency
- ▶ 64-bit AXI memory interface with I-Cache and D-Cache
 - efficient access to external resources
 - interface to large external memories for a complete RTOS experience
 - support for richer HMI with higher resolution graphics, multiple connectivity stacks and middleware



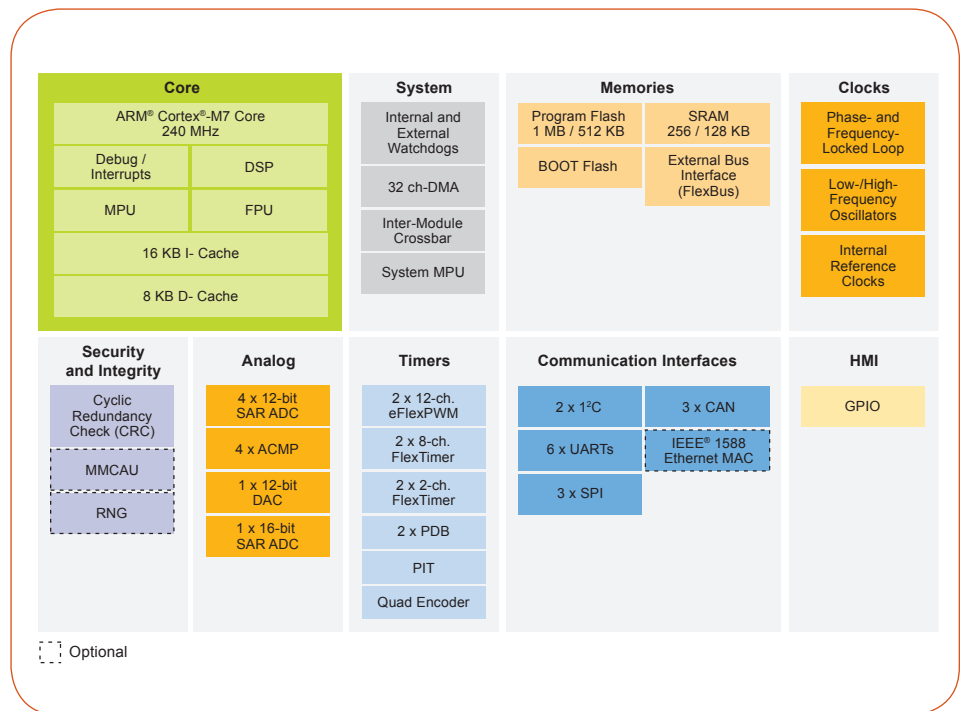
- ▶ Four 8-ch., 12-bit ADCs sampling at 5 MSPS with dual sample and hold circuitry, can capture current and voltage simultaneously for two motors giving true independent dual motor control
- ▶ Ethernet option with true random number generator and cryptographic unit providing a low-cost integrated connectivity solution
- ▶ Two eFlexPWM blocks provides four independent time bases per module with a highly flexible configuration that easily supports motor and power control topologies
- ▶ Multiple instantiations of timer blocks provide a vast array of timers (44 channels) simplifying the complex task of advanced motor control
- ▶ A single eFlexPWM block featuring 12 channels with nano-edge capability, providing up to 285 psec resolution on pulse width and frequency modulation
- ▶ Up to three FlexCAN modules for high-speed, high-reliability industrial communication
- ▶ Inter-peripheral cross bar, with AND-OR-Invert logic, provides a highly flexible connection fabric between peripherals that supports simplified control topology implementation

DEVELOPMENT TOOLS

TWR-KV58F220M development board

The TWR-KV58F220M board is a cost-effective, modular development module that features the Kinetis KV5x MCU in a 144 LQFP package with an integrated OpenSDA debug adapter (requires no external debug interface). It is compatible with the TWR-MC-LV3PH 3-phase motor peripheral module and the FreeMASTER run-time debugging tool.

KINETIS KV5x MCU FAMILY BLOCK DIAGRAM



TWR-MC-LV3PH development board

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 KV5x MCU (and several other of our controllers), it includes a 3-phase BLDC motor and motor drive circuitry.

Motor control development toolbox

NXP'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 our MCUs.

Integrated development environment (IDE)

Kinetis KV5x MCUs will be supported by the 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.

Embedded software libraries

NXP provides several advanced software libraries for motor control, math, filter and other general functions an advanced and modular software library for the Cortex-M7 core; and a core self-test library for IEC 60730 certification.

Motor control reference designs

NXP provides multiple reference designs for motor control and power conversion applications that leverage NXP's extensive knowledge earned over decades of developing solutions for these applications. All reference designs are fully tested and validated, enabling use in a production environment.

KINETIS KV5X MCU FAMILY OPTIONS

Part Number	Freq. (MHz)	Ambient Op Temp	Package	Flash / SRAM	Ethernet	FlexCAN
MKV58F1M0VMD24*	240 MHz	105°C	144MAPBGA	1 MB / 256 KB	Yes	3
MKV58F1M0VLQ24	240 MHz	105°C	144 LQFP	1 MB / 256 KB	Yes	3
MKV58F1M0VLL24	240 MHz	105°C	100 LQFP	1 MB / 256 KB	Yes	3
MKV56F1M0VMD24	240 MHz	105°C	144 MAPBGA	1 MB / 256 KB	No	2
MKV56F1M0VLQ24	240 MHz	105°C	144 LQFP	1 MB / 256 KB	No	2
MKV56F1M0VLL24	240 MHz	105°C	100 LQFP	1 MB / 256 KB	No	2
MKV58F512VMD24*	240 MHz	105°C	144 MAPBGA	512 KB / 128 KB	Yes	3
MKV58F512VLQ24	240 MHz	105°C	144 LQFP	512 KB / 128 KB	Yes	3
MKV58F512VLL24	240 MHz	105°C	100 LQFP	512 KB / 128 KB	Yes	3
MKV56F512VMD24*	240 MHz	105°C	144 MAPBGA	512 KB / 128 KB	No	2
MKV56F512VLQ24	240 MHz	105°C	144 LQFP	512 KB / 128 KB	No	2
MKV56F512VLL24	240 MHz	105°C	100 LQFP	512 KB / 128 KB	No	2

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

www.nxp.com/Kinetis/Vseries

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