Kinetis KV1x MCU Family

The Kinetis KV1x family of microcontrollers is a high-performance, cost-competitive solution for three-phase sensorless BLDC and PMSM motor control applications and the entry point into the Kinetis V series—the first Kinetis microcontroller family specifically designed for motor control.

**TARGET APPLICATIONS**
- Sensorless BLDC motor control
- Entry-level sensorless PMSM motor control
- Compressors
- Pumps
- Domestic appliances

Built upon the Cortex-M0+ core running at 75 MHz with hardware square root and divide capability, Kinetis KV1x microcontrollers deliver a 27% increase in performance in math-intensive applications versus comparable MCUs, allowing them to target BLDC as well as more computationally demanding PMSM motors. Additional features include integrated FlexCAN, dual 16-bit analog-to-digital controllers (ADCs) sampling at up to 1.2 mega samples per second (MS/s) in 12-bit mode, multiple motor control timers, up to 128 KB of flash memory and a comprehensive enablement suite both from us and third-party resources, including reference designs, software libraries and motor configuration tools.

**KINETIS KV1x MCU FAMILY**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>CPU</th>
<th>Pin Count</th>
<th>Package</th>
<th>Flash</th>
<th>SRAM</th>
<th>FlexCAN</th>
<th>FlexTimers</th>
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</thead>
<tbody>
<tr>
<td>MKV11Z128**</td>
<td>64, 48, 32*</td>
<td>32</td>
<td>LQFP</td>
<td>128</td>
<td>1</td>
<td>0</td>
<td>2 x 6-ch., 4 x 2-ch.</td>
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<td>0</td>
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</tr>
</tbody>
</table>

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

**These devices include versions enabled by Kinetis Motor Suite. For more information, visit [www.nxp.com/KMS](http://www.nxp.com/KMS).
FEATURES AND BENEFITS

- 75 MHz Cortex-M0+ core with hardware square root and divide block that improves performance in math-intensive applications (e.g., processing of sensorless field-oriented control (FOC) algorithms)
- 2 x 16-bit ADCs with two capture and hold circuits and up to 1.2 MS/s samples rate in 12-bit mode, simultaneous measurement of current and voltage phase, reduced jitter on input values improving system accuracy
- Up to 2 x 6-channel and 4 x 2-channel programmable FlexTimers—High-accuracy PWM generation with integrated power factor correction or speed sensor decoder (incremental encoder/hall sensor)
- 12-bit DAC and 2 x ACMP (analog comparators) for overcurrent and overvoltage fault detection and reduced BOM costs; ADC and ACMP interconnect with PWM and PDB (programmable delay) blocks for real-time hardware control
- 4-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

Kinetis Motor Suite (KMS)

KMS is a software solution that enables the rapid configuration of motor drive systems, accelerates development of the final motor drive application whilst 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.

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.

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 Application Tuning Tool (MCAT)

MCAT is a GUI that runs inside of FreeMASTER that helps simplify the motor identification and tuning process for the field-oriented control and trapezoidal control reference designs.

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.

Embedded Libraries

- Extensive suite of complimentary software libraries for motor real-time control applications
- Core self-test libraries for simpler IEC 60730 certification

www.nxp.com/Kinetis/Vseries

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