

# PIC32MK Family SOLUTION FACT SHEET

## High-Performance 32-bit MCU's for Precision Motor Control

State-of-the-Art Analog Peripherals, DSP and Floating Point in Small Package Size

### Summary

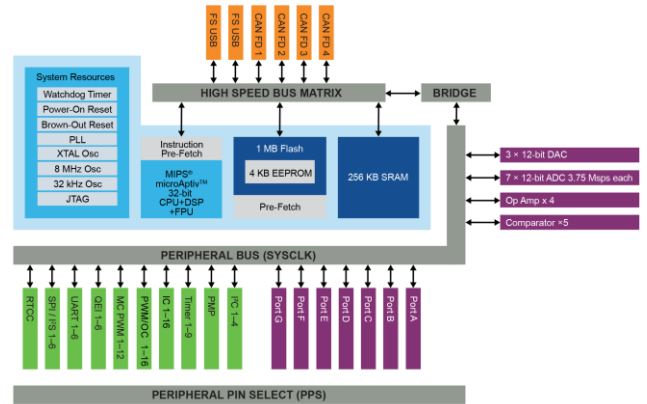
Motor Control is all about precision, efficiency and reliability. Adding intelligence to industrial and consumer motor systems is an easy way to reduce overall energy consumption while increasing the life-span of end-application motors.

### Product Description

PIC32MK, 32-bit microcontroller (MCU) family offers high computational performance CPU running at 120MHz (198 DMIPS), hardware Floating Point Unit (FPU) and DSP, industry-leading analog integration, variety of communication interfaces like USB, CAN-FD, SPI, I2C and UART, in wide range of package sizes; making it a perfect fit for industrial, automotive and motor control applications.

### Key Applications

- **3-Phase AC Induction Motor:** pumps, fans and industrial motor drives
- **Sensored BLDC and PMSM Motor:** E-bikes, power tools, 3D printers
- **Cost-Sensitive Sensorless Motor:** ceiling fans, drones, pumps, compressors, washing machines
- **High-Speed and High-Precision Motor:** CNC, sewing machine, robotics



### Key Highlights

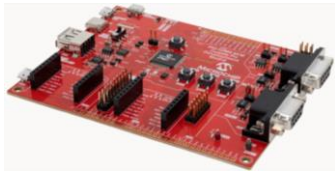
Key Features	Benefits	
<b>Superior Analog</b> 7x ADC, 3x DAC, 5x AC, 4x OpAmp	<ul style="list-style-type: none"> <li>• 7x 3.75 Msps 12-bit ADC modules offering up to 42 inputs and supporting a combined performance of 25.45 Msps, enables higher analog precision</li> <li>• High-speed Analog Comparator (AC) and Operational Amplifier (OpAmp) enable higher system efficiency and reduce design complexity and the no. of external discrete device needed</li> </ul>	Precision Efficiency Save Cost
<b>Advanced Motor Interfaces</b> Up to 12x Motor PWM Pairs, 6x QEI	<ul style="list-style-type: none"> <li>• Motor control optimized PWM modules increase the system efficiency and decrease the no. of external discrete devices</li> <li>• Multiple Quadrature Encoders enables higher resolution on motor position and direction</li> </ul>	Efficiency Save Cost Precision
<b>Smart Peripheral Mix</b> 2x USB, 4x CAN-FD, LIN, I2S	<ul style="list-style-type: none"> <li>• One single MCU that communicates to multiple bus protocols                             <ul style="list-style-type: none"> <li>• Reduced design complexity</li> <li>• Reduced cost</li> </ul> </li> </ul>	Efficiency Save Cost

## Tools and Demo Examples

### Development Kits

#### [PIC32MK MCM Curiosity Pro Development Board \(EV31E34A\)](#):

a low-cost, modular development system with an on-board programmer/debugger, and can be expanded with various MikroElektronika Click™ boards.



#### [PIC32MK MCJ Curiosity Pro Development Board \(DT100113\)](#):

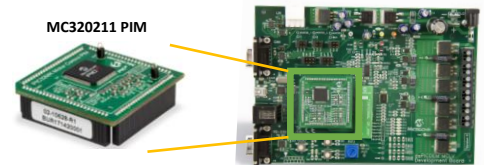
a low-cost, modular development system with an integrated programmer/debugger, and can be expanded with Arduino Uno R3 or Xplained Pro compatible boards.



#### [PIC32MK MCM 100-pin Motor Control Plug-In Module \(PIM\) \(MA320211\)](#):

using on-chip op amps with the following hardware:

- dsPICDEM™ MCLV-2 development board ([DM330021-2](#))
- dsPICDEM™ MCHV-2 development board ([DM330023-2](#))
- dsPICDEM™ MCHV-3 development board ([DM330023-3](#))



MCLV-2 Low Voltage Motor Control Board

### MPLAB® Harmony v3: [Motor Control Apps Repo](#)

Algorithm	Description	Supported Plug In Module	dsPICDEM™ MCLV-2 Support
<a href="#">pmsm_foc_pll_estimator_pic32_mk</a>	Sensorless Field Oriented Control of PMSM using PLL Estimator	PIC32MK Motor Control Plugin Module	Yes
<a href="#">pmsm_foc_encoder_pic32_mk</a>	Sensored Field Oriented Control of PMSM using Quadrature Encoder	PIC32MK Motor Control Plugin Module	Yes
<a href="#">mc_foc_zsmt_fip_pic32mk_mclv2tc1*</a>	Sensorless Field Oriented Control of PMSM w/ Zero Speed Maximum Torque Capability	PIC32MK Motor Control Plugin Module	Yes

\* Contact Microchip sales

### Available Resources:

- [MPLAB® X IDE](#)
- [MPLAB® Harmony v3 Software Framework](#)
- [Harmony v3 Motor Control Library](#)
- [MPLAB MINDI™ Analog Simulator](#)
- [32-bit MCUs Motor Control Design Center](#)

### Services and 3rd party:

- [MATLAB® and Simulink®](#) for Motor Control Development
- **Open-Source Tools for Motor Control Development** including [Scilab](#), [Xcos](#) and [X2C](#)

### Devices for Microchip TSS Solution

- **Wireless Connectivity:** WiFi, BT, BLE, LoRa, IEEE 802.15.4, Sub-G
- **Wired Connectivity & Interface:** [CAN Transceivers](#), [Ethernet PHY](#)
- **Industrial Networking:** [EtherCAT](#)
- **CryptoAuthentication Device:** [ATECC608A](#), [ATSHA204A](#)
- **Clock & Timing:** MEMs Oscillator
- **Analog:** [OpAmp](#), [Motor Driver](#)
- **Power Management:** [Linear & Switching Regulators](#)