Microsemi’s motor control solution is designed specially to meet the challenging industrial requirements of performance, reliability, and safety in an easy-to-use environment. Microsemi offers a modular intellectual property (IP) portfolio, tools, reference designs, kits, and software to control motors such as permanent-magnet synchronous motor (PMSM)/brushless DC (BLDC) and stepper motors.

**Reference Design Features**
- Motor control algorithms implemented in FPGA fabric
- Scalability to a multi-axis motor drive design
- Design flexibility with modular IP suite
- Deterministic, high-precision, low-power, reliable, and secure
- Robust sensorless solution—supports 100K RPM or more
- Integration of system functions to lower total cost of ownership (TCO)
- Low latency of 1 μs for FOC loop from ADC measurement to PWM generation

**Motors and Algorithms**

<table>
<thead>
<tr>
<th>Motor</th>
<th>Algorithm</th>
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<tbody>
<tr>
<td>PMSM/BLDC</td>
<td>FOC sensorless</td>
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<tr>
<td></td>
<td>FOC with HALL</td>
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<td>FOC with encoder</td>
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<td>FOC with resolver</td>
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<tr>
<td>Stepper</td>
<td>Microstepping</td>
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</tbody>
</table>

**Fully Modular IP Suite**
- Quick plug-and-play approach to implement algorithms
- Easy porting and customization through block-based approach
- Precise algorithm for angle estimation in sensorless FOC
- PWM with dead time protection and delay time insertion
- IP blocks are coded for efficient use of FPGA resources
- IP blocks tested in simulations and on actual hardware
- IPs available as MATLAB models; VHDL Verilog code for FPGA
Microsemi Corporation (Nasdaq: MSCC) offers a comprehensive portfolio of semiconductor and system solutions for aerospace & defense, communications, data center and industrial markets. Products include high-performance and radiation-hardened analog mixed-signal integrated circuits, FPGAs, SoCs and ASICs; power management products; timing and synchronization devices and precise time solutions, setting the world’s standard for time; voice processing devices; RF solutions; discrete components; enterprise storage and communication solutions, security technologies and scalable anti-tamper products; Ethernet solutions; Power-over-Ethernet ICs and midspans; as well as custom design capabilities and services. Microsemi is headquartered in Aliso Viejo, California and has approximately 4,800 employees globally. Learn more at www.microsemi.com.

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High-Performance, Reliable, and Secured Motor Control Solution

Microsemi’s SmartFusion®2 SoC-FPGA-based solution is an ideal reference platform for developing high-performance, reliable, and secured dual-axis motor control applications. The solution has algorithms like sensorless FOC, FOC with HALL, FOC with encoder, and FOC with resolver for PMSM/BLDC motors. The position control algorithm of the stepper motor supports up to 1024 micro-steps.

The SmartFusion®2 Motor Control GUI allows for the dynamic tuning of parameters, such as reference speed, Kp/Ki gains of PI controllers, and viewing internal signals for debugging. The kit also supports various communication interfaces, including Ethernet, CAN, USB, and others. SmartFusion®2 SoC FPGAs feature stronger design security than other FPGAs and include differential power analysis (DPA) resistant anti-tamper measures using technology licensed from Cryptography Research Incorporated (CRI). The security architecture was designed with a layered approach in mind, building on top of a foundation of secure hardware.

Microsemi offers a one-stop shop with a portfolio of complementary products to meet your motor control needs. Microsemi’s product portfolio includes FPGAs, SiC diodes/MOSFETs, power modules, timing, PoE/Midspans, sensors, and more.

Software GUI for Motor Control

Dual-Axis Motor Control on a Single SoC FPGA
Superior Performance, Reliability, Safety, Security, and Integration Made Easy

Software GUI for Motor Control

Dual-Axis Motor Control Board

Ordering Information
SmartFusion2 Dual-Axis Motor Control Starter Kit
Part number: SF2-MC-STARTER-KIT
RTL source code for Motor Control IPs
Part number: MCSOLCores-RM
For more information, visit www.microsemi.com/applications/motor-control