

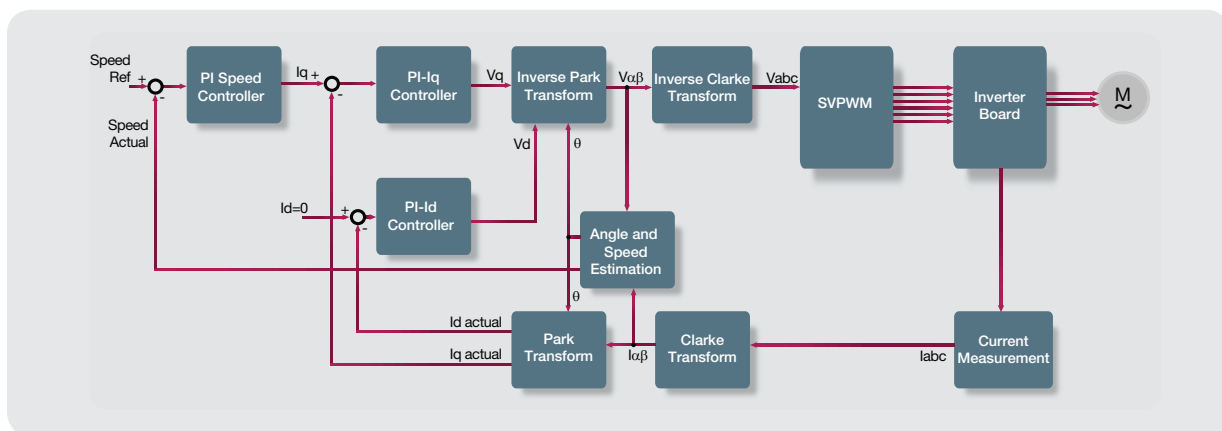
Multi-Axis Motor Control on a Single SoC FPGA

Superior Performance, Reliability, Safety and Integration - Made EASY

Motor control solution of Microsemi® is designed specially to meet the challenging industrial requirements of performance, reliability, and safety in an easy-to-use environment. The solution is compliant with industry coding standards such as MISRA C-2004 for developing safe and reliable software for embedded applications. Microsemi offers a modular intellectual property (IP) portfolio, tools, reference designs, kits, and software for motors such as permanent-magnet synchronous motor (PMSM)/brushless DC (BLDC) and stepper motors.

Reference Design Features

- Multi-axis motor control on a single system-on-chip (SoC) field programmable gate array (FPGA)
- Motor performance of 30,000 RPM or more for sensorless field oriented control (FOC)
- Low latency (3 μ s) for FOC with sensors and 6 μ s sensorless FOC at 50 MHz
- 14x control loop performance advantage over a standard microcontroller
- Efficient, reliable, and safe drive/motor control with product longevity
- Design flexibility with modular IP suite
- SoC integration of system functions to lower total cost of ownership
- Ease-of-use with motor control reference designs and efficient design tools to reduce time-to-market



IP Modules

IP blocks are offered for the FPGA fabric and software libraries for the ARM® Cortex™-M3 processor

- Clarke and inverse clarke transformations
- Park and inverse park transformations
- Proportional integral (PI) controller
- Space vector pulse-width modulation (SVPWM)
- Ramp profile
- Angle estimation
- Speed calculation
- Current measurement
- 3-Phase PWM generation

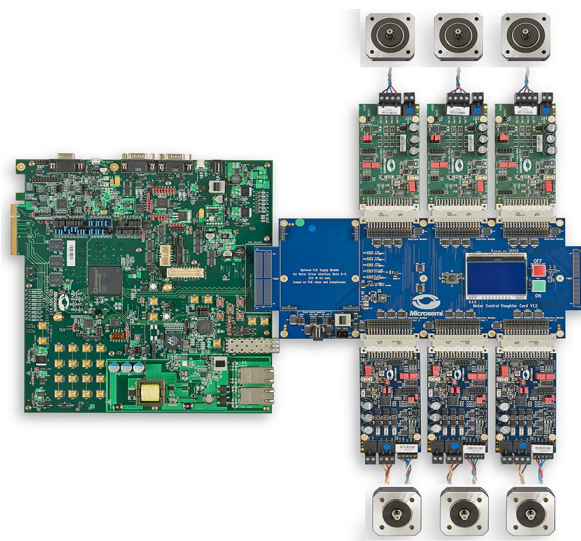
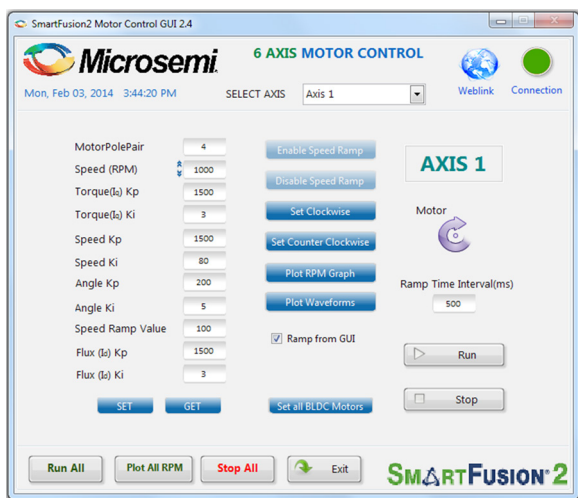
Fully Modular IP Suite

- 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
- Almost 100% code coverage achieved for individual IPs
- IP block tested in simulations and on actual hardware
- IPs available as MATLAB, VHDL code for FPGA, and C APIs

SoC FPGA-Based System Solutions for Motor Control

SmartFusion®2 Multi-Axis Motor Control Kit

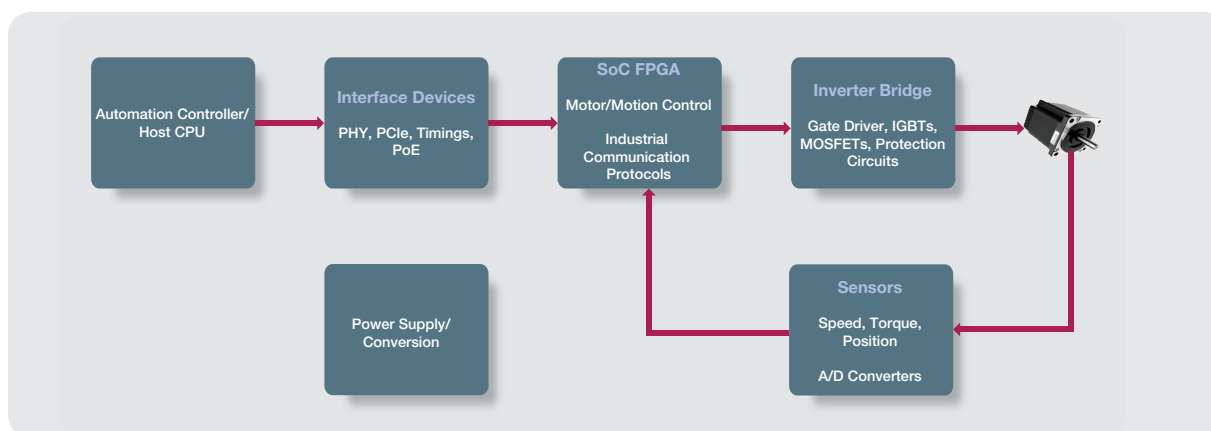
Microsemi's multi-axis motor control kit is a scalable solution for PMSM/BLDC and stepper motors, which supports up to six motors with PMSM only, stepper only, or three PMSMs and three steppers configurations. Algorithms supported for PMSM/BLDC motors are Sensorless - FOC, FOC with HALL, FOC with Encoder, and FOC with Resolver. The speed control algorithm is supported for stepper motors. The SmartFusion2 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, RS485, USB, and others.



Industrial Product Portfolio

Microsemi offers a one-stop shop for all your motor control solution needs. It offers a vast portfolio of complementary products that meet your motor control solution requirements. Microsemi's product offerings include SoC FPGAs, power modules, sensors, security, RFIC, timing, PoE, memory and storage, etc.

Microsemi System Solutions for Motor Control



For more information, visit www.microsemi.com/applications/motor-control



Microsemi Corporate Headquarters
One Enterprise, Aliso Viejo, CA 92656, USA
Tel: 408.433.0910 • Fax: 408.428.7896
www.microsemi.com
E-mail: Sales.Support@Microsemi.com

©2014 Microsemi Corporation. All rights reserved. Microsemi and the Microsemi logo are trademarks of Microsemi Corporation. All other trademarks and service marks are the property of their respective owners.