International
IOR Rectifier

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# IRMCO203

# Sensorless Control FPGA Object Code Accelerator™ Based Soft ASIC Manual

## Features

- **Xilinx Spartan2-300™ based complete Sensorless control solution for Permanent Magnet AC motors with Sinusoidal Back EMF.**
- **No voltage feedback sensing required**
- **Synchronously Rotating Frame current regulated control**
- **High starting torque and smooth speed ramping**
- **Direct interface to IR2175 current sensing high voltage IC**
- **Direct interface to IR213x 3-phase gate driver IC**
- **Versatile loss minimization Space Vector PWM**
- **Configurable architecture for motor/drive parameters**
- **Asynchronous serial communication interface (RS232C, RS422, RS485)**
- **±10V reference command input with 12-bit A/D interface**
- **17-bit parallel bus interface for microcontroller expansion**
- **Integrated brake IGBT control**
- **ServoDesigner™ tool for easy operation**
- **EXO file format**

## Product Summary

| | |
|---|---|
| Max Sysclk | 33.3 MHz |
| Max PLL clock for current feedback | 133.3 MHz |
| Sensorless control computation time | 10 usec max |
| High Speed operation | 100,000 rpm (2pole motor) |
| Speed operating range (typical) | 5 to 100% |
| Speed accuracy | 0.01% |
| Speed resolution | 15 bit full range |
| Adjustable current limited start-up | |
| Over current, speed, dc bus trip fault protection | |
| PWM carrier frequency | 16 bit/Sysclk |
| IR2175 Current feedback sampling latency | 8.3 usec |
| Current feedback temp drift/offset | calibrated |
| Current feedback data resolution | 1111 count/sysclk*4 |
| Max ASCI comm. speed | 56 Kbps |
| Target EEPROM device | XC18V02 (programmable) |
| | XC17V02 (one-time) |

## Description

IRMCO203 is an FPGA object code for a Sensorless AC permanent magnet motor (Sinusoidal Back EMF) control system, which can be downloaded into the Xilinx Spartan2-300™ low cost FPGA. With IRMCO203, the user can readily build the high performance Sensorless drive system without any programming effort. This soft ASIC is so flexible that the user can configure and optimize the system specifically to the needs of each application. With International Rectifier high voltage ICs such as IR2175 current sensing IC and IR2137 3-phase gate drive IC, IRMCO203 minimizes analog and power electronics component count, and simplifies the design for low cost drives without a shaft encoder. IRMCO203 can be easily adapted to various permanent magnet motors through the fully configurable GUI (graphic user interface) tool.