International
I☉R Rectifier

IRMCO203

Sensorless Control FPGA Object Code
Accelerator^{TM} Based Soft ASIC Manual

Features

- **Xilinx Spartan2-300^{TM} 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^{TM} 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^{TM} 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.