MIMOS Green Motion Controller (GMC)

Permanent Magnet Synchronous Motors (PMSM) are highly efficient motors used in precision applications such as machine and power tools, elevators and electric vehicles. PMSM have higher torque, better reliability and less noise when compared to AC induction motors. MIMOS Green Motion Controller Integrated Circuit (IC) (Mi-GMC) provides an easy and cost competitive way to control the speed and torque of PMSMs.

Overview

MIMOS Mi-GMC (MCGP02I) is a high performance, general purpose motion control IC providing field oriented control (FOC) for permanent magnet synchronous motors (PMSM). It frees up the host processor for other tasks by performing all time-intensive digital signal processing (DSP) functions of the FOC. The programmability of all control parameters enables maximum flexibility and quick design of control systems. With an integrated on-chip oscillator, ADCs, voltage references and regulator, the complete control system can be constructed with minimum number of components, thus reducing the PCB real estate as well as overall system cost. A complete control system using MCGP02I can be comprised of merely a host processor to specify commands via SPI, a pair of fully differential amplifiers, a 3-phase PWM motor driver and a PMSM with incremental and UVW Hall encoders. No other costly components like ADCs, voltage references and oscillator are necessary.

Features

Mi-GMC comprises the following features:

- **Field-Oriented Control**
  Optimal torque production and best energy efficiency during motor operation.
- **Torque and Velocity Control**
  On-the-fly programmable speed and torque of the motor via SPI interface.
- **Programmable PWM Frequency**
  Able to obtain higher motor efficiency, faster control response, and lower motor torque ripple.
- **PI Controller with Saturation and Anti-Windup**
  Helps to reduce large overshoots and slow settling time when the motor is starting for torque and velocity loops.

Technology Benefits

The main impacts of Mi-GMC are:

- **No Software Coding Required for FOC Motor Control**
  Fully hardware implementation state machine which reduces latency and increases accuracy.
- **Fully Integrated IC Solution**
  On chip Voltage regulator, Analog-to-Digital converter, Oscillator and Voltage Reference that can reduce overall built of material and costs.

Technology Summary

Mi-GMC

A simple and low cost, integrated PMSM motor controller solution.

Industries: Transportation (E-Vehicles), Manufacturing (Machine & Power Tools, White Goods (refrigerators, air conditioners)), Industrial (compressors, pumps, blowers), Office Automation (printers, plotters, photocopiers))

Features

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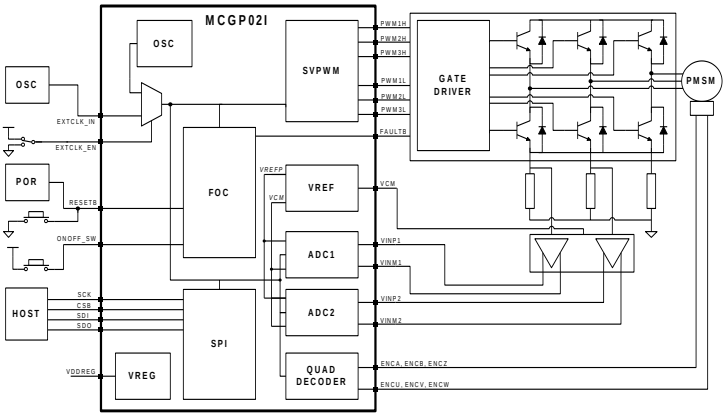
- Torque and velocity control
- Programmable PWM frequency
- PI controller with saturation and anti-windup

Technology Benefits

- No software coding for FOC motor control
- Fully integrated IC solution



Mi-GMC block diagram

Mi-GMC evaluation board