

PRODUCT BRIEF
PB 5114, REV -

SENSORLESS BLDC MOTOR DIGITAL SPEED CONTROLLER 1000V/40A



The Digital Vector Motor Drive is a DSP based motor controller designed for high reliability and industrial motor control applications. The flexibility of this design allows for use of a single device/part number for multiple motor applications with few hardware changes. This motor controller is composed of two internal assemblies in a small footprint module: the Motion Control Engine and a 3-Phase Bridge. The Motion Control Engine is programmable via an isolated RS-232 input port, and the 3 Phase Bridge is rated design to 40A, 1000V. The sinusoidal vector drive with space vector modulation control design allows for maximum utilization of the DC bus voltage and provides smooth torque control. Typical DC bus voltage operating range is 100V to 800V. The sensorless algorithm allows start up to be tuned for almost any load. Operating speed range is typically 10 to 1 with maximum speed more than 8000 RPM (6-pole motor).

Features

- Sinusoidal Sensorless Speed Control
- Vector Drive FOC) with Space Vector PWM
- 75A peak phase, 800V steady state operation
- Torque limiting
- IGBT's rated to 1200V
- Top Speed of 8000+ RPM
- Re-configurable Firmware
- Isolated RS232 interface
- Digital Tach and Direction output via RS232
- Smart gate drivers with de-sat protection
- Boot-strap powered high sided gate driver
- Integrated phase current sensors
- DC bus voltage sensor

Protection

- DC Bus Overvoltage
- DC Bus Undervoltage
- DC Bus Critical Detection
- Phase Loss Detection
- Zero Speed Detection

Operating Baseplate Temperature

- -40°C to 85°C

Power Requirements

- Bus Voltage to 800 VDC
- +3.3V +/-5%
- +5.0V +/-5%
- +15V +/-10%

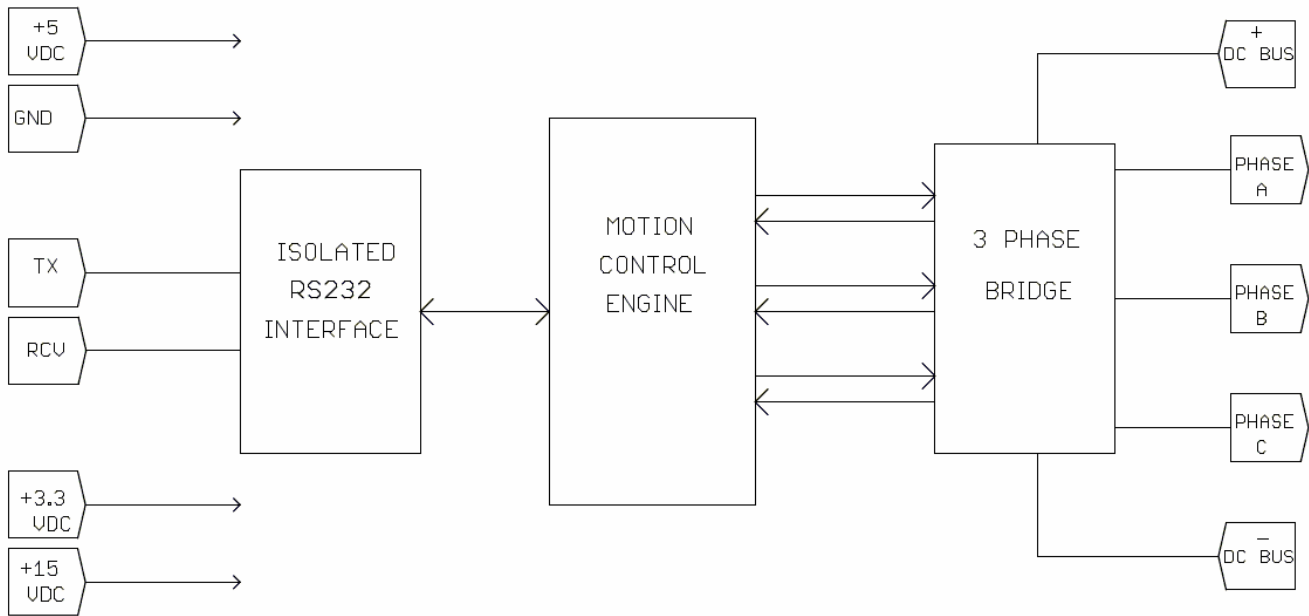
Application Areas:

This product is intended to be used in high reliability military and industrial motor control applications. The design can be used for pump and fan applications in the following markets:

- **Military Ground Vehicles**
- **Industrial Equipment**
- **Heavy Duty Vehicles**
- **Air Handlers**
- **Lifts**

BLOCK DIAGRAM

The vector drive is programmed via an Isolated RS232 Interface to set the motor and control parameters. The Motor Control Engine has an inner torque loop (Sinusoidal/Space Vector/FOC -Field Oriented Control) and an outer speed loop. The torque loop uses a digitally tunable P+I controller and integrated phase current sensors. The speed loop uses a digitally tunable P+I controller and speed feedback derived from the FOC. Sensorless startup is performed open loop using a Volts-per-Hertz algorithm. The Volts-per-Hertz startup parameters are digitally configurable. Space vector modulation allows for the motor line to line voltage to reach the full DC Bus Voltage without waveform clipping unlike other sinusoidal control methods.



SOFTWARE

The device is configured using Excel based software along with a special motor drive GUI. The GUI configures the motor parameters through the RS232 interface. The motor can be controlled directly from the GUI and parameters modified directly from the GUI. A built in datalogger feature allows monitoring of motor drive performance.

The list below shows the motor input parameters and typical Application parameters:

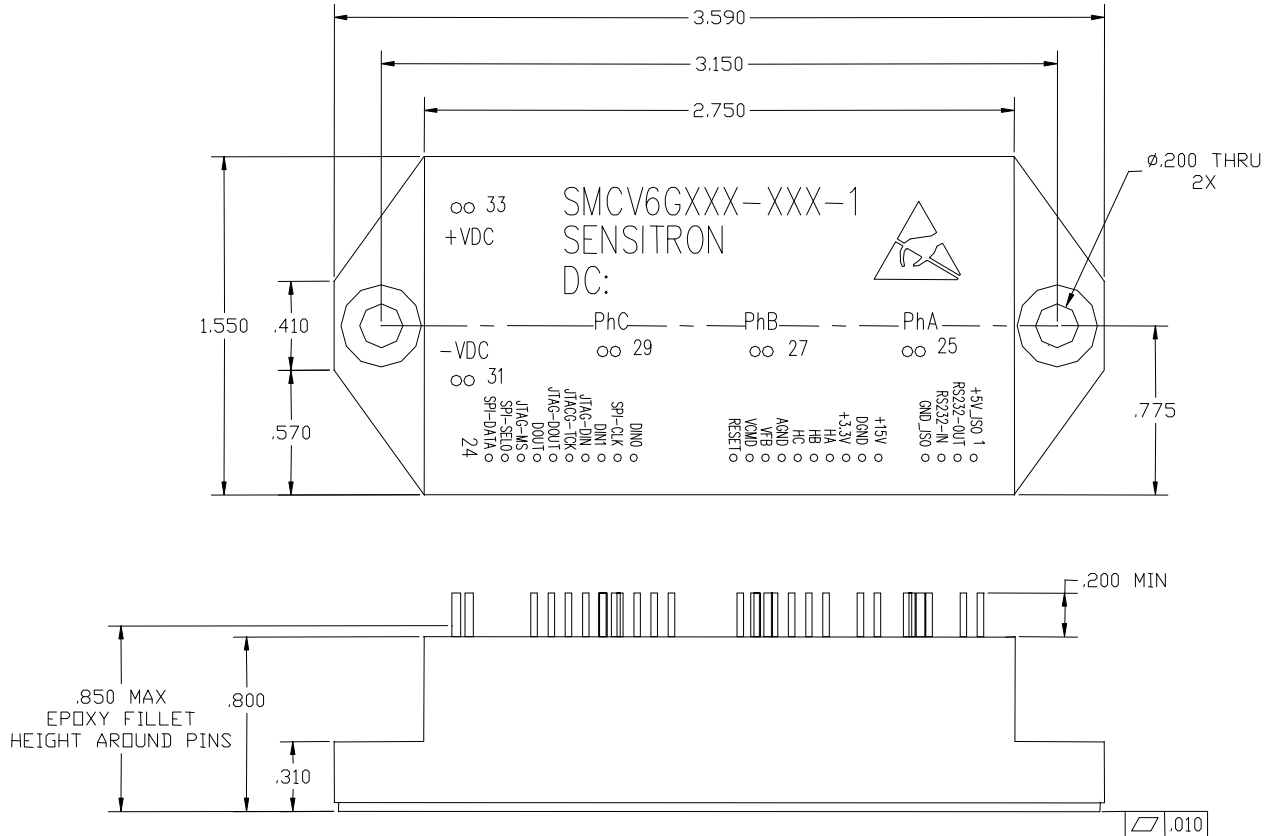
Motor Input Parameters

RPM
Current
Poles
Inertia
Stator Resistance
Inductance Lq and Ld
Kt, Ke

Application Information

Maximum RPM
Nominal dc bus voltage
Current Limits – Start, Regen
Running Speed – Max, Min, Coast, Stop
Protection Levels – Speed, Phase Loss, DC Bus
Speed Regulator Bandwidth and Time Constant

OUTLINE DRAWING:



NOTE: Evaluation boards, Software GUI and additional technical information are available. Please contact the factory.

PART NUMBER ORDERING INFORMATION:

Please reference part number SMCV6Gxxx-xxx-1

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