# Digital Servo Motor Driver

Description

This 510 series digital servo drive is designed to drive brushed and brushless servomotors from a compact form factor. This fully digital drive operates in force, velocity, or position mode and employs Space Vector Modulation (SVM), which results in higher bus voltage utilization and reduced heat dissipation compared to traditional PWM. The command source can be generated internally for testing or can be supplied externally. This drive features dedicated and programmable digital and analog inputs and outputs to enhance interfacing with external controllers and devices.

The drive features an RS-232 interface for drive configuration and setup.

All drive and motor parameters are stored in non-volatile memory.

Power Range

Peak Current	Up to 40 A (28 A$_{RMS}$)
Continuous Current	Up to 20 A (14 A$_{RMS}$)
Supply Voltage	20 - 80 VDC
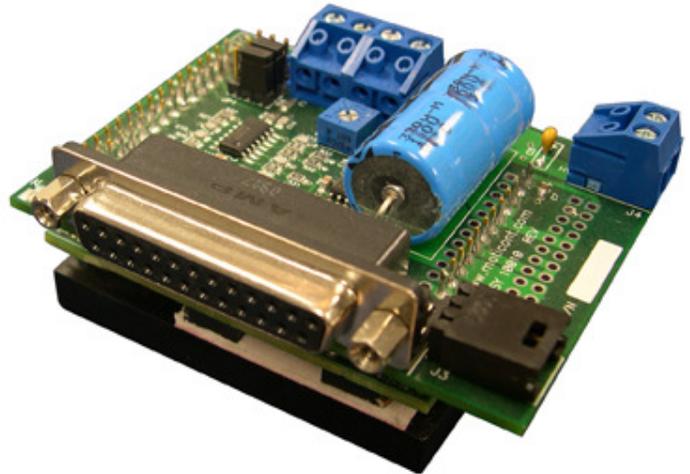
Features

- Four Quadrant Regenerative Operation
- Space Vector Modulation (SVM) Technology
- Fully Digital State-of-the-art Design
- Programmable Gain Settings
- Fully Configurable Current, Voltage, Velocity and Position Limits

- PIDF Velocity Loop
- PID + FF Position Loop
- Compact size, high power density
- 12-bit Analog to Digital Hardware

MODES OF OPERATION
- Current
- Position
- Velocity

COMMAND SOURCE
- ±10 V Analog
- +5V Step and Direction

FEEDBACK SUPPORTED
- Hall Effect Sensor
- Incremental Encoder

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SPECIFICATIONS

Power Specifications		
Description	Units	Value
DC Supply Voltage Range	VDC	20 - 80
DC Bus Over Voltage Limit	VDC	86
DC Bus Under Voltage Limit	VDC	17
Logic Supply Voltage	VDC	5, 1 Amp
Maximum Peak Output Current	A (Arms)	Up to 40 A (28 A_{RMS})
Maximum Continuous Output Current	A (Arms)	Up to 20 A (14 A_{RMS})
Internal Bus Capacitance	µF	330
Minimum Load Inductance (Line-To-Line)[1]	µH	250
Switching Frequency	kHz	20
Control Specifications		
Description	Units	Value
Communication Interfaces	-	RS-232
Command Sources	-	±10 V Analog, 5V Step and Direction
Feedback Supported	-	Incremental Encoder, Halls, Incremental Encoder
Commutation Methods	-	Sinusoidal, Trapezoidal
Modes of Operation	-	Current, Position, Velocity
Motors Supported	-	Brushed, Brushless, Voice Coil
Hardware Protection	-	40+ Configurable Functions, Over Current, Over Temperature (Drive & Motor), Over Voltage, Short Circuit (Phase-Phase & Phase-Ground), Under Voltage
Programmable Analog Inputs	-	1
Current Loop Sample Time	µs	50
Velocity Loop Sample Time	µs	100
Position Loop Sample Time	µs	100
Maximum Encoder Frequency	MHz	1
Mechanical Specifications		
Description	Units	Value
Weight	g (oz)	175 (6.2)
Heatsink (Base) Temperature Range[2]	°C (°F)	0 - 65 (32 - 149)
Storage Temperature Range	°C (°F)	-40 - 85 (-40 - 185)
Cooling System	-	Natural Convection
Form Factor	-	Chassis Mounted

Notes
1. Lower inductance is acceptable for bus voltages well below maximum. Use external inductance to meet requirements.
2. Additional cooling and/or heatsink may be required to achieve rated performance.

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PIN FUNCTIONS

Pin	Name	Description / Notes	I/O
J2 - Signal Connector, DB-25 Female		
1	+5 VDC	+5 VDC Input / Output	I - O
2	STEP	Step Signal	I
3	DIRECTION	Direction Signal	I
4		Not Connected	
5	MOT ENC B+	Motor Encoder B+ Channel Input	I
6	MOT ENC A+	Motor Encoder A+ Channel Input	I
7	GND	Ground	GND
8		Not Connected	
9	HALL-B	Single-ended Commutation Sensor Input - B	I
10	+5 VDC	+5 VDC Input / Output	I-O
11	HALL-A	Single-ended Commutation Sensor Input - A	I
12	GND	Ground	I
13	REF-	Inverting Analog Input	I
14	GND	Ground	
15	STSLED	Status LED	O
16		Not Connected	
17		Not Connected	
18		Not Connected	
19		Not Connected	
20	+5 VDC	+5 VDC Input / Output	I-O
21		Not Connected	I
22	GND	Ground	
23	HALL-C	Single-ended Commutation Sensor Input - C	I
24		Not Connected	
25	REF+	Non-Inverting Analog Input	I

Pin	Name	Description / Notes	I/O
J4 - Power Connector, Screw Terminal		
G	GND	Ground	GND
HV	HIGH VOLTAGE	DC Power Input	I

Pin	Name	Description / Notes	I/O
J5 - Motor Connector, Screw Terminal		
C	MOTOR C	Motor Phase C	O
B	MOTOR B	Motor Phase B	O
A	MOTOR A	Motor Phase A	O
G	GND	Ground	GND

Pin	Name	Description / Notes	I/O
J3 – RS232 Connector		
1	RS232 RX	Receive Line	I
2	RS232 TX	Transmit Line	O
3	GND	Ground	GND

DIMENSIONS
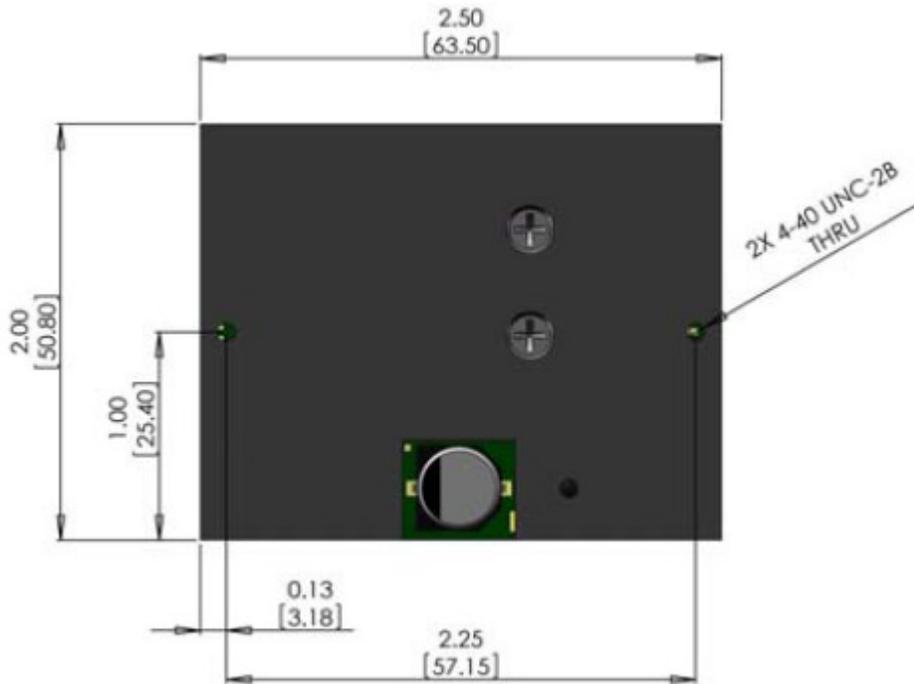
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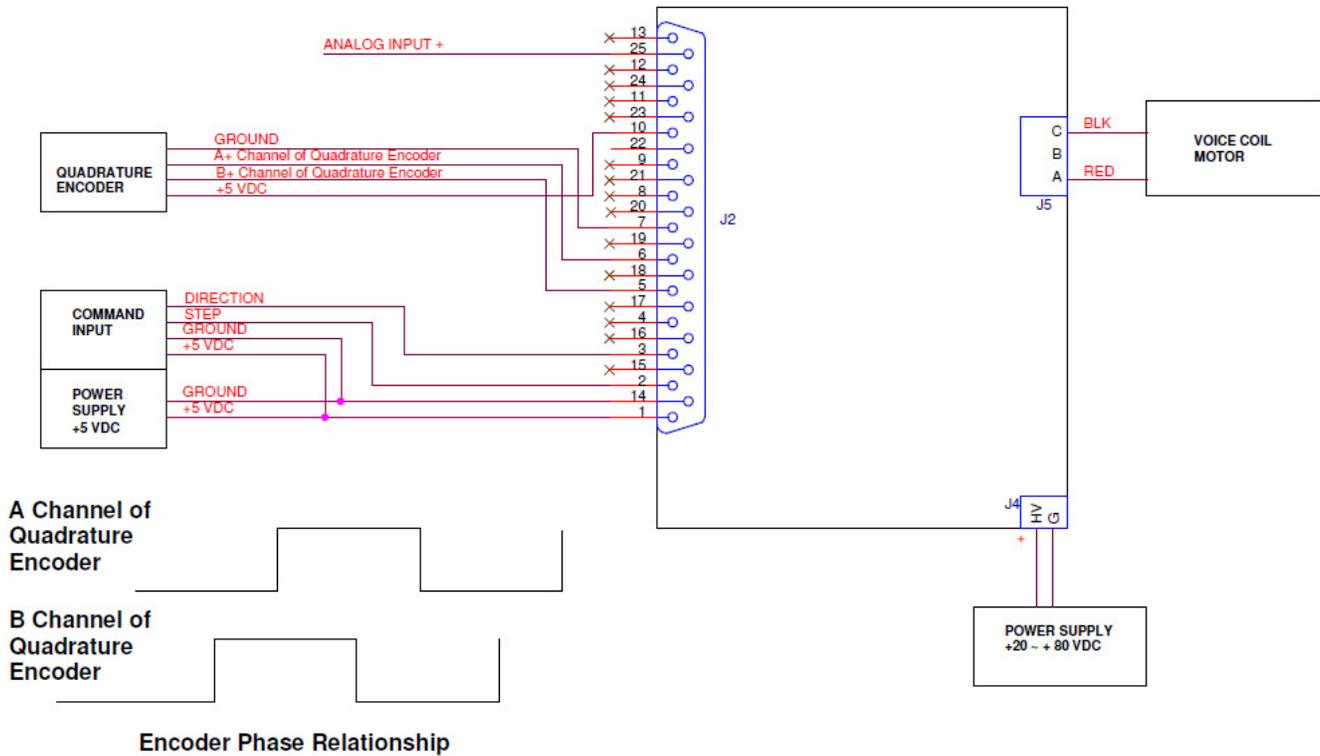
**DC MOTOR CONTROL with STEP and
DIRECTION COMMAND INPUT or ANALOG INPUT**

J3 is used for RS-23 communication during setup.