

SHD24

The SHD24 is a fully digital servo amplifier designed to optimize the performance of electric surgical hand tools. The amplifier provides closed loop velocity control of a Brushless DC servo (BLDC) motor up to 180,000 RPM while simultaneously and independently controlling the current. In addition, the SHD24 can be digitally configured for a wide range of motor models and can store multiple configurations for quick change of tools.

The amplifier utilizes Space Vector Modulation, Flux Vector Current Control, and proprietary switching and noise control techniques to minimize the heating in the motor and maximize the motor's torque and speed performance.

To protect the amplifier and the motor, two different algorithms are used to track the thermal impact of the output current. The amplifier is protected using an advanced, real-time adaptive thermal model developed to limit extreme thermal cycling of the power devices as well as control their maximum junction temperature. At the same time, the amplifier protects the motor from thermal degradation by using a user programmable time constant and limit threshold applied to an independently maintained RMS current value. Open load, short circuit and instantaneous over-current conditions are detected to achieve high system reliability. A tri-state (Red/Yellow/Green) LED provides a visual indication of the status of the amplifier.

Features & Benefits

- **Advanced Commutation** –Space Vector Commutation for better bus voltage utilization for improved torque/speed curves compared with standard sinusoidal or trapezoidal commutation
- **Flux Vector Current Control** – Provides improved power efficiency and torque over the full speed range
- **Sensorless Control** – Option to eliminate the Hall Sensors and Hall Sensor cable without sacrificing the advantages of the advanced commutation
- **Automatic Feedback Mode Change** – If the Hall Sensor fail the drive can automatically switch to sensorless
- **High Speed Operation** – Up to 180,000 RPM, depending upon motor design
- **Digital Tuning** – Optimizes performance and enables quick change over of tools
- **“Get Me Home” Over-Temperature Mode** – provides warning and linear reduction of current limit instead of immediate fault, which allows a controlled shutdown
- **Extensive Fault Protection** – designed to protect the amplifier and the motor
- **Customization** – PCI can offer the servo drive as a stand-alone unit for the OEM to integrate into their console or PCI can integrate the OEM's console controls into the drive to make a single board solution

PERFORMANCE CONTROLS, INC.[®]

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SHD24-05 Specifications				
Parameter	Units	Min	Typical	Max
User Inputs				
Analog Command, differential input	volts		±10	±12
Analog Command, input impedance	kΩ		10	
Disable (sink current to common)	mA			4
User Outputs (Open collector)				
V _{ceo}	volts			30
I _{sink}	mA			20
V _{ce,sat@I_{sink}}	volt			0.4
Analog Monitor (12 bit)	volt		±10	
Hall Feedback (Open Collector, 60° or 120°)				
Pull-Up Voltage (2k ohm)		5		15
Control Loop				
Linearity	%		3	
Dynamic Range	dB		60	
Bandwidth (typical, motor dependant)	Hz		4,000	
Current Loop Update Period	μS		25	
Load Inductance	μH	10		
Motor Speed (application dependent)	RPM			180,000
Power Stage*				
PWM Frequency	kHz		100	
Nominal Bus Voltage Range	Volts DC		24	
Maximum Output Current (5 sec) **	Amps, RMS		10	
Continuous Output Current **	Amps, RMS		5	
Environmental				
Operating Temperature Range	°C			
Storage Temperature Range	°C		-40 to 105	
Humidity (non-condensing)	%		95	
Barometric pressure	kPa	69.3		106.7
Vibration (20 Hz to 2kHz)	GRMS		3	
Mechanical Specifications				
Weight	Lbs		***	
Length	inches		***	
Width	inches		***	
Height	inches		***	

*Note: Other current and voltage capabilities available upon request

**Rating based upon ambient air temperature at 25°C

***Application dependent