



Signal Consulting, LLC

www.signallc.com

16 Wilelinor Drive, Edgewater, MD 21037-1003 USA

Phone: 410-224-8429, Fax: 410-510-1821, E-mail: info@signallc.com

Si50HyUdMC1-30V-50A, Single, 30V 50A, Open-Loop, Hybrid, Unidirectional Motor Controller with Integrated Heat Sink, 5kHz or 20kHz PWM, T-Chip

The **Si50HyUdMC1-30V-50A** is a 30V, 50A microprocessor based, Single, Open-Loop, Hybrid, Unidirectional, Motor-Controller board that uses 5kHz or 20kHz pulse-width modulation (**PWM**) to efficiently control the speed of a brush type DC motor (or load current) in the 0 to 1500W power range, and in 12.5W steps. An onboard microprocessor generates a 5kHz or 20kHz **PWM** carrier signal, controls the load-power (or motor speed) and controls the load-current rate (or motor acceleration and deceleration). The **PWM** carrier frequency is user selectable by the jumper **CN4**, 20kHz when **CN4** is open and 5kHz when short. The high frequency PWM rate provides a smooth speed control and insures a quiet motor environment. As the name hybrid (**Hy**) implies, the desired motor speed (or PWM pulse-duration) is set by a variable (0 to +5V) analog input-voltage $V_{I1,G}$, providing a smooth motor-speed control from 0 to 100% in 0.833% steps; while the other control-signals are digital. This analog input ($V_{I1,G}$) is zener-diode protected and includes an integrator with a time-constant of 0.01s; accordingly, this input can be driven with DC or PWM signals. The user can choose between slow or fast motor acceleration/deceleration modes by short-circuiting or open-circuiting the pins labeled **J1**. The slow mode, with rise-time/fall-time of 0.5s, is selected by short-circuit (**J1** jumper installed); while the fast buildup mode, with rise-time/fall-time of 0.025s, is selected by leaving these pins open (no Jumper installed). An onboard LED (red) is used to monitor the load-voltage. A small (3.0"x4.0"x1.0") finned heat-sink is required to operate 1200W power level (or at 30V and 40A) Higher current level levels (50A at 30V or 1500W) can be achieved with more efficient heat-sinks (5" x 5" x 1.5" finned heat sink). This board requires a single 9V to 30V DC unregulated power source at a 0A to 50A current range to operate normally. Typical applications are: DC Motor-Speed Controller, Light-Dimmer with variable delay, Power Amplifier, SPST Solid State Relay, etc. This board can be configured and programmed to perform efficiently in many customized applications.



Specification and Application for Si50HyUdMC1-30V-50A

- **Overall Dimensions:** Length=3.93 In (101mm), Width= 3.65 In (93mm), Height=2.0 In (51mm)
- **Typical Operating Temperature at 50A and 5kHz:** 45°C with MOSFETs bolted to a small (3.0"x4.0"x1.0") finned heat-sink, while the fins are exposed to ambient air at 25°C (as shown on photograph).
- **Source-Voltage Requirement (V_P from pin +P to pin -P):** Any DC voltage from 9V to 30V, unregulated and unfiltered DC.
- **Average Load-Voltage:** Linearly variable from 0 to V_P in 0.83% steps, using $V_{I1,G}$ as control input.
- **Average Load-Current:** 0A at 0% duty-cycle and 50A max. at 100% duty-cycle.
- **Load Isolation:** The Load or Motor must be isolated from the source voltage (V_P).
- **Power-Conversion Efficiency:** Approximately 98.5% at full-load (30V and 50A).
- **PWM Switching Frequency:** 5kHz when **CN4** short and 20kHz when **CN4** open.
- **PWM Duty-Cycle:** varies linearly from 0% to 100% in 0.83% steps, using $V_{I1,G}$ as control voltage (voltage at pin **I1** relative to pin **G** on connector **CN5**): where $V_{I1,G} = 0V$ yields 0%, and $V_{I1,G} = +5V$, yields 100%. This input is zener-diode protected and includes an integrator with time-constant of 10mSec. Accordingly, this control input can be driven with DC or PWM input voltage. Note that the

