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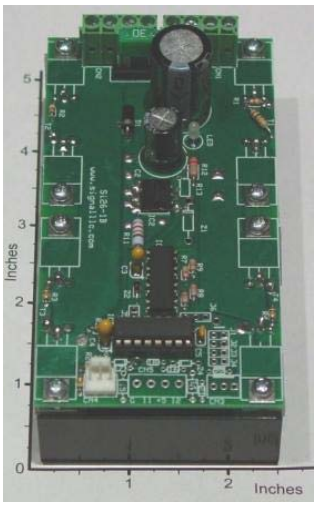
Si30HyBdMC1-50V-30A-ALC, 50V-30A Hybrid Bidirectional Open-Loop DC Motor Controller, with Integrated Finned Heat-Sink, 5kHz or 20kHZ PWM, RS232 LCD Port, Active-Low Control Inputs



The **Si30HyBdMC1-50V-30A-ALC** is a 50V 30A, microprocessor based, high-power, Hybrid, Bidirectional, Motor Controller with user selectable Soft-Start and Soft-Start features. This controller uses a single (9V to 50V at 0 to 30A) DC power supply to control the speed of a DC motor in forward or reverse direction. An onboard microprocessor generates a 5kHz or 20kHz **PWM** carrier signal, controls the load-power (or motor speed), controls the load-current rate (or motor acceleration and deceleration), updates the Liquid Crystal Display (LCD) and monitors the user inputs. The **PWM** carrier frequency is user selectable by the jumper **J2**, 20kHz when **J2** is open and 5kHz when short. This high frequency PWM rate insures a quiet motor environment. 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 1.25Sec, is selected by short-circuit (**J1** jumper installed); while the fast buildup mode, with rise-time/fall-time of 0.05s, is selected by leaving these pins open (no Jumper installed). As the name hybrid (**Hy**) implies the required motor speed (or PWM pulse-duration) is variable from 0 to 100% in 0.83% steps using the analog voltage ($V_{P1,G}$ on **CN5**), while the motor direction is selected using two active low digital (0 to +5V) control signals ($V_{F,G}$ and $V_{R,G}$ on **CN4**) or switches. All inputs are optically isolated or zener-diode protected. A bicolor LED is used to monitor the motor (or load) voltage (Red = Forward, Green = Reverse). An LCD port (with 9600 Baud RS232 Standard) is provided for optional display of motor RPM data in a 2 line by 20 character format (on **CN3**). A small (4.6"x2.5"x1.0") integrated finned hear-sink is used to operate at 30A current levels. Higher current-levels (40A) can be achieved with more efficient heat-sinks. Please click on this link and read the **Board Mounting Instructions and Heat Sink Selection Guide**. This board operates in a wide voltage-range (9V to 50V) at maximum continuous load current of 30A. Typical applications are: Bi-directional DC Motor-Speed Controller, Peltier Effect TE Coolers, Heat Pumps, DPDT Solid State Relay, etc. This board can be configured and programmed to perform efficiently in many customized applications.

Motor Control-Action Truth-Table, (Pins on Connector CN4)

($V_{F,N}$) Voltage at Pin **F** relative to pin **N**	($V_{R,N}$) Voltage at Pin **R** relative to pin **N**	**Operation Mode of Motor or Load**
$V_{F,N}$ = 5V or pin Open	$V_{R,N}$ = 5V or pin Open	Stop Rotation (Motor Open)
$V_{F,N}$= 0V @ 2mA Sink	$V_{R,N}$ = 5V or pin Open	Forward Rotation with V_{PWM} Control
$V_{F,N}$ = 5V or pin Open	$V_{R,N}$= 0V @ 2mA Sink	Reverse Rotation with V_{PWM} Control
$V_{F,N}$= 0V @ 2mA Sink	$V_{R,N}$= 0V @ 2mA Sink	Stop Rotation (Motor Open)

The motor action or load-current direction is controlled by active low control inputs, (0 to +5V) applied to Pin **F** (Forward) and/or pin **R** (Reverse) relative to Pin **N** (Neutral) on the Connector **CN4**. These pins are optically isolated from the H-Bridge, providing good noise immunity for these inputs. The control actions and the required voltage levels are defined by the Truth-Table listed above. All control lines (analog and digital) are sampled approximately at 80Hz rate in the fast mode (**J1** jumper open), and at 8Hz rate in the slow mode (**J1** jumper short).

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Specification and Application of Si30HyBdMC1-50V-30A-ALC

- **Typical Operating Temperature at 30A:** 45^{0}C with the Metal Heat-Ring Bolted to the (4.6"x2.5"x1.0") Finned Heat-Sink, while it is exposed to air at 25^{0}C (as shown on photograph).
- **Source-Voltage Requirement:** 9V to 50V DC for **V_P (pin +P to pin -P)** unregulated DC voltage.
- **Average Load Voltage (from pin +L to pin -L):** 0V at 0% Duty-Cycle and **V_p** at 100% Duty-Cycle.
- **Max. Continuous Load Current:** 30A at 100% Duty-Cycle.
- **Max. Load Current for 5Sec:** 50A at 100% Duty-Cycle.
- **Two User Selectable Motor Acceleration/Deceleration Modes:** Using Jumper, on Port **J1**.
- **Two User Selectable PWM Modes:** Using Jumper, on Port **J2**.
- **Motor Directional Control:** Active Low Control (4.7k Ohm, internal Pull-Up to +5V) on **CN4**.
- **Motor-Speed Control (%PWM):** 5k Ohm Analog Pot, (0 t0 5V), on **CN5**.
- **LCD Display Format:** 9600 Baud, RST232 Protocol, on **CN3**.
- **Load Isolation:** The Load or Motor must be isolated from the source voltage (**V_P**).
- **Power-Conversion Efficiency:** Approximately 98.5% at full-load (50V and 20A).
- **Load-Voltage Indicator:** A bicolor **LED** monitors the Load Voltage (Red=Forward, Green=Reverse)
- **Voltage Requirement:** The Si30 will work with any DC Source in the 9 to 50 V range at 30A rating.
- **Overall Dimensions:** 4.6"x2.43"x2.35", (117 x 62 x 60 mm).

A Typical Application of the Si30HyBdMC1-50V-30A-ALC

In this open-loop application, the PWM or motor speed (in forward or reverse direction) is adjusted by an external linear 1-turn 5kΩ potentiometer (Signal Part number **Si5Pot1-5k**) and the motor direction is controlled by 2 external normally-open switches connected to port **CN4** (as shown below). The LCD module can be ordered from Signal with the part number of **Si30LCD2L20CH** (2 line by 20 character display with 12" cable and 3-pin connector). **Warning: The connecting wires to the Load and the Power Supply must be heavy gauge copper wire (#12 AWG or heavier) to handle the rated current level. In addition, these heavy gauge wires act as a heat sink, protecting the board from overheating. Note that each connecting point on CN1 is available at 2 places, thus two smaller wires can be used in place of a larger one.**