

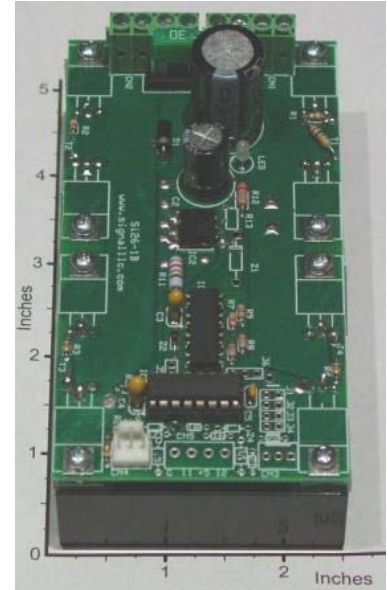
# Signal Consulting, LLC

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## Si30HFHB-50V-30A-ALC, 50V at 30A High-Frequency H-Bridge, DC to 20kHz PWM , with Integrated Finned Heat-Sink, Active Low Control Inputs, Y-Chip

The **Si30HFHB-50V-30A-ALC** is a 50V 30A, microprocessor based, high-power, High-Frequency H-Bridge with active-low control inputs. This board uses a single (9V to 50V at 0 to 30A) DC power supply to control the speed of a DC motor (or load current) in forward or reverse direction. An onboard microprocessor samples the control inputs at 150kHz rate and generates the timing signals for the H-Bridge. The high sampling rate provides a worst-case control latency of 7uS when the bridge is changing current direction or switching on or off. Two active low digital (0 to +5V) control signals ( $V_{F,N}$  and  $V_{R,N}$ ) or switches are used to select the direction of rotation (or Load-Current Direction). These inputs can be Pulse Width Modulated (PWM) from DC to 20kHz carrier rate. A bicolor LED is used to monitor the motor (or load) voltage (Red = Forward, Green = Reverse). A small (4.6"x2.4"x1.0") integrated finned heat-sink is used to operate the bridge at 30A (continuous) 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 a 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.



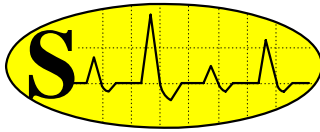
### Motor Control-Action Truth-Table, (Pins on Connector CN4)

$(V_{F,N})$ 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 control signals are optically isolated from the high-side of the H-Bridge, providing good noise immunity. The control actions and the required voltage and current levels are listed in the Truth-Table (given above).

### Specification and Application of **Si30HFHB-50V-30A-ALC**

- **Typical Operating Temperature at 30A:** 45°C with the Metal Heat-Ring Bolted to the (4.6"x2.4"x1.0") Finned Heat-Sink, while it is exposed to air at 25°C (as shown on photograph).
- **Source-Voltage Requirements:**  $V_p$  (from pin +P to pin -P) 9V to 50V, unregulated DC voltage.
- **Average Load Voltage (from pin +L to pin -L):** 0V at 0% Duty-Cycle and  $V_p$  at 100% Duty-Cycle.



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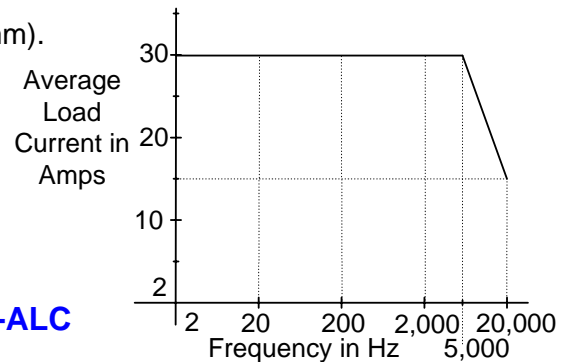
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- **Max. Continuous Load Current:** 30A at 100% Duty-Cycle.
- **Max. Load Current for 5Sec:** 50A at 100% Duty-Cycle.
- **Control Type:** Active-Low
- **Worst-Case Control Latency:** 7 micro seconds.
- **Load Isolation:** The Load or Motor must be isolated from the source voltage ( $V_P$ ).
- **Power-Conversion Efficiency:** Approximately 98.5% at full-load (50V and 30A).
- **Load-Voltage Indicator:** An onboard bicolor LED is used to monitor the motor (or load) voltage (Red = Forward, Green = Reverse).
- **Voltage Requirement:** The Si30 will work with any 9V to 50V DC source with a 30A current rating. In addition, the power filters are included on this board.
- **Overall Dimensions:** 4.6"x2.43"x2.35", (117 x 62 x 60 mm).

## Frequency Response of the Si30HFHB-50V-30A-ALC

This plot shows the maximum average load current as a function of PWM carrier frequency (in Hz) at 100% duty-cycle.



## A Typical Application of the Si30HFHB-50V-30A-ALC

In this open-loop application, the motor direction is controlled by 2 external normally-open switches connected to port **CN4** (as shown below), selecting the direction of rotational. The switches can be replaced by open-collector transistors that can be Pulse Width Modulated (PWM).

**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. Each Pin on CN1 has a current rating of 32A (or 64A Jointly).**

