

# Signal Consulting, LLC

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

The **Si30HFHB-50V-30A-AHC** is a 50V 30A, microprocessor based, high-frequency, H-Bridge with high-pulse (0 to +5V PWM) control input. This board uses a single (12V 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 7 $\mu$ S when the bridge is changing current direction or switching on or off. Two active high digital (0 to +5V) control signals ( $V_{I1,G}$  and  $V_{I2,G}$ ) 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 (12V 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.



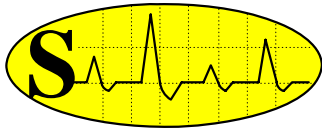
### **AHC Control Truth Table (on connector CN5)**

$V_{I1,G}$	$V_{I2,G}$	Motor/Load Action
Low=0V or pin Open	Low=0V or pin Open	Motor Stop / Load Current OFF
High=4.0V to +15V	Low=0V or pin Open	Motor Forward / +Load Current
Low=0V or pin Open	High=4.0V to +15V	Motor Reverse / -Load Current
High=4.0V to +15V	High=4.0V to +15V	Motor Forward / +Load Current

- The control lines I1, I2 ( $V_{I1,G}$ ,  $V_{I2,G}$ ) can be Pulse-Width Modulated (PWM in a range of 0-20k Hz) to vary the average current supplied to a load or to a DC Motor.
- Typical Input Resistance of I1 and I2 is 33kOhm, relative to pin G

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

- **Typical Operating Temperature at 30A:** 45 $^{\circ}$ 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 $^{\circ}$ C (as shown on photograph).
- **Source-Voltage Requirements:**  $V_p$  (from pin +P to pin -P) 12V 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.
- **Max. Continuous Load Current:** 30A at 100% Duty-Cycle.
- **Max. Load Current for 5Sec:** 50A at 100% Duty-Cycle.



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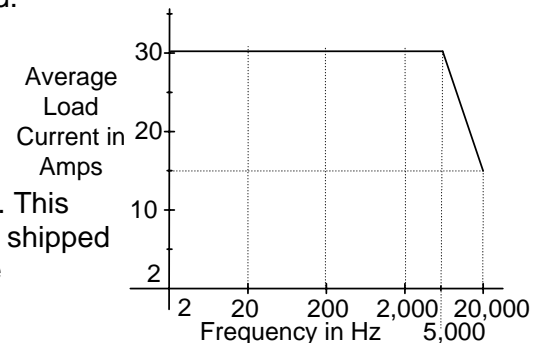
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- **Control Type:** Active-High Control (0 to +5V).
- **Worst-Case Control Latency:** 7 micro seconds.
- **Load Isolation:** The Load or Motor must be isolated from the source voltage ( $V_P$ ).
- **Power-Conversion Efficiency:** Approximately 98.5% 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 12V 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).

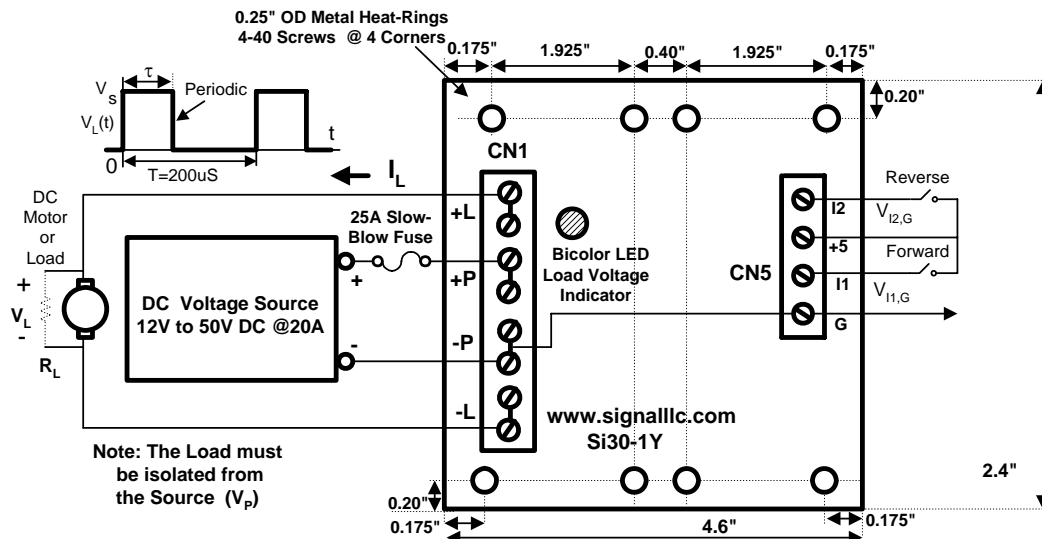
## Frequency Response of the Si30HFHB-50V-30A-AHC

The I1 and I2 control lines ( $V_{I1,G}$ ,  $V_{I2,G}$  inputs, 0 to +5V) can be Pulse-Width Modulated (PWM with a duty-cycle of 0% to 100%) over a wide range of carrier frequencies, as shown on the graph. This plot was obtained with the finned heat-sink (4.6" x 2.4" x 1.0", as shipped with the unit). Improved performance can be achieved with more effective heat-sinks.



## A Typical Motor Control Application of the Si30HFHB-50V-30A-AHC

In this open-loop application, the motor direction is controlled by 2 external normally-open switches connected to pins I1 (forward) and I2 (reverse) on port CN5 (using the internal +5V source as shown below).



**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).

**Typical Applications:** Driver for Variable-Speed Bidirectional DC Motors, Peltier Effect TE Cells, Heat Pumps, PPDT Solid State Relays.