

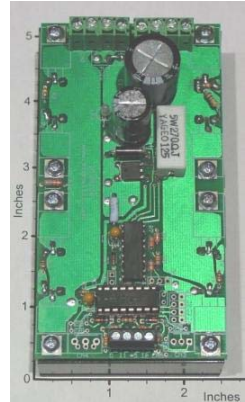
# Signal Consulting, LLC

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## Si30HFHB-50V-22A-HPC, 50V at 22A High-Frequency H-Bridge, DC to 20kHz PWM, with Integrated Finned Heat-Sink, High-Pulse Control, Y-Chip

The **Si30HFHB-50V-22A-HPC** is a 50V 22A, microprocessor based, high-frequency, H-Bridge with high-pulse (0 to +5V PWM) control input. This board uses a single (12V to 50V at 22A) 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 (0 to +5V) control signals ( $V_{I1,G}$  and  $V_{I2,G}$ ) or switches are used to select the Stop/Go (**pin I1**) and motor direction (**pin I2**). The **pin I1** input 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 22A (continuous) current levels. Higher current-levels (30A) 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 22A. 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.



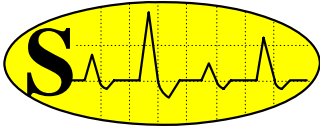
### HPC Control Truth Table (on connector CN5)

$(V_{I1,G})$ Voltage at Pin I1 relative to pin G	$(V_{I2,G})$ Voltage at Pin I2 relative to pin G	Operation Mode of Motor or Load
$V_{I1,G} = 0V$ or pin Open	$V_{I2,G} = 0V$ or pin Open	Stop Rotation (Motor Open)
$V_{I1,G} = 0V$ or pin Open	$V_{I2,G} = 5V @ 0.2mA$	Stop Rotation (Motor Open)
$V_{I1,G} = 5V$ or PWM pulse	$V_{I2,G} = 0V$ or pin Open	Forward Rotation with $V_{PWM}$ Control
$V_{I1,G} = 5V$ or PWM pulse	$V_{I2,G} = 5V @ 0.2mA$	Reverse Rotation with $V_{PWM}$ Control

- The I1 control line ( $V_{I1,G}$ ) 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-22A-HPC

- **Typical Operating Temperature at 22A:** 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.
- **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:** 22A at 100% Duty-Cycle.
- **Max. Load Current for 5Sec:** 50A at 100% Duty-Cycle.
- **Control Type:** High Pulse Control (0 to +5V).
- **Worst-Case Control Latency:** 7 micro seconds.



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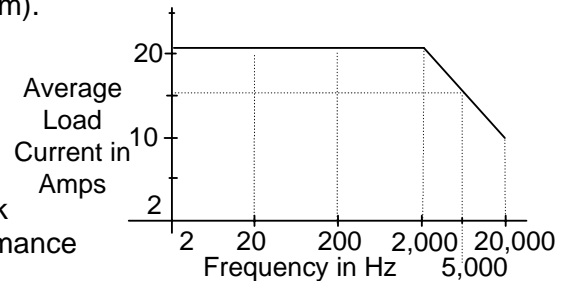
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- **Load Isolation:** The Load or Motor must be isolated from the source voltage ( $V_p$ ).
- **Power-Conversion Efficiency:** Approximately 98.5% at full-load (50V and 22A).
- **Load-Voltage Indicator:** An onboard bicolor LED is used to monitor the motor (or load) voltage (Red = Forward, Green = Reverse).
- **Voltage Requirement:** The Si30 will work with any 12V to 50V DC source with a 22A 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).

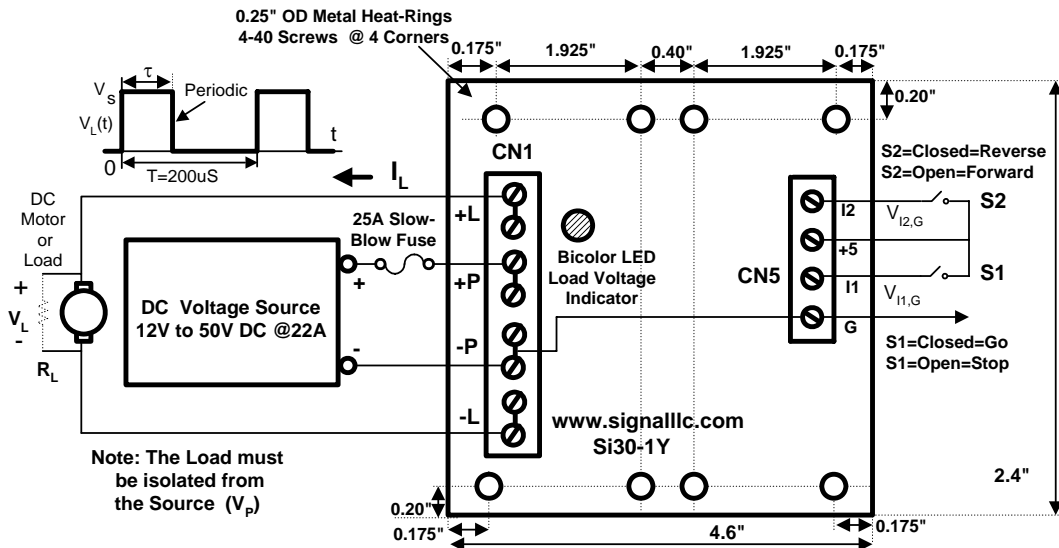
## Frequency Response of the Si30HFHB-50V-22A-HPC

The **I1** control line ( $V_{I1,G}$  input voltage, 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-22A-HPC

In this open-loop application, the motor direction is controlled by 2 external normally-open switches connected to pins **I1** and **I2** on port **CN5** (using the internal +5V source as shown below). The switch **S1** controls the Stop and Go action, while the switch **S2** selects the direction of rotational. The **I1** input can be Pulse-Width Modulated (with 0 to +5V pulses) over a wide Frequency range.



**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.