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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 (9V to 50V at 0 to 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 7uS 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 (9V 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.

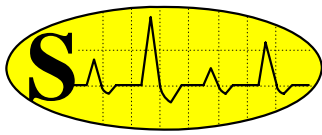
HPC Control Truth Table (on connector CN5)

$(V_{I1,G})$ 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°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.
- **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).



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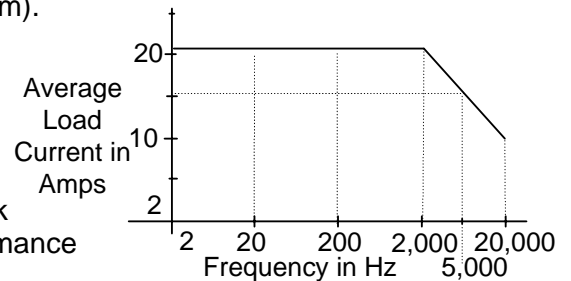
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- **Worst-Case Control Latency:** 7 micro seconds.
- **Load Isolation:** The Load or Motor must be isolated from the source voltage (V_P).
- **Power-Conversion Efficiency:** Approximately 98.5% at full-load (50V and 22A).
- **Load-Voltage Indicator:** 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 9V 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).

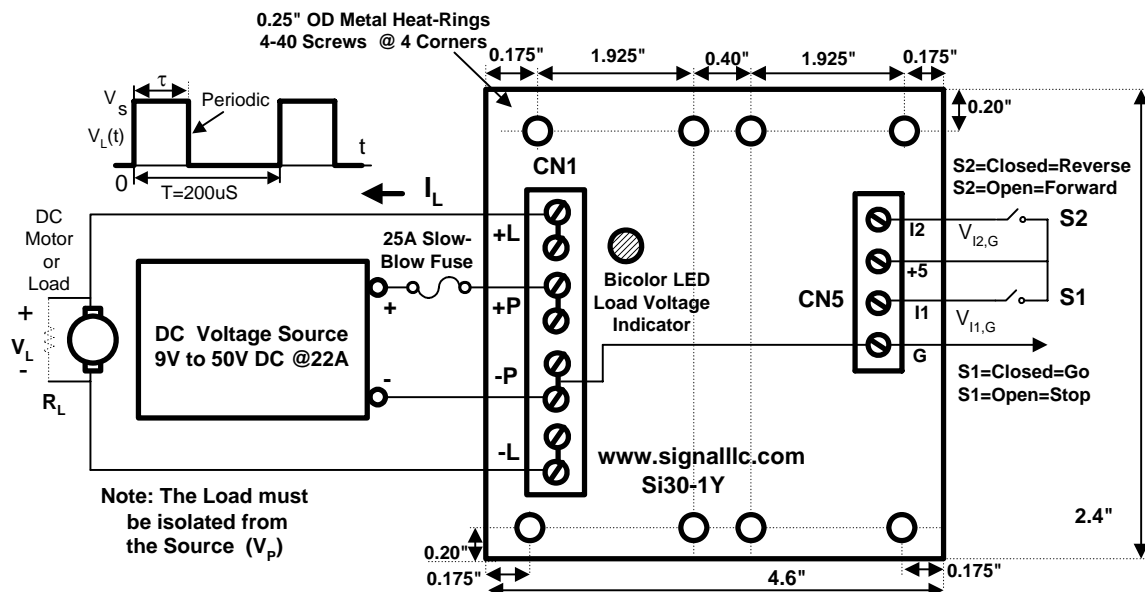
Frequency Response of the Si30HFHB-50V-22A-HPC

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 gage copper wire (#12 AWG or heavier) to handle the rated current level. In addition, these heavy gage 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.