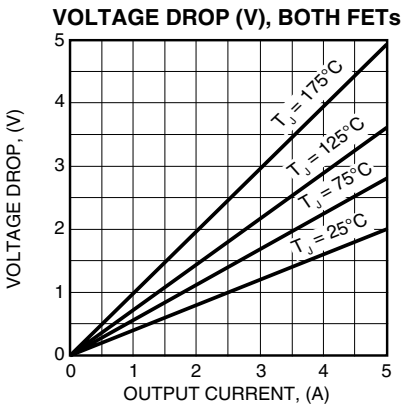
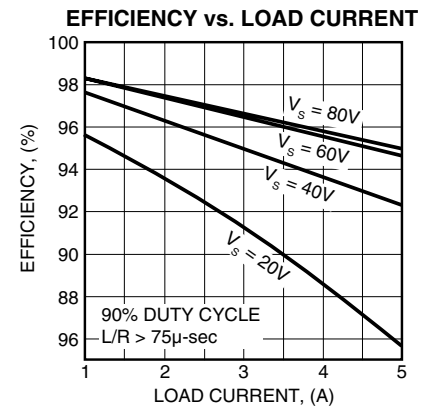
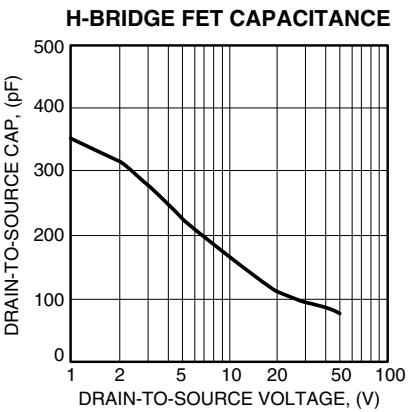
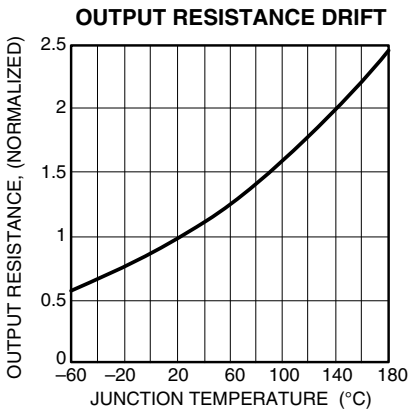
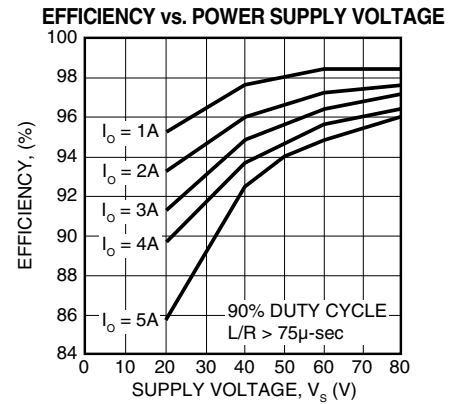
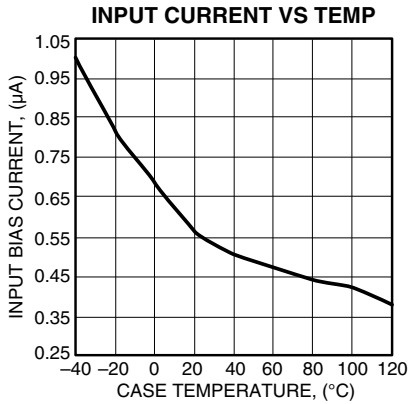
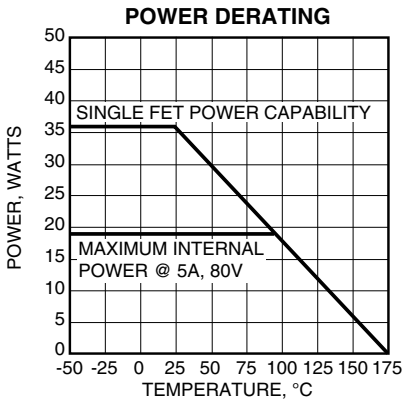

H-Bridge Motor Driver/Amplifiers

1 * / 50
1 "\$, " (& 45 : - & \$ &

74 # 065
" 065
34 & / 4 & #
7 DD (/ % * / 165





3

Please read Application Note 30 on "PWM Basics". Refer to Application Note 1 "General Operating Considerations" for helpful information regarding power supplies, heat sinking and mounting. Visit www.Cirrus.com for design tools that help automate pwm filter design and heat sink selection. The "Application Notes" and "Technical Seminar" sections contain a wealth of information on specific types of applications. Information on package outlines, heat sinks, mounting hardware and other accessories are located in the "Packages and Accessories" section. Evaluation Kits are available for most Apex Precision Power product models, consult the "Evaluation Kit" section for details. For the most current version of all Apex Precision Power product data sheets, visit www.Cirrus.com.

1

V_{CC} - is the low voltage supply for powering internal logic and drivers for the lowside and highside MOSFETS. The supplies for the highside drivers are derived from this voltage.

V_S - is the higher voltage H-bridge supply. The MOSFETS obtain the output current from this supply pin. Proper by-passing to GND with sufficient capacitance to suppress any voltage transients, and to ensure removing any drooping during switching, should be done as close to the pins on the hybrid as possible.

A OUT - is the output pin for one half of the bridge. Increasing the input voltage causes increasing duty cycle at this output.

B OUT - is the output pin for the other half of the bridge. Decreasing the input voltage causes increasing duty cycles at this point.

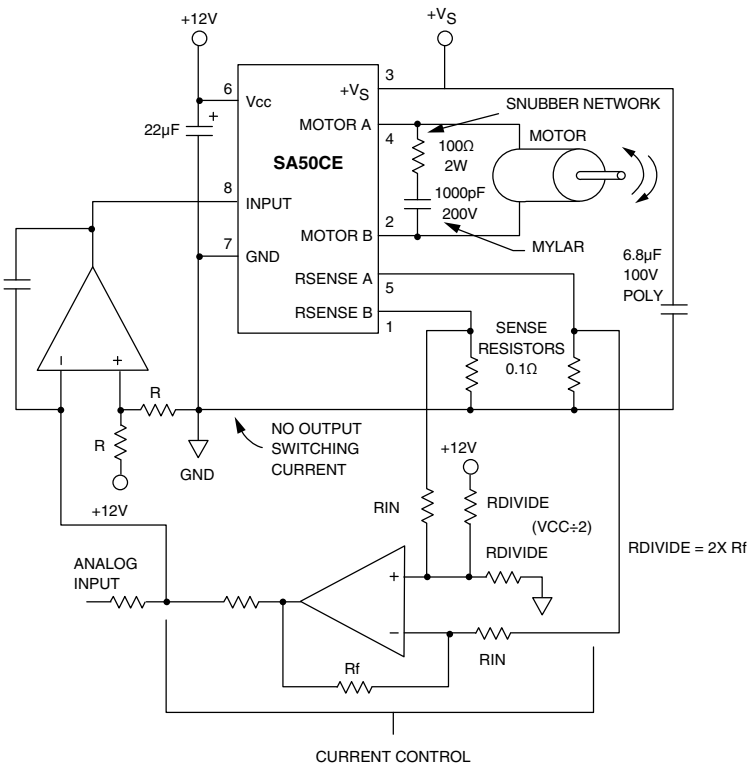
RSENSE A - This is the connection for the bottom of the A half bridge. This can have a sense resistor connected to the V_S return ground for current limit sensing, or can be connected directly to ground. The maximum voltage on this pin is ± 2 volts with respect to GND.

GND - is the return connection for the input logic and V_{CC} .

RSENSE B - This is the connection for the bottom of the B half bridge. This can have a sense resistor connection to the V_S return ground for current limit sensing, or can be connected directly to ground. The maximum voltage on this pin is ± 2 volts with respect to GND.

INPUT - is an analog input for controlling the PWM pulse width of the bridge. A voltage higher than $V_{CC}/2$ will produce greater than 50% duty cycle pulses out of A OUT. A voltage lower than $V_{CC}/2$ will produce greater than 50% duty cycle pulses out of B OUT.

5:1



This is a diagram of a typical application of the SA50CE. The design V_{CC} voltage is +12 volts. V_{CC} is internally bypassed with a good low ESR ceramic capacitor. A higher ESR bulk capacitor, such as a tantalum electrolytic, may be used externally in parallel. The analog input can be an analog speed control voltage from a potentiometer, other analog circuitry or by microprocessor and a D/A converter. This analog input gets pulled by the current control circuitry in the proper direction to reduce the current flow in the bridge if it gets too high. The gain of the current control amplifier will have to be set to obtain the proper amount of current limiting required by the system.

Current sensing is done in this case by a 0.1Ω sense resistor to sense the current from both legs of the bridge separately. It is important to make the high current traces as big as possible to keep inductance down. The storage capacitor connected to the V_S and the hybrid GND should be large enough to provide the high energy pulse without the voltage sagging too far. A low ESR capacitor will be required. Mount capacitor as close to the hybrid as possible. The connection between GND and the V_S return should not be carrying any motor current. The sense resistor signal is common mode filtered as necessary to feed the limiting circuitry. This application will allow full four quadrant torque control for a closed loop servo system.

A snubber network is usually required, due to the inductance in the power loop. It is important to design the snubber network to suppress any positive spikes above $+V_S$ and negative spikes below $-2V$ with respect to pin 7 (GND).

21 15523325

For all Apex Precision Power product questions and inquiries, call toll free 800-546-2739 in North America.

For inquiries via email, please contact apex.support@cirrus.com.

International customers can also request support by contacting their local Cirrus Logic Sales Representative.

To find the one nearest to you, go to www.cirrus.com

IMPORTANT NOTICE

Cirrus Logic, Inc. and its subsidiaries ("Cirrus") believe that the information contained in this document is accurate and reliable. However, the information is subject to change without notice and is provided "AS IS" without warranty of any kind (express or implied). Customers are advised to obtain the latest version of relevant information to verify, before placing orders, that information being relied on is current and complete. All products are sold subject to the terms and conditions of sale supplied at the time of order acknowledgment, including those pertaining to warranty, indemnification, and limitation of liability. No responsibility is assumed by Cirrus for the use of this information, including use of this information as the basis for manufacture or sale of any items, or for infringement of patents or other rights of third parties. This document is the property of Cirrus and by furnishing this information, Cirrus grants no license, express or implied under any patents, mask work rights, copyrights, trademarks, trade secrets or other intellectual property rights. Cirrus owns the copyrights associated with the information contained herein and gives consent for copies to be made of the information only for use within your organization with respect to Cirrus integrated circuits or other products of Cirrus. This consent does not extend to other copying such as copying for general distribution, advertising or promotional purposes, or for creating any work for resale.

CERTAIN APPLICATIONS USING SEMICONDUCTOR PRODUCTS MAY INVOLVE POTENTIAL RISKS OF DEATH, PERSONAL INJURY, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE ("CRITICAL APPLICATIONS"). CIRRUS PRODUCTS ARE NOT DESIGNED, AUTHORIZED OR WARRANTED TO BE SUITABLE FOR USE IN PRODUCTS SURGICALLY IMPLANTED INTO THE BODY, AUTOMOTIVE SAFETY OR SECURITY DEVICES, LIFE SUPPORT PRODUCTS OR OTHER CRITICAL APPLICATIONS. INCLUSION OF CIRRUS PRODUCTS IN SUCH APPLICATIONS IS UNDERSTOOD TO BE FULLY AT THE CUSTOMER'S RISK AND CIRRUS DISCLAIMS AND MAKES NO WARRANTY, EXPRESS, STATUTORY OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE, WITH REGARD TO ANY CIRRUS PRODUCT THAT IS USED IN SUCH A MANNER. IF THE CUSTOMER OR CUSTOMER'S CUSTOMER USES OR PERMITS THE USE OF CIRRUS PRODUCTS IN CRITICAL APPLICATIONS, CUSTOMER AGREES, BY SUCH USE, TO FULLY INDEMNIFY CIRRUS, ITS OFFICERS, DIRECTORS, EMPLOYEES, DISTRIBUTORS AND OTHER AGENTS FROM ANY AND ALL LIABILITY, INCLUDING ATTORNEYS' FEES AND COSTS, THAT MAY RESULT FROM OR ARISE IN CONNECTION WITH THESE USES.

Cirrus Logic, Cirrus, and the Cirrus Logic logo designs, Apex Precision Power, Apex and the Apex Precision Power logo designs are trademarks of Cirrus Logic, Inc. All other brand and product names in this document may be trademarks or service marks of their respective owners.