



# 2A Dual H-Bridge Driver

## Description

The CS-298 is a power integrated circuit capable of driving resistive and inductive loads such as relays, solenoids, DC and stepping motors. This device is a quad push-pull driver (half H-bridge) with the ability to deliver up to 2A of continuous current per channel.

Each pair of drivers is equipped with an ENABLE input which enables or disables the associated drive stage independent of input signals. This is convenient for powering the device down or utilizing it in the chop mode. The logic inputs to the CS-298 have high input thresholds and hysteresis to provide trouble free operation in noisy environments normally associated with motors and inductive loads. The input currents and thresholds enable the device to be driven by TTL and CMOS systems without buffering or level shifting.

The emitters of the lower transistors of each bridge are connected together and the corresponding pins (SENSE A / SENSE B) can be connected to a sense resistor which, when used with an appropriate external circuit, can detect load faults or control load currents when the device is in switch mode operation.

This device also features separate logic supply and load supply inputs to reduce total IC power consumption, thus making the CS-298 ideal for systems which require low-standby current.

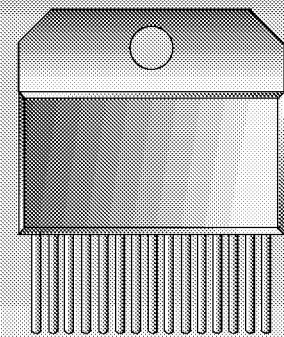
The CS-298 is packaged in a 15-lead Power SIP package and handles up to 2A per channel at voltages of 46 volts.

## Features

- Supply Voltage up to 46V
- Total Saturation Voltage 3.4V (Max) at 1A
- Overtemperature Protection
- Operates in Switched and Linear Regulation Modes
- 2A Per Channel Continuous
- Individual Logic Inputs for Each Driver
- Channel-Enable Logic Inputs for Driver Pairs

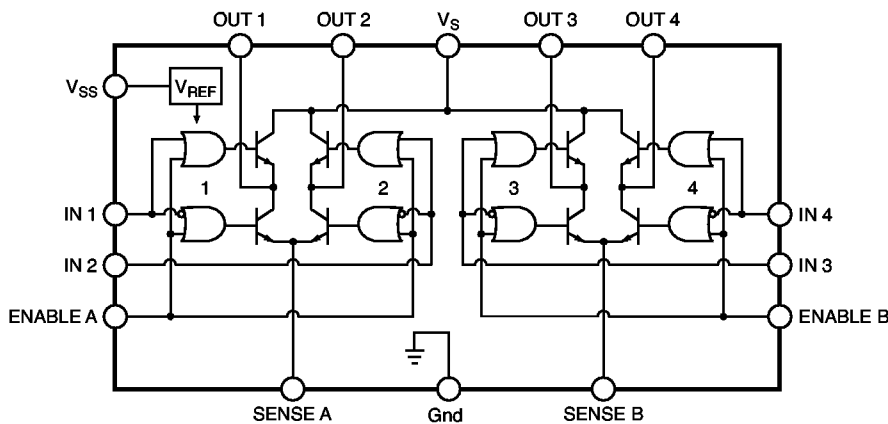
## Package Options

15L Power SIP



- |                  |                   |
|------------------|-------------------|
| 1 SENSE A        | 9 V <sub>SS</sub> |
| 2 OUT1           | 10 IN3            |
| 3 OUT2           | 11 ENABLE B       |
| 4 V <sub>S</sub> | 12 IN4            |
| 5 IN1            | 13 OUT3           |
| 6 ENABLE A       | 14 OUT4           |
| 7 IN2            | 15 SENSE B        |
| 8 Gnd            |                   |

## Block Diagram



## Absolute Maximum Ratings

Power Supply .....	50V
Logic Supply Voltage .....	7V
Input and Inhibit Voltage.....	-0.3 to +7V
Peak Output Current (each channel)	
Non-Repetitive (+100 $\mu$ s).....	3A
Repetitive (80% on 20% off; $t_{on} = 10$ ms) .....	2.5A
DC Operation .....	2A
Sensing Voltage.....	-1 to 2.3V
Total Power Dissipation ( $T_{EASE} = 75^{\circ}$ C) .....	25W
Junction Temperature.....	-40 $^{\circ}$ C to 150 $^{\circ}$ C
Storage Temperature.....	-65 $^{\circ}$ C to 150 $^{\circ}$ C
Operating Temperature.....	-40 $^{\circ}$ C to 125 $^{\circ}$ C
Lead Temperature Soldering: Wave Solder(through hole styles only) .....	10 sec. max, 260 $^{\circ}$ C peak

Electrical Characteristics: For each channel,  $V_S = 42$ V,  $V_{SS} = 5$ V,  $T_J = 25^{\circ}$ C

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	Operative Condition	$V_{IN} + 2.5$		46	V
Logic Supply Voltage		4.5		7.0	V
Quiescent Supply Current	$V_{INH} = H; V_I = L$ $I_L = 0; V_I = H$ $V_{INH} = L$		3 15	7 20	mA
Quiescent Current from VSS	$V_{INH} = H; V_I = L$ $I_L = 0; V_I = H$ $V_{INH} = L$		5 1.5 1	10 3 1.5	mA
Input Low Voltage		-0.3		1.5	V
Input High Voltage		2.3		$V_{SS}$	V
Low Voltage Input Current	$V_I = L$			-10	$\mu$ A
High Voltage Input Current	$V_I = H$		30	100	$\mu$ A
Inhibit Low Voltage		-0.3		1.5	V
Inhibit High Voltage		2.3		$V_{SS}$	V
Low Voltage Inhibit Current	$V_{INH} = L$			-10	$\mu$ A
High Voltage Inhibit Current	$V_{INH} = H \leq V_{SS} - 0.6$ V		30	100	$\mu$ A
Source Saturation Voltage	$I_L = 1$ A $I_L = 2$ A		1.2 1.8	1.8 2.8	V
Sink Saturation Voltage	$I_L = 1$ A $I_L = 2$ A		1.2 1.7	1.8 2.6	V
Total Drop	$I_L = 1$ A $I_L = 2$ A			3.4 5.2	V
Sensing Voltage		-1(1)		2	V
Source Current Turn-Off Delay	0.5 $V_I$ to 0.9 $I_L$ (2)		1.7		$\mu$ s
Source Current Fall Time	0.9 $I_L$ to 0.1 $I_L$ (2)		0.2		$\mu$ s
Source Current Turn-On Delay	0.5 $V_I$ to 0.1 $I_L$ (2)		2.5		$\mu$ s
Source Current Rise Time	0.1 $I_L$ to 0.9 $I_L$ (2)		0.35		$\mu$ s

## Electrical Characteristics: continued

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Sink Current Turn-off Delay	$0.5 V_I$ to $0.9 I_L$ (3)		0.7		$\mu s$
Sink Current Fall Time	$0.9 I_L$ to $0.1 I_L$ (3)		0.2		$\mu s$
Sink Current Turn-on Delay	$0.5 V_I$ to $0.1 I_L$ (3)		1.5		$\mu s$
Sink Current Rise Time	$0.1 I_L$ to $0.9 I_L$ (3)		0.2		$\mu s$
Commutation Frequency	$I_L = 2A$		25	40	KHz

## Note:

1. Sensing voltage can be  $-1V$  for  $t \leq 50\mu s$ ; in steady state  $V_{SENSE \text{ min}} \geq -0.5V$ .
2. See Figure 1a.
3. See Figure 2a.

## Package Pin Description

PACKAGE PIN #	PIN SYMBOL	FUNCTION
<b>15L Power SIP</b>		
1	SENSE A	Monitors current through half H-bridges 1 and 2.
2	OUT 1	Output for half H-bridge 1.
3	OUT2	Opposite output to second half H-bridge 2.
4	$V_S$	Power supply for output drivers.
5	IN 1	Input to half H-bridge driver 1.
6	ENABLE A	Enables half bridge drivers 1 and 2.
7	IN 2	Input to half H-bridge 2.
8	Gnd	Ground connection.
9	$V_{SS}$	Power supply for analog and logic circuits.
10	IN 3	Input to half H-bridge driver 3.
11	ENABLE B	Enables half H-bridge drivers 3 and 4.
12	IN 4	Input to half H-bridge 4.
13	OUT 3	Output to half H-bridge 3.
14	OUT 4	Output to half H-bridge 4.
15	SENSE B	Monitors current through half H-bridges 3 and 4.

## Circuit Operation

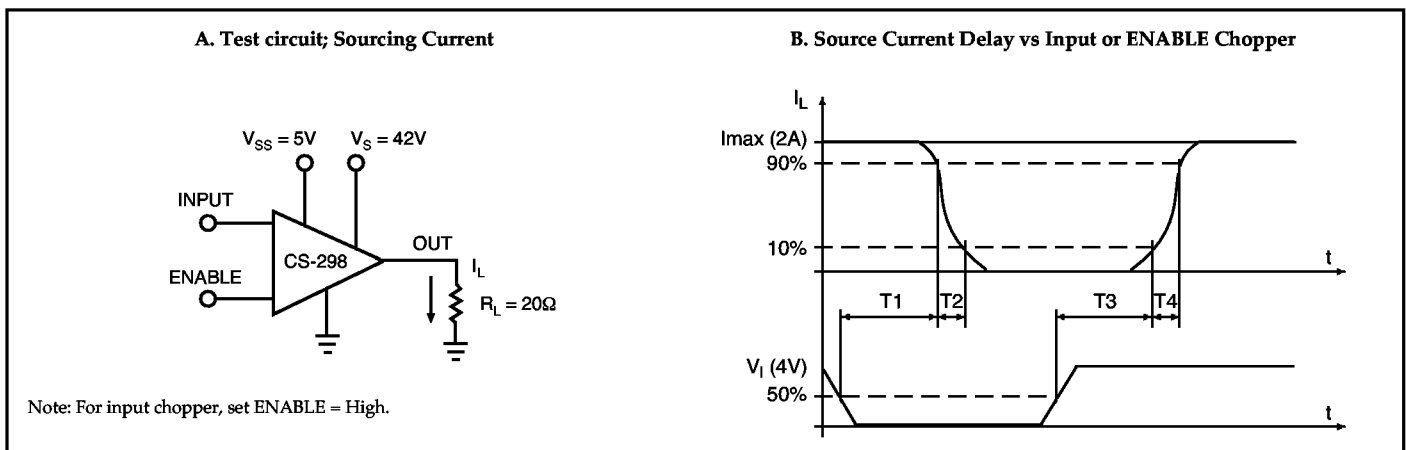


Figure 1. Switching Times

**Circuit Operation**

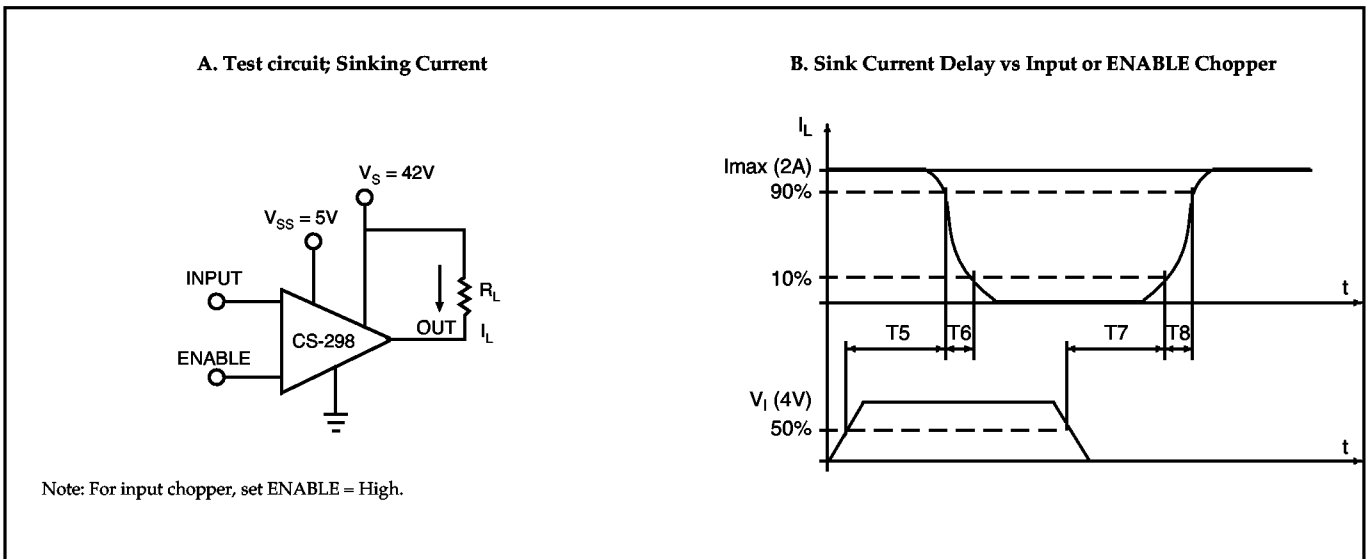


Figure 2. Switching Times Test Circuits

**Application Circuits**

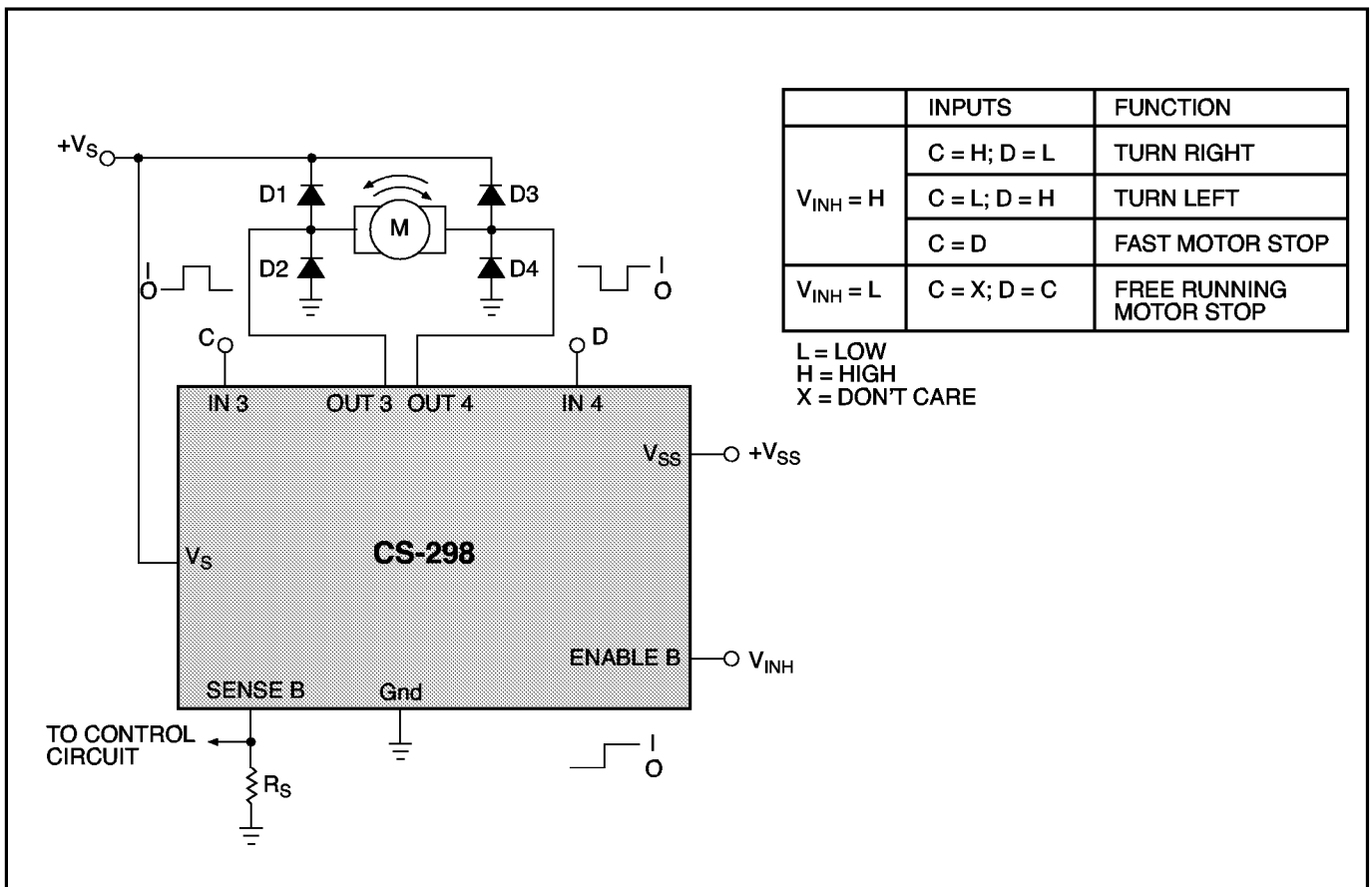


Figure 3. Bi-Directional DC Motor Control

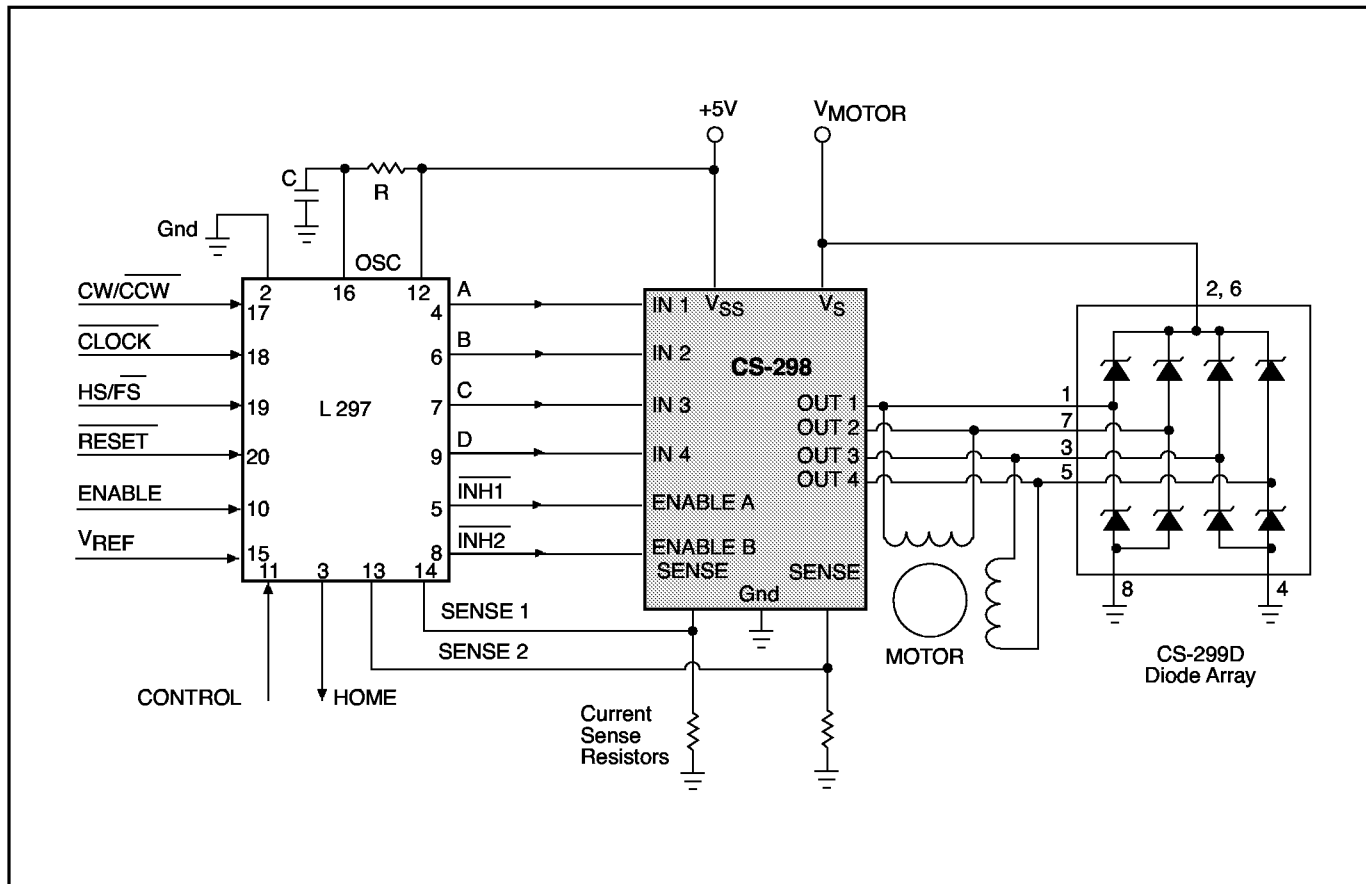


Figure 4. Two Phase Bipolar Stepper Motor Control Circuit. This Circuit Drives Bipolar Stepper Motor With Winding Currents Up To 2A

