CS-298

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.

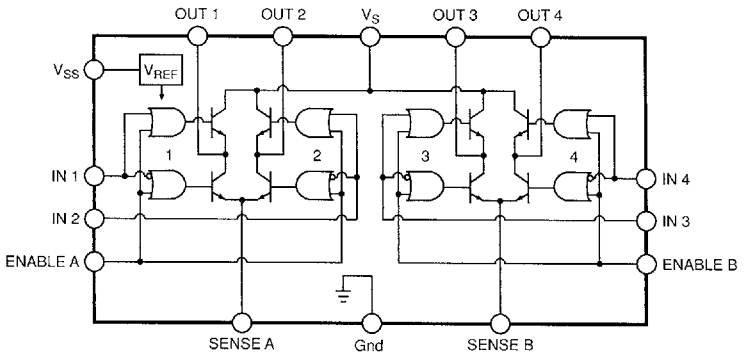
This device also features separate logic supply and load supply inputs to reduce total IC power consumption, thus making the CS-298 ideal for systems which require low-standby current.

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

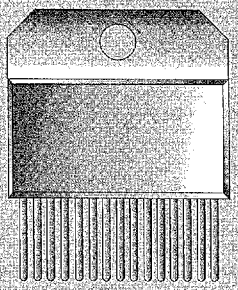
- Supply Voltage up to 46V
- Total Saturation Voltage 3.4V (Max) at 1A
- Overtemperature Protection
- Operates in Switched and Linear Regulation Modes
- 2A Per Channel Continuous
- Individual Logic Inputs for Each Driver
- Channel-Enable Logic Inputs for Driver Pairs

Block Diagram



Package Options

15L Power SIP



1	SENSE A	9	V_{SS}
2	OUT1	10	IN3
3	OUT2	11	ENABLE B
4	V_S	12	IN4
5	IN1	13	OUT3
6	ENABLE A	14	OUT4
7	IN2	15	SENSE B
8	Gnd		

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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 (+=100µs) 3A
  Repetitive (80% on 20% off; t_{on} = 10ms) 2.5A
  DC Operation 2A
Sensing Voltage ..... –1 to 2.3V
Total Power Dissipation (T_{EASE} = 75°C) 25W
Junction Temperature ..... -40°C to 150°C
Storage Temperature ..... –65°C to 150°C
Operating Temperature ..... –40°C to 125°C
Lead Temperature Soldering: Wave Solder(through hole styles only) ..... 10 sec. max, 260°C peak

Electrical Characteristics: For each channel, V_S = 42V, V_{SS} = 5V, T_J = 25°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		3	7	mA
	I_L = 0; V_I = H		15	20	
	V_{INH} = L			1	
Quiescent Current from VSS	V_{INH} = H; V_I = L		5	10	mA
	I_L = 0; V_I = H		1.5	3	
	V_{INH} = L		1	1.5	
Input Low Voltage		-0.3		1.5	V
Input High Voltage		2.3		V_{SS}	V
Low Voltage Input Current	V_I = L			-10	µA
High Voltage Input Current	V_I = H		30	100	µA
Inhibit Low Voltage		-0.3		1.5	V
Inhibit High Voltage		2.3		V_{SS}	V
Low Voltage Inhibit Current	V_{INH} = L			-10	µA
High Voltage Inhibit Current	V_{INH} = H ≤ V_{SS} -0.6V		30	100	µA
Source Saturation Voltage	I_L = 1A		1.2	1.8	V
	I_L = 2A		1.8	2.8	
Sink Saturation Voltage	I_L = 1A		1.2	1.8	V
	I_L = 2A		1.7	2.6	
Total Drop	I_L = 1A			3.4	V
	I_L = 2A			5.2	
Sensing Voltage		-1(1)		2	V
Source Current Turn-Off Delay	0.5 V_I to 0.9 I_L (2)		1.7		µs
Source Current Fall Time	0.9 I_L to 0.1 I_L (2)		0.2		µs
Source Current Turn-On Delay	0.5 V_I to 0.1 I_L (2)		2.5		µs
Source Current Rise Time	0.1 I_L to 0.9 I_L (2)		0.35		µs

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		µs
Sink Current Fall Time	0.9 I_L to 0.1 I_L (3)		0.2		µs
Sink Current Turn-on Delay	0.5 V_I to 0.1 I_L (3)		1.5		µs
Sink Current Rise Time	0.1 I_L to 0.9 I_L (3)		0.2		µs
Commutation Frequency	IL = 2A		25	40	KHz

Note:

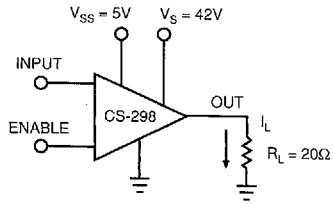
1. Sensing voltage can be -1V for t ≤ 50µs; in steady state V_{SENSE} min ≥ -0.5V.
2. See Figure 1a.
3. See Figure 2a.

Package Pin Description

PACKAGE PIN #	PIN SYMBOL	FUNCTION
15L Power SIP		
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

A. Test circuit; Sourcing Current



Note: For input chopper, set ENABLE = High.

B. Source Current Delay vs Input or ENABLE Chopper

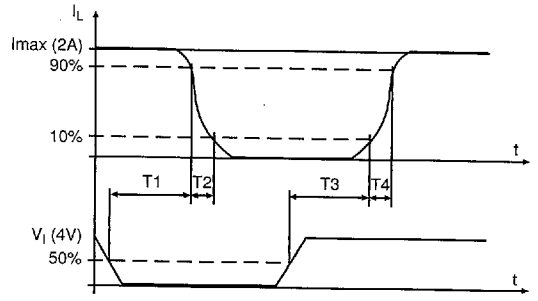
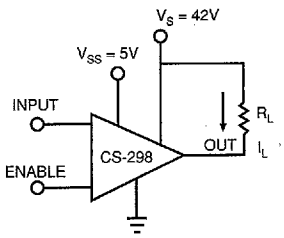


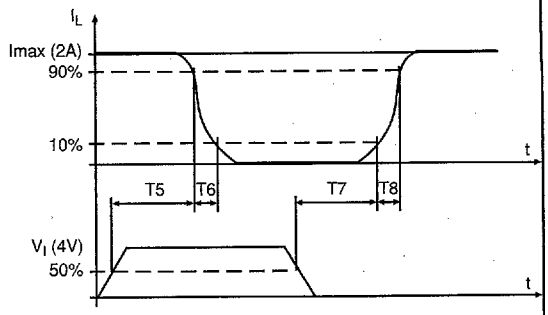
Figure 1. Switching Times

Circuit Operation

A. Test circuit; Sinking Current



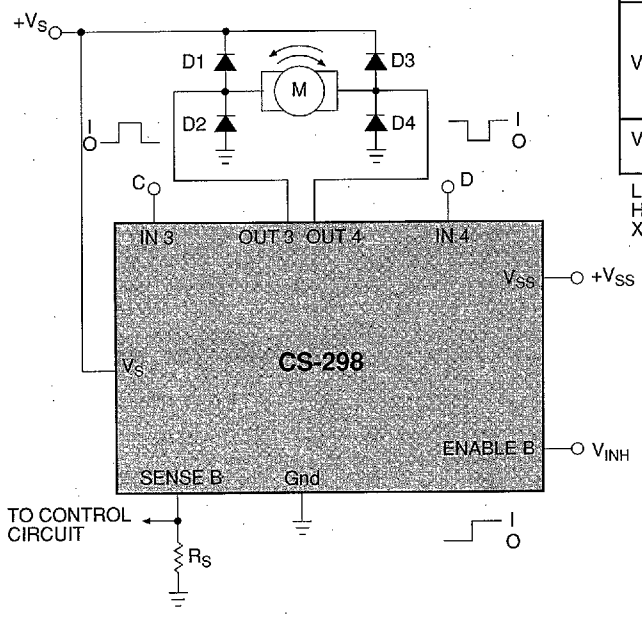
B. Sink Current Delay vs Input or ENABLE Chopper



Note: For input chopper, set ENABLE = High.

Figure 2. Switching Times Test Circuits

Application Circuits



	INPUTS	FUNCTION
V_{INH} = H	C = H; D = L	TURN RIGHT
	C = L; D = H	TURN LEFT
	C = D	FAST MOTOR STOP
V_{INH} = L	C = X; D = C	FREE RUNNING MOTOR STOP

L = LOW
H = HIGH
X = DON'T CARE

Figure 3. Bi-Directional DC Motor Control

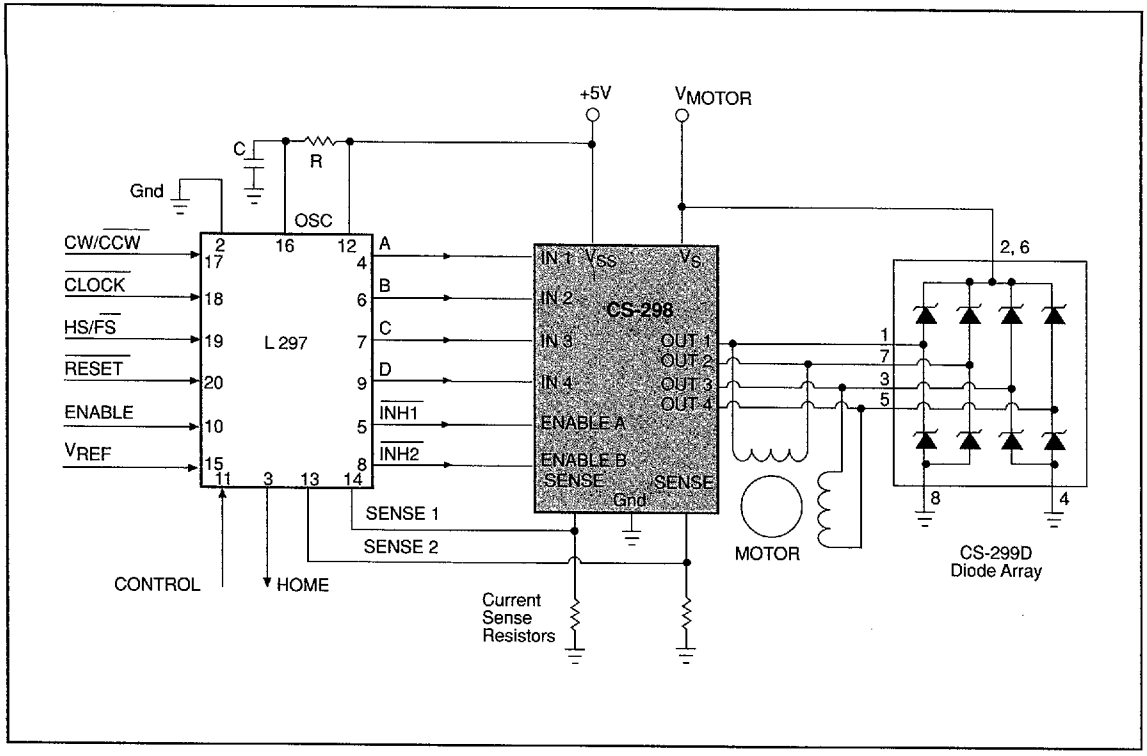


Figure 4. Two Phase Bipolar Stepper Motor Control Circuit. This Circuit Drives Bipolar Stepper Motor With Winding Currents Up To 2A

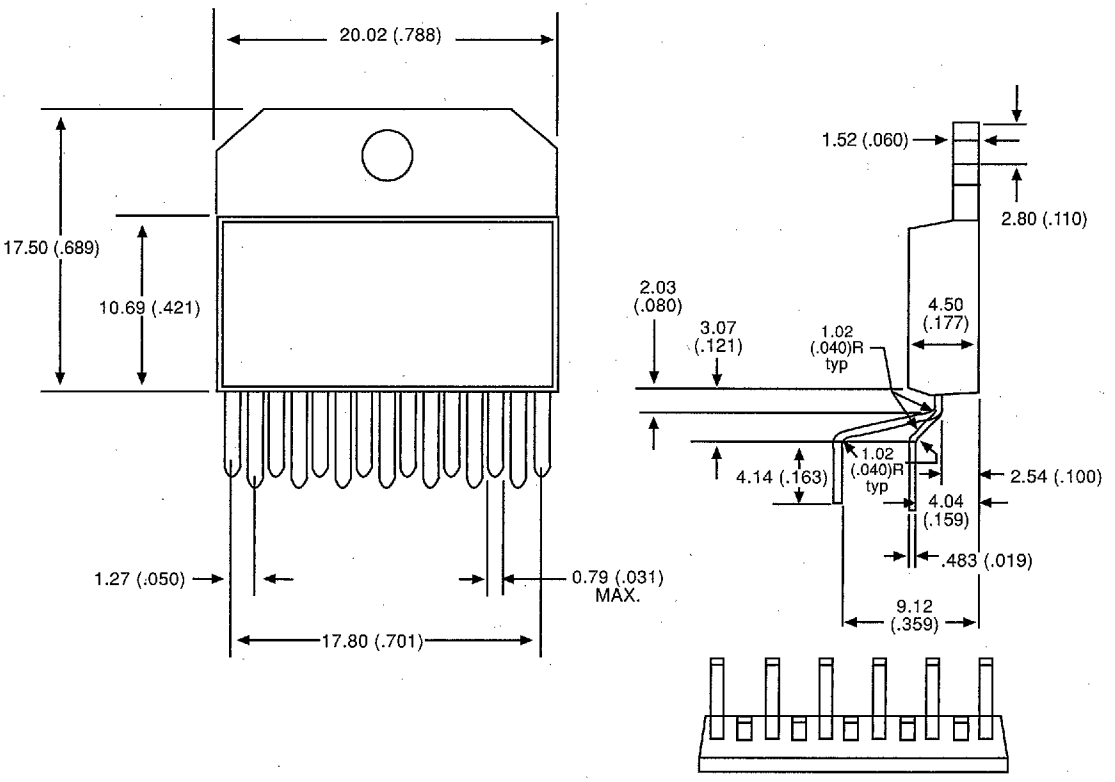
Package Specification

PACKAGE DIMENSIONS IN mm (INCHES)

PACKAGE THERMAL DATA

Thermal Data		15 Lead Power SIP	
$R_{\Theta JC}$	typ	3	°C/W
$R_{\Theta JA}$	typ	35	°C/W

15 Lead Power SIP



Ordering Information

Part Number	Description
CS-298M15	15L Power SIP Straight
CS-298MV15	15L Power SIP Vertical