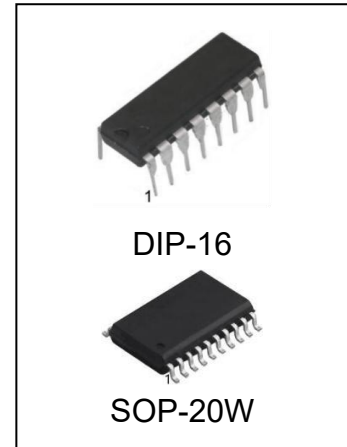


PUSH-PULL FOUR CHANNEL DRIVER WITH DIODES

FEATURES

- 600mA Output Current Capability Per Channel
- 1.0 A Peak Output Current(Non Repeti- Tive) Per Channel
- Enable Facility Overtemperature Protection
- Logical "0" Input Voltage Up To 1.5 V (High Noise Immunity)
- Internal Clamp Diodes



ORDERING INFORMATION

DEVICE	Package Type	MARKING	Packing	Packing Qty
L293DN	DIP-16	L293D	TUBE	1000pcs/box
L293DDM/TR	SOP-20W	L293D	REEL	2000pcs/reel

DESCRIPTION

The Device is a monolithic integrated high voltage, high current four channel driver designed to accept standard DTL or TTL logic levels and drive inductive loads (such as relays solenoids, DC and stepping motors) and switching power transistors.

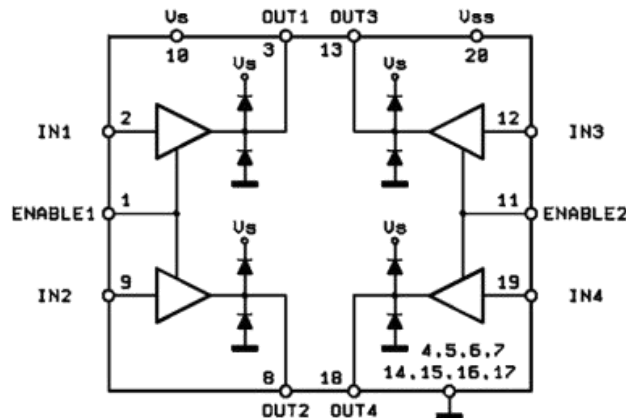
To simplify use as two bridges each pair of channels is equipped with an enable input. A separate supply input is provided for the logic, allowing operation at a lower voltage and internal clamp diodes are included.

This device is suitable for use in switching applications at frequencies up to 5 kHz.

The L293D is assembled in a 16 lead plastic package which has 4 center pins connected together and used for heatsinking

The L293DD is assembled in a 20 lead surface mount which has 8 center pins connected together and used for heatsinking.

BLOCK DIAGRAM

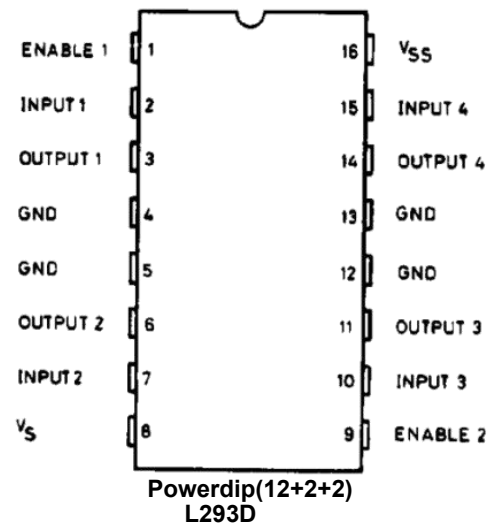
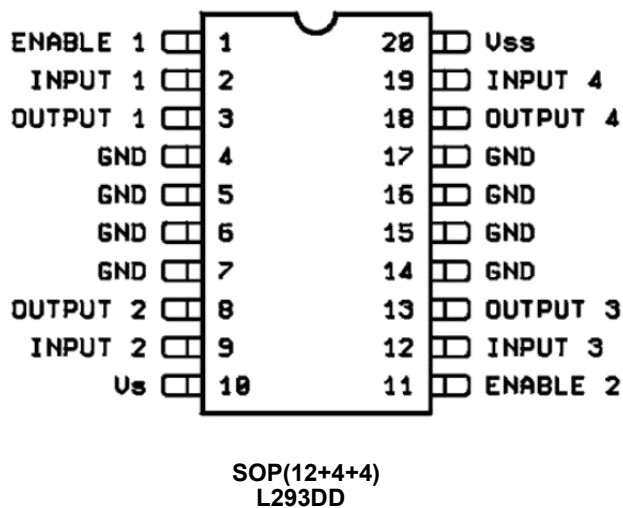


ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_S	Supply Voltage	36	V
V_{SS}	Logic Supply Voltage	36	V
V_i	Input Voltage	7	V
V_{en}	Enable Voltage	7	V
I_o	Peak Output Current (100 μ s non repetitive)	1.0	A
P_{tot}	Total Power Dissipation at $T_{pins} = 90^{\circ}C$	4	W
T_L	Lead Temperature (Soldering, 10 seconds)	260	$^{\circ}C$
T_{stg}, T_j	Storage and Junction Temperature	-40 ~ 150	$^{\circ}C$
T_A	Operating Temperature Range	-20 ~ 85	$^{\circ}C$

Note: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but specific performance is not ensured.

PIN CONNECTIONS (Top view)



THERMAL DATA

Symbol	Decription		DIP	SOP	Unit
$R_{th\ j-pins}$	Thermal Resistance Junction-pins	max.	—	14	$^{\circ}C/W$
$R_{th\ j-amb}$	Thermal Resistance junction-ambient	max.	80	50 (*)	$^{\circ}C/W$
$R_{th\ j-case}$	Thermal Resistance Junction-case	max.	14	—	

(*) With 6sq. cm on board heatsink.

ELECTRICAL CHARACTERISTICS

(for each channel, $V_S=24V$, $V_{SS}=5V$, $T_{amb}=25\text{ }^{\circ}C$, unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_S	Supply Voltage (pin 10)		V_{SS}		36	V
V_{SS}	Logic Supply Voltage (pin 20)		4.5		36	V
I_S	Total Quiescent Supply Current	$V_i = L$; $I_o = 0$; $V_{en} = H$		2	6	mA
	(pin 10)	$V_i = H$; $I_o = 0$; $V_{en} = H$		16	24	mA
		$V_{en} = L$			4	mA
I_{SS}	Total Quiescent Logic Supply	$V_i = L$; $I_o = 0$; $V_{en} = H$		44	60	mA
	Current (pin 20)	$V_i = H$; $I_o = 0$; $V_{en} = H$		16	22	mA
		$V_{en} = L$		16	24	mA
V_{IL}	Input Low Voltage (pin 2, 9, 12, 19)		-0.3		1.5	V
V_{IH}	Input High Voltage (pin 2, 9, 12, 19)	$V_{SS} \quad 7\text{ V}$	2.3		V_{SS}	V
		$V_{SS} > 7\text{ V}$	2.3		7	V
I_{IL}	Low Voltage Input Current (pin 2, 9, 12, 19)	$V_{IL} = 1.5\text{ V}$			-10	μA
I_{IH}	High Voltage Input Current (pin 2, 9, 12, 19)	$2.3\text{ V} \quad V_{IH} \quad V_{SS} - 0.6\text{ V}$		30	100	μA
$V_{en L}$	Enable Low Voltage (pin 1, 11)		-0.3		1.5	V
$V_{en H}$	Enable High Voltage	$V_{SS} \quad 7\text{ V}$	2.3		V_{SS}	V
	(pin 1, 11)	$V_{SS} > 7\text{ V}$	2.3		7	V
$I_{en L}$	Low Voltage Enable Current (pin 1, 11)	$V_{en L} = 1.5\text{ V}$		-30	-100	μA
$I_{en H}$	High Voltage Enable Current (pin 1, 11)	$2.3\text{ V} \quad V_{en H} \quad V_{SS} - 0.6\text{ V}$			± 10	μA
$V_{CE(sat)H}$	Source Output Saturation Voltage (pins 3, 8, 13, 18)	$I_o = -0.6\text{ A}$		1.4	1.8	V
$V_{CE(sat)L}$	Sink Output Saturation Voltage (pins 3, 8, 13, 18)	$I_o = +0.6\text{ A}$		1.2	1.8	V
V_F	Clamp Diode Forward Voltage	$I_o = 600\text{ nA}$		1.3		V
t_r	Rise Time (*)	$0.1\text{ to }0.9\text{ }V_O$		250		ns
t_f	Fall Time (*)	$0.9\text{ to }0.1\text{ }V_O$		250		ns
t_{on}	Turn-on Delay (*)	$0.5\text{ }V_i\text{ to }0.5\text{ }V_O$		750		ns
t_{off}	Turn-off Delay (*)	$0.5\text{ }V_i\text{ to }0.5\text{ }V_O$		200		ns

(*) See fig. 1.

TRUTH TABLE (one channel)

Input	Enable (*)	Output
H	H	H
L	H	L
H	L	Z
L	L	Z

Z = High output impedance

(*) Relative to the considered channel

Figure 1: Switching Times

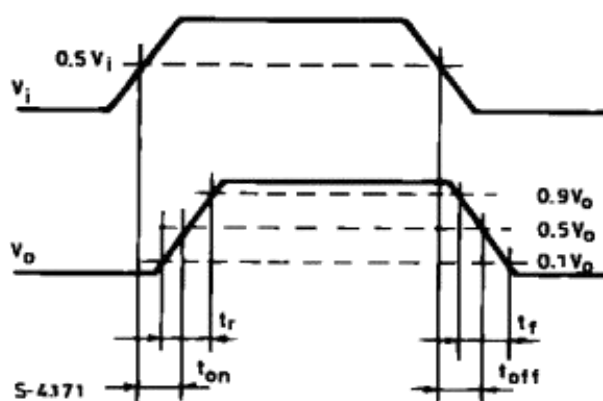
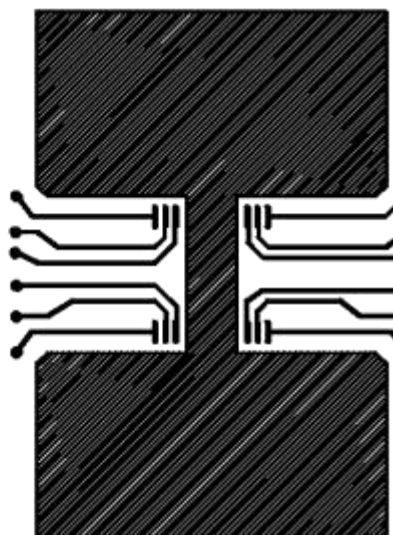
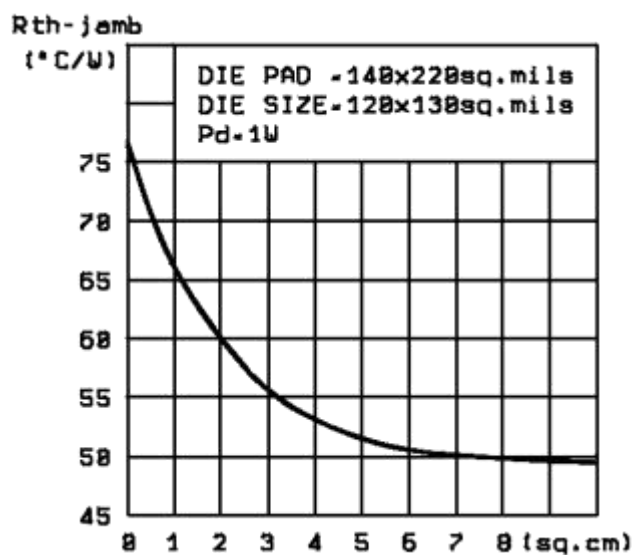
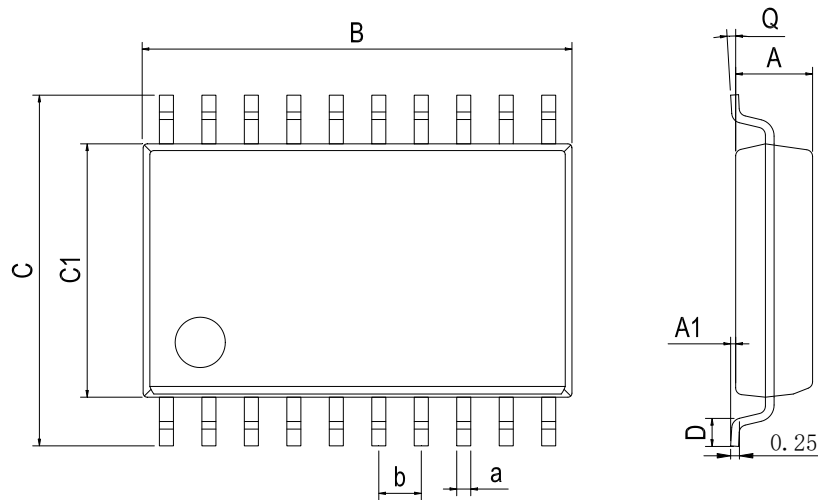


Figure 2: Junction to ambient thermal resistance vs. area on board heatsink (SOP 12+4+4 package)



PHYSICAL DIMENSIONS

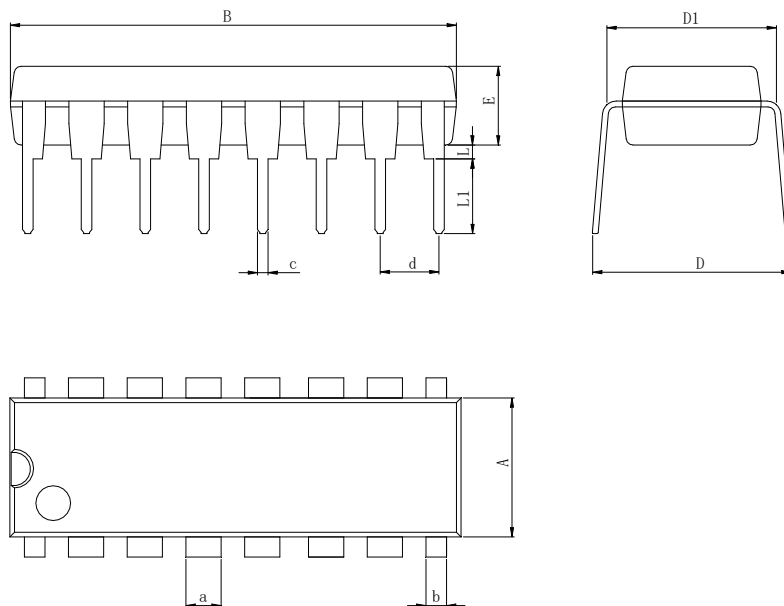
SOP-20W



Dimensions In Millimeters(SOP-20W)

Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	2.10	0.05	12.50	10.21	7.40	0.45	0°	0.35	1.27 BSC
Max:	2.50	0.25	13.00	10.61	7.60	1.25	8°	0.45	

DIP-16



Dimensions In Millimeters(DIP-16)

Symbol:	A	B	D	D1	E	L	L1	a	b	c	d
Min:	6.10	18.94	8.10	7.42	3.10	0.50	3.00	1.50	0.85	0.40	2.54 BSC
Max:	6.68	19.56	10.9	7.82	3.55	0.70	3.60	1.55	0.90	0.50	

Revision History

REVISION NUMBER	DATE	REVISION	PAGE
V1.0	2014-8	New	1-8
V1.1	2018-9	Update encapsulation type、Updated DIP-16 dimension	1、 6
V1.2	2020-10	Updated max Peak Output Current、 Update packages model SOP-20W	1
V1.3	2024-12	Update Lead Temperature	3
V1.4	2025-12	Update important statements	8

IMPORTANT STATEMENT:

Huaguan Semiconductor reserves the right to change products and services offered without prior notice. Customers should obtain the latest relevant information before placing orders and verify that such information is current and complete. Huaguan Semiconductor assumes no responsibility or liability for altered documents.

Customers are responsible for complying with safety standards and implementing safety measures when using Huaguan Semiconductor products in system design and end-product manufacturing. You assume full responsibility for: selecting the appropriate Huaguan Semiconductor products for your application; designing, validating, and testing your application; and ensuring that your application complies with applicable standards and all other safety, security, or other requirements. This is to prevent potential risks that may lead to personal injury or property damage.

Huaguan Semiconductor products are not approved for use in life support, military, aerospace, or other high-risk applications. Huaguan products are neither intended nor warranted for use in such systems or equipment. Any failure or malfunction may lead to personal injury or severe property damage. Such applications are deemed "Unsafe Use." Unsafe Use includes, but is not limited to: surgical and medical equipment, nuclear energy control equipment, aircraft or spacecraft instruments, control or operation of vehicle power, braking, or safety systems, traffic signal instruments, all types of safety devices, and any other applications intended to support or sustain life. Huaguan Semiconductor shall not be liable for consequences resulting from Unsafe Use in these fields. Users must independently evaluate and assume all risks. Any issues, liabilities, or losses arising from the use of products beyond their approved applications shall be solely borne by the user. Users may not claim any compensation from Huaguan Semiconductor based on these terms. If any third party claims against Huaguan Semiconductor due to such Unsafe Use, the user shall compensate Huaguan Semiconductor for all resulting damages and liabilities.

Huaguan Semiconductor provides technical and reliability data (including datasheets), design resources (including reference designs), application or other design advice, web tools, safety information, and other resources for its semiconductor products. However, no guarantee is made that these resources are free from defects, and no express or implied warranties are provided. The use of testing and other quality control techniques is limited to Huaguan Semiconductor's quality assurance scope. Not all parameters of each device are tested.

Huaguan Semiconductor's documentation authorizes you to use these resources only for developing applications related to the products described herein. You are not granted rights to any other intellectual property of Huaguan Semiconductor or any third party. Any other reproduction or display of these resources is strictly prohibited. You shall fully indemnify Huaguan Semiconductor and its agents against any claims, damages, costs, losses, and liabilities arising from your use of these resources. Huaguan Semiconductor shall not be held responsible.