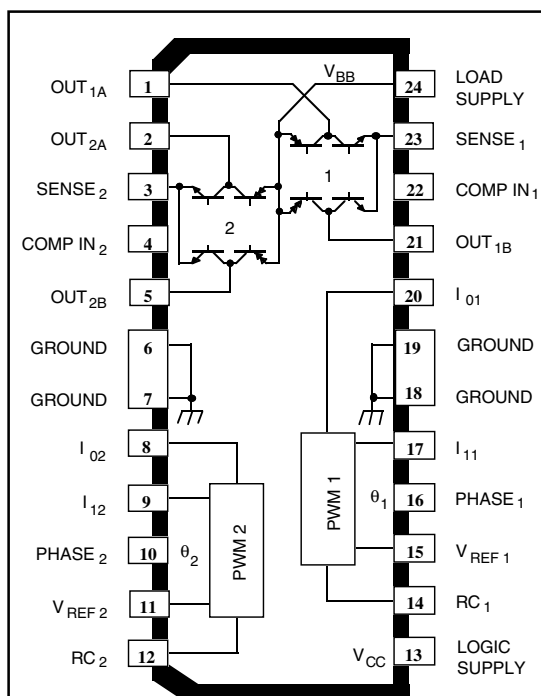


L6219DS

Data Sheet
29319.43

DUAL FULL-BRIDGE PWM MOTOR DRIVER



Dwg. PP-005-3

ABSOLUTE MAXIMUM RATINGS at $T_J \leq 150^\circ\text{C}$

Motor Supply Voltage, V_{BB}	45 V
Output Current, I_{OUT}	
(Peak)	+1.0 A
(Continuous)	+750 mA
Logic Supply Voltage, V_{CC}	7.0 V
Logic Input Voltage Range,	
V_{IN}	-0.3 V to +7.0 V
Output Emitter Voltage, V_{SENSE}	1.5 V
Package Power Dissipation,	
P_D	See Graph
Operating Temperature Range,	
T_A	-20°C to +85°C
Storage Temperature Range,	
T_S	-55°C to +150°C

Output current rating may be limited by duty cycle, ambient temperature, and heat sinking. Under any set of conditions, do not exceed the specified peak current rating or a junction temperature of +150°C.

The L6219DS motor driver is designed to drive both windings of a bipolar stepper motor or bidirectionally control two dc motors. Both bridges are capable of sustaining 45 V and include internal pulse-width modulation (PWM) control of the output current to 750 mA. The outputs have been optimized for a low output saturation voltage drop (less than 1.8 V total source plus sink at 500 mA).

For PWM current control, the maximum output current is determined by the user's selection of a reference voltage and sensing resistor. Two logic-level inputs select output current limits of 0, 33, 67, or 100% of the maximum level. A PHASE input to each bridge determines load current direction.

The bridges include both ground clamp and flyback diodes for protection against inductive transients. Internally generated delays prevent cross-over currents when switching current direction. Special power-up sequencing is not required. Thermal protection circuitry disables the outputs if the chip temperature exceeds safe operating limits.

The L6219DS is supplied in a 24-lead surface-mountable SOIC. Its batwing construction provides for maximum package power dissipation in the smallest possible construction. This device is also available on special order for operation from -40°C to +85°C or to +105°C.

FEATURES

- Interchangeable with SGS L6219DS
- 750 mA Continuous Output Current
- 45 V Output Sustaining Voltage
- Internal Clamp Diodes
- Internal PWM Current Control
- Low Output Saturation Voltage
- Internal Thermal Shutdown Circuitry
- Similar to Dual PBL3717, UC3770

Always order by complete part number, e.g., **L6219DS**.

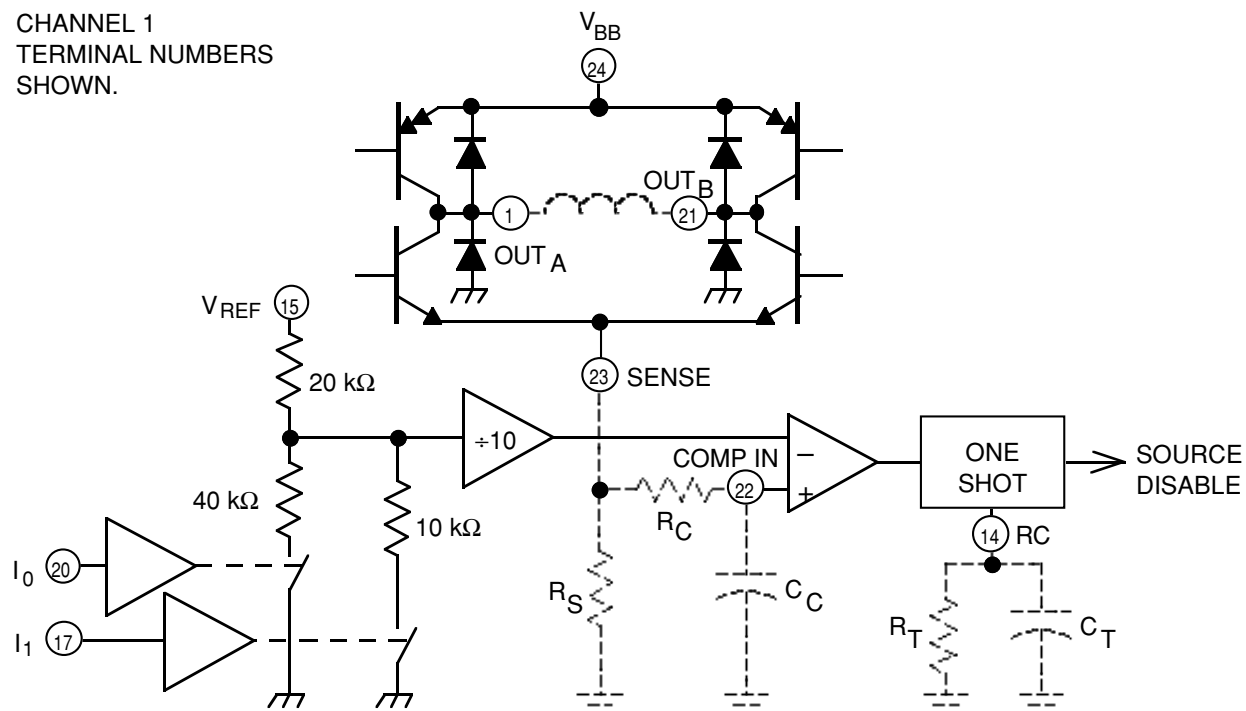
L6219DS

DUAL FULL-BRIDGE

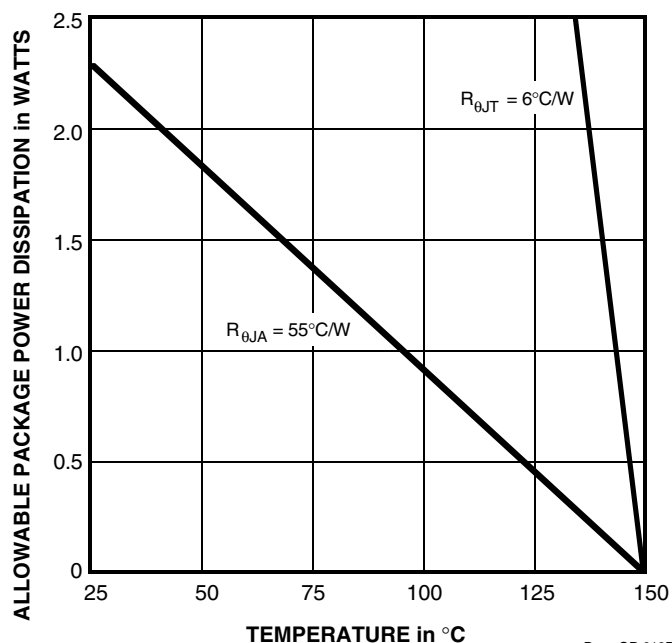
MOTOR DRIVER

PWM CURRENT-CONTROL CIRCUITRY

CHANNEL 1
TERMINAL NUMBERS
SHOWN.



Dwg. EP-007-5



Dwg. GP-019B

TRUTH TABLE

PHASE	OUT _A	OUT _B
H	H	L
L	L	H

L6219DS

DUAL FULL-BRIDGE MOTOR DRIVER

ELECTRICAL CHARACTERISTICS at $T_A = +25^{\circ}\text{C}$, $T_J \leq 150^{\circ}\text{C}$, $V_{BB} = 45\text{ V}$, $V_{CC} = 4.75\text{ V}$ to 5.25 V , $V_{REF} = 5.0\text{ V}$ (unless otherwise noted).

Characteristic	Symbol	Test Conditions	Limits			
			Min.	Typ.	Max.	Units
Output Drivers (OUT _A or OUT _B)						
Motor Supply Range	V _{BB}		10	—	45	V
Output Leakage Current	I _{CEX}	V _{OUT} = V _{BB}	—	< 1.0	50	μA
		V _{OUT} = 0	—	<-1.0	-50	μA
Output Sustaining Voltage	V _{CE(sus)}	I _{OUT} = ±750 mA, L = 3.0 mH	45	—	—	V
Output Saturation Voltage	V _{CE(SAT)}	Sink Driver, I _{OUT} = +500 mA	—	0.4	0.6	V
		Sink Driver, I _{OUT} = +750 mA	—	1.0	1.2	V
		Source Driver, I _{OUT} = -500 mA	—	1.0	1.2	V
		Source Driver, I _{OUT} = -750 mA	—	1.3	1.5	V
Clamp Diode Leakage Current	I _R	V _R = 45 V	—	< 1.0	50	μA
Clamp Diode Forward Voltage	V _F	I _F = 750 mA	—	1.6	2.0	V
Driver Supply Current	I _{BB(ON)}	Both Bridges On, No Load	—	20	25	mA
	I _{BB(OFF)}	Both Bridges Off	—	5.0	10	mA

Control Logic

Input Voltage	$V_{IN(1)}$	All inputs	2.4	—	—	V
	$V_{IN(0)}$	All inputs	—	—	0.8	V
Input Current	$I_{IN(1)}$	$V_{IN} = 2.4\text{ V}$	—	<1.0	20	μA
		$V_{IN} = 0.8\text{ V}$	—	- 3.0	-200	μA
Reference Voltage Range	V_{REF}	Operating	1.5	—	7.5	V
Current Limit Threshold (at trip point)	V_{REF}/V_{COMPIN}	$I_0 = I_1 = 0.8\text{ V}$	9.5	10	10.5	—
		$I_0 = 2.4\text{ V}$, $I_1 = 0.8\text{ V}$	13.5	15	16.5	—
		$I_0 = 0.8\text{ V}$, $I_1 = 2.4\text{ V}$	25.5	30	34.5	—
Thermal Shutdown Temperature	T_J		—	170	—	$^{\circ}\text{C}$
Total Logic Supply Current	$I_{CC(ON)}$	$I_0 = I_1 = 0.8\text{ V}$, No Load	—	40	50	mA
	$I_{CC(OFF)}$	$I_0 = I_1 = 2.4\text{ V}$, No Load	—	10	12	mA

L6219DS

DUAL FULL-BRIDGE

MOTOR DRIVER

APPLICATIONS INFORMATION

PWM CURRENT CONTROL

The L6219DS dual bridge is designed to drive both windings of a bipolar stepper motor. Output current is sensed and controlled independently in each bridge by an external sense resistor (R_S), internal comparator, and monostable multivibrator.

When the bridge is turned on, current increases in the motor winding and it is sensed by the external sense resistor until the sense voltage (V_{COMPIN}) reaches the level set at the comparator's input:

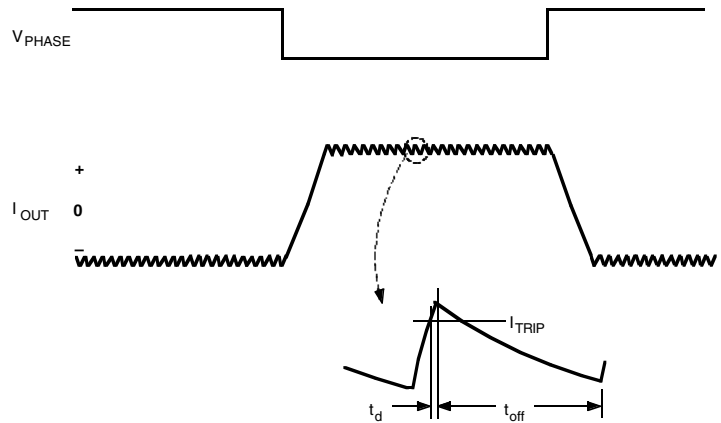
$$I_{\text{TRIP}} = V_{\text{REF}} / 10 R_S$$

The comparator then triggers the monostable which turns off the source driver of the bridge. The actual load current peak will be slightly higher than the trip point (especially for low-inductance loads) because of the internal logic and switching delays. This delay (t_d) is typically 2 μs . After turn-off, the motor current decays, circulating through the ground-clamp diode and sink transistor. The source driver's off time (and therefore the magnitude of the current decrease) is determined by the monostable's external RC timing components, where $t_{\text{off}} = R_T C_T$ within the range of 20 k Ω to 100 k Ω and 100 pF to 1000 pF.

When the source driver is re-enabled, the winding current (the sense voltage) is again allowed to rise to the comparator's threshold. This cycle repeats itself, maintaining the average motor winding current at the desired level.

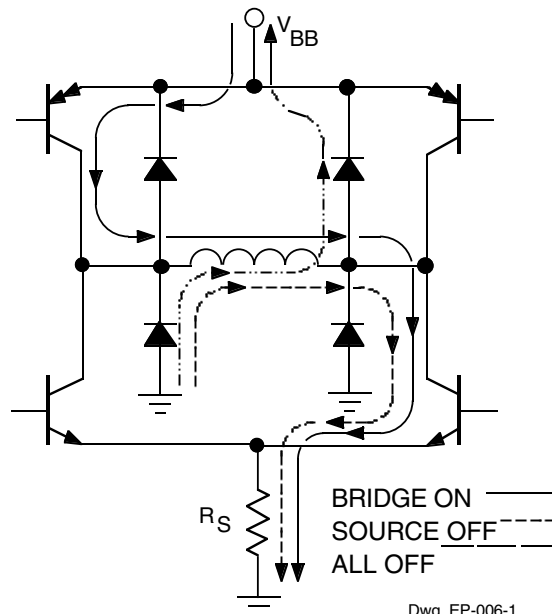
Loads with high distributed capacitances may result in high turn-on current peaks. This peak (appearing across R_S) will attempt to trip the comparator, resulting in erroneous current control or high-frequency oscillations. An external $R_C C_C$ time delay should be used to further delay the action of the comparator. Depending on load type, many applications will not require these external components (SENSE connected to COMP IN).

PWM OUTPUT CURRENT WAVE FORM



Dwg. WM-003-1A

LOAD CURRENT PATHS



Dwg. EP-006-1

Dwg. EP-008-2

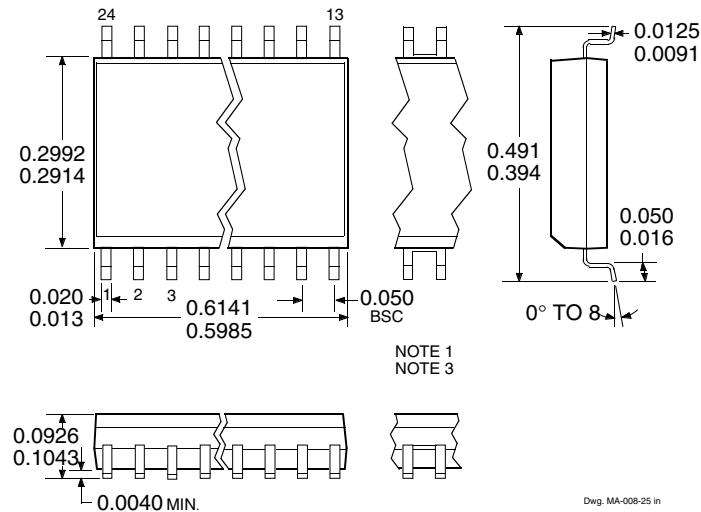
L6219DS

DUAL FULL-BRIDGE

MOTOR DRIVER

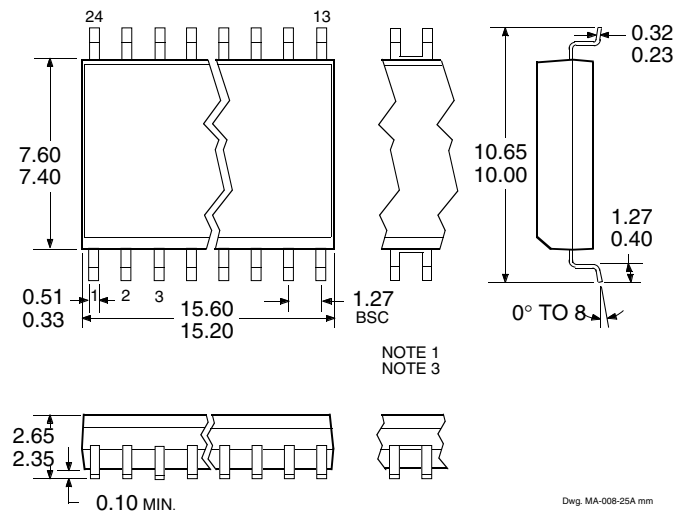
Dimensions in Inches

(for reference only)



Dimensions in Millimeters

(controlling dimensions)



- NOTES: 1. Webbed lead frame. Leads indicated are internally one piece.
2. Lead spacing tolerance is non-cumulative.
3. Exact body and lead configuration at vendor's option within limits shown.

L6219DS
DUAL FULL-BRIDGE
MOTOR DRIVER

BRIDGE & HALF-BRIDGE DRIVERS

IN ORDER OF 1) OUTPUT CURRENT AND 2) OUTPUT VOLTAGE

Output Ratings *		Description	Features			Part Number †
mA	V		Internal Diodes	Outputs	Internal Protection	
±650	30	dual PWM full bridge	X	bipolar	X	3966
	30	dual PWM full bridge	X	bipolar	X	3968
±750	45	dual PWM full bridge	X	bipolar	X	2916
	45	dual PWM full bridge	X	bipolar	X	2919
	45	dual PWM full bridge	X	bipolar	X	6219
±800	33	dual PWM full bridge	X	bipolar	X	3964
±900	14	3-Ø back-EMF controller/driver	X	DMOS	X	8902-A
±1300	50	PWM full bridge	X	bipolar	X	3953
±1500	45	dual PWM full bridge	X	bipolar	X	2917
	45	dual PWM full bridge	X	bipolar	X	2918
	50	PWM microstepping full bridge	X	Darlington/Satlington™	X	3955
	50	PWM microstepping full bridge	X	Darlington/Satlington™	X	3957
±2000	45	3-Ø brushless controller/driver	X	Darlington	X	2936
	50	dual full bridge	X	Darlington	X	2998
	50	PWM full-bridge	X	Darlington	X	3951
	50	PWM full-bridge	X	Darlington	X	3952
	50	PWM full-bridge	X	DMOS	X	3958
±3000	45	PWM control	X	Darlington	—	2962
±3400	45	PWM control	X	bipolar	X	2961
—	28	3-Ø MOSFET controller	—	DMOS	X	3933

* Current is maximum specified test condition, voltage is maximum rating. See specification for sustaining voltage limits or over-current protection voltage limits.

† Complete part number includes additional characters to indicate operating temperature range and package style.

L6219DS

DUAL FULL-BRIDGE

MOTOR DRIVER

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