

UDN-2938W AND UDN-2939B

3-PHASE UNIPOLAR BRUSHLESS DC MOTOR DRIVERS

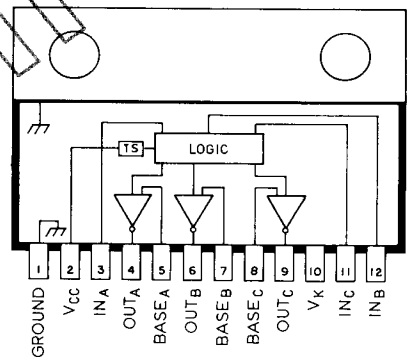
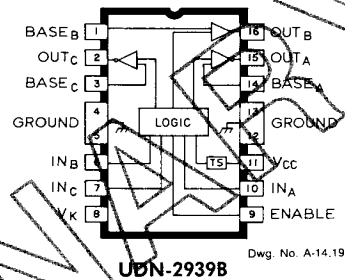
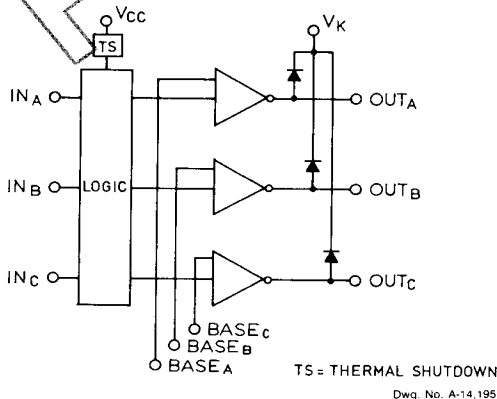
FEATURES

- Output Voltage of 30 V
- Output Current of 4 A
- Integral Transient-Suppression Diodes
- External Output Driver Capacitor Pins
- Thermal Shutdown Circuitry
- TTL, DTL, CMOS Compatible Inputs

The UDN-2938W and UDN-2939B are three-phase unipolar brushless dc motor drivers capable of handling 4 A drive currents, an output OFF voltage of 50 V, and a sustaining voltage of 30 V. The output drive structure of these devices have been designed for low saturation voltages (less than 1.0 V at 1 A). UDN-2938W and UDN-2939B are functionally identical except that the UDN-2939B has ENABLE input for extended control flexibility. The bases of the output drivers have been brought out to external pins so that capacitors may be connected in order to stimulate an ac drive and to avoid EMI and RFI problems.

Output transient-suppression diodes have been incorporated for use with inductive loads. Inputs are active high and float low. These inputs are TTL, DTL, and 5 V-12 V CMOS compatible. The ENABLE function (UDN-2939B) is active high and, when

FUNCTIONAL BLOCK DIAGRAM



pulled low, will turn OFF all output drivers. These devices have thermal shutdown circuitry with hysteresis to guard against overheating. This thermal shutdown circuitry is designed to operate at a temperature of 165°C. A logic supply current regulator has been introduced into these devices to maintain a relatively constant output base drive over the logic supply (V_{cc}) operating range.

The UDN-2938W is packaged in a single in-line 12-pin power-tab SIP package with lead centers at 0.100 inches. The UDN-2939B is packaged in a 16-pin dual in-line batwing package with heat-sink contact tabs.

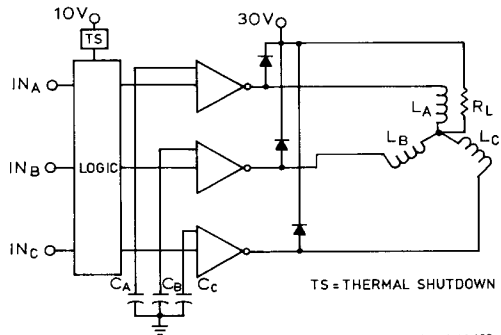
ABSOLUTE MAXIMUM RATINGS
at +25°C

Output Voltage, V_{CE}	50 V
Output Sustaining Voltage, $V_{CE(SUS)}$	30 V
Output Current, I_{OUT}	5 A
Logic Supply, V_{CC}	15 V
Input Voltage, V_{IN}	15 V
Package Power Dissipation, P_D	
(W Package)	5.2 W*
(B Package)	2.77 W**
Operating Temperature Range, T_A	-20°C to +85°C
Storage Temperature Range, T_S	-55°C to +150°C

*Derate at the rate of 41.16 mW/°C above $T_A = +25^\circ\text{C}$.

**Derate at the rate of 22.22 mW/°C above $T_A = +25^\circ\text{C}$.

TYPICAL APPLICATION



ELECTRICAL CHARACTERISTICS at $T_A = +25^\circ\text{C}$, $V_{CC} = 5.0\text{ V}$ (Unless otherwise noted)

Characteristic	Symbol	Test Conditions	Limits			Units
			Min.	Typ.	Max.	
Logic Supply Voltage Range	V_{CC}		4.5	—	15	V
Output Leakage Current	I_{CEX}	$V_{OUT} = 50\text{ V}$	—	<1.0	100	μA
Output Sustaining Voltage	$V_{CE(SUS)}$	$I_{OUT} = 4.0\text{ A}$	30	—	—	V
Output Saturation Voltage	$V_{CE(SAT)}$	$I_{OUT} = 1.0\text{ A}$	—	0.9	1.1	V
		$I_{OUT} = 4.0\text{ A}$	—	1.9	2.0	V
Clamp Diode Leakage Current	I_R	$V_R = 50\text{ V}$	—	<1.0	100	μA
Clamp Diode Forward Voltage	V_F	$I_F = 1.0\text{ A}$	—	1.3	1.5	V
Input Voltage	$V_{IN(CL)}$		—	—	2.0	V
	$V_{IN(O)}$		0.8	—	—	V
Input Current	$I_{IN(CL)}$	$V_{IN} = 2.4\text{ V}$	—	30	50	μA
	$V_{IN(O)}$	$V_{IN} = 0.8\text{ V}$	—	—	1.0	μA
Supply Current	$I_{CC(ON)}$	One Driver ON, No Load	—	12	15	mA
	$I_{CC(OFF)}$	All Drivers OFF	—	5.0	8.0	mA
Thermal Shutdown Temperature	T_J		—	165	—	°C