

# Half-Bridge Bipolar Switch

## FEATURES

- Source or Sink 4.0A
- Supply Voltage to 35V
- High-Current Output Diodes
- Tri-State Operation
- TTL and CMOS Input Compatibility
- Thermal Shutdown Protection
- 300kHz Operation
- Low-Cost TO-220 Package

## DESCRIPTION

This device is a monolithic integrated circuit designed to provide high-current switching with low saturation voltages when activated by low-level logic signals. Source and sink switches may be independently activated without regard to timing as a built-in interlock will keep the sink off if the source is on.

This driver has the high current capability to drive large capacitive loads with fast rise and fall times; but with high-speed internal flyback diodes, it is also ideal for inductive loads. Two UC2950s can be used together to form a full bridge, bipolar motor driver compatible with high frequency chopper current control.

## ABSOLUTE MAXIMUM RATINGS (Note 1)

Supply Voltage Range,  $V_C$  ..... 8V to 35V  
 Output Voltage Range,  $V_O$  ..... -3.0V to  $V_C+3V$   
 Input Voltage Range,  $V_{IN}$  ..... -0.3V to +7.0V  
 Peak Output Current (100 ms, 10% DC) .....  $\pm 4.0A$   
 Continuous Output Current .....  $\pm 2.0A$   
 Power Dissipation with Heat Sink ..... 15W  
 Power Dissipation in Free Air ..... 2W  
 Operating Temperature Range,  $T_A$  ..... -20°C to +100°C  
 Storage Temperature Range,  $T_S$  ..... -55°C to +125°C

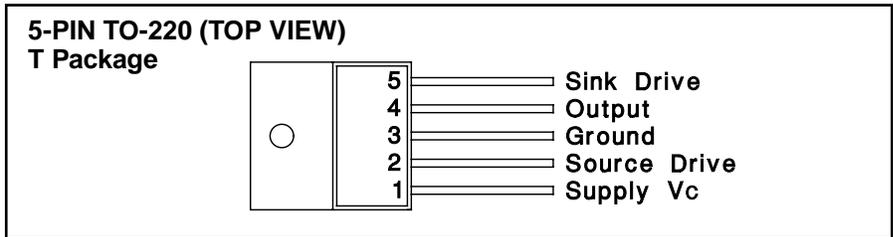
Note 1: Consult Packaging section of databook for thermal limitations and considerations of package.

## TRUTH TABLE

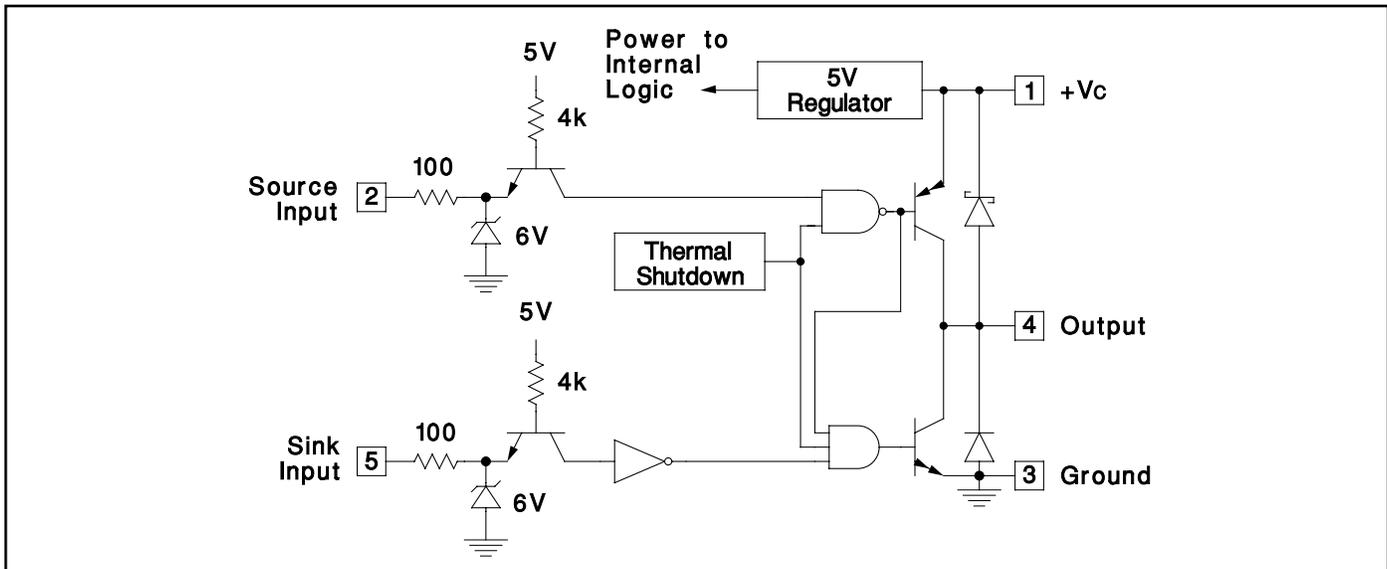
Source Drive Pin 2	Sink Drive Pin 5	Output Pin 4
Low	Low	Low
Low	High	Off
High	Low	High
High	High	High

Note: With no load, output voltage will be HIGH in the OFF state.

## CONNECTION DIAGRAM



## SIMPLIFIED SCHEMATIC



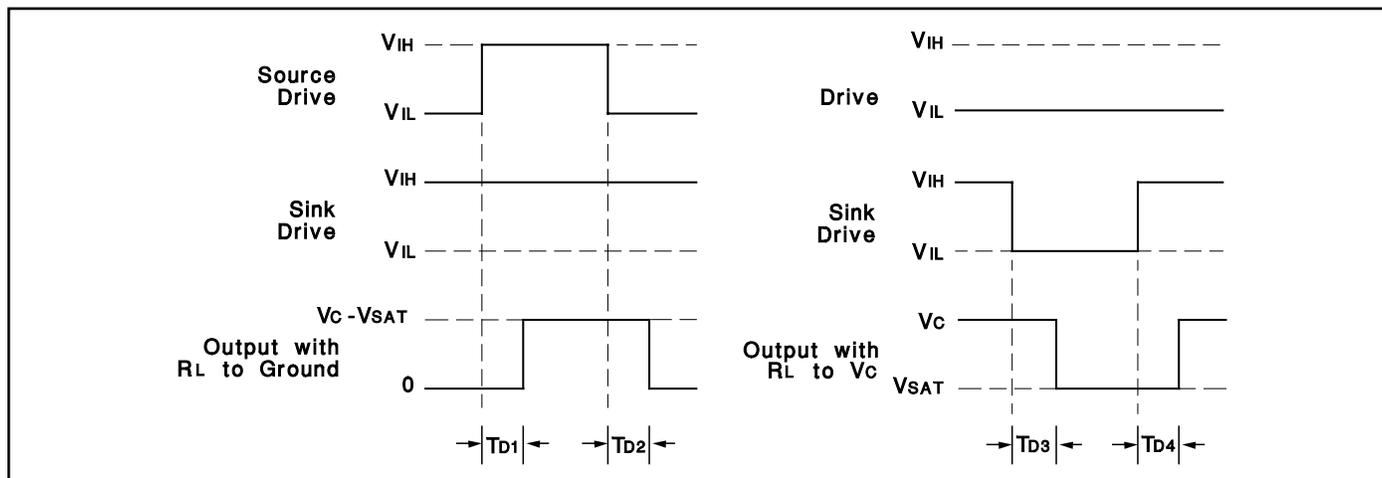
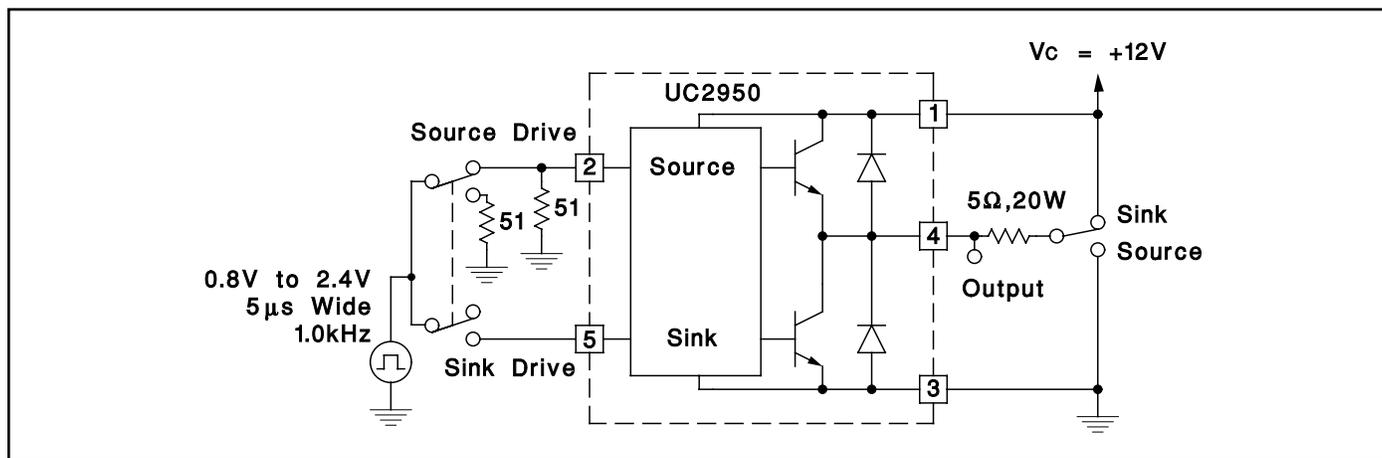
**ELECTRICAL CHARACTERISTICS:** Unless otherwise stated,  $V_C = 35V$ ,  $T_A = -20^{\circ}C$  to  $+100^{\circ}C$ ,  $V_{IL} = 0.8V$ ,  $V_{IH} = 2.4V$  for either input,  $T_A = T_J$ .

PARAMETERS	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Output Leakage to $V_C$	Output Off		20	500	$\mu A$
Output Leakage to Ground	Output Off		-200	-500	$\mu A$
Output Sink Saturation	$V_{OL}, I_L = 2.0A$		1.2	2.0	V
Output Source Saturation	$(V_C - V_{OL}), I_L = -2.0A$		1.2	2.0	V
Sink Diode Forward Voltage	$I_D = -2.0A$		1.4	2.0	V
Source Diode Forward Voltage	$I_D = 2.0A$		1.4	2.0	V
Input Current	Either Input, $V_I = 5V$		20	100	$\mu A$
	Either Input, $V_I = 0V$		-1.0	-1.6	mA
Supply Current	Output High		20	36	mA
	Output Low		10	20	mA

**SWITCHING CHARACTERISTICS:** See Test Circuit.  $V_C = 12V$ ,  $R_L = 5\Omega$ ,  $T_A = 25^{\circ}C$ . Guaranteed by design, not 100% tested in production.

PARAMETERS	MIN	TYP	MAX	UNITS
Source Turn-On Delay, $t_{D1}$		300	500	ns
Source Turn-Off Delay, $t_{D2}$		1.0	2.0	$\mu s$
Sink Turn-On Delay, $t_{D3}$		200	400	ns
Sink Turn-Off Delay, $t_{D4}$		100	300	ns
Cross-Conduction Current Spike When Source and Sink are Activated Together		0.6	1.0	$\mu s$

**SWITCHING TEST CIRCUIT**



**PACKAGING INFORMATION**

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
UC2950T	ACTIVE	TO-220	KC	5	50	Green (RoHS & no Sb/Br)	CU SN	N / A for Pkg Type
UC2950TG3	ACTIVE	TO-220	KC	5	50	Green (RoHS & no Sb/Br)	CU SN	N / A for Pkg Type

<sup>(1)</sup> The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBsolete:** TI has discontinued the production of the device.

<sup>(2)</sup> Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

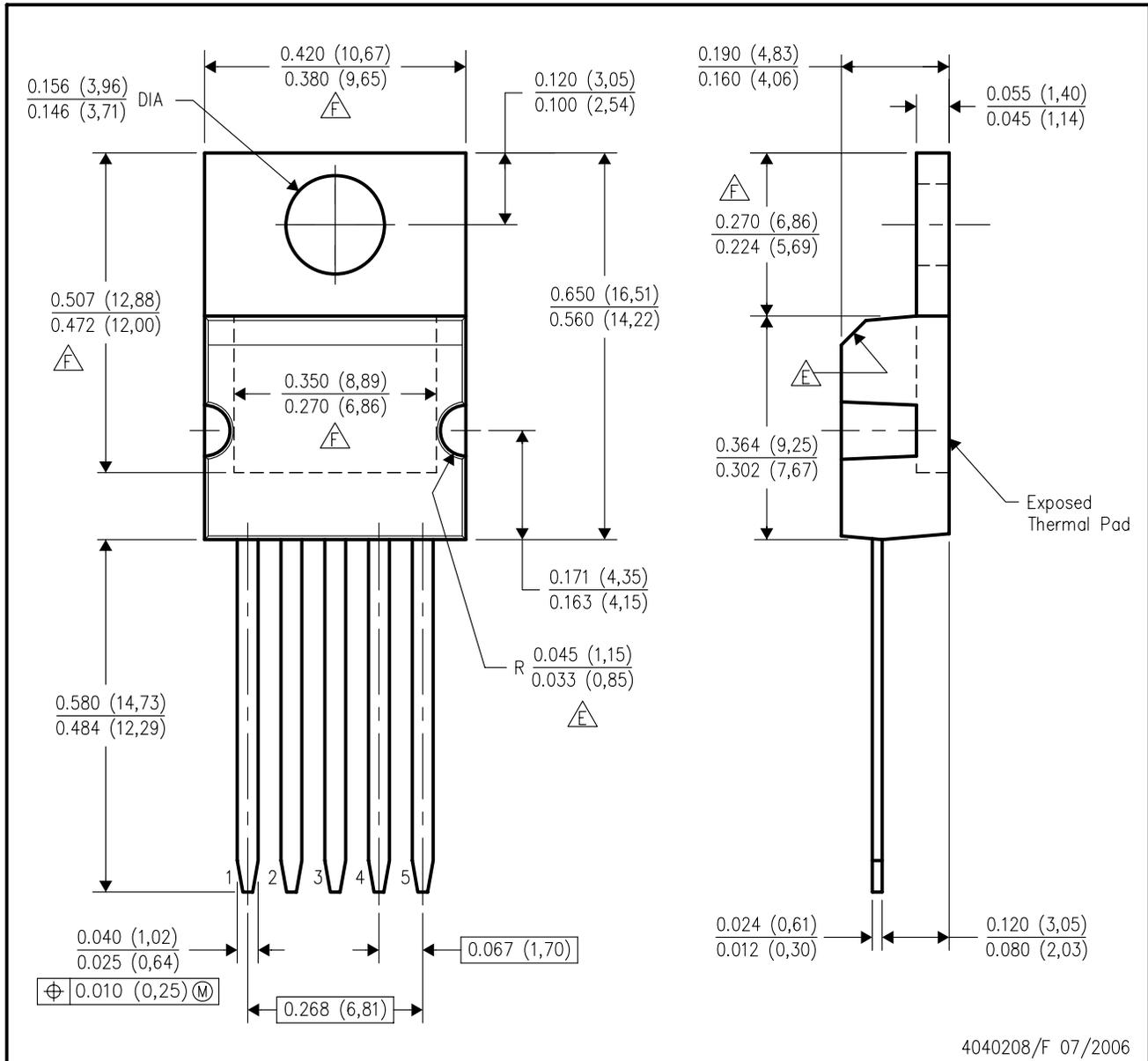
<sup>(3)</sup> MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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KC (R-PSFM-T5)

PLASTIC FLANGE-MOUNT PACKAGE



- NOTES:
- All linear dimensions are in inches (millimeters).
  - This drawing is subject to change without notice.
  - All lead dimensions apply before solder dip.
  - The center lead is in electrical contact with the mounting tab.
- $\triangle$  These features are optional.
- $\triangle$  Thermal pad contour optional within these dimensions.

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Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265  
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