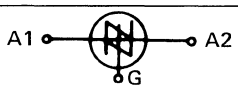
2N4993 (SILICON)



SILICON
BIDIRECTIONAL SWITCH

6.0-10 VOLTS
350 mW

SILICON BIDIRECTIONAL SWITCH

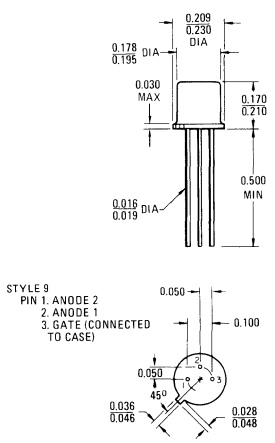
. . . designed for full-wave triggering in Triac phase control circuits, half-wave SCR triggering applications and as voltage level detectors.

- Low Switching Voltage – 8.0 Volts Typical
- Uniform Characteristics in Each Direction
- Low On-State Voltage – 1.7 Volts Maximum
- Low Off-State Current – 1.0 μA Maximum
- Low Temperature Coefficient – 0.02 %/°C Typical

*MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Power Dissipation	P_D	350	mW
DC Forward Anode Current	I_F	200	mA
DC Gate Current (off-state only)	$I_{G(off)}$	5.0	mA
Repetitive Peak Forward Current (1.0% Duty Cycle, 10 μs Pulse Width)	$I_{FM(rep)}$	1.0	Amp
Non-Repetitive Forward Current 10 μs Pulse Width	$I_{FM(nonrep)}$	5.0	Amp
Operating Junction Temperature Range	T_J	-55 to +150	°C
Storage Temperature Range	T_{stg}	-65 to +200	°C

*Indicates JEDEC Registered Data



To convert inches to millimeters multiply by 25.4
All JEDEC dimensions and notes apply

Gate Connected to Case
CASE 22 (9)
(TO-18)

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
*Switching Voltage	V_S	6.0	8.0	10	Vdc
*Switching Current	I_S	–	175	500	μAdc
*Switching Voltage Differential	$\|V_{S1}-V_{S2}\|$	–	0.3	0.5	Vdc
Holding Current	I_H	–	0.7	1.5	mAdc
*Off-State Blocking Current (V_F = 5.0 Vdc, T_A = 25°C) (V_F = 5.0 Vdc, T_A = 100°C)	I_B	 – –	 0.08 6.0	 1.0 10	μAdc
*Forward On-State Voltage (I_F = 200 mAdc)	V_F	–	1.4	1.7	Vdc
Peak Output Voltage (C_C = 0.1 μF, R_L = 20 ohms, (Figure 7)	V_o	3.5	4.8	–	Vdc
Turn-On Time (Figure 8)	t_{on}	–	1.0	–	μs
Turn-Off Time (Figure 9)	t_{off}	–	30	–	μs
Temperature Coefficient of Switching Voltage	T_C	–	+0.02	–	%/°C
*Switching Current Differential	$\|I_{S2} - I_{S1}\|$	–	–	100	μAdc

*Indicates JEDEC Registered Data

TYPICAL ELECTRICAL CHARACTERISTICS

FIGURE 1 – SWITCHING VOLTAGE versus TEMPERATURE

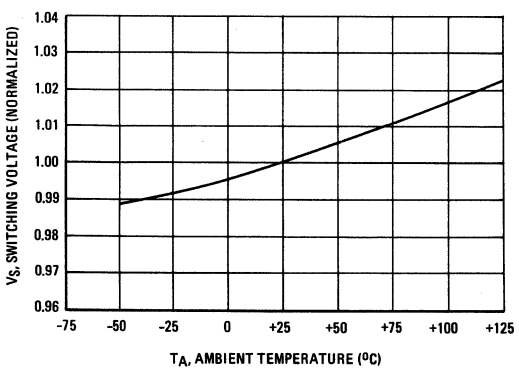


FIGURE 2 – SWITCHING CURRENT versus TEMPERATURE

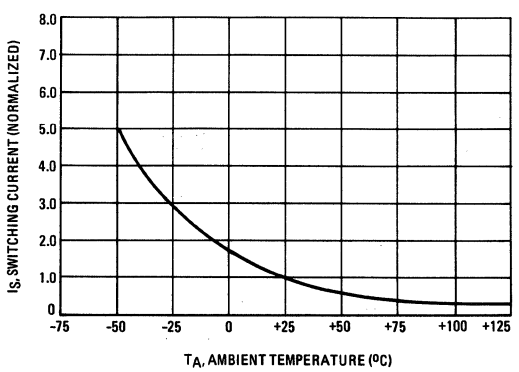


FIGURE 3 – HOLDING CURRENT versus TEMPERATURE

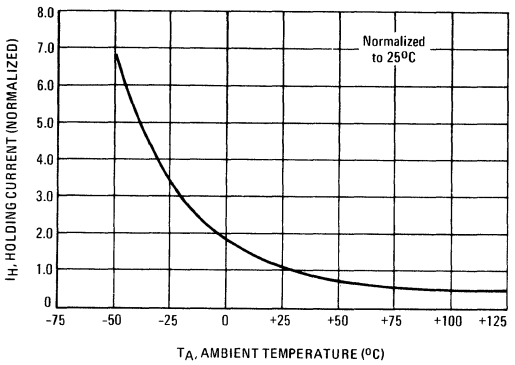


FIGURE 4 – OFF-STATE BLOCKING CURRENT versus TEMPERATURE

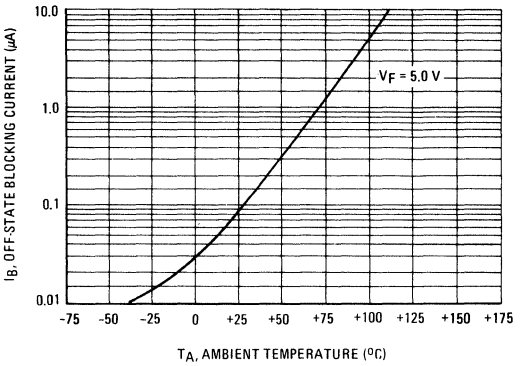


FIGURE 5 – ON-STATE VOLTAGE versus FORWARD CURRENT

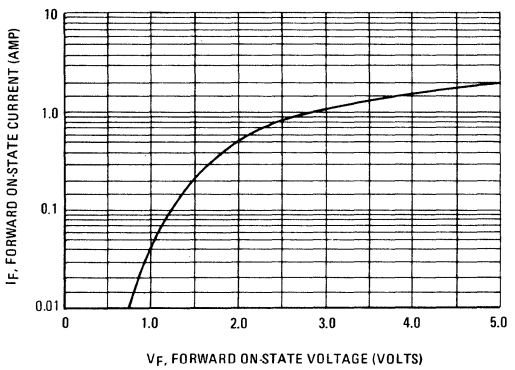


FIGURE 6 – PEAK OUTPUT VOLTAGE (FUNCTION OF R_L AND C_C)

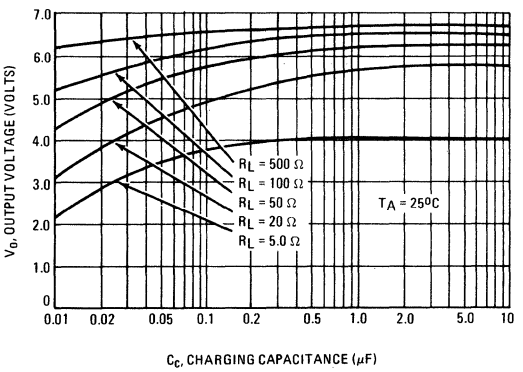


FIGURE 7 – PEAK OUTPUT VOLTAGE TEST CIRCUIT

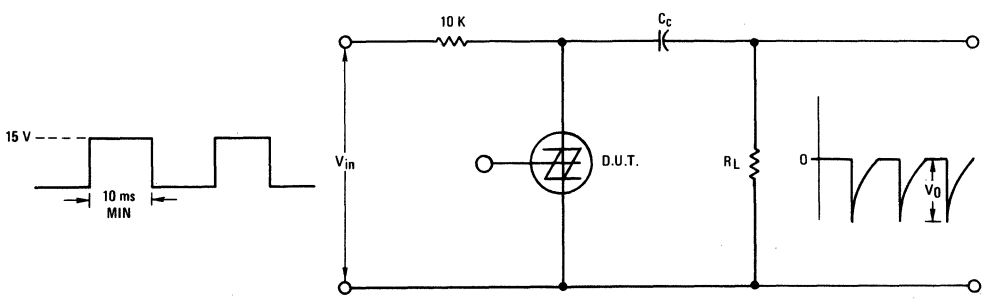
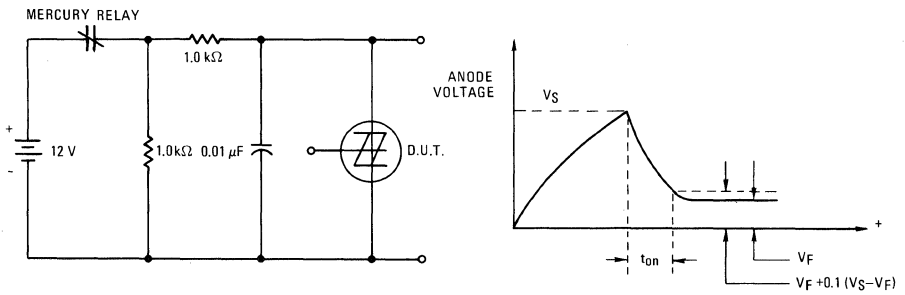
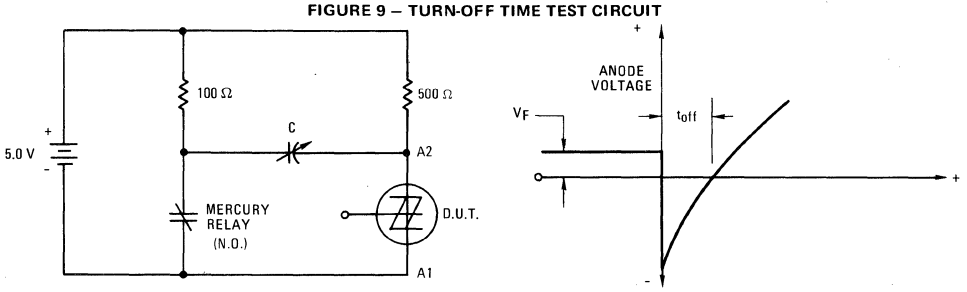


FIGURE 8 – TURN-ON TIME TEST CIRCUIT



Turn-on time is measured from the time V_S is achieved to the time when the anode voltage drops to within 90% of the difference between V_S and V_F.

FIGURE 9 – TURN-OFF TIME TEST CIRCUIT



With the SBS in conduction and the relay contacts open, close the contacts to cause anode A2 to be driven negative. Decrease C until the SBS just remains off when anode A2 becomes positive. The turn-off time, t_{off}, is the time from initial contact closure and until anode A2 voltage reaches zero volts.

FIGURE 10 – DEVICE EQUIVALENT CIRCUIT, CHARACTERISTICS AND SYMBOLS