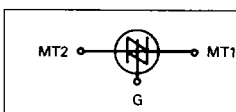
Silicon Bidirectional Switches
Diode Thyristors

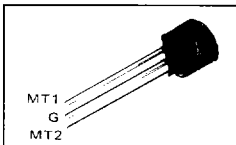
MBS4991
MBS4992
MBS4993

SBS
(PLASTIC)

. . . designed for full-wave triggering in Triac phase control circuits, half-wave SCR triggering application and as voltage level detectors. Supplied in an inexpensive plastic TO-226AA package for high-volume requirements, this low-cost plastic package is readily adaptable for use in automatic insertion equipment.

- Low Switching Voltage — 8 Volts Typical
- Uniform Characteristics in Each Direction
- Low On-State Voltage — 1.7 Volts Maximum
- Low Off-State Current — 0.1 μA Maximum
- Low Temperature Coefficient — 0.02 %/°C Typical





CASE 29-04
(TO-226AA)
STYLE 12

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MAXIMUM RATINGS (T_J = 25°C unless otherwise noted.)

Rating	Symbol	Value	Unit
Power Dissipation	P_D	500	mW
DC Forward Current	I_F	200	mA
DC Gate Current (Off-State Only)	$I_G(off)$	5	mA
Repetitive Peak Forward Current (1% Duty Cycle, 10 μs Pulse Width, T_A = 100°C)	$I_{FM}(rep)$	2	Amps
Non-Repetitive Forward Current (10 μs Pulse Width, T_A = 25°C)	$I_{FM}(nonrep)$	6	Amps
Operating Junction Temperature Range	T_J	−55 to +125	°C
Storage Temperature Range	T_{stg}	−65 to +150	°C

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

Characteristic		Symbol	Min	Typ	Max	Unit
Switching Voltage	MBS4991 MBS4992, MBS4993	V_S	6 7.5	8 8	10 9	Vdc
Switching Current	MBS4991 MBS4992 MBS4993	I_S	— —	175 90 175	500 120 250	μAdc
Switching Voltage Differential (See Figure 10)	MBS4991 MBS4992, MBS4993	$\|V_{S1}-V_{S2}\|$	— —	0.3 0.1	0.5 0.2	Vdc
Gate Trigger Current (V_F = 5 Vdc, R_L = 1 k ohm)	MBS4992 MBS4993	I_{GF}	— —	— —	100 500	μAdc
Holding Current	MBS4991 MBS4992 MBS4993	I_H	— — —	0.7 0.2 0.3	1.5 0.5 0.75	mAdc
Off-State Blocking Current (V_F = 5 Vdc, T_A = 25°C) (V_F = 5 Vdc, T_A = 85°C) (V_F = 5 Vdc, T_A = 25°C) (V_F = 5 Vdc, T_A = 100°C)	 MBS4991 MBS4991 MBS4992, MBS4993 MBS4992, MBS4993	I_B	 — — — —	 0.08 2 0.08 6	 1 10 0.1 10	μAdc
Forward On-State Voltage (I_F = 175 mAdc) (I_F = 200 mAdc)	 MBS4991 MBS4992, MBS4993	V_F	 — —	 1.4 1.5	 1.7 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	—	μs
Turn-Off Time (Figure 9)		t_{off}	—	30	—	μs
Temperature Coefficient of Switching Voltage (−50 to +125°C)		T_C	—	+0.02	—	%/°C
Switching Current Differential (See Figure 10)		$I_{S1}-I_{S2}$	—	—	100	μA

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TYPICAL ELECTRICAL CHARACTERISTICS

FIGURE 1 – SWITCHING VOLTAGE versus TEMPERATURE

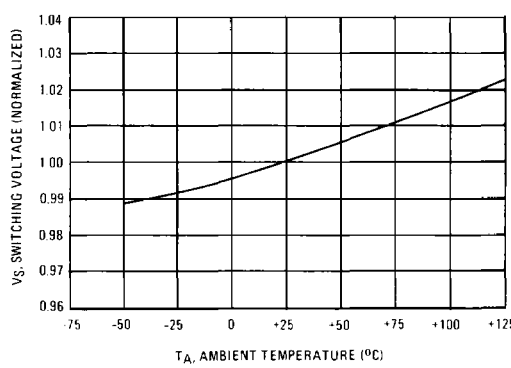


FIGURE 2 – SWITCHING CURRENT versus TEMPERATURE

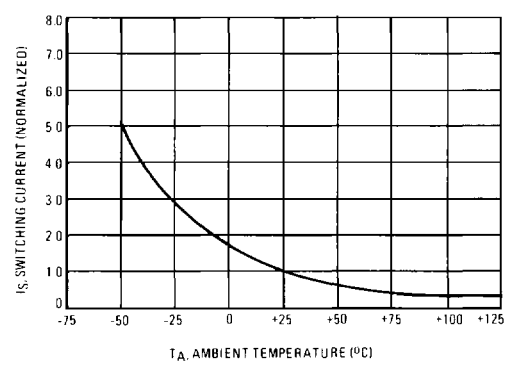


FIGURE 3 – HOLDING CURRENT versus TEMPERATURE

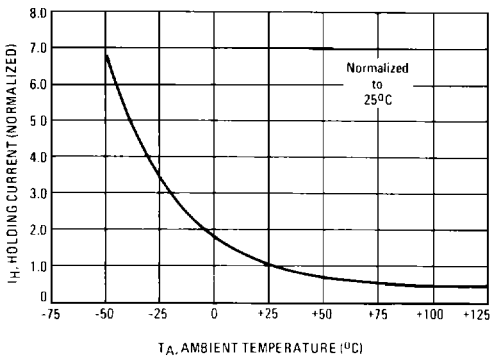


FIGURE 4 – OFF-STATE BLOCKING CURRENT versus TEMPERATURE

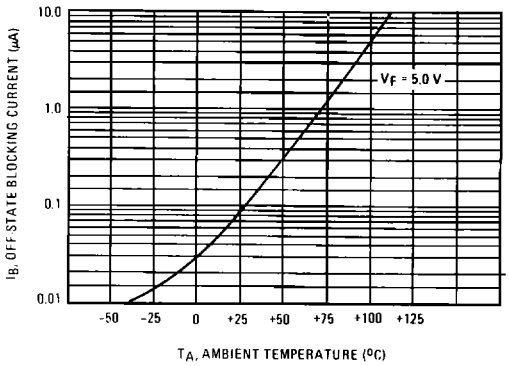


FIGURE 5 – ON-STATE VOLTAGE versus FORWARD CURRENT

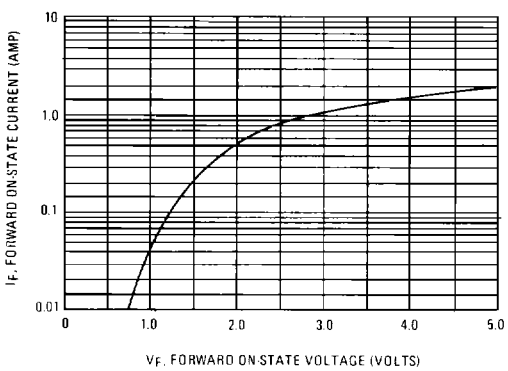


FIGURE 6 – PEAK OUTPUT VOLTAGE (FUNCTION OF R_L AND C_c)

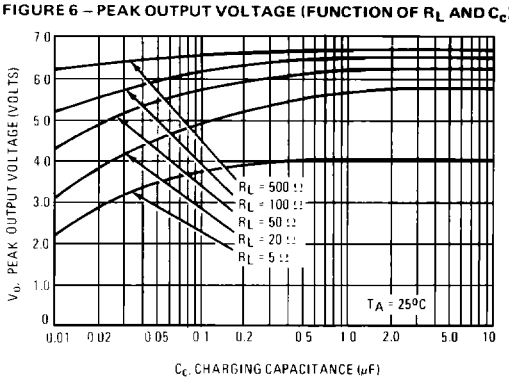


FIGURE 7 – PEAK OUTPUT VOLTAGE TEST CIRCUIT

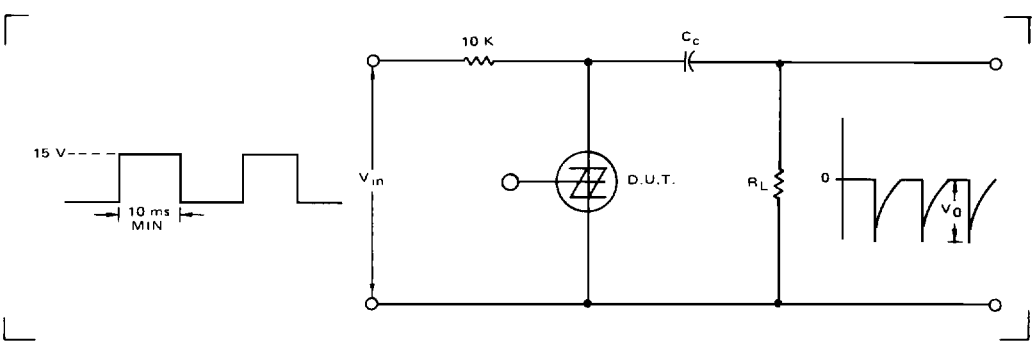
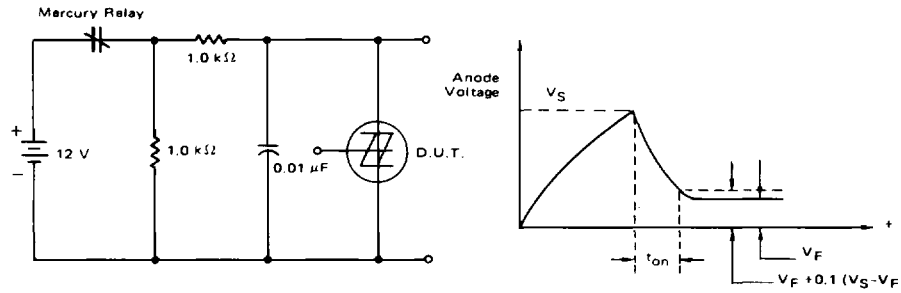
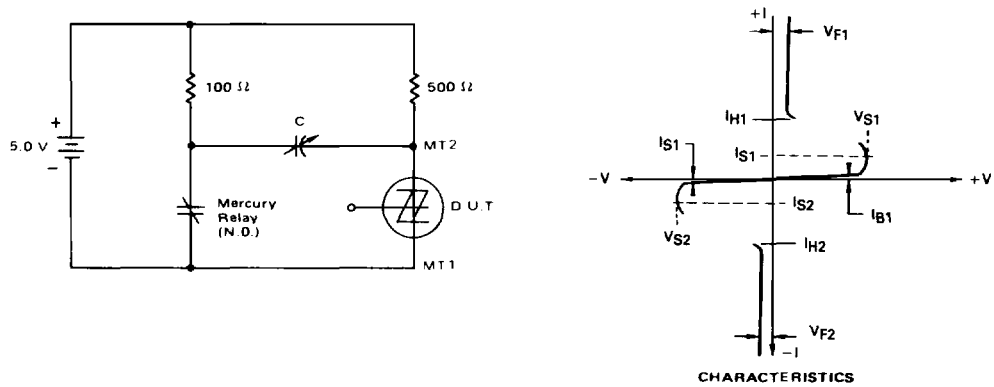


FIGURE 8 – TURN-ON TIME TEST CIRCUIT



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