

2N6151 (SILICON)

thru

2N6156



SILICON BIDIRECTIONAL THYRISTORS

... designed primarily for full-wave ac control applications, such as light dimmers, motor controls, heating controls and power supplies; or wherever full-wave silicon gate controlled solid-state devices are needed. Triac type thyristors switch from a blocking to a conducting state for either polarity of applied anode voltage with positive or negative gate triggering.

- All Diffused and Passivated Junctions for Greater Parameter Uniformity and Stability
- Small, Rugged, Thermopad Construction for Low Thermal Resistance, High Heat Dissipation and Durability
- Gate Triggering Guaranteed in Two (2N6154, 2N6155, 2N6156) or Four Modes (2N6151, 2N6152, 2N6153)

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
* Repetitive Peak Off-State Voltage, Note 1 ($T_J = -40$ to $+100^\circ\text{C}$) ½ Sine Wave 50 to 60 Hz, Gate Open Peak Principle Voltage 2N6151, 2N6154 2N6152, 2N6155 2N6153, 2N6156	V_{DRM}	200 400 600	Volts
*Peak Gate Voltage	V_{GM}	10	Volts
*On-State Current RMS ($T_C = -40$ to $+75^\circ\text{C}$) Full Cycle Sine Wave 50 to 60 Hz ($T_C = +90^\circ\text{C}$)	$I_T(\text{RMS})$	10 5.0	Amp
*Peak Surge Current (One Full Cycle, 60 Hz, $T_J = +75^\circ\text{C}$) preceded and followed by 10 A Current	I_{TSM}	100	Amp
Circuit Fusing Considerations ($T_J = -40$ to $+100^\circ\text{C}$, $t = 1.0$ to 8.3 ms)	I^2t	40	A^2s
*Peak Gate Power ($T_J = +75^\circ\text{C}$, Pulse Width = $2.0 \mu\text{s}$)	P_{GM}	20	Watts
*Average Gate Power ($T_J = +75^\circ\text{C}$, $t = 8.3$ ms)	$P_{G(AV)}$	0.5	Watt
*Peak Gate Current	I_{GM}	2.0	Amp
*Operating Junction Temperature Range	T_J	-40 to $+100$	$^\circ\text{C}$
*Storage Temperature Range	T_{stg}	-40 to $+150$	$^\circ\text{C}$
*Mounting Torque (6-32 Screw), Note 2	—	8.0	in. lb

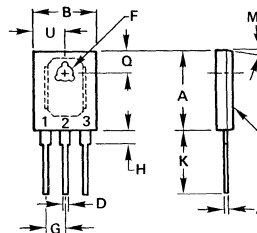
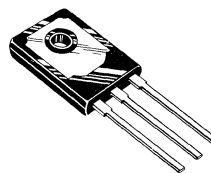
THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
* Thermal Resistance, Junction to Case	$R_{\theta JC}$	2.0	$^\circ\text{C}/\text{W}$
Thermal Resistance Case to Ambient	$R_{\theta CA}$	50	$^\circ\text{C}/\text{W}$

*Indicates JEDEC Registered Data.

TRIACS (THYRISTORS)

10 AMPERES RMS



STYLE 4:
PIN 1. MT 1
2. MT 2
3. GATE



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	16.13	16.38	0.635	0.645
B	12.57	12.83	0.495	0.505
C	3.18	3.43	0.125	0.135
D	1.09	1.24	0.043	0.049
F	3.51	3.76	0.138	0.148
G	4.22 BSC		0.166 BSC	
H	2.67	2.92	0.105	0.115
J	0.813	0.864	0.032	0.034
K	15.11	16.38	0.595	0.645
M	90 TYP		90 TYP	
Q	4.70	4.95	0.185	0.195
R	1.91	2.16	0.075	0.085
U	6.22	6.48	0.245	0.255

CASE 90-05

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
*Peak Blocking Current (Either Direction) Rated V_{DRM} @ $T_J = 100^\circ\text{C}$, Gate Open	I_{DRM}	—	—	2.0	mA
*On-State Voltage (Either Direction) $I_{TM} = 14$ A Peak; Pulse Width = 1.0 to 2.0 ms, Duty Cycle $\leq 2.0\%$	V_{TM}	—	1.3	1.8	Volts
Gate Trigger Current, Continuous dc Main Terminal Voltage = 12 Vdc, $R_L = 100$ Ohms Minimum Gate Pulse Width = 2.0 μs MT2 (+), G(+) All Types MT2 (+), G(-) 2N6151 thru 2N6153 MT2 (-), G(-) All Types MT2 (-), G(+) 2N6151 thru 2N6153	I_{GT}	—	6.0	50	mA
*MT2 (+), G(+); MT2 (-), G(-) $T_C = -40^\circ\text{C}$ All Types		—	6.0	75	
*MT2 (+), G(-); MT2 (-), G(+) $T_C = -40^\circ\text{C}$ 2N6151 thru 2N6153		—	10	50	
		—	25	75	
		—	—	100	
		—	—	125	
Gate Trigger Voltage, Continuous dc Main Terminal Voltage = 12 Vdc, $R_L = 100$ Ohms Minimum Gate Pulse Width = 2.0 μs MT2 (+), G(+) All Types MT2 (+), G(-) 2N6151 thru 2N6153 MT2 (-), G(-) All Types MT2 (-), G(+) 2N6151 thru 2N6153	V_{GT}	—	0.9	2.0	Volts
*MT2 (+), G(+); MT2 (-), G(-) $T_C = -40^\circ\text{C}$ All Types		—	0.9	2.5	
*MT2 (+), G(-); MT2 (-), G(+) $T_C = -40^\circ\text{C}$ 2N6151 thru 2N6153		—	1.1	2.0	
		—	1.4	2.5	
		—	—	2.5	
		—	—	3.0	
Main Terminal Voltage = Rated V_{DRM} , $R_L = 10$ k ohms, $T_J = 100^\circ\text{C}$ *MT2 (+), G(+); MT2 (-), G(-) All Types *MT2 (+), G(-); MT2 (-), G(+) 2N6151 thru 2N6153		0.2	—	—	
		0.2	—	—	
Holding Current (Either Direction) Main Terminal Voltage = 12 Vdc, Gate Open, } Initiating Current = 200 mA	I_H	—	6.0	40	mA
		—	—	75*	
*Turn-On Time Main Terminal Voltage = Rated V_{DRM} , $I_{TM} = 14$ A Gate Source Voltage = 12 V, $R_S = 100$ Ohms, Rise Time = 0.1 μs , Pulse Width = 2.0 μs	tgt	—	1.5	2.0	μs
Blocking Voltage Application Rate at Commutation, $f = 60$ Hz, $T_C = 75^\circ\text{C}$ On-State Conditions: $I_{TM} = 14$ A, Pulse Width = 4.0 ms, $d_i/dt = 5.3$ A/ms Off-State Conditions: Main Terminal Voltage = Rated V_{DRM} (200 μs min), Gate Source Voltage = 0 V, $R_S = 100 \Omega$	dv/dt	—	5.0	—	V/ μs

*Indicates JEDEC Registered Data

NOTES:

1. Ratings apply for open gate conditions. Thyristor devices shall not be tested with a constant current source for blocking capability such that the voltage applied exceeds the rated blocking voltage.
 2. Torque rating applies with use of torque washer (Shakeproof WD19522 #6 or equivalent). Mounting torque in excess of 8 in. lbs. does not appreciably lower case-to-sink thermal resistance. Anode lead and heatsink contact pad are common.
- For soldering purposes (either terminal connection or device mounting), soldering temperatures shall not exceed $+230^\circ\text{C}$.

Trigger devices are recommended for gating on Triacs
Triggers Provide:

1. Consistent predictable turn-on points.
2. Simplified circuitry.
3. Fast turn-on time for cooler, more efficient and reliable operation.

Electrical Characteristics	For General Usage		For Lamp Dimmer
	MBS4991	MBS4992	MBS100
$V_S =$	6.0–10 V	7.5–9.0 V	3.0–5.0 V
$I_S =$	350 μA Max	120 μA Max	100–400 μA
$V_{S1}-V_{S2} =$	0.5 V Max	0.2 V Max	0.35 V Max
Temperature Coefficient = 0.02%/°C Typ			

See AN-526 for Theory and Characteristics of Silicon Bidirectional Switches.

FIGURE 1 – AVERAGE CURRENT DERATING

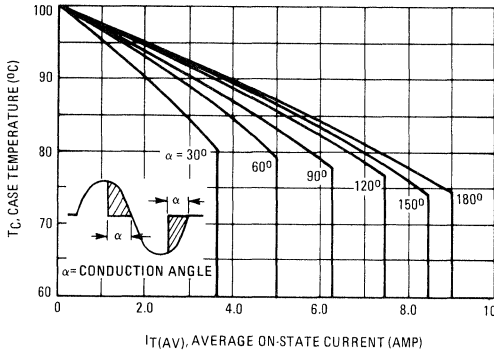


FIGURE 2 – RMS CURRENT DERATING

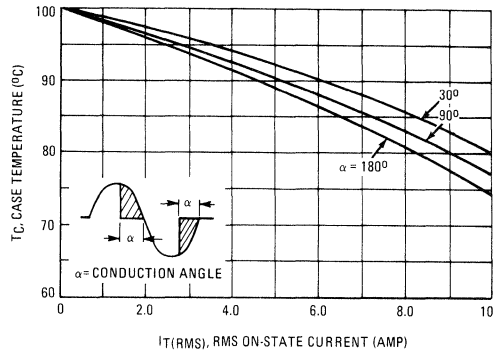


FIGURE 3 – POWER DISSIPATION

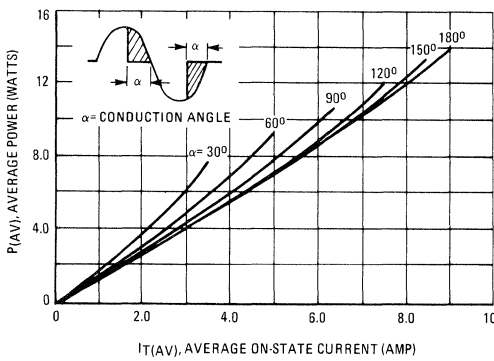


FIGURE 4 – POWER DISSIPATION

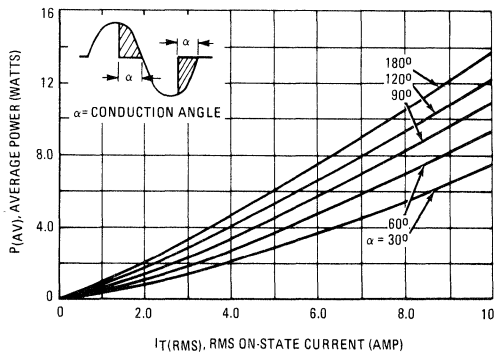


FIGURE 5 – TYPICAL GATE TRIGGER VOLTAGE

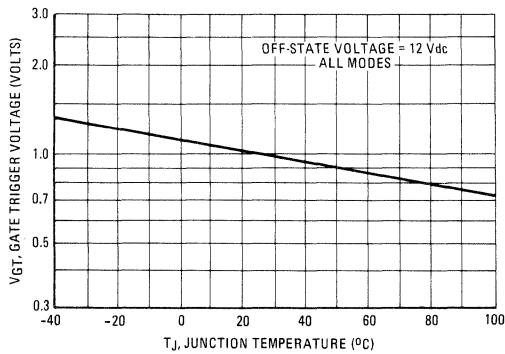


FIGURE 6 – TYPICAL GATE TRIGGER CURRENT

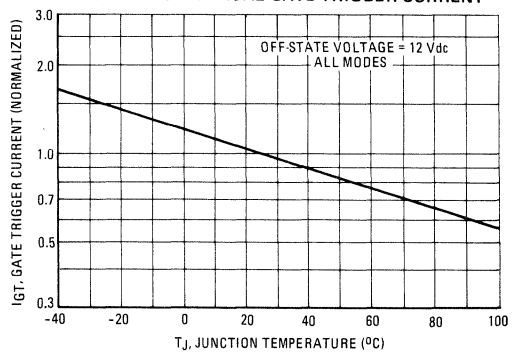


FIGURE 7 – MAXIMUM ON-STATE CHARACTERISTICS

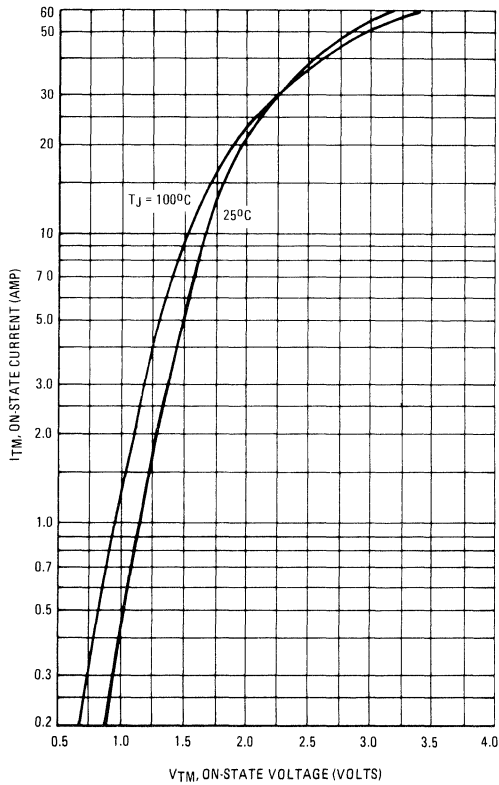


FIGURE 8 – TYPICAL HOLDING CURRENT

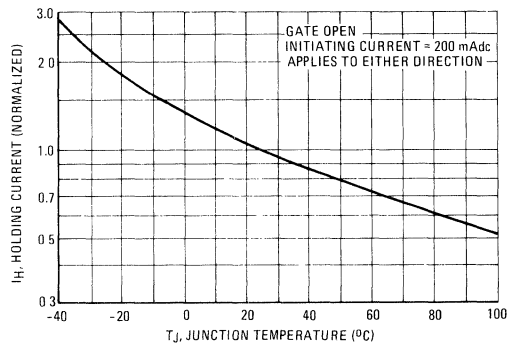


FIGURE 9 – MAXIMUM ALLOWABLE SURGE CURRENT

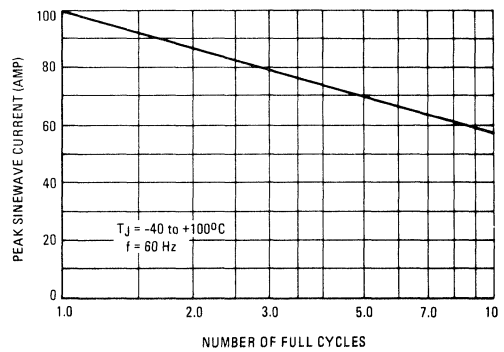


FIGURE 10 – THERMAL RESPONSE

