

# Triacs

## Silicon Bidirectional Triode Thyristors

... designed primarily for industrial and military applications for the control of ac loads in applications such as light dimmers, power supplies, heating controls, motor controls, welding equipment and power switching systems; or wherever full-wave, silicon gate controlled solid-state devices are needed.

- Glass Passivated Junctions and Center Gate Fire
- Isolated Stud for Ease of Assembly
- Gate Triggering Guaranteed In All 4 Quadrants

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
*Peak Repetitive Off-State Voltage ( $T_J = -65$ to $+125^\circ\text{C}$ ) 1/2 Sine Wave 50 to 60 Hz, Gate Open	$V_{DRM}$		Volts
*Peak Principal Voltage 2N6157, 2N6160, 2N6163 2N6158, 2N6161, 2N6164 2N6159, 2N6162, 2N6165		200 400 600	
*Peak Gate Voltage	$V_{GM}$	10	Volts
*RMS On-State Current ( $T_C = -65$ to $+85^\circ\text{C}$ ) ( $T_C = +100^\circ\text{C}$ ) Full Sine Wave, 50 to 60 Hz	$I_T(\text{RMS})$	30 20	Amps
*Peak Non-Repetitive Surge Current (One Full Cycle of surge current at 60 Hz, preceded and followed by a 30 A RMS current, $T_C = 85^\circ\text{C}$ )	$I_{TSM}$	250	Amps
Circuit Fusing Considerations ( $t = 8.3$ ms)	$I^2t$	260	$\text{A}^2\text{s}$
*Peak Gate Power ( $T_J = +80^\circ\text{C}$ , Pulse Width = $2 \mu\text{s}$ )	$P_{GM}$	20	Watts
*Average Gate Power ( $T_J = +80^\circ\text{C}$ , $t = 8.3$ ms)	$P_{G(AV)}$	0.5	Watt
*Peak Gate Current	$I_{GM}$	2	Amps
*Operating Junction Temperature Range	$T_J$	$-65$ to $+125$	$^\circ\text{C}$
*Storage Temperature Range	$T_{stg}$	$-65$ to $+150$	$^\circ\text{C}$
*Stud Torque 2N6160 thru 2N6165	—	30	in. lb.

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
*Thermal Resistance, Junction to Case	$R_{\theta JC}$	1	$^\circ\text{C/W}$

\*Indicates JEDEC Registered Data

2N6145-47  
(See 2N5571)

2N6157  
thru  
2N6165

TRIACs  
30 AMPERES RMS  
200 thru 600 VOLTS



CASE 174-04  
(TO-203AA)  
STYLE 3  
2N6157-59



CASE 263-04  
STYLE 2  
2N6160-62



CASE 311-02  
STYLE 2  
2N6163-65

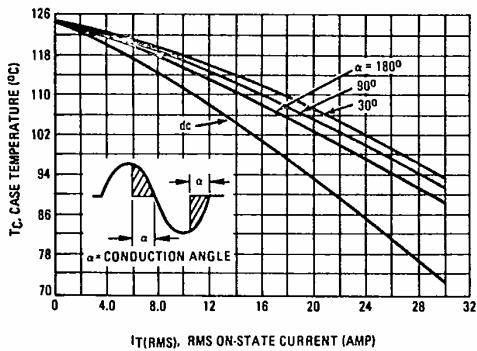
**ELECTRICAL CHARACTERISTICS** ( $T_C = 25^\circ\text{C}$  unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
*Peak Forward or Reverse Blocking Current (Rated $V_{DRM}$ or $V_{RRM}$ ) $T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$	$I_{DRM}, I_{RRM}$	— —	— —	10 2	$\mu\text{A}$ mA
*Peak On-State Voltage (Either Direction) ( $I_{TM} = 42$ A Peak, Pulse Width = 1 to 2 ms, Duty Cycle $\leq 2\%$ )	$V_{TM}$	—	1.5	2	Volts
Gate Trigger Current (Continuous dc), Note 1 (Main Terminal Voltage = 12 Vdc, $R_L = 50$ Ohms)	$I_{GT}$				mA
MT2(+), G(+)		—	15	60	
MT2(+), G(-)		—	20	70	
MT2(-), G(-)		—	20	70	
MT2(-), G(+)		—	30	100	
*MT2(+), G(+); MT2(-), G(-) $T_C = -65^\circ\text{C}$		—	—	200	
*MT2(+), G(-); MT2(-), G(+), $T_C = -65^\circ\text{C}$		—	—	250	
Gate Trigger Voltage (Continuous dc) (Main Terminal Voltage = 12 Vdc, $R_L = 50$ Ohms)	$V_{GT}$				Volts
MT2(+), G(+)		—	0.8	2	
MT2(+), G(-)		—	0.7	2.1	
MT2(-), G(-)		—	0.85	2.1	
MT2(-), G(+)		—	1.1	2.5	
*All Quadrants, $T_C = -65^\circ\text{C}$		—	—	3.4	
*Main Terminal Voltage = Rated $V_{DRM}$ , $R_L = 10$ k ohms, $T_J = +125^\circ\text{C}$		0.2	—	—	
Holding Current (Main Terminal Voltage = 12 Vdc, Gate Open) (Initiating Current = 500 mA)	$I_H$				mA
MT2(+)		—	8	70	
MT2(-)		—	10	80	
*Either Direction, $T_C = -65^\circ\text{C}$		—	—	200	
*Turn-On Time (Main Terminal Voltage = Rated $V_{DRM}$ , $I_{TM} = 42$ A, Gate Source Voltage = 12 V, $R_S = 50$ Ohms, Rise Time = $0.1 \mu\text{s}$ , Pulse Width = $2 \mu\text{s}$ )	$t_{gt}$	—	1	2	$\mu\text{s}$
Blocking Voltage Application Rate at Commutation, $f = 60$ Hz, $T_C = 85^\circ\text{C}$ On-State Conditions: ( $I_{TM} = 42$ A, Pulse Width = 4 ms, $di/dt = 17.5$ A/ms) Off-State Conditions: (Main Terminal Voltage = Rated $V_{DRM}$ (200 $\mu\text{s}$ min), Gate Source Voltage = 0 V, $R_S = 50 \Omega$ )	$dv/dt(c)$	—	5	—	V/ $\mu\text{s}$

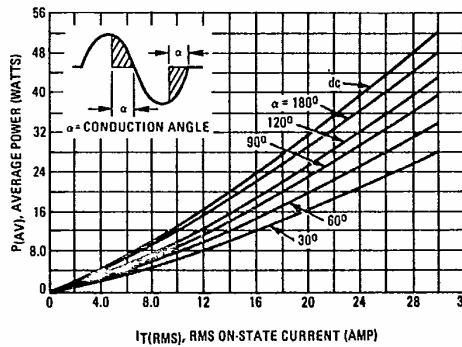
\*Indicates JEDEC Registered Data.

Note 1. All voltage polarities referenced to main terminal 1.

**FIGURE 1 — RMS CURRENT DERATING**



**FIGURE 2 — POWER DISSIPATION**



MOTOROLA THYRISTOR DEVICE DATA

FIGURE 3 – TYPICAL GATE TRIGGER VOLTAGE

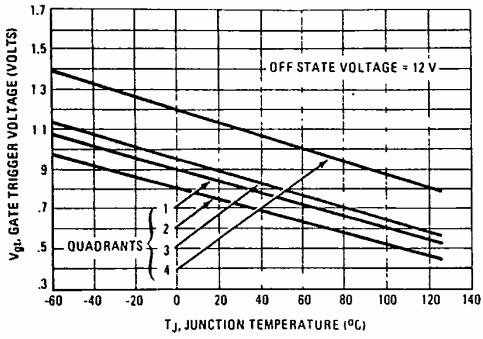


FIGURE 4 – TYPICAL GATE TRIGGER CURRENT

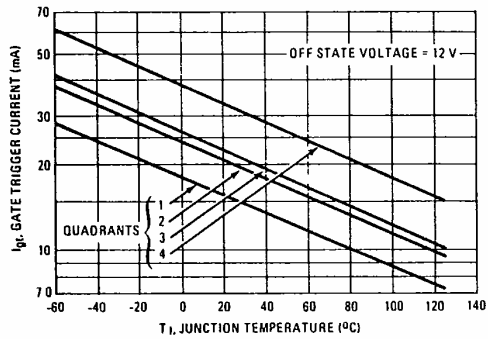


FIGURE 6 – TYPICAL HOLDING CURRENT

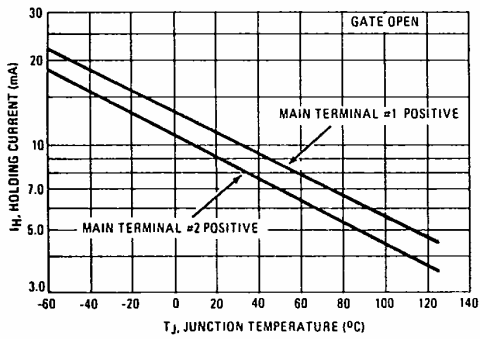


FIGURE 5 – MAXIMUM ON-STATE CHARACTERISTICS

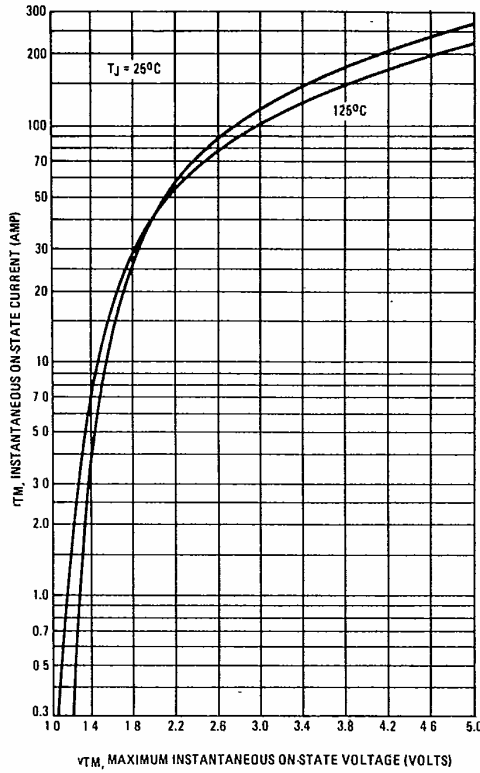


FIGURE 7 – MAXIMUM ALLOWABLE SURGE CURRENT

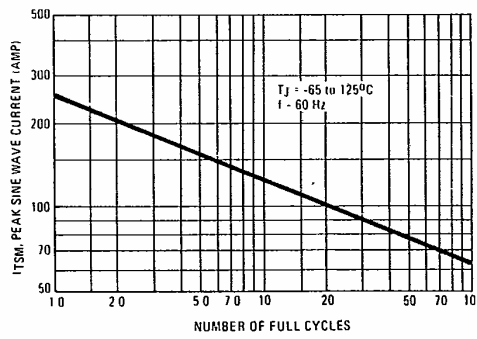


FIGURE 8 - TYPICAL THERMAL RESPONSE

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