

# NOT RECOMMENDED FOR NEW DESIGNS

MOTOROLA SC (DIODES/OPTO) 25E D ■ 6367255 0080908 0 ■ T-25-15

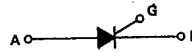
## Silicon Controlled Rectifiers Reverse Blocking Triode Thyristors

... multi-purpose PNP silicon controlled rectifiers suited for industrial, consumer, and military applications. Offered in a choice of space-saving, economical packages for mounting versatility.

- Uniform Low-Level Noise-Immune Gate Triggering —  $I_{GT} = 10 \text{ mA (Typ) @ } T_C = 25^\circ\text{C}$
- Low Forward "On" Voltage —  $V_T = 1 \text{ V (Typ) @ 5 Amp @ } 25^\circ\text{C}$
- High Surge-Current Capability —  $I_{TSM} = 100 \text{ Amp Peak}$
- Shorted Emitter Construction

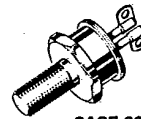
**2N4168  
thru  
2N4174  
2N4184  
thru  
2N4190**

**SCRs  
8 AMPERES RMS  
50 thru 600 VOLTS**



**MAXIMUM RATINGS** (Apply over operating temperature range and for all case types unless otherwise noted.)

Rating	Symbol	Value	Unit
*Peak Repetitive Forward and Reverse Blocking Voltage, Note 1	$V_{DRM}$ or $V_{RRM}$	50 100 200 400 600	Volts
Forward Current RMS	$I_T(\text{RMS})$	8	Amps
*Peak Forward Surge Current (One cycle, 60 Hz, $T_J = -40$ to $+100^\circ\text{C}$ )	$I_{TSM}$	100	Amps
Circuit Fusing ( $t = 8.3 \text{ ms}$ )	$I^2t$	40	$\text{A}^2\text{s}$
*Peak Gate Power	PGM	5	Watts
*Average Gate Power	$P_{G(\text{AV})}$	0.5	Watt
*Peak Gate Current	$I_{GM}$	2	Amps
Peak Gate Voltage, Note 2	$V_{GM}$	10	Volts
*Operating Temperature Range	$T_J$	$-40$ to $+100$	$^\circ\text{C}$
*Storage Temperature Range	$T_{stg}$	$-40$ to $+150$	$^\circ\text{C}$
Stud Torque		15	in. lb.



**CASE 86-01  
STYLE 1  
2N4168 thru 2N4174**



**CASE 87L-02  
STYLE 1  
2N4184 thru 2N4190**

**3**

T-25-15

**THERMAL CHARACTERISTICS**

Characteristic	Symbol	Typ	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.5	2.5*	°C/W
Thermal Resistance, Case to Ambient (See Figure 11) 2N4183-98	$R_{\theta CA}$	50	—	°C/W

\*Indicates JEDEC Registered Data.

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

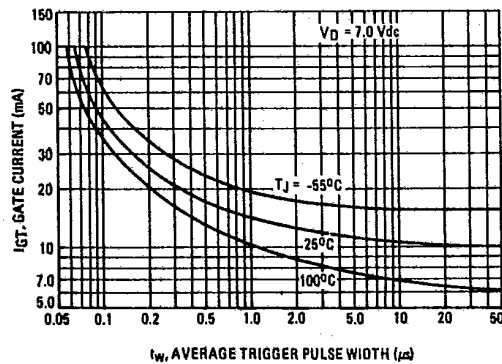
Characteristic	Symbol	Min	Typ	Max	Unit
*Peak Forward or Reverse Blocking Current (Rated $V_{DRM}$ or $V_{RRM}$ , gate open) $T_C = 25^\circ\text{C}$ $T_C = 100^\circ\text{C}$	$I_{DRM}, I_{RRM}$	— —	— —	10 2	$\mu\text{A}$ mA
Gate Trigger Current (Continuous dc), Note 1 ( $V_D = 7 \text{ Vdc}, R_L = 100 \Omega$ ) *( $V_D = 7 \text{ Vdc}, R_L = 100 \Omega, T_C = -40^\circ\text{C}$ )	$I_{GT}$	— —	10	30 60	mA
Gate Trigger Voltage (Continuous dc) ( $V_D = 7 \text{ Vdc}, R_L = 100 \Omega$ ) *( $V_D = 7 \text{ Vdc}, R_L = 100 \Omega, T_C = -40^\circ\text{C}$ ) *( $V_D = 7 \text{ Vdc}, R_L = 100 \Omega, T_C = 100^\circ\text{C}$ )	$V_{GT}$	— — 0.2	0.75	1.5 2.5	Volts
*Forward "On" Voltage (pulsed, 1 ms max, duty cycle $\leq 1\%$ ) ( $I_{TM} = 15.7 \text{ A}$ )	$V_{TM}$	—	1.4	2	Volts
Holding Current ( $V_D = 7 \text{ Vdc}$ , gate open) *( $V_D = 7 \text{ Vdc}$ , gate open, $T_C = -40^\circ\text{C}$ )	$I_H$	— —	10	30 60	mA
Turn-On Time ( $t_d + t_r$ ) ( $I_G = 20 \text{ mAdc}, I_F = 5 \text{ Adc}, V_D = \text{Rated } V_{DRM}$ )	$t_{on}$	—	1	—	$\mu\text{s}$
Turn-Off Time ( $I_F = 5 \text{ Adc}, I_R = 5 \text{ Adc}$ ) ( $I_F = 5 \text{ Adc}, I_R = 5 \text{ Adc}, T_C = 100^\circ\text{C}, V_D = \text{Rated } V_{DRM}$ ) ( $dv/dt = 30 \text{ V}/\mu\text{s}$ )	$t_{off}$	— —	15 25	—	$\mu\text{s}$
Forward Voltage Application Rate (Exponential) (Gate open, $T_C = 100^\circ\text{C}, V_D = \text{Rated } V_{DRM}$ )	$dv/dt$	—	50	—	$\text{V}/\mu\text{s}$

\*Indicates JEDEC Registered Data

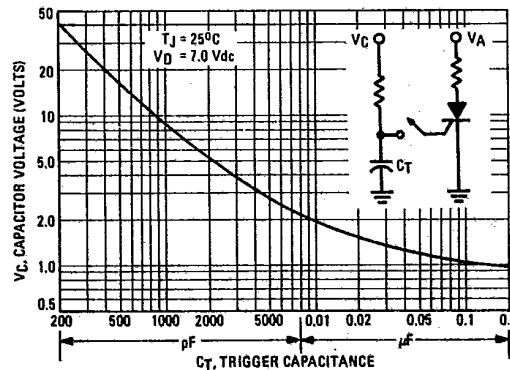
Note 1. For optimum operation, i.e. faster turn-on, lower switching losses, best  $dv/dt$  capability, recommended  $I_{GT} = 200 \text{ mA}$  minimum.

**TYPICAL TRIGGER CHARACTERISTICS**

**FIGURE 1 - PULSE CURRENT TRIGGERING**



**FIGURE 2 - CAPACITIVE DISCHARGE TRIGGERING**



CURRENT DERATING

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FIGURE 3 - MAXIMUM CASE TEMPERATURE

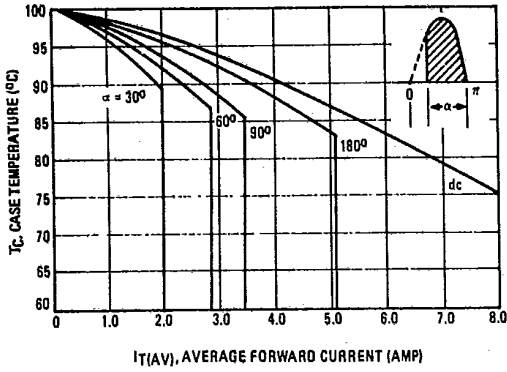
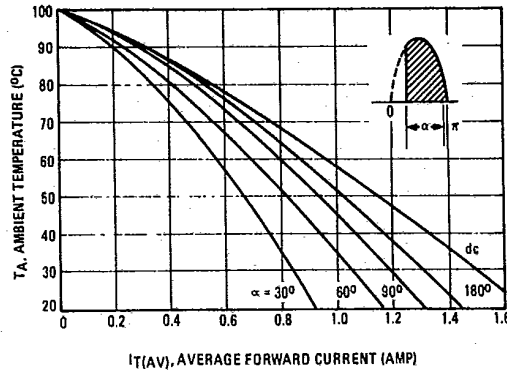


FIGURE 4 - MAXIMUM AMBIENT TEMPERATURE



MOTOROLA SC (DIODES/OPTO)

25E D

FIGURE 5 - POWER DISSIPATION

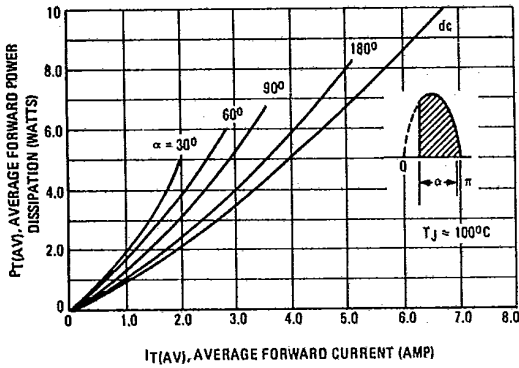
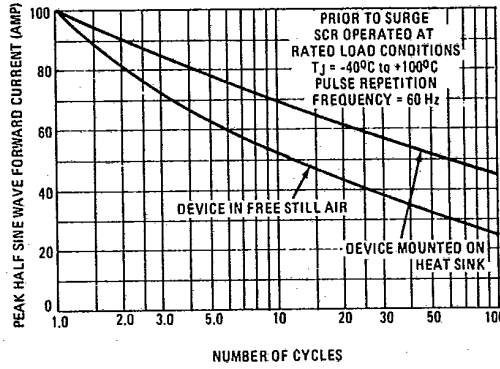
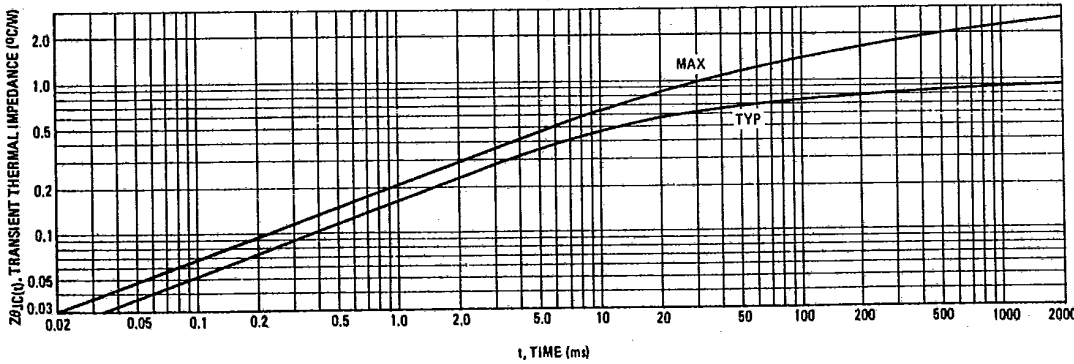


FIGURE 6 - MAXIMUM SURGE CAPABILITY



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FIGURE 7 - THERMAL RESPONSE



T-25-15

FIGURE 8 - FORWARD VOLTAGE

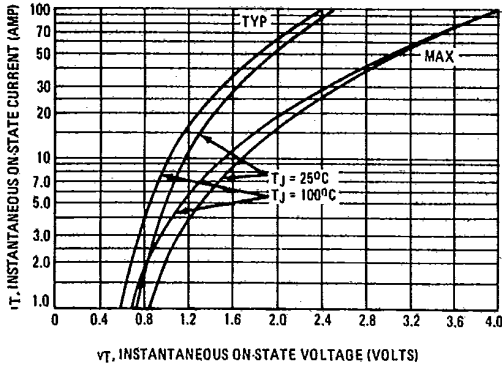


FIGURE 9 - HOLDING CURRENT

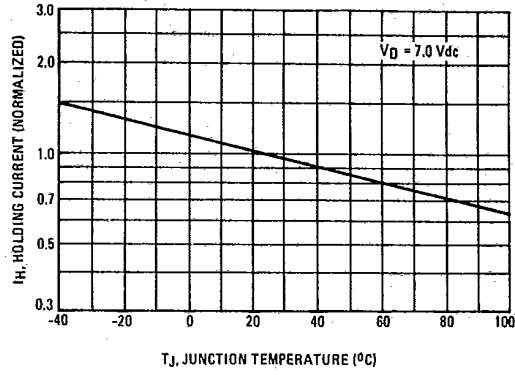


FIGURE 10 - TYPICAL THERMAL RESISTANCE OF PLATES

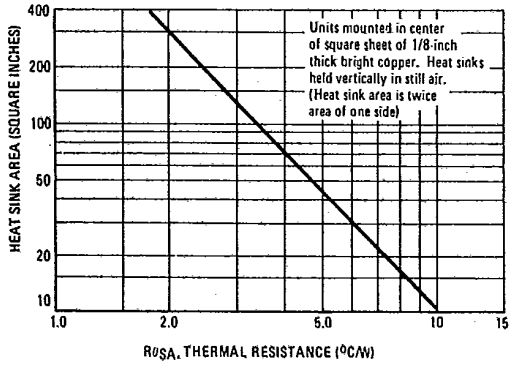
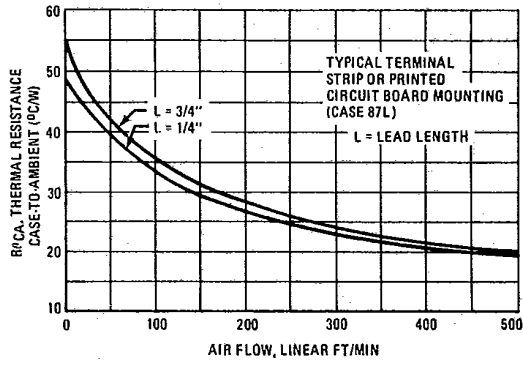


FIGURE 11 - CASE-TO-AMBIENT THERMAL RESISTANCE



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