MOTOROLA
SEMICONDUCTOR TECHNICAL DATA

Order this document by MCR25/D

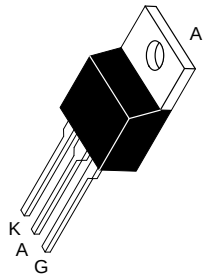
Silicon Controlled Rectifiers
Reverse Blocking Thyristors

MCR25 SERIES*
***Motorola preferred devices**

SCRs
25 AMPERES RMS
400 thru 800
VOLTS

Designed primarily for half–wave ac control applications, such as motor controls, heating controls, and power supplies; or wherever half–wave, silicon gate–controlled devices are needed.

- Blocking Voltage to 800 Volts
- On-State Current Rating of 25 Amperes RMS
- High Surge Current Capability — 300 Amperes
- Industry Standard TO–220AB Package for Ease of Design
- Glass Passivated Junctions for Reliability and Uniformity



CASE 221A–06
(TO-220AB)
Style 3

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

Parameter		Symbol	Value	Unit
Peak Repetitive Off-State Voltage (1) Peak Repetitive Reverse Voltage (T_J = –40 to 125°C)	MCR25D MCR25M MCR25N	V_{DRM} V_{RRM}	 400 600 800	Volts
On-State RMS Current (All Conduction Angles)		$I_{T(RMS)}$	25	A
Peak Non-repetitive Surge Current (One Half Cycle, 60 Hz, T_J = 125°C)		I_{TSM}	300	A
Circuit Fusing Consideration (t = 8.3 ms)		I^2t	373	A^2sec
Peak Gate Power (Pulse Width ≤ 1.0 µs, T_C = 80°C)		P_{GM}	20.0	Watts
Average Gate Power (t = 8.3 ms, T_C = 80°C)		$P_{G(AV)}$	0.5	Watts
Peak Gate Current (Pulse Width ≤ 1.0 µs, T_C = 80°C)		I_{GM}	2.0	A
Operating Junction Temperature Range		T_J	–40 to +125	°C
Storage Temperature Range		T_{stg}	–40 to +150	°C

THERMAL CHARACTERISTICS

Thermal Resistance — Junction to Case — Junction to Ambient	$R_{\theta JC}$ $R_{\theta JA}$	1.5 62.5	°C/W
Maximum Lead Temperature for Soldering Purposes 1/8″ from Case for 5 Seconds	T_L	260	°C

(1) V_{DRM} and V_{RRM} for all types can be applied on a continuous basis. Ratings apply for zero or negative gate voltage; positive gate voltage shall not be applied concurrent with negative potential on the anode. Blocking voltages shall not be tested with a constant current source such that the voltage ratings of the devices are exceeded.

Preferred devices are Motorola recommended choices for future use and best overall value.

REV 2

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

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Peak Forward Blocking Current Peak Reverse Blocking Current (V_{AK} = Rated V_{DRM} or V_{RRM}, Gate Open)	T_J = 25°C T_J = 125°C	I_{DRM} I_{RRM}	— —	— —	0.01 2.0	mA
ON CHARACTERISTICS						
Peak On-State Voltage* (I_{TM} = 50 A)		V_{TM}	—	—	1.8	Volts
Gate Trigger Current (Continuous dc) (V_D = 12 V, R_L = 100 Ω)		I_{GT}	4.0	10	30	mA
Gate Trigger Voltage (Continuous dc) (V_D = 12 V, R_L = 100 Ω)		V_{GT}	0.5	0.65	1.0	Volts
Hold Current (Anode Voltage =12 V)		I_H	5.0	25	40	mA
DYNAMIC CHARACTERISTICS						
Critical Rate of Rise of Off–State Voltage (V_D = Rated V_{DRM}, Exponential Waveform, Gate Open, T_J = 125°C)		dv/dt	50	200	—	V/μs

*Indicates Pulse Test: Pulse Width ≤ 2.0 ms, Duty Cycle ≤ 2%.

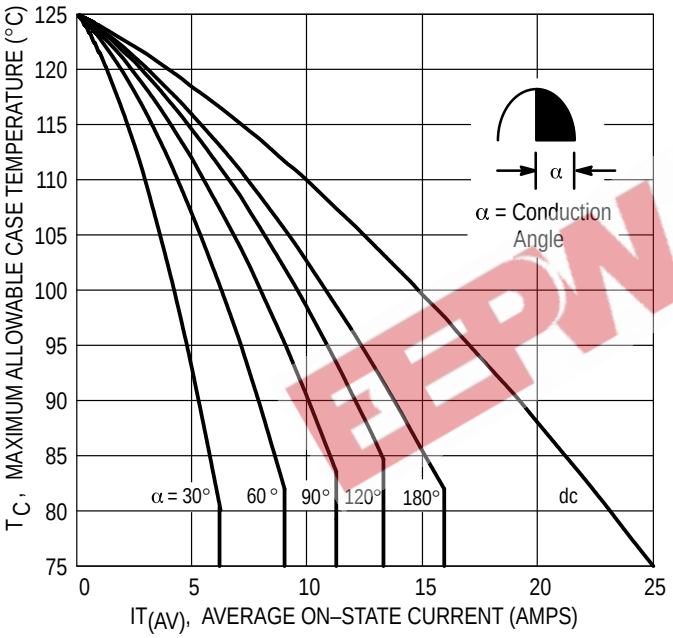


Figure 1. Average Current Derating

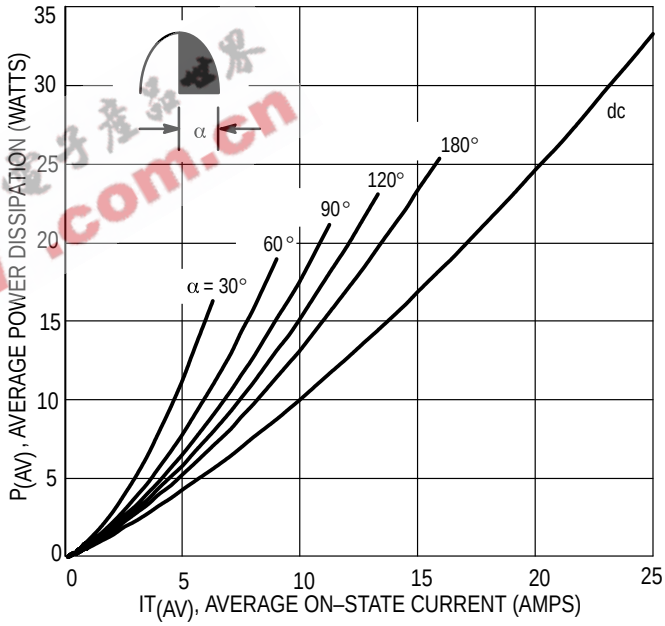


Figure 2. Maximum On–State Power Dissipation

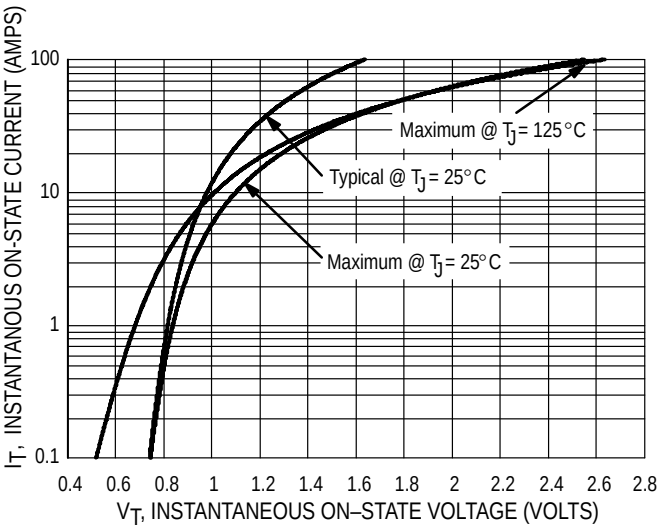


Figure 3. On–State Characteristics

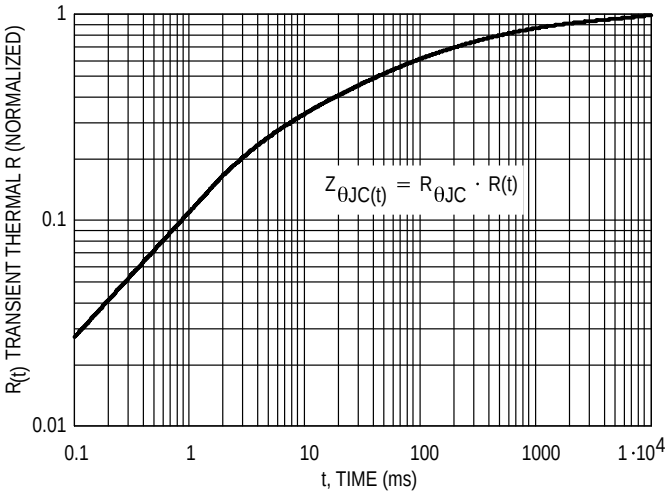


Figure 4. Transient Thermal Response

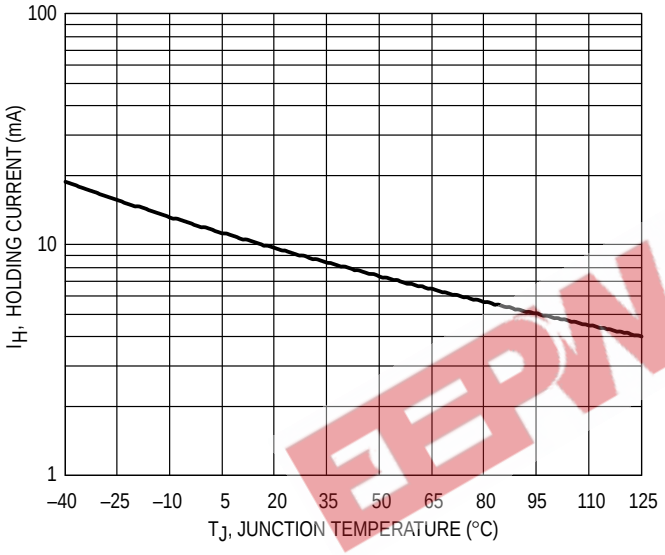


Figure 5. Typical Holding Current Versus Junction Temperature

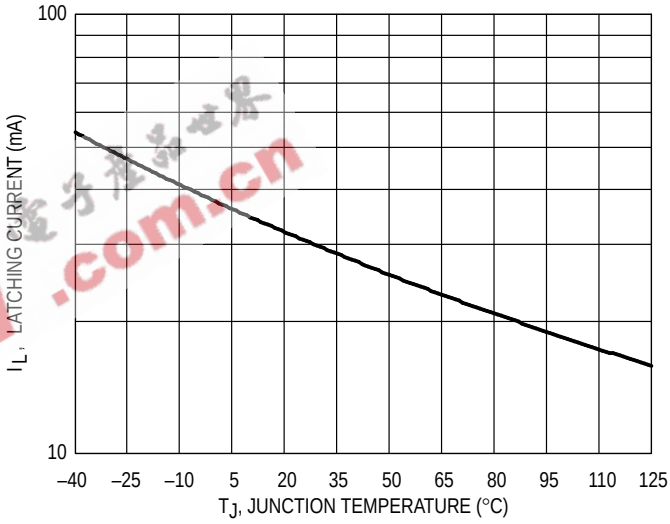


Figure 6. Typical Latching Current Versus Junction Temperature

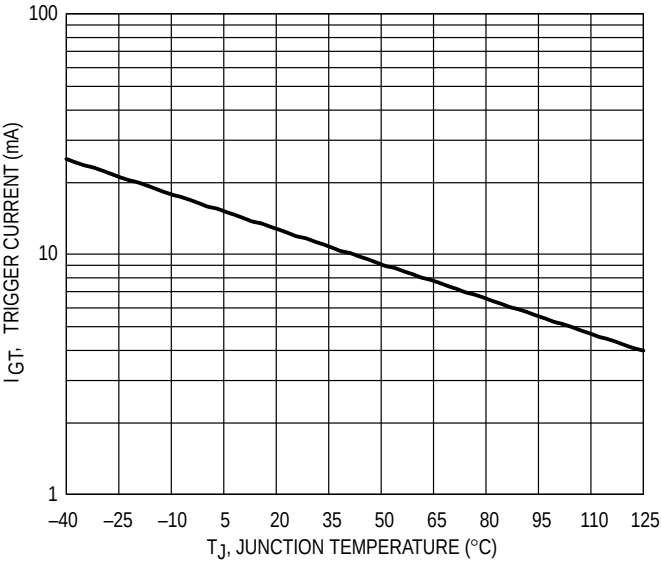


Figure 7. Typical Gate Trigger Current Versus Junction Temperature

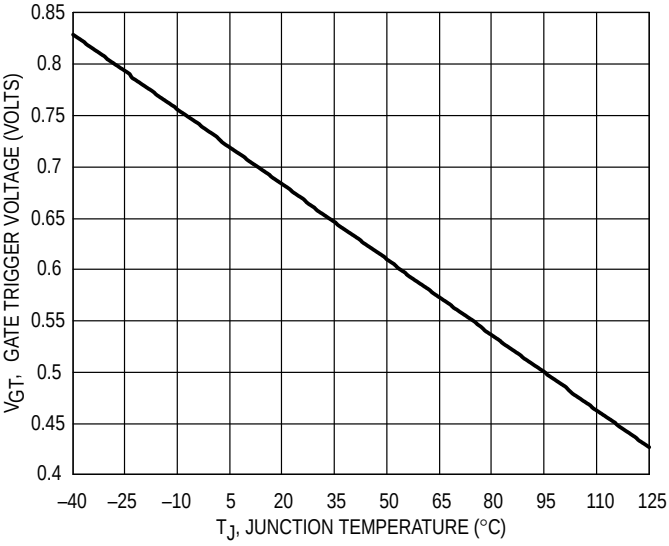


Figure 8. Typical Gate Trigger Voltage Versus Junction Temperature

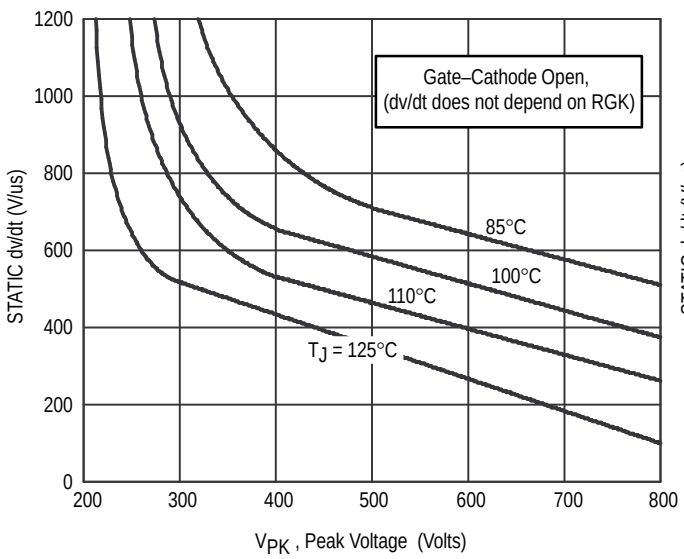


Figure 9. Typical Exponential Static dv/dt Versus Peak Voltage.

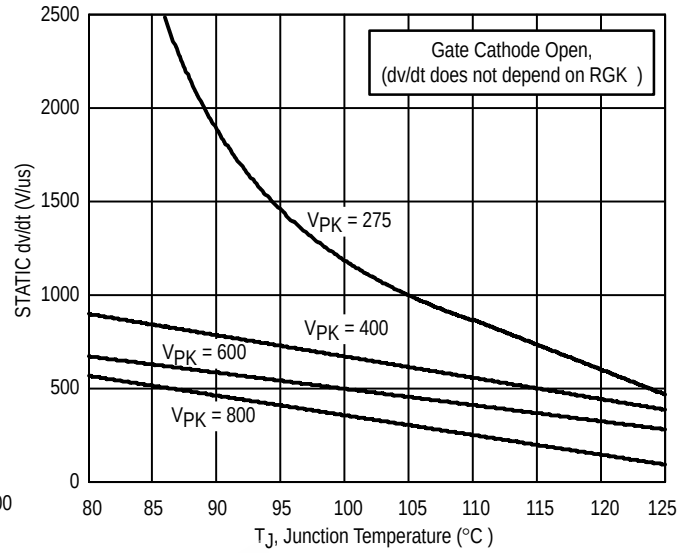


Figure 10. Typical Exponential Static dv/dt Versus Junction Temperature.

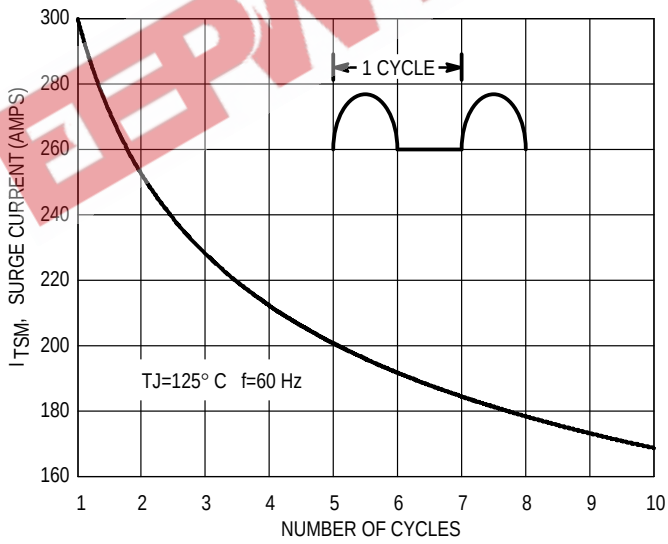
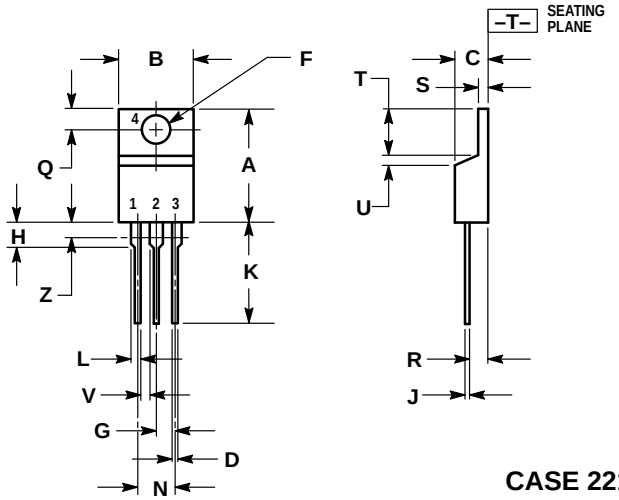


Figure 11. Maximum Non–Repetitive Surge Current

PACKAGE DIMENSIONS



CASE 221A–06
(TO-220AB)

STYLE 3:
PIN 1. CATHODE
2. ANODE
3. GATE
4. ANODE

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.570	0.620	14.48	15.75
B	0.380	0.405	9.66	10.28
C	0.160	0.190	4.07	4.82
D	0.025	0.035	0.64	0.88
F	0.142	0.147	3.61	3.73
G	0.095	0.105	2.42	2.66
H	0.110	0.155	2.80	3.93
J	0.018	0.025	0.46	0.64
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
N	0.190	0.210	4.83	5.33
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.15	1.39
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045	—	1.15	—
Z	—	0.080	—	2.04

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