

## Silicon Controlled Rectifiers Reverse Blocking Thyristors

Designed for high volume, low cost, industrial and consumer applications such as motor control; process control; temperature, light and speed control.

- Small Size
- Passivated Die for Reliability and Uniformity
- Low Level Triggering and Holding Characteristics
- Available in Two Package Styles
  - Surface Mount Lead Form — Case 369A
  - Miniature Plastic Package — Straight Leads — Case 369

### ORDERING INFORMATION

- To Obtain "DPAK" in Surface Mount Leadform (Case 369A)
  - Shipped in Sleeves — No Suffix, i.e. MCR8DSN
  - Shipped in 16 mm Tape and Reel — Add "T4" Suffix to Device Number, i.e. MCR8DSNT4
- To Obtain "DPAK" in Straight Lead Version (Case 369) Shipped in Sleeves — Add "–1" Suffix to Device Number, i.e. MCR8DSN–1

### MAXIMUM RATINGS (T<sub>J</sub> = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Peak Repetitive Off-State Voltage (1) Peak Repetitive Reverse Voltage (T <sub>J</sub> = –40 to 110°C, R <sub>GK</sub> = 1.0 KΩ)	V <sub>DRM</sub> V <sub>R RM</sub>	600 800	Volts
On-State RMS Current (All Conduction Angles; T <sub>C</sub> = 90°C)	I <sub>T(RMS)</sub>	8.0	Amps
Average On-State Current (All Conduction Angles; T <sub>C</sub> = 90°C)	I <sub>T(AV)</sub>	5.1	
Peak Non-Repetitive Surge Current (One Half Cycle, 60 Hz, T <sub>J</sub> = 110°C)	I <sub>TSM</sub>	90	
Circuit Fusing Consideration (t = 8.3 msec)	i <sup>2</sup> t	34	A <sup>2</sup> sec
Peak Gate Power (Pulse Width ≤ 10 μsec, T <sub>C</sub> = 90°C)	P <sub>GM</sub>	5.0	Watts
Average Gate Power (t = 8.3 msec, T <sub>C</sub> = 90°C)	P <sub>G(AV)</sub>	0.5	
Peak Gate Current (Pulse Width ≤ 10 μsec, T <sub>C</sub> = 90°C)	I <sub>GM</sub>	2.0	Amps
Operating Junction Temperature Range	T <sub>J</sub>	–40 to 110	°C
Storage Temperature Range	T <sub>stg</sub>	–40 to 150	

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance — Junction to Case — Junction to Ambient — Junction to Ambient (2)	R <sub>θJC</sub> R <sub>θJA</sub> R <sub>θJA</sub>	2.2 88 80	°C/W
Maximum Lead Temperature for Soldering Purposes (3)	T <sub>L</sub>	260	°C

(1) V<sub>DRM</sub> for all types can be applied on a continuous basis. Ratings apply for negative gate voltage or R<sub>GK</sub> = 1.0 KΩ; 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 device are exceeded.

(2) Surface mounted on minimum recommended pad size.

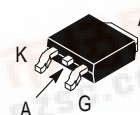
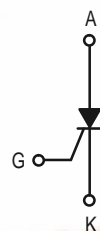
(3) 1/8" from case for 10 seconds.

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

## MCR8DSM MCR8DSN

Motorola Preferred Devices

SCRs  
8.0 AMPERES RMS  
600 thru 800 VOLTS



CASE 369A–13  
STYLE 4



MOTOROLA

## MCR8DSM MCR8DSN

### ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ ; $R_{GK} = 1.0\text{ K}\Omega$ unless otherwise noted)

Characteristics	Symbol	Min	Typ	Max	Unit
Peak Reverse Gate Blocking Voltage ( $I_{GR} = 10\text{ }\mu\text{A}$ )	$V_{GRM}$	10	12.5	18	Volts
Peak Forward Blocking Current Peak Reverse Blocking Current ( $V_{AK} = \text{Rated } V_{DRM} \text{ or } V_{RRM}$ ) <sup>(1)</sup>	$I_{DRM}$ $I_{RRM}$	— —	— —	10 500	$\mu\text{A}$
Peak Reverse Gate Blocking Current ( $V_{GR} = 10\text{ V}$ )	$I_{RGM}$	—	—	1.2	$\mu\text{A}$
Peak On-State Voltage <sup>(2)</sup> ( $I_{TM} = 16\text{ A}$ )	$V_{TM}$	—	1.4	1.8	Volts
Gate Trigger Current (Continuous dc) <sup>(3)</sup> ( $V_D = 12\text{ V}$ , $R_L = 100\text{ }\Omega$ , $T_J = 25^\circ\text{C}$ ) ( $V_D = 12\text{ V}$ , $R_L = 100\text{ }\Omega$ , $T_J = -40^\circ\text{C}$ )	$I_{GT}$	5.0 —	12 —	200 300	$\mu\text{A}$
Gate Trigger Voltage (Continuous dc) ( $V_D = 12\text{ V}$ , $R_L = 100\text{ }\Omega$ , $T_J = 25^\circ\text{C}$ ) ( $V_D = 12\text{ V}$ , $R_L = 100\text{ }\Omega$ , $T_J = -40^\circ\text{C}$ ) ( $V_D = 12\text{ V}$ , $R_L = 100\text{ }\Omega$ , $T_J = 110^\circ\text{C}$ )	$V_{GT}$	0.45 — 0.2	0.65 — —	1.0 1.5 —	Volts
Holding Current ( $V_D = 12\text{ V}$ , $I_{(init)} = 200\text{ mA}$ , $T_J = 25^\circ\text{C}$ ) ( $V_D = 12\text{ V}$ , $I_{(init)} = 200\text{ mA}$ , $T_J = -40^\circ\text{C}$ )	$I_H$	0.5 —	1.0 —	6.0 10	mA
Latching Current ( $V_D = 12\text{ V}$ , $I_G = 2.0\text{ mA}$ , $T_J = 25^\circ\text{C}$ ) ( $V_D = 12\text{ V}$ , $I_G = 2.0\text{ mA}$ , $T_J = -40^\circ\text{C}$ )	$I_L$	0.5 —	1.0 —	6.0 10	mA

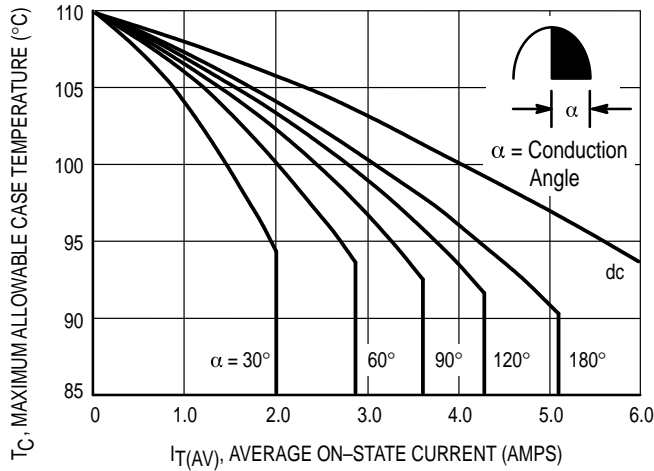
### DYNAMIC CHARACTERISTICS

Characteristics	Symbol	Min	Typ	Max	Unit
Total Turn-On Time (Source Voltage = 12 V, $R_S = 6.0\text{ K}\Omega$ , $I_T = 16\text{ A(pk)}$ , $R_{GK} = 1.0\text{ K}\Omega$ ) ( $V_D = \text{Rated } V_{DRM}$ , Rise Time = 20 ns, Pulse Width = 10 $\mu\text{s}$ )	tgt	—	2.0	5.0	$\mu\text{s}$
Critical Rate of Rise of Off-State Voltage ( $V_D = 0.67 \times \text{Rated } V_{DRM}$ , Exponential Waveform, $R_{GK} = 1.0\text{ K}\Omega$ , $T_J = 110^\circ\text{C}$ )	dv/dt	2.0	10	—	V/ $\mu\text{s}$

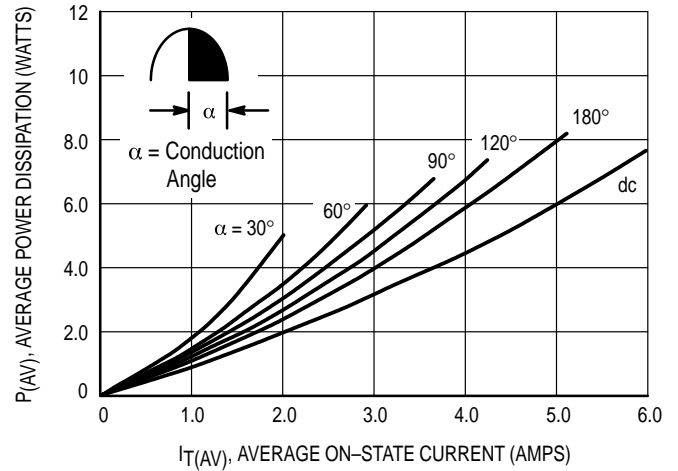
(1) Ratings apply for negative gate voltage or  $R_{GK} = 1.0\text{ K}\Omega$ . Devices shall not have a positive gate voltage concurrently with a negative voltage on the anode. Devices should not be tested with a constant current source for forward and reverse blocking capability such that the voltage applied exceeds the rated blocking voltage.

(2) Pulse Test; Pulse Width  $\leq 2.0\text{ msec}$ , Duty Cycle  $\leq 2\%$ .

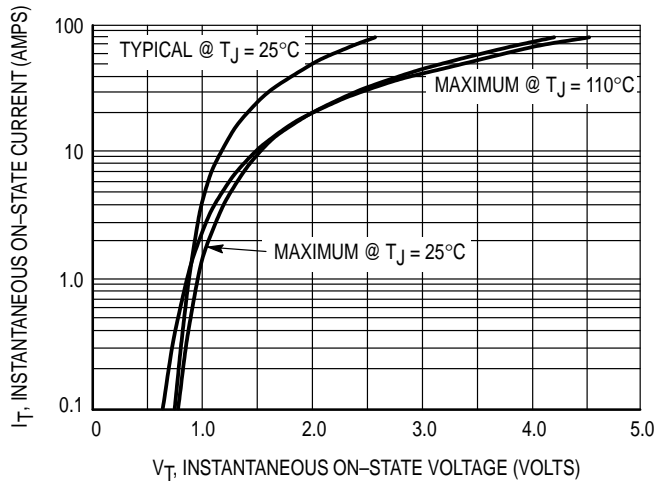
(3) Does not include  $R_{GK}$  current.



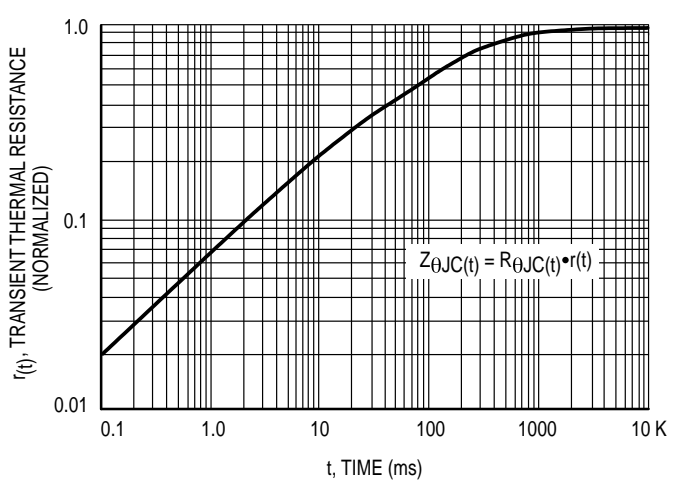
**Figure 1. Average Current Derating**



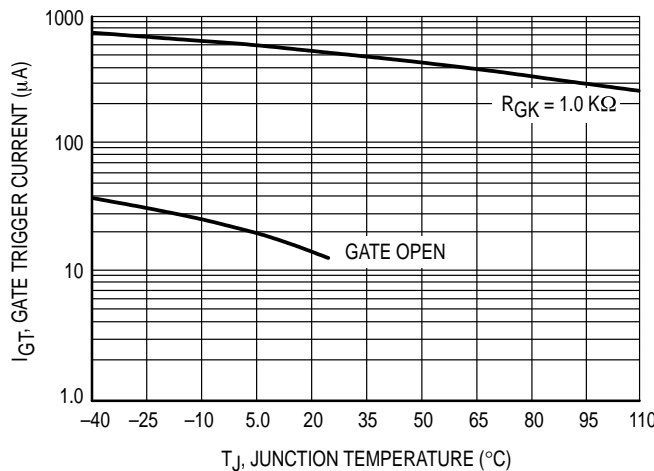
**Figure 2. On-State Power Dissipation**



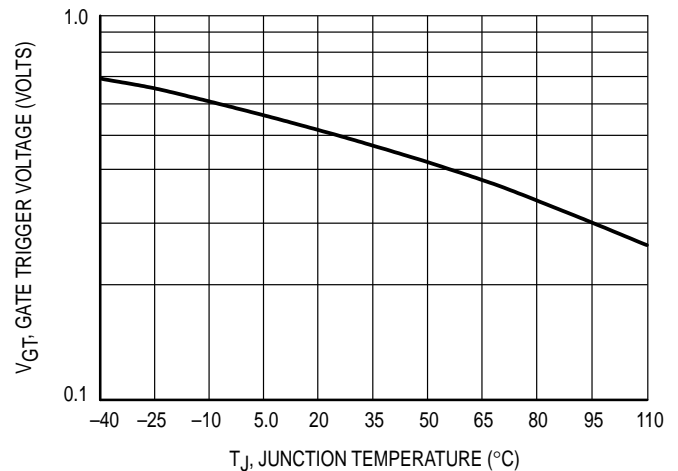
**Figure 3. On-State Characteristics**



**Figure 4. Transient Thermal Response**

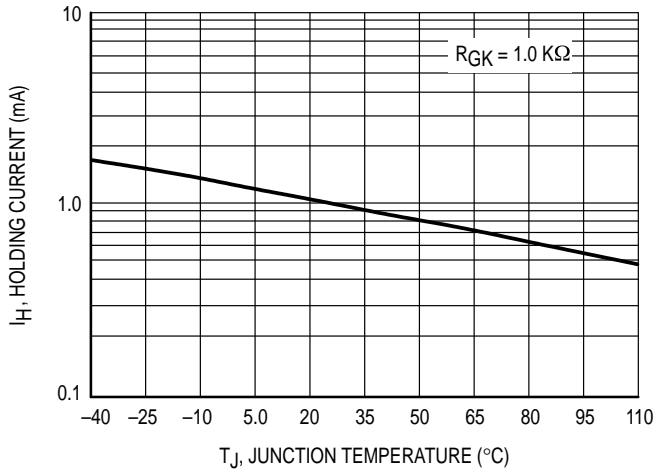


**Figure 5. Typical Gate Trigger Current versus Junction Temperature**

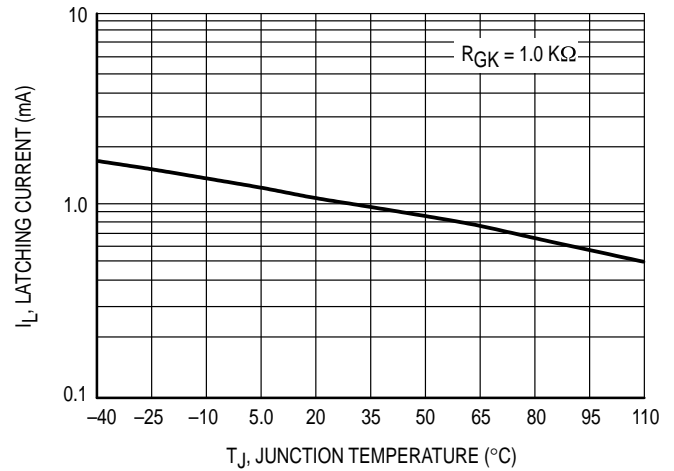


**Figure 6. Typical Gate Trigger Voltage versus Junction Temperature**

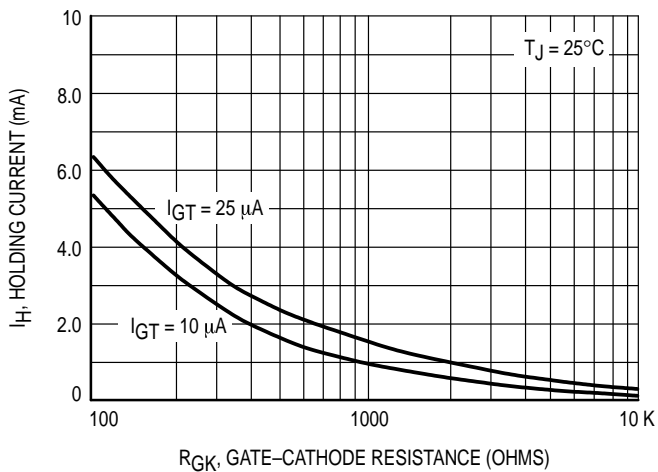
## MCR8DSM MCR8DSN



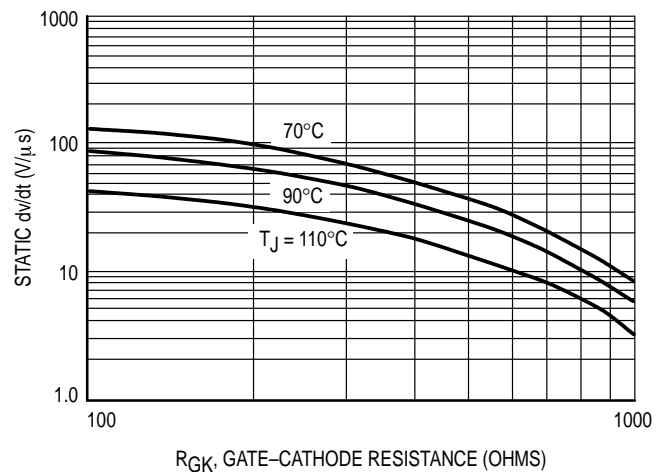
**Figure 7. Typical Holding Current versus Junction Temperature**



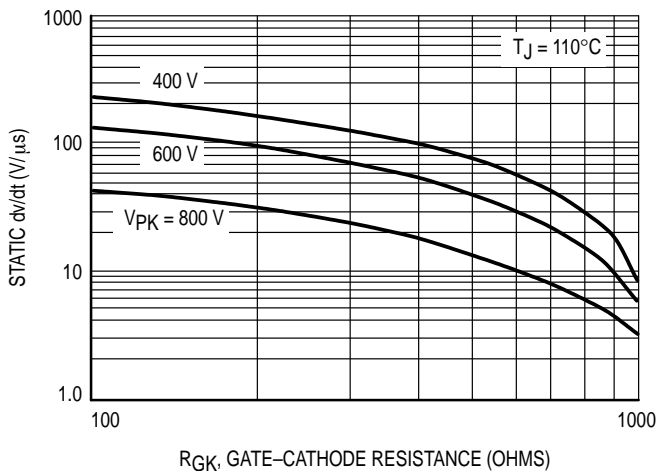
**Figure 8. Typical Latching Current versus Junction Temperature**



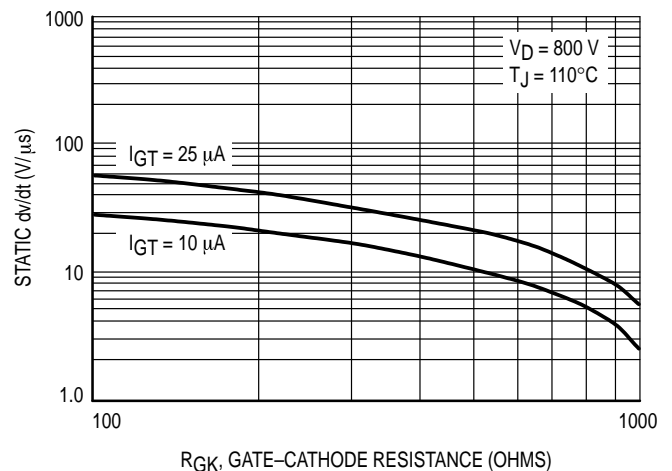
**Figure 9. Holding Current versus Gate-Cathode Resistance**



**Figure 10. Exponential Static  $dv/dt$  versus Gate-Cathode Resistance and Junction Temperature**

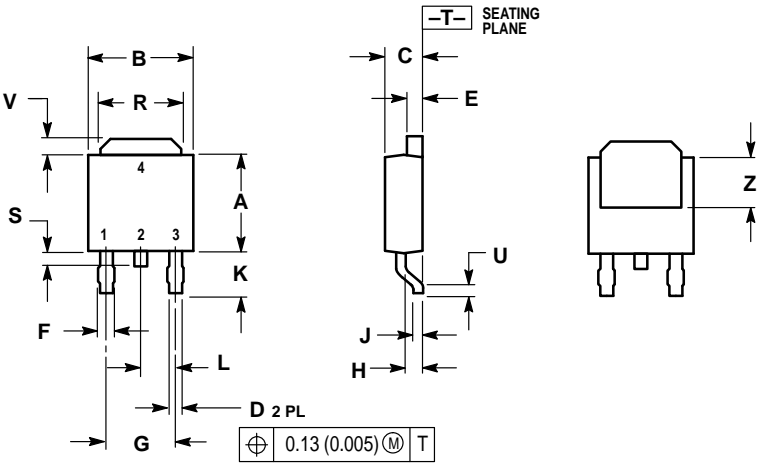


**Figure 11. Exponential Static  $dv/dt$  versus Gate-Cathode Resistance and Peak Voltage**



**Figure 12. Exponential Static  $dv/dt$  versus Gate-Cathode Resistance and Gate Trigger Current Sensitivity**

PACKAGE DIMENSIONS




- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.235	0.250	5.97	6.35
B	0.250	0.265	6.35	6.73
C	0.086	0.094	2.19	2.38
D	0.027	0.035	0.69	0.88
E	0.033	0.040	0.84	1.01
F	0.037	0.047	0.94	1.19
G	0.180 BSC		4.58 BSC	
H	0.034	0.040	0.87	1.01
J	0.018	0.023	0.46	0.58
K	0.102	0.114	2.60	2.89
L	0.090 BSC		2.29 BSC	
R	0.175	0.215	4.45	5.46
S	0.020	0.050	0.51	1.27
U	0.020		0.51	
V	0.030	0.050	0.77	1.27
Z	0.138		3.51	

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

CASE 369A-13  
ISSUE Y

## MCR8DSM MCR8DSN

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