

# 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

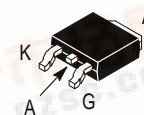
- To Obtain "DPAK" in Surface Mount Leadform (Case 369A)
  - Shipped in Sleeves — No Suffix, i.e. MCR12DCN
  - Shipped in 16 mm Tape and Reel — Add "T4" Suffix to Device Number, i.e. MCR12DCNT4
- To Obtain "DPAK" in Straight Lead Version (Case 369) Shipped in Sleeves — Add "-1" Suffix to Device Number, i.e. MCR12DCN-1



## MCR12DCM MCR12DCN

Motorola Preferred Devices

SCRs  
 12 AMPERES RMS  
 600 thru 800 VOLTS



CASE 369A-13  
 STYLE 4

### 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 125°C)	V <sub>DRM</sub> V <sub>RRM</sub>	600 800	Volts
On-State RMS Current (All Conduction Angles; T <sub>C</sub> = 90°C)	I <sub>T(RMS)</sub>	12	Amps
Average On-State Current (All Conduction Angles; T <sub>C</sub> = 90°C)	I <sub>T(AV)</sub>	7.6	
Peak Non-Repetitive Surge Current (One Half Cycle, 60 Hz, T <sub>J</sub> = 125°C)	I <sub>TSM</sub>	100	
Circuit Fusing Consideration (t = 8.3 msec)	i <sup>2</sup> t	41	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 125	°C
Storage Temperature Range	T <sub>stg</sub>	-40 to 150	°C

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance — Junction to Case	R <sub>θJC</sub>	2.2	°C/W
— Junction to Ambient	R <sub>θJA</sub>	88	
— Junction to Ambient (2)	R <sub>θJA</sub>	80	
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 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 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.



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### ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

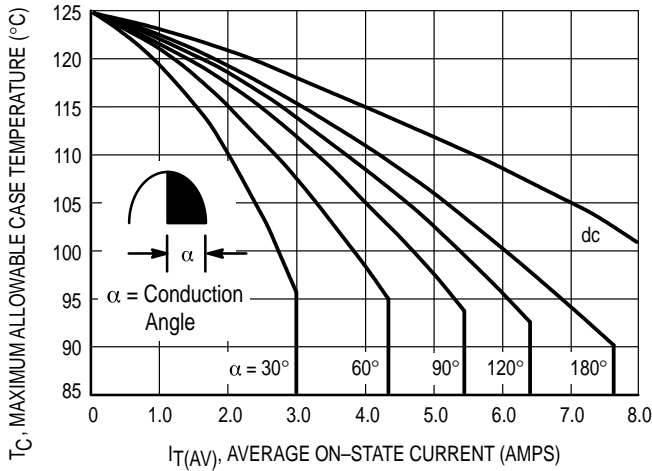
Characteristics	Symbol	Min	Typ	Max	Unit
Peak Forward Blocking Current Peak Reverse Blocking Current ( $V_{AK} = \text{Rated } V_{DRM} \text{ or } V_{RRM}, \text{ Gate Open}$ ) $T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$	$I_{DRM}$ $I_{RRM}$	— —	— —	0.01 5.0	mA
Peak On-State Voltage (1) ( $I_{TM} = 24 \text{ A}$ )	$V_{TM}$	—	1.4	2.1	Volts
Gate Trigger Current (Continuous dc) ( $V_D = 12 \text{ V}, R_L = 100 \Omega, T_J = 25^\circ\text{C}$ ) ( $V_D = 12 \text{ V}, R_L = 100 \Omega, T_J = -40^\circ\text{C}$ )	$I_{GT}$	2.0 —	7.0 —	20 40	mA
Gate Trigger Voltage (Continuous dc) ( $V_D = 12 \text{ V}, R_L = 100 \Omega, T_J = 25^\circ\text{C}$ ) ( $V_D = 12 \text{ V}, R_L = 100 \Omega, T_J = -40^\circ\text{C}$ ) ( $V_D = 12 \text{ V}, R_L = 100 \Omega, T_J = 125^\circ\text{C}$ )	$V_{GT}$	0.5 — 0.2	0.65 — —	1.0 2.0 —	Volts
Holding Current ( $V_D = 12 \text{ V}, I_T = 200 \text{ mA}, T_J = 25^\circ\text{C}$ ) ( $V_D = 12 \text{ V}, I_T = 200 \text{ mA}, T_J = -40^\circ\text{C}$ )	$I_H$	4.0 —	22 —	40 80	mA
Latching Current ( $V_D = 12 \text{ V}, I_G = 20 \text{ mA}, T_J = 25^\circ\text{C}$ ) ( $V_D = 12 \text{ V}, I_G = 40 \text{ mA}, T_J = -40^\circ\text{C}$ )	$I_L$	4.0 —	22 —	40 80	mA

### DYNAMIC CHARACTERISTICS

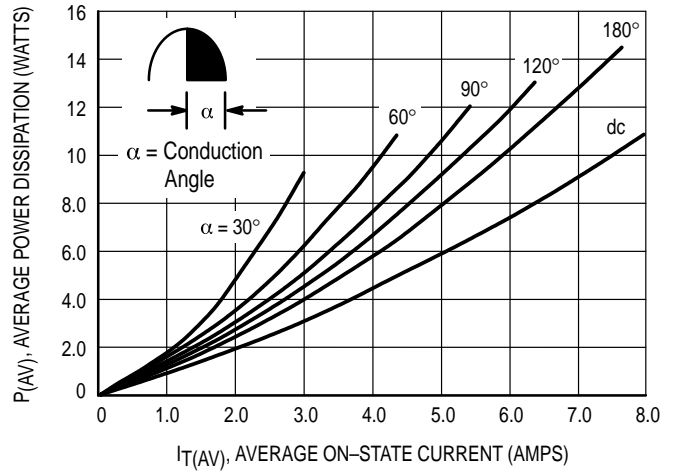
Characteristics	Symbol	Min	Typ	Max	Unit
Critical Rate of Rise of Off-State Voltage ( $V_D = \text{Rated } V_{DRM}, \text{ Exponential Waveform, Gate Open, } T_J = 125^\circ\text{C}$ )	$dv/dt$	50	200	—	$\text{V}/\mu\text{s}$

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

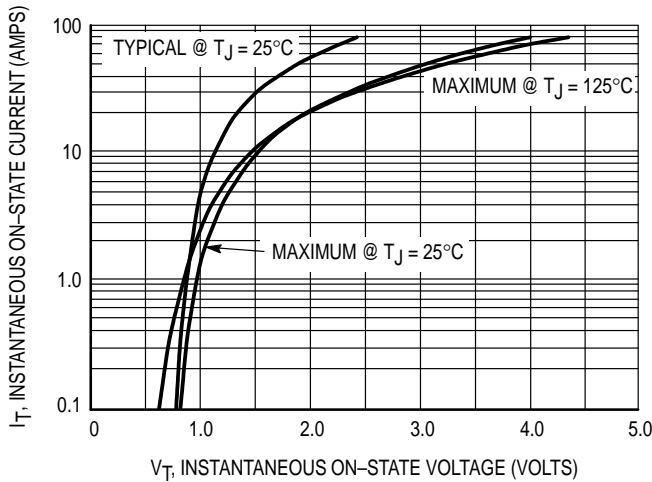
**MCR12DCM MCR12DCN**



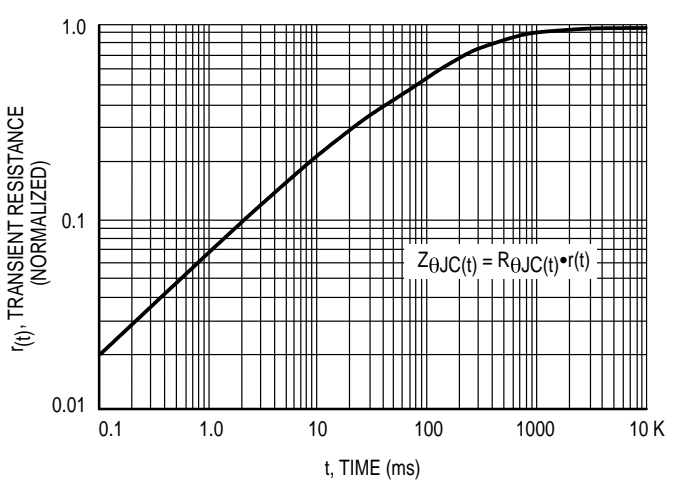
**Figure 1. Average Current Derating**



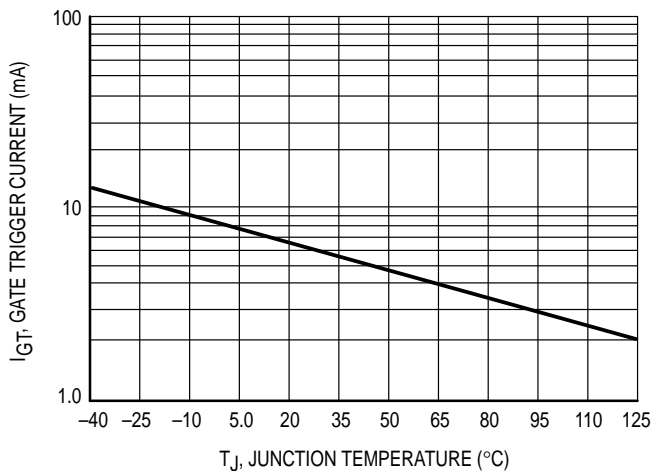
**Figure 2. On-State Power Dissipation**



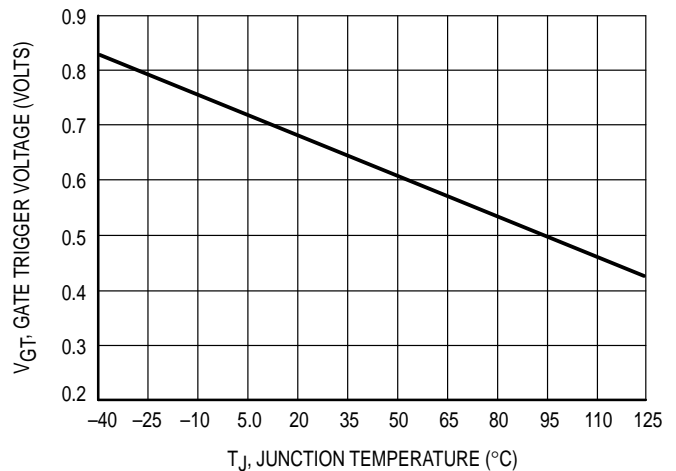
**Figure 3. On-State Characteristics**



**Figure 4. Transient Thermal Response**

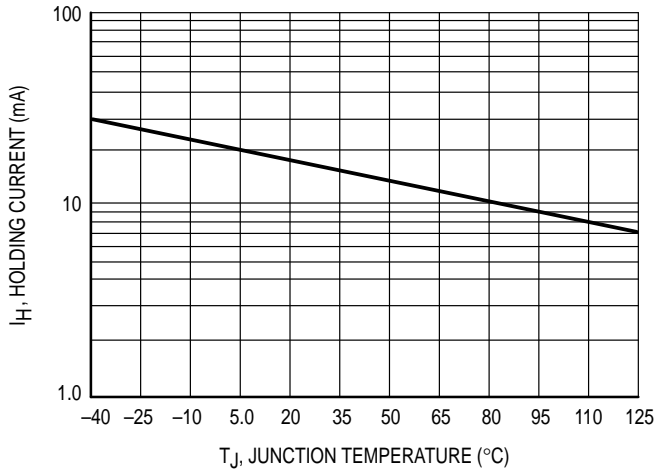


**Figure 5. Typical Gate Trigger Current versus Junction Temperature**

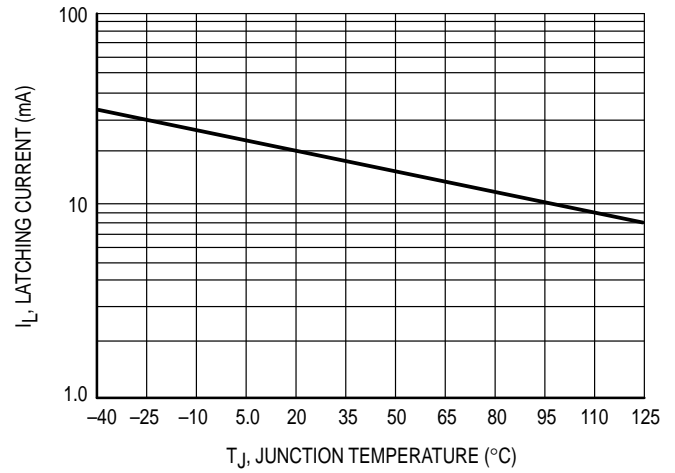


**Figure 6. Typical Gate Trigger Voltage versus Junction Temperature**

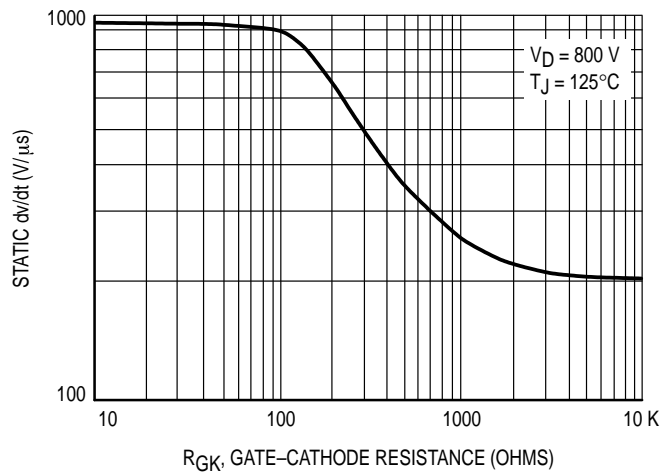
**MCR12DCM MCR12DCN**



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



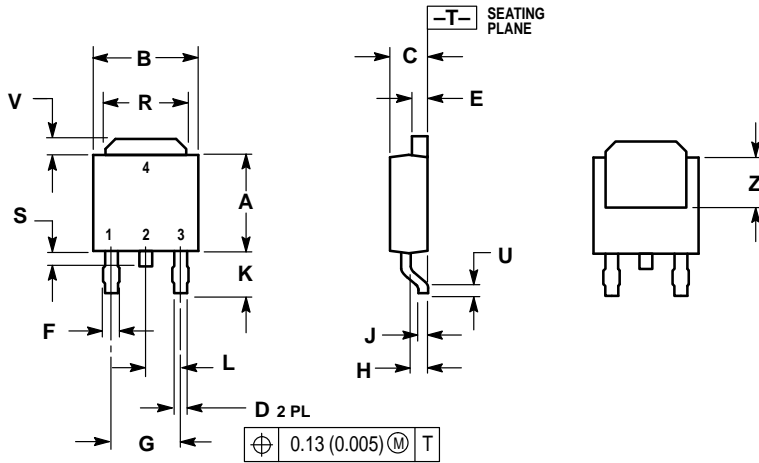
**Figure 8. Typical Latching Current versus Junction Temperature**



**Figure 9. Exponential Static dv/dt versus Gate-Cathode Resistance**

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## 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

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**USA/EUROPE/Locations Not Listed:** Motorola Literature Distribution;  
P.O. Box 5405, Denver, Colorado 80217. 303-675-2140 or 1-800-441-2447

**JAPAN:** Nippon Motorola Ltd.: SPD, Strategic Planning Office, 4-32-1,  
Nishi-Gotanda, Shinagawa-ku, Tokyo 141, Japan. 81-3-5487-8488

**Mfax™:** RMFAX0@email.sps.mot.com – TOUCHTONE 602-244-6609  
– US & Canada ONLY 1-800-774-1848

**ASIA/PACIFIC:** Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,  
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298

**INTERNET:** <http://motorola.com/sps>



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