

# MCR12DCM, MCR12DCN

Preferred Device

## 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.

#### Features

- Small Size
- Passivated Die for Reliability and Uniformity
- Low Level Triggering and Holding Characteristics
- Epoxy Meets UL 94 V-0 @ 0.125 in
- ESD Ratings: Human Body Model, 3B > 8000 V  
Machine Model, C > 400 V
- Pb-Free Packages are Available

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

Rating	Symbol	Value	Unit
Peak Repetitive Off-State Voltage (Note 1) (T <sub>J</sub> = -40 to 125°C, Sine Wave, 50 to 60 Hz, Gate Open) MCR12DCM MCR12DCN	V <sub>DRM</sub> , V <sub>RRM</sub>	600 800	V
On-State RMS Current (180° Conduction Angles; T <sub>C</sub> = 90°C)	I <sub>T(RMS)</sub>	12	A
Average On-State Current (180° Conduction Angles; T <sub>C</sub> = 90°C)	I <sub>T(AV)</sub>	7.8	A
Peak Non-Repetitive Surge Current (1/2 Cycle, Sine Wave 60 Hz, T <sub>J</sub> = 125°C)	I <sub>TSM</sub>	100	A
Circuit Fusing Consideration (t = 8.3 msec)	I <sup>2</sup> t	41	A <sup>2</sup> sec
Forward Peak Gate Power (Pulse Width ≤ 1.0 μsec, T <sub>C</sub> = 90°C)	P <sub>GM</sub>	5.0	W
Forward Average Gate Power (t = 8.3 msec, T <sub>C</sub> = 90°C)	P <sub>G(AV)</sub>	0.5	W
Forward Peak Gate Current (Pulse Width ≤ 1.0 μsec, T <sub>C</sub> = 90°C)	I <sub>GM</sub>	2.0	A
Operating Junction Temperature Range	T <sub>J</sub>	-40 to 125	°C
Storage Temperature Range	T <sub>stg</sub>	-40 to 150	°C

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

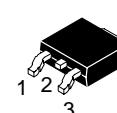
1. V<sub>DRM</sub> for all types can be applied on a continuous basis. Ratings apply for zero or negative gate voltage; positive gate voltage shall not be applied concurrent with negative potential on the anode. Blocking voltages shall not be tested with a constant current source such that the voltage ratings of the device are exceeded.



ON Semiconductor®

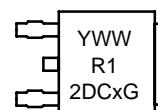
<http://onsemi.com>

SCRs  
12 AMPERES RMS  
600 – 800 VOLTS



DPAK  
CASE 369C  
STYLE 4

#### MARKING DIAGRAM



Y = Year  
WW = Work Week  
R12DCx = Device Code  
x = M or N  
G = Pb-Free Package

#### PIN ASSIGNMENT

Pin	Assignment
1	Cathode
2	Anode
3	Gate
4	Anode

#### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

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

# MCR12DCM, MCR12DCN

## THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance – Junction-to-Case	$R_{\theta JC}$	2.2	$^{\circ}C/W$
– Junction-to-Ambient	$R_{\theta JA}$	88	
– Junction-to-Ambient (Note 2)	$R_{\theta JA}$	80	
Maximum Lead Temperature for Soldering Purposes (Note 3)	$T_L$	260	$^{\circ}C$

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

Characteristic	Symbol	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Peak Repetitive Forward or Reverse Blocking Current ( $V_{AK} = \text{Rated } V_{DRM} \text{ or } V_{RRM}$ , Gate Open)	$I_{DRM}$ , $I_{RRM}$	–	–	0.01	mA
$T_J = 25^{\circ}C$					
$T_J = 125^{\circ}C$		–	–	5.0	

### ON CHARACTERISTICS

Peak Forward On-State Voltage (Note 4) ( $I_{TM} = 20 \text{ A}$ )	$V_{TM}$	–	1.3	1.9	V
Gate Trigger Current (Continuous dc) ( $V_D = 12 \text{ V}$ , $R_L = 100 \Omega$ )	$I_{GT}$	2.0	7.0	20	mA
$T_J = 25^{\circ}C$					
$T_J = -40^{\circ}C$		–	–	40	
Gate Trigger Voltage (Continuous dc) ( $V_D = 12 \text{ V}$ , $R_L = 100 \Omega$ )	$V_{GT}$	0.5	0.65	1.0	V
$T_J = 25^{\circ}C$					
$T_J = -40^{\circ}C$		–	–	2.0	
Gate Non-Trigger Voltage ( $V_D = 12 \text{ V}$ , $R_L = 100 \Omega$ )	$V_{GD}$	0.2	–	–	V
Holding Current ( $V_D = 12 \text{ V}$ , Initiating Current = 200 mA, Gate Open)	$I_H$	4.0	22	40	mA
$T_J = 25^{\circ}C$					
$T_J = -40^{\circ}C$		–	–	80	
Latching Current ( $V_D = 12 \text{ V}$ , $I_G = 20 \text{ mA}$ , $T_J = 25^{\circ}C$ ) ( $V_D = 12 \text{ V}$ , $I_G = 40 \text{ mA}$ , $T_J = -40^{\circ}C$ )	$I_L$	4.0	22	40	mA
$T_J = 25^{\circ}C$					
$T_J = -40^{\circ}C$		–	–	80	

### DYNAMIC CHARACTERISTICS

Critical Rate of Rise of Off-State Voltage ( $V_D = \text{Rated } V_{DRM}$ , Exponential Waveform, Gate Open, $T_J = 125^{\circ}C$ )	dv/dt	50	200	–	V/ $\mu s$
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2. These ratings are applicable when surface mounted on the minimum pad sizes recommended.
3. 1/8" from case for 10 seconds.
4. Pulse Test: Pulse Width  $\leq 2.0$  msec, Duty Cycle  $\leq 2\%$ .

## ORDERING INFORMATION

Device	Package	Shipping <sup>†</sup>
MCR12DCMT4	DPAK	2500 / Tape and Reel
MCR12DCMT4G	DPAK (Pb-Free)	2500 / Tape and Reel
MCR12DCNT4	DPAK	2500 / Tape and Reel
MCR12DCNT4G	DPAK (Pb-Free)	2500 / Tape and Reel

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

# MCR12DCM, MCR12DCN

## Voltage Current Characteristic of SCR

Symbol	Parameter
$V_{DRM}$	Peak Repetitive Off-State Forward Voltage
$I_{DRM}$	Peak Forward Blocking Current
$V_{RRM}$	Peak Repetitive Off-State Reverse Voltage
$I_{RRM}$	Peak Reverse Blocking Current
$V_{TM}$	Peak On-State Voltage
$I_H$	Holding Current

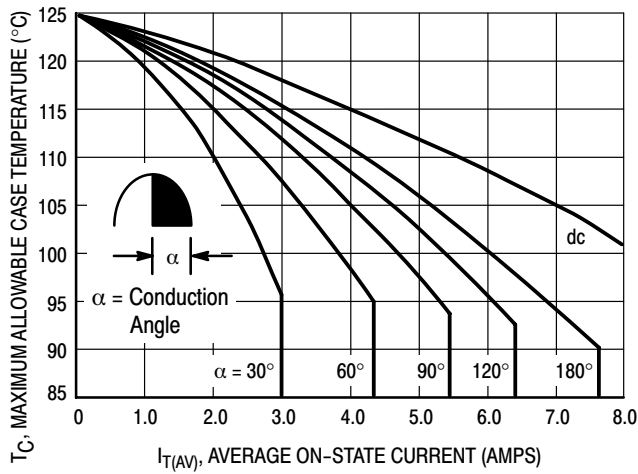
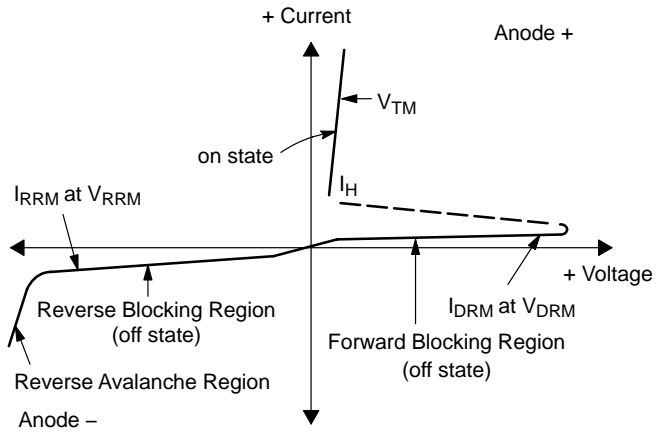


Figure 1. Average Current Derating

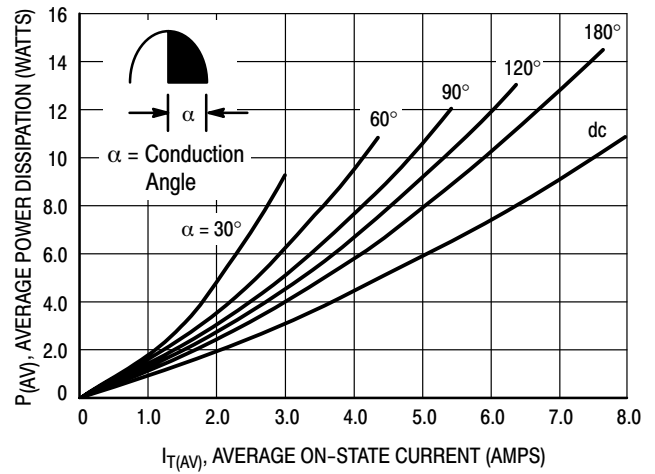


Figure 2. On-State Power Dissipation

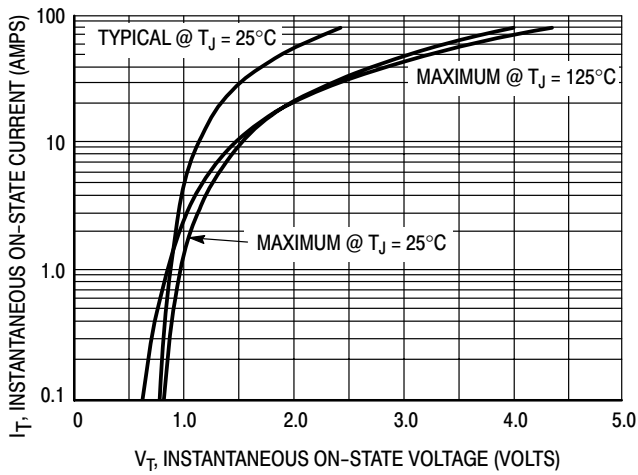


Figure 3. On-State Characteristics

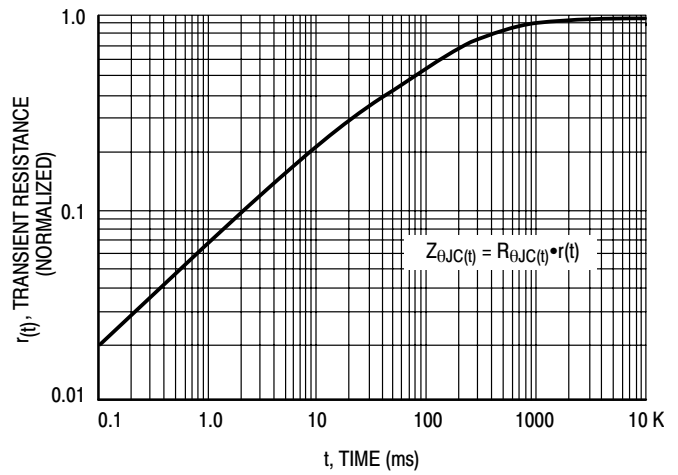


Figure 4. Transient Thermal Response

# MCR12DCM, MCR12DCN

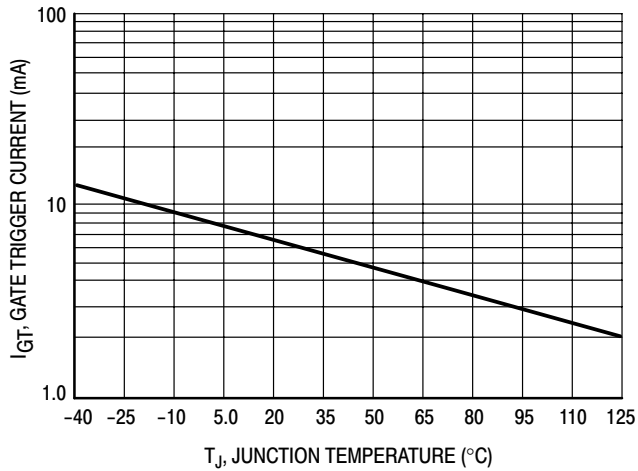


Figure 5. Typical Gate Trigger Current versus Junction Temperature

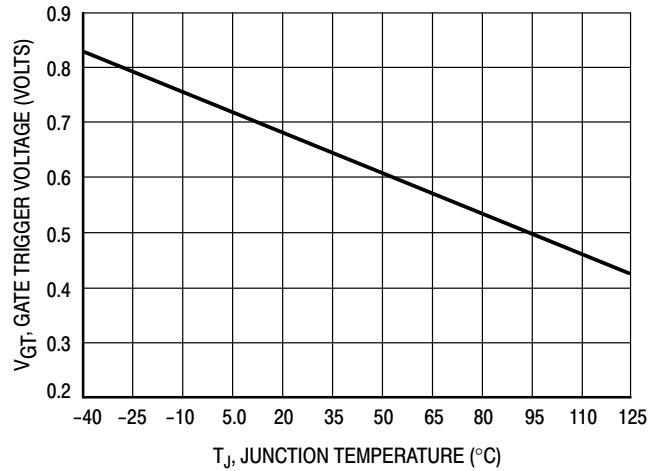


Figure 6. Typical Gate Trigger Voltage versus Junction Temperature

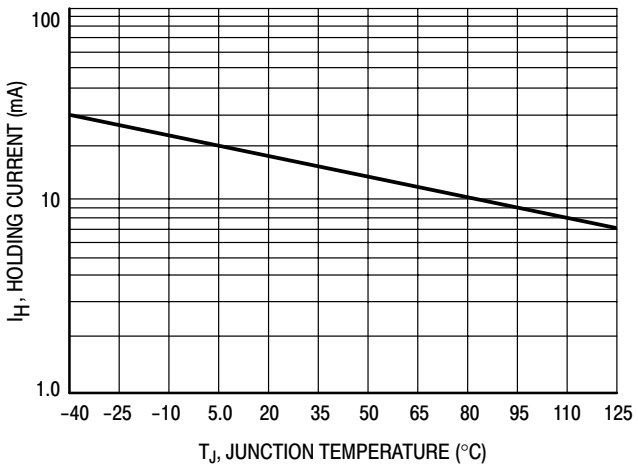


Figure 7. Typical Holding Current versus Junction Temperature

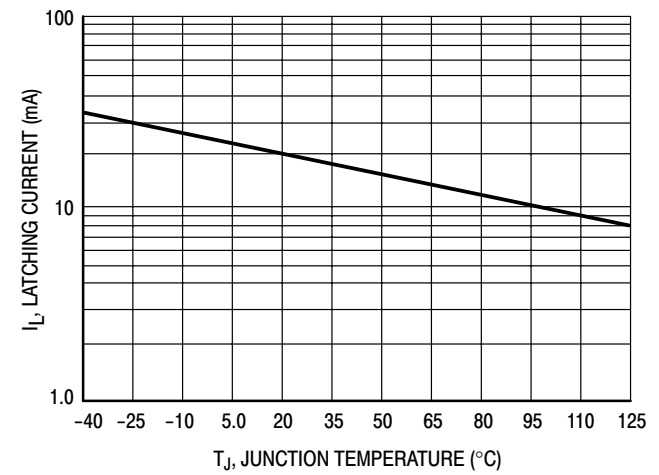


Figure 8. Typical Latching Current versus Junction Temperature

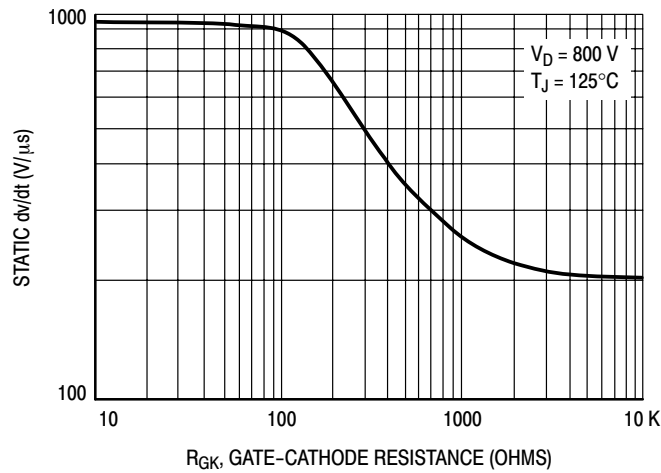
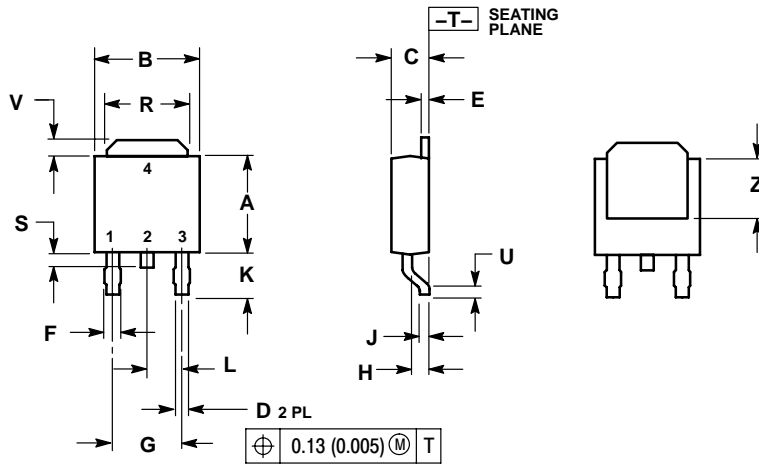


Figure 9. Exponential Static dv/dt versus Gate-Cathode Resistance

# MCR12DCM, MCR12DCN

## PACKAGE DIMENSIONS

### DPAK CASE 369C ISSUE O

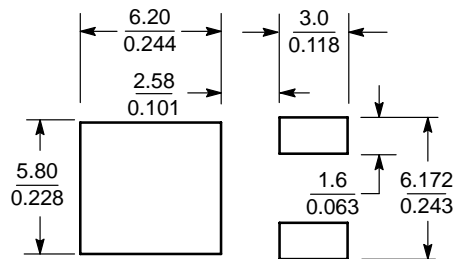


- NOTES:  
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.  
2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.235	0.245	5.97	6.22
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	0.018	0.023	0.46	0.58
F	0.037	0.045	0.94	1.14
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	0.180	0.215	4.57	5.45
S	0.025	0.040	0.63	1.01
U	0.020	---	0.51	---
V	0.035	0.050	0.89	1.27
Z	0.155	---	3.93	---

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

### SOLDERING FOOTPRINT\*



SCALE 3:1  $\left(\frac{\text{mm}}{\text{inches}}\right)$

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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