

# 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.

- Small Size
- Passivated Die for Reliability and Uniformity
- Low Level Triggering and Holding Characteristics
- Device Marking: Device Type, e.g., for MCR12DCM: R12DCM, Date Code

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

Rating	Symbol	Value	Unit
Peak Repetitive Off-State Voltage <sup>(1)</sup> ( $T_J = -40$ to $125^\circ\text{C}$ , Sine Wave, 50 to 60 Hz, Gate Open) MCR12DCM MCR12DCN	$V_{\text{DRM}}$ , $V_{\text{RRM}}$	600 800	Volts
On-State RMS Current ( $180^\circ$ Conduction Angles; $T_C = 90^\circ\text{C}$ )	$I_{\text{T(RMS)}}$	12	Amps
Average On-State Current ( $180^\circ$ Conduction Angles; $T_C = 90^\circ\text{C}$ )	$I_{\text{T(AV)}}$	7.6	Amps
Peak Non-Repetitive Surge Current (1/2 Cycle, Sine Wave 60 Hz, $T_J = 125^\circ\text{C}$ )	$I_{\text{TSM}}$	100	Amps
Circuit Fusing Consideration ( $t = 8.3$ msec)	$I^2t$	41	$\text{A}^2\text{sec}$
Forward Peak Gate Power (Pulse Width $\leq 1.0$ $\mu\text{sec}$ , $T_C = 90^\circ\text{C}$ )	$P_{\text{GM}}$	5.0	Watts
Forward Average Gate Power ( $t = 8.3$ msec, $T_C = 90^\circ\text{C}$ )	$P_{\text{G(AV)}}$	0.5	Watts
Forward Peak Gate Current (Pulse Width $\leq 1.0$ $\mu\text{sec}$ , $T_C = 90^\circ\text{C}$ )	$I_{\text{GM}}$	2.0	Amps
Operating Junction Temperature Range	$T_J$	$-40$ to $125$	$^\circ\text{C}$
Storage Temperature Range	$T_{\text{stg}}$	$-40$ to $150$	$^\circ\text{C}$

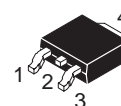
(1)  $V_{\text{DRM}}$  for all types can be applied on a continuous basis. Ratings apply for zero or negative gate voltage; positive gate voltage shall not be applied concurrent with negative potential on the anode. Blocking voltages shall not be tested with a constant current source such that the voltage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



ON Semiconductor

<http://onsemi.com>

SCRs  
12 AMPERES RMS  
600 thru 800 VOLTS



D-PAK  
CASE 369A  
STYLE 4

#### PIN ASSIGNMENT

1	Cathode
2	Anode
3	Gate
4	Anode

#### ORDERING INFORMATION

Device	Package	Shipping
MCR12DCMT4	DPAK 369A	16mm Tape and Reel (2.5K/Reel)
MCR12DCNT4	DPAK 369A	16mm Tape and Reel (2.5K/Reel)

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	$^{\circ}\text{C/W}$
— Junction to Ambient	$R_{\theta JA}$	88	
— Junction to Ambient <sup>(1)</sup>	$R_{\theta JA}$	80	
Maximum Lead Temperature for Soldering Purposes <sup>(2)</sup>	$T_L$	260	$^{\circ}\text{C}$

## ELECTRICAL CHARACTERISTICS ( $T_J = 25^{\circ}\text{C}$ 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
$T_J = 25^{\circ}\text{C}$		—	—	5.0	
$T_J = 125^{\circ}\text{C}$		—	—		

## ON CHARACTERISTICS

Peak Forward On-State Voltage <sup>(3)</sup> ( $I_{TM} = 20 \text{ A}$ )	$V_{TM}$	—	1.3	1.9	Volts
Gate Trigger Current (Continuous dc) ( $V_D = 12 \text{ V}$ , $R_L = 100 \Omega$ )	$I_{GT}$	2.0	7.0	20	mA
$T_J = 25^{\circ}\text{C}$		—	—	40	
$T_J = -40^{\circ}\text{C}$					
Gate Trigger Voltage (Continuous dc) ( $V_D = 12 \text{ V}$ , $R_L = 100 \Omega$ )	$V_{GT}$	0.5	0.65	1.0	Volts
$T_J = 25^{\circ}\text{C}$		—	—	2.0	
$T_J = -40^{\circ}\text{C}$					
Gate Non-Trigger Voltage ( $V_D = 12 \text{ V}$ , $R_L = 100 \Omega$ )	$V_{GD}$	0.2	—	—	Volts
$T_J = 125^{\circ}\text{C}$					
Holding Current ( $V_D = 12 \text{ V}$ , Initiating Current = 200 mA, Gate Open)	$I_H$	4.0	22	40	mA
$T_J = 25^{\circ}\text{C}$		—	—	80	
$T_J = -40^{\circ}\text{C}$					
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	mA
		—	—	80	

## DYNAMIC CHARACTERISTICS

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

(1) Surface mounted on minimum recommended pad size.

(2) 1/8" from case for 10 seconds.

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

# 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

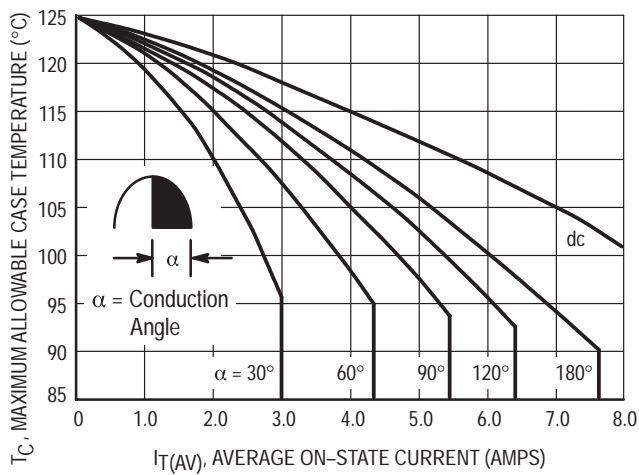
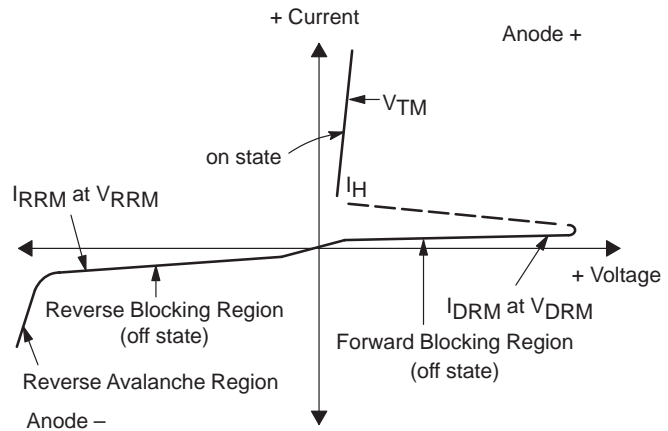


Figure 1. Average Current Derating

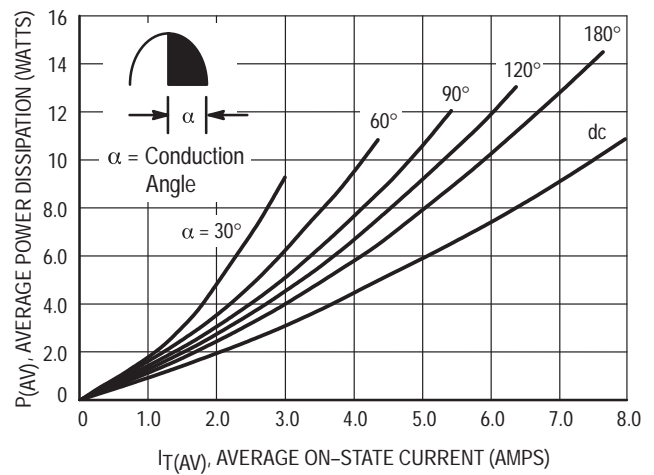


Figure 2. On-State Power Dissipation

# MCR12DCM, MCR12DCN

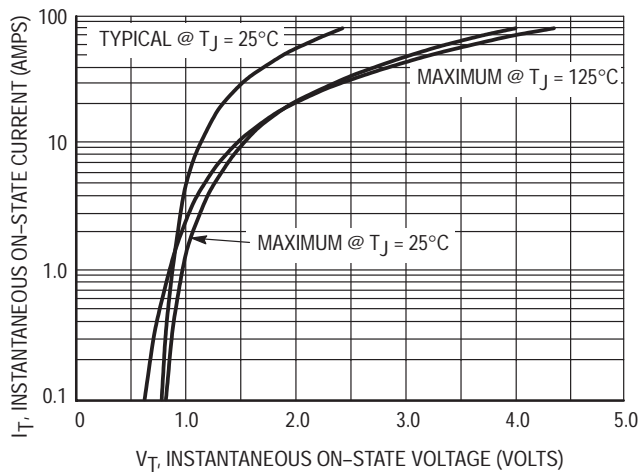


Figure 3. On-State Characteristics

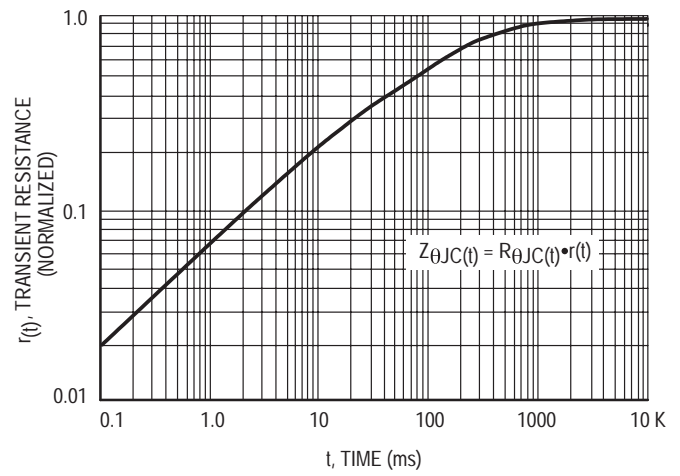


Figure 4. Transient Thermal Response

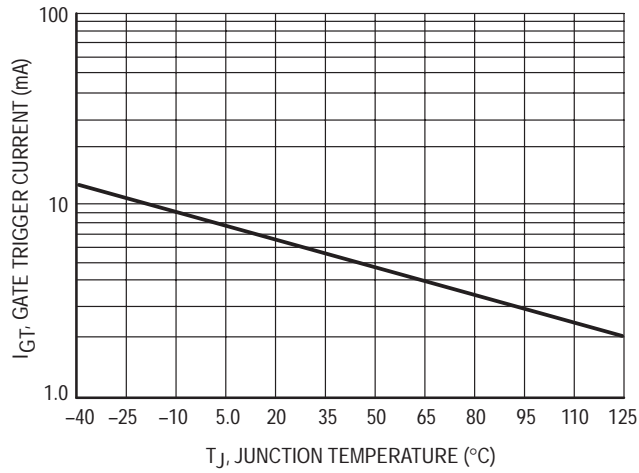


Figure 5. Typical Gate Trigger Current versus Junction Temperature

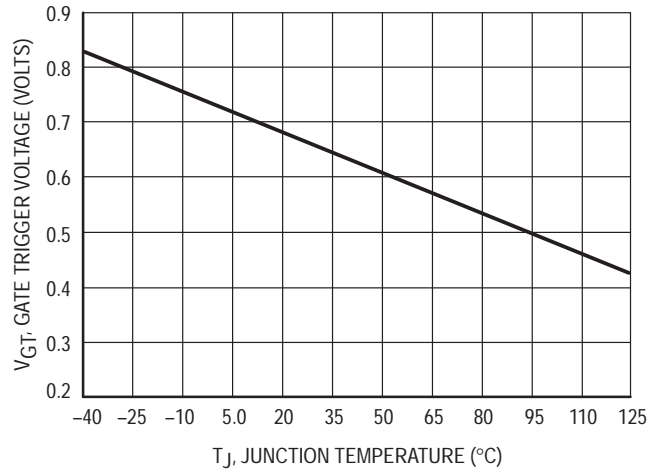
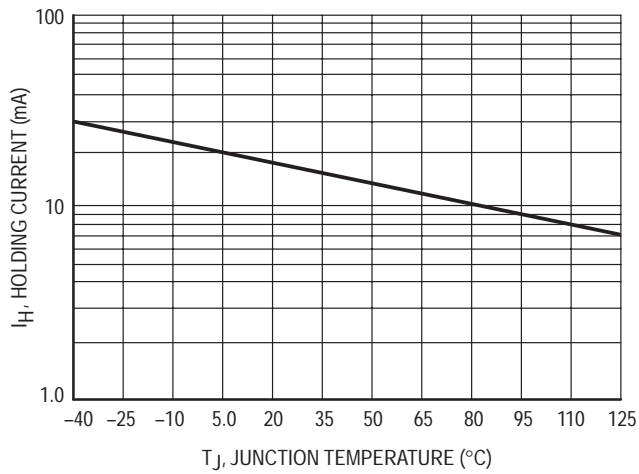
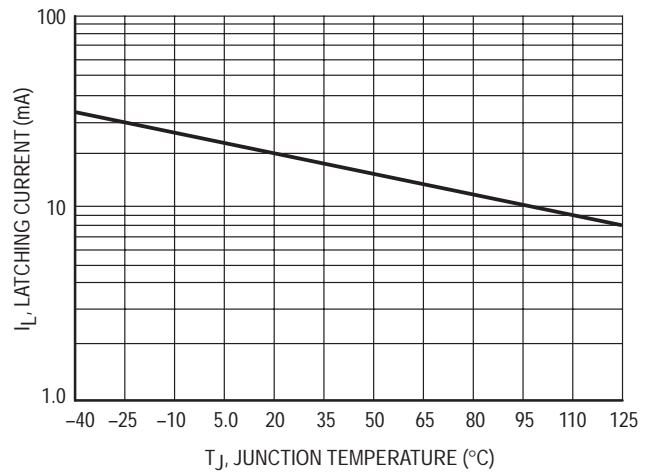


Figure 6. Typical Gate Trigger Voltage versus Junction Temperature

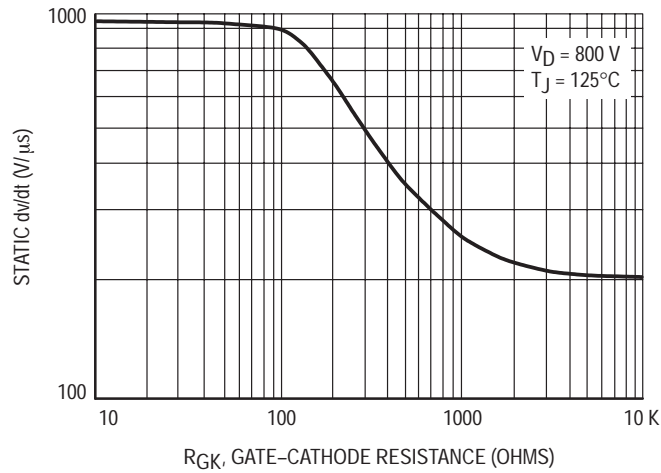
# MCR12DCM, MCR12DCN



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



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



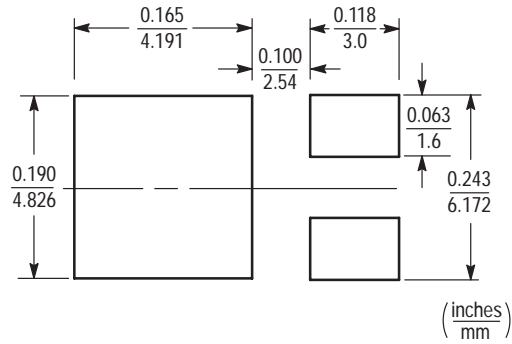
**Figure 9. Exponential Static dv/dt versus Gate-Cathode Resistance**

## MCR12DCM, MCR12DCN

### MINIMUM RECOMMENDED FOOTPRINT FOR SURFACE MOUNTED APPLICATIONS

Surface mount board layout is a critical portion of the total design. The footprint for the semiconductor packages must be the correct size to insure proper solder connection

interface between the board and the package. With the correct pad geometry, the packages will self align when subjected to a solder reflow process.

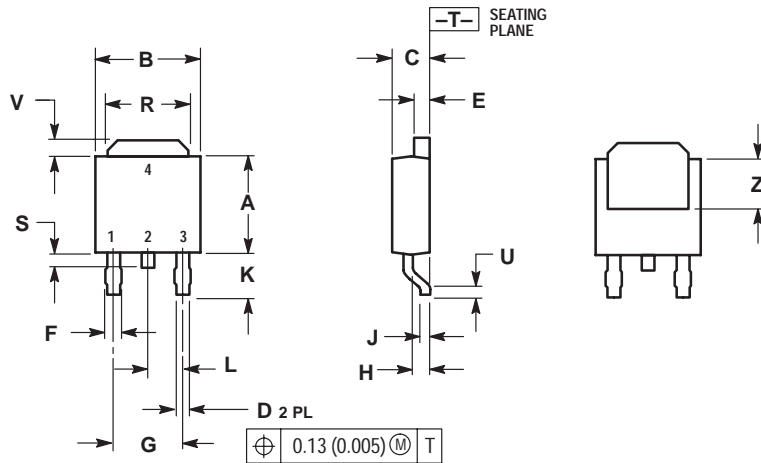


**DPAK**

# MCR12DCM, MCR12DCN

## PACKAGE DIMENSIONS

### D-PAK CASE 369A-13 ISSUE Z



#### 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  
 PIN 2: ANODE  
 PIN 3: GATE  
 PIN 4: ANODE

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