MCR12DCM MCR12DCN

Motorola Preferred Devices

Silicon Controlled Rectifiers
Reverse Blocking Thyristors

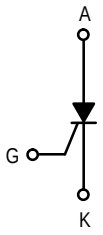
Designed for high volume, low cost, industrial and consumer applications such as motor control; process control; temperature, light and speed control.

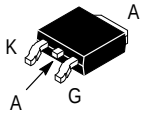
- Small Size
- Passivated Die for Reliability and Uniformity
- Low Level Triggering and Holding Characteristics
- Available in Two Package Styles
  Surface Mount Lead Form — Case 369A
  Miniature Plastic Package — Straight Leads — Case 369

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

SCRs
12 AMPERES RMS
600 thru 800 VOLTS





CASE 369A–13
STYLE 4

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

Rating	Symbol	Value	Unit
Peak Repetitive Off–State Voltage (1) Peak Repetitive Reverse Voltage (T_J = –40 to 125°C) MCR12DCM MCR12DCN	V_{DRM} V_{RRM}	 600 800	Volts
On–State RMS Current (All Conduction Angles; T_C = 90°C)	$I_{T(RMS)}$	12	Amps
Average On–State Current (All Conduction Angles; T_C = 90°C)	$I_{T(AV)}$	7.6	
Peak Non–Repetitive Surge Current (One Half Cycle, 60 Hz, T_J = 125°C)	I_{TSM}	100	
Circuit Fusing Consideration (t = 8.3 msec)	I^2t	41	A^2sec
Peak Gate Power (Pulse Width ≤ 10 μsec, T_C = 90°C)	P_{GM}	5.0	Watts
Average Gate Power (t = 8.3 msec, T_C = 90°C)	$P_{G(AV)}$	0.5	
Peak Gate Current (Pulse Width ≤ 10 μsec, T_C = 90°C)	I_{GM}	2.0	Amps
Operating Junction Temperature Range	T_J	–40 to 125	°C
Storage Temperature Range	T_{stg}	–40 to 150	

THERMAL CHARACTERISTICS

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

(1) V_{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.

(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.

© Motorola, Inc. 1997

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

Characteristics		Symbol	Min	Typ	Max	Unit
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 5.0	mA
Peak On–State Voltage (1) (I_{TM} = 24 A)		V_{TM}	—	1.4	2.1	Volts
Gate Trigger Current (Continuous dc) (V_D = 12 V, R_L = 100 Ω, T_J = 25°C) (V_D = 12 V, R_L = 100 Ω, T_J = –40°C)		I_{GT}	 2.0 —	 7.0 —	 20 40	mA
Gate Trigger Voltage (Continuous dc) (V_D = 12 V, R_L = 100 Ω, T_J = 25°C) (V_D = 12 V, R_L = 100 Ω, T_J = –40°C) (V_D = 12 V, R_L = 100 Ω, T_J = 125°C)		V_{GT}	 0.5 — 0.2	 0.65 — —	 1.0 2.0 —	Volts
Holding Current (V_D = 12 V, I_T = 200 mA, T_J = 25°C) (V_D = 12 V, I_T = 200 mA, T_J = –40°C)		I_H	 4.0 —	 22 —	 40 80	mA
Latching Current (V_D = 12 V, I_G = 20 mA, T_J = 25°C) (V_D = 12 V, I_G = 40 mA, T_J = –40°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 = Rated V_{DRM}, Exponential Waveform, Gate Open, T_J = 125°C)	dv/dt	 50	 200	 —	V/μs

(1) Pulse Test; Pulse Width ≤ 2.0 msec, Duty Cycle ≤ 2%.

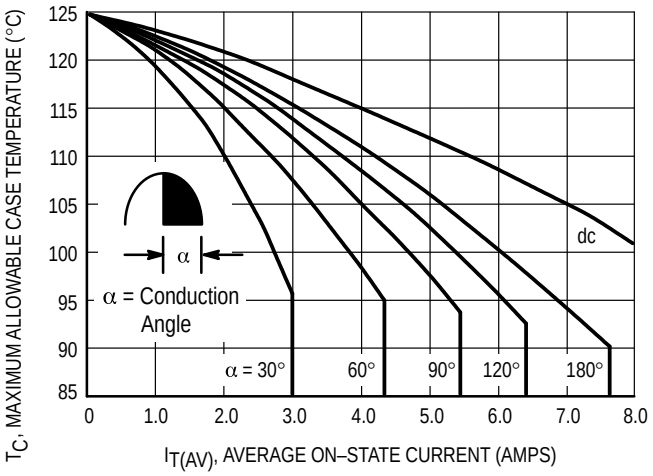


Figure 1. Average Current Derating

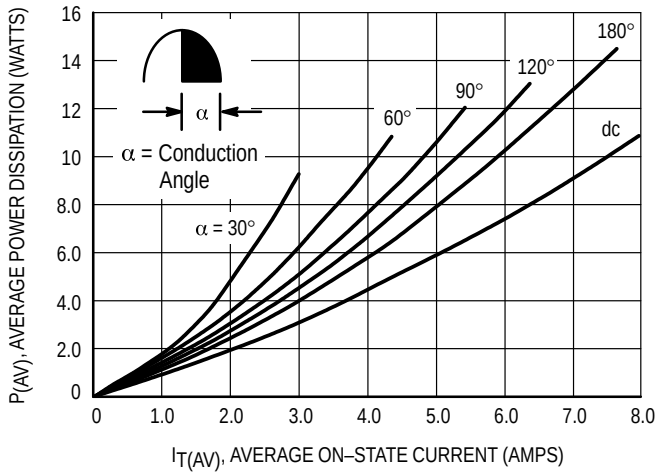


Figure 2. On–State Power Dissipation

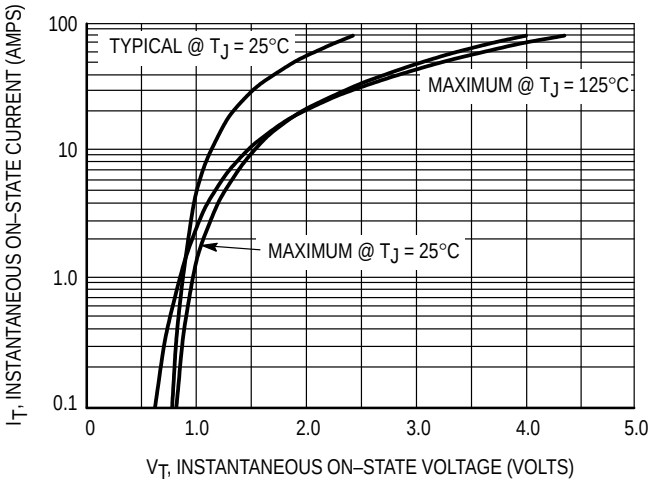


Figure 3. On–State Characteristics

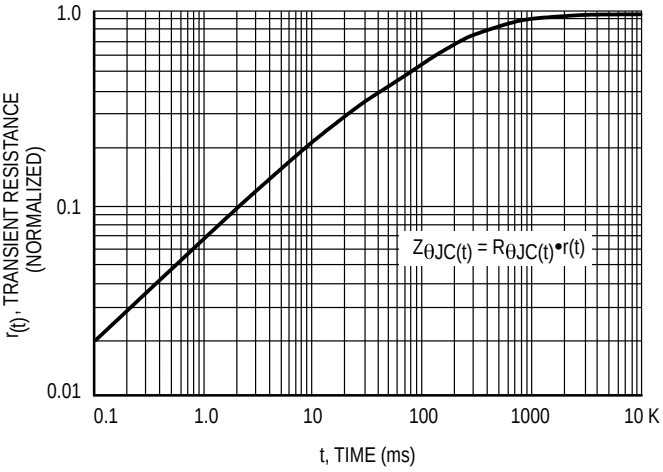


Figure 4. Transient Thermal Response

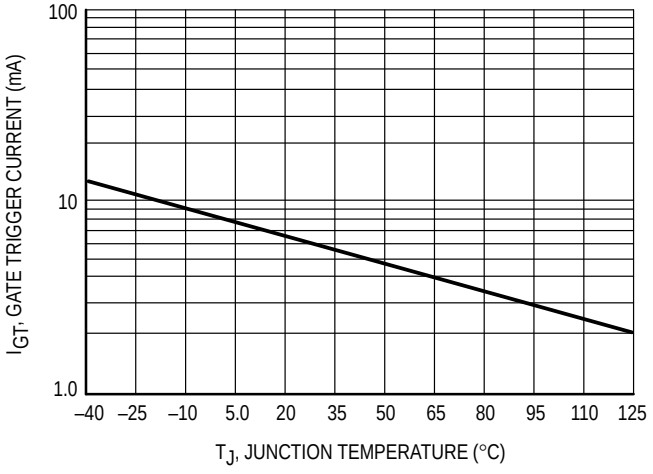


Figure 5. Typical Gate Trigger Current versus Junction Temperature

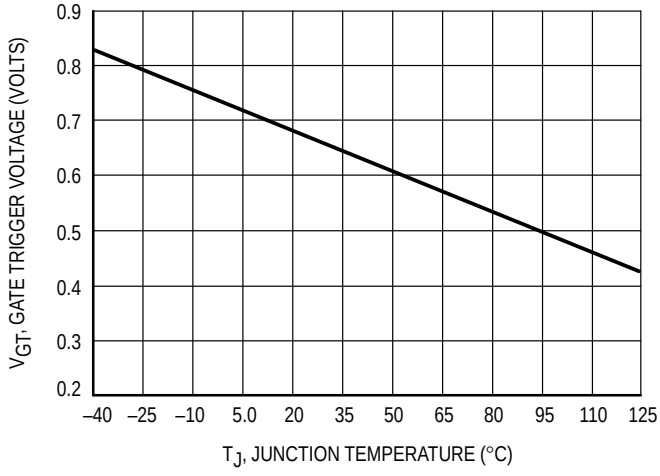


Figure 6. Typical Gate Trigger Voltage versus Junction Temperature

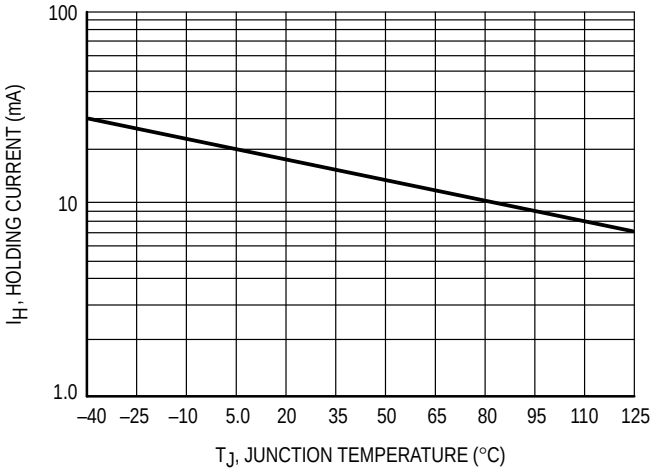


Figure 7. Typical Holding Current versus Junction Temperature

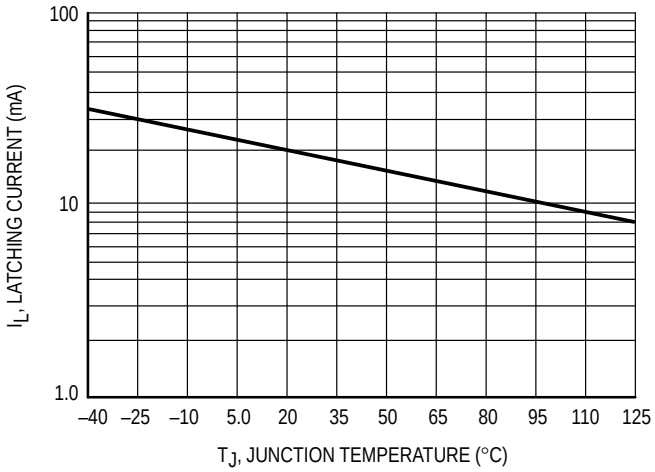


Figure 8. Typical Latching Current versus Junction Temperature

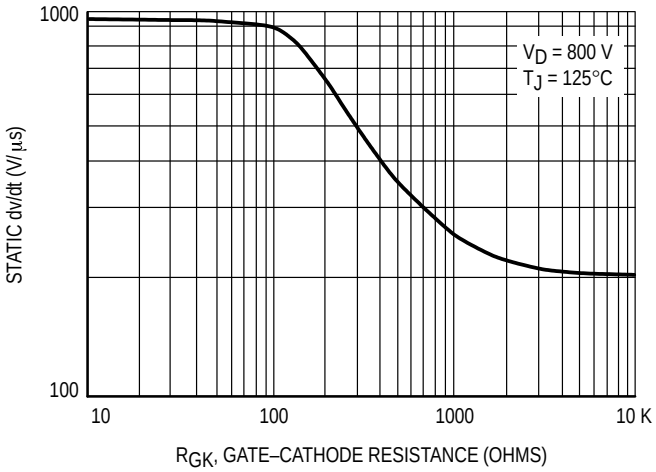
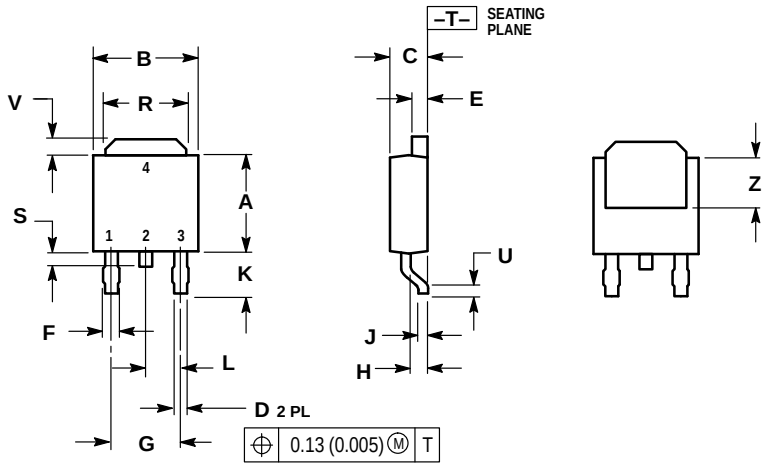


Figure 9. Exponential Static dv/dt versus Gate–Cathode Resistance

PACKAGE DIMENSIONS



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

	INCHES		MILLIMETERS	
DIM	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

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. “Typical” parameters which may be provided in Motorola data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including “Typicals” must be validated for each customer application by customer’s technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and Ⓜ are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

Mfax is a trademark of Motorola, Inc.

How to reach us:

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

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

INTERNET: http://motorola.com/sps

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

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