MCR12DSM MCR12DSN

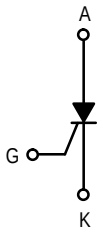
Motorola Preferred Devices

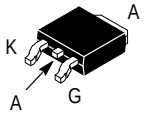
Silicon Controlled Rectifiers
Reverse Blocking Thyristors

SCRs
12 AMPERES RMS
600 thru 800 VOLTS

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





CASE 369A–13
STYLE 4

ORDERING INFORMATION

- To Obtain “DPAK” in Surface Mount Leadform (Case 369A)
  Shipped in Sleeves — No Suffix, i.e. MCR12DSN
  Shipped in 16 mm Tape and Reel — Add “T4” Suffix to Device Number, i.e. MCR12DSNT4
- To Obtain “DPAK” in Straight Lead Version (Case 369) Shipped in Sleeves — Add “–1” Suffix to Device Number, i.e. MCR12DSN–1

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 110°C, R_{GK} = 1.0 KΩ)	MCR12DSM MCR12DSN	V_{DRM} V_{RRM}	 600 800	Volts
On–State RMS Current (All Conduction Angles; T_C = 75°C)		$I_{T(RMS)}$	12	Amps
Average On–State Current (All Conduction Angles; T_C = 75°C)		$I_{T(AV)}$	7.6	
Peak Non–Repetitive Surge Current (One Half Cycle, 60 Hz, T_J = 110°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 = 75°C)		P_{GM}	5.0	Watts
Average Gate Power (t = 8.3 msec, T_C = 75°C)		$P_{G(AV)}$	0.5	
Peak Gate Current (Pulse Width ≤ 10 μsec, T_C = 75°C)		I_{GM}	2.0	Amps
Operating Junction Temperature Range		T_J	–40 to 110	°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 negative gate voltage or R_{GK} = 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.

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ELECTRICAL CHARACTERISTICS (T_J = 25°C; R_{GK} = 1.0 KΩ unless otherwise noted)

Characteristics	Symbol	Min	Typ	Max	Unit
Peak Reverse Gate Blocking Voltage (I_{GR} = 10 μA)	V_{GRM}	10	12.5	18	Volts
Peak Forward Blocking Current Peak Reverse Blocking Current (V_{AK} = Rated V_{DRM} or V_{RRM}) (1) T_J = 25°C T_J = 110°C	I_{DRM} I_{RRM}	 — —	 — —	 10 500	μA
Peak Reverse Gate Blocking Current (V_{GR} = 10 V)	I_{RGM}	—	—	1.2	μA
Peak On–State Voltage (2) (I_{TM} = 24 A)	V_{TM}	—	1.4	2.1	Volts
Gate Trigger Current (Continuous dc) (3) (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}	 5.0 —	 12 —	 200 300	μA
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 = 110°C)	V_{GT}	 0.45 — 0.2	 0.65 — —	 1.0 1.5 —	Volts
Holding Current (V_D = 12 V, I(init) = 200 mA, T_J = 25°C) (V_D = 12 V, I(init) = 200 mA, T_J = –40°C)	I_H	 0.5 —	 1.0 —	 6.0 10	mA
Latching Current (V_D = 12 V, I_G = 2.0 mA, T_J = 25°C) (V_D = 12 V, I_G = 2.0 mA, T_J = –40°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 KΩ, I_T = 16 A(pk), R_{GK} = 1.0 KΩ) (V_D = Rated V_{DRM}, Rise Time = 20 ns, Pulse Width = 10 μs)	tgt	—	2.0	5.0	μs
Critical Rate of Rise of Off–State Voltage (V_D = 0.67 X Rated V_{DRM}, Exponential Waveform, R_{GK} = 1.0 KΩ, T_J = 110°C)	dv/dt	2.0	10	—	V/μs

(1) Ratings apply for negative gate voltage or R_{GK} = 1.0 KΩ. 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 ≤ 2.0 msec, Duty Cycle ≤ 2%.

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

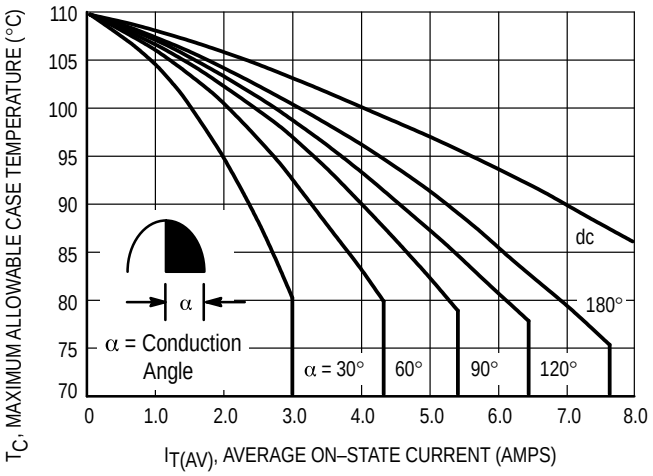


Figure 1. Average Current Derating

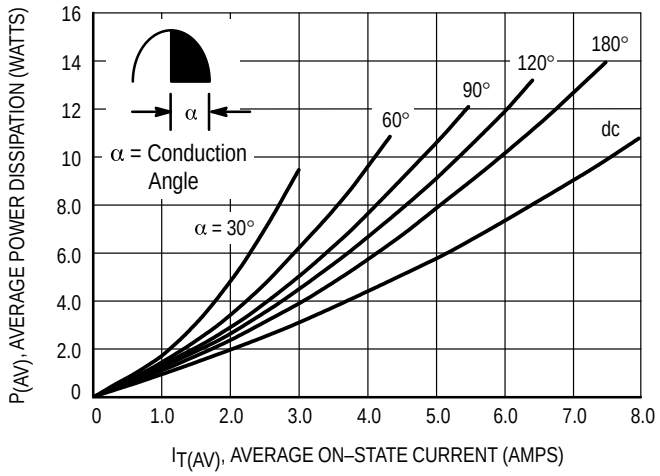


Figure 2. On–State Power Dissipation

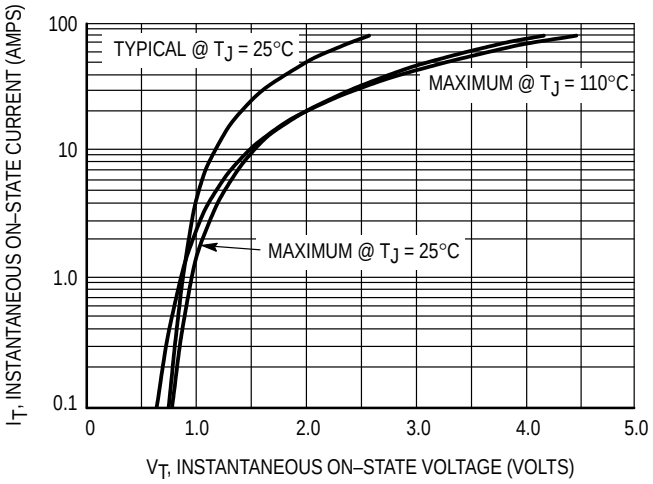


Figure 3. On–State Characteristics

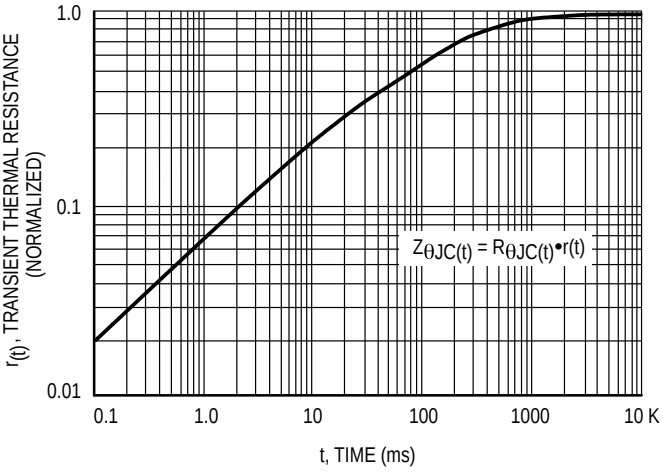


Figure 4. Transient Thermal Response

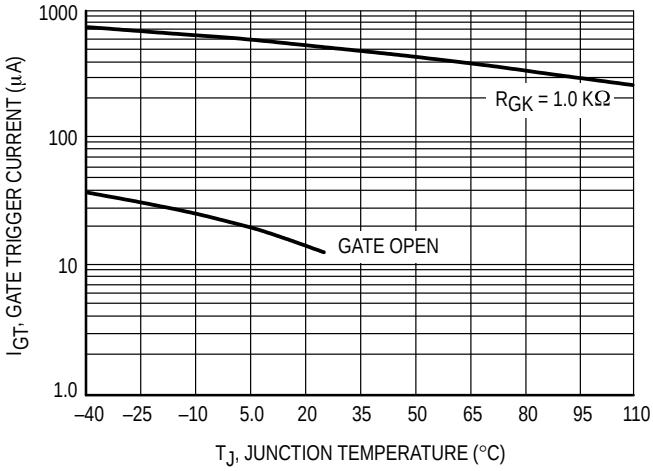


Figure 5. Typical Gate Trigger Current versus Junction Temperature

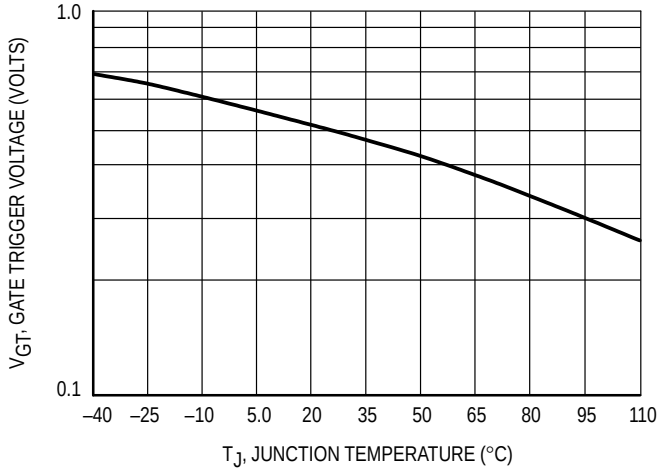


Figure 6. Typical Gate Trigger Voltage versus Junction Temperature

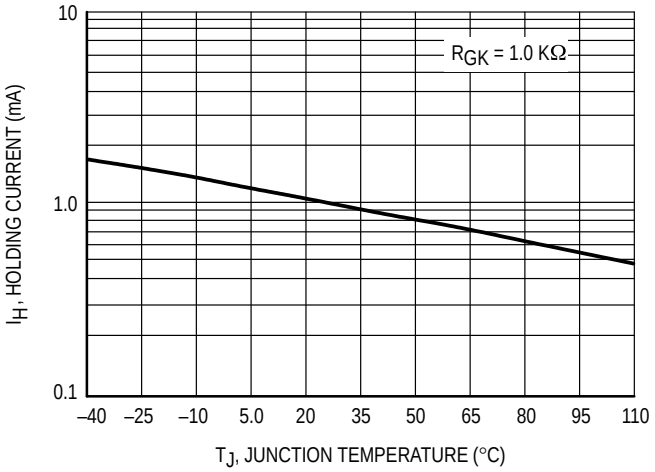


Figure 7. Typical Holding Current versus Junction Temperature

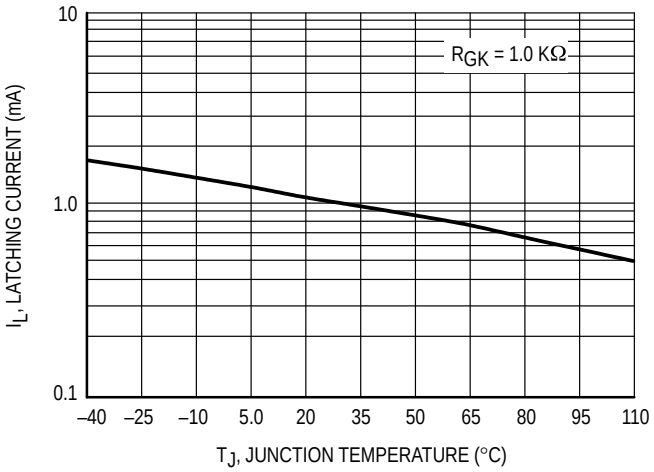


Figure 8. Typical Latching Current versus Junction Temperature

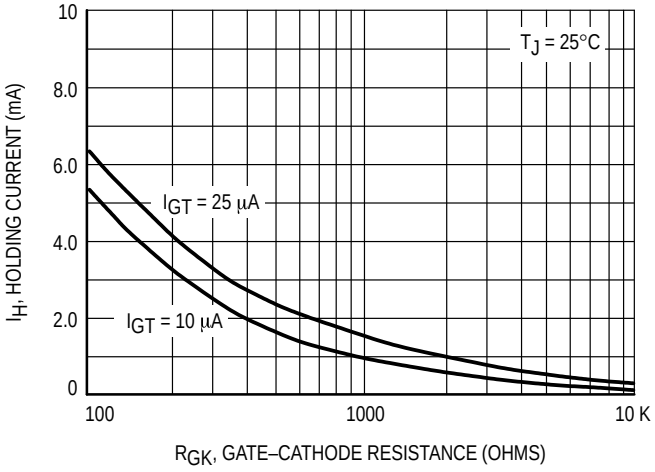


Figure 9. Holding Current versus Gate–Cathode Resistance

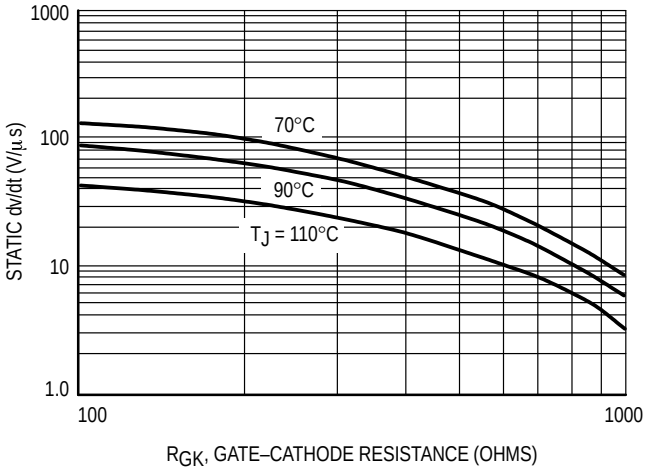


Figure 10. Exponential Static dv/dt versus Gate–Cathode Resistance and Junction Temperature

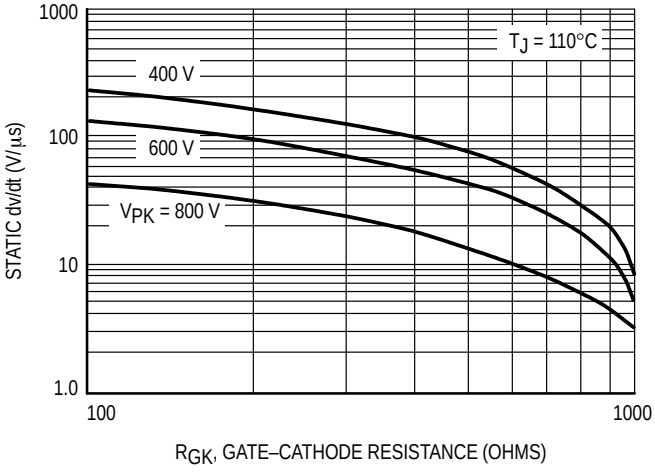


Figure 11. Exponential Static dv/dt versus Gate–Cathode Resistance and Peak Voltage

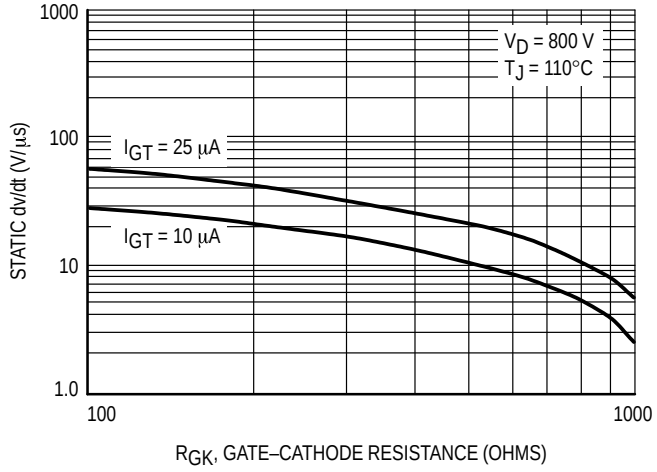
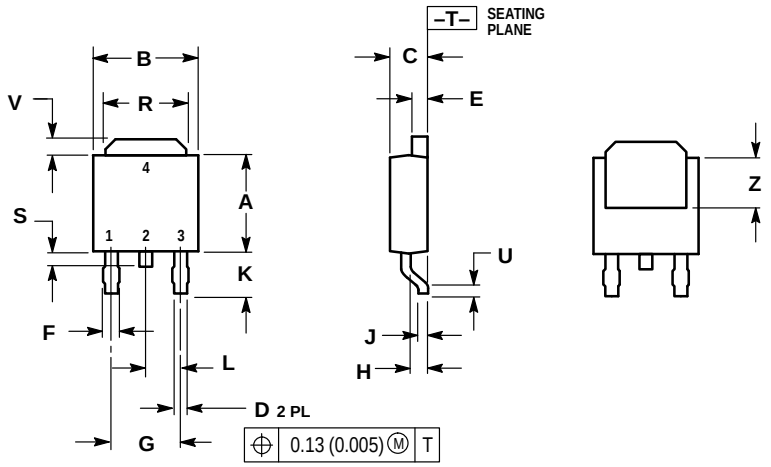


Figure 12. Exponential Static dv/dt versus Gate–Cathode Resistance and Gate Trigger Current Sensitivity

PACKAGE DIMENSIONS



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

	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

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