

# DIGITRON SEMICONDUCTORS

MCR25D, MCR25M, MCR25N

SILICON CONTROLLED RECTIFIERS

Available Non-RoHS (standard) or RoHS compliant (add PBF suffix).  
Available as "HR" (high reliability) screened per MIL-PRF-19500, JANTX level. Add "HR" suffix to base part number.

## MAXIMUM RATINGS

Rating	Symbol	Value	Unit
<b>Peak repetitive off-state voltage</b> <sup>(1)</sup> (T <sub>J</sub> = -40 to +125°C, sine wave, 50 to 60Hz) MCR25D MCR25M MCR25N	V <sub>DRM</sub> V <sub>RRM</sub>	400 600 800	V
<b>On-state RMS current</b> (180° conduction angles, T <sub>C</sub> = 80°C)	I <sub>T(RMS)</sub>	25	A
<b>Peak non-repetitive surge current</b> (half-cycle, sine wave, 60Hz, T <sub>J</sub> = 125°C)	I <sub>TSM</sub>	300	A
<b>Circuit fusing consideration</b> (t = 8.3ms)	I <sup>2</sup> t	373	A <sup>2</sup> s
<b>Forward peak gate power</b> (pulse width ≤ 1.0μs, T <sub>C</sub> = 80°C)	P <sub>GM</sub>	20	W
<b>Forward average gate power</b> (t = 8.3ms, T <sub>C</sub> = 80°C)	P <sub>G(AV)</sub>	0.5	W
<b>Forward peak gate current</b> (pulse width ≤ 1.0μs, T <sub>C</sub> = 80°C)	I <sub>GM</sub>	2.0	A
<b>Operating junction temperature range</b>	T <sub>J</sub>	-40 to +125	°C
<b>Storage temperature range</b>	T <sub>stg</sub>	-40 to +150	°C

Note 1: V<sub>DRM</sub> and V<sub>RRM</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 devices are exceeded.

## THERMAL CHARACTERISTICS

Characteristic	Symbol	Maximum	Unit
<b>Thermal resistance, junction to case</b>	R <sub>θJC</sub>	1.5	°C/W
<b>Thermal resistance, junction to ambient</b>	R <sub>θJA</sub>	62.5	°C/W
<b>Lead solder temperature</b> (lead length ≥ 1/8" from case, 10s max)	T <sub>L</sub>	260	°C

## ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 25°C, unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS start here</b>					
<b>Peak forward or reverse blocking current</b> (V <sub>AK</sub> = Rated V <sub>DRM</sub> or V <sub>RRM</sub> , gate open) T <sub>J</sub> = 25°C T <sub>J</sub> = 125°C	I <sub>DRM</sub> , I <sub>RRM</sub>	- -	- -	0.01 2.0	mA
<b>ON CHARACTERISTICS</b>					
<b>Peak forward on-state voltage</b> * (I <sub>TM</sub> = 50A)	V <sub>TM</sub>	-	-	1.8	V
<b>Gate trigger current</b> (continuous dc) (V <sub>D</sub> = 12V, R <sub>L</sub> = 100Ω)	I <sub>GT</sub>	4.0	12	30	mA
<b>Gate trigger voltage</b> (continuous dc) (V <sub>D</sub> = 12V, R <sub>L</sub> = 100Ω)	V <sub>GT</sub>	0.5	0.67	1.0	V
<b>Holding current</b> (V <sub>D</sub> = 12V, gate open, initiating current = 200mA)	I <sub>H</sub>	5.0	13	40	mA
<b>Latching current</b> (V <sub>D</sub> = 12V, I <sub>G</sub> = 30mA)	I <sub>L</sub>	-	35	80	mA
<b>DYNAMIC CHARACTERISTICS</b>					
<b>Critical rate of rise of off-state voltage</b> (V <sub>D</sub> = 67% of rated V <sub>DRM</sub> , exponential waveform, gate open, T <sub>J</sub> = 125°C)	dv/dt	100	250	-	V/μs
<b>Critical rate of rise of on-state current</b> (I <sub>PK</sub> = 50A, PW = 30μsec, di <sub>c</sub> /dt = 1A/μsec, I <sub>gt</sub> = 50mA)	di/dt	-	-	50	A/μs

\* Pulse width ≤ 2.0ms, duty cycle ≤ 2%.

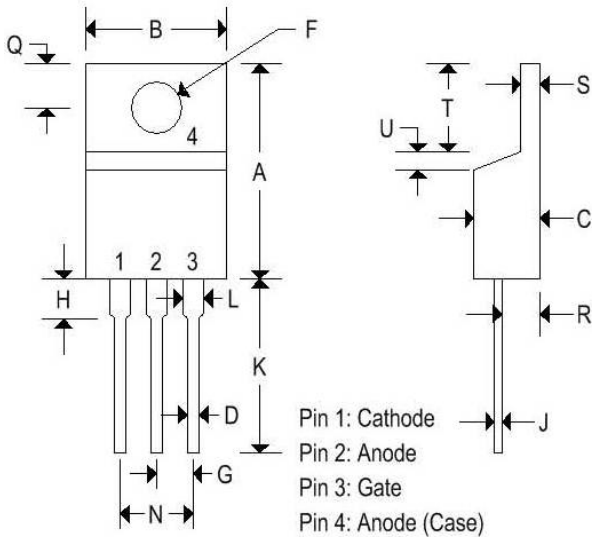
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#### MECHANICAL CHARACTERISTICS

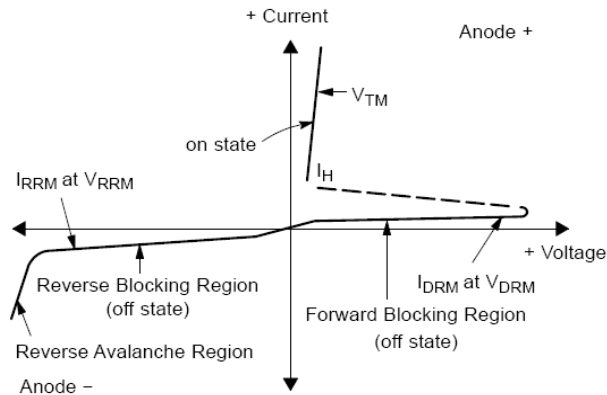
Case	TO-220AB
Marking	Alpha-numeric
Pin out	See below



	TO-220AB			
	Inches		Millimeters	
	Min	Max	Min	Max
A	0.575	0.620	14.600	15.750
B	0.380	0.405	9.650	10.290
C	0.160	0.190	4.060	4.820
D	0.025	0.035	0.640	0.890
F	0.142	0.147	3.610	3.730
G	0.095	0.105	2.410	2.670
H	0.110	0.155	2.790	3.930
J	0.014	0.022	0.360	0.560
K	0.500	0.562	12.700	14.270
L	0.045	0.055	1.140	1.390
N	0.190	0.210	4.830	5.330
Q	0.100	0.120	2.540	3.040
R	0.080	0.110	2.040	2.790
S	0.045	0.055	1.140	1.390
T	0.235	0.255	5.970	6.480
U	-	0.050	-	1.270
V	0.045	-	1.140	-
Z	-	0.080	-	2.030

#### 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



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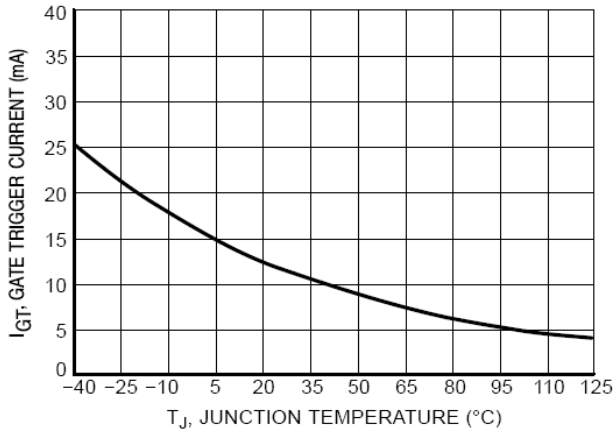


Figure 1. Typical Gate Trigger Current versus Junction Temperature

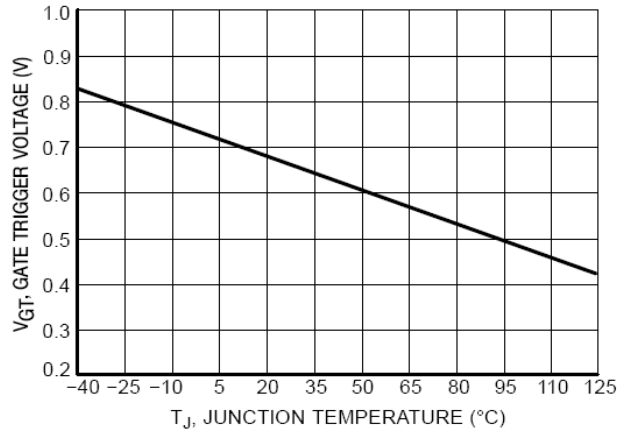


Figure 2. Typical Gate Trigger Voltage versus Junction Temperature

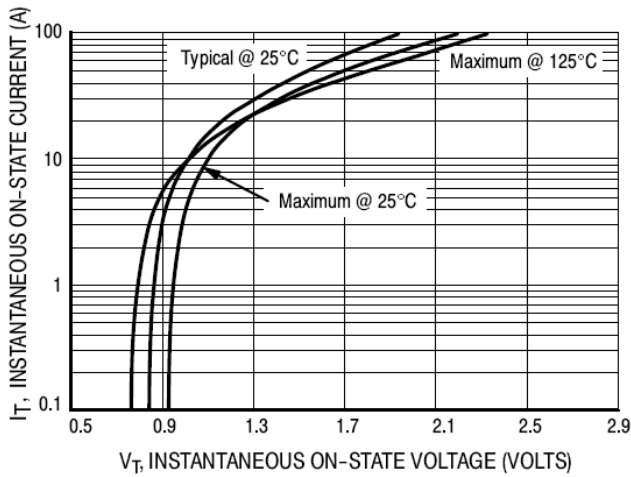


Figure 3. Typical On-State Characteristics

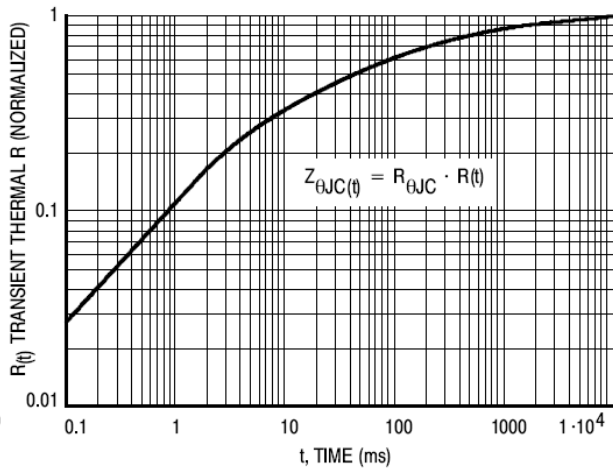


Figure 4. Transient Thermal Response

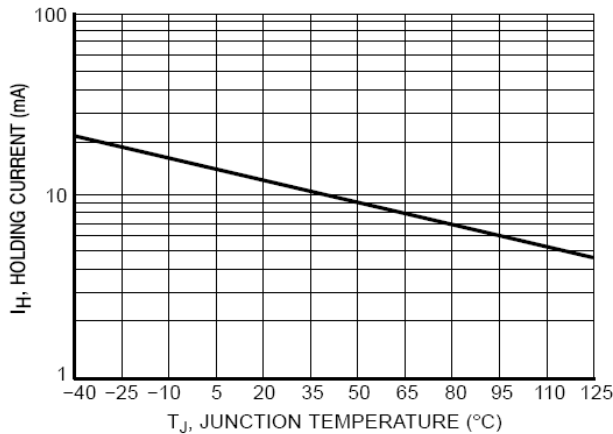


Figure 5. Typical Holding Current versus Junction Temperature

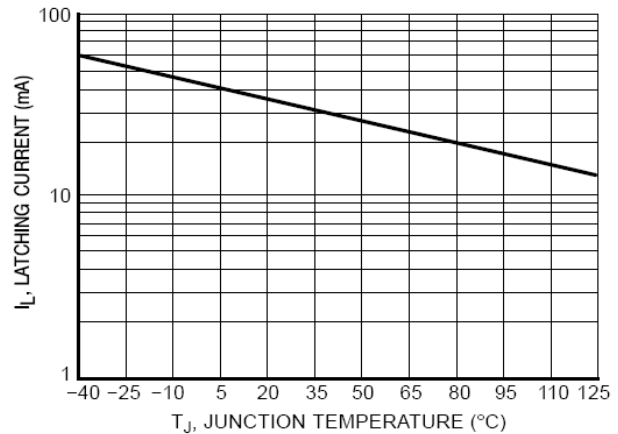


Figure 6. Typical Latching Current versus Junction Temperature

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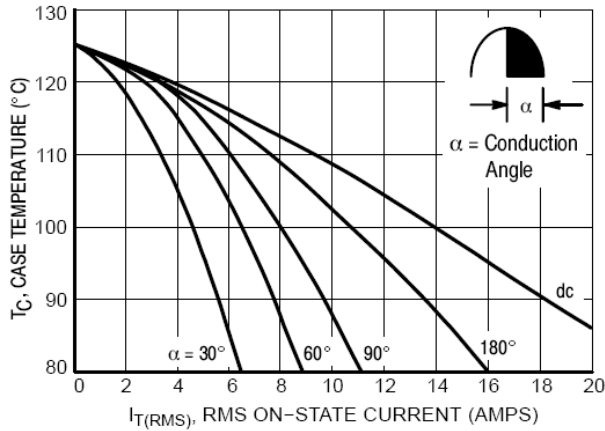


Figure 7. Typical RMS Current Derating

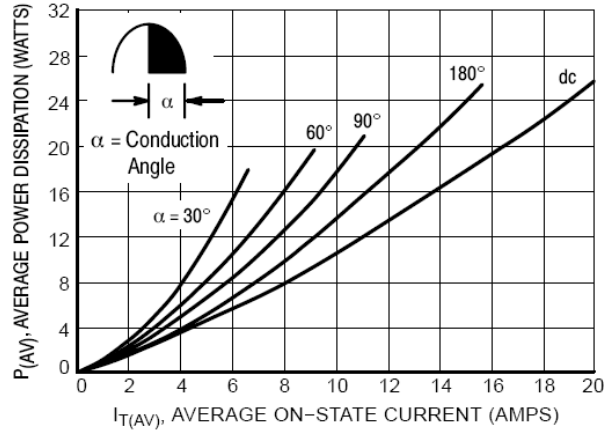


Figure 8. On State Power Dissipation

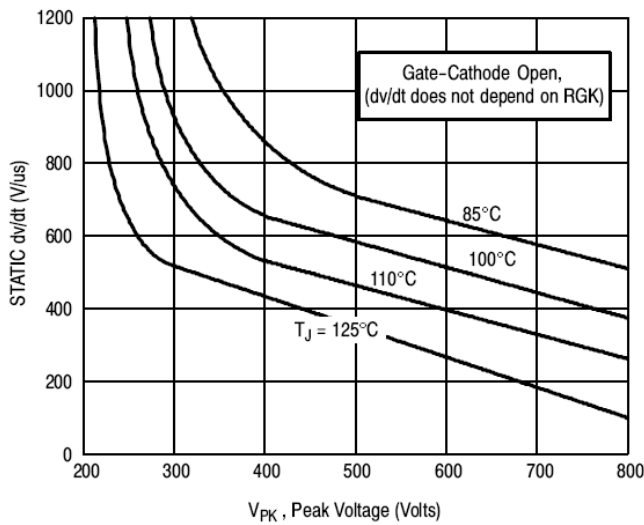


Figure 9. Typical Exponential Static dv/dt Versus Peak Voltage

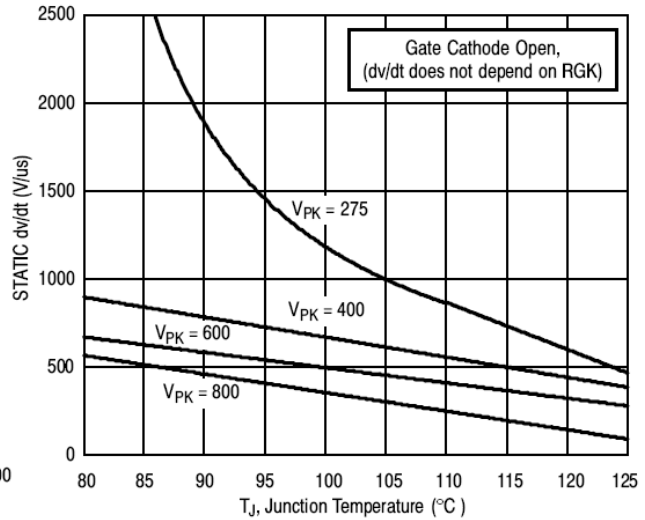


Figure 10. Typical Exponential Static dv/dt Versus Junction Temperature

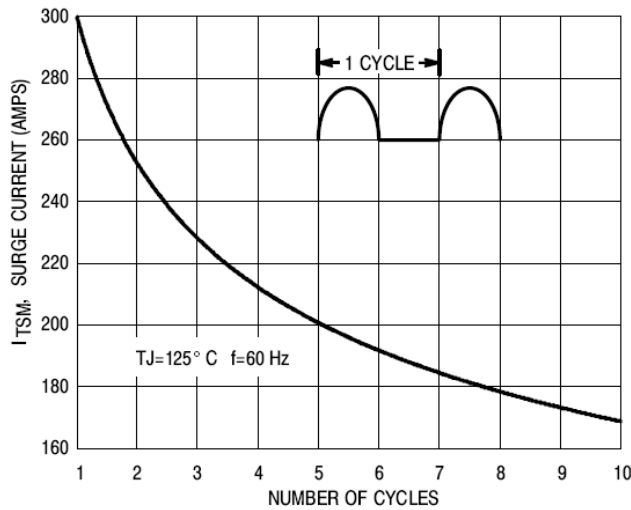


Figure 11. Maximum Non-Repetitive Surge Current