DIGITRON™ Semiconductors

High-reliability discrete products
and engineering services since 1977

MCR221-5, MCR221-7, MCR221-9

SILICON CONTROLLED RECTIFIERS

FEATURES

- Available as "HR" (high reliability) screened per MIL-PRF-19500, JANTX level. Add "HR" suffix to base part number.
- Available as non-RoHS (Sn/Pb plating), standard, and as RoHS by adding "-PBF" suffix.

MAXIMUM RATINGS.

Rating	Symbol	Value	Unit
Peak repetitive forward and reverse off-state voltage [(1)] MCR221-5 MCR221-7 MCR221-9	 V_{DRM} V_{RRM}	 300 500 700	Volts
On-state RMS current (180° conduction angles), T_C = 90°C)	$I_{T(RMS)}$	16	Amps
Average on-state current	$I_{T(AV)}$	10	Amps
Peak non-repetitive surge current (1/2 cycle, sine wave 60Hz, T_J = 125°C)	I_{TSM}	160	Amps
Circuit fusing (t = 8.3ms, T_J = -40 to +125°C)	I^2t	100	A^2s
Forward peak gate power	P_{GM}	20	Watts
Forward average gate power	$P_{G(AV)}$	0.5	Watts
Forward peak gate current	I_{GM}	2.0	Amps
Operating junction temperature range	T_J	-40 to 125	°C
Storage temperature range	T_{stg}	-40 to 150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal resistance, junction to case	$R_{\Theta JC}$	1.5	°C/W

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

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Peak repetitive forward or 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}	 - -	 - -	 10 2.0	 µA mA
ON CHARACTERISTICS						
Peak forward on-state voltage (I_{TM} = 32A peak, pulse width ≤ 1ms, duty cycle ≤ 2%)		V_{TM}	-	-	1.7	Volts
Gate trigger current (continuous dc) (V_D = 12Vdc, R_L = 50ohms)		I_{GT}	-	5.0	30	mA
Gate trigger voltage (continuous dc) (V_D = 12Vdc, R_L = 50ohms)	 T_C = 25°C T_C = -40°C	V_{GT}	 - -	 0.7 -	 1.5 2.5	Volts
Gate non-trigger voltage (V_D = Rated V_{DRM}, R_L = 50ohms)	T_C = 125°C	V_{GD}	0.2	-	-	Volts

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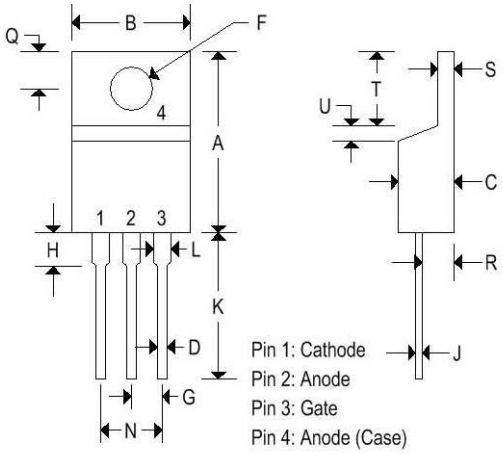
ON CHARACTERISTICS						
Holding current (V_D = 12Vdc)	T_C = 25°C T_C = -40°C	I_H	- -	6 -	40 60	mA
Turn-on time (I_{TM} = 16A, I_{GT} = 40mAdc, V_D = rated V_{DRM})		t_{gt}	-	1.0	-	µs
Turn-off time (I_{TM} = 16A, I_R = 16A, V_D = rated V_{DRM})	T_C = 25°C T_J= 125°C	t_q	- -	15 35	- -	µs
DYNAMIC CHARACTERISTICS						
Critical rate of rise of off state voltage (V_D = rated V_{DRM}, exponential waveform)	T_J = 125°C	dv/dt	-	50	-	V/µs

MECHANICAL CHARACTERISTICS

Case:	TO-220AB
Marking:	Body painted, 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

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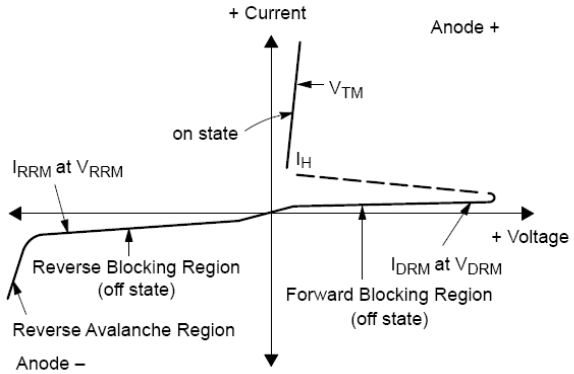

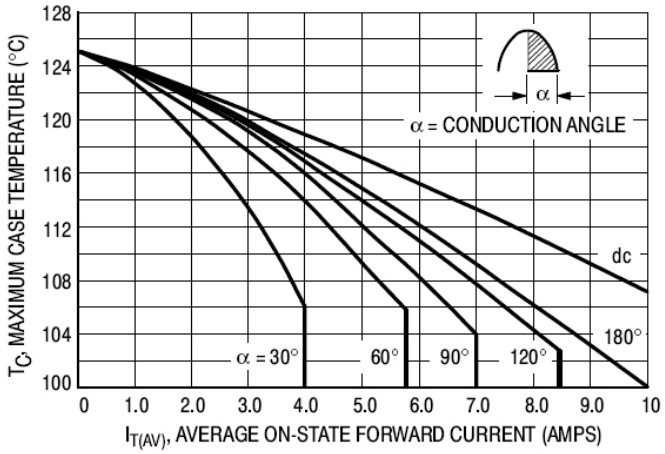

Figure 1. Average Current Derating

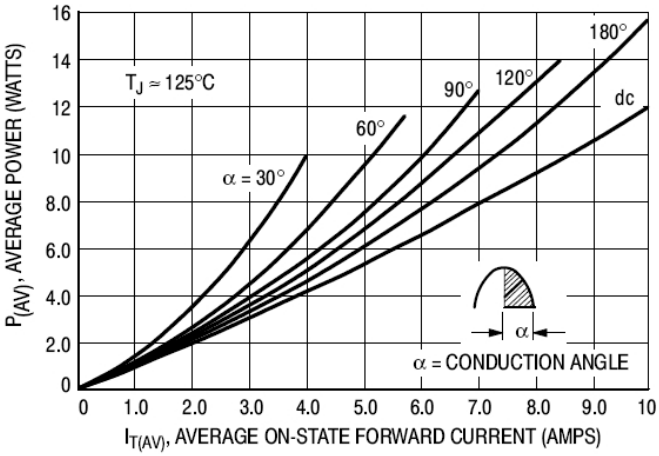

Figure 2. Maximum On–State Power Dissipation

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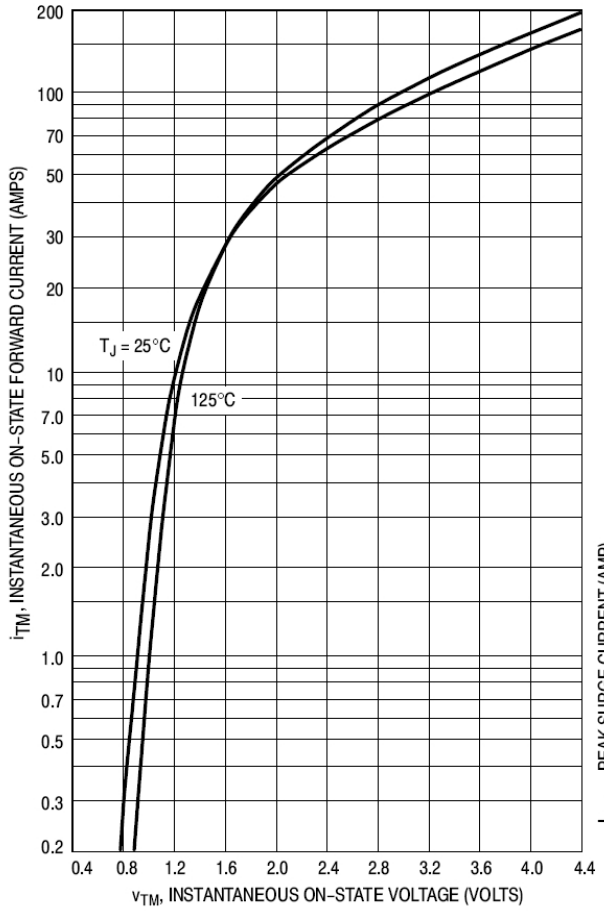

Figure 3. On–State Characteristics

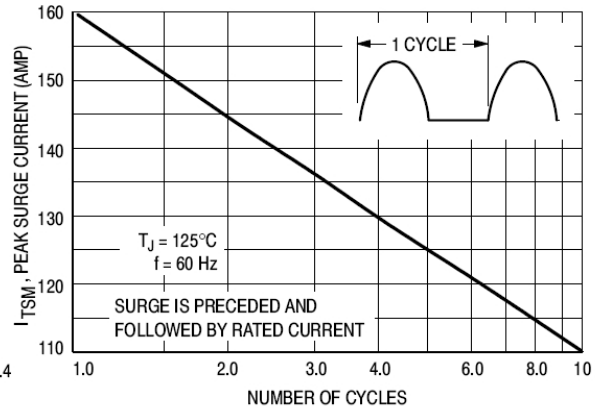

Figure 4. Maximum Non–Repetitive Surge Current

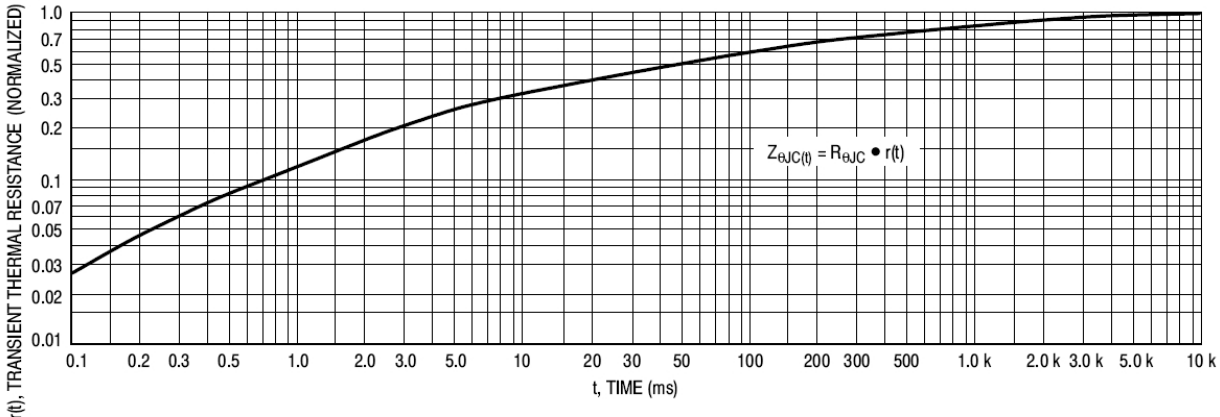

Figure 5. Thermal Response

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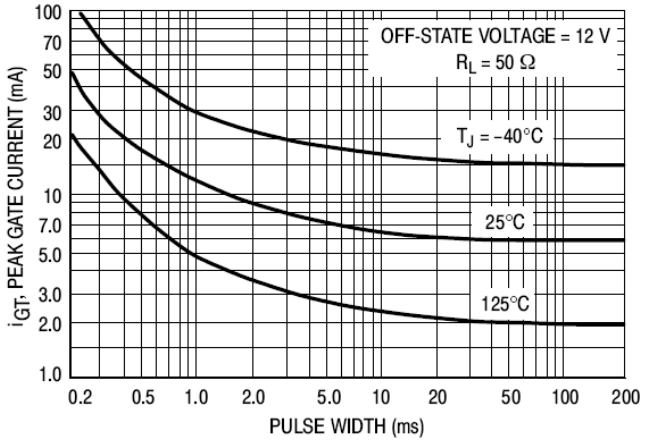

Figure 6. Typical Gate Trigger Current versus Pulse Width

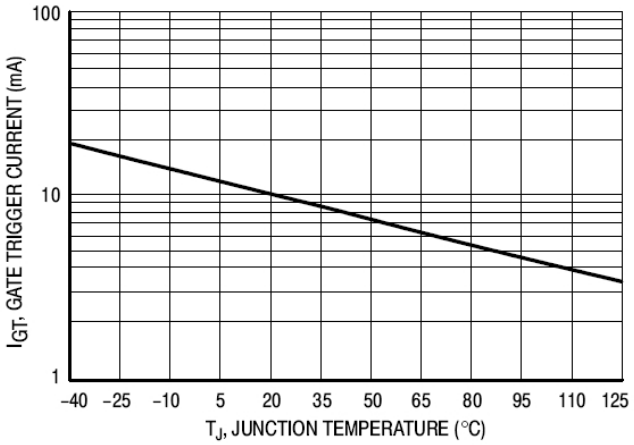

Figure 7. Typical Gate Trigger Current versus Junction Temperature

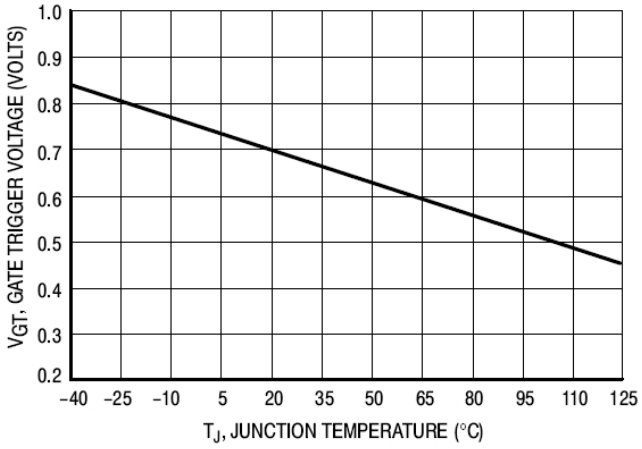

Figure 8. Typical Gate Trigger Voltage versus Junction Temperature

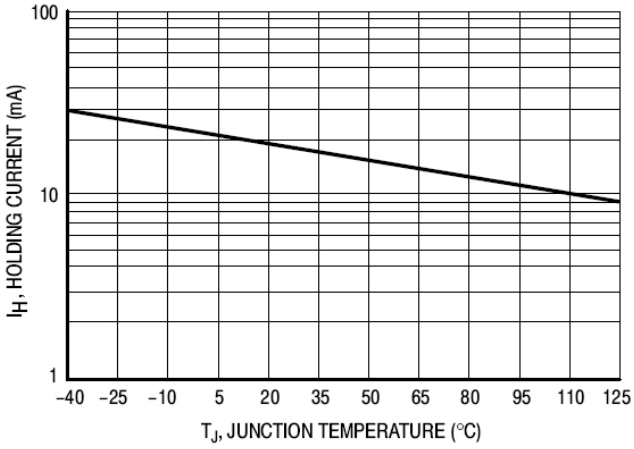

Figure 9. Typical Holding Current versus Junction Temperature