DIGITRON™ Semiconductors

High-reliability discrete products
and engineering services since 1977

MCR220-5, MCR220-7, MCR220-9

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.

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Peak forward or reverse blocking current[2] (V_{AK} = Rated V_{DRM} or V_{RRM}, R_{GK} = 1kΩ) T_C = 25°C T_C = 110°C	$I_{DRM,}$ I_{RRM}	 - -	 - -	 10 500	µA
ON CHARACTERISTICS					
Peak forward on-state voltage (I_{TM} = 16A, pulse width ≤ 1ms, duty cycle ≤ 2%)	V_{TM}	-	1.7	2.0	V
Gate trigger current (continuous dc)[3] (V_D = 12V, R_L = 100Ω)	I_{GT}	-	30	200	µA
Gate trigger voltage (continuous dc)[3] (V_D = 12V, R_L = 100Ω)	V_{GT}	-	0.5	1.5	V
Gate non-trigger voltage (V_D = 12V, R_L = 100Ω, T_J = 110°C)	V_{GD}	0.1	-	-	V
Holding current (V_D = 12V, gate open, initiating current = 200mA)	I_H	-	-	6.0	mA
Gate controlled turn-on time (V_D = Rated V_{DRM}, I_{TM} = 16A, I_G = 2mA)	t_{gt}	-	1.0	-	µs
DYNAMIC CHARACTERISTICS					
Critical rate of rise of off-state voltage (V_D = rated V_{DRM}, R_{GK} = 1kΩ, T_J = 110°C, exponential waveform)	dv/dt	-	10	-	V/µs

THERMAL CHARACTERISTICS

Characteristic	Symbol	Maximum	Unit
Thermal resistance, junction to case	$R_{\Theta JC}$	2.0	°C/W

DIGITRON™ Semiconductors

High-reliability discrete products
and engineering services since 1977

MCR220-5, MCR220-7, MCR220-9

SILICON CONTROLLED RECTIFIERS

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

Characteristic	Symbol	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS					
Peak forward or reverse blocking current (V_{AK} = Rated V_{DRM} or V_{RRM}, gate open)	I_{DRM} or I_{RRM}				
T_J = 25°C		-	-	10	µA
T_J = 125°C		-	-	2.0	mA
ON CHARACTERISTICS					
Peak forward on-state voltage (I_{TM} = 24A peak)	V_{TM}	-	1.7	2.2	Volts
Gate trigger current (continuous dc) (V_D = 12 Vdc, R_L = 100 Ω)	I_{GT}	-	5.0	30	mA
Gate trigger voltage (continuous dc) (V_D = 12 Vdc, R_L = 100 Ω)	V_{GT}	-	0.7	1.5	Volts
Gate non-trigger voltage (V_D = Rated V_{DRM}, R_L = 100 Ω, T_J = 125°C)	V_{GD}	0.2	-	-	Volts
Holding current (V_D = 12Vdc)	I_H	-	6.0	40	mA
Turn on time (I_{TM} = 12A, I_{GT} = 40mAdc, V_D = rated V_{DRM})	t_{gt}	-	1.0	2.0	µs
Turn-off time (V_D = rated V_{DRM})	t_q				µs
(I_{TM} = 12A, I_R = 12A)		-	15	-	
(I_{TM} = 12A, I_R = 12A, T_J = 125°C)		-	35	-	
DYNAMIC CHARACTERISTICS					
Critical rate of rise of off-state voltage exponential (V_D = rated V_{DRM}, T_J = 125°C)	dv/dt	-	50	-	V/µs

DIGITRON™ Semiconductors

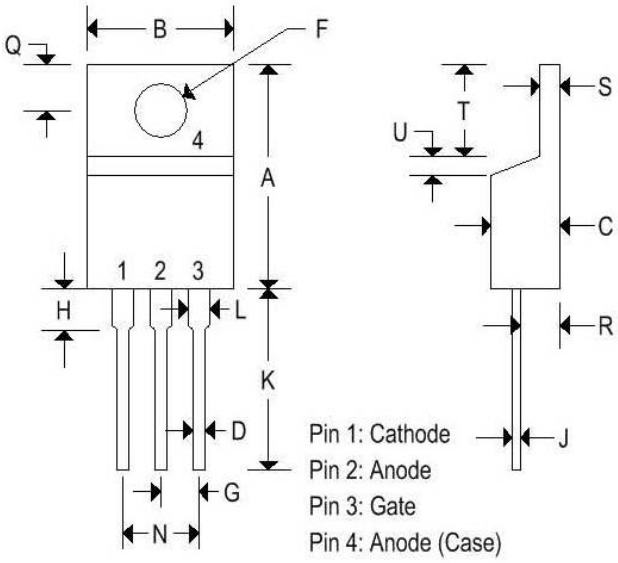
High-reliability discrete products and engineering services since 1977

MCR220-5, MCR220-7, MCR220-9

SILICON CONTROLLED RECTIFIERS

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

DIGITRON Semiconductors

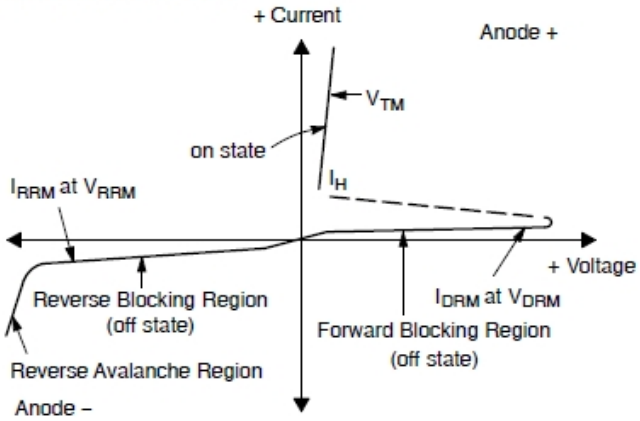
High-reliability discrete products
and engineering services since 1977

MCR220-5, MCR220-7, MCR220-9

SILICON CONTROLLED RECTIFIERS

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

Voltage Current Characteristic of SCR



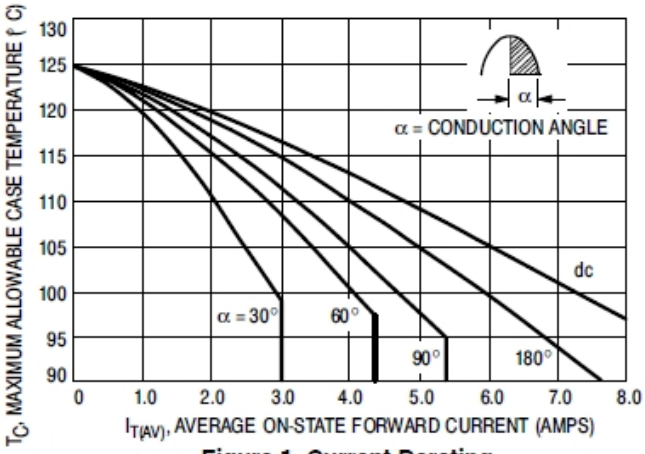


Figure 1. Current Derating

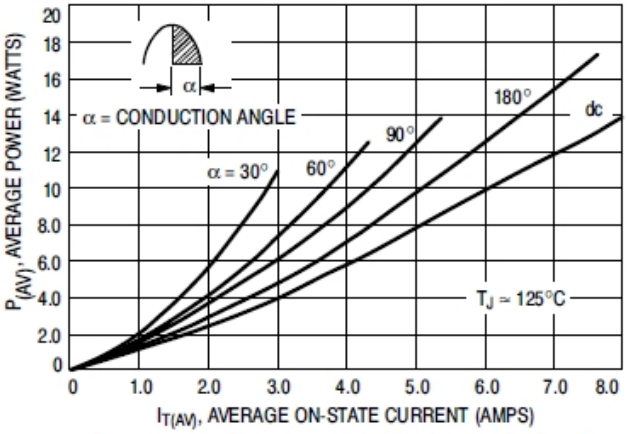


Figure 2. Maximum On–State Power Dissipation

DIGITRON™ Semiconductors

High-reliability discrete products
and engineering services since 1977

MCR220-5, MCR220-7, MCR220-9

SILICON CONTROLLED RECTIFIERS

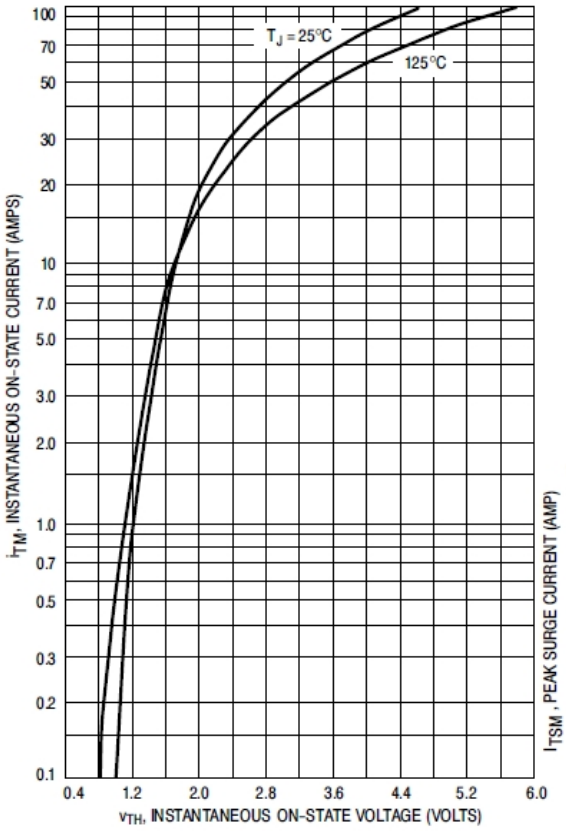


Figure 3. On–State Characteristics

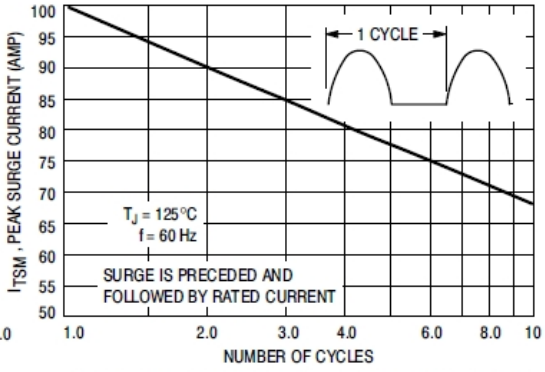


Figure 4. Maximum Non–Repetitive Surge Current

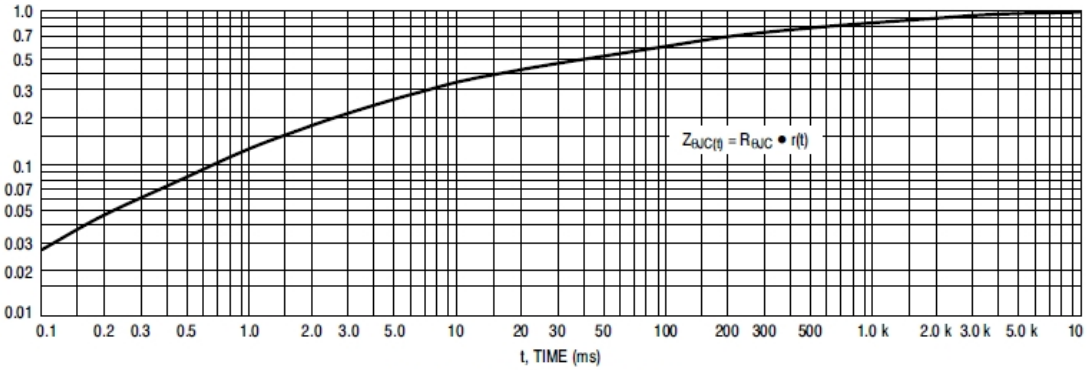


Figure 5. Thermal Response

DIGITRON™ Semiconductors

High-reliability discrete products
and engineering services since 1977

MCR220-5, MCR220-7, MCR220-9

SILICON CONTROLLED RECTIFIERS

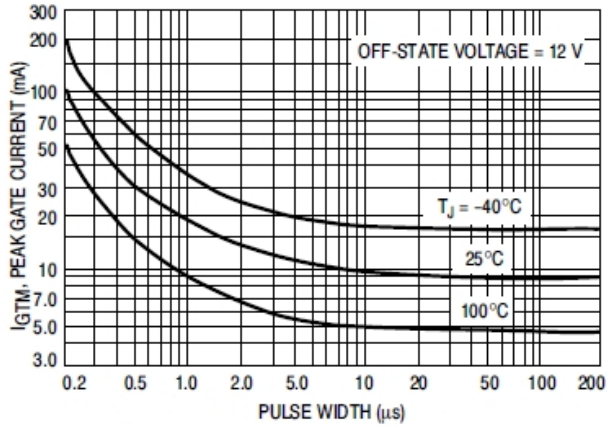


Figure 6. Typical Gate Trigger Current versus Pulse Width

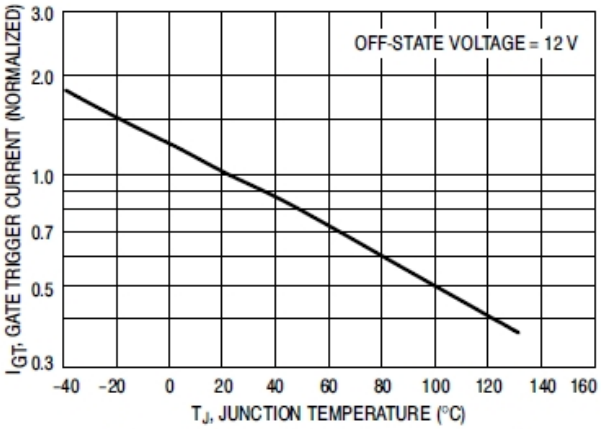


Figure 7. Typical Gate Trigger Current versus Temperature

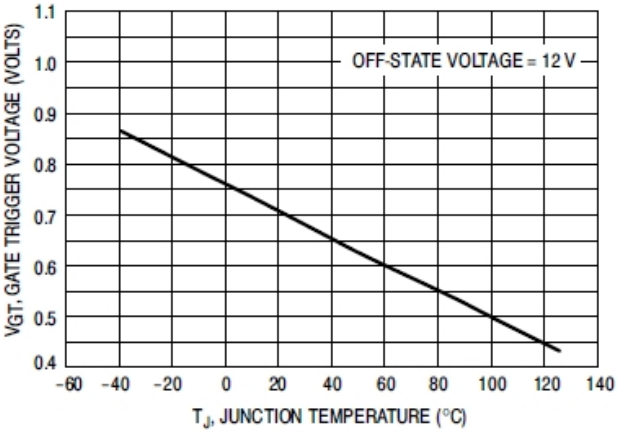


Figure 8. Typical Gate Trigger Voltage versus Temperature

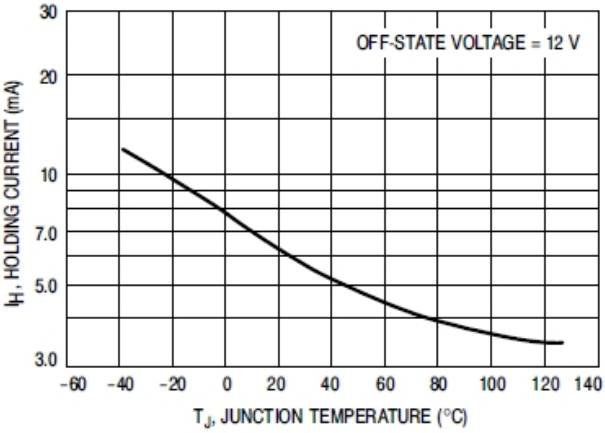


Figure 9. Typical Holding Current versus Temperature