DIGITRON™ Semiconductors

High-reliability discrete products
and engineering services since 1977

MCR3818 SERIES
MCR3918 SERIES

SILICON CONTROLLED RECTIFIER

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 blocking voltage(1)			
MCR3818, MCR3918-2		50	
MCR3818, MCR3918-3		100	
MCR3818, MCR3918-4	V_{RRM}, V_{DRM}	200	Volts
MCR3818, MCR3918-6		400	
MCR3818, MCR3918-8		600	
MCR3818, MCR3918-10		800	
Peak non-repetitive reverse blocking voltage			
MCR3818, MCR3918-2		75	
MCR3818, MCR3918-3		150	
MCR3818, MCR3918-4	V_{RSM}	300	Volts
MCR3818, MCR3918-6		500	
MCR3818, MCR3918-8		700	
MCR3818, MCR3918-10		900	
Forward on-state current RMS (all conduction angles)	$I_{T(RMS)}$	20	Amps
Average on-state current (T_C = 67°C)	$I_{T(AV)}$	13	Amps
Circuit fusing considerations (T_J = -40 to +100°C, t ≤ 8.3ms)	I^2t	235	A^2s
Peak non-repetitive surge current (1/2 cycle, 60Hz, T_J = -40 to +100°C)	I_{TSM}	240	Amps
Peak gate power (maximum pulse width = 10µs)	P_{GM}	5	Watts
Average gate power	$P_{G(AV)}$	0.5	Watts
Peak forward gate current (maximum pulse width = 10µs)	I_{GM}	2	Amps
Peak gate voltage	V_{GM}	10	Volts
Operating junction temperature range	T_J	-40 to +125	°C
Storage temperature range	T_{stg}	-40 to +150	°C
Mounting torque		30	In. lb.

Note 1: V_{DRM} for all types can be applied on a continuous basis. Ratings apply for zero or negative gate voltage; however, 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	Typical	Maximum	Unit
Thermal resistance, junction to case				
DIGI PF2	$R_{\Theta JC}$	1	1.5	°C/W
TO-48		1.1	1.6	

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

Characteristic	Symbol	Min.	Max.	Unit
Peak forward or reverse blocking current (Rated V_{DRM} or V_{RRM}, gate open)	I_{DRM}, I_{RRM}			
T_J = 25°C		-	10	µA
T_J = 100°C		-	5	mA
Gate trigger current (continuous dc)				
(V_D = 7Vdc, R_L = 100Ω)	I_{GT}	-	40	mA
(V_D = 7Vdc, R_L = 100Ω, TC = -40°C)		-	75	
Gate trigger voltage (continuous dc)	V_{GT}			Volts
(V_D = 7Vdc, gate open)		-	1.5	
(V_D = 7Vdc, R_L = 100Ω, T_C = -40°C)		-	2.5	
(V_D = rated V_{DRM}, R_L = 100Ω, T_J = 100°C)		0.2	-	
Peak on state voltage (pulse width = 1ms max., duty cycle ≤ 1%)	V_{TM}			Volts
(I_{TM} = 20A)		-	1.5	
(I_{TM} = 41A)		-	1.7	
Holding current	I_H			mA
(V_D = 7Vdc, gate open)		-	50	
(V_D = 7Vdc, gate open, T_C = -40°C)		-	90	
Gate controlled turn-on time (t_d + t_r)	t_{gt}	Typical		µs
(I_{TM} = 20A, I_{GT} = 40mAdc, V_D = rated V_{DRM})		1		
Circuit commutate turn-off time	t_q			µs
(I_{TM} = 10A, I_R – 10A)		20		
(I_{TM} = 10A, I_R = 10A, T_J = 100°C)		30		
(V_D = V_{DRM} = rated voltage)				
(dv/dt = 30V/µs)				
Critical rate of rise of off state voltage (V_D = rated V_{DRM}, exponential waveform, gate open, T_J = 100°C)	dv/dt	50		V/µs

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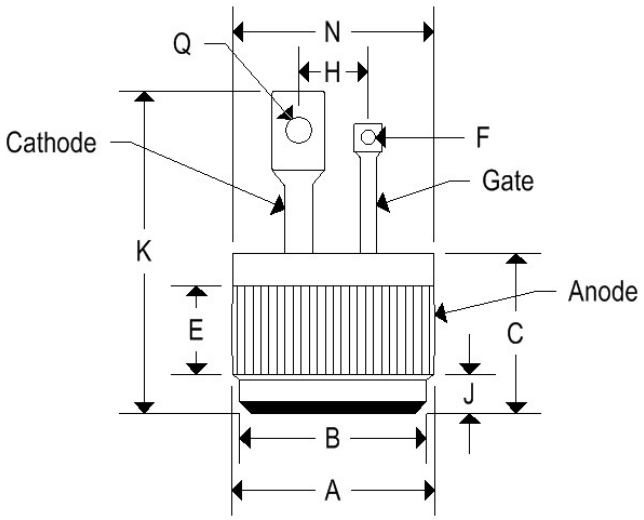
MECHANICAL CHARACTERISTICS

Case	Digi PF2 (MCR3818 series)
Marking	Body painted, alpha-numeric



	DIGI PF2			
	Inches		Millimeters	
	Min	Max	Min	Max
A	0.501	0.505	12.730	12.830
B	0.465	0.475	11.810	12.060
C	0.330	0.380	8.390	9.650
E	0.100	-	2.540	-
F	0.035	0.085	0.890	2.160
J	0.080	0.097	2.040	2.460
K	-	0.800	-	20.320
N	-	0.510	-	12.950
Q	0.065	0.160	1.650	4.060

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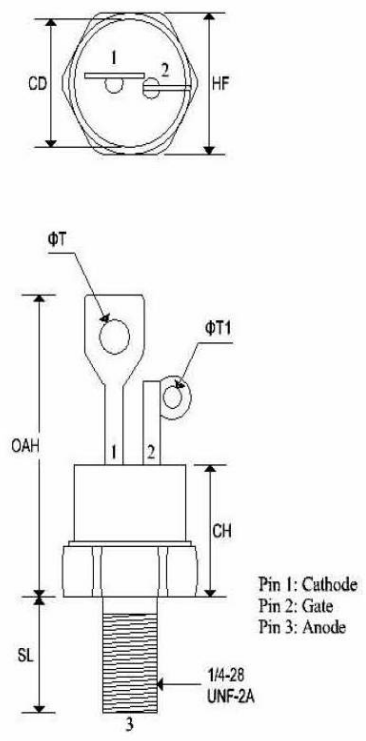
MECHANICAL CHARACTERISTICS

Case	TO-48
Marking	Body painted, alpha-numeric
Polarity	Cathode is stud



	TO-48			
	Inches		Millimeters	
	Min	Max	Min	Max
CD	-	0.543	-	13.793
CH	-	0.550	-	13.970
HF	0.544	0.563	13.817	14.301
OAH	-	1.193	-	30.303
SL	0.422	0.453	10.718	11.507
ΦT	0.125	0.165	3.175	4.191
ΦT_1	0.060	0.075	1.524	1.905

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EFFECT OF TEMPERATURE UPON TYPICAL TRIGGER CHARACTERISTICS

FIGURE 1 – GATE TRIGGER CURRENT

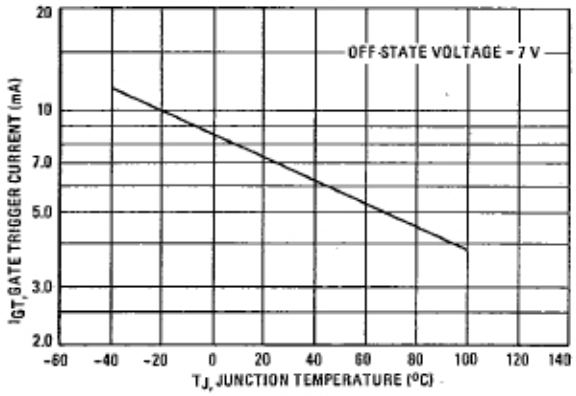
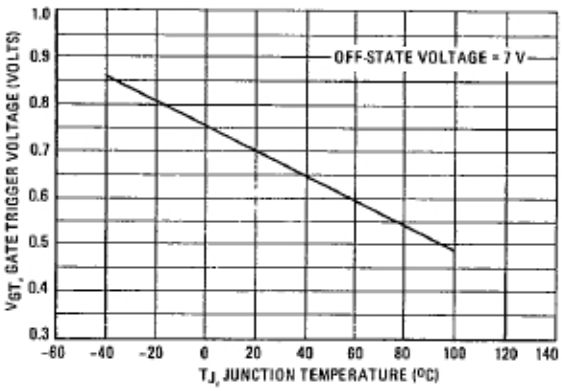


FIGURE 2 – GATE TRIGGER VOLTAGE



MAXIMUM ALLOWABLE NON-REPETITIVE SURGE CURRENT

FIGURE 3 – 60 Hz SURGES

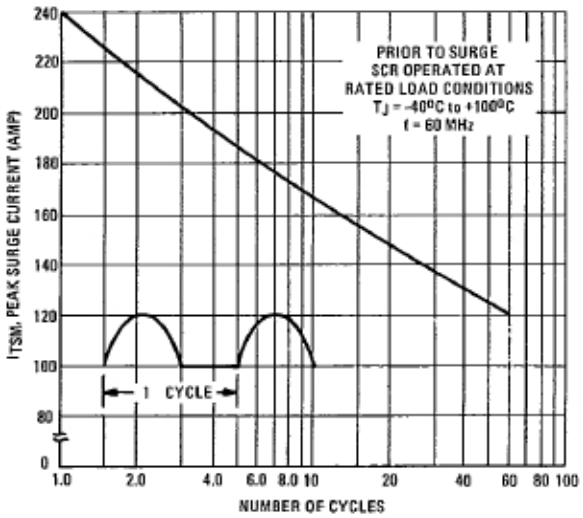


FIGURE 4 – SUB-CYCLE SURGES

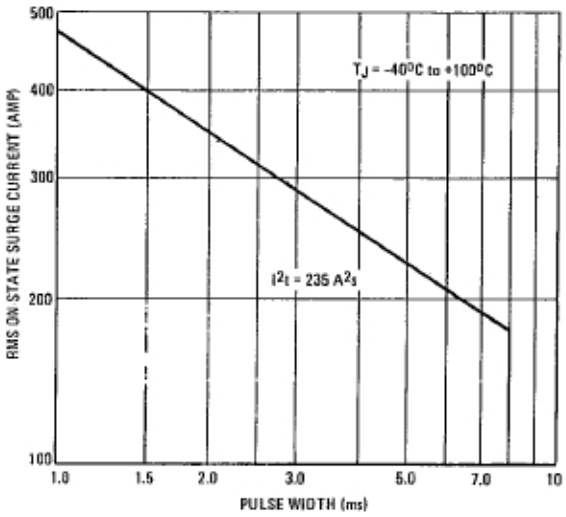


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FIGURE 5 – GATE TRIGGER CHARACTERISTICS

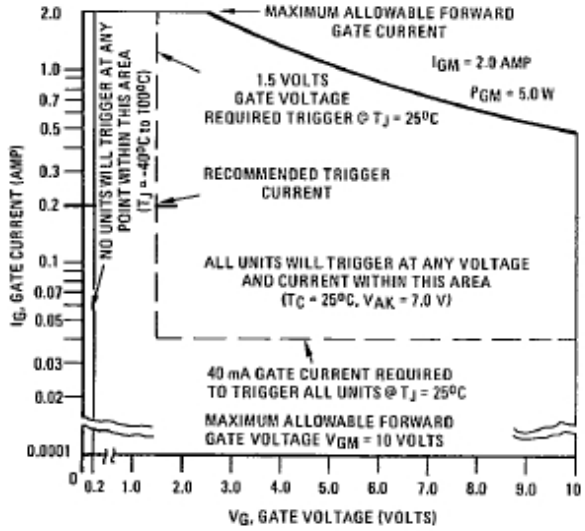
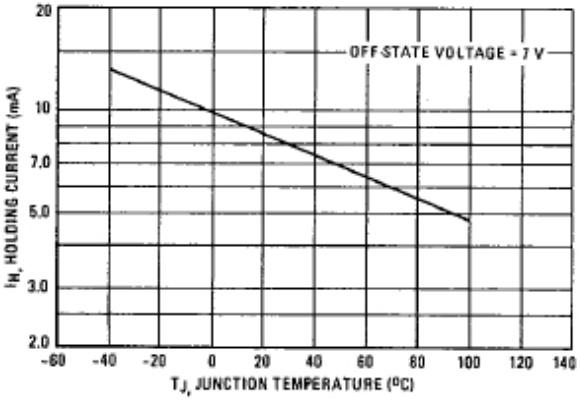


FIGURE 6 – EFFECT OF TEMPERATURE ON TYPICAL HOLDING CURRENT



DERATING AND DISSIPATION FOR RESISTIVE AND INDUCTIVE LOADS (f = 60 to 400 Hz, SINE WAVE)

FIGURE 7 – AVERAGE CURRENT DERATING

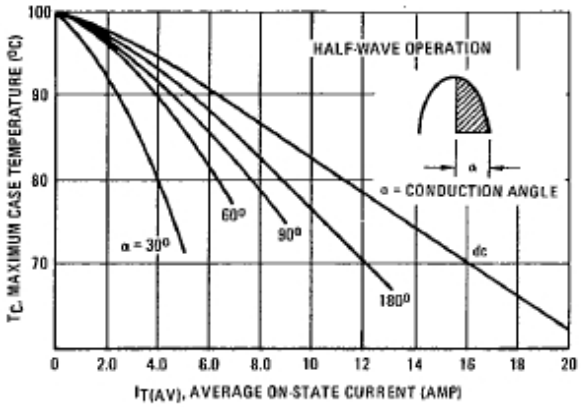


FIGURE 8 – ON-STATE POWER DISSIPATION

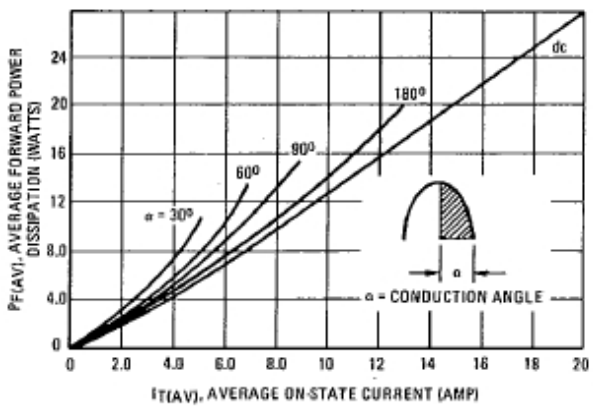


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FIGURE 9 – ON-STATE CHARACTERISTICS

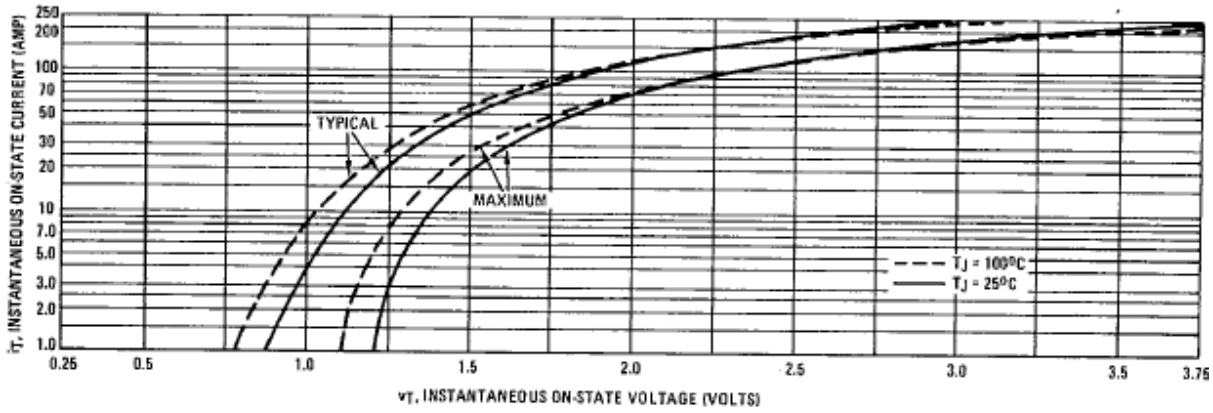


FIGURE 10 – TYPICAL THERMAL RESISTANCE OF PLATES

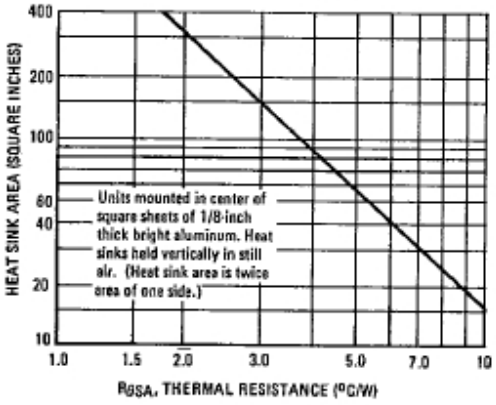
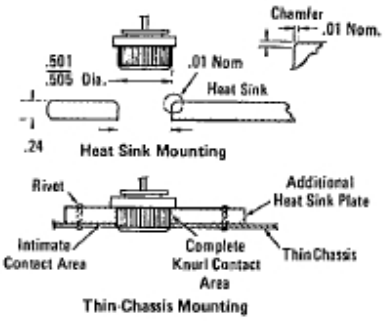


FIGURE 11 – MOUNTING DETAILS FOR PRESSFIT THYRISTORS



The hole edge must be chamfered as shown to prevent shearing off the knurled edge of the rectifier during press-in. The pressing force should be applied evenly on the shoulder ring to avoid tilting or canting of the rectifier case in the hole during the pressing operation. Also, the use of a thermal joint compound will be of considerable aid. The pressing force will vary from 250 to 1000 pounds, depending upon the heat sink material. Recommended hardnesses are: copper – less than 50 on the Rockwell F scale; aluminum – less than 65 on the Brinell scale. A heat sink as thin as 1/8" may be used, but the interface thermal resistance will increase in proportion to the reduction of contact area. A thin chassis requires the addition of a back-up plate.