

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

MCR3818, MCR3918-2 MCR3818, MCR3918-3 MCR3818, MCR3918-4 MCR3818, MCR3918-6 MCR3818, MCR3918-8 MCR3818, MCR3918-8 MCR3818, MCR3918-10 Peak non-repetitive reverse blocking voltage MCR3818, MCR3918-10 Peak non-repetitive reverse blocking voltage MCR3818, MCR3918-2 MCR3818, MCR3918-3 MCR3818, MCR3918-6 MCR3818, MCR3918-6 MCR3818, MCR3918-6 MCR3818, MCR3918-10 Porward on-state current RMS (all conduction angles) MCR3818, MCR3918-10 Forward on-state current (T _C = 67°C) Interval to +100°C, t ≤ 8.3ms) Peak non-repetitive surge current (1/2 cycle, 60Hz, T ₁ = -40 to +100°C) Peak gate power (maximum pulse width = 10μs) Peak gate power (maximum pulse width = 10μs) Peak gate voltage V _{SM} V	Rating	Symbol	Value	Unit
MCR3818, MCR3918-3 MCR3818, MCR3918-6 MCR3818, MCR3918-6 MCR3818, MCR3918-8 MCR3818, MCR3918-8 MCR3818, MCR3918-8 MCR3818, MCR3918-10 Peak non-repetitive reverse blocking voltage MCR3818, MCR3918-2 MCR3818, MCR3918-3 MCR3818, MCR3918-4 MCR3818, MCR3918-6 MCR3818, MCR3918-6 MCR3818, MCR3918-10 Pool MCR3818, MCR3918-10 MCR3818, MCR3918-10 MCR3818, MCR3918-10 Forward on-state current RMS (all conduction angles) Average on-state current (T _C = 67°C) Int(M) Int(M) Int(Peak repetitive forward and reverse blocking voltage ⁽¹⁾			
MCR3818, MCR3918-4 V _{RRMZ} V _{DBM} 200 Volts MCR3818, MCR3918-6 400 400 400 MCR3818, MCR3918-8 600 800 800 MCR3818, MCR3918-10 800 75 800 MCR3818, MCR3918-2 75 90 75 90 90 90 90 90 90 90 90 90 90 90 90 900 90 <td< td=""><td>MCR3818, MCR3918-2</td><td></td><td>50</td><td></td></td<>	MCR3818, MCR3918-2		50	
MCR3818, MCR3918-6 MCR3818, MCR3918-10 Peak non-repetitive reverse blocking voltage MCR3818, MCR3918-2 MCR3818, MCR3918-2 MCR3818, MCR3918-3 MCR3818, MCR3918-4 MCR3818, MCR3918-6 MCR3818, MCR3918-6 MCR3818, MCR3918-6 MCR3818, MCR3918-6 MCR3818, MCR3918-10 MCR3818, MCR3918-10 Forward on-state current RMS (all conduction angles) Average on-state current (T _C = 67°C) MTLMJ MTL	MCR3818, MCR3918-3		100	
MCR3818, MCR3918-8 600 MCR3818, MCR3918-10 800 Peak non-repetitive reverse blocking voltage 75 MCR3818, MCR3918-2 75 MCR3818, MCR3918-3 150 MCR3818, MCR3918-4 V _{RSM} 300 Volts MCR3818, MCR3918-6 500 MCR3818, MCR3918-8 700 900 MCR3818, MCR3918-10 900 500 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 I²t 235 A²s IT ₁ = -40 to +100°C, t ≤ 8.3ms) I¹ _{TSM} 235 A²s Peak non-repetitive surge current I _{TSM} 240 Amps 1/2 c cycle, 60Hz, T₁ = -40 to +100°C) 1 _{TSM} 5 Watts Average gate power (maximum pulse width = 10µs) P _{G(AV)} 0.5 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 _G <t< td=""><td>MCR3818, MCR3918-4</td><td>V_{RRM}, V_{DRM}</td><td>200</td><td>Volts</td></t<>	MCR3818, MCR3918-4	V_{RRM} , V_{DRM}	200	Volts
MCR3818, MCR3918-10 800 Peak non-repetitive reverse blocking voltage 75 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 I²t 235 A²s Circuit fusing considerations I¹ _{T(AV)} 13 Amps Circuit fusing considerations I²t 235 A²s Peak non-repetitive surge current I _{TSM} 240 Amps Peak gate power (maximum pulse width = 10µs) P _{GM} 5 Watts Average gate power (maximum pulse width = 10µs) P _{G(AV)} 0.5 Watts Peak gate voltage V _{GM} 10 Volts Operating junction temperature range T _J -40 to +125 °C Storage temperature range T _J -40 to +150 </td <td>MCR3818, MCR3918-6</td> <td></td> <td>400</td> <td></td>	MCR3818, MCR3918-6		400	
Peak non-repetitive reverse blocking voltage 75 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 MCR3818, MCR3918-10 20 Amps Forward on-state current RMS (all conduction angles) I _{T(RMS)} 20 Amps Average on-state current (T _C = 67°C) It _{T(AV)} 13 Amps Circuit fusing considerations I²t 235 A²s Peak non-repetitive surge current I _{TSM} 240 Amps Peak gate power (maximum pulse width = 10µs) P _{G(AV)} 0.5 Watts Average gate power P _{G(AV)} 0.5 Watts 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	MCR3818, MCR3918-8		600	
MCR3818, MCR3918-2 MCR3818, MCR3918-3 MCR3818, MCR3918-4 MCR3818, MCR3918-6 MCR3818, MCR3918-6 MCR3818, MCR3918-8 MCR3818, MCR3918-8 MCR3918-10 MCR3818, MCR3918-8 MCR3918-6 MCR3818, MCR3918-4 MCR3918-2 MCR3818, MCR3918-6 MCR3818, MCR3918-4 MCR318, MCR3918-4 MCR318, MCR318, MCR391	MCR3818, MCR3918-10		800	
MCR3818, MCR3918-3 150 MCR3818, MCR3918-4 V _{RSM} 300 Volts MCR3818, MCR3918-6 500 500 MCR3818, MCR3918-8 700 900 MCR3818, MCR3918-10 900 Amps 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 ₁ = -40 to +100°C, t ≤ 8.3ms) 1°t 235 A²s Peak non-repetitive surge current (1/2 cycle, 60Hz, T ₁ = -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	Peak non-repetitive reverse blocking voltage			
MCR3818, MCR3918-4 MCR3818, MCR3918-6 MCR3818, MCR3918-8 MCR3918-10 Forward on-state current RMS (all conduction angles) Average on-state current ($T_c = 67^{\circ}C$) Circuit fusing considerations $T_c = -40 \text{ to } +100^{\circ}C$, $t \le 8.3 \text{ ms}$) Peak gate power (maximum pulse width = $10 \mu s$) Average gate power Peak gate voltage Operating junction temperature range T_{stg} T_{stg} August 1300 Volts Volts Volts Volts Volts Volts August 300 Volts Volts Source Volts August 4500 Volts Vol	MCR3818, MCR3918-2		75	
MCR3818, MCR3918-6 MCR3818, MCR3918-8 MCR3918-10 Forward on-state current RMS (all conduction angles) Average on-state current ($T_{C} = 67^{\circ}C$) $T_{T(RMS)}$ T_{T	MCR3818, MCR3918-3		150	
MCR3818, MCR3918-8 MCR3918-10 Forward on-state current RMS (all conduction angles) Average on-state current ($T_c = 67^{\circ}C$) $I_{T(RMS)}$	MCR3818, MCR3918-4	V_{RSM}	300	Volts
MCR3818, MCR3918-10 900 Forward on-state current RMS (all conduction angles) $I_{T(RMS)}$ 20 Amps Average on-state current ($T_c = 67^{\circ}\text{C}$) $I_{T(AV)}$ 13 Amps $I_{T(AV)}$ 13 Amps $I_{T(AV)}$ 13 Amps $I_{T(AV)}$ 235 $I_{T(AV)}$ 235 $I_{T(AV)}$ 235 $I_{T(AV)}$ 235 $I_{T(AV)}$ 240 Amps $I_{T(AV)}$ 240 $I_{T(AV)}$ 240 Amps $I_{T(AV)}$ 240 $I_{T(AV)}$ 240 Amps $I_{T(AV)}$ 240 $I_{T(AV)}$ 250 $I_{T(AV)}$ 240 $I_{T(AV)}$ 250 $I_{T(AV)}$ 250 $I_{T(AV)}$ 260 $I_{T(AV)}$ 2	MCR3818, MCR3918-6		500	
Forward on-state current RMS (all conduction angles) Average on-state current ($T_c = 67^{\circ}\text{C}$) $I_{T(AV)}$ $I_{T(A$	MCR3818, MCR3918-8		700	
Average on-state current ($T_c = 67^{\circ}\text{C}$) $I_{T(AV)}$ $I_{T(AV)$	MCR3818, MCR3918-10		900	
Circuit fusing considerations $(T_J = -40 \text{ to } +100^{\circ}\text{C}, t \le 8.3 \text{ms})$ Peak non-repetitive surge current $(1/2 \text{ cycle}, 60 \text{Hz}, T_J = -40 \text{ to } +100^{\circ}\text{C})$ Peak gate power (maximum pulse width = $10 \mu \text{s}$) Average gate power $P_{G(AV)}$ Peak forward gate current (maximum pulse width = $10 \mu \text{s}$) Peak gate voltage V _{GM} 10 Volts Operating junction temperature range T _J -40 to +125 °C Storage temperature range	Forward on-state current RMS (all conduction angles)	I _{T(RMS)}	20	Amps
Peak non-repetitive surge current (1/2 cycle, 60Hz, $T_J = -40 \text{ to} + 100^{\circ}\text{C}$, $t \le 8.3 \text{ms}$) Peak gate power (maximum pulse width = $10 \mu \text{s}$) Peak forward gate current (maximum pulse width = $10 \mu \text{s}$) Peak forward gate current (maximum pulse width = $10 \mu \text{s}$) Peak gate voltage Peak gate voltage T _J T _{stg} T _{stg} T _{stg} T _{stg} A*s A*s A*s A*s A*s A*s A*s A*	Average on-state current ($T_c = 67^{\circ}C$)	I _{T(AV)}	13	Amps
$ (T_J = -40 \text{ to} + 100^{\circ}\text{C}, t \leq 8.3 \text{ms}) $ $ 235 $ $ (T_J = -40 \text{ to} + 100^{\circ}\text{C}, t \leq 8.3 \text{ms}) $ $ (T_J = -40 \text{ to} + 100^{\circ}\text{C}, t \leq 8.3 \text{ms}) $ $ (T_J = -40 \text{ to} + 100^{\circ}\text{C}) $ $ (T_J = -40 \text{ to} + 100^{\circ}\text{C}) $ $ (T_J = -40 \text{ to} + 100^{\circ}\text{C}) $ $ (T_J = -40 \text{ to} + 100^{\circ}\text{C}) $ $ (T_J = -40 \text{ to} + 100^{\circ}\text{C}) $ $ (T_J = -40 \text{ to} + 100^{\circ}\text{C}) $ $ (T_J = -40 \text{ to} + 100^{\circ}\text{C}) $ $ (T_J = -40 \text{ to} + 100^{\circ}\text{C}) $ $ (T_J = -40 \text{ to} + 120^{\circ}$	Circuit fusing considerations	12+		A ² c
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$(T_J = -40 \text{ to } +100^{\circ}\text{C}, t \le 8.3\text{ms})$	1 (235	AS
$(1/2 \text{ cycle}, 60\text{Hz}, T_J = -40 \text{ to} + 100^{\circ}\text{C})$ Peak gate power (maximum pulse width = 10μs) Average gate power $P_{G(AV)}$ Peak forward gate current (maximum pulse width = 10μs) $P_{G(AV)}$ $P_$	Peak non-repetitive surge current	1		Amns
Average gate power $P_{G(AV)}$ 0.5 Watts Peak forward gate current (maximum pulse width = $10\mu s$) 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	(1/2 cycle, 60Hz, T _J = -40 to +100°C)	ITSM	240	Allips
Peak forward gate current (maximum pulse width = 10μ s) 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	Peak gate power (maximum pulse width = 10μ s)	P _{GM}	5	Watts
Peak gate voltage V_{GM} 10 Volts Operating junction temperature range T_J $-40 \text{ to } +125$ °C Storage temperature range T_{stg} $-40 \text{ to } +150$ °C	Average gate power	P _{G(AV)}	0.5	Watts
Operating junction temperature range T _J -40 to +125 °C Storage temperature range T _{stg} -40 to +150 °C	Peak forward gate current (maximum pulse width = 10μs)	I _{GM}	2	Amps
Storage temperature range T _{stg} -40 to +150 °C	Peak gate voltage	V _{GM}	10	Volts
3,6	Operating junction temperature range	Tı	-40 to +125	°C
Mounting torque 30 In. lb.	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)				
T _J = 25°C	I_{DRM} , I_{RRM}	-	10	μΑ
T _J = 100°C		-	5	mA
Gate trigger current (continuous dc)				
$(V_D = 7Vdc, R_L = 100\Omega)$	I _{GT}	-	40	mA
$(V_D = 7Vdc, R_L = 100\Omega, TC = -40^{\circ}C)$		-	75	
Gate trigger voltage (continuous dc)	V_{GT}			Volts
(V _D = 7Vdc, gate open)		-	1.5	
$(V_D = 7Vdc, R_L = 100\Omega, T_C = -40^{\circ}C)$		-	2.5	
$(V_D = \text{rated } V_{DRM}, R_L = 100\Omega, T_J = 100^{\circ}\text{C})$		0.2	-	
Peak on state voltage	V _{TM}			Volts
(pulse width = 1ms max., duty cycle ≤ 1%)				
(I _{TM} = 20A)		-	1.5	
(I _{TM} = 41A)		-	1.7	
Holding current	I _H			mA
(V _D = 7Vdc, gate open)		-	50	
$(V_D = 7Vdc, gate open, T_C = -40^{\circ}C)$		-	90	
Gate controlled turn-on time (t _d + t _r)	t _{gt}	Typical		μs
$(I_{TM} = 20A, I_{GT} = 40 \text{mAdc}, V_D = \text{rated } V_{DRM})$		1		
Circuit commutate turn-off time	tq			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)				
$(dv/dt = 30V/\mu s)$				
Critical rate of rise of off state voltage				V/µs
(V _D = rated V _{DRM} , exponential waveform, gate open, T _J = 100°C)	dv/dt	50		

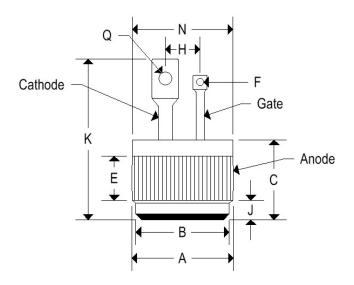


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MECHANICAL CHARACTERISTICS

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



	DIGI PF2				
	Inc	hes	Millim	neters	
	Min	Max	Min	Max	
Α	0.501	0.505	12.730	12.830	
В	0.465	0.475	11.810	12.060	
С	0.330	0.380	8.390	9.650	
Е	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	

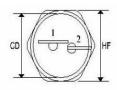


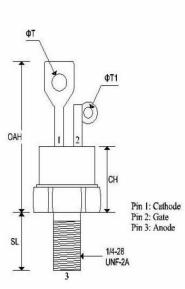
MCR3818 SERIES MCR3918 SERIES

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MECHANICAL CHARACTERISTICS

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





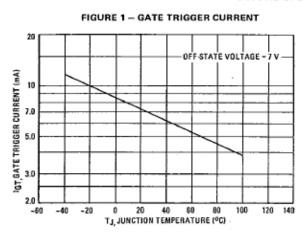
	TO-48			
	Inches		Millin	neters
	Min	Max	Min	Max
CD	(2)	0.543	ě.	13.793
СН	-	0.550	-	13.970
HF	0.544	0.563	13.817	14.301
OAH	-	1.193	-	30.303
SL	0.422	0.453	10.718	11.507
ΦТ	0.125	0.165	3.175	4.191
ΦT ₁	0.060	0.075	1.524	1.905

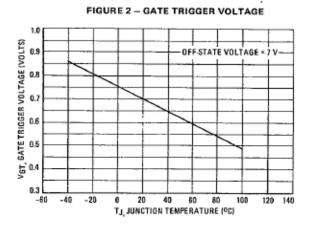


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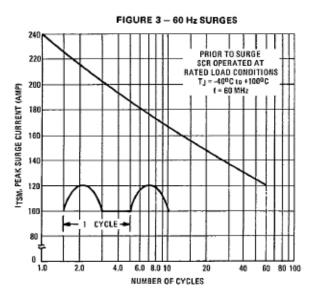
SILICON CONTROLLED RECTIFIER

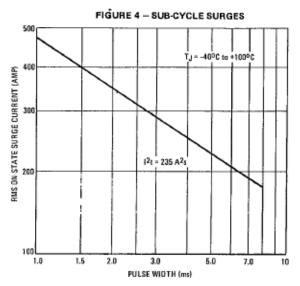
EFFECT OF TEMPERATURE UPON TYPICAL TRIGGER CHARACTERISTICS





MAXIMUM ALLOWABLE NON-REPETITIVE SURGE CURRENT

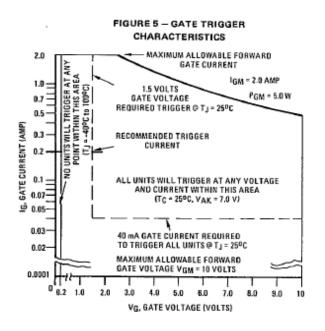


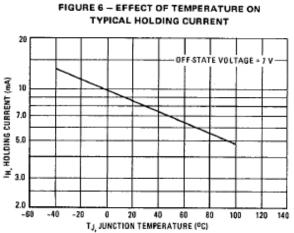




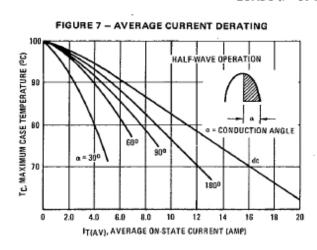
MCR3818 SERIES MCR3918 SERIES

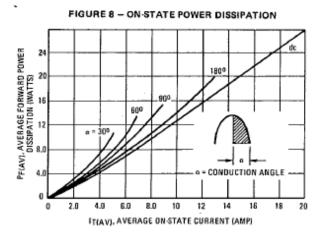
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DERATING AND DISSIPATION FOR RESISTIVE AND INDUCTIVE LOADS (f = 60 to 400 Hz, SINE WAVE)







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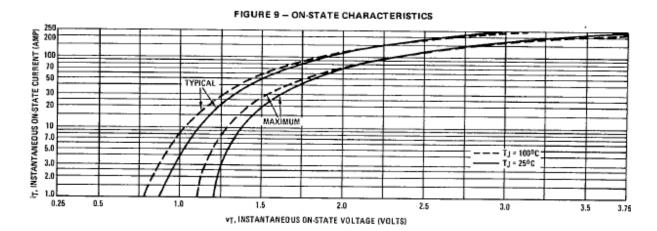
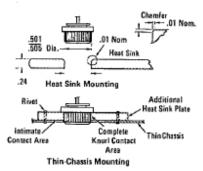


FIGURE 10 - TYPICAL THERMAL RESISTANCE OF PLATES 400 HEAT SINK AREA (SQUARE INCHES) 100 Units mounted in center of square sheets of 1/8-inch thick bright alumin sinks held vertically in still air. (Heat sink area is twice area of one side.) 10 1.0 2.0 3.0 7.0 Resa, THERMAL RESISTANCE (°C/W)

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.