DIGITRON™ Semiconductors

High-reliability discrete products
and engineering services since 1977

2N5164-2N5171

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)(2)]			
2N5164, 2N5168	V_{RRM}, V_{DRM}	50	Volts
2N5165, 2N5169		200	
2N5166, 2N5170		400	
2N5167, 2N5171		600	
Non repetitive peak reverse blocking voltage			
2N5164, 2N5168	V_{RSM}	75	Volts
2N5165, 2N5169		300	
2N5166, 2N5170		500	
2N5167, 2N5171		700	
Forward current RMS	$I_{T(RMS)}$	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 (T_J = -40 to +100°C) (1 cycle, 60Hz preceded and followed by rated current and voltage)	I_{TSM}	240	Amps
Peak gate power (maximum pulse width = 10µs)	P_{GM}	5	Watts
Average gate power	$P_{G(AV)}$	0.5	Watts
Forward peak 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 +100	°C
Storage temperature range	T_{stg}	-40 to +150	°C
Mounting torque (2N5168-2N5171)	-	30	In. lb.

Note 1: V_{DRM} for all types can be applied on a continuous basis without incurring damage. 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.
Note 2: Devices should not be operated with a positive bias applied to the gate concurrent with a negative potential applied to the anode.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Typical	Maximum	Unit
Thermal resistance, junction to case				
2N5164, 2N5165, 2N5166, 2N5167	$R_{\Theta JC}$	1	1.5	°C/W
2N5168, 2N5169, 2N5170, 2N5171		1.1	1.6	

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

Characteristic	Symbol	Min.	Max.	Unit
Peak forward blocking current				
(Rated V_{DRM} or V_{RRM}, gate open)	I_{DRM} or I_{RRM}			
T_J = 25°C		-	10	µA
T_J = 100°C		-	5	mA
Gate trigger current (continuous dc)(1)				
(V_D = 7 Vdc, R_L = 100 Ω)	I_{GT}	-	40	mA
(V_D = 7 Vdc, R_L = 100 Ω, T_C = -40°C)		-	75	
Gate trigger voltage (continuous dc)				
(V_D = 7 Vdc, gate open)	V_{GT}	-	1.5	volts
(V_D = 7 Vdc, R_L = 100 Ω, T_C = -40°C)		-	2.5	
(V_D = Rated V_{DRM}, R_L = 100 Ω, T_J = 100°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)		8	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_{gt}	Typical		µs
(I_{TM} = 20A, I_{GT} = 40mA, V_D = rated V_{DRM})		1		
Circuit commutated turn-off time	t_q	20		µs
(I_{TM} = 10A, I_R = 10A)		30		
(I_{TM} = 10A, I_R = 10A, T_J = 100°C)				
(V_D = V_{DRM} = rated voltage)				
(dv/dt = 30V/µs)				
Critical rate of rise of off-state voltage	dv/dt			V/µs
(V_D = rated V_{DRM}, exponential waveform, T_J = 100°C, gate open)		50		

Note 1: Devices should not be operated with a positive bias applied to the gate concurrent with a negative potential applied to the anode.

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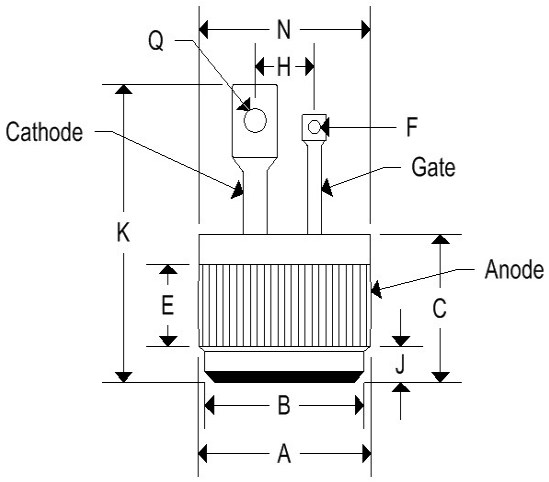
MECHANICAL CHARACTERISTICS

Case	Digi PF1 (2N5164-2N5167)
Marking	Body painted, alpha-numeric



	DIGI PF1			
	Inches		Millimeters	
	Min	Max	Min	Max
A	0.501	0.505	12.730	12.830
F	-	0.160	-	4.060
G	0.085	0.095	2.160	2.410
H	0.060	0.070	1.520	1.780
J	0.300	0.350	7.620	8.890
K	-	1.050	-	26.670
L	-	0.670	-	17.020
Q	0.055	0.085	1.400	2.160

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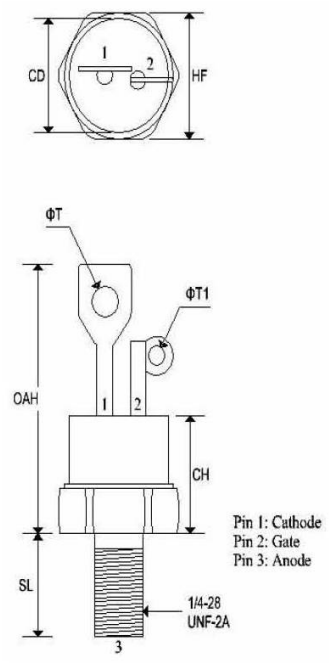
MECHANICAL CHARACTERISTICS

Case	TO-48 (2N5168-2N5171)
Marking	Body painted, alpha-numeric
Polarity	Anode 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

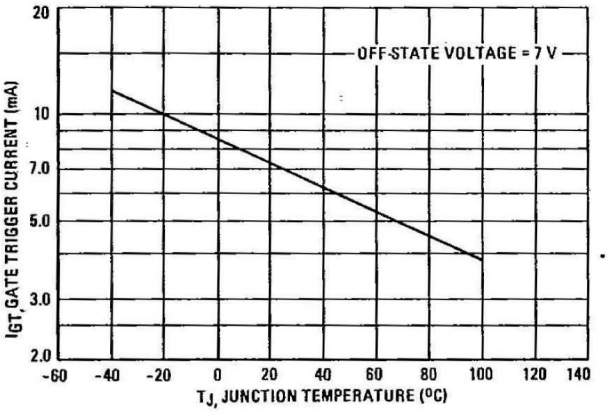
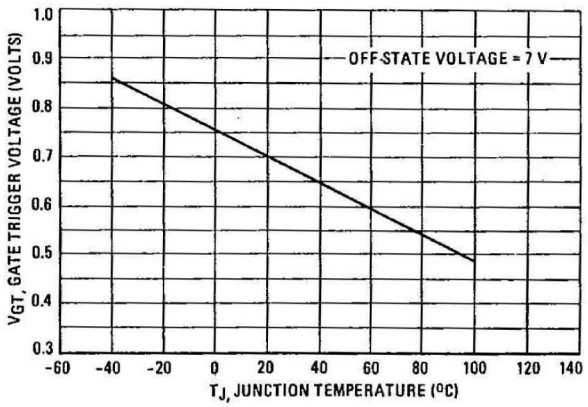


FIGURE 2 – GATE TRIGGER VOLTAGE



MAXIMUM ALLOWABLE NON-REPETITIVE SURGE CURRENT

FIGURE 3 – 60 Hz SURGES

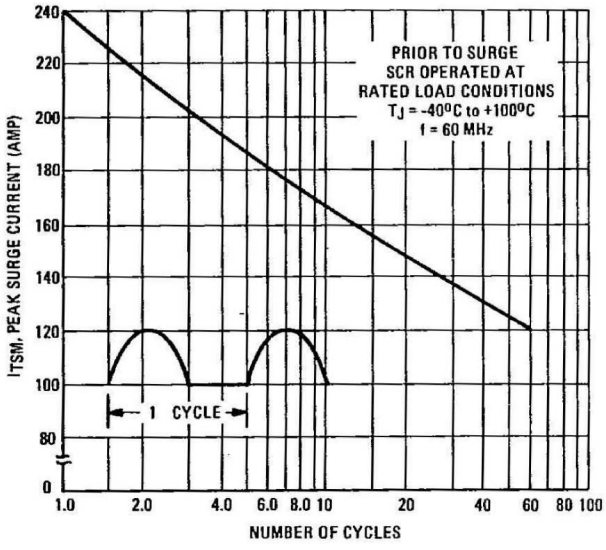


FIGURE 4 – SUB-CYCLE SURGES

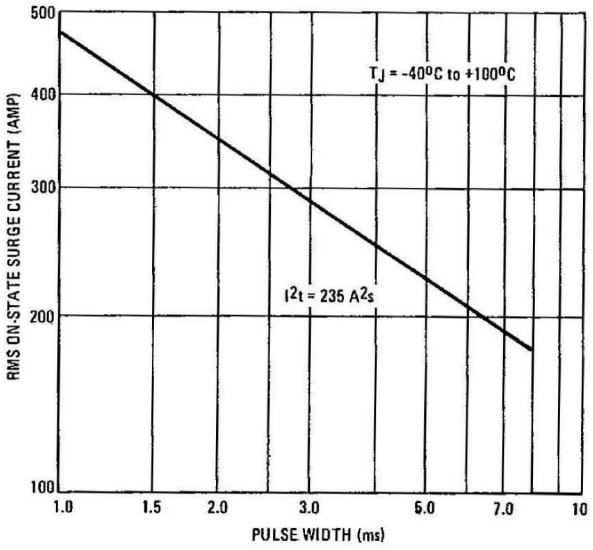


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FIGURE 5 – GATE TRIGGER CHARACTERISTICS

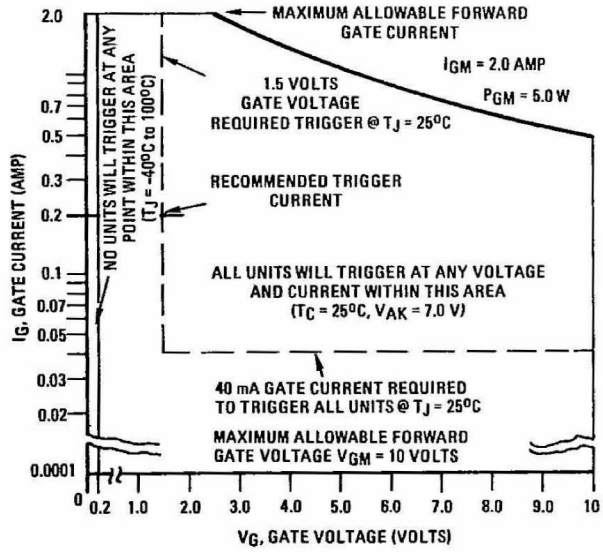
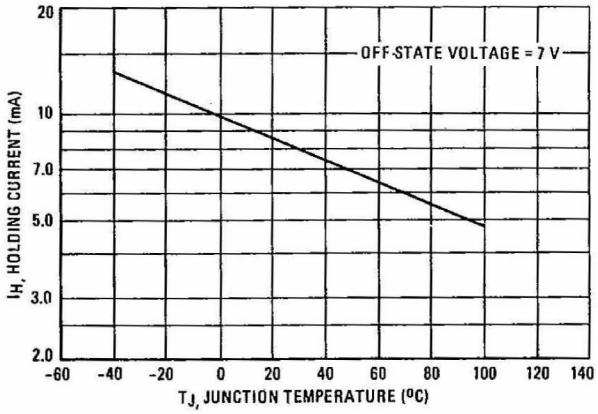


FIGURE 6 – EFFECT OF TEMPERATURE ON TYPICAL HOLDING CURRENT



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

FIGURE 7 – AVERAGE CURRENT DERATING

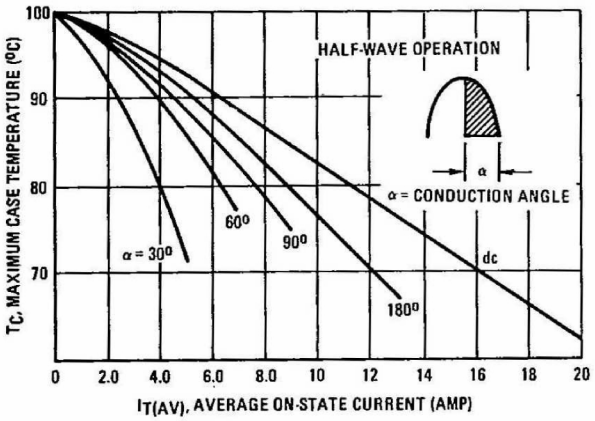


FIGURE 8 – ON-STATE POWER DISSIPATION

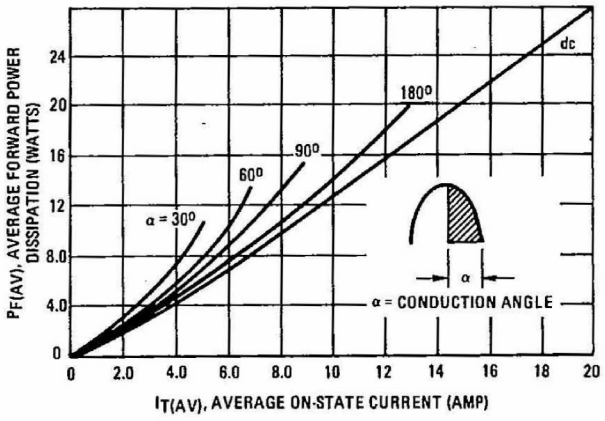


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FIGURE 9 – ON-STATE CHARACTERISTICS

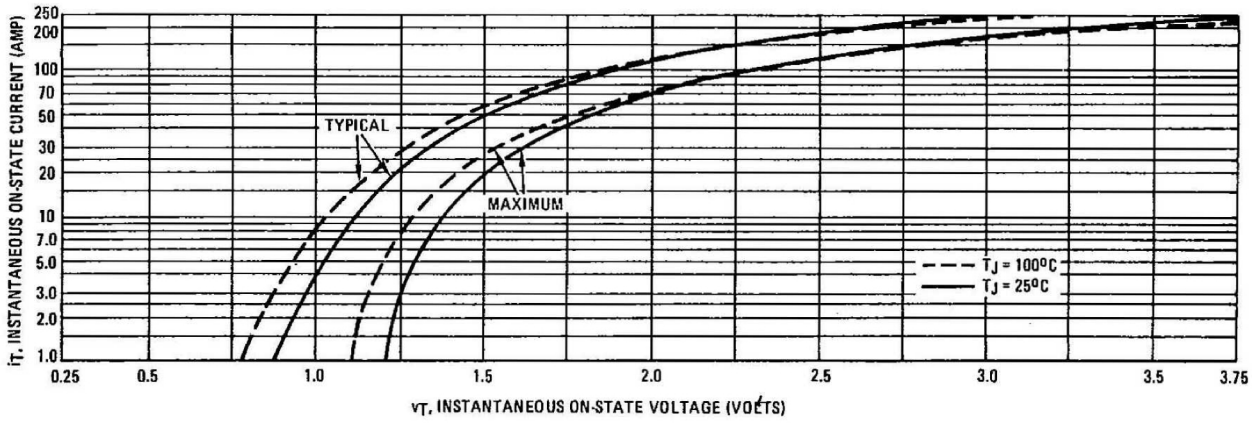

FIGURE 10 – TYPICAL THERMAL RESISTANCE OF PLATES

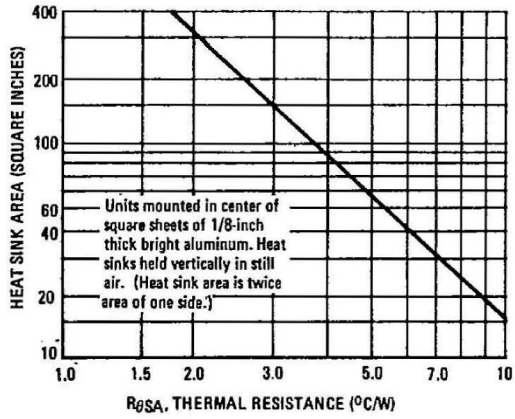

FIGURE 11 – MOUNTING DETAILS FOR PRESSFIT THYRISTORS