

# DIGITRON SEMICONDUCTORS

2N5164-2N5171

SILICON CONTROLLED RECTIFIER

Available Non-RoHS (standard) or RoHS compliant (add PBF suffix).

Available as "HR" (high reliability) screened per MIL-PRF-19500, JANTX level. Add "HR" suffix to base part number.

## MAXIMUM RATINGS

Rating	Symbol	Value	Unit
<b>Peak repetitive forward and reverse blocking voltage</b> <sup>(1)(2)</sup> 2N5164, 2N5168 2N5165, 2N5169 2N5166, 2N5170 2N5167, 2N5171	$V_{RRM}, V_{DRM}$	50 200 400 600	Volts
<b>Non repetitive peak reverse blocking voltage</b> 2N5164, 2N5168 2N5165, 2N5169 2N5166, 2N5170 2N5167, 2N5171	$V_{RSM}$	75 300 500 700	Volts
<b>Forward current RMS</b>	$I_{T(RMS)}$	20	Amps
<b>Average on state current, <math>T_C = 67^\circ\text{C}</math></b>	$I_{T(AV)}$	13	Amps
<b>Circuit fusing considerations, <math>T_J = -40</math> to <math>+100^\circ\text{C}</math>; <math>t = 8.3\text{ms}</math></b>	$I^2t$	235	$\text{A}^2\text{s}$
<b>Peak non-repetitive surge current (<math>T_J = -40</math> to <math>+100^\circ\text{C}</math>)</b> (1 cycle, 60Hz preceded and followed by rated current and voltage)	$I_{TSM}$	240	Amps
<b>Peak gate power (maximum pulse width = <math>10\mu\text{s}</math>)</b>	$P_{GM}$	5	Watts
<b>Average gate power</b>	$P_{G(AV)}$	0.5	Watts
<b>Forward peak gate current (maximum pulse width = <math>10\mu\text{s}</math>)</b>	$I_{GM}$	2	Amps
<b>Peak gate voltage</b>	$V_{GM}$	10	Volts
<b>Operating junction temperature range</b>	$T_J$	-40 to +100	$^\circ\text{C}$
<b>Storage temperature range</b>	$T_{stg}$	-40 to +150	$^\circ\text{C}$
<b>Mounting torque (2N5168-2N5171)</b>	-	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
<b>Thermal resistance, junction to case</b> 2N5164, 2N5165, 2N5166, 2N5167 2N5168, 2N5169, 2N5170, 2N5171	$R_{\theta JC}$	1 1.1	1.5 1.6	$^\circ\text{C}/\text{W}$

## ELECTRICAL CHARACTERISTICS ( $T_C 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min.	Max.	Unit
<b>Peak forward blocking current</b> (Rated $V_{DRM}$ or $V_{RRM}$ , gate open) $T_J = 25^\circ\text{C}$ $T_J = 100^\circ\text{C}$	$I_{DRM}$ or $I_{RRM}$	- -	10 5	$\mu\text{A}$ mA
<b>Gate trigger current (continuous dc)</b> <sup>(1)</sup> ( $V_D = 7$ Vdc, $R_L = 100 \Omega$ ) ( $V_D = 7$ Vdc, $R_L = 100 \Omega$ , $T_C = -40^\circ\text{C}$ )	$I_{GT}$	- -	40 75	mA
<b>Gate trigger voltage (continuous dc)</b> ( $V_D = 7$ Vdc, gate open) ( $V_D = 7$ Vdc, $R_L = 100 \Omega$ , $T_C = -40^\circ\text{C}$ ) ( $V_D = \text{Rated } V_{DRM}$ , $R_L = 100 \Omega$ , $T_J = 100^\circ\text{C}$ )	$V_{GT}$	- - 0.2	1.5 2.5 -	volts

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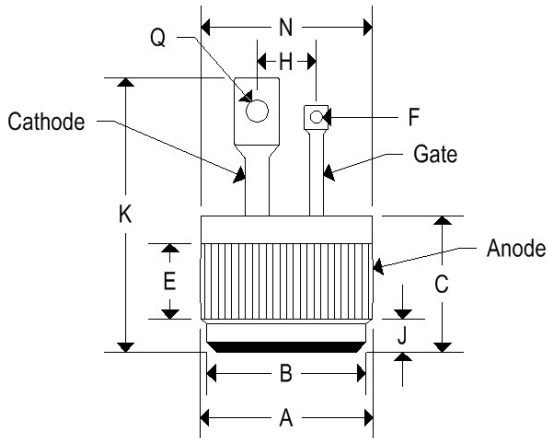
SILICON CONTROLLED RECTIFIER

Characteristic	Symbol	Min.	Max.	Unit
<b>Peak on state voltage</b> (pulse width = 1ms max., duty cycle ≤ 1%) ( $I_{TM} = 20A$ ) ( $I_{TM} = 41A$ )	$V_{TM}$	- 8	1.5 1.7	Volts
<b>Holding current</b> ( $V_D = 7V_{dc}$ , gate open) ( $V_D = 7V_{dc}$ , gate open, $T_C = -40^\circ C$ )	$I_H$	- -	50 90	mA
<b>Gate controlled turn-on time</b> ( $I_{TM} = 20A$ , $I_{GT} = 40mA$ , $V_D = \text{rated } V_{DRM}$ )	$t_{gt}$	Typical 1		$\mu s$
<b>Circuit commutated turn-off time</b> ( $I_{TM} = 10A$ , $I_R = 10A$ ) ( $I_{TM} = 10A$ , $I_R = 10A$ , $T_J = 100^\circ C$ ) ( $V_D = V_{DRM} = \text{rated voltage}$ ) ( $dv/dt = 30V/\mu s$ )	$t_q$	20 30		$\mu s$
<b>Critical rate of rise of off-state voltage</b> ( $V_D = \text{rated } V_{DRM}$ , exponential waveform, $T_J = 100^\circ C$ , gate open)	$dv/dt$	50		$V/\mu s$

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

## MECHANICAL CHARACTERISTICS

<b>Case</b>	Digi PF1 (2N5164-2N5167)
<b>Marking</b>	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

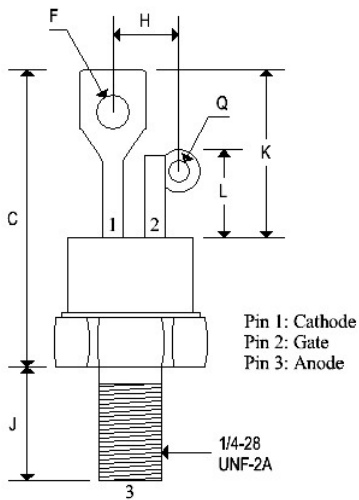
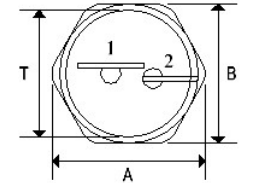
# DIGITRON SEMICONDUCTORS

2N5164-2N5171

SILICON CONTROLLED RECTIFIER

## MECHANICAL CHARACTERISTICS

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



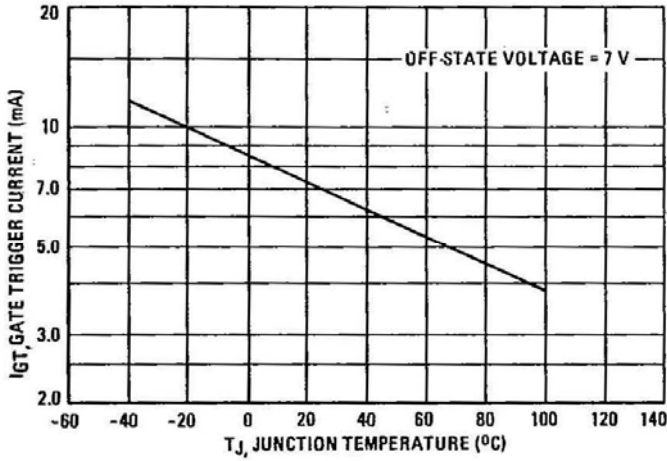
	TO-48			
	Inches		Millimeters	
	Min	Max	Min	Max
A	0.604	0.614	15.340	15.600
B	0.551	0.559	14.000	14.200
C	1.050	1.190	2.670	30.230
F	0.135	0.160	3.430	4.060
H	-	0.265	-	6.730
J	0.420	0.455	10.670	11.560
K	0.620	0.670	15.750	17.020
L	0.300	0.350	7.620	8.890
Q	0.055	0.085	1.400	2.160
T	0.501	0.505	12.730	12.830

# DIGITRON SEMICONDUCTORS

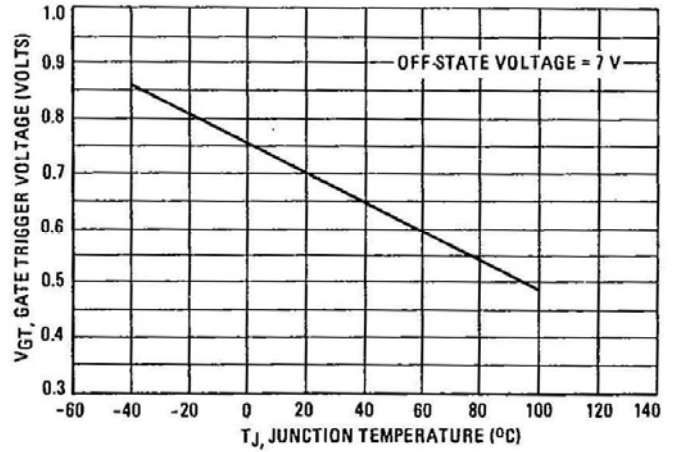
## 2N5164-2N5171 SILICON CONTROLLED RECTIFIER

### EFFECT OF TEMPERATURE UPON TYPICAL TRIGGER CHARACTERISTICS

**FIGURE 1 – GATE TRIGGER CURRENT**

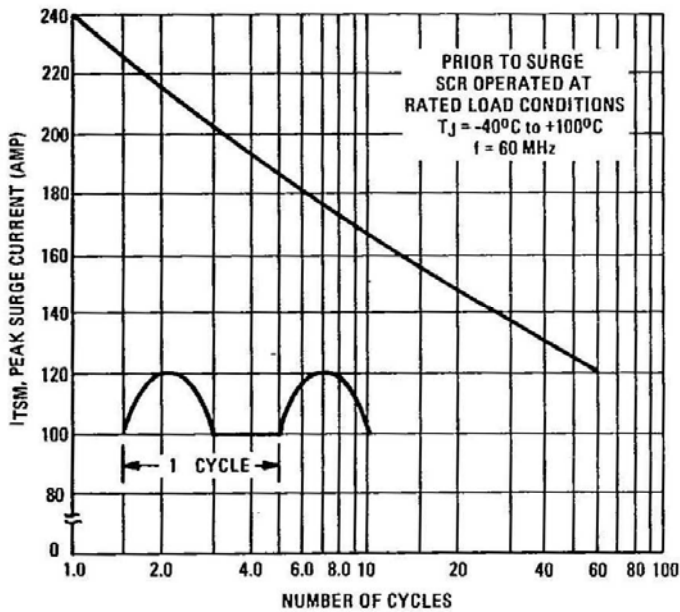


**FIGURE 2 – GATE TRIGGER VOLTAGE**

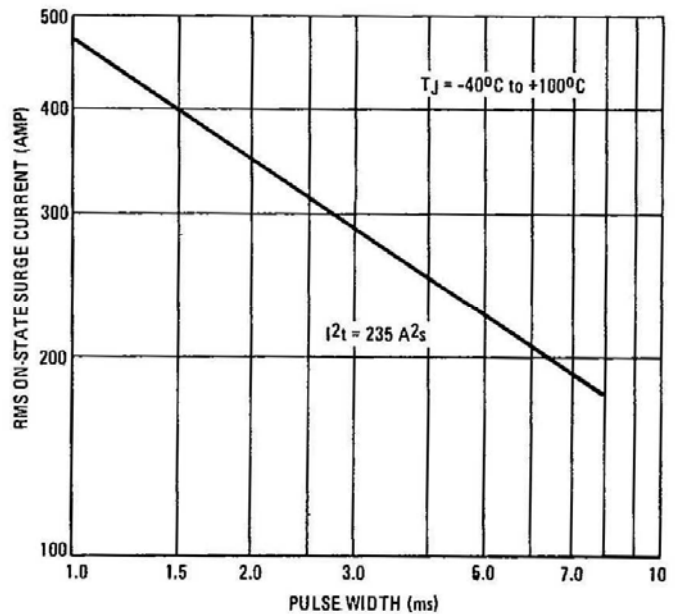


### MAXIMUM ALLOWABLE NON-REPETITIVE SURGE CURRENT

**FIGURE 3 – 60 Hz SURGES**



**FIGURE 4 – SUB-CYCLE SURGES**



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SILICON CONTROLLED RECTIFIER

FIGURE 5 – GATE TRIGGER CHARACTERISTICS

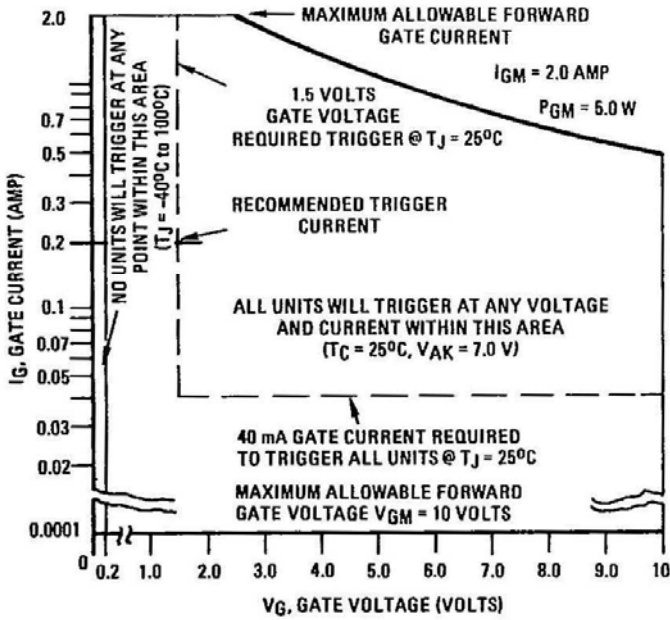
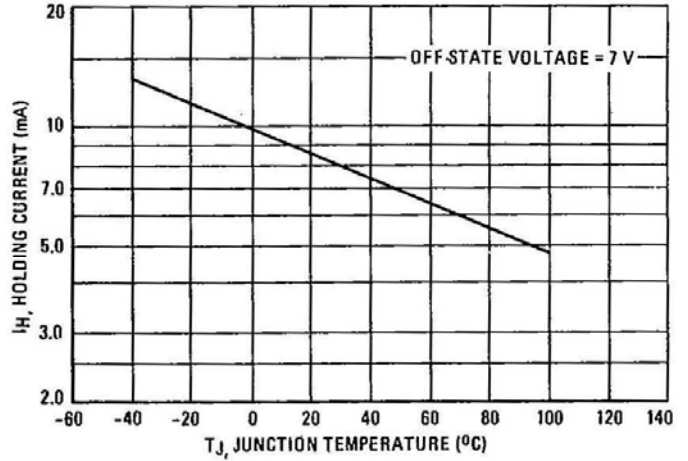


FIGURE 6 – EFFECT OF TEMPERATURE ON TYPICAL HOLDING CURRENT



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

FIGURE 7 – AVERAGE CURRENT DERATING

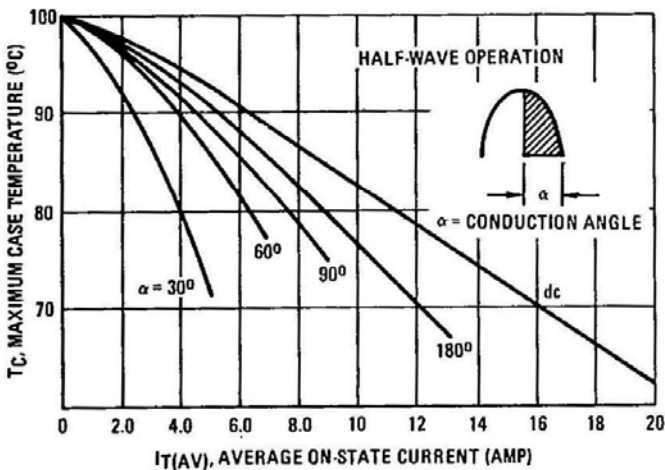
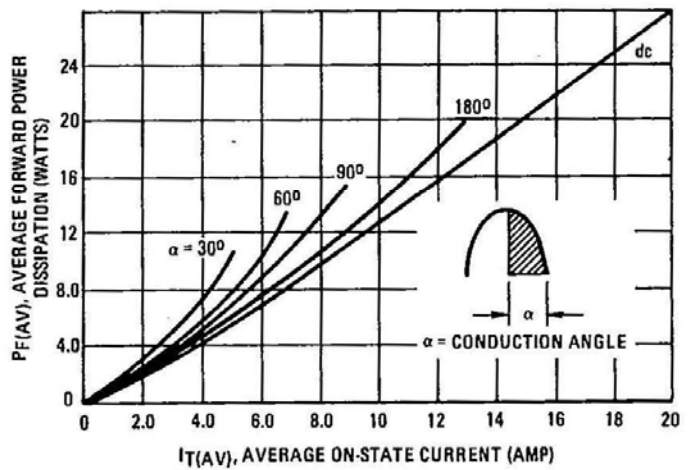


FIGURE 8 – ON-STATE POWER DISSIPATION



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FIGURE 9 – ON-STATE CHARACTERISTICS

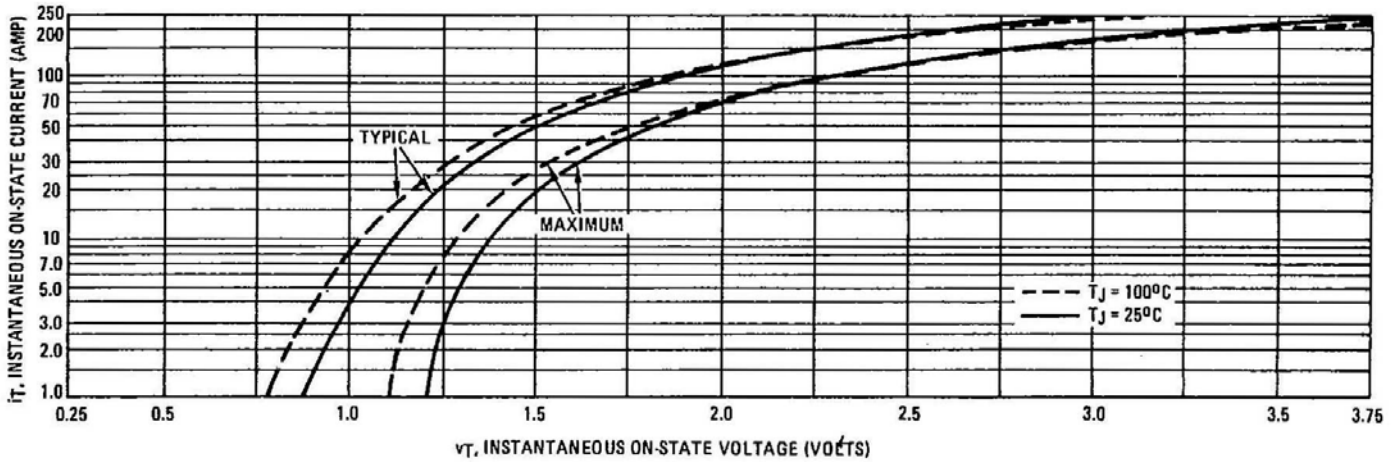


FIGURE 10 – TYPICAL THERMAL RESISTANCE OF PLATES

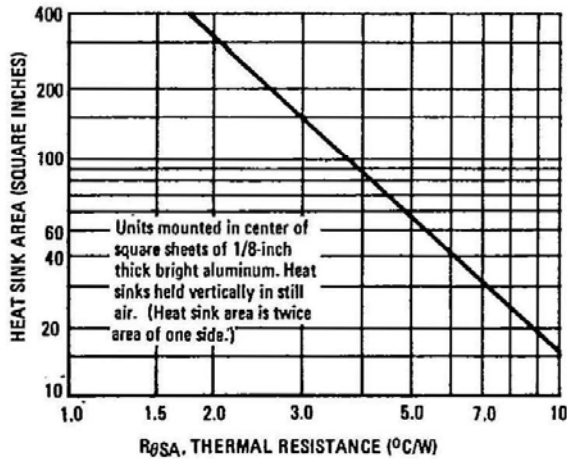


FIGURE 11 – MOUNTING DETAILS FOR PRESSFIT THYRISTORS

