

14859

The C38 Silicon Controlled Rectifier is a three junction semiconductor device for use in power switching and control applications requiring a blocking voltage of 500 volts or less and RMS Forward Currents up to 35 amperes. Because of its higher Junction Temperature Rating than the C35 (2N681-92) series, it will prove useful in applications calling for higher ambient temperatures or smaller heat sinks than the C35 series permits.

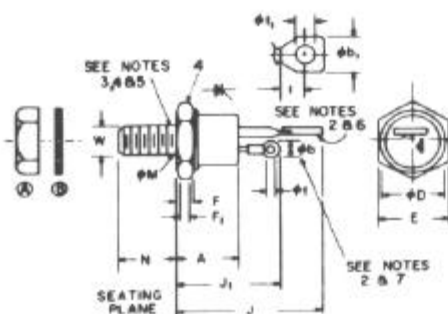
- No Peak Forward Voltage Limitation
- Thermal Fatigue Free
- High Junction Temperature (150°C)
- Standard TO-48 Outline
- Long Creepage Path
- Low Thermal Resistance

OUTLINE DRAWING
(COMPLIES WITH JEDEC TO-48)

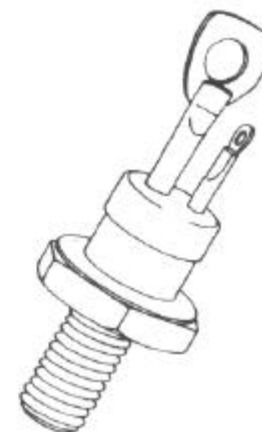
NOTES:

1. Complete threads to extend to within 2 1/2 threads of seating plane. Diameter of unthreaded portion .249" (6.32MM) Maximum. .220" (5.59MM) Minimum.
2. Angular orientation of these terminals is undefined.
3. 1/8-28 UNF-2A. Maximum pitch diameter of plated threads shall be basic pitch diameter .3268" (5.76MM), minimum pitch diameter .2225" (5.65MM), reference screw thread standards for Federal Service 1937, Handbook H28, 1937, P1.
4. A chamfer (or undercut) on one or both ends of hexagonal portion is optional.
5. Case is anode connection.
6. Large terminal is cathode connection.
7. Small terminal is gate connection.
8. Isolating kit available upon request.
9. 1/8-28 steel stud, Ni plated, .178 min. dia.
10. Ext. tooth lockwasher, steel, Ni plated, .023 min. dia.

(COMPLIES WITH JEDEC TO-48)



SYMBOL	INCHES MIN.	INCHES MAX.	MILLIMETERS MIN.	MILLIMETERS MAX.	NOTES
A	.330	.505	8.38	12.83	
Ø	.115	.140	2.92	3.56	2
Ø ₁	.210	.300	5.33	7.62	2
Ø ₂	.544	.562	13.82	14.27	
F	.113	.200	2.87	5.08	4
F ₁	.080		1.52		
J	1.193		30.30		
J ₁		.875		22.23	
L	.120		3.05		
NH					1
N	.422	.453	10.72	11.51	
P	.060	.075	1.52	1.91	
P ₁	.125	.165	3.18	4.19	
W					3



Type	Minimum Forward Breakover Voltage (V_{BO})* $T_J = -65^{\circ}\text{C to } +150^{\circ}\text{C}$	Repetitive Peak Reverse Voltage (PRV)* $T_J = -65^{\circ}\text{C to } +150^{\circ}\text{C}$	Transient Peak Reverse Voltage (Non-recurrent < 5.0 Millisec.)* $T_J = -65^{\circ}\text{C to } +150^{\circ}\text{C}$
C38U	25 volts	25 volts	35 volts
C38F	50 volts	50 volts	75 volts
C38A	100 volts	100 volts	150 volts
C38G	150 volts	150 volts	225 volts
C38B	200 volts	200 volts	300 volts
C38H	250 volts	250 volts	350 volts
C38C	300 volts	300 volts	400 volts
C38D	400 volts	400 volts	500 volts
C38E	500 volts	500 volts	600 volts

*Values apply for zero or negative gate voltage only. Maximum case to ambient thermal resistance for which maximum PRV ratings apply — equals 11°C/watt .

MAXIMUM ALLOWABLE RATINGS

RMS Forward Current _____ 35 amperes (all conduction angles)

Average Forward Current (I_O) _____ Depends on conduction angle (see charts 3 & 5)

Peak One-cycle Non-recurrent Surge Current (i_{surge}) _____ 150 amperes

Peak Non-recurrent Surge Current during Turn-on time Interval _____ See Chart 10

I^2t (for fusing) _____ 75 ampere² seconds (for times ≥ 1.5 milliseconds)

Peak Gate Power (p_G) _____ 12 watts

Average Gate Power (P_G) _____ 0.5 watt

Peak Gate Current (i_G) _____ 2.0 amperes

Peak Gate Voltage (v_G) (Forward and Reverse) _____ 10 volts

Storage Temperature _____ $-65^{\circ}\text{C to } +150^{\circ}\text{C}$

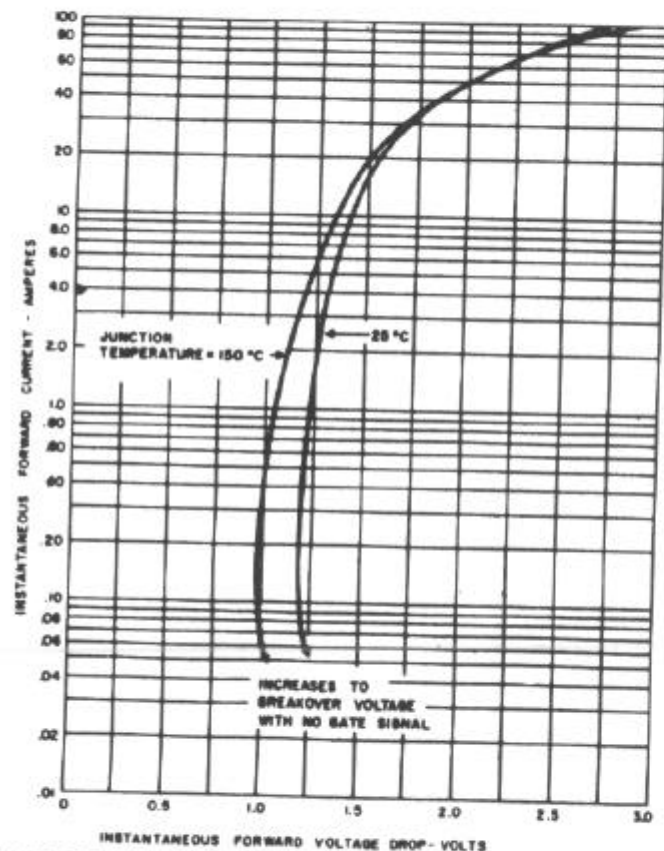
Operating Temperature _____ $-65^{\circ}\text{C to } +150^{\circ}\text{C}$

Stud Torque _____ 30 inch-pounds

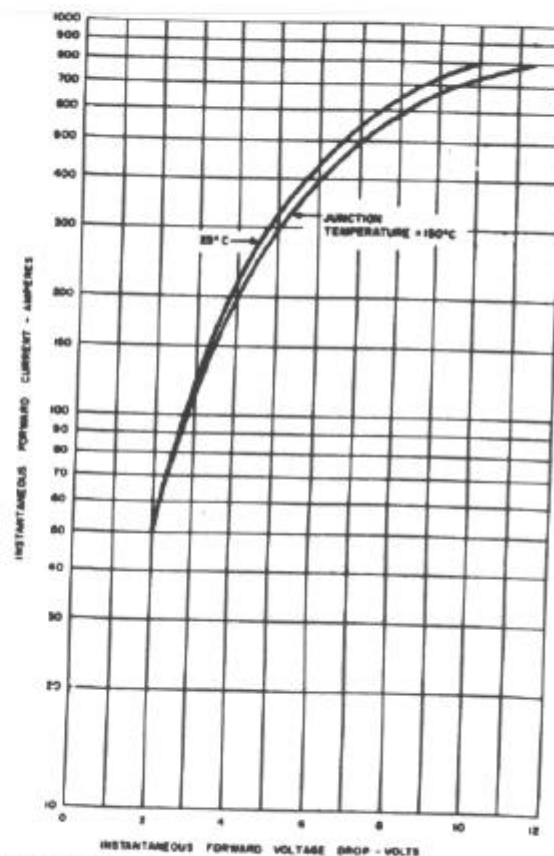
**NOT TO EXCEED GATE POWER RATINGS

Thermal Resistance		θ_{J-C}	—	.75	1.5	°C/watt	Junction to case
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*Values apply for zero or negative gate voltage. Max. case to ambient thermal resistance for which max. PRV ratings apply = 11°C per watt.
 **See Chart 8.



**1. MAXIMUM FORWARD CHARACTERISTICS
CONDUCTING STATE**



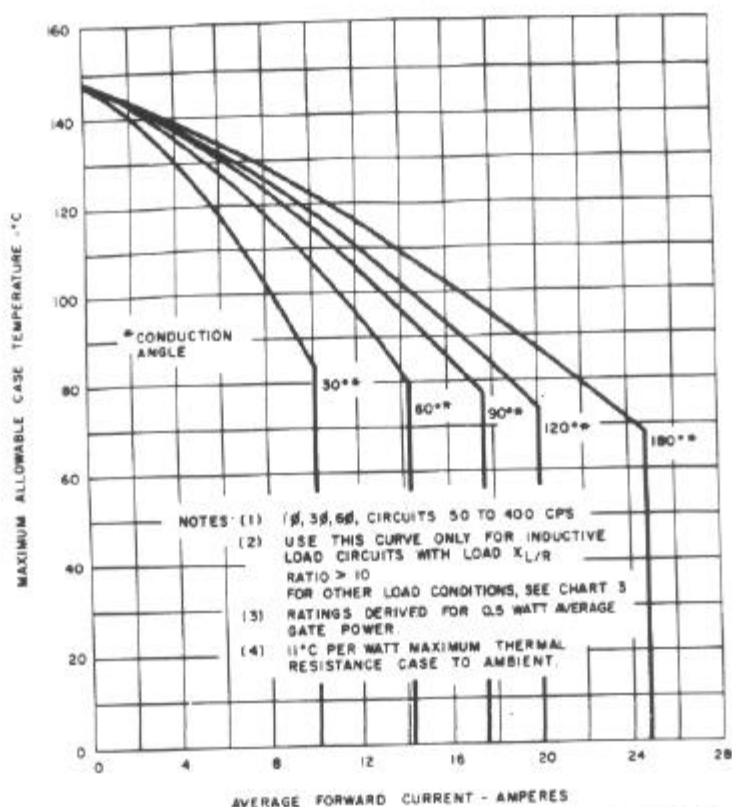
**2. MAXIMUM FORWARD CHARACTERISTICS
HIGH CURRENT LEVEL—CONDUCTING STATE**

CHARACTERISTICS

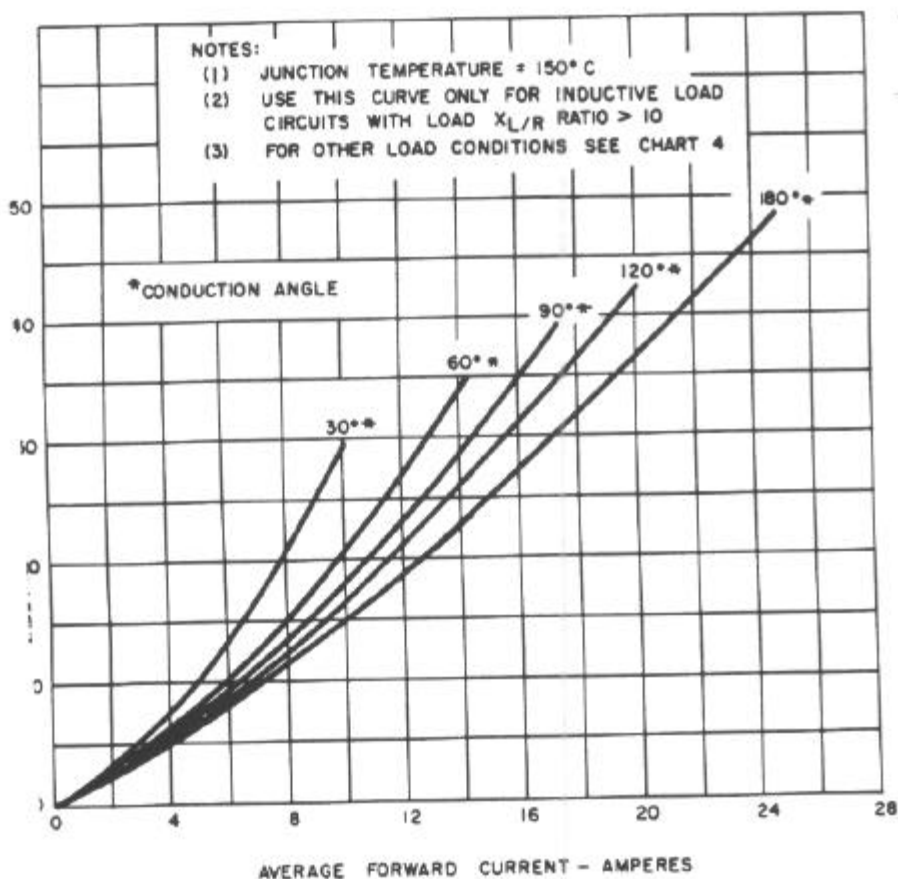
C38

Test	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Peak Reverse and Forward Blocking Current*	i_R and i_S					$T_J = 25^\circ\text{C}$ $V_{AC} = V_{CA} = 25\text{V peak}$
C38U	—	6.0	10.0	ma	50	
C38F	—	5.5	10.0	ma	100	
C38A	—	5.0	10.0	ma	150	
C38G	—	4.5	10.0	ma	200	
C38B	—	4.0	8.0	ma	250	
C38H	—	3.0	6.0	ma	300	
C38C	—	2.5	5.0	ma	400	
C38D	—	2.0	4.0	ma	500	
C38E	—	1.5	3.0	ma		
Peak Reverse and Forward Blocking Current*	i_R and i_S					$T_J = 150^\circ\text{C}$ $V_{AC} = V_{CA} = 25\text{V peak}$
C38U	—	9.0	13.0	ma	50	
C38F	—	8.9	13.0	ma	100	
C38A	—	7.8	13.0	ma	150	
C38G	—	7.7	13.0	ma	200	
C38B	—	7.5	12.0	ma	250	
C38H	—	7.3	11.0	ma	300	
C38C	—	6.8	10.0	ma	400	
C38D	—	5.3	8.0	ma	500	
C38E	—	2.6	6.0	ma		
Rate of Rise of Forward Voltage that Will Not Turn on SCR**	dv/dt	20.0	40.0	—	volts/ μsec	$T_J = 150^\circ\text{C}$. Gate open circuited. $V_{AC} = \text{Rated}$.
Gate Current to Fire	I_{GF}	—	15	40	mA dc	$T_J = 25^\circ\text{C}$, $V_{AC} = 6\text{ Vdc}$, $R_L = 50\text{ ohms}$
	—	35	80	mA dc	$T_J = -65^\circ\text{C}$, $V_{AC} = 6\text{ Vdc}$, $R_L = 50\text{ ohms}$	
	—	7.5	20	mA dc	$T_J = 150^\circ\text{C}$, $V_{AC} = 6\text{ Vdc}$, $R_L = 50\text{ ohms}$	
Gate Voltage to Fire	V_{GF}	—	1.2	3.0	Vdc	$V_{AC} = 6\text{ Vdc}$, $T_J = 25^\circ\text{C}$, $R_L = 50\text{ ohms}$
	—	2.0	3.0	Vdc	$V_{AC} = 6\text{ Vdc}$, $T_J = -65^\circ\text{C}$, $R_L = 50\text{ ohms}$	
	0.15	—	—	Vdc	$V_{AC} = \text{Rated}$, $T_J = 150^\circ\text{C}$, $R_L = 1000\text{ ohms}$	
Forward Voltage Drop	V_F	—	1.7	2.0	V	$I_F = 50\text{A peak}$, $T_J = 25^\circ\text{C}$
Holding Current	I_H	—	10	80	mA dc	$T_J = 25^\circ\text{C}$, Anode Supply = 6 Vdc
Turn-on Time	$t_d + t_r$	—	1.4	—	μsec	$T_J = 25^\circ\text{C}$, $I_F = 5.0\text{ A dc}$, $V_{AC} = \text{Rated}$. Gate supply: 10 volt open circuit, 25 ohm, 0.1 μsec . max. rise time.
Turn-off Time	t_{off}	—	24	—	μsec	$T_J = 150^\circ\text{C}$, $i_F = 10\text{A}$, $i_R = 5\text{A}$, V_{AC} (reapplied) = Rated, $dv/dt = 20\text{V}/\mu\text{sec}$ Linear
Thermal Resistance	θ_{J-C}	—	.75	1.5	$^\circ\text{C}/\text{watt}$	Junction to case

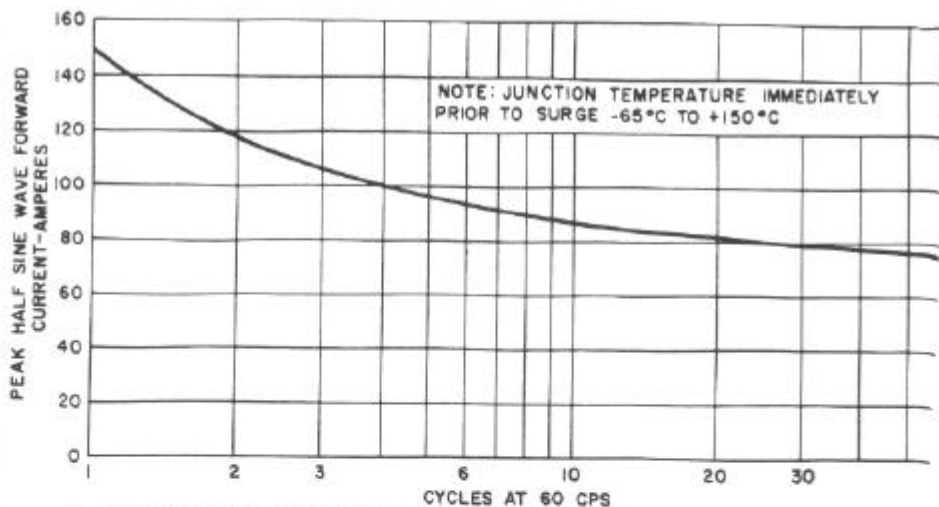
*Max. gate voltage. Max. case to ambient thermal resistance for which max. PRV ratings apply = 11°C per watt.



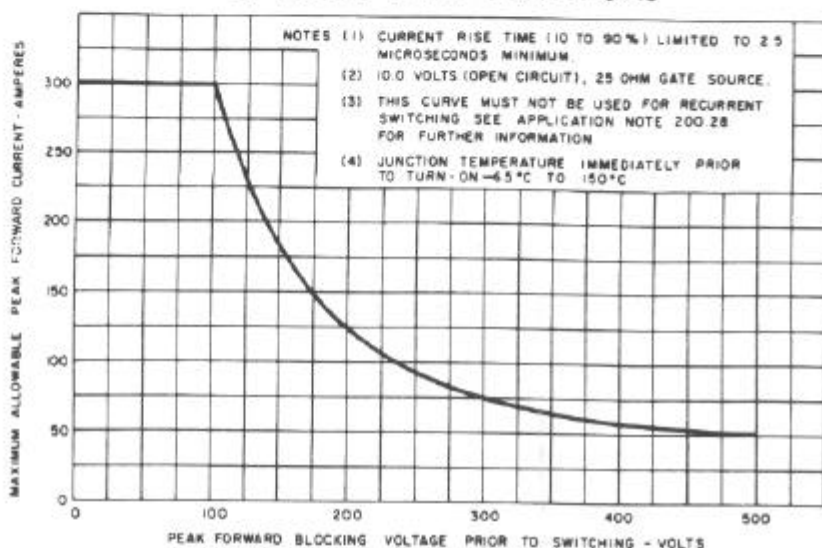
5. MAXIMUM ALLOWABLE CASE TEMPERATURE FOR RECTANGULAR CURRENT WAVEFORM



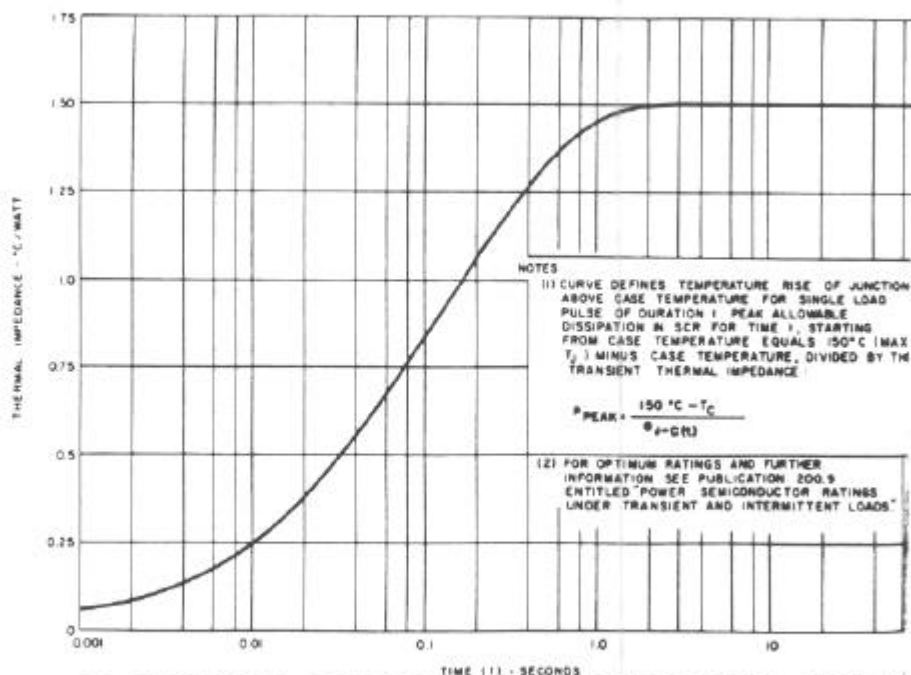
6. FORWARD POWER DISSIPATION FOR RECTANGULAR CURRENT WAVEFORM



9. MAXIMUM ALLOWABLE NON-RECURRENT SURGE CURRENT AT RATED LOAD CONDITIONS



10. PEAK NON-RECURRENT SURGE CURRENT DURING TURN-ON TIME INTERVAL



11. MAXIMUM TRANSIENT THERMAL IMPEDANCE JUNCTION TO CASE