



SOLID STATE INC.

46 FARRAND STREET
BLOOMFIELD, NEW JERSEY 07003

www.solidstateinc.com

2N3091 SERIES

110 Amp RMS SCRs

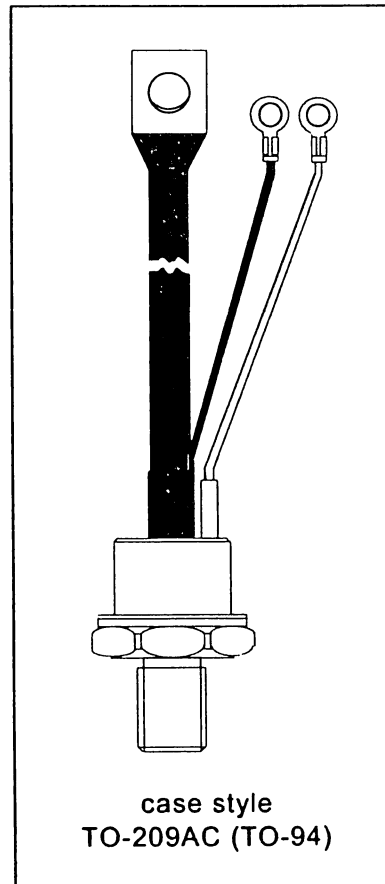
Major Ratings and Characteristics

	2N3091-98	Units
$I_T(\text{RMS})$	110	A
$I_T(\text{AV})$	70*	A
@ Max. T_C	62*	°C
I_{TSM}	@ 50 Hz	955
	@ 60 Hz	1000*
$I^2 t$	@ 50 Hz	4550
	@ 60 Hz	4150
I_{GT}	110	mA
dv/dt	20*	V/ μ s
di/dt	300	A/ μ s
T_J	-40 to 125	°C
V_{RRM} , V_{DRM} range	600 to 1300	V

*JEDEC registered values.

Description/Features

- Bulk Avalanche
- Forward and reverse ratings from 600 – 1300 volts.



2N3091 Series

VOLTAGE RATINGS (Applied gate voltage zero or negative)

Part Number ①	$V_{RRM} - V_{DRM}$ Max. Repetitive Peak Reverse and Off-State Voltage (V) ②	$V_{(BR)R}$ Min. Reverse Avalanche Voltage
	$T_J = -40^{\circ}\text{C to } 125^{\circ}\text{C}$	$T_J = 25^{\circ}\text{C}$
2N3091	600*	700*
2N3092	700*	800*
2N3093	800*	900*
2N3094	900*	1000*
2N3095	1000*	1100*
2N3096	1100*	1200*
2N3097	1200*	1300*
2N3098	1300*	1400*

ELECTRICAL SPECIFICATIONS

	2N3091-98	Units	Conditions
ON-STATE			
$I_{T(RMS)}$ Max. RMS on-state current	110	A	
$I_{T(AV)}$ Max. average on-state current @ Max. $T_C =$	70*	A	180° half sine wave conduction
	62*	°C	
I_{TSM} Max. peak one cycle, non-repetitive surge current	955	A	50 Hz half cycle sine wave or 6 ms rectangular pulse
	1000*		60 Hz half cycle sine wave or 5 ms rectangular pulse
	1150	A	50 Hz half cycle sine wave or 6 ms rectangular pulse
			60 Hz half cycle sine wave or 5 ms rectangular pulse
Following any rated load condition, and with rated V_{RRM} applied following surge. SCR turned fully on.			
Same conditions as above except with V_{RRM} applied following surge = 0.			
I^2t Max. I^2t capability, for fusing	4550	A^2s	t = 10 ms Rated V_{RRM} applied following surge, initial $T_J = 125^{\circ}\text{C}$
	4150		t = 8.3 ms
I^2t Max. I^2t capability, for individual device fusing	6450	A^2s	t = 10 ms $V_{RRM} = 0$ following surge, initial $T_J = 125^{\circ}\text{C}$
	5900		t = 8.3 ms
$I^2\sqrt{t}$ Max. $I^2\sqrt{t}$ capability, for individual device fusing ③	64 500	$A^2\sqrt{s}$	V_{RRM} following surge = 0. Initial $T_J \leq 125^{\circ}\text{C}$ t = 0.1 to 10ms.
V_{TM} Max. peak on-state voltage	1.85*	V	$T_J = 25^{\circ}\text{C}$, $I_{T(AV)} = 70\text{A}$ (220A peak)
I_H Max. holding current	500	mA	$T_C = 25^{\circ}\text{C}$, anode supply = 22V, initial $I_T = 3\text{A}$.
BLOCKING			
dv/dt Min. critical rate of rise of off-state voltage	20*	V/μs	$T_J = 125^{\circ}\text{C}$. Exponential to 100% rated V_{DRM} ; gate open circuited
I_{RM} & I_{DM} Max. peak reverse and off-state current 300V – 600V	5*	mA	Max. rated T_J , rated V_{RRM} , gate open circuited.

① Meets MIL-S-19500/280A when ordered as JAN2N - - -

② Units may be broken over without damage if di/dt does not exceed 20 A/μs.

③ I^2t for time $t_x = I^2\sqrt{t} \sqrt{t_x}$.

* JEDEC registered values.

ELECTRICAL SPECIFICATIONS (Continued)

		2N3901-98	Units	Conditions
SWITCHING				
t_d	Typical delay time	1		$T_C = 25^\circ\text{C}$, rated V_{DRM}
t_r	Typical rise time	1	μs	$I_{TM} = 50\text{A}$ resistive circuit, Gate pulse: 10V, 25 Ω , $t_p = 6\mu\text{s}$
t_q	Typical turn-off time	50	μs	$T_C = 125^\circ\text{C}$, $I_{TM} = 50\text{A}$, $di/dt = 5\text{A}/\mu\text{s}$, $V_R = 50\text{V}$, reapplied $dv/dt = 20\text{V}/\mu\text{s}$ linear to rated V_{DRM} , Gate bias: 0V, 100 Ω .
di/dt	Max. non-repetitive rate of rise of turned-on current = V_{RRM} = 500V to 600V	300	A/ μs	$T_C = 125^\circ\text{C}$, $V_{VDM} = \text{rated } V_{DRM}$. $I_{TM} = (2 \times di/dt)$ or $(2 \times \text{rated } I_{T(AV)})\text{A}$ (whichever is the greater), Gate pulse: 20V, 15 Ω , $t_p = 6\mu\text{s}$, $t_r = 0.1\mu\text{s}$. Per JEDEC standard RS397, 5.2.2.6.
	= 700V to 1000V	225		
	= 1100V to 1400V	150		
TRIGGERING				
P_{GM}	Max. peak gate power	5*	W	$t_p \leq 5\text{ ms max.}$
$P_{G(AV)}$	Max. average gate power	0.5*	W	
$+I_{GM}$	Max. peak positive gate current	2	A	
$+V_{GM}$	Max. peak positive gate voltage	20*	V	
$-V_{GM}$	Max. peak negative gate voltage	5*	V	
I_{GT}	Max. required DC gate current to trigger	200*	mA	$T_C = -40^\circ\text{C}$. Max. required gate trigger voltage is the lowest value which will trigger all units with +6V anode-to-cathode.
		110	mA	$T_C = 25^\circ\text{C}$
		50	mA	$T_C = 125^\circ\text{C}$
	Typical DC gate current to trigger	25	mA	$T_C = 25^\circ\text{C}$ +6V anode-to-cathode
V_{GT}	Max. required DC gate voltage to trigger	3*	V	$T_C = -40^\circ\text{C}$. Max. required gate trigger voltage is the lowest value which will trigger all units with +6V anode-to-cathode.
		2.5	V	$T_C = 25^\circ\text{C}$
	Typical DC gate voltage to trigger	1	V	$T_C = 25^\circ\text{C}$ +6V anode-to-cathode
V_{GD}	Max. DC gate voltage not to trigger	0.20*	V	$T_C = 125^\circ\text{C}$. Max. gate voltage not to trigger is the maximum value which will not trigger any unit with rated V_{DRM} anode-to-cathode.

THERMAL-MECHANICAL SPECIFICATIONS

		2N3901-98	Units	Conditions	
T_J	Operating junction temperature range	-40° to 125°	$^\circ\text{C}$		
T_{stg}	Storage temperature range	-40° to 125°	$^\circ\text{C}$		
R_{thJC}	Max. internal thermal resistance, junction to case	0.4*	K/W	DC operation	
R_{thCS}	Thermal resistance, case to sink	0.1	K/W	Mounting surface smooth, flat and greased.	
T	Mounting torque	Min.	14.5 (125)	N m (lbf-in)	Non-lubricated threads
		Max.	17.0 (150)		
	Max. torque on screw in flag terminal	1.4 (12)	N m (lbf-in)	Non-lubricated threads. TO-208AD: case only.	
wt	Approximate weight	100 (3.5)	g (oz)		
Case Style		TO-209AC (TO-94) (IR case Style A-11)		JEDEC	

*JEDEC registered values.

2N3091 Series

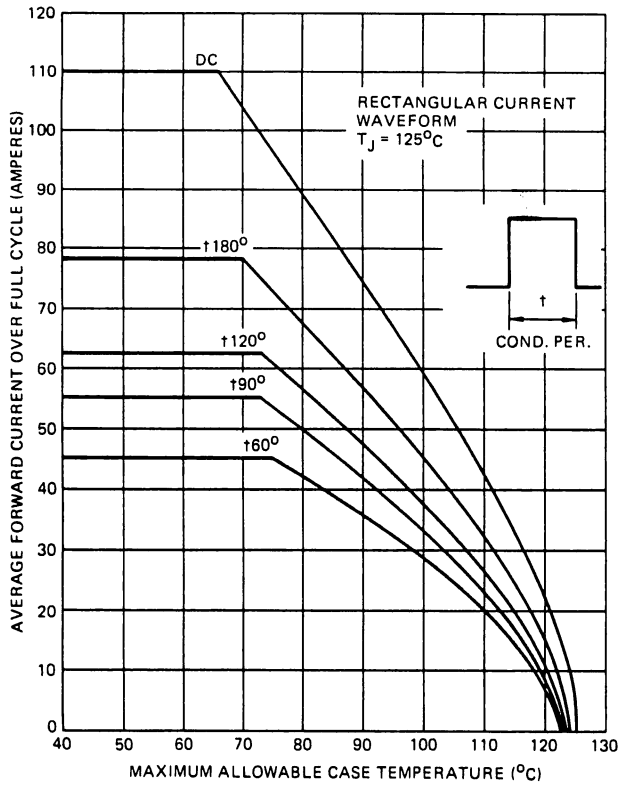


Fig. 1 – Average On-State Current Vs. Maximum Allowable Case Temperature (Sinusoidal Current Waveform, 50 to 400 Hz)

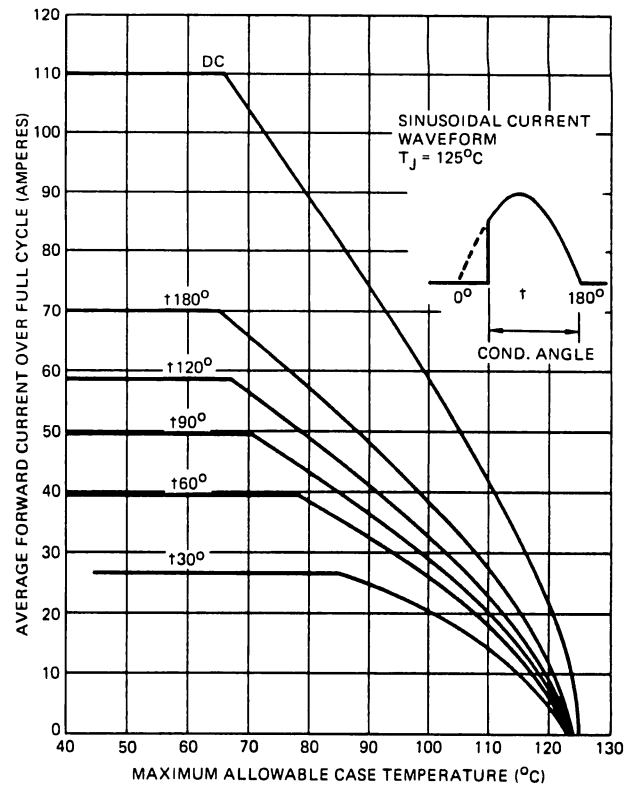


Fig. 2 – Average On-State Current Vs. Maximum Allowable Case Temperature (Rectangular Current Waveform, 50 to 400 Hz)

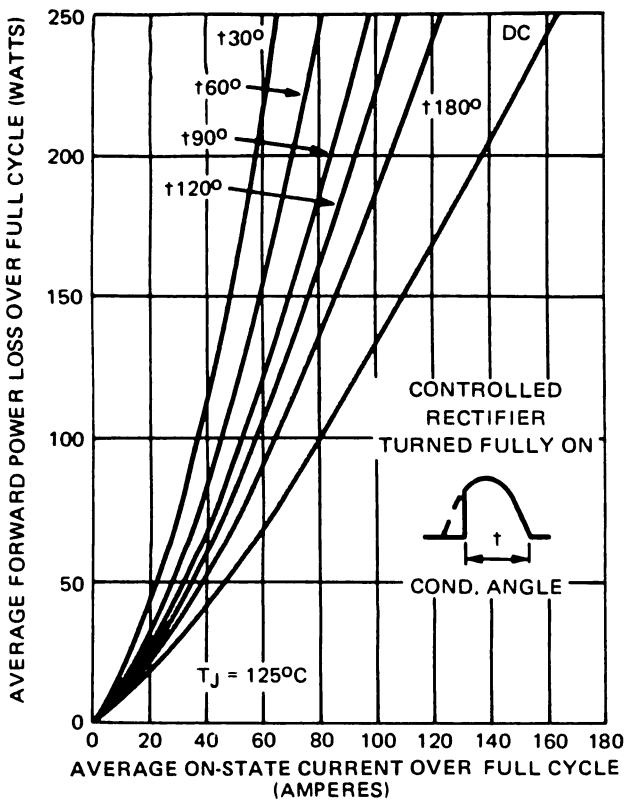


Fig. 3 – Maximum Low Level On-State Power Loss Vs. On-State Current (Sinusoidal Current Waveform)

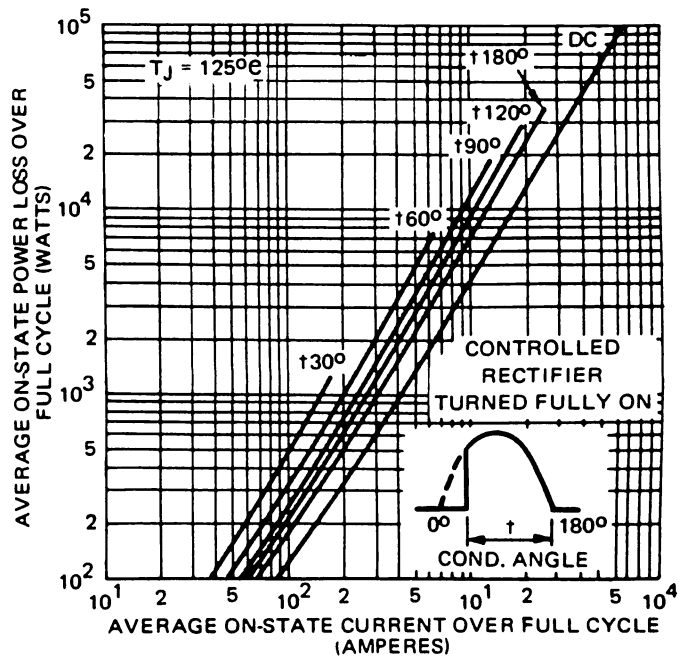


Fig. 4 – Maximum High Level On-State Power Loss Vs. On-State Current (Sinusoidal Current Waveform)

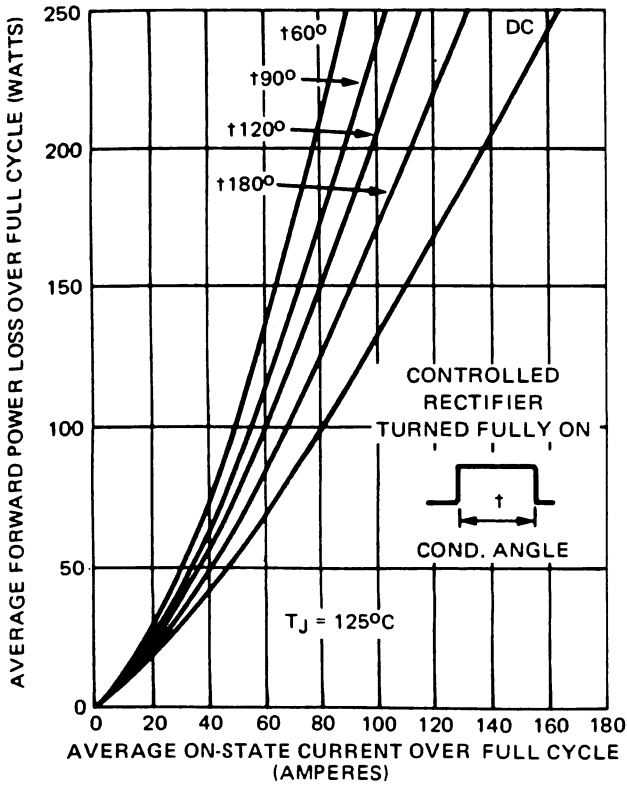


Fig. 5 – Maximum Low Level On-State Power Loss Vs. On-State Current (Rectangular Current Waveform)

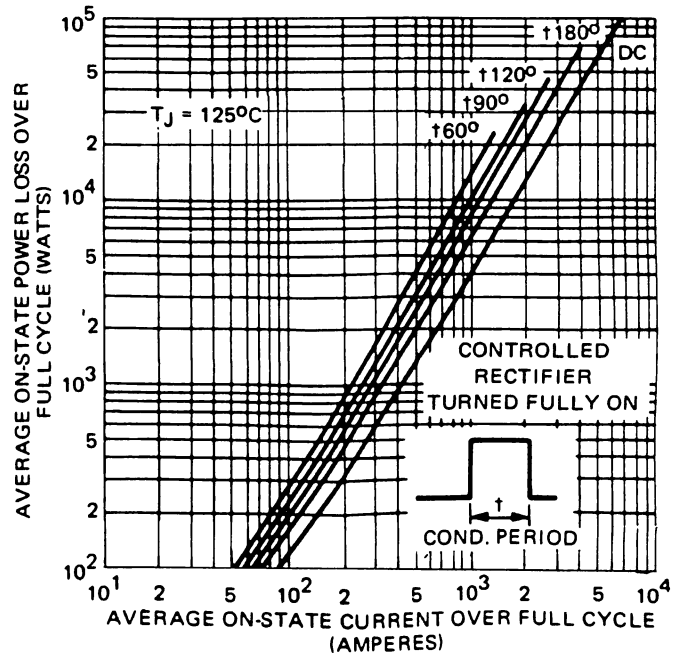


Fig. 6 – Maximum High Level On-State Power Loss Vs. On-State Current (Rectangular Current Waveform)

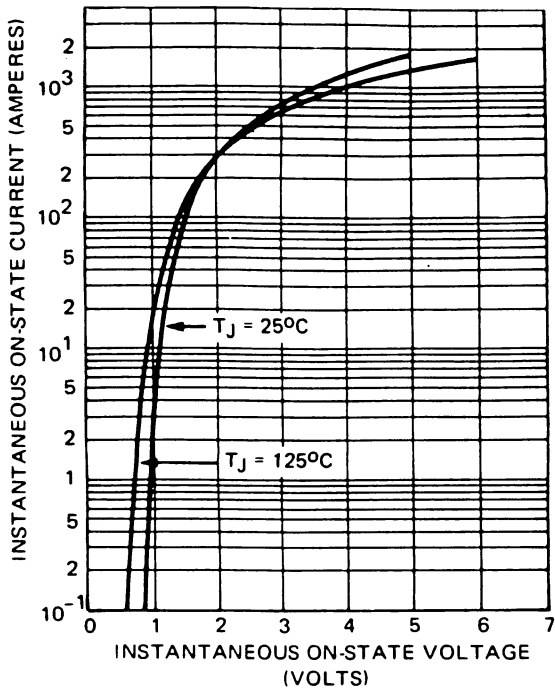


Fig. 7 – Maximum Instantaneous On-State Voltage Vs. Instantaneous On-State Current

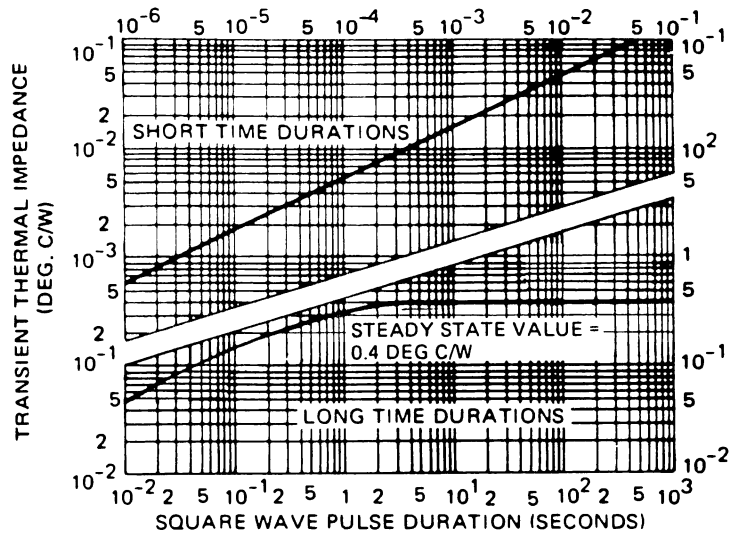


Fig. 8 – Maximum Transient Thermal Impedance, Junction to Case Vs. Pulse Duration

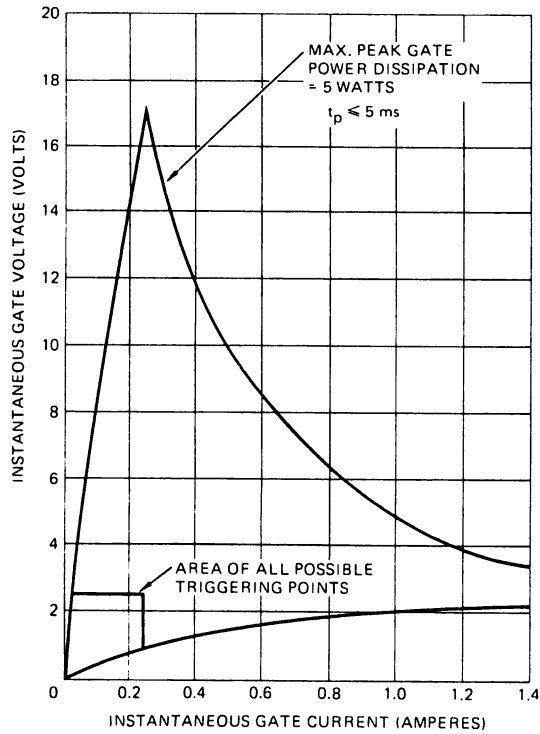


Fig. 9 – Gate Characteristics

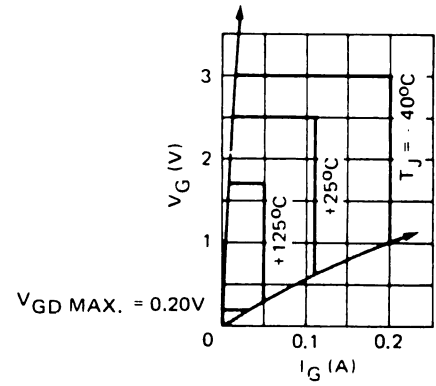


Fig. 9a – Area of All Possible Triggering Points

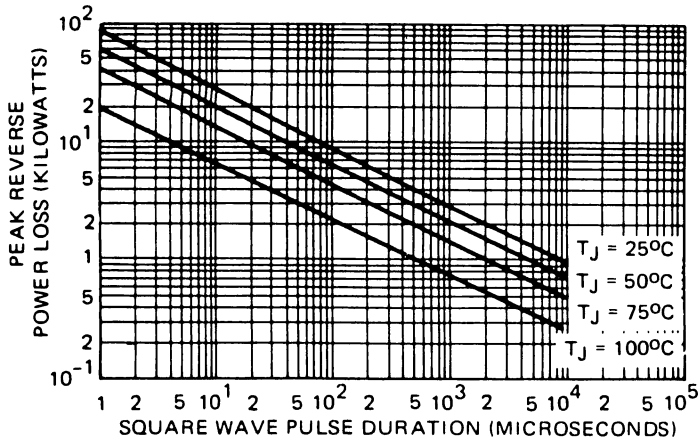


Fig. 10 – Maximum Allowable Reverse Power Dissipation Vs. Pulse Duration

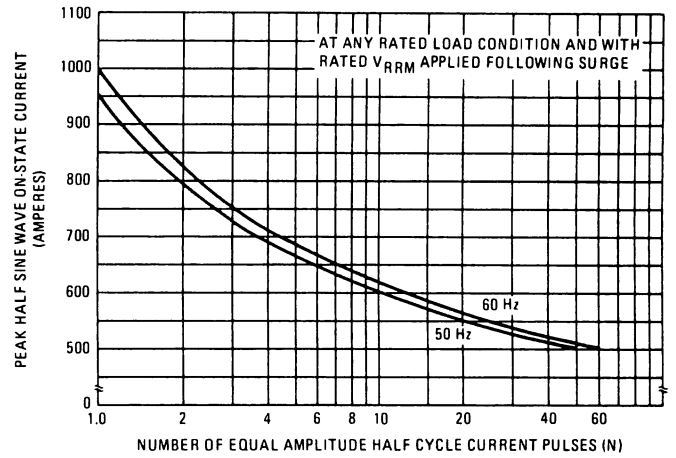
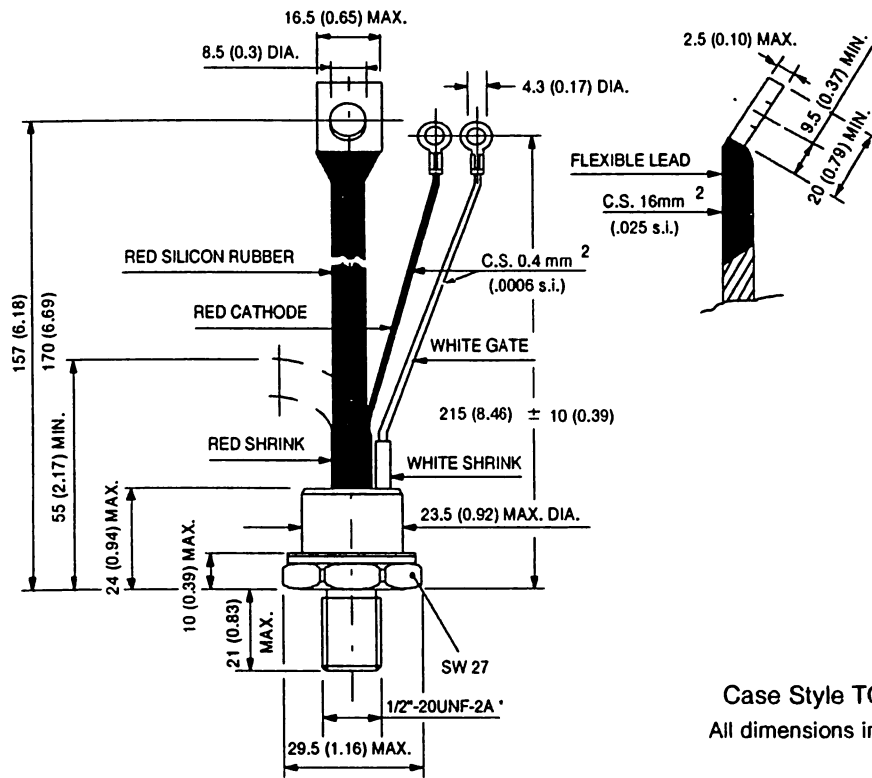


Fig. 11 – Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses

Outline Table

GLASS METAL SEAL



Case Style TO-209AC (TO-94)
All dimensions in millimeters (inches)