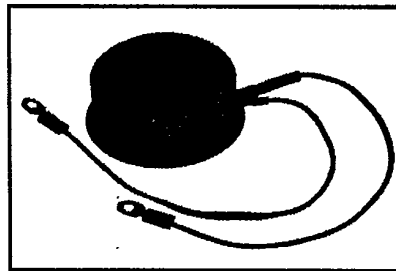
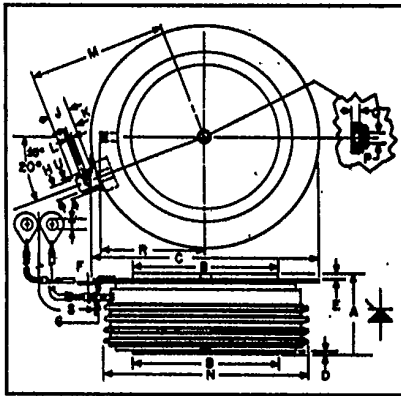




**C451**

Powerex, Inc. Hillis Street, Youngwood, Pennsylvania 15897 (412) 925-7272  
 Powerex Europe, S.A., 428 Ave. G. Durand, BP107, 72003 LeMans, France (43) 72.75.15

**Phase Control SCR**  
 1400-1500 Amperes Avg  
 500-1800 Volts



**C451**  
 Phase Control SCR  
 1400-1500 Amperes/500-1800 Volts

**C451**  
 Outline Drawing

Dimensions	Inches		Millimeters	
	Min.	Max.	Min.	Max.
A	1.020	1.065	25.90	27.05
B	1.845	1.855	46.86	47.12
C	—	2.940	—	74.68
D	.030	—	.76	—
E	.050	—	1.27	—
F	.017	.023	.43	.58
G	.057	.059	1.44	1.50
H	.186	.191	4.72	4.85
J	.245	.255	6.22	6.48
K	.115	.130	2.92	3.30
L	.064	.070	1.62	1.78
M	—	1.800	—	45.72
N	—	2.650	—	67.31
P	.135	.145	3.42	3.68
Q	.070	.100	1.77	2.54
R	—	1.355	—	34.42
S	12.219	12.343	310.36	313.51
T	.137	.153	3.47	3.89

**Description**

Powerex Silicon Controlled Rectifiers (SCR) are designed for phase control applications. These are all-diffused, Press-Pak (Pow-R-Disc) devices employing the field-proven amplifying (di/namic) gate.

**Features:**

- Low On-State Voltage
- High di/dt
- High dv/dt
- Hermetic Packaging
- Excellent Surge and I<sup>2</sup>t Ratings

**Applications:**

- Power Supplies
- Battery Chargers
- Motor Control
- Light Dimmers
- VAR Generators

**Ordering Information**

Example: Select the complete six or seven digit part number you desire from the table - i.e. C451M1 is a 600 Volt, 1500 Ampere Phase Control SCR.

Type	Voltage		Current			
	V <sub>onm</sub> V <sub>nom</sub>	Code	I <sub>r</sub> (avg)	Code		
C451	500	E	1500	1		
	600	M			1400	2
	700	S				
	800	N				
	900	T				
	1000	P				
	1100	PA				
	1200	PB				
	1300	PC				
	1400	PD				
	1500	PE				
	1600	PM				
1700	PS					
1800	PN					



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### C451

Phase Control SCR

1400-1500 Amperes Avg/500-1800 Volts

### Absolute Maximum Ratings

	Symbol	C451-1	C451-2	Units
RMS On-State Current	$I_{T(RMS)}$	2350	2200	Amperes
Average On-State Current	$I_{T(av)}$	1500	1400	Amperes
Peak One-Cycle Surge (Non Repetitive) On-State Current (60Hz)	$I_{TSM}$	23,000	21,000	Amperes
Peak One-Cycle Surge (Non-Repetitive) On-State Current (50Hz)	$I_{TSM}$	20,800	19,200	Amperes
Critical Rate-of-Rise of On-State Current (Non-Repetitive)	$di/dt$	400	400	Amperes/ $\mu$ s
Critical Rate-of-Rise of On-State Current (Repetitive)	$di/dt$	75	75	Amperes/ $\mu$ s
$I^2t$ (for Fusing), One Cycle at 60Hz	$I^2t$	2,200,000	1,830,000	$A^2$ sec
Peak Gate Power Dissipation	$P_{GM}$	200	200	Watts
Average Gate Power Dissipation	$P_{G(av)}$	5	5	Watts
Storage Temperature	$T_{STG}$	-40 to 150	-40 to 150	$^{\circ}$ C
Operating Temperature	$T_J$	-40 to 125	-40 to 125	$^{\circ}$ C
Mounting Force <sup>Ⓞ</sup>		5500 to 6000	5500 to 6000	lb.
Mounting Force <sup>Ⓞ</sup>		24.5 to 26.7	24.5 to 26.7	kN

### Electrical and Thermal Characteristics

Characteristics	Symbol	Test Conditions	C451-1	C451-2	Units
<b>Current—Conducting State Maximums</b>					
Peak On-State Voltage	$V_{TM}$	$T_J = 25^{\circ}$ C; $I_{TM} = 3000A$ Peak, Duty Cycle $\leq 0.01\%$	1.70	1.90	Volts
C451					
<b>Voltage—Blocking State Maximums</b>					
Forward Leakage, Peak	$I_{DFM}$	$T_J = 125^{\circ}$ C, $V = V_{DFM}$	45		mA
Reverse Leakage, Peak	$I_{RRM}$	$T_J = 125^{\circ}$ C, $V = V_{RRM}$	45		mA
<b>Switching</b>					
Typical Turn-Off Time	$t_q$	$T_J = 125^{\circ}$ C, $I_T = 2000A$ , Pulse Width = 1000 $\mu$ sec; $V_R = 50V$ ; $dv/dt = 200 V/\mu$ sec; Linear to $.8 V_{DRM}$ ; $di_R/dt = 25A/\mu$ sec; $V_G = 0$ , $R_L = 100\Omega$	150		$\mu$ sec
Typical Delay Time	$t_d$	$T_J = 25^{\circ}$ C, $I_T = 50A$ , Gate Supply = 20V; $R_L = 20\Omega$ ; Rise Time = 0.1/ $\mu$ sec		.7	$\mu$ sec
Min. Critical $dv/dt$ exponential to $V_{DRM}$	$dv/dt$	$T_J = 125^{\circ}$ C, 0.8 $V_{DRM}$ Applied	400		V/ $\mu$ sec
<b>Thermal</b>					
Maximum Thermal Resistance, <sup>Ⓞ</sup> double sided cooling Junction to Case	$R_{\theta JC}$			.025	$^{\circ}$ C/Watt
Case to Sink, Lubricated	$R_{\theta CS}$			.0075	$^{\circ}$ C/Watt
<b>Gate—Maximum Parameters</b>					
Gate Current to Trigger	$I_{GT}$	$T_J = 25^{\circ}$ C, $V_D = 20Vdc$ , $R_L = 3\Omega$	200		mA
Gate Voltage to Trigger	$V_{GT}$	$T_J = -40$ to $125^{\circ}$ C, $V_D = 20Vdc$ , $R_L = 3\Omega$	5		Volts
Non-Triggering Gate Voltage	$V_{GDM}$	$V_D = \text{rated } V_{DRM}$ , $T_J = 125^{\circ}$ C, $R_L 1000\Omega$	.15		Volts
Peak Forward Gate Current	$I_{GTM}$		10		Amperes
Peak Reverse Gate Voltage	$V_{GRM}$		5		Volts

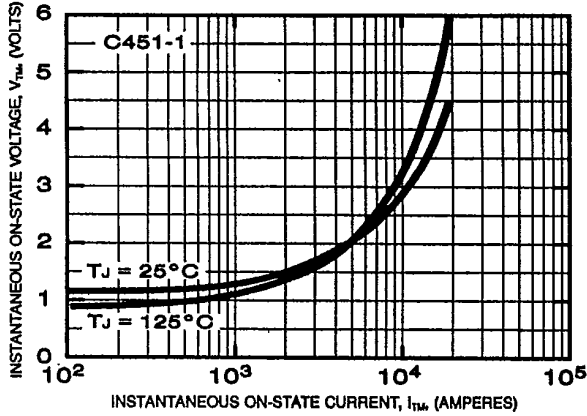
<sup>Ⓞ</sup> Consult recommended mounting procedures.



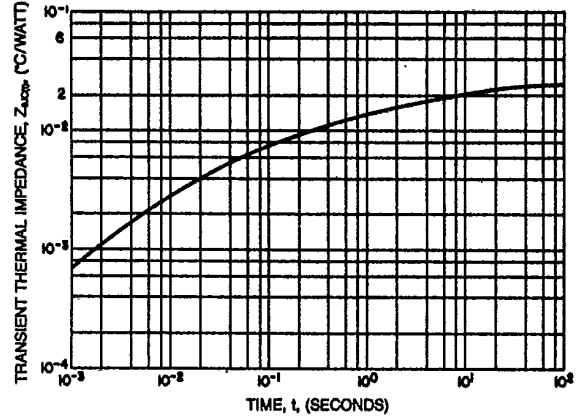
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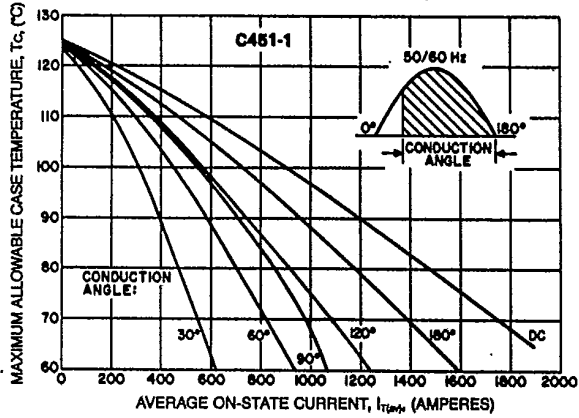
MAXIMUM ON-STATE CHARACTERISTICS



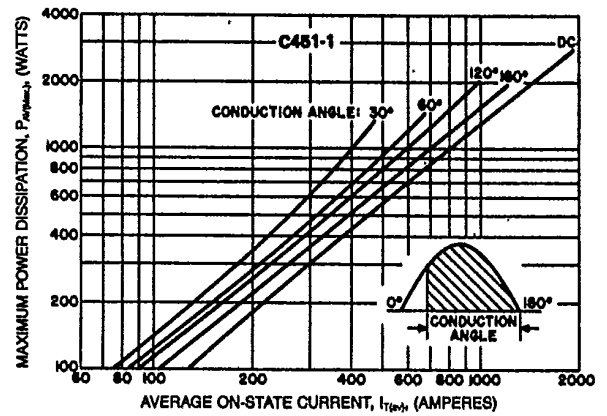
TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (JUNCTION TO CASE)



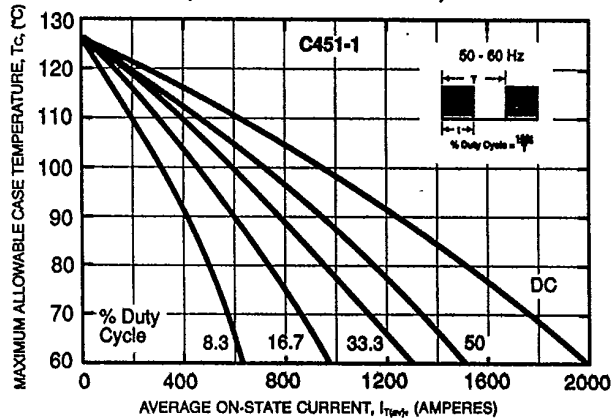
MAXIMUM ALLOWABLE CASE TEMPERATURE (SINUSOIDAL WAVEFORM)



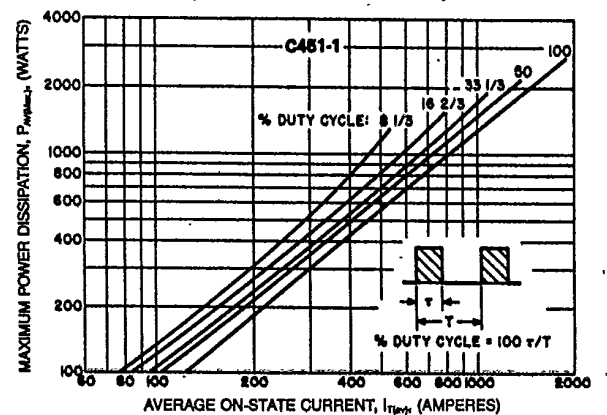
MAXIMUM ON-STATE POWER DISSIPATION (SINUSOIDAL WAVEFORM)



MAXIMUM ALLOWABLE CASE TEMPERATURE (RECTANGULAR WAVEFORM)



MAXIMUM ON-STATE POWER DISSIPATION (RECTANGULAR WAVEFORM)

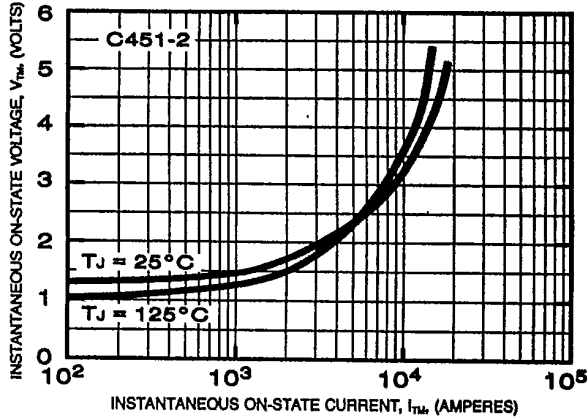




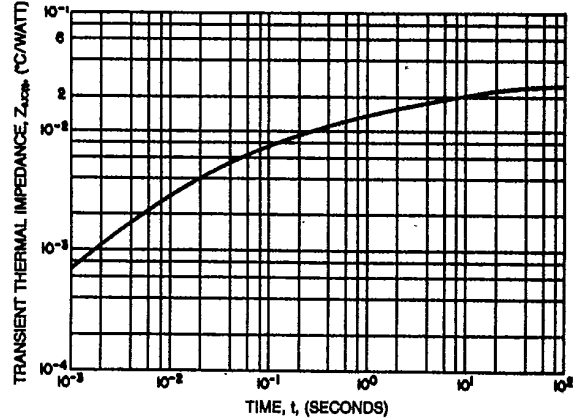
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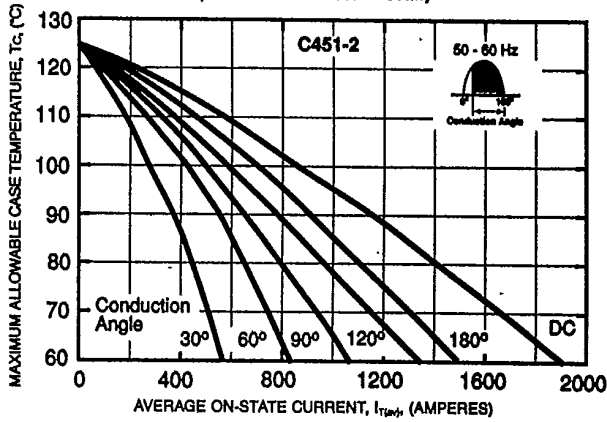
MAXIMUM ON-STATE CHARACTERISTICS



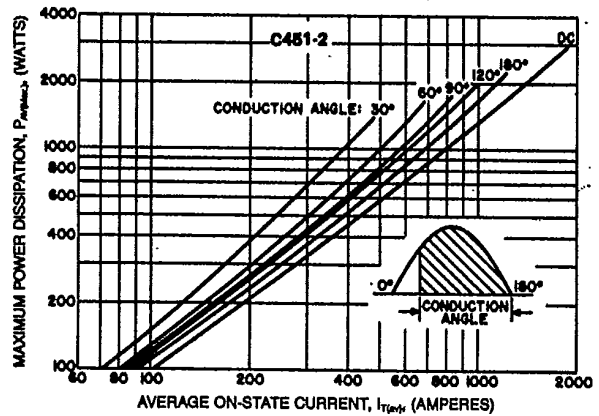
TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (JUNCTION TO CASE)



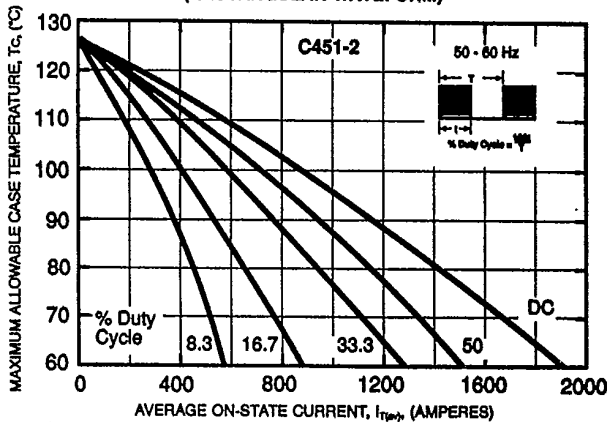
MAXIMUM ALLOWABLE CASE TEMPERATURE (SINUSOIDAL WAVEFORM)



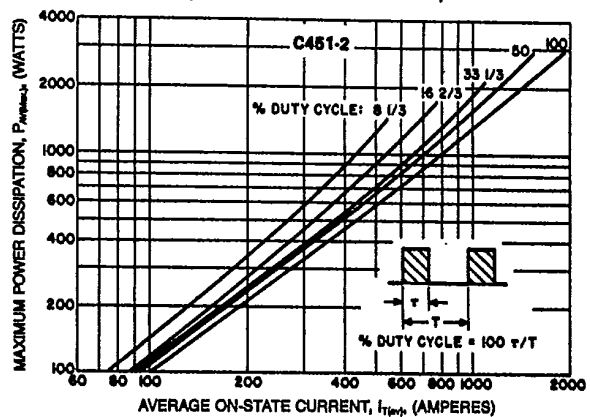
MAXIMUM ON-STATE POWER DISSIPATION (SINUSOIDAL WAVEFORM)



MAXIMUM ALLOWABLE CASE TEMPERATURE (RECTANGULAR WAVEFORM)



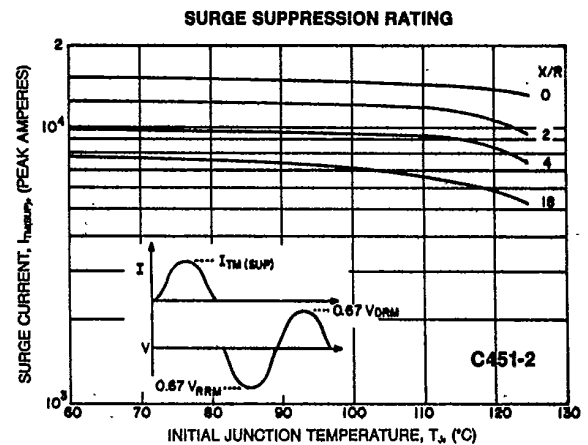
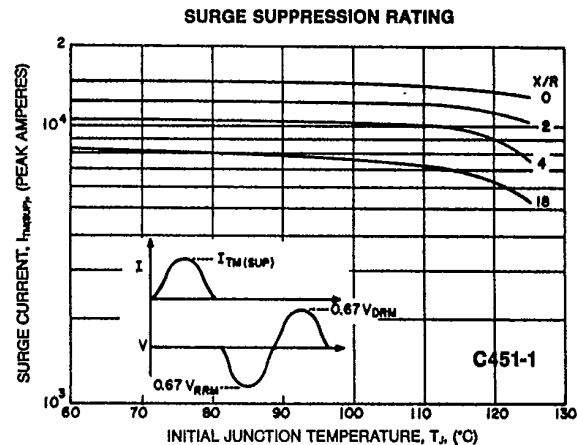
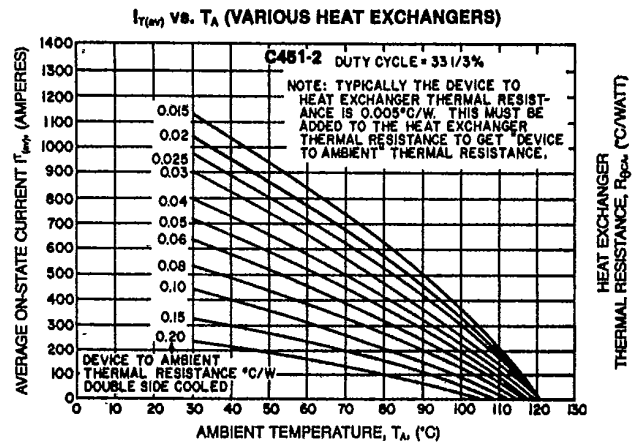
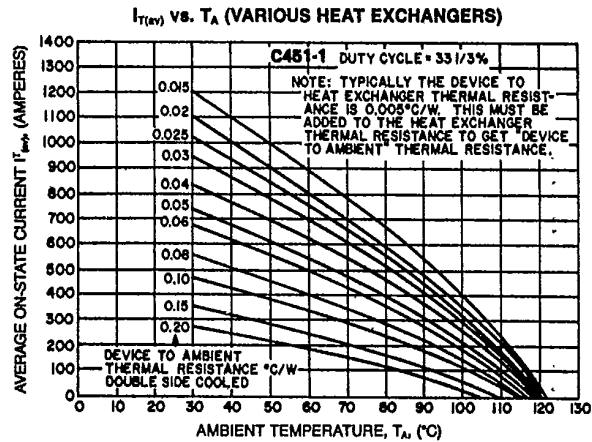
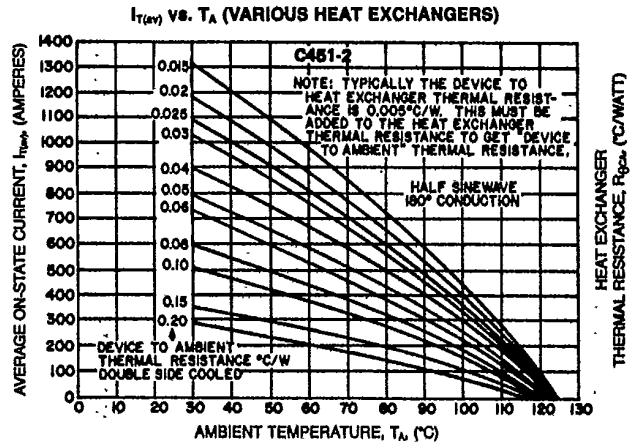
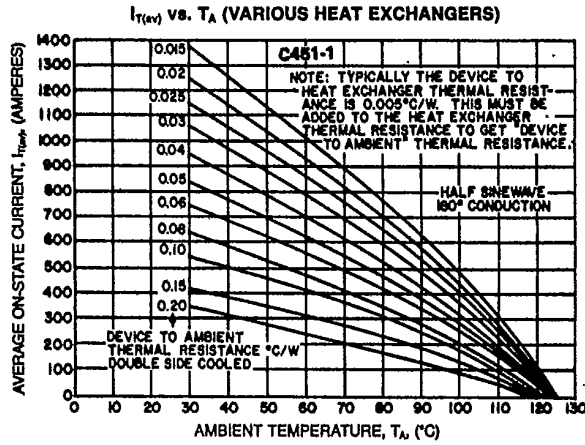
MAXIMUM ON-STATE POWER DISSIPATION (RECTANGULAR WAVEFORM)





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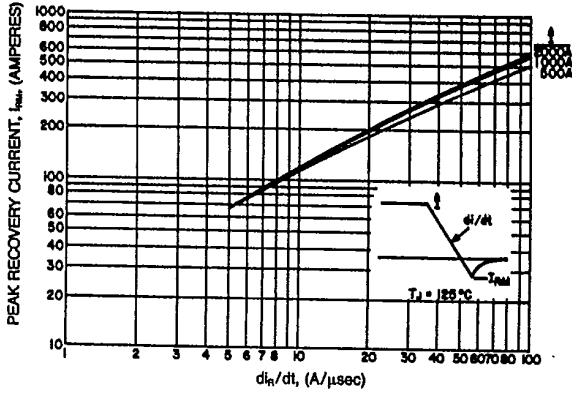
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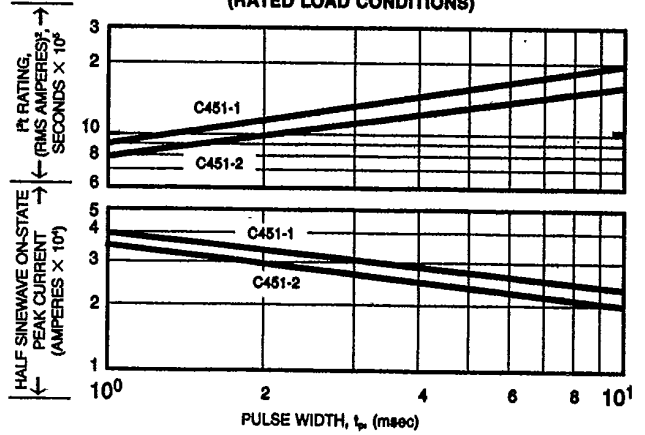
**Phase Control SCR**

1400-1500 Amperes Avg/500-1800 Volts

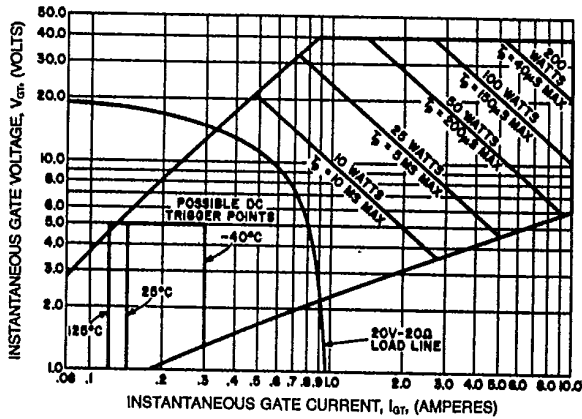
**TYPICAL RECOVERY CURRENT**



**SUB-CYCLE SURGE AND I<sub>T</sub> RATINGS (RATED LOAD CONDITIONS)**



**GATE CHARACTERISTICS**



**NOTES:**

1. Maximum allowable average gate dissipation = 5 watts.
2. The locus of possible dc trigger points lies outside the boundaries shown at various case temperatures.
3.  $t_p$  = rectangular gate current pulse width (5  $\mu$ s min. duration, 1  $\mu$ s max. rise time).
4. Maximum long-term, repetitive anode  $di/dt$  = 75 amps/ $\mu$ s with 20V-20 $\Omega$  gate source.



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