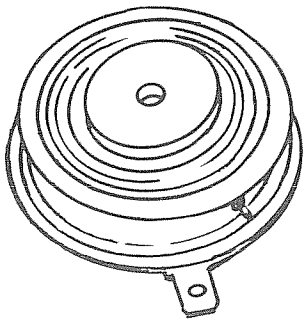
HIGH SPEED
Silicon Controlled Rectifier

C358

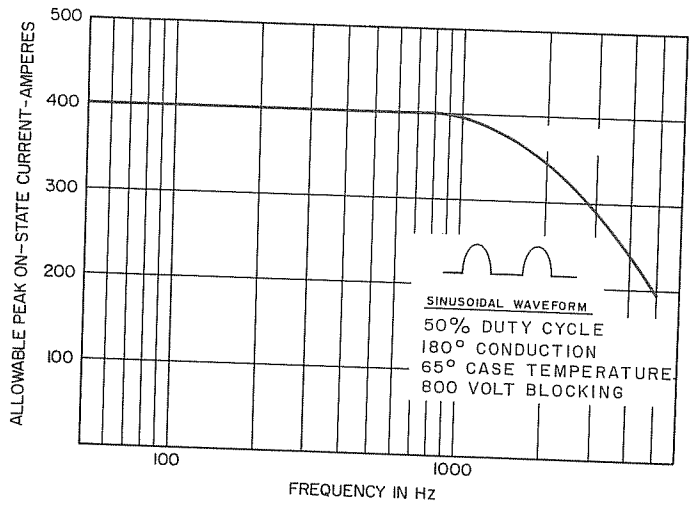
1200 Volts | 225A RMS | AMPLIFYING GATE

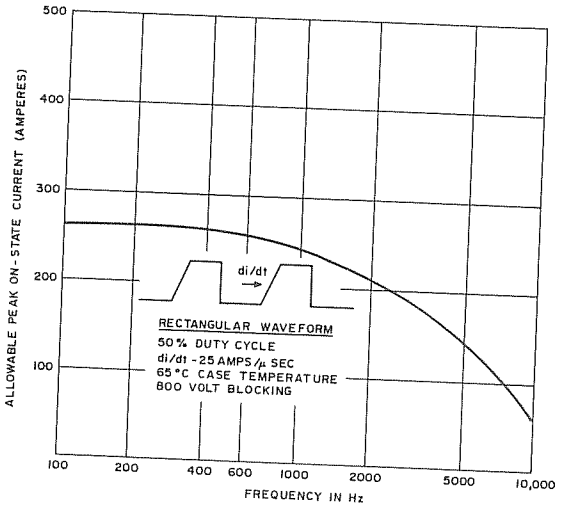
The General Electric C358 Silicon Controlled Rectifier is designed for power switching at high frequencies. This is an all-diffused Press-Pak device employing the field-proven amplifying gate.



FEATURES:

- Fully characterized for operation in inverted and chopper applications.
- High di/dt ratings.
- High dv/dt capability with selections available.
- Rugged hermetic glazed ceramic package.





MAXIMUM ALLOWABLE RATINGS

TYPES	REPETITIVE PEAK OFF-STATE VOLTAGE, V_{DRM}[1] T_J = -40°C to +125°C	REPETITIVE PEAK REVERSE VOLTAGE, V_{RRM}[1] T_J = -40°C to +125°C	NON-REPETITIVE PEAK REVERSE VOLTAGE, V_{RSM}[1] T_J = +125°C
C358E	500 Volts	500 Volts	600 Volts
C358M	600	600	720
C358S	700	700	840
C358N	800	800	960
C358T	900	900	1080
C358P	1000	1000	1200
C358PA	1100	1100	1300
C358PB	1200	1200	1400

[1] Half sinewave waveform 10 ms max. pulse width.

RMS On-State Current, $I_{T(RMS)}$ . . . . . 225 Amperes
Peak One Cycle Surge (Non-Repetitive) On-State Current, I_{TSM} (60 Hz) . . . . . 1600 Amperes
Peak One Cycle Surge (Non-Repetitive) On-State Current, I_{TSM} (50 Hz) . . . . . 1500 Amperes
I^2t (for fusing) for times ⩾ 1.5 milliseconds . . . . . 5,200 (RMS Ampere)^2 Seconds
I^2t (for fusing) for times ⩾ 8.3 milliseconds . . . . . 10,500 (RMS Ampere)^2 Seconds
Critical Rate-of-Rise of On-State Current, Non-Repetitive. . . . . 800 A/μs †
Critical Rate-of-Rise of On-State Current, Repetitive. . . . . 500 A/μs †
Average Gate Power Dissipation, $P_{G(AV)}$ . . . . . 2 Watts
Storage Temperature, T_{stg} . . . . . -40°C to +150°C
Operating Temperature, T_J . . . . . -40°C to +125°C
Mounting Force . . . . . 800 Lbs. ± 10%
3.56 KN ± 10%

†di/dt ratings established in accordance with EIA-NEMA Standard RS-397, Section 5.2.2.6 for conditions of max. rated V_{DRM}; 20 volts, 20 ohms gate trigger source with 0.5μs short circuit trigger current rise time.

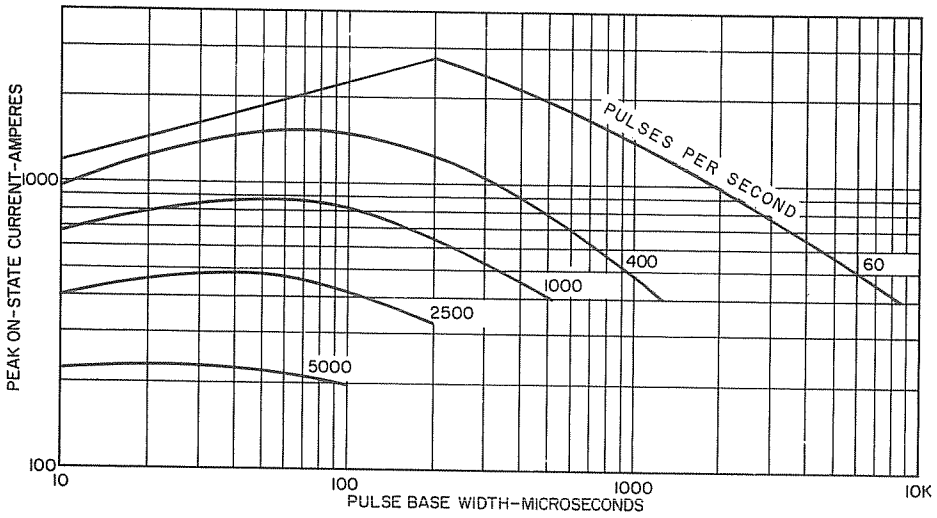
CHARACTERISTICS

TEST	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
Repetitive Peak Reverse and Off-State Current	I_{RRM} and I_{DRM}				mA	T_J = +25°C, V_{DRM} = V_{RRM} =
C358E		–	3	10		500 Volts
C358M		–	3	10		600
C358S		–	3	10		700
C358N		–	3	10		800
C358T		–	3	9		900
C358P		–	3	7		1000
C358PA		–	3	7		1100
C358PB		–	3	7		1200
Repetitive Peak Reverse and Off-State Current	I_{RRM} and I_{DRM}				mA	T_J = 125°C, V_{DRM} = V_{RRM} =
C358E		–	12	15		500 Volts
C358M		–	12	15		600
C358S		–	12	15		700
C358N		–	12	15		800
C358T		–	12	15		900
C358P		–	12	15		1000
C358PA		–	12	17		1100
C358PB		–	12	18		1200
Thermal Resistance	$R_{\theta JC}$	–	.12	.135	°C/Watt	Junction-to-Case – Double-Side Cooled
		–	.15	.26		Junction-to-Case – Single-Side Cooled
Critical Rate-of-Rise of Off-State Voltage (Higher values may cause device switching)	dv/dt	200	500	–	V/μsec	T_J = +125°C, Gate Open. V_{DRM} = Rated Linear or Exponential Rising Waveform. Exponential dv/dt = $\frac{V_{DRM}}{\tau}$ (.632)
Higher minimum dv/dt selections available – consult factory.						
Holding Current	I_H	–	100	500	mAdc	T_C = +25°C, Anode Supply = 24 Vdc. Initial On-State Current = 2 Amps.
DC Gate Trigger Current	I_{GT}	–	50	150	mAdc	T_C = +25°C, V_D = 6 Vdc, R_L = 3 Ohms
		–	75	300		T_C = -40°C, V_D = 6 Vdc, R_L = 3 Ohms
		–	15	125		T_C = +125°C, V_D = 6 Vdc, R_L = 3 Ohms
DC Gate Trigger Voltage	V_{GT}	–	3	5	Vdc	T_C = -40°C to 0°C, V_D = 6 Vdc, R_L = 3 Ohms
		–	1.25	3.0		T_C = 0°C to +125°C, V_D = 6 Vdc, R_L = 3 Ohms
		0.15	–	–		T_C = 125°C, V_{DRM}, R_L = 1000 Ohms
Peak On-State Voltage	V_{TM}	–	2.8	3.5	Volts	T_C = +25°C, I_{TM} = 500 Amps. Peak. Duty Cycle ⩽ .01%.

CHARACTERISTICS (continued)

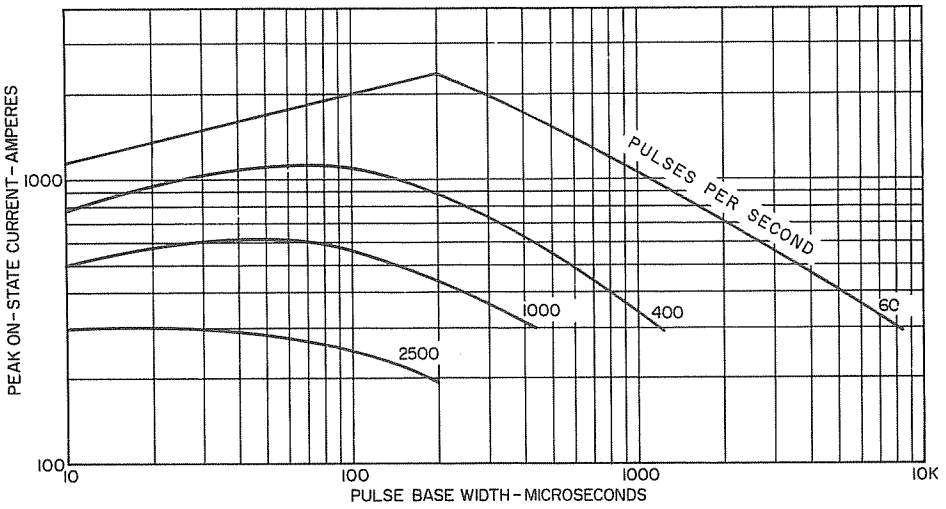
TEST	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITION
Turn-On Delay Time	t_d	–	0.5	–	μsec	T_C = +25°C, I_T = 50 Adc, V_{DRM}, Gate Supply: 20 volt open circuit, 20 ohm, 0.1 μsec max. rise time. ††, †††
Conventional Circuit Commutated Turn-Off Time (with Reverse Voltage) Faster Maximum Turn-Off Times Available, Consult Factory	t_q	–	25	40	μsec	(1) T_C = +125°C (2) I_{TM} = 150 Amps. (3) V_R = 50 Volts Min. (4) V_{DRM} (Reapplied) (5) Rate-of-Rise of Reapplied Off-State Voltage = 200 V/μsec (Linear) (6) Commutation di/dt = 5 Amps/μsec. (7) Repetition Rate = 1 pps. (8) Gate bias during turn-off interval = 0 volts, 100 ohms
Conventional Circuit Commutated Turn-Off Time (with Feedback Diode)	t_q (diode)	–	40	†	μsec	(1) T_C = +125°C (2) I_{TM} = 150 Amps. (3) V_R = 1 Volt (4) V_{DRM} (Reapplied) (5) Rate-of-Rise of Reapplied Off-State Voltage = 200 V/μsec (Linear). (6) Commutation di/dt = 5 Amps/μsec. (7) Repetition Rate = 1 pps. (8) Gate bias during turn-off interval = 0 volts, 100 ohms

†Consult factory for specified maximum turn-off time.
††Delay time may increase significantly as the gate drive approaches the I_{GT} of the device under test (D.U.T.).
†††Current risetime as measured with a current probe, or voltage risetime across a non-inductive resistor.

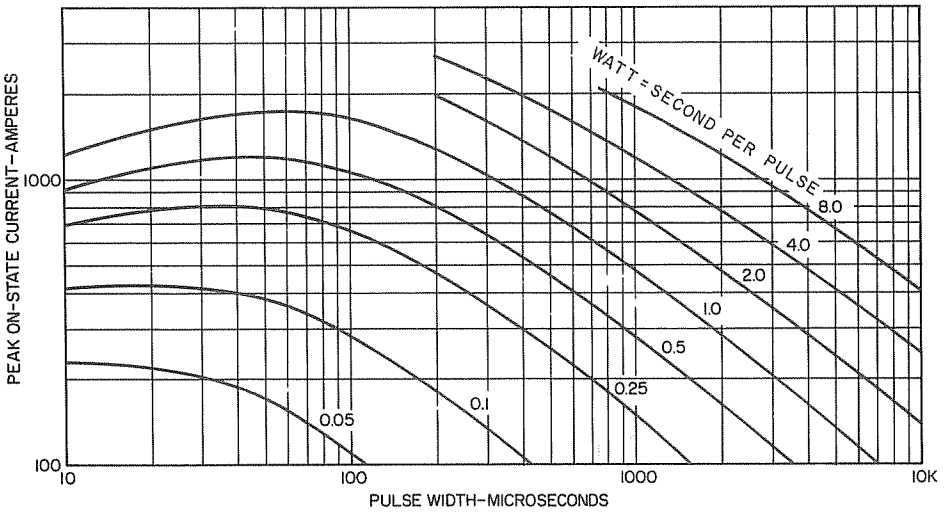


1. MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT VS. PULSE WIDTH (T_C = 65°C)

SINE WAVE CURRENT RATING DATA



2. MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT VS. PULSE WIDTH (T_C = 90°C)



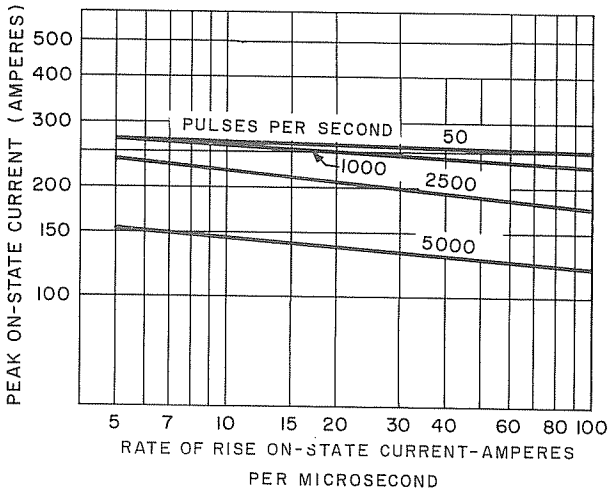
3. ENERGY PER PULSE FOR SINUSOIDAL PULSES

NOTES:
(Pertaining to Sine and Rectangular Wave Current Ratings)

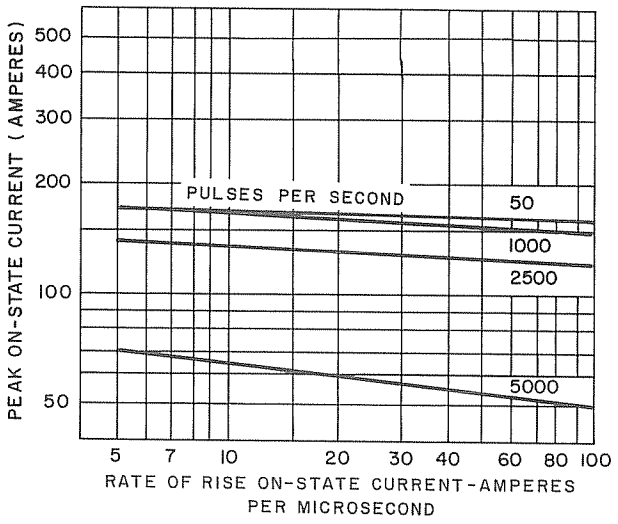
1. Switching voltage = 800 volts.
2. Maximum ckt. dv/dt = 200 volts/μsec.
3. Reverse voltage applied = 50V $\leqslant V_R \leqslant$ 800 volts.
4. Required gate drive:
   20 volts, 65 ohms, 1μsec rise time for less than 100 amps/μsec.
   20 volts, 20 ohms, .5μsec rise time for greater than 100 amps/μsec.
5. R-C Snubber ckt. = .2μF, 5Ω.
6. Double-Side Cooled.
7. Max. energy dissipated during reverse recovery to be 15% of total W-S/P shown in chart 5 or 0.03 W-S/P whichever is least.
8. Values of W-S/P are for T_j = 125°C.

TRAPEZOIDAL WAVE CURRENT RATING DATA

DUTY CYCLE – 50%

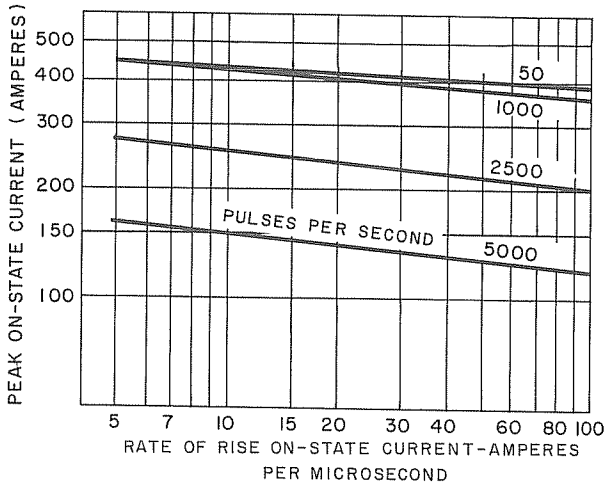


4. MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT VS. di/dt (T_C = 65°C)

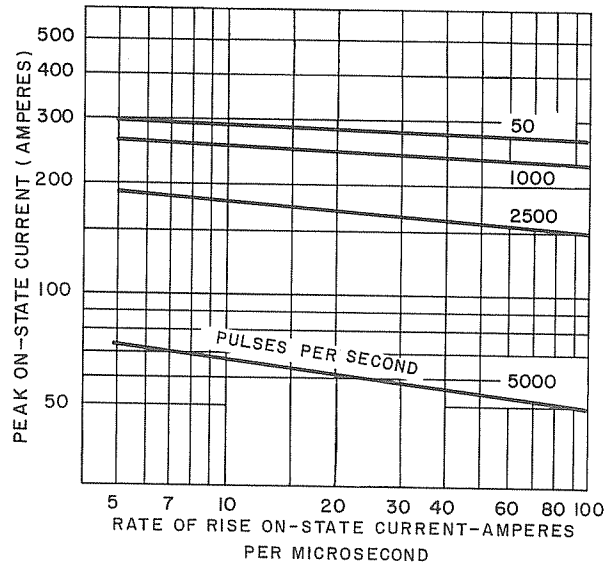


5. MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT VS. di/dt (T_C = 90°C)

DUTY CYCLE – 25%

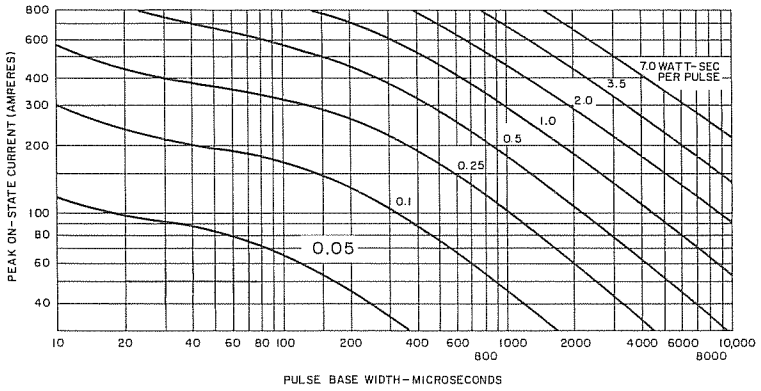


6. MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT VS. di/dt (T_C = 65°C)

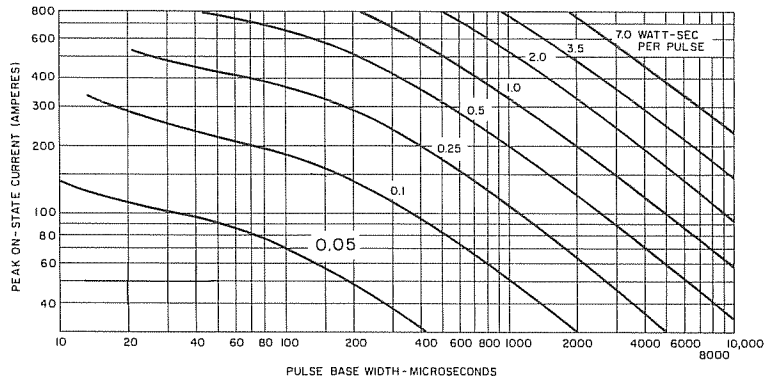


7. MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT VS. di/dt (T_C = 90°C)

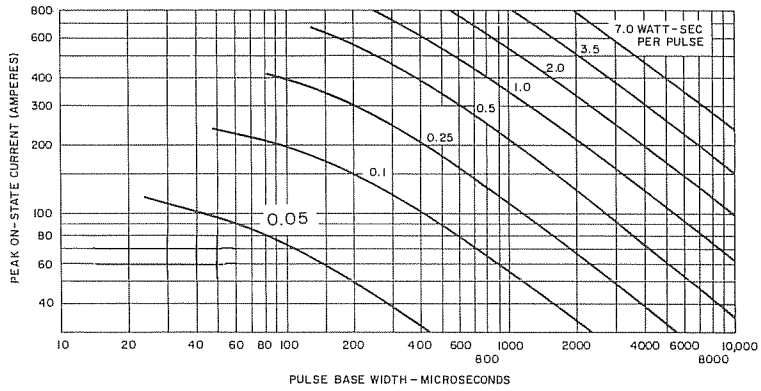
WATT-SECOND PER PULSE



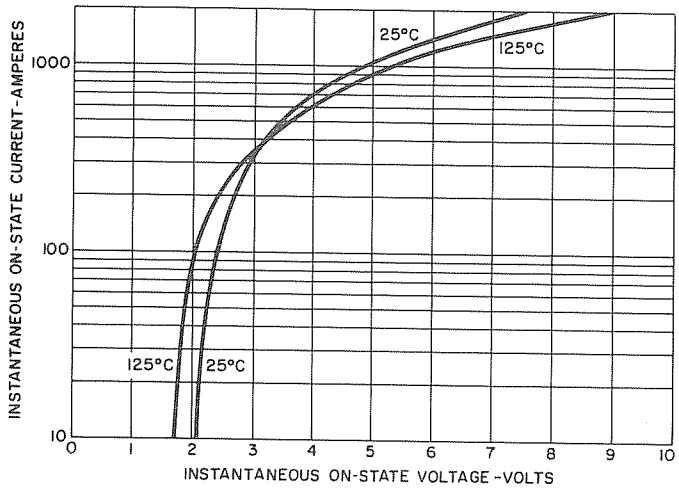
8. ENERGY PER PULSE VS. PEAK CURRENT AND PULSE WIDTH (di/dt = 100 A/μsec)



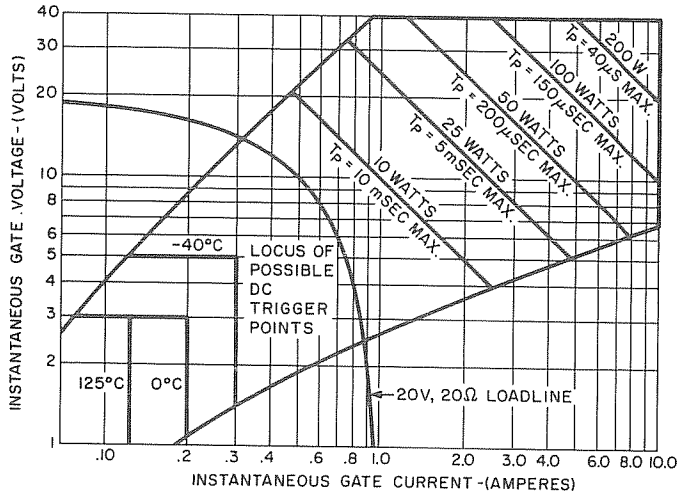
9. ENERGY PER PULSE VS. PEAK CURRENT AND PULSE WIDTH (di/dt = 25 A/μsec)



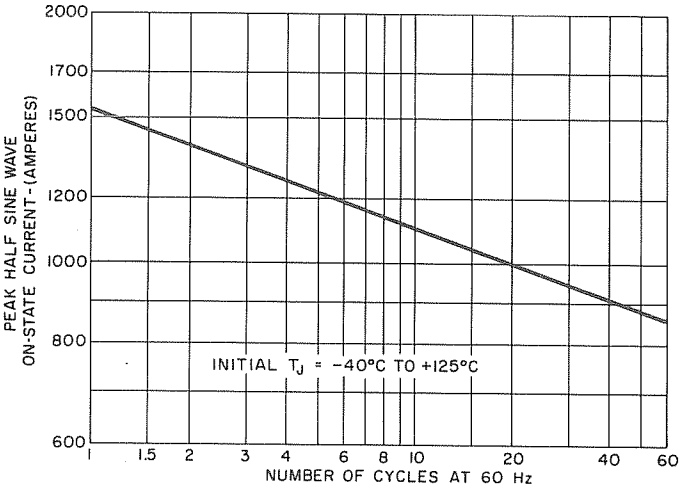
10. ENERGY PER PULSE VS. PEAK CURRENT AND PULSE WIDTH (di/dt = 5 A/μsec)



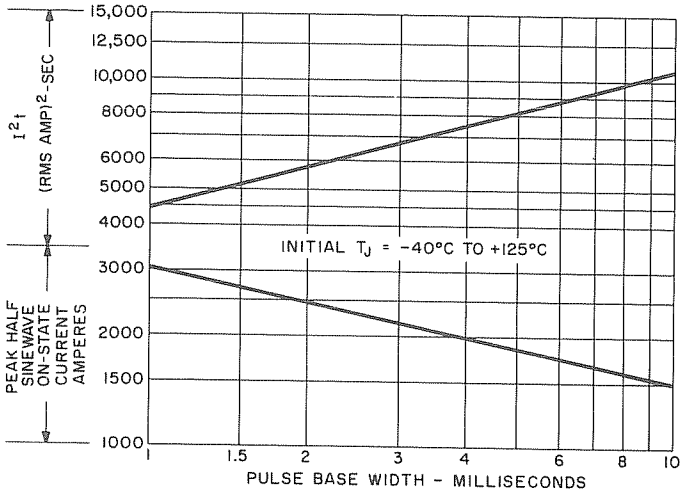
11. MAXIMUM ON-STATE CHARACTERISTICS



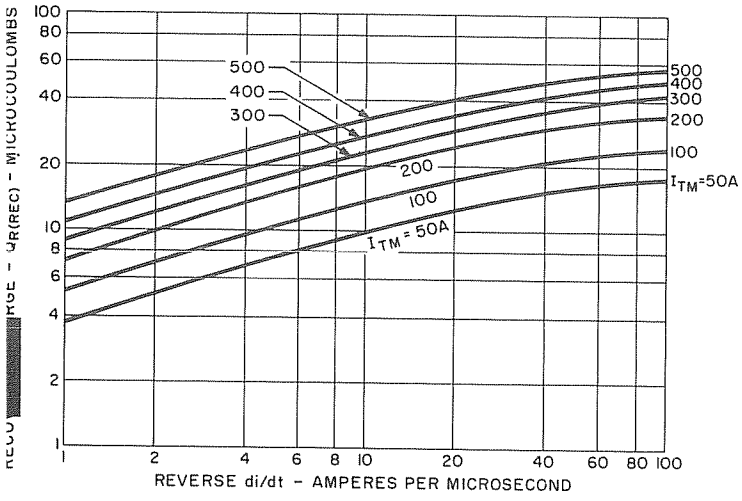
12. GATE TRIGGER CHARACTERISTICS AND POWER RATINGS



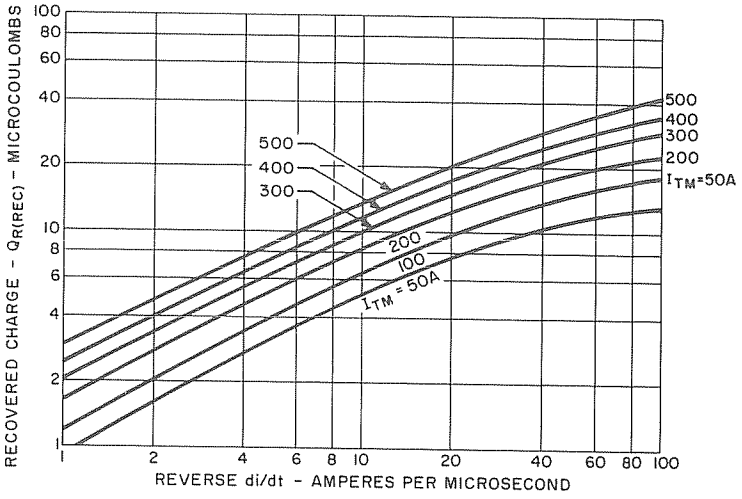
13. SURGE (NON-REPETITIVE) ON-STATE CURRENT



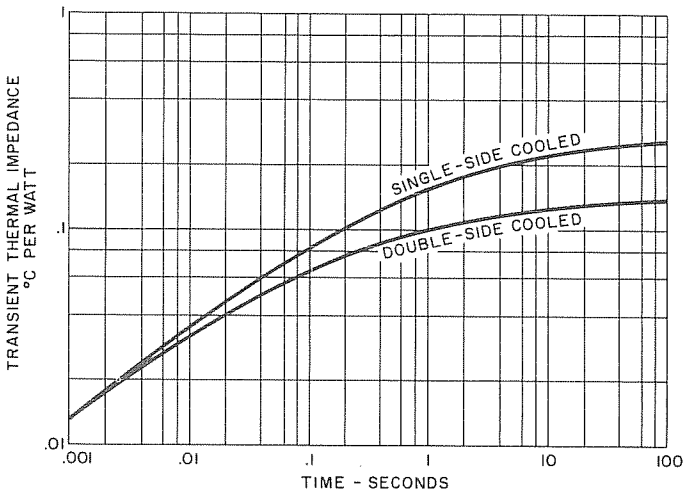
14. SUB-CYCLE SURGE (NON-REPETITIVE) ON-STATE CURRENT AND I^2t RATING



15. TYPICAL RECOVERED CHARGE (125°C) SINE WAVE CURRENT WAVEFORM

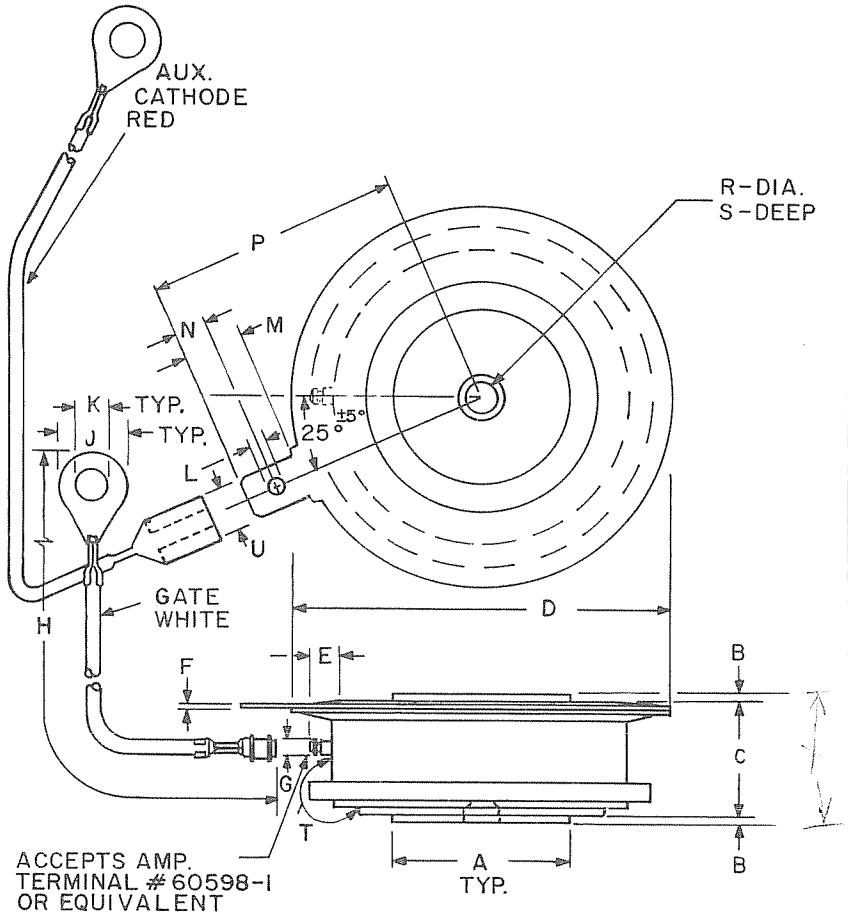


16. TYPICAL RECOVERED CHARGE (25°C) SINE WAVE CURRENT WAVEFORM



17. TRANSIENT THERMAL IMPEDANCE – JUNCTION-TO-CASE

OUTLINE DRAWING



H – STRAIGHT LEAD LENGTH, TYP. 2 LEADS

T – SURFACE CREEPAGE

TABLE OF DIMENSIONS

Conversion Table

SYM	DECIMAL INCHES		METRIC MM	
	MIN	MAX.	MIN.	MAX.
A	.744	.752	18.897	19.101
B	.030	.060	.762	1.524
C	.515	.565	13.081	14.351
D	1.600	1.656	40.64	42.06
E	.110	—	2.794	—
F	.031	.017	.330	.432
G	.057	.059	1.447	1.449
H	7.980	8.115	202.70	206.11
J	—	.300	—	7.620
K	.137	.153	3.479	3.886
L	.065	.070	1.651	1.778
M	.245	.260	6.223	6.604
N	.120	.140	3.048	3.556
P	1.090	1.125	27.69	28.55
R	.135	.145	3.429	3.683
S	.067	.083	1.701	2.108
T	.340	—	8.636	—
U	.186	.189	4.724	4.801