

HIGH SPEED Silicon Controlled Rectifier

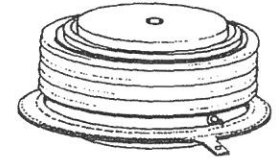
1200 Volts, 650 A RMS



The General Electric C397 and C398 Silicon Controlled Rectifiers are designed for power switching at high frequencies. These are all-diffused Press-Pak devices employing the field-proven amplifying gate.

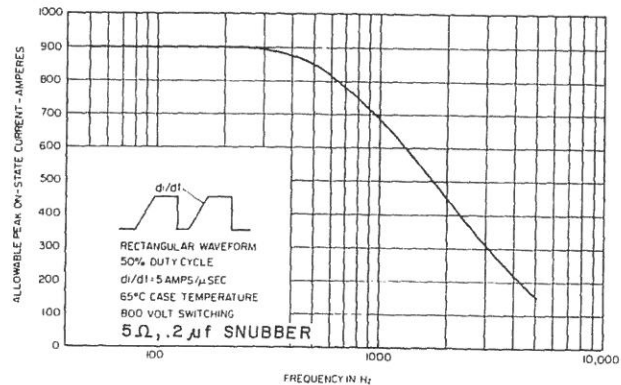
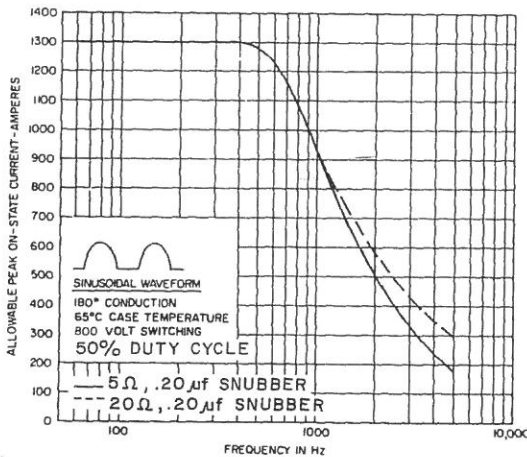
FEATURES:

- Fully characterized for operation in inverter and chopper applications.
- High di/dt ratings.
- High dv/dt capability with selections available.
- Rugged hermetic glazed ceramic package having 1" creepage path.



IMPORTANT: Mounting instructions on the mounting clamp specifications at back of this sheet must be followed.

HIGH FREQUENCY CURRENT RATINGS



Equipment designers can use the C397/C398 SCR's in demanding applications, such as:

- | | | |
|---|---|---|
| <ul style="list-style-type: none"> • Choppers • Inverters • Regulated Power Supplies | <ul style="list-style-type: none"> • Sonar Transmitters • Induction Heaters • Radio Transmitters | <ul style="list-style-type: none"> • Cycloconverters • DC to DC Converters • High Frequency Lighting |
|---|---|---|

FOR SINEWAVE OPERATION

Like the Type C140/141, C158/159 and C358 SCR's, the C397/C398 SCR is rated for:

- Peak Current
- vs.
- Pulse Width
- Frequency
- Case Temperature

FOR RECTANGULAR WAVE OPERATION

GE now introduces a new, high-frequency rating for the C397/398 SCR, which is:

- Peak Current
- vs.
- di/dt of Leading Edge
- Frequency
- Duty Cycle
- Case Temperature

CHARACTERISTICS

TEST	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITION
Repetitive Peak Reverse and Off-State Current	I_{RRM} and I_{DRM}	—	5	20	mA	$T_J = +25^\circ\text{C}$ $V = V_{DRM} = V_{RRM}$
Repetitive Peak Reverse and Off-State Current	I_{RRM} and I_{DRM}	—	20	45	mA	$T_J = 125^\circ\text{C}$ $V = V_{DRM} = V_{RRM}$
Thermal Resistance	$R_{\theta JC}$	—	.05	.06	$^\circ\text{C}/\text{Watt}$	Junction-to-Case (DC) (Double-Side Cooled)
Critical Rate-of-Rise of Off-State Voltage (Higher values may cause device switching)	dv/dt	200	500	—	V/ μsec	$T_J = 125^\circ\text{C}$, Gate Open. $V_{DRM} = \text{Rated}$, Linear or Exponential Rising Waveform. Exponential dv/dt = $\frac{V_{DRM}}{\tau}$ (.632)
Higher minimum dv/dt selections available – consult factory.						
DC Gate Trigger Current	I_{GT}	—	50	150	mAdc	$T_C = +25^\circ\text{C}$, $V_D = 6\text{ Vdc}$, $R_L = 3\text{ Ohms}$
		—	75	300		$T_C = -40^\circ\text{C}$, $V_D = 6\text{ Vdc}$, $R_L = 3\text{ Ohms}$
		—	15	125		$T_C = +125^\circ\text{C}$, $V_D = 6\text{ Vdc}$, $R_L = 3\text{ Ohms}$
DC Gate Trigger Voltage	V_{GT}	—	3	5	Vdc	$T_C = -40^\circ\text{C}$ to 25°C , $V_D = 6\text{ Vdc}$, $R_L = 3\text{ Ohms}$
		—	1.25	3.0		$T_C = 25^\circ\text{C}$ to $+125^\circ\text{C}$, $V_D = 6\text{ Vdc}$, $R_L = 3\text{ Ohms}$
		0.15	—	—		$T_C = 125^\circ\text{C}$, V_{DRM} , $R_L = 1000\text{ Ohms}$
Peak On-State Voltage	V_{TM}	—	2.7	3.0	Volts	$T_C = +25^\circ\text{C}$, $I_{TM} = 3000\text{ Amps Peak}$. Duty Cycle $\leq .01\%$. Pulse Width = 1 ms.
Turn-On Delay Time	t_d	—	0.5	—	μsec	$T_C = +25^\circ\text{C}$, $I_{TM} = 50\text{ Adc}$, V_{DRM} . Gate Supply: 20 volt open circuit, 20 ohms, 0.1 μsec max. rise time. ††, †††
Conventional Circuit Commutated Turn-Off Time (with Reverse Voltage)	t_q	—	20	†	μsec	(1) $T_C = +125^\circ\text{C}$ (2) $I_{TM} = 500\text{ Amps}$. (3) $V_R = 50\text{ Volts Min}$. (4) V_{DRM} (Reapplied) (5) Rate-of-rise of reapplied off-state voltage = 20 V/ μsec (linear) (6) Commutation di/dt = 25 Amps/ μsec (7) Repetition rate = 1 pps. (8) Gate bias during turn-off interval = 0 volts, 100 ohms
			35	†		
		—	30	40		
			45	60		
Conventional Circuit Commutated Turn-Off Time (with Feedback Diode)	$t_{q(\text{diode})}$	—	40	†	μsec	(1) $T_C = +125^\circ\text{C}$ (2) $I_{TM} = 500\text{ Amps}$ (3) $V_R = 1\text{ Volt}$ (4) V_{DRM} (Reapplied) (5) Rate-of-rise of reapplied off-state voltage = 200 V/ μsec (linear) (6) Commutation di/dt = 25 Amps/ μsec (7) Repetition rate = 1 pps. (8) Gate bias during turn-off interval = 0 volts, 100 ohms
		—	60	†		

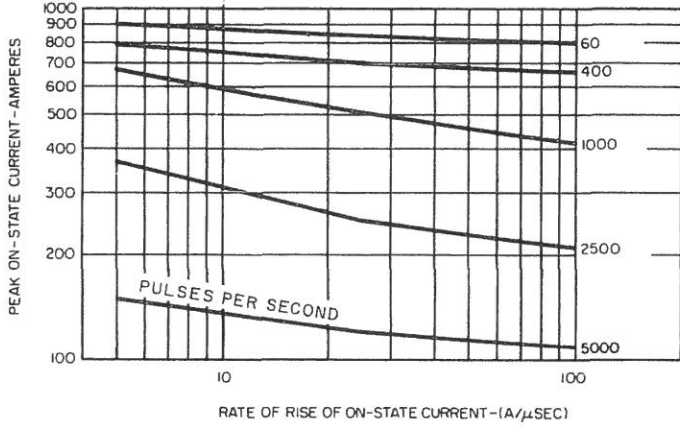
† Consult factory for specified maximum turn-off time.

†† Delay time may increase significantly as the gate drive approaches the I_{GT} of the Device Under Test.

††† Current risetime as measured with a current probe, or voltage risetime across a non-inductive resistor.

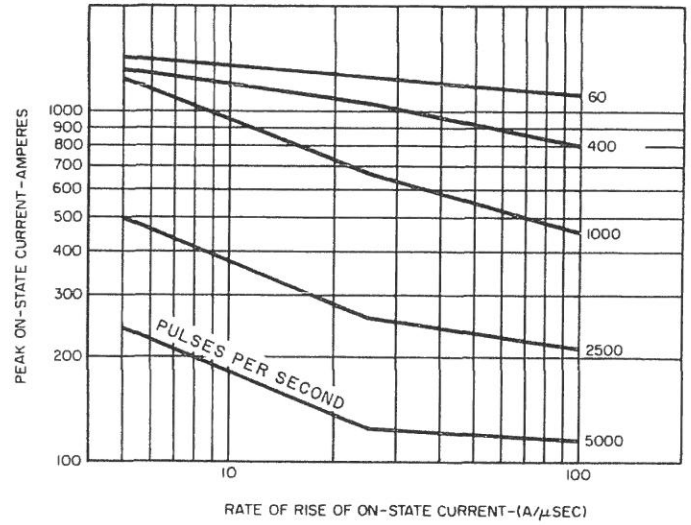
RECTANGULAR WAVE CURRENT RATING DATA

DUTY CYCLE - 50%

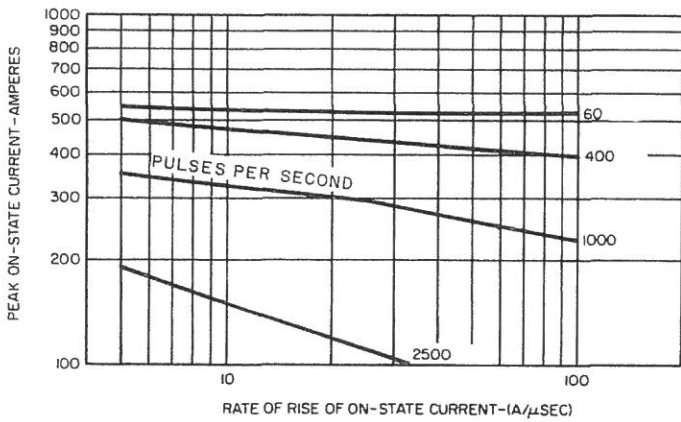


4. MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT VS di/dt ($T_C = 65^\circ\text{C}$)

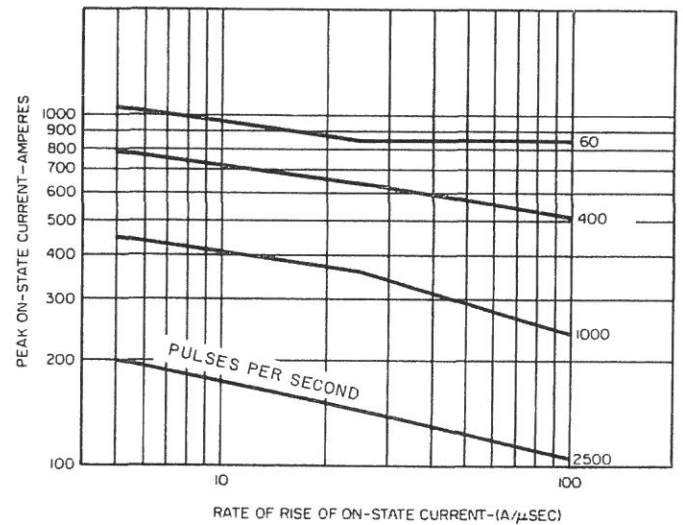
DUTY CYCLE - 25%



6. MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT VS. di/dt ($T_C = 65^\circ\text{C}$)

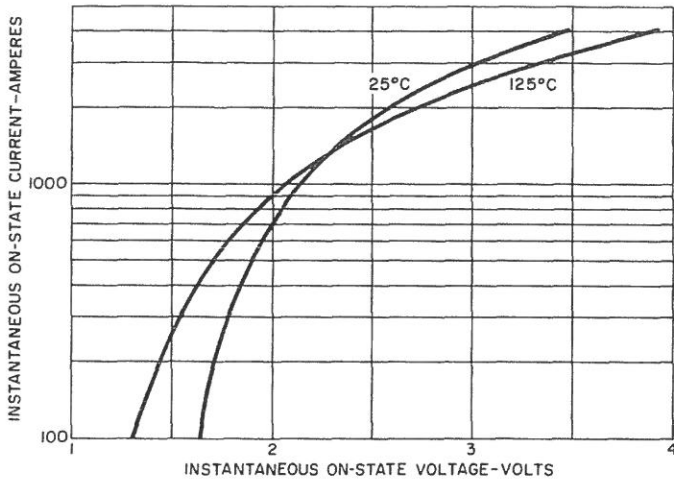


5. MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT VS. di/dt ($T_C = 90^\circ\text{C}$)

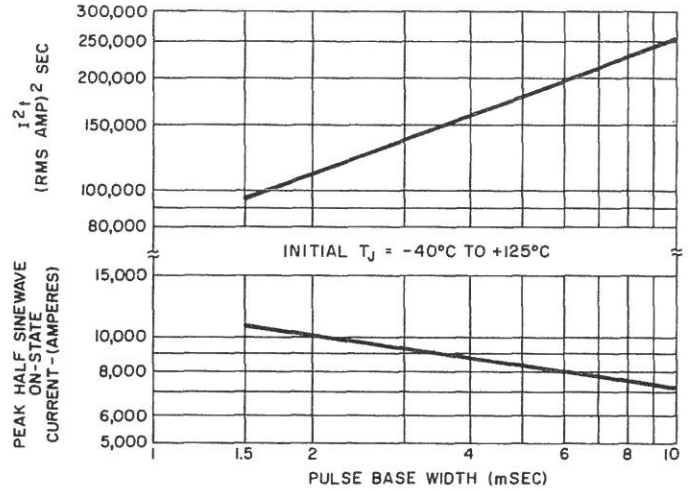


7. MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT VS. di/dt ($T_C = 90^\circ\text{C}$)

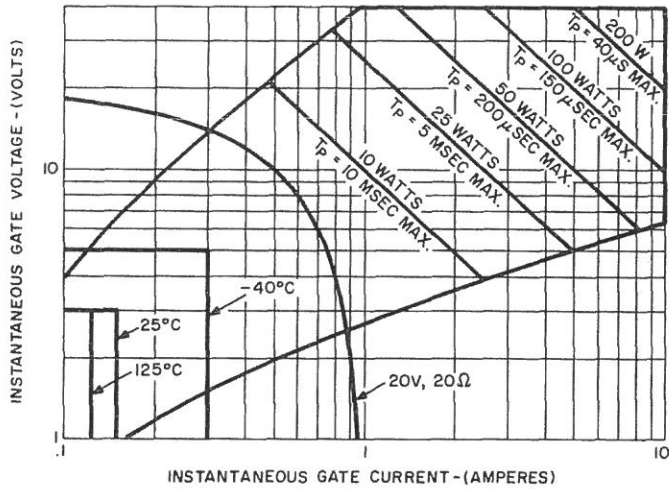
NOTES: (SEE SINE WAVE DATA)



11. MAXIMUM ON-STATE CHARACTERISTICS



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

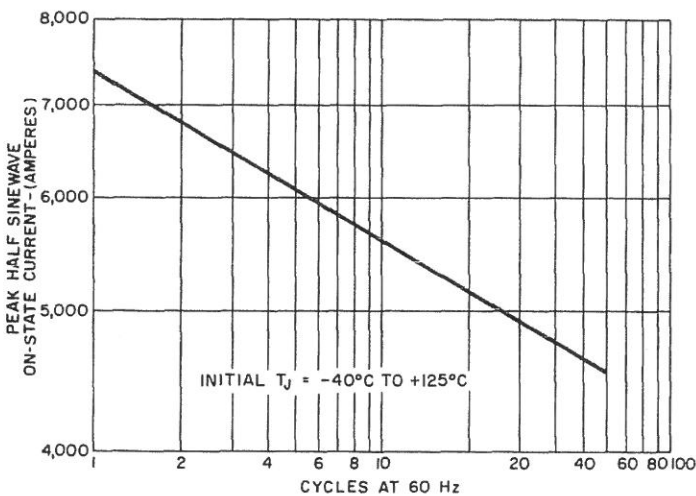


12. GATE TRIGGER CHARACTERISTICS AND POWER RATINGS

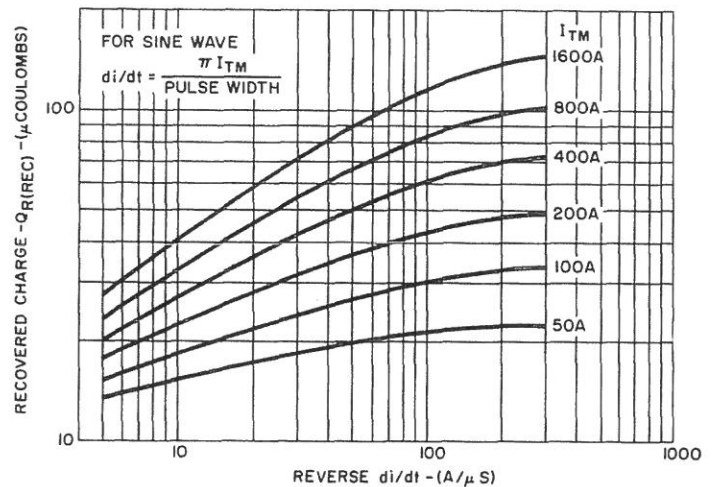
NOTES:

1. The locus of possible dc trigger points lies outside the boundaries shown at various case temperatures.
2. 20V - 20 is the minimum gate source load line when rate of circuit current rise > 100 amp/μs or anode rate of current rise > 200 amps/μs (Tp = 5 μs min., 0.5 μs max. rise time.)

Maximum long term repetitive anode di/dt = 500 amps/μs with 20V - 20Ω gate source.



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



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