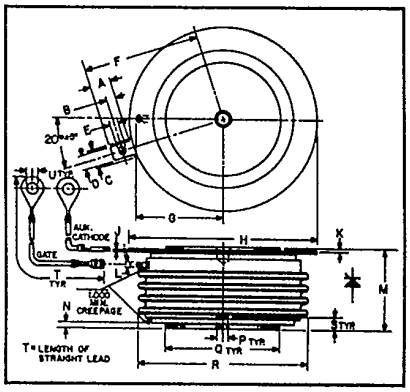
C390__X500

Phase Control SCR

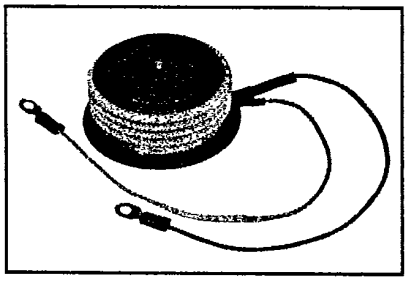
620 Amperes Avg
100-600 Volts

Powerex, Inc. Hillis Street, Youngwood, Pennsylvania 15697 (412) 925-7272
Powerex Europe, S.A., 428 Ave. G. Durand, BP107, 72003 LeMans, France (43) 72.75.15



C390__X500
Outline Drawing

Dimensions	Inches		Millimeters	
	Min.	Max.	Min.	Max.
A	.240	.260	6.096	6.604
B	.110	.130	2.794	3.302
C	.245	—	6.223	—
D	.186	.191	4.724	4.851
E	.060	.075	1.524	1.905
F	—	1.430	—	36.32
G	—	1.065	—	27.051
H	2.200	2.500	55.88	63.50
J	.011	.019	2.794	3.483
K	.030	.130	.762	3.302
L	.056	.060	1.422	1.524
M	1.000	1.065	25.40	27.05
N	.030	.096	.762	2.438
P	.130	.150	3.302	3.810
Q	1.300	1.345	33.02	34.16
R	—	2.150	—	54.61
S	.067	.803	1.702	2.110
T	12.200	12.360	309.9	313.9
U	.137	.153	3.480	3.886



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Phase Control SCR
620 Amperes/100-600 Volts

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^2t Ratings

Applications:
- ☐ Power Supplies
- ☐ Battery Chargers
- ☐ Motor Control
- ☐ Light Dimmers
- ☐ VAR Generators

Ordering Information
Example: Select the complete nine digit part number you desire from the table – i.e. C390DX500 is a 400 Volt, 620 Ampere Phase Control SCR.

Type	Voltage		Current
	V_{DRM} V_{RRM}	Code	I_T (avg)
C390__X500	100	A	620
	200	B	
	300	C	
	400	D	
	500	E	
	600	M	

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Absolute Maximum Ratings

	Symbol	C390__X500	Units
RMS On-State Current	$I_{T(RMS)}$	975	Amperes
Average On-State Current	$I_{T(av)}$	620	Amperes
Peak One-Cycle Surge (Non Repetitive) On-State Current (60Hz)	I_{TSM}	10,000	Amperes
Peak One-Cycle Surge (Non-Repetitive) On-State Current (50Hz)	I_{TSM}	9500	Amperes
Critical Rate-of-Rise of On-State Current (Non-Repetitive)	di/dt	400	Amperes/µs
Critical Rate-of-Rise of On-State Current (Repetitive)	di/dt	150	Amperes/µs
I^2t (for Fusing), One Cycle at 60Hz	I^2t	416,500	A^2sec
Peak Gate Power Dissipation, 40 µsec Pulse	P_{GM}	200	Watts
Average Gate Power Dissipation	$P_{G(av)}$	5	Watts
Storage Temperature	T_{STG}	−40 to 150	°C
Operating Temperature	T_J	−40 to 125	°C
Mounting Force①		1800 to 2200	lb.
Mounting Force①		8 to 9.8	kN

Electrical and Thermal Characteristics

Characteristics	Symbol	Test Conditions	C390__X500	Units
Voltage—Blocking State Maximums				
Forward Leakage, Peak	I_{DRM}	T_J = 125°C, V = V_{DRM}	50	mA
Reverse Leakage, Peak	I_{RRM}	T_J = 125°C, V = V_{RRM}	50	mA
Current—Conducting State Maximums				
Peak On-State Voltage	V_{TM}	I_{TM} = 3000A; T_J = 25°C	1.9	Volts
Switching				
Typical Turn-Off Time	t_q	T_J = 125°C, I_{TM} = 500 Amps; V_R = 50 Volts Min.; V_{DRM} (Reapplied); Rate-of-Rise of Reapplied Off-State Voltage = 20V/µsec (linear); Commutation di/dt = 25A/µsec; Repetition Rate = 1 pps; Gate Bias During Turn-Off Interval = 0 Volts, 100Ω	125	µsec
Typical Delay Time	t_d	T_J = 25°C, I_{TM} = 50 Adc, V_{DRM} Rated. Gate Supply: 20 Volts, 20Ω, 0.1 µsec Max. Rise Time	0.7	µsec
Min. Critical dv/dt exponential to V_{DRM}	dv/dt	T_J = 125°C, Gate Open	200	V/µsec
Thermal				
Maximum Thermal Resistance,① double sided cooling				
Junction to Case	$R_{\theta JC}$		.06	°C/Watt
Case to Sink, Lubricated	$R_{\theta CS}$		.02	°C/Watt
Gate—Maximum Parameters				
Gate Current to Trigger	I_{GT}	V_D = 6Vdc, T_J = 25°C, R_L = 3Ω	200	mA
Gate Voltage to Trigger	V_{GT}	T_J = −40°C to 125°C, V_D = Vdc, R_L = 3Ω	5	Volts
Non-Triggering Gate Voltage	V_{GDM}	T_J = 125°C, rated V_{DRM}, R_L = 1000Ω	.15	Volts
Peak Forward Gate Current	I_{GTM}		10	Amperes
Peak Reverse Gate Voltage	V_{GRM}		5	Volts

① Consult recommended mounting procedures.

POWEREX

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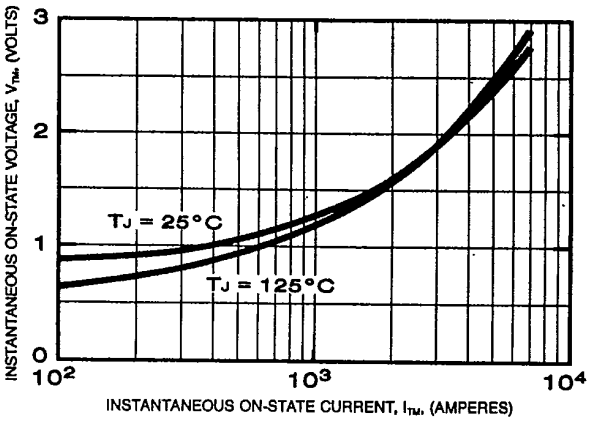
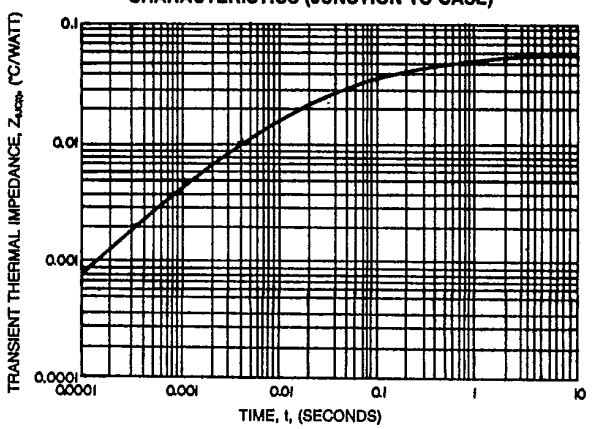
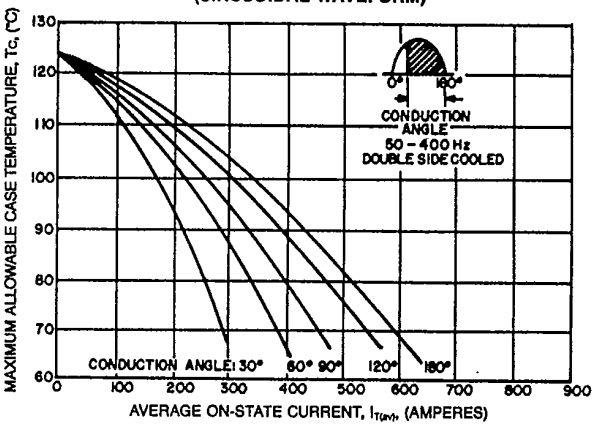
MAXIMUM ON-STATE CHARACTERISTICS



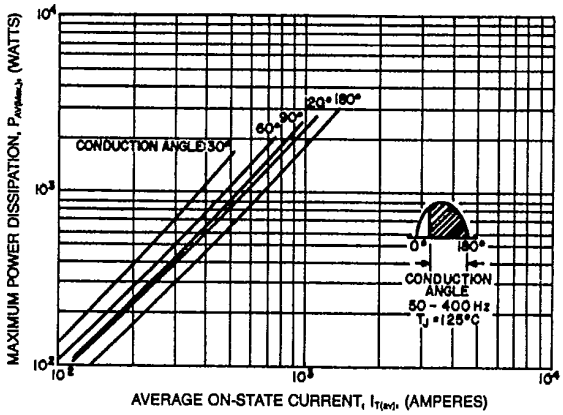
TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (JUNCTION TO CASE)



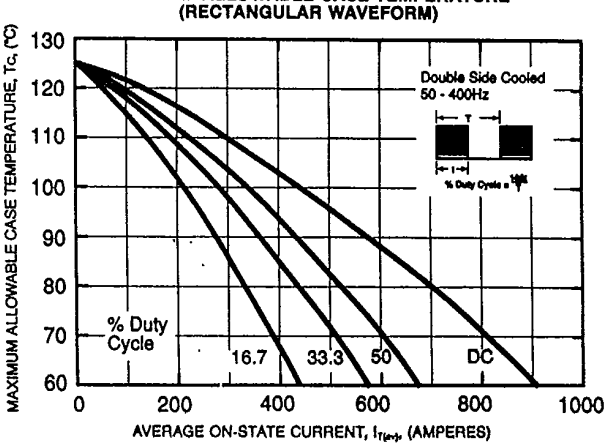
MAXIMUM ALLOWABLE CASE TEMPERATURE (SINUSOIDAL WAVEFORM)



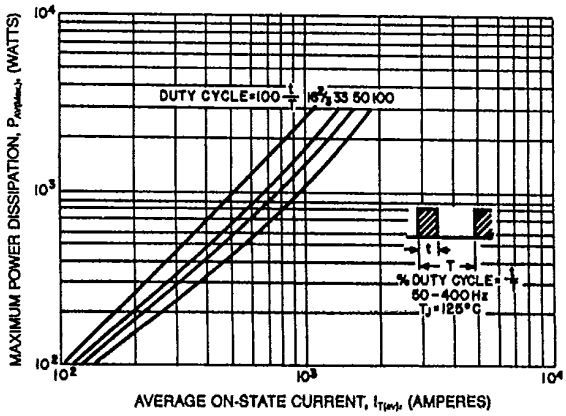
MAXIMUM ON-STATE POWER DISSIPATION (SINUSOIDAL WAVEFORM)



MAXIMUM ALLOWABLE CASE TEMPERATURE (RECTANGULAR WAVEFORM)



MAXIMUM ON-STATE POWER DISSIPATION (RECTANGULAR WAVEFORM)



T-25-20

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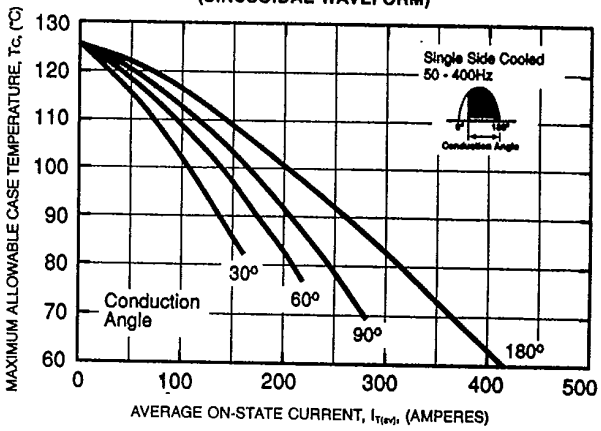
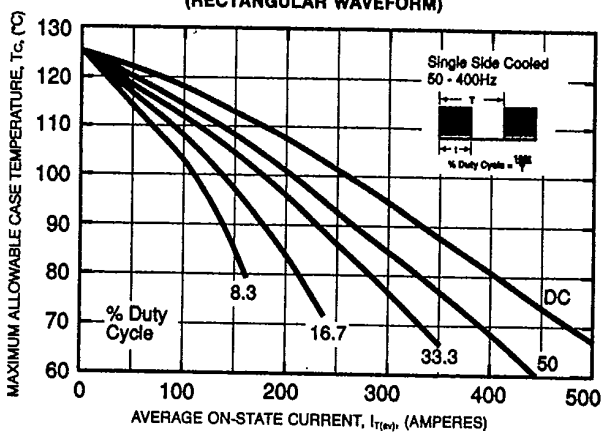
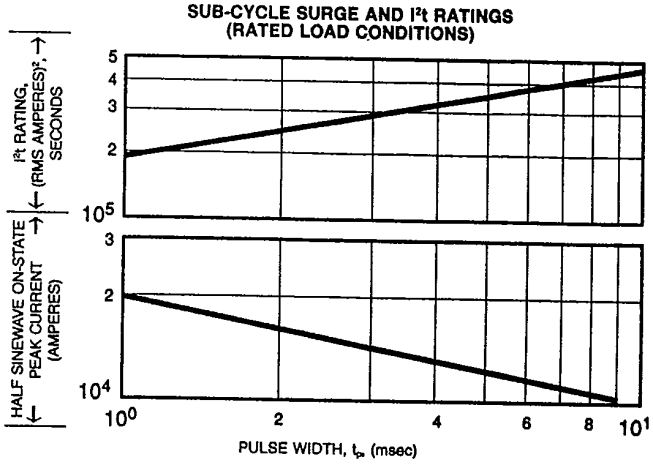
MAXIMUM ALLOWABLE CASE TEMPERATURE (SINUSOIDAL WAVEFORM)



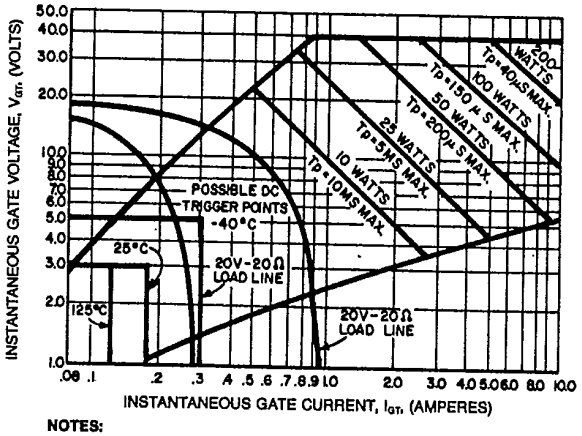
MAXIMUM ALLOWABLE CASE TEMPERATURE (RECTANGULAR WAVEFORM)



SUB-CYCLE SURGE AND I^2t RATINGS (RATED LOAD CONDITIONS)



GATE CHARACTERISTICS



NOTES:

1. Maximum allowable average gate dissipation = 5 watts.
2. The locus of possible dc trigger points lie outside the boundaries shown at various case temperatures.
3. Tp = Rectangular gate current pulse width (5µs min. duration; 1.0 µs max. rise time for 20V, 65 Ω source).
4. 20 V — 20 Ω 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., 0.5µs max. rise time).

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