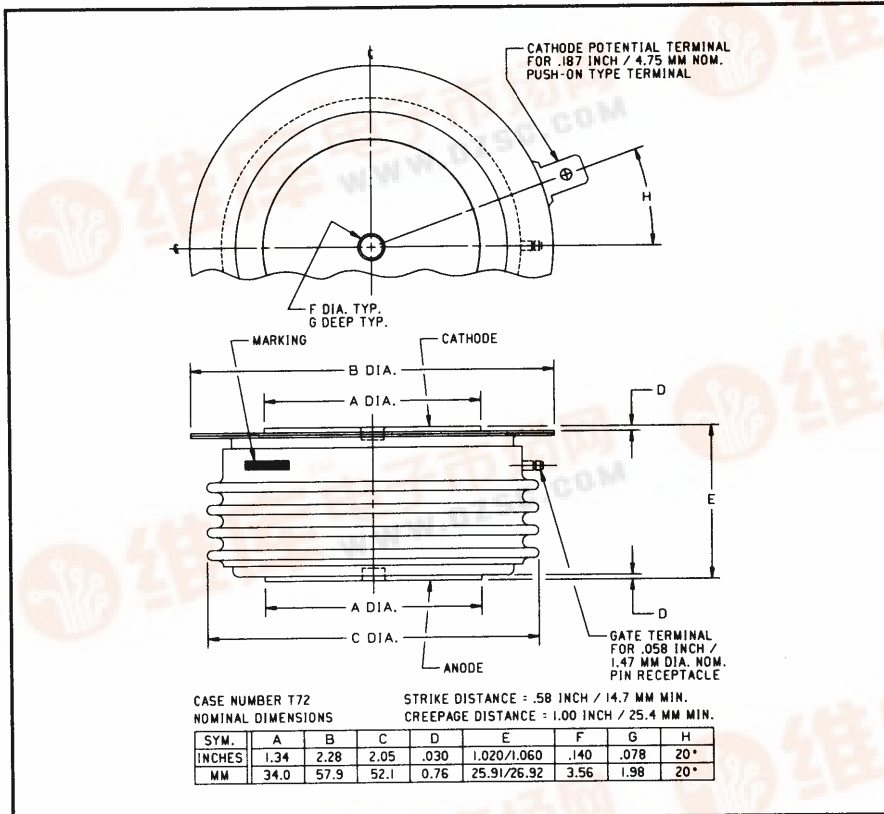
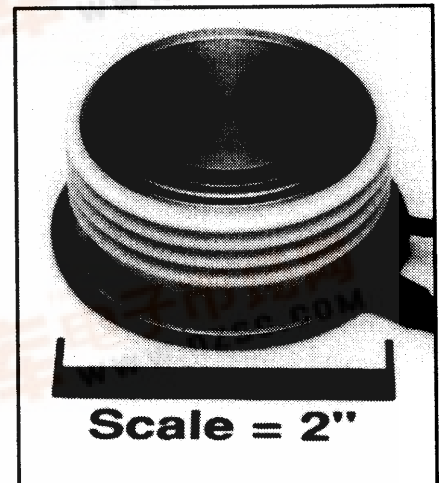


Powerex, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800 (412) 925-7272  
Powerex, Europe, S.A. 428 Avenue G. Durand, BP107, 72003 Le Mans, France (43) 41.14.14

**Phase Control SCR**  
620 Amperes Average  
600 Volts



C390\_X500 (Outline Drawing)



C390\_X500 Phase Control SCR  
620 Amperes Average, 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

#### Ordering Information:

Select the complete nine digit part number you desire from the table, i.e. C390MX500 is a 600 Volt, 620 Ampere Phase Control SCR.

| Type      | Voltage                              |      | Current |
|-----------|--------------------------------------|------|---------|
|           | V <sub>DRM</sub><br>V <sub>RRM</sub> | Code |         |
| C390_X500 | 200                                  | B    | 620     |
|           | 400                                  | D    |         |
|           | 600                                  | M    |         |



Powerex, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800 (412) 925-7272  
 Powerex, Europe, S.A. 428 Avenue G. Durand, BP107, 72003 Le Mans, France (43) 41.14.14

### C390\_X500

#### Phase Control SCR

620 Amperes Average, 600 Volts

### Absolute Maximum Ratings

|                                                               | Symbol       | C390_X500    | Units                  |
|---------------------------------------------------------------|--------------|--------------|------------------------|
| RMS On-State Current @ $T_C = 65^\circ\text{C}$               | $I_{T(RMS)}$ | 975          | Amperes                |
| Average On-State Current @ $T_C = 65^\circ\text{C}$           | $I_{T(av)}$  | 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/ $\mu\text{s}$ |
| Critical Rate-of-Rise of On-State Current (Repetitive)        | $di/dt$      | 150          | Amperes/ $\mu\text{s}$ |
| $I^2t$ (for Fusing), One Cycle at 60Hz                        | $I^2t$       | 416,500      | $\text{A}^2\text{sec}$ |
| Peak Gate Power Dissipation, 40 $\mu\text{sec}$ Pulse         | $P_{GM}$     | 200          | Watts                  |
| Average Gate Power Dissipation                                | $P_{G(av)}$  | 5            | Watts                  |
| Storage Temperature                                           | $T_{STG}$    | -40 to 150   | $^\circ\text{C}$       |
| Operating Temperature                                         | $T_J$        | -40 to 125   | $^\circ\text{C}$       |
| Mounting Force                                                |              | 1800 to 2200 | lb.                    |
| Mounting Force                                                |              | 8 to 9.8     | kN                     |

### Electrical and Thermal Characteristics

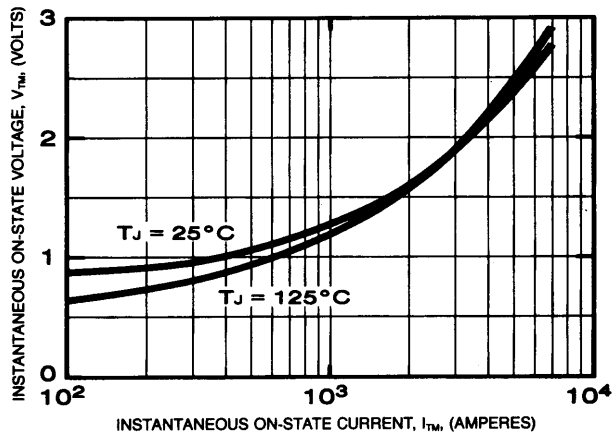
| Characteristics                                  | Symbol          | Test Conditions                                                                                                                                                                                                                                                                                                            | C390_X500 | Units                        |
|--------------------------------------------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------------------------------|
| <b>Voltage—Blocking State Maximums</b>           |                 |                                                                                                                                                                                                                                                                                                                            |           |                              |
| Forward Leakage, Peak                            | $I_{DRM}$       | $T_J = 125^\circ\text{C}, V = V_{DRM}$                                                                                                                                                                                                                                                                                     | 50        | mA                           |
| Reverse Leakage, Peak                            | $I_{RRM}$       | $T_J = 125^\circ\text{C}, V = V_{RRM}$                                                                                                                                                                                                                                                                                     | 50        | mA                           |
| <b>Current—Conducting State Maximums</b>         |                 |                                                                                                                                                                                                                                                                                                                            |           |                              |
| Peak On-State Voltage                            | $V_{TM}$        | $I_{TM} = 3000\text{A}; T_J = 25^\circ\text{C}$                                                                                                                                                                                                                                                                            | 1.9       | Volts                        |
| <b>Switching</b>                                 |                 |                                                                                                                                                                                                                                                                                                                            |           |                              |
| Typical Turn-Off Time                            | $t_q$           | $T_J = 125^\circ\text{C}, I_{TM} = 500\text{Amps}; V_R = 50\text{Volts Min.}; V_{DRM}$ (Reapplied); Rate-of-Rise of Reapplied Off-State Voltage = $20\text{V}/\mu\text{sec}$ (linear); Commutation $di/dt = 25\text{A}/\mu\text{sec}$ ; Repetition Rate = 1 pps; Gate Bias During Turn-Off Interval = 0 Volts, $100\Omega$ | 125       | $\mu\text{sec}$              |
| Typical Delay Time                               | $t_d$           | $T_J = 25^\circ\text{C}, I_{TM} = 50\text{Adc}, V_{DRM}$ Rated. Gate Supply: 20 Volts, $20\Omega$ , 0.1 $\mu\text{sec}$ Max. Rise Time                                                                                                                                                                                     | 0.7       | $\mu\text{sec}$              |
| Min. Critical $dv/dt$ exponential to $V_{DRM}$   | $dv/dt$         | $T_J = 125^\circ\text{C}, \text{Gate Open}$                                                                                                                                                                                                                                                                                | 200       | $\text{V}/\mu\text{sec}$     |
| <b>Thermal</b>                                   |                 |                                                                                                                                                                                                                                                                                                                            |           |                              |
| Maximum Thermal Resistance, double sided cooling |                 |                                                                                                                                                                                                                                                                                                                            |           |                              |
| Junction to Case                                 | $R_{\theta JC}$ |                                                                                                                                                                                                                                                                                                                            | 0.06      | $^\circ\text{C}/\text{Watt}$ |
| Case to Sink, Lubricated                         | $R_{\theta CS}$ |                                                                                                                                                                                                                                                                                                                            | 0.02      | $^\circ\text{C}/\text{Watt}$ |
| <b>Gate—Maximum Parameters</b>                   |                 |                                                                                                                                                                                                                                                                                                                            |           |                              |
| Gate Current to Trigger                          | $I_{GT}$        | $V_D = 6\text{Vdc}, T_J = 25^\circ\text{C}, R_L = 3\Omega$                                                                                                                                                                                                                                                                 | 200       | mA                           |
| Gate Voltage to Trigger                          | $V_{GT}$        | $T_J = -40^\circ\text{C}$ to $125^\circ\text{C}, V_D = \text{Vdc}, R_L = 3\Omega$                                                                                                                                                                                                                                          | 5         | Volts                        |
| Non-Triggering Gate Voltage                      | $V_{GDM}$       | $T_J = 125^\circ\text{C}, \text{rated } V_{DRM}, R_L = 1000\Omega$                                                                                                                                                                                                                                                         | 0.15      | Volts                        |
| Peak Forward Gate Current                        | $I_{GTM}$       |                                                                                                                                                                                                                                                                                                                            | 10        | Amperes                      |
| Peak Reverse Gate Voltage                        | $V_{GRM}$       |                                                                                                                                                                                                                                                                                                                            | 5         | Volts                        |



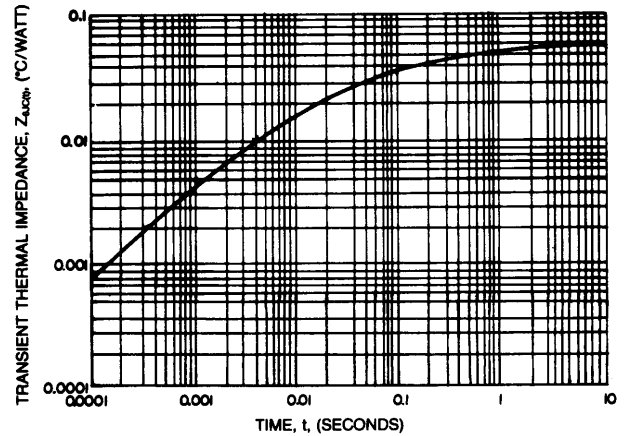
Powerex, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800 (412) 925-7272  
Powerex, Europe, S.A. 428 Avenue G. Durand, BP107, 72003 Le Mans, France (43) 41.14.14

C390\_X500  
Phase Control SCR  
620 Amperes Average, 600 Volts

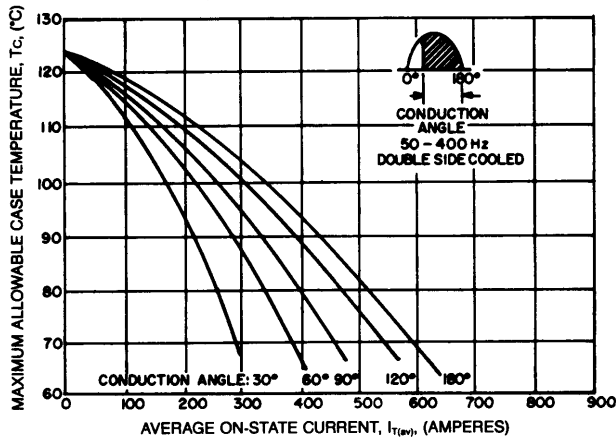
MAXIMUM ON-STATE CHARACTERISTICS



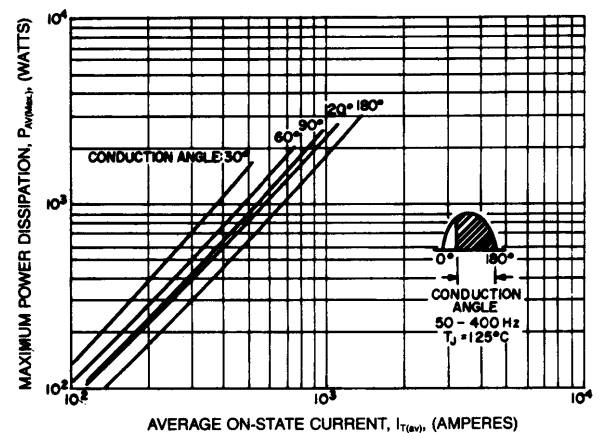
TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (JUNCTION TO CASE)



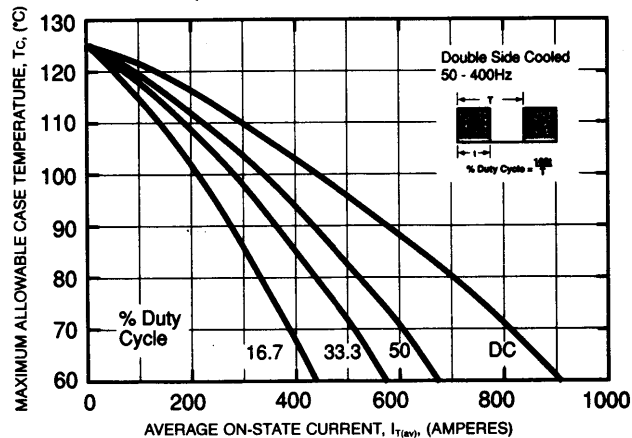
MAXIMUM ALLOWABLE CASE TEMPERATURE (SINUSOIDAL WAVEFORM)



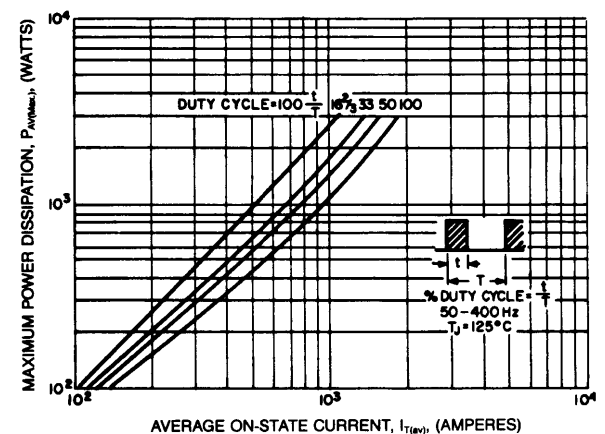
MAXIMUM ON-STATE POWER DISSIPATION (SINUSOIDAL WAVEFORM)



MAXIMUM ALLOWABLE CASE TEMPERATURE (RECTANGULAR WAVEFORM)



MAXIMUM ON-STATE POWER DISSIPATION (RECTANGULAR WAVEFORM)





Powerex, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800 (412) 925-7272  
Powerex, Europe, S.A. 428 Avenue G. Durand, BP107, 72003 Le Mans, France (43) 41.14.14

C390\_X500

Phase Control SCR

620 Amperes Average, 600 Volts

