

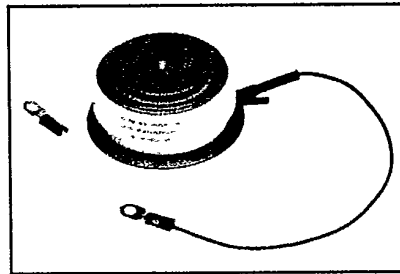
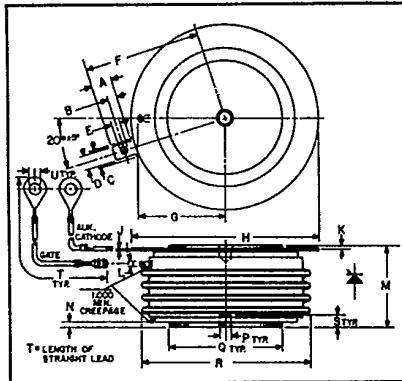


T-25-19

C390

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

**Phase Control SCR**  
**450 Amperes Avg**  
**500-1300 Volts**



**C390**  
**Phase Control SCR**  
 450 Amperes/500-1300 Volts

**C390**  
**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  |

**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 five or six digit part number you desire from the table – i.e. C390P is a 1000 Volt, 450 Ampere Phase Control SCR.

| Type | Voltage                              |      | Current |
|------|--------------------------------------|------|---------|
|      | V <sub>ONM</sub><br>V <sub>RRM</sub> | Code |         |
| C390 | 500                                  | E    | 450     |
|      | 600                                  | M    |         |
|      | 700                                  | S    |         |
|      | 800                                  | N    |         |
|      | 900                                  | T    |         |
|      | 1000                                 | P    |         |
|      | 1100                                 | PA   |         |
|      | 1200                                 | PB   |         |
|      | 1300                                 | PC   |         |



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**Absolute Maximum Ratings**

|   | Symbol       | C390         | Units              |
|---|--------------|--------------|--------------------|
| RMS On-State Current  | $I_{T(RMS)}$ | 700          | Amperes            |
| Average On-State Current                                      | $I_{T(av)}$  | 450          | Amperes            |
| Peak One-Cycle Surge (Non Repetitive) On-State Current (60Hz) | $I_{TSM}$    | 8000         | Amperes            |
| Peak One-Cycle Surge (Non-Repetitive) On-State Current (50Hz) | $I_{TSM}$    | 7600         | Amperes            |
| Critical Rate-of-Rise of On-State Current (Non-Repetitive)    | di/dt        | 800          | Amperes/ $\mu$ s   |
| Critical Rate-of-Rise of On-State Current (Repetitive)        | di/dt        | 500          | Amperes/ $\mu$ s   |
| $I^2t$ (for Fusing), 8.3 milliseconds                         | $I^2t$       | 265,000      | A <sup>2</sup> sec |
| Peak Gate Power Dissipation, 40 $\mu$ sec 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 Force <sup>Ⓞ</sup>                                   |              | 2000 to 2500 | lb.                |
| Mounting Force <sup>Ⓞ</sup>                                   |              | 8.9 to 11.1  | kN                 |

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



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### Electrical and Thermal Characteristics

| Characteristics  | Symbol          | Test Conditions  | C390 | Units                        |
|--|-----------------|--|------|------------------------------|
| <b>Voltage—Blocking State Maximums</b>                           |                 |  |      |                              |
| Forward Leakage, Peak  | $I_{DRM}$       | $T_J = 125^\circ\text{C}, V = V_{DRM}$   | 45   | mA                           |
| Reverse Leakage, Peak  | $I_{RRM}$       | $T_J = 125^\circ\text{C}, V = V_{RRM}$   | 45   | mA                           |
| <b>Current—Conducting State Maximums</b>                         |                 |  |      |                              |
| Peak On-State Voltage  | $V_{TM}$        | $T_C = 25^\circ\text{C}, I_{TM} = 3000 \text{ A Peak, Duty Cycle } \leq 0.01\%$  | 2.4  | Volts                        |
| <b>Switching</b>   |                 |  |      |                              |
| Typical Turn-Off Time  | $t_q$           | $T_J = 125^\circ\text{C}; I_{TM} = 500 \text{ Amps}; V_R = 50 \text{ Volts Min.};$<br>$V_{DRM}$ (Reapplied); Rate-of-Rise of Reapplied<br>Off-State Voltage = $20\text{V}/\mu\text{sec}$ (linear);<br>Commutation $di/dt = 25 \text{ Amps}/\mu\text{sec}$ ;<br>Repetition Rate = 1 pps; Gate Bias During<br>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.<br>Gate Supply: 20 Volts, $20\Omega$ , $0.1 \mu\text{sec}$<br>Max. Rise Time   | 0.4  | $\mu\text{sec}$              |
| 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, <sup>ⓐ</sup><br>double sided cooling |                 |  |      |                              |
| Junction to Case   | $R_{\theta JC}$ |  | .06  | $^\circ\text{C}/\text{Watt}$ |
| Case to Sink, Lubricated   | $R_{\theta CS}$ |  | .020 | $^\circ\text{C}/\text{Watt}$ |
| <b>Gate—Maximum Parameters</b>                                   |                 |  |      |                              |
| Gate Current to Trigger  | $I_{GT}$        | $T_J = 25^\circ\text{C}, V_D = 6\text{Vdc}, R_L = 3\Omega$   | 150  | mA                           |
| Gate Voltage to Trigger  | $V_{GT}$        | $T_J = -40^\circ\text{C to } 125^\circ\text{C}, V_D = 6\text{Vdc}, R_L = 3\Omega$  | 5    | Volts                        |
| Non-Triggering Gate Voltage                                      | $V_{GDM}$       | $T_C = 125^\circ\text{C}, V_D = \text{Rated}, R_L = 1000\Omega$  | .15  | Volts                        |
| Peak Forward Gate Current  | $I_{GTM}$       |  | 10   | Amperes                      |
| Peak Reverse Gate Voltage  | $V_{GRM}$       |  | 5    | Volts                        |

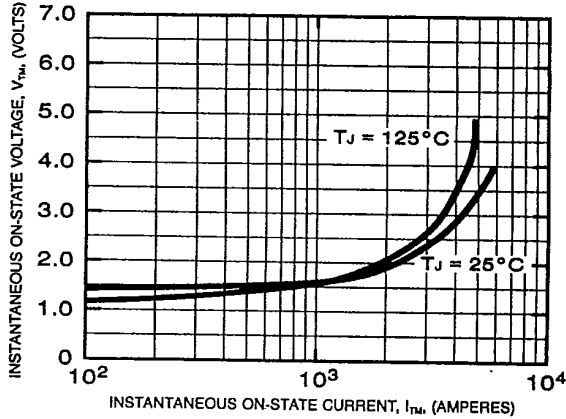
<sup>ⓐ</sup> Consult recommended mounting procedures.



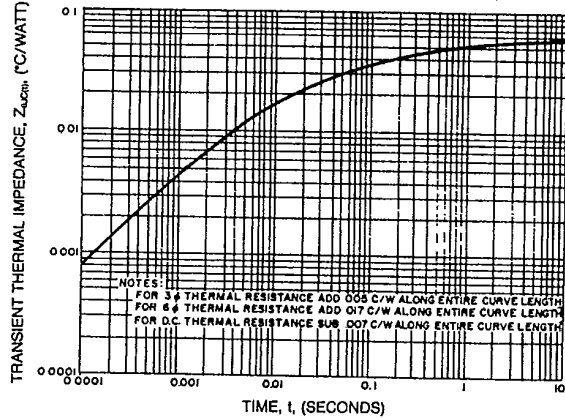
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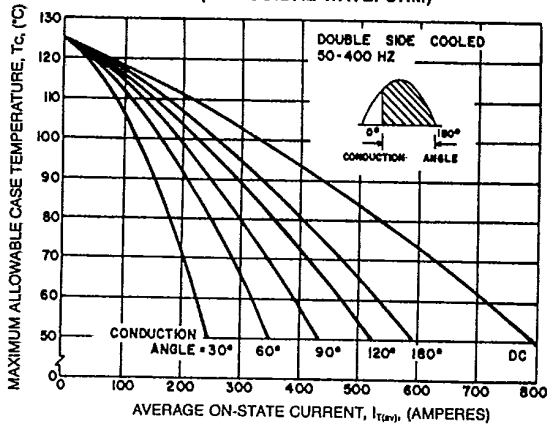
MAXIMUM ON-STATE CHARACTERISTICS



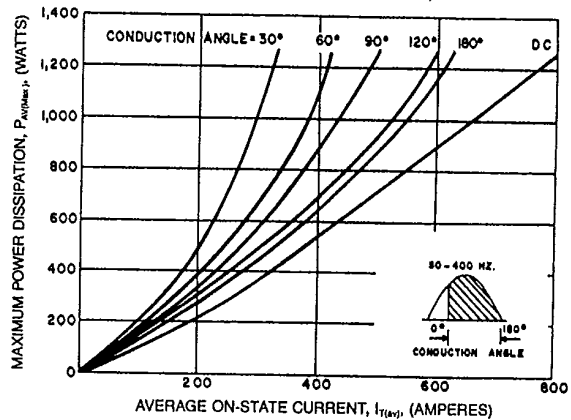
TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (JUNCTION TO CASE)



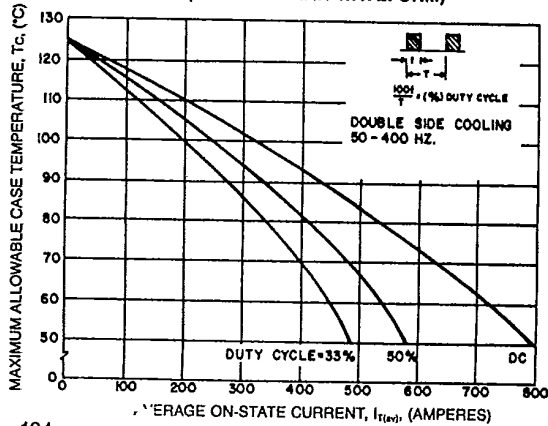
MAXIMUM ALLOWABLE CASE TEMPERATURE (SINUSOIDAL WAVEFORM)



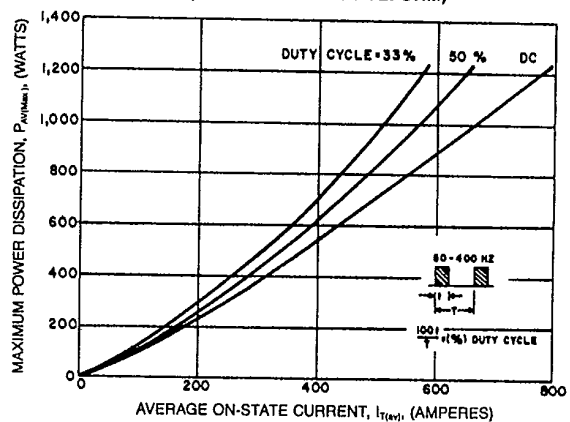
MAXIMUM ON-STATE POWER DISSIPATION (SINUSOIDAL WAVEFORM)



MAXIMUM ALLOWABLE CASE TEMPERATURE (RECTANGULAR WAVEFORM)



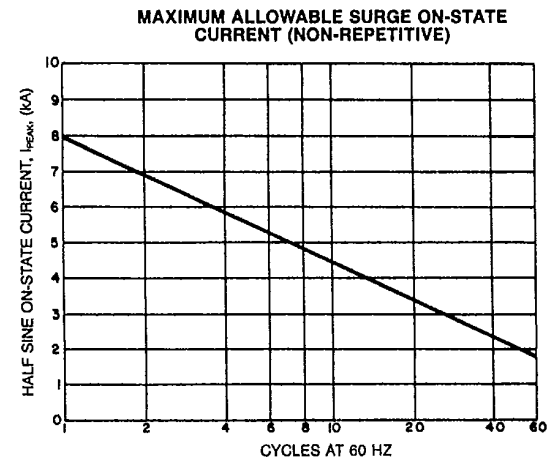
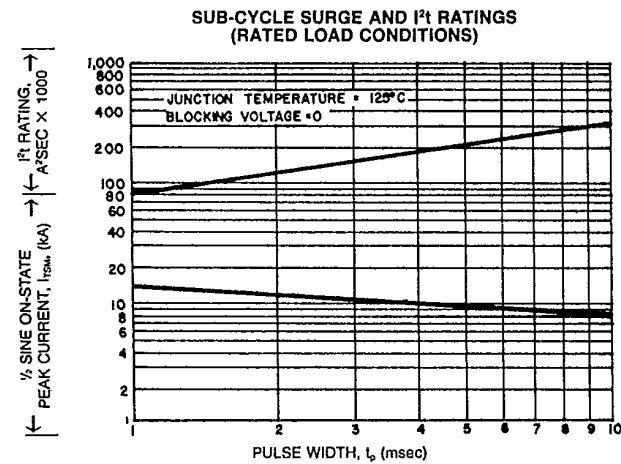
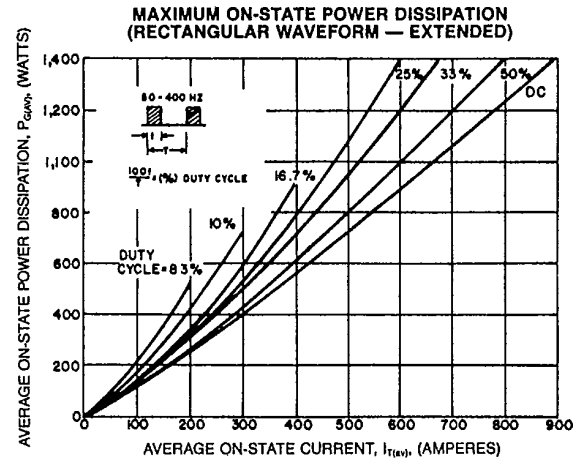
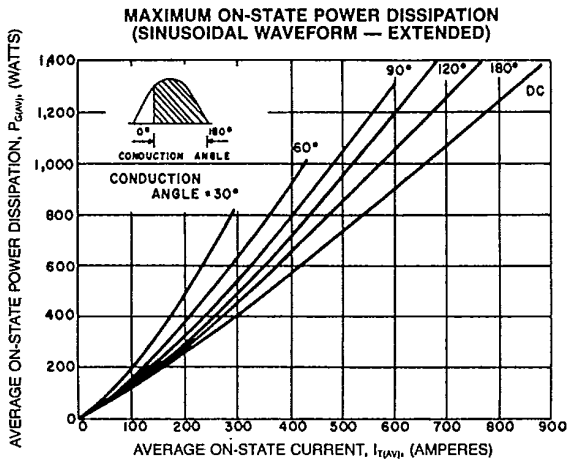
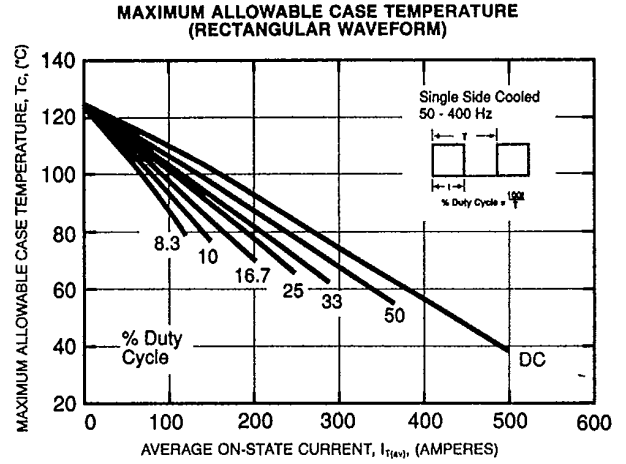
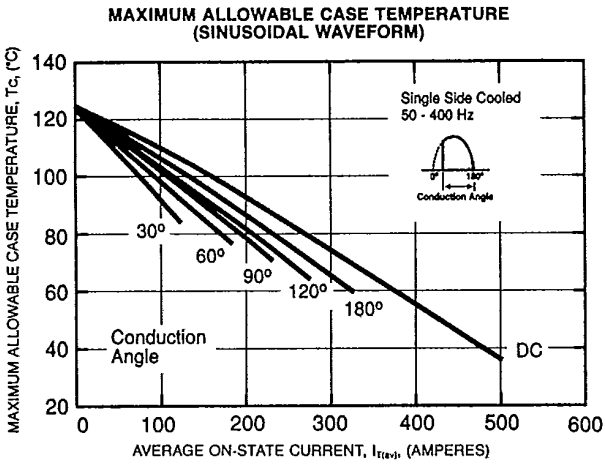
MAXIMUM ON-STATE POWER DISSIPATION (RECTANGULAR WAVEFORM)





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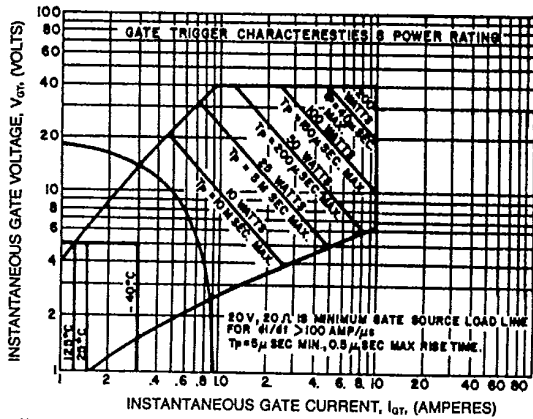




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**GATE CHARACTERISTICS**



**NOTES:**

1. Maximum allowable gate power 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.