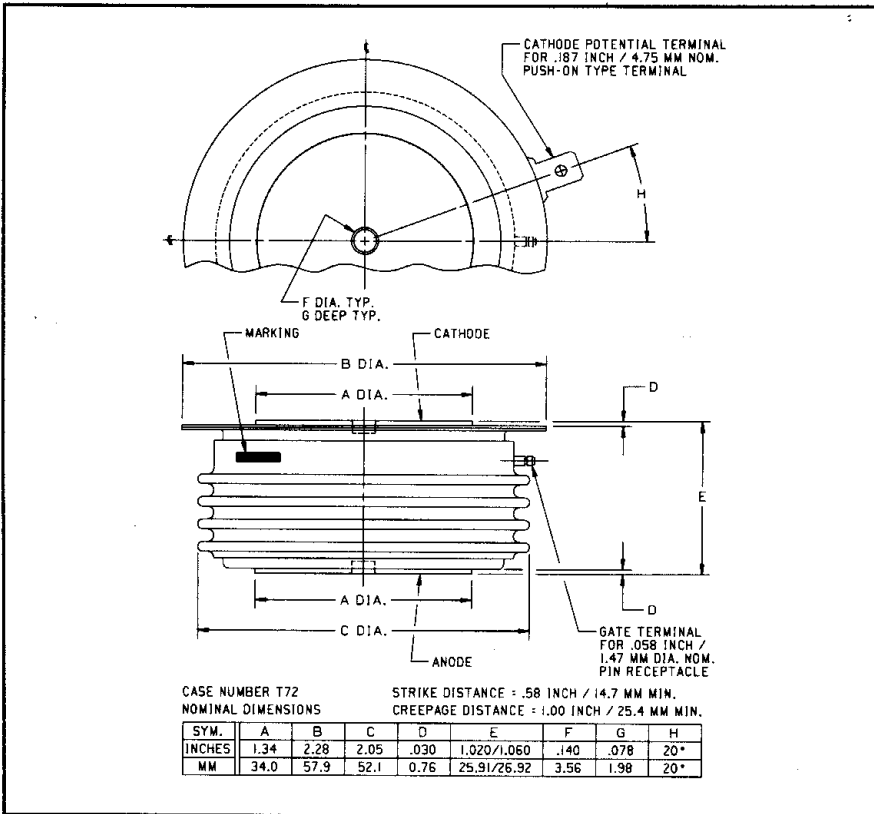


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**Phase Control SCR**  
490 Amperes Average  
2400 Volts



C391 (Outline Drawing)



C391 Phase Control SCR  
490 Amperes Average, 2400 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
- ☐ VAR Generators

### Ordering Information:

Select the complete six digit part number you desire from the table, i.e. C391LD is a 2400 Volt, 490 Ampere Phase Control SCR.

| Type | Voltage                |      | Current   |
|------|------------------------|------|-----------|
|      | $V_{DRM}$<br>$V_{RRM}$ | Code | $I_T(av)$ |
| C391 | 1400                   | PD   | 490       |
|      | 1600                   | PM   |           |
|      | 1800                   | PN   |           |
|      | 2000                   | L    |           |
|      | 2200                   | LB   |           |
|      | 2400                   | LD   |           |

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C391

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490 Amperes Average, 2400 Volts

## Absolute Maximum Ratings

|                                                               | Symbol       | C391         | Units                  |
|---------------------------------------------------------------|--------------|--------------|------------------------|
| RMS On-State Current @ $T_C = 64^\circ\text{C}$               | $I_{T(RMS)}$ | 770          | Amperes                |
| Average On-State Current @ $T_C = 64^\circ\text{C}$           | $I_{T(av)}$  | 490          | 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) | $I_{TSM}$    | 7000         | Amperes                |
| Critical Rate-of-Rise of On-State Current (Non-Repetitive)    | $di/dt$      | 150          | Amperes/ $\mu\text{s}$ |
| Critical Rate-of-Rise of On-State Current (Repetitive)        | $di/dt$      | 75           | Amperes/ $\mu\text{s}$ |
| $I^2t$ (for Fusing), One Cycle at 60Hz                        | $I^2t$       | 265,000      | $\text{A}^2\text{sec}$ |
| Peak Gate Power Dissipation                                   | $P_{GM}$     | 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                                                |              | 2000 to 2500 | lb.                    |
| Mounting Force                                                |              | 8.9 to 11.1  | kN                     |

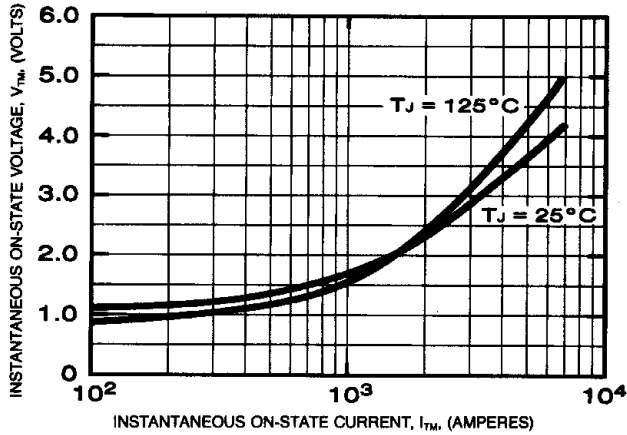
## Electrical and Thermal Characteristics

| Characteristics                                                         | Symbol          | Test Conditions                                                                                                                                                                                                                                                                                                                                | C391 | Units                        |
|-------------------------------------------------------------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------------------------------|
| <b>Voltage—Blocking State Maximums</b>                                  |                 |                                                                                                                                                                                                                                                                                                                                                |      |                              |
| Forward Leakage, Peak                                                   | $I_{DRM}$       | $T_J = 125^\circ\text{C}$ , Rated $V_{DRM}$                                                                                                                                                                                                                                                                                                    | 45   | mA                           |
| Reverse Leakage, Peak                                                   | $I_{RRM}$       | $T_J = 125^\circ\text{C}$ , Rated $V_{RRM}$                                                                                                                                                                                                                                                                                                    | 45   | mA                           |
| <b>Current—Conducting State Maximums</b>                                |                 |                                                                                                                                                                                                                                                                                                                                                |      |                              |
| Peak On-State Voltage                                                   | $V_{TM}$        | $I_{TM} = 3000\text{A}$ Peak, Duty Cycle $\leq 0.01\%$ , $T_C = 25^\circ\text{C}$                                                                                                                                                                                                                                                              | 2.65 | Volts                        |
| <b>Switching</b>                                                        |                 |                                                                                                                                                                                                                                                                                                                                                |      |                              |
| Typical Turn-Off Time                                                   | $t_q$           | $T_J = 125^\circ\text{C}$ ; $I_{TM} = 500$ Amps; $V_R = 50$ Volts Min.;<br>.8 $\times V_{DRM}$ (Reapplied); Rate-of-Rise of Reapplied<br>Off-State Voltage = $20\text{V}/\mu\text{sec}$ (linear);<br>Commutation $di/dt = 25$ Amps/ $\mu\text{sec}$ ; Repetition<br>Rate = 1 pps; Gate Bias During Turn-Off<br>Interval = 0 Volts, $100\Omega$ | 200  | $\mu\text{sec}$              |
| Typical Delay Time                                                      | $t_d$           | $T_J = 25^\circ\text{C}$ , $I_{TM} = 50$ Adc, $V_{DRM}$ Rated.<br>Gate Supply: 20 Volts, $20\Omega$ , $0.1 \mu\text{sec}$<br>Max. Rise Time                                                                                                                                                                                                    | 1    | $\mu\text{sec}$              |
| Min. Critical $dv/dt$ exponential to $V_{DRM}$                          | $dv/dt$         | $0.8V_{DRM}$ Rated, $T_J = 125^\circ\text{C}$                                                                                                                                                                                                                                                                                                  | 200  | $\text{V}/\mu\text{sec}$     |
| <b>Thermal</b>                                                          |                 |                                                                                                                                                                                                                                                                                                                                                |      |                              |
| Maximum Thermal Resistance,<br>double sided cooling<br>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                                                 | $I_{GT}$        | $V_D = 6\text{Vdc}$ , $T_C = 25^\circ\text{C}$ , $R_L = 3\Omega$                                                                                                                                                                                                                                                                               | 150  | mA                           |
| Gate Voltage to Trigger                                                 | $V_{GT}$        | $T_C = -40$ to $+125^\circ\text{C}$ , $V_D = 6\text{Vdc}$ , $R_L = 3\Omega$                                                                                                                                                                                                                                                                    | 5    | Volts                        |
| Non-Triggering Gate Voltage                                             | $V_{GDM}$       | $V = \text{rated } V_{DRM}$ , $T_C = 125^\circ\text{C}$ , $R_L = 1000\Omega$                                                                                                                                                                                                                                                                   | 0.15 | Volts                        |
| Peak Forward Gate Current                                               | $I_{GTM}$       |                                                                                                                                                                                                                                                                                                                                                | 10   | Amperes                      |
| Peak Reverse Gate Voltage                                               | $V_{GRM}$       |                                                                                                                                                                                                                                                                                                                                                | 5    | Volts                        |

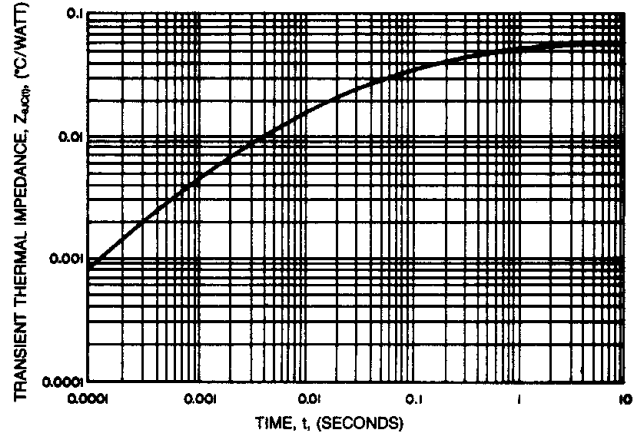
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**C391**  
**Phase Control SCR**  
490 Amperes Average, 2400 Volts

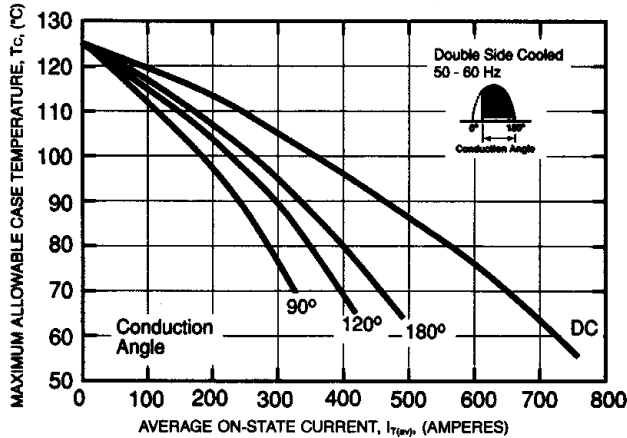
**MAXIMUM ON-STATE CHARACTERISTICS**



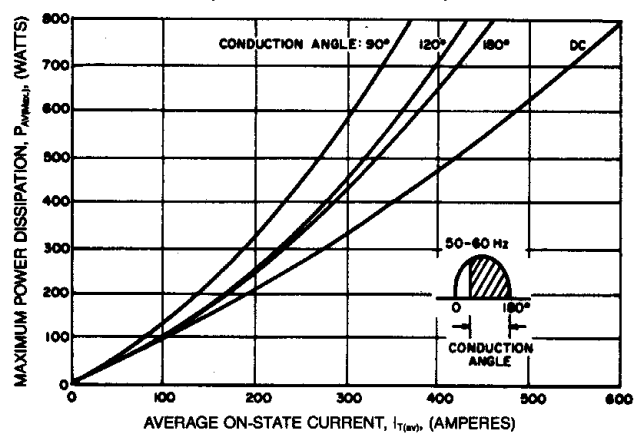
**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (JUNCTION TO CASE)**



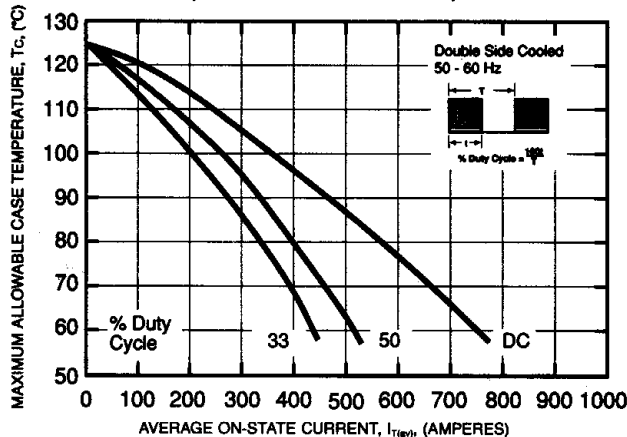
**MAXIMUM ALLOWABLE CASE TEMPERATURE (SINUSOIDAL WAVEFORM)**



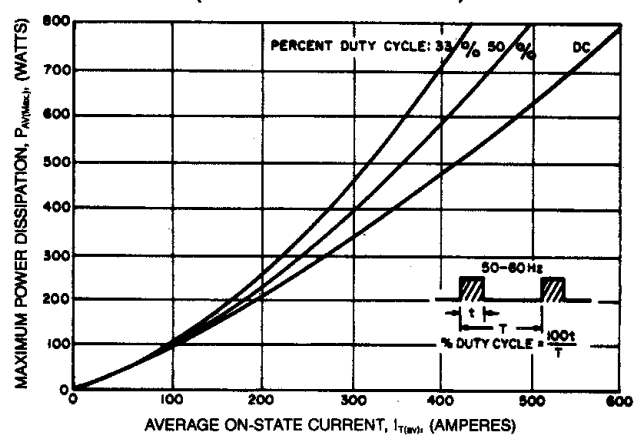
**MAXIMUM ON-STATE POWER DISSIPATION (SINUSOIDAL WAVEFORM)**



**MAXIMUM ALLOWABLE CASE TEMPERATURE (RECTANGULAR WAVEFORM)**



**MAXIMUM ON-STATE POWER DISSIPATION (RECTANGULAR WAVEFORM)**



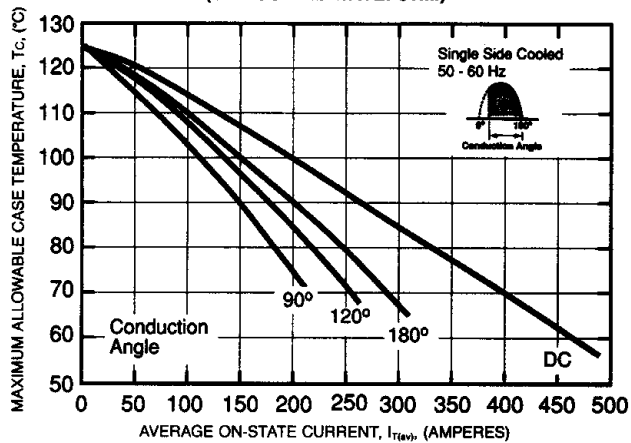
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C391

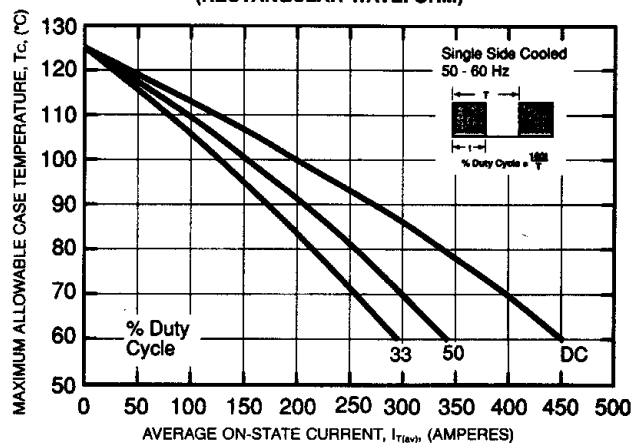
Phase Control SCR

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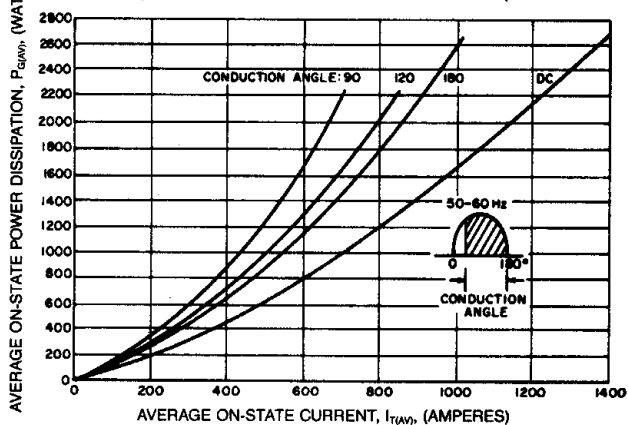
MAXIMUM ALLOWABLE CASE TEMPERATURE  
(SINUSOIDAL WAVEFORM)



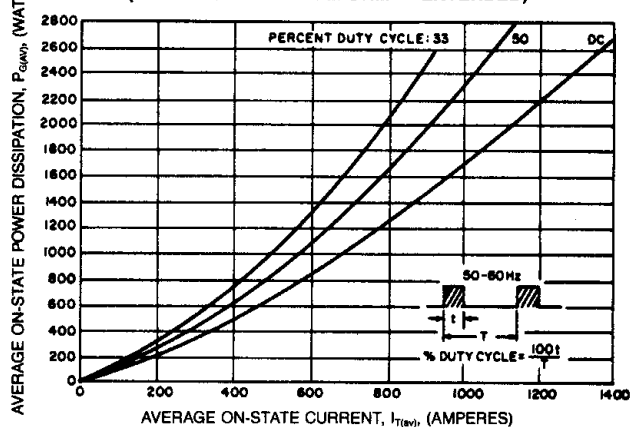
MAXIMUM ALLOWABLE CASE TEMPERATURE  
(RECTANGULAR WAVEFORM)



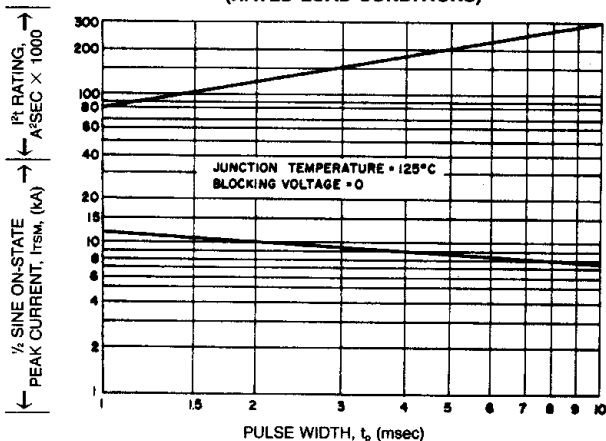
MAXIMUM ON-STATE POWER DISSIPATION  
(SINUSOIDAL WAVEFORM — EXTENDED)



MAXIMUM ON-STATE POWER DISSIPATION  
(RECTANGULAR WAVEFORM — EXTENDED)



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



GATE CHARACTERISTICS

