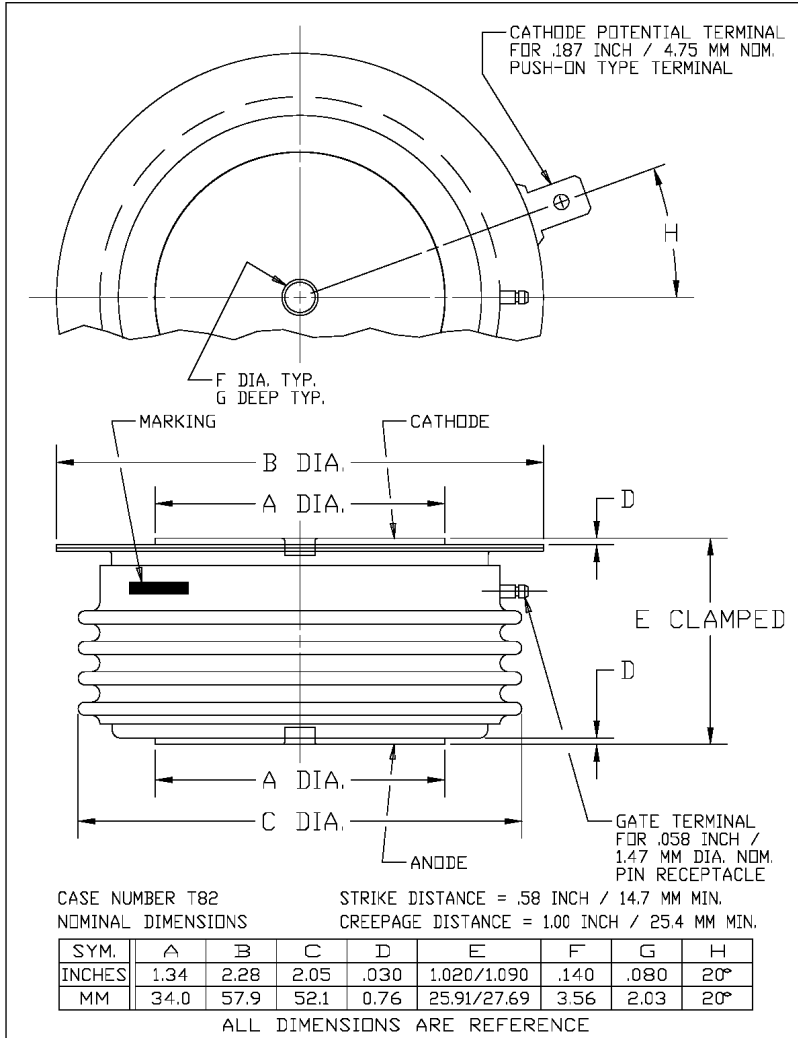


**Phase Control SCR**  
**750 Amperes Average**  
**2400 Volts**



**T820 750A (Outline Drawing)**



**T820 750A Phase Control SCR**  
750 Amperes Average, 2400 Volts

**Description:**

Powerex Silicon Controlled Rectifiers (SCR) are designed for phase control applications. These are all-diffused, Press-Pak, hermetic Pow-R-Disc devices employing the field proven amplifying gate.

**Features:**

- Low On-State Voltage
- High di/dt Capability
- High dv/dt Capability
- Hermetic Packaging
- Excellent Surge and I<sup>2</sup>t Ratings

**Applications:**

- Power Supplies
- Motor Control

**Ordering Information:**

Select the complete 12 digit module part number from the table below.  
Example: T820167504DH is a 1600V 750A Phase Control SCR.

| Type | Voltage<br>V <sub>RRM</sub><br>(Volts) | Current<br>I <sub>T(av)</sub><br>(A) | Turn-off Time<br>t <sub>q</sub><br>(µsec) | Gate Current<br>I <sub>GT</sub><br>(mA) | Lead Code |
|------|--|--------------------------------------|---|---|-----------|
| T820 | 02<br>through<br>24                    | 75                                   | 0   | 4                                       | DH        |
|      | 200V<br>through<br>2400V               | 750A                                 | 200 µsec<br>(Typical)                     | 150 mA                                  | 12"       |



**T820  
750A**

Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272  
www.pwrx.com

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

### Absolute Maximum Ratings

| Characteristics  | Symbol       |                  | Units              |
|--|--------------|------------------|--------------------|
| Non-Repetitive Transient Peak Reverse Blocking Voltage       | $V_{RSM}$    | $V_{RRM} + 100V$ | Volts              |
| RMS On-State Current, $T_C = 70^\circ C$                     | $I_{T(RMS)}$ | 1175             | Amperes            |
| Average Current 180° Sine Wave, $T_C = 70^\circ C$           | $I_{T(AV)}$  | 750              | Amperes            |
| RMS On-State Current, $T_C = 55^\circ C$                     | $I_{T(RMS)}$ | 1500             | Amperes            |
| Average Current 180° Sine Wave, $T_C = 55^\circ C$           | $I_{T(AV)}$  | 960              | Amperes            |
| Peak One Cycle Surge On-State Current (Non-Repetitive) 60 Hz | $I_{TSM}$    | 12,000           | Amperes            |
| Peak One Cycle Surge On-State Current (Non-Repetitive) 50 Hz | $I_{TSM}$    | 10,950           | Amperes            |
| Critical Rate-of-rise of On-State Current (Non-Repetitive)   | di/dt        | 400              | A/ $\mu$ sec       |
| Critical Rate-of-rise of On-State Current (Repetitive)       | di/dt        | 150              | A/ $\mu$ sec       |
| $I^2t$ (for Fusing) for One Cycle, 60 Hz                     | $I^2t$       | 600,000          | A <sup>2</sup> sec |
| Peak Gate Power Dissipation                                  | $P_{GM}$     | 16               | Watts              |
| Average Gate Power Dissipation                               | $P_{G(av)}$  | 3                | Watts              |
| Operating Temperature  | $T_J$        | -40 to +125      | $^\circ C$         |
| Storage Temperature  | $T_{stg}$    | -40 to +150      | $^\circ C$         |
| Approximate Weight   |              | 8                | oz.                |
|  |              | 227              | g                  |
| Mounting Force   |              | 3000 to 3500     | lb.                |
|  |              | 1360 to 1590     | kg.                |

Information presented is based upon manufacturers testing and projected capabilities.  
This information is subject to change without notice.  
The manufacturer makes no claim as to the suitability of use, reliability, capability,  
or future availability of this product.

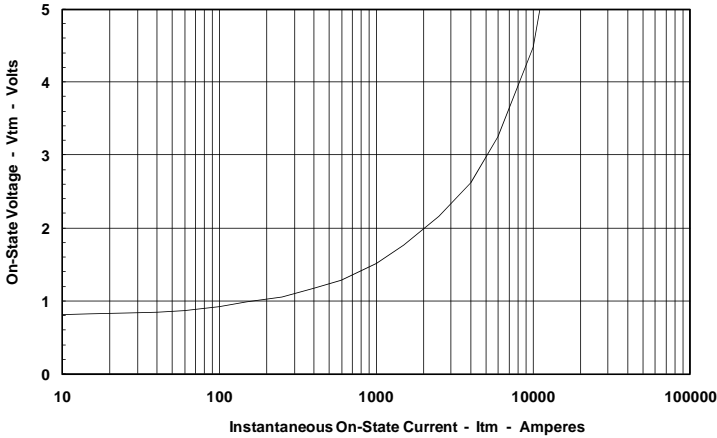
**Electrical Characteristics,  $T_J=25^\circ\text{C}$  unless otherwise specified**

| Characteristics                                     | Symbol      | Test Conditions   | Min. | Typ. | Max.       | Units                  |
|---|-------------|---|------|------|------------|------------------------|
| Repetitive Peak Reverse Leakage Current             | $I_{RRM}$   | $T_J=125^\circ\text{C}$ , $V_R = V_{RRM}$   |      |      | 60         | mA                     |
| Repetitive Peak Forward Leakage Current             | $I_{DRM}$   | $T_J=125^\circ\text{C}$ , $V_D = V_{DRM}$   |      |      | 60         | mA                     |
| Peak On-State Voltage                               | $V_{TM}$    | $I_{FM}=1500\text{A}$ peak,<br>Duty Cycle < 0.1 %   |      |      | 1.65       | V                      |
| Threshold Voltage, Low-level                        | $V_{(TO)1}$ | $T_J = 125^\circ\text{C}$ , $I = 15\%I_{T(AV)}$ to $\pi I_{T(AV)}$  |      |      | 0.97268    | V                      |
| Slope Resistance, Low-level                         | $r_{T1}$    |   |      |      | 0.4950     | $m\Omega$              |
| Threshold Voltage, High-level                       | $V_{(TO)2}$ | $T_J = 125^\circ\text{C}$ , $I = \pi I_{T(AV)}$ to $I_{TSM}$  |      |      | 1.2785     | V                      |
| Slope Resistance, High-level                        | $r_{T2}$    |   |      |      | 0.3365     | $m\Omega$              |
| $V_{TM}$ Coefficients, Low-level                    |             | $T_J = 125^\circ\text{C}$ , $I = 15\%I_{T(AV)}$ to $\pi I_{T(AV)}$<br>$V_{TM} = A + B \ln(I) + C(I) + D \text{ Sqrt}(I)$                                      |      | A =  | 0.50605    |                        |
|   |             |   |      | B =  | 0.073285   |                        |
|   |             |   |      | C =  | 2.864 E-04 |                        |
|   |             |   |      | D =  | 0.007176   |                        |
| $V_{TM}$ Coefficients, High-level                   |             | $T_J = 125^\circ\text{C}$ , $I = \pi I_{T(AV)}$ to $I_{TSM}$<br>$V_{TM} = A + B \ln(I) + C(I) + D \text{ Sqrt}(I)$  |      | A =  | -10.717    |                        |
|   |             |   |      | B =  | 2.2006     |                        |
|   |             |   |      | C =  | 7.43 E-04  |                        |
|   |             |   |      | D =  | -0.12418   |                        |
| Typical Turn-On Time                                | $t_{on}$    | $I_T = 1000\text{A}$ , $V_D = 600\text{V}$  |      | 5    |            | $\mu\text{s}$          |
| Typical Turn-Off Time                               | $t_q$       | $T_J = 125^\circ\text{C}$ , $I_T = 250\text{A}$ ,<br>$di_r/dt = 50\text{A}/\mu\text{s}$ Reapplied<br>$dv/dt = 20\text{V}/\mu\text{s}$ Linear to 80% $V_{DRM}$ |      | 200  |            | $\mu\text{s}$          |
| Minimum Critical $dv/dt$ – Exponential to $V_{DRM}$ | $dv/dt$     | $T_J = 125^\circ\text{C}$   | 300  |      |            | $\text{V}/\mu\text{s}$ |
| Gate Trigger Current                                | $I_{GT}$    | $T_J = 25^\circ\text{C}$ , $V_D = 12\text{V}$   |      |      | 150        | mA                     |
| Gate Trigger Voltage                                | $V_{GT}$    | $T_J = 25^\circ\text{C}$ , $V_D = 12\text{V}$   |      |      | 3.0        | V                      |
| Non-Triggering Gate Voltage                         | $V_{GDM}$   | $T_J = 125^\circ\text{C}$ , $V_D = V_{DRM}$   |      |      | 0.15       | V                      |
| Peak Forward Gate Current                           | $I_{GTM}$   |   |      |      | 4          | A                      |
| Peak Reverse Gate Voltage                           | $V_{GRM}$   |   |      |      | 5          | V                      |

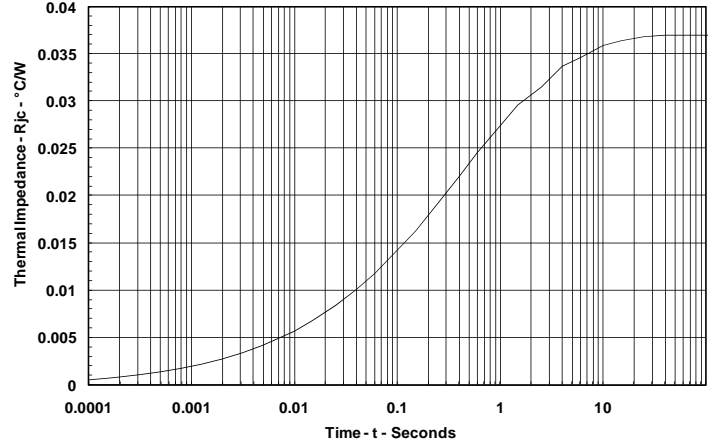
**Thermal Characteristics**

| Characteristics                                  | Symbol            | Max.  | Units                     |
|--|-------------------|-------|---------------------------|
| Maximum Thermal Resistance, Double Sided Cooling |                   |       |                           |
| Junction-to-Case                                 | $R_{\theta(J-C)}$ | 0.037 | $^\circ\text{C}/\text{W}$ |
| Case-to-Sink                                     | $R_{\theta(C-S)}$ | 0.020 | $^\circ\text{C}/\text{W}$ |

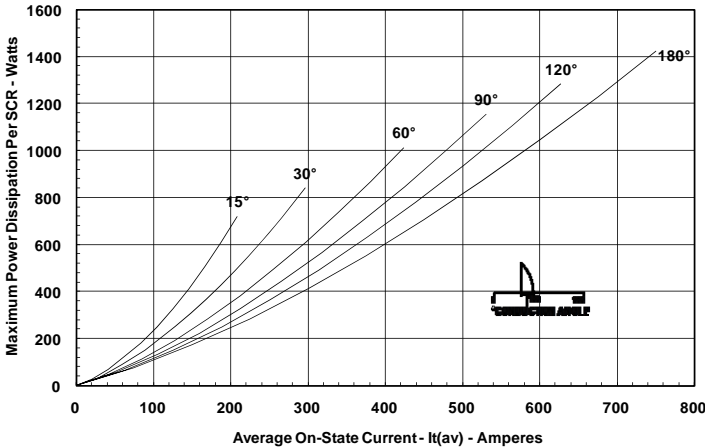
**Maximum On-State Forward Voltage Drop**  
( $T_j = 125^\circ\text{C}$ )



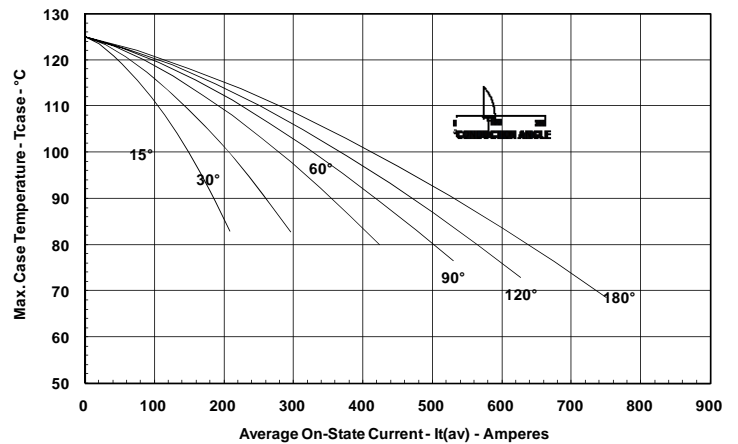
**Maximum Transient Thermal Impedance**  
(Junction to Case)



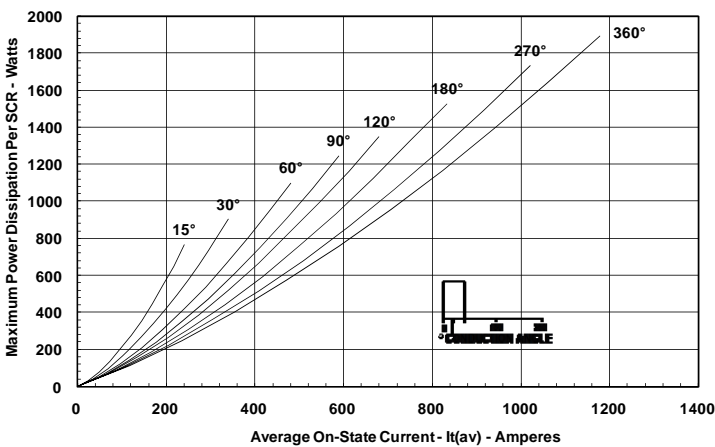
**Maximum On-State Power Dissipation**  
(Sinusoidal Waveform)



**Maximum Allowable Case Temperature**  
(Sinusoidal Waveform)



**Maximum On-State Power Dissipation**  
(Rectangular Waveform)



**Maximum Allowable Case Temperature**  
(Rectangular Waveform)

