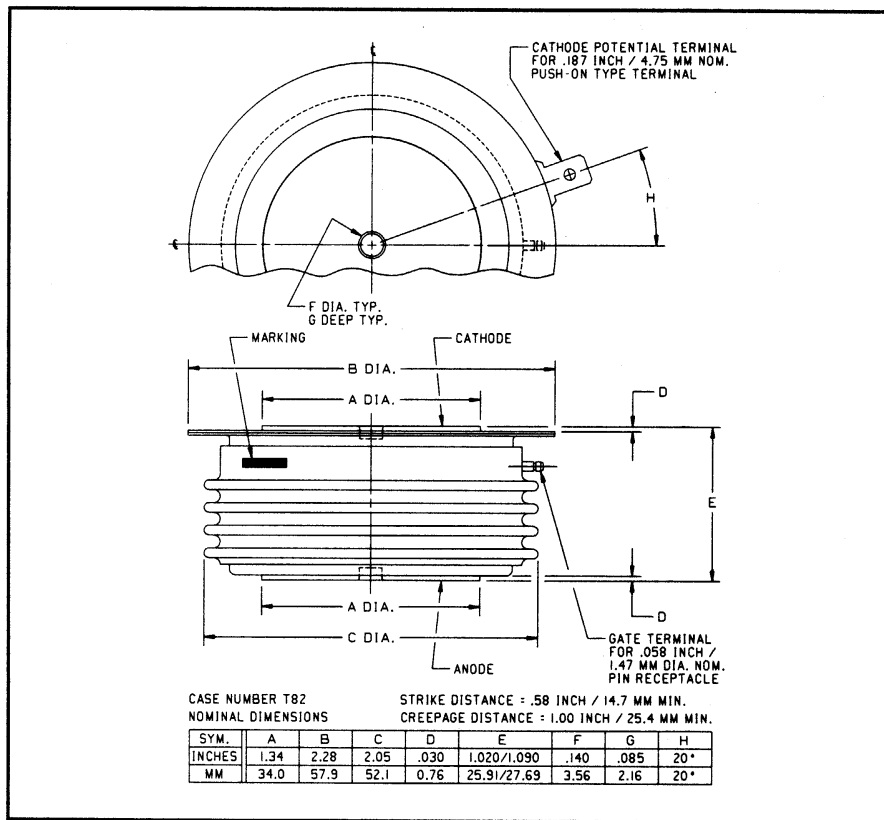


Powerex, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800 (412) 925-7272  
Powerex, Europe, S.A. 428 Avenue G. Durand, BP107, 72003 Le Mans, France (43) 41.14.14

**Phase Control SCR**  
900 Amperes Average  
1600 Volts



T820 900A (Outline Drawing)



T820 900A Phase Control SCR  
900 Amperes Average, 1600 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  $I^2t$  Ratings

### Applications:

- ☐ Power Supplies
- ☐ Motor Control

### Ordering Information:

Select the complete 12 digit part number you desire from the table below.

| Type | Voltage<br>$V_{DRM}/V_{RRM}$<br>(Volts) | Current<br>$I_T(av)$<br>(A) | Turn-off<br>$t_q$<br>( $\mu$ sec) | Gate Current<br>$I_{GT}$<br>(mA) | Lead Code     |
|------|-----------------------------------------|-----------------------------|-----------------------------------|----------------------------------|---------------|
| T820 | 02 through 16<br><br>200V through 1600V | 90<br><br>900A              | 0<br><br>200 $\mu$ sec (Typical)  | 4<br><br>150mA                   | DH<br><br>12" |

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**T820 900A**

**Phase Control SCR**

900 Amperes Average, 1600 Volts

## Absolute Maximum Ratings

| Characteristics                                             | Symbol       | T820 900A        | Units              |
|-------------------------------------------------------------|--------------|------------------|--------------------|
| Non-repetitive Transient Peak Reverse Voltage               | $V_{RSM}$    | $V_{RRM} + 100V$ | Volts              |
| RMS On-state Current, $T_C = 70^\circ C$                    | $I_{T(rms)}$ | 1410             | Amperes            |
| Average Current 180° Sine Wave, $T_C = 70^\circ C$          | $I_{T(av)}$  | 900              | Amperes            |
| RMS On-state Current, $T_C = 55^\circ C$                    | $I_{T(rms)}$ | 1725             | Amperes            |
| Average Current 180° Sine Wave, $T_C = 55^\circ C$          | $I_{T(av)}$  | 1100             | Amperes            |
| Peak One Cycle Surge On-state Current (Non-repetitive) 60Hz | $I_{tsm}$    | 15000            | Amperes            |
| Peak One Cycle Surge On-state Current (Non-repetitive) 50Hz | $I_{tsm}$    | 13700            | 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, 60Hz                     | $I^2t$       | 935,000          | 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°C    | °C                 |
| Storage Temperature                                         | $T_{stg}$    | -40 to +150°C    | °C                 |
| Approximate Weight                                          |              | 8                | oz.                |
|                                                             |              | 227              | g                  |
| Mounting Force                                              |              | 3000 to 3500     | lb.                |
|                                                             |              | 1360 to 1590     | kg.                |

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T820 900A

Phase Control SCR

900 Amperes Average, 1600 Volts

## Electrical Characteristics, $T_j = 25^\circ\text{C}$ Unless Otherwise Specified

| Characteristics                                     | Symbol      | Test Conditions                                                                                                                                                      | Min. | Typ. | Max.                                                                                 | Units                    |
|-----------------------------------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|--------------------------------------------------------------------------------------|--------------------------|
| Repetitive Peak Reverse Leakage Current             | $I_{RRM}$   | $T_j = 125^\circ\text{C}$ , $V_R = V_{RRM}$                                                                                                                          |      |      | 35                                                                                   | mA                       |
| Repetitive Peak Forward Leakage Current             | $I_{DRM}$   | $T_j = 125^\circ\text{C}$ , $V_D = V_{DRM}$                                                                                                                          |      |      | 35                                                                                   | mA                       |
| Peak On-state Voltage                               | $V_{TM}$    | $I_{TM} = 1500\text{A Peak}$<br>Duty Cycle $< 0.1\%$                                                                                                                 |      |      | 1.35                                                                                 | Volts                    |
| Threshold Voltage, Low-level                        | $V_{(TO)1}$ | $T_j = 125^\circ\text{C}$ , $I = 15\%$ , $I_{T(av)}$ to $\pi I_{T(av)}$                                                                                              |      |      | 0.78526                                                                              | Volts                    |
| Slope Resistance, Low-level                         | $r_{T1}$    |                                                                                                                                                                      |      |      | 0.3505                                                                               | $\text{m}\Omega$         |
| Threshold Voltage, High-level                       | $V_{(TO)2}$ | $T_j = 125^\circ\text{C}$ , $I = \pi I_{T(av)}$ to $I_{TSM}$                                                                                                         |      |      | 1.0789                                                                               | Volts                    |
| Slope Resistance, High-level                        | $r_{T2}$    |                                                                                                                                                                      |      |      | 0.2311                                                                               | $\text{m}\Omega$         |
| $V_{TM}$ Coefficients, Low-level                    |             | $T_j = 125^\circ\text{C}$ , $I = 15\%$ $I_{T(av)}$ to $\pi I_{T(av)}$                                                                                                |      |      | $A_1 = 0.68865$<br>$B_1 = -0.04011$<br>$C_1 = -1.578\text{E-}05$<br>$D_1 = 0.025339$ |                          |
| $V_{TM}$ Coefficients, High-level                   |             | $T_j = 125^\circ\text{C}$ , $I = \pi I_{T(av)}$ to $I_{TSM}$                                                                                                         |      |      | $A_2 = 2.6289$<br>$B_2 = -0.37766$<br>$C_2 = 8.873\text{E-}05$<br>$D_2 = 0.034055$   |                          |
| Typical Turn-on Time                                | $t_{on}$    | $I_T = 1000\text{A}$ , $V_D = 600\text{V}$                                                                                                                           |      | 5    |                                                                                      | $\mu\text{sec}$          |
| Typical Turn-off Time                               | $t_q$       | $T_j = 125^\circ\text{C}$ , $I_T = 250\text{A}$ ,<br>$di_R/dt = 50\text{A}/\mu\text{sec}$ Reapplied<br>$dv/dt = 20\text{V}/\mu\text{sec}$ Linear to<br>80% $V_{DRM}$ |      | 200  |                                                                                      | $\mu\text{sec}$          |
| Minimum Critical $dv/dt$ - Exponential to $V_{DRM}$ | $dv/dt$     | $T_j = 125^\circ\text{C}$                                                                                                                                            | 300  |      |                                                                                      | $\text{V}/\mu\text{sec}$ |
| 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                                                                                  | Volts                    |
| Non-Triggering Gate Voltage                         | $V_{GDM}$   | $T_j = 125^\circ\text{C}$ , $V_D = V_{DRM}$                                                                                                                          |      |      | 0.15                                                                                 | Volts                    |
| Peak Forward Gate Current                           | $I_{GTM}$   |                                                                                                                                                                      |      |      | 4                                                                                    | A                        |
| Peak Reverse Gate Voltage                           | $V_{GRM}$   |                                                                                                                                                                      |      |      | 5                                                                                    | Volts                    |

## Thermal Characteristics

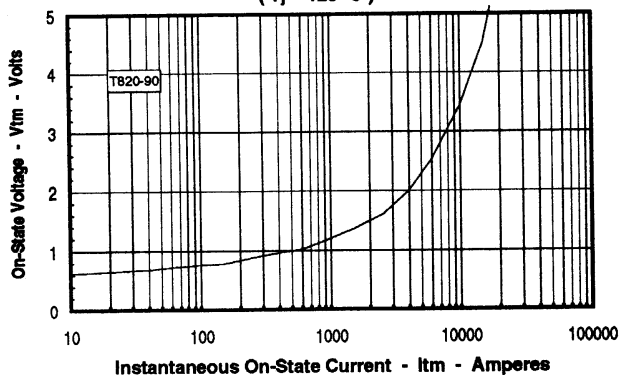
Maximum Thermal Resistance, Double Sided Cooling

|                  |                   |       |                           |
|------------------|-------------------|-------|---------------------------|
| Junction-to-Case | $R_{\theta(j-c)}$ | 0.037 | $^\circ\text{C}/\text{W}$ |
| Case-to-Sink     | $R_{\theta(c-s)}$ | 0.020 | $^\circ\text{C}/\text{W}$ |

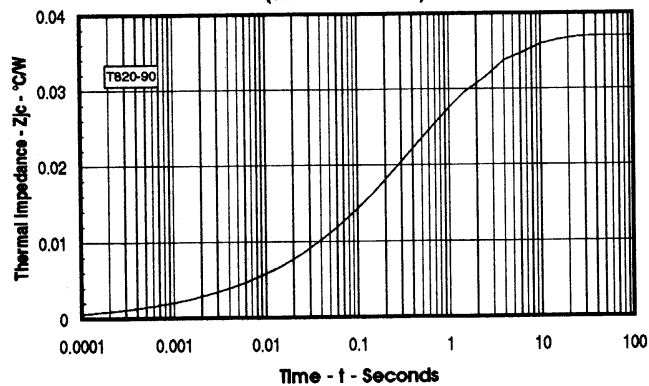
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**T820 900A**  
**Phase Control SCR**  
900 Amperes Average, 1600 Volts

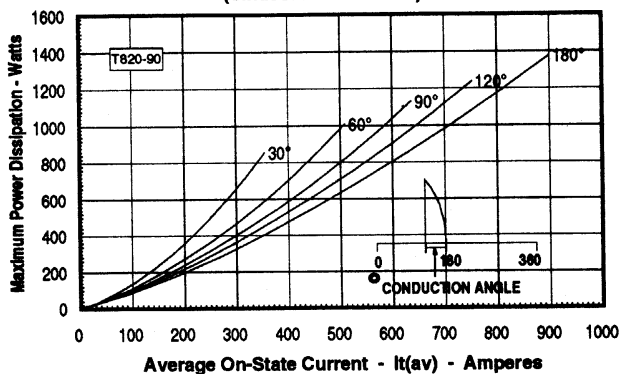
**Maximum On-State Forward Voltage Drop**  
( $T_J = 125^\circ\text{C}$ )



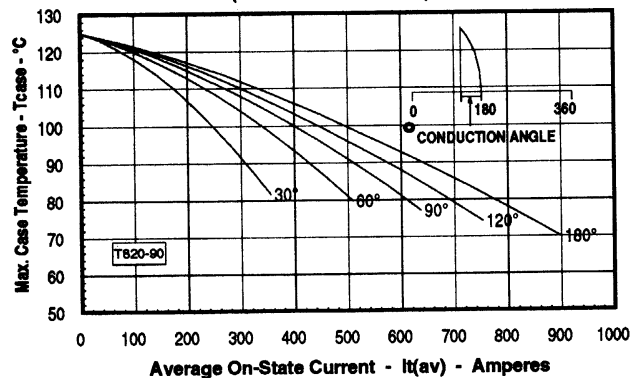
**Maximum Transient Thermal Impedance**  
(Junction to Case)



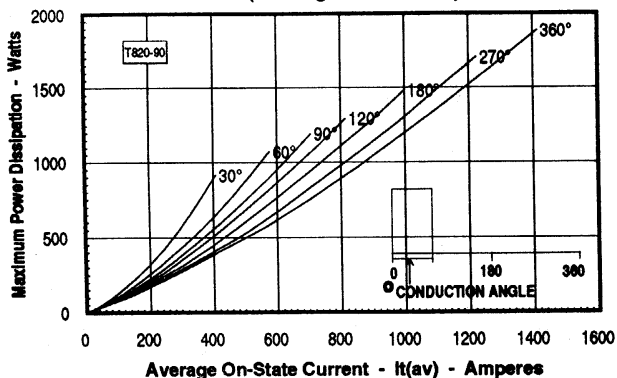
**Maximum On-State Power Dissipation**  
(Sinusoidal Waveform)



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



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



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

