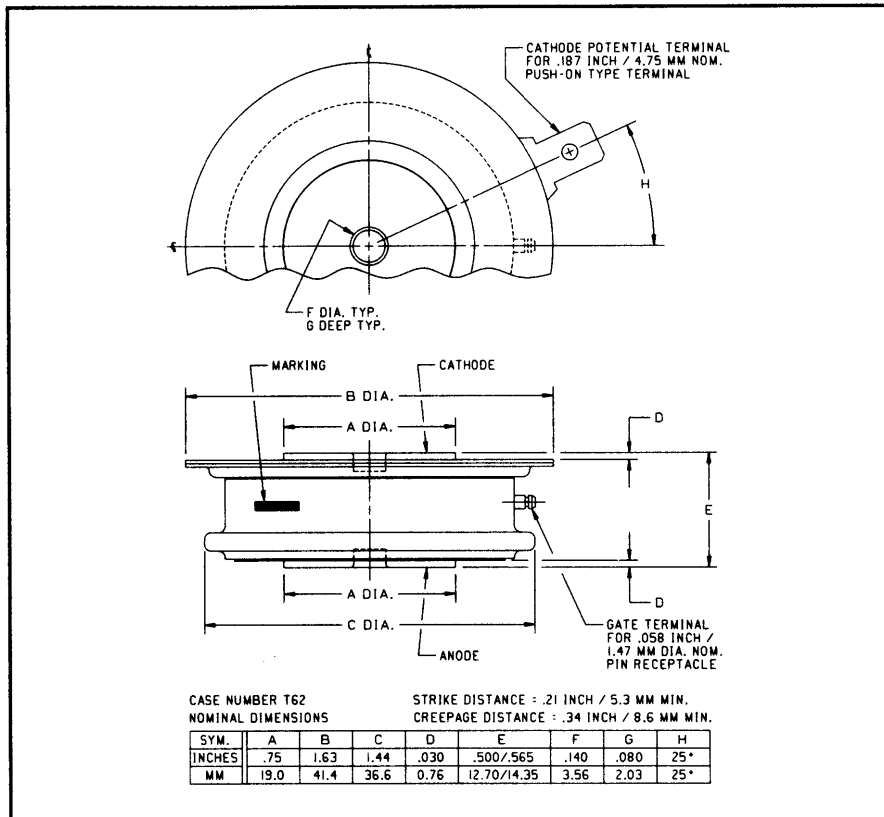
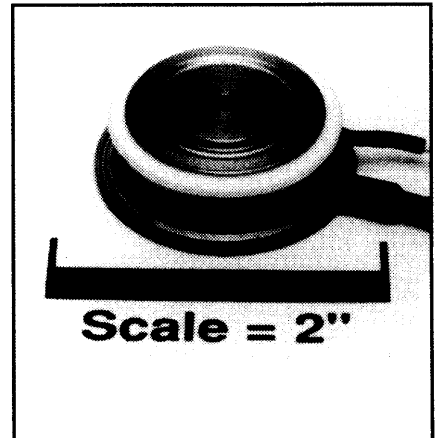


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Powerex, Europe, S.A. 428 Avenue G. Durand, BP107, 72003 Le Mans, France (43) 41.14.14

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



C380 (Outline Drawing)



C380 Phase Control SCR  
250 Amperes Average, 1600 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 five or six digit part number you desire from the table, i.e. C380PM is a 1600 Volt, 250 Ampere Phase Control SCR.

| Type | Voltage                |      | Current     |
|------|------------------------|------|-------------|
|      | $V_{DRM}$<br>$V_{RRM}$ | Code | $I_{T(av)}$ |
| C380 | 400                    | D    | 250         |
|      | 600                    | M    |             |
|      | 800                    | N    |             |
|      | 1000                   | P    |             |
|      | 1200                   | PB   |             |
|      | 1400                   | PD   |             |
|      | 1600                   | PM   |             |



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**C380**  
**Phase Control SCR**  
250 Amperes Average, 1600 Volts

#### Absolute Maximum Ratings

|                                                               | Symbol       | C380        | Units                  |
|---------------------------------------------------------------|--------------|-------------|------------------------|
| RMS On-State Current @ $T_C = 74^\circ\text{C}$               | $I_{T(RMS)}$ | 400         | Amperes                |
| Average On-State Current @ $T_C = 74^\circ\text{C}$           | $I_{T(av)}$  | 250         | Amperes                |
| Peak One-Cycle Surge (Non Repetitive) On-State Current (60Hz) | $I_{TSM}$    | 3500        | Amperes                |
| Peak One-Cycle Surge (Non-Repetitive) On-State Current (50Hz) | $I_{TSM}$    | 3200        | Amperes                |
| Critical Rate-of-Rise of On-State Current (Non-Repetitive)    | $di/dt$      | 800         | Amperes/ $\mu\text{s}$ |
| Critical Rate-of-Rise of On-State Current (Repetitive)        | $di/dt$      | 500         | Amperes/ $\mu\text{s}$ |
| $I^2t$ (for Fusing), 8.3 milliseconds                         | $I^2t$       | 50,000      | $\text{A}^2\text{sec}$ |
| Peak Gate Power Dissipation                                   | $P_{GM}$     | 10          | Watts                  |
| Average Gate Power Dissipation                                | $P_{G(av)}$  | 2           | Watts                  |
| Storage Temperature                                           | $T_{STG}$    | -40 to 150  | $^\circ\text{C}$       |
| Operating Temperature                                         | $T_J$        | -40 to 125  | $^\circ\text{C}$       |
| Mounting Force                                                |              | 720 to 880  | lb.                    |
| Mounting Force                                                |              | 3.2 to 3.92 | kN                     |

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**C380**  
**Phase Control SCR**  
250 Amperes Average, 1600 Volts

## Electrical and Thermal Characteristics

| Characteristics                                     | Symbol          | Test Conditions                                                                                                                                                                                                                                                                                   | C380  | Units                 |
|-----------------------------------------------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----------------------|
| <b>Voltage—Blocking State Maximums</b>              |                 |                                                                                                                                                                                                                                                                                                   |       |                       |
| Forward Leakage, Peak                               | $I_{DRM}$       | $T_J = 125^\circ\text{C}, V = V_{DRM}$                                                                                                                                                                                                                                                            | 20    | mA                    |
| Reverse Leakage, Peak                               | $I_{RRM}$       | $T_J = 125^\circ\text{C}, V = V_{RRM}$                                                                                                                                                                                                                                                            | 20    | mA                    |
| <b>Current—Conducting State Maximums</b>            |                 |                                                                                                                                                                                                                                                                                                   |       |                       |
| Peak On-State Voltage                               | $V_{TM}$        | $I_{TM} = 1500\text{A Peak}, T_C = 25^\circ\text{C}, \text{Duty Cycle} \leq 0.01\%$                                                                                                                                                                                                               | 2.85  | Volts                 |
| <b>Switching</b>                                    |                 |                                                                                                                                                                                                                                                                                                   |       |                       |
| Typical Turn-Off Time                               | $t_q$           | $T_J = 120^\circ\text{C}, I_{TM} = 250\text{ amps};$<br>$V_R = 50\text{ Volts Min.}; V_{DRM} \text{ (Reapplied);}$<br>Rate-of-Rise of Reapplied Off-State;<br>Voltage = 20 Volts/ $\mu\text{sec}$ (Linear);<br>Gate Bias During Turn-Off Interval = 0 Volts,<br>100 Ohms Duty Cycle $\leq 0.01\%$ | 200   | $\mu\text{sec}$       |
| Typical Delay Time                                  | $t_d$           | $T_J = 25^\circ\text{C}, I_T = 100\text{ Adc}, V_{DRM} = \text{Rated};$<br>Gate Supply: 10 Volt Open Circuit, 25 Ohm,<br>0.1 $\mu\text{sec}$ max. rise time                                                                                                                                       | 1     | $\mu\text{sec}$       |
| Min. Critical dv/dt exponential to $V_{DRM}$        | dv/dt           | $T_J = 125^\circ\text{C}, \text{Gate Open}$                                                                                                                                                                                                                                                       | 200   | V/ $\mu\text{sec}$    |
| <b>Thermal</b>                                      |                 |                                                                                                                                                                                                                                                                                                   |       |                       |
| Maximum Thermal Resistance,<br>double sided cooling |                 |                                                                                                                                                                                                                                                                                                   |       |                       |
| Junction to Case                                    | $R_{\theta JC}$ |                                                                                                                                                                                                                                                                                                   | 0.095 | $^\circ\text{C/Watt}$ |
| Case to Sink, Lubricated                            | $R_{\theta CS}$ |                                                                                                                                                                                                                                                                                                   | 0.02  | $^\circ\text{C/Watt}$ |
| <b>Gate—Maximum Parameters</b>                      |                 |                                                                                                                                                                                                                                                                                                   |       |                       |
| Gate Current to Trigger                             | $I_{GT}$        | $V_D = 6\text{V}, T_C = 25^\circ\text{C}, R_L = 3\Omega$                                                                                                                                                                                                                                          | 150   | mA                    |
| Gate Voltage to Trigger                             | $V_{GT}$        | $V_D = 6\text{V}, T_C = -40\text{ to }125^\circ\text{C}, R_L = 3\Omega$                                                                                                                                                                                                                           | 3     | 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                 |

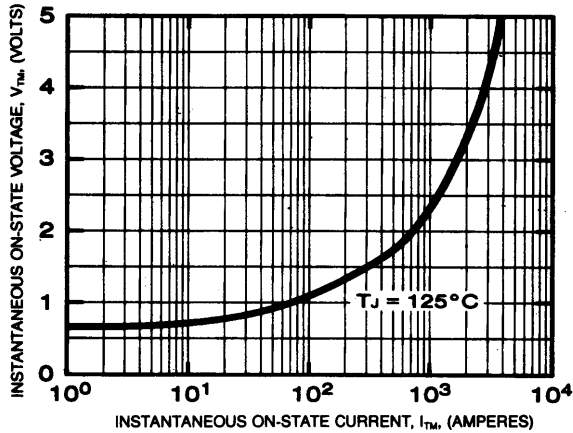
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## C380

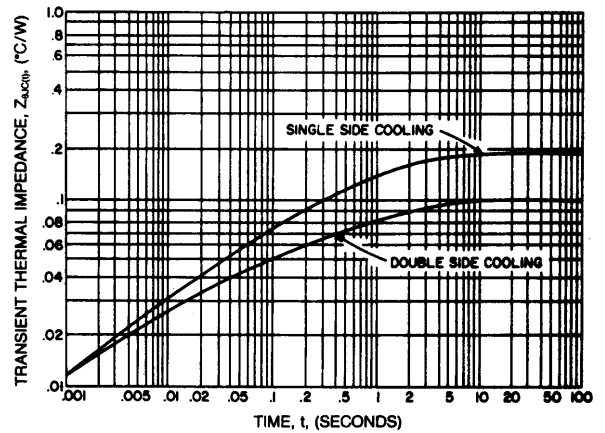
### Phase Control SCR

250 Amperes Average, 1600 Volts

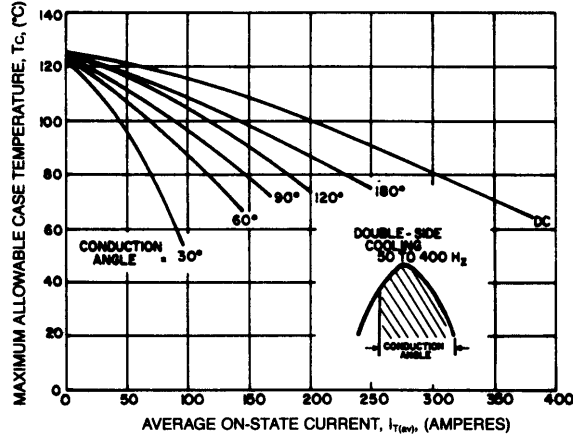
MAXIMUM ON-STATE CHARACTERISTICS



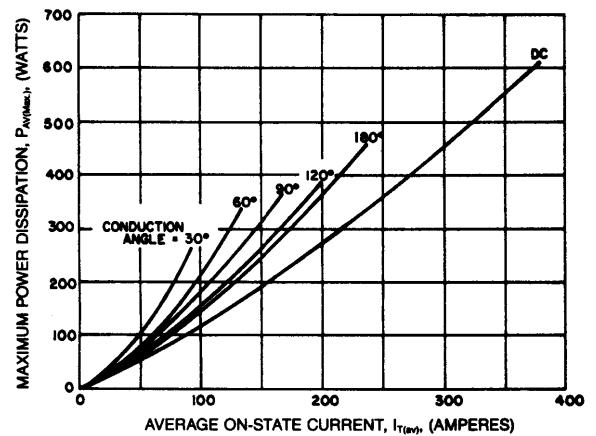
TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (JUNCTION TO CASE)



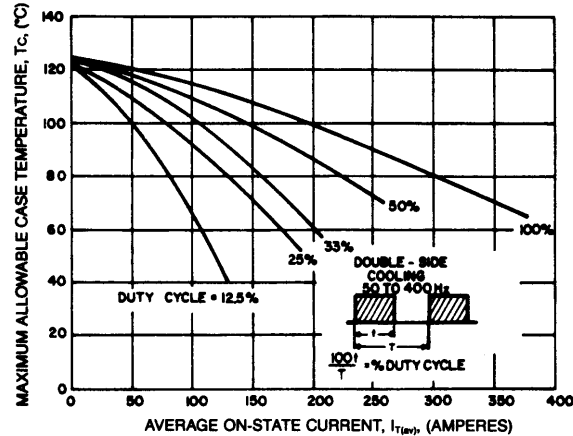
MAXIMUM ALLOWABLE CASE TEMPERATURE (SINUSOIDAL WAVEFORM)



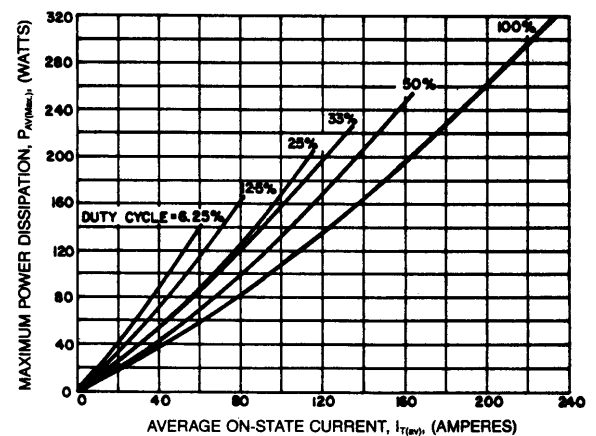
MAXIMUM ON-STATE POWER DISSIPATION (SINUSOIDAL WAVEFORM)



MAXIMUM ALLOWABLE CASE TEMPERATURE (RECTANGULAR WAVEFORM)



MAXIMUM ON-STATE POWER DISSIPATION (RECTANGULAR WAVEFORM)



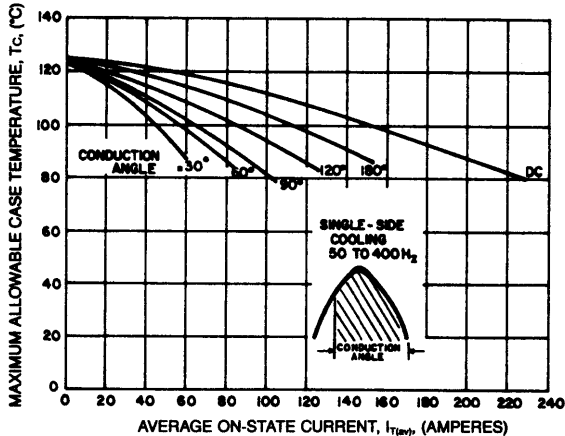
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## C380

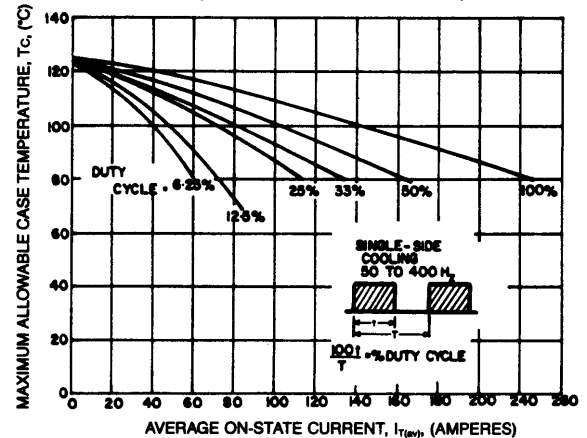
### Phase Control SCR

250 Amperes Average, 1600 Volts

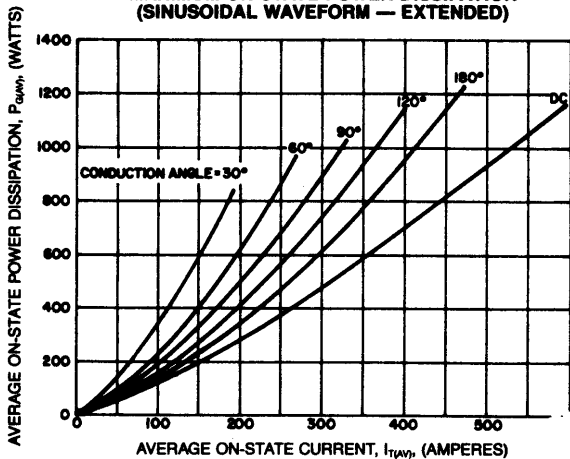
**MAXIMUM ALLOWABLE CASE TEMPERATURE  
(SINUSOIDAL WAVEFORM)**



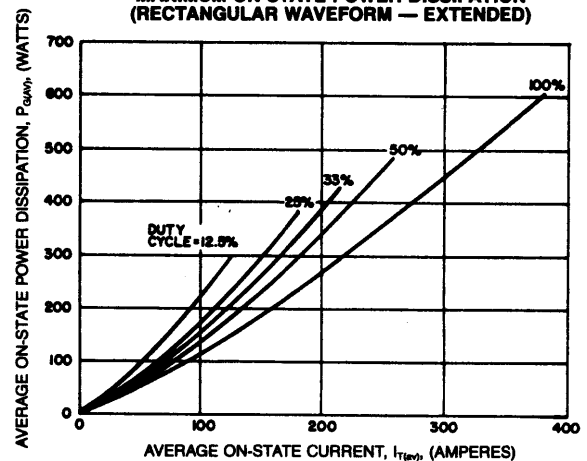
**MAXIMUM ALLOWABLE CASE TEMPERATURE  
(RECTANGULAR WAVEFORM)**



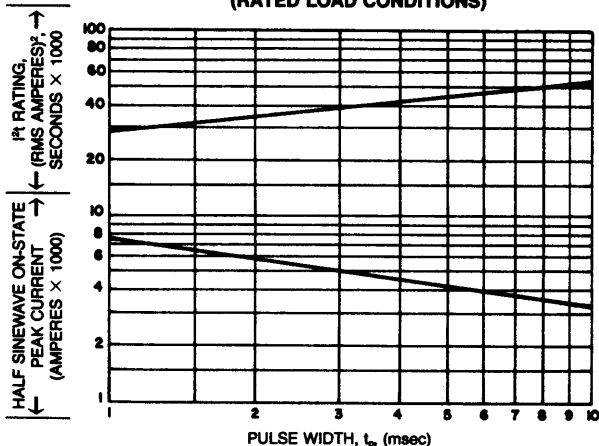
**MAXIMUM ON-STATE POWER DISSIPATION  
(SINUSOIDAL WAVEFORM — EXTENDED)**



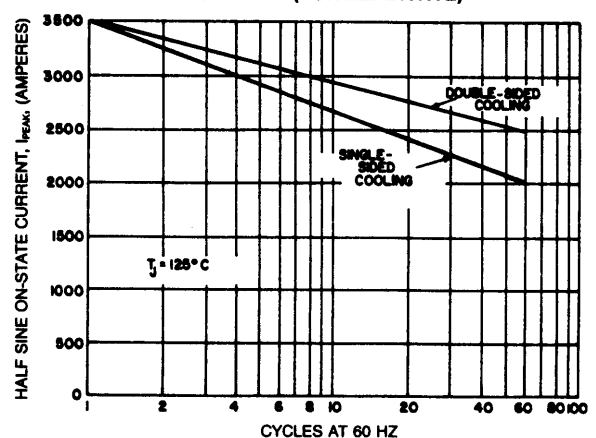
**MAXIMUM ON-STATE POWER DISSIPATION  
(RECTANGULAR WAVEFORM — EXTENDED)**



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



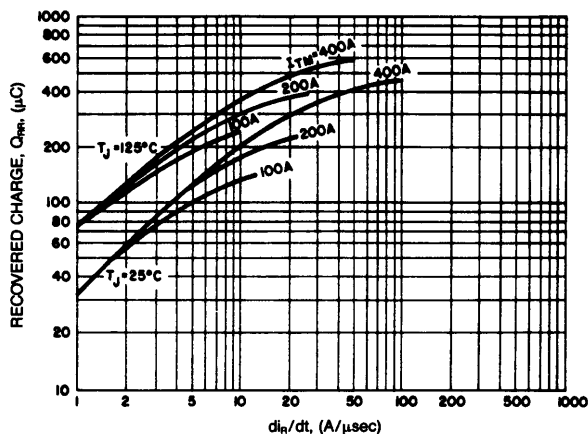
**MAXIMUM ALLOWABLE SURGE ON-STATE  
CURRENT (NON-REPETITIVE)**



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**C380**  
**Phase Control SCR**  
 250 Amperes Average, 1600 Volts

**MAXIMUM RECOVERED CHARGE**



**GATE CHARACTERISTICS**

