

The TC20 is a high voltage, high current disc pack SCR employing a high di/dt gate structure. This gate design allows the SCR to be reliably operated at high di/dt and dv/dt conditions in various phase control applications.

FEATURES:

- Low On-State Voltage
- High di/dt Capability
- High dv/dt Capability
- Hermetic Ceramic Package
- Excellent Surge and I²t Ratings

APPLICATIONS:

- DC Power Supplies
- Motor Controls

ORDERING INFORMATION

Select the complete 12 digit Part Number using the table below.
EXAMPLE: TC20442402DH is a 4400V-24500A SCR with 300ma IGT and 12 inch gate and cathode potential leads.

| PART | Voltage Rating $V_{DRM}-V_{RRM}$ | Voltage Code | Current Rating I_{TAVG} | Current Code | Turn-Off T_q | Gate I_{GT} | Leads |
|-------------|-------------------------------------|--------------|------------------------------|--------------|-------------------|------------------|-------|
| TC20 | 4400 | 44 | 2450 | 24 | 0 | 2 | |
| | 4200 | 42 | | | | | |
| | 4000 | 40 | | | 500us | 300ma | 12" |
| | 3600 | 36 | | | (typ.) | (max) | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Absolute Maximum Ratings

| Characteristic | Symbol | Rating | Units |
|--------------------------------------------------|-------------------|---------------|------------------|
| Repetitive Peak Voltage | $V_{DRM}-V_{RRM}$ | 4400 | Volts |
| Average On-State Current, $T_C=73^\circ\text{C}$ | $I_{T(Avg.)}$ | 2450 | A |
| RMS On-State Current, $T_C=73^\circ\text{C}$ | $I_{T(RMS)}$ | 3848 | A |
| Average On-State Current, $T_C=55^\circ\text{C}$ | $I_{T(Avg.)}$ | 2920 | A |
| RMS On-State Current, $T_C=55^\circ\text{C}$ | $I_{T(RMS)}$ | 4587 | A |
| Peak One Cycle Surge Current, 60Hz, $V_R=0V$ | I_{TSM} | 30,000 | A |
| Peak One Cycle Surge Current, 50Hz, $V_R=0V$ | I_{TSM} | 28,284 | A |
| Fuse Coordination I^2t , 60Hz | I^2t | 3.75E+06 | A^2s |
| Fuse Coordination I^2t , 50Hz | I^2t | 4.00E+06 | A^2s |
| Critical Rate-of-Rise of On-State Current | di/dt | 100 | A/us |
| Repetitive | | | |
| Critical Rate-of-Rise of On-State Current | di/dt | 300 | A/us |
| Non-Repetitive | | | |
| Peak Gate Power, 100us | P_{GM} | 16 | Watts |
| Average Gate Power | $P_{G(avg)}$ | 5 | Watts |
| Operating Temperature | T_j | -40 to+125 | $^\circ\text{C}$ |
| Storage Temperature | $T_{Stg.}$ | -50 to+150 | $^\circ\text{C}$ |
| Approximate Weight | | 5.5 | lb |
| | | 2.49 | Kg |
| Mounting Force | | 12,000-15,000 | lbs |
| | | 53 - 67 | KNewtons |



PRELIMINARY

TC20_2402
Phase Control Thyristor

Powerex, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800 (724)925-7272

2450Amperes 4400Volts

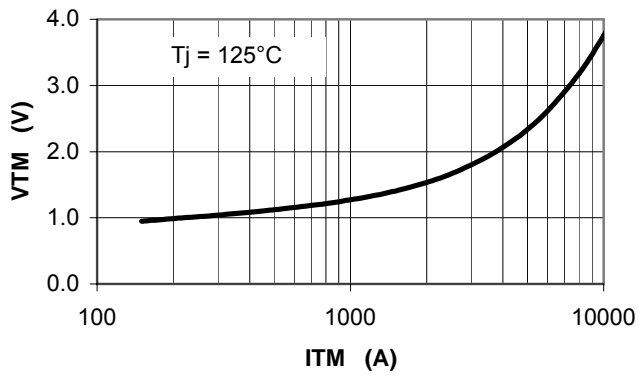
Electrical Characteristics, Tj=25°C unless otherwise specified

| Characteristic | Symbol | Test Conditions | Rating | | | Units |
|--------------------------------------------------------------------------------|-----------|------------------------------------------------------------|--------|-----|-----------|----------|
| | | | min | typ | max | |
| Repetitive Peak Forward Leakage Current | I_{DRM} | Tj=125°C, V_{DRM} =Rated | | | 300 | ma |
| Repetitive Peak Reverse Leakage Current | I_{RRM} | Tj=125°C, V_{RRM} =Rated | | | 300 | ma |
| Peak On-State Voltage | V_{TM} | Tj=125°C, I_{TM} =3000A | | | 1.80 | V |
| V_{TM} Model, Low Level | V_0 | Tj=125°C | | | 0.990 | V |
| $V_{TM} = V_0 + r \cdot I_{TM}$ | r | 15% $I_{TM} - \pi \cdot I_{TM}$ | | | 2.71E-04 | Ω |
| V_{TM} Model, High Level | V_0 | Tj=125°C | | | 0.698 | V |
| $V_{TM} = V_0 + r \cdot I_{TM}$ | r | $\pi \cdot I_{TM} - I_{TSM}$ | | | 3.04E-04 | Ω |
| V_{TM} Model, 4-Term | A | Tj=125°C | | | 0.191 | |
| $V_{TM} = A + B \cdot \ln(I_{TM}) + C \cdot (I_{TM}) + D \cdot (I_{TM})^{1/2}$ | B | 15% $I_{TM} - I_{TSM}$ | | | 0.181 | |
| | C | | | | 3.56E-04 | |
| | D | | | | -1.66E-02 | |
| Turn-On Delay Time | t_d | $V_D = 0.5 \cdot V_{DRM}$ Gate Drive: 40V - 20 Ω | | | 1.5 | us |
| Turn-Off Time | tq | Tj=125°C dv/dt = 20V/us to 67% V_{DRM} | | | 500 | us |
| dv/dt _(crit) | dv/dt | Tj=125°C Exp. Waveform $V_D = 67\%$ Rated | 400 | | | V/us |
| Gate Trigger Current | I_{GT} | Tj=25°C $V_D = 12V$ | 30 | 150 | 400 | ma |
| Gate Trigger Voltage | V_{GT} | | 0.8 | 2.0 | 4.5 | V |
| Peak Reverse Gate Voltage | V_{GRM} | | | | 5 | V |

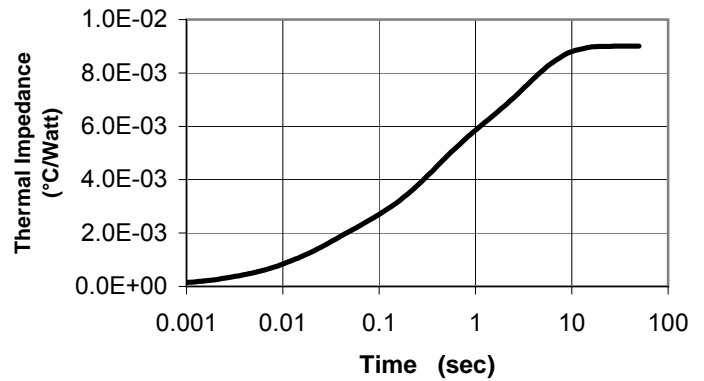
Thermal Characteristics

| Characteristic | Symbol | Test Conditions | Rating | | | Units | |
|---------------------------------------------------------------------|----------------|--------------------|----------|----------|----------|----------|----------|
| | | | min | typ | max | | |
| Thermal Resistance | | | | | | | |
| Junction to Case | $R\theta_{jc}$ | Double side cooled | | | 0.009 | °C/Watt | |
| Case to Sink | $R\theta_{cs}$ | Double side cooled | | | 0.0025 | °C/Watt | |
| Thermal Impedance Model | | | | | | | |
| $Z\theta_{jc}(t) = \Sigma(A(N) \cdot (1 - \exp(-t/\text{Tau}(N))))$ | | Double side cooled | | | | | |
| | where: | | N = | 1 | 2 | 3 | 4 |
| | | | A(N) = | 2.00E-04 | 1.50E-03 | 3.20E-03 | 4.10E-03 |
| | | | Tau(N) = | 2.62E-03 | 2.31E-02 | 3.05E-01 | 3.30E+00 |

Maximum On-State Voltage Drop

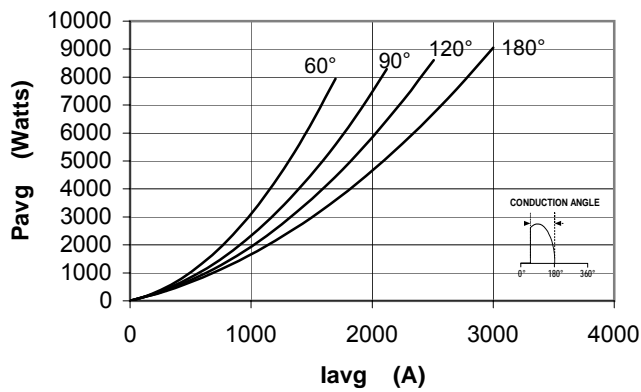


MAXIMUM TRANSIENT THERMAL IMPEDANCE



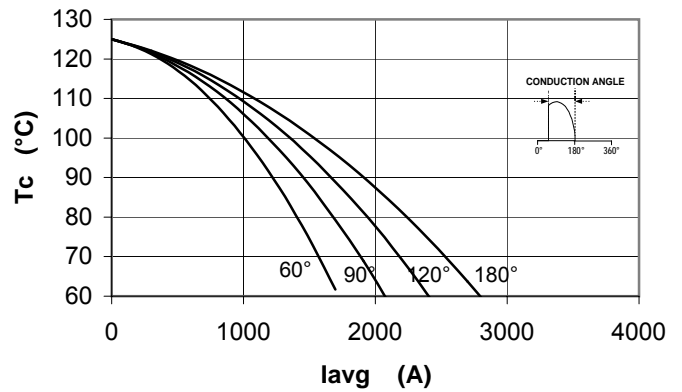
Maximum On-State Power Dissipation

Sinusoidal Waveform



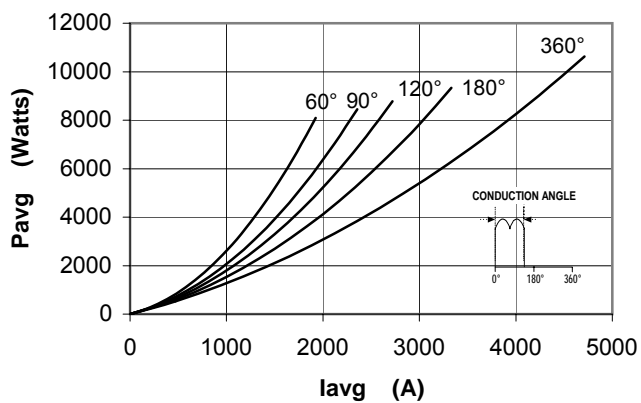
Maximum Allowable Case Temperature

Sinusoidal Waveform



Maximum On-State Power Dissipation

Square Waveform



Maximum Allowable Case Temperature

Square Waveform

