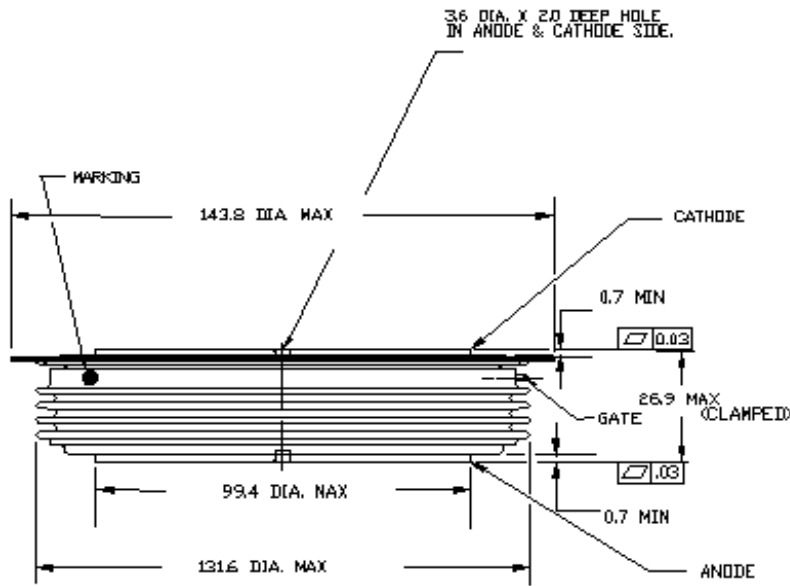




The TDS4 is a medium voltage, high current, thin pack disc SCR employing an amplifying gate structure. This thin package provides greater cooling thus maximizing high current performance. The amplifying gate design allows the SCR to be reliably operated at high di/dt and dv/dt conditions in various phase control applications.

#### FEATURES:

- Low On-State Voltage
- High di/dt Capability
- High dv/dt Capability
- Hermetic Ceramic Package
- Excellent Surge and  $I^2t$  Ratings

#### APPLICATIONS:

- DC Power Supplies
- Motor Controls
- Plating Rectifiers

#### ORDERING INFORMATION

Select the complete 12 digit Part Number using the table below.  
 EXAMPLE: TDS4304002DH is a 3000V 4000A SCR with 300ma IGT and 12 inch gate and cathode potential leads.

| PART        | Voltage Rating<br>$V_{DRM}-V_{RRM}$ | Voltage Code | Current Rating<br>$I_{TAVG}$ | Current Code | Turn-Off<br>$T_q$ | Gate<br>$I_{GT}$ | Leads |
|-------------|-------------------------------------|--------------|------------------------------|--------------|-------------------|------------------|-------|
| <b>TDS4</b> | 3000                                | <b>30</b>    | 4000                         | <b>40</b>    | <b>0</b>          | <b>2</b>         |       |
|             | 2800                                | <b>28</b>    |                              |              |                   |                  |       |
|             | 2600                                | <b>26</b>    |                              |              | 600us             | 300ma            | 12"   |
|             | 2400                                | <b>24</b>    |                              |              | (typ.)            | (max)            |       |
|             |                                     |              |                              |              |                   |                  |       |
|             |                                     |              |                              |              |                   |                  |       |
|             |                                     |              |                              |              |                   |                  |       |

Revised: 10/16/2013

**Absolute Maximum Ratings**

| Characteristic                               | Symbol            | Rating        | Units            |
|----------------------------------------------|-------------------|---------------|------------------|
| Repetitive Peak Voltage                      | $V_{DRM}-V_{RRM}$ | 3000          | Volts            |
| Average On-State Current, $T_C=70^{\circ}C$  | $I_{T(Avg.)}$     | 4000          | A                |
| RMS On-State Current, $T_C=70^{\circ}C$      | $I_{T(RMS)}$      | 6283          | A                |
| Average On-State Current, $T_C=55^{\circ}C$  | $I_{T(Avg.)}$     | 4700          | A                |
| RMS On-State Current, $T_C=55^{\circ}C$      | $I_{T(RMS)}$      | 7383          | A                |
| Peak One Cycle Surge Current, 60Hz, $V_R=0V$ | $I_{TSM}$         | 80,000        | A                |
| Peak One Cycle Surge Current, 50Hz, $V_R=0V$ | $I_{TSM}$         | 75,424        | A                |
| Fuse Coordination $I^2t$ , 60Hz              | $I^2t$            | 2.67E+07      | A <sup>2</sup> s |
| Fuse Coordination $I^2t$ , 50Hz              | $I^2t$            | 2.84E+07      | A <sup>2</sup> s |
| 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    | $^{\circ}C$      |
| Storage Temperature                          | $T_{Stg.}$        | -50 to+150    | $^{\circ}C$      |
| Approximate Weight                           |                   | 6.5           | lb               |
|                                              |                   | 2.95          | Kg               |
| Mounting Force                               |                   | 16,000-20,000 | lbs              |
|                                              |                   | 71.2 - 89.0   | KNewtons         |

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

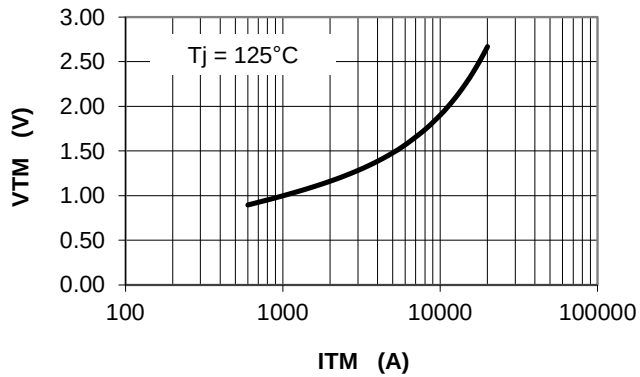
**Electrical Characteristics, Tj=25°C unless otherwise specified**

| Characteristic                              | Symbol     | Test Conditions                                    | Rating |     |           | Units |
|---------------------------------------------|------------|----------------------------------------------------|--------|-----|-----------|-------|
|                                             |            |                                                    | min    | typ | max       |       |
| Repetitive Peak Forward Leakage Current     | $I_{DRM}$  | Tj=125°C, $V_{DRM}$ =Rated                         |        |     | 250       | ma    |
| Repetitive Peak Reverse Leakage Current     | $I_{RRM}$  | Tj=125°C, $V_{RRM}$ =Rated                         |        |     | 250       | ma    |
| Peak On-State Voltage                       | $V_{TM}$   | Tj=125°C, $I_{TM}$ =4000A                          |        |     | 1.38      | V     |
| $V_{TM}$ Model, Low Level                   | $V_0$      | Tj=125°C                                           |        |     | 0.942     | V     |
| $V_{TM} = V_0 + r \cdot I_{TM}$             | $r$        | 15% $I_{TM} - I_{TSM}$                             |        |     | 9.79E-02  | mΩ    |
| $V_{TM}$ Model, High Level                  | $V_0$      | Tj=125°C                                           |        |     | 1.175     | V     |
| $V_{TM} = V_0 + r \cdot I_{TM}$             | $r$        | $\pi \cdot I_{TM} - I_{TSM}$                       |        |     | 7.45E-02  | mΩ    |
| $V_{TM}$ Model, 4-Term                      | A          | Tj=125°C                                           |        |     | -0.257    |       |
| $V_{TM} = A + B \cdot \ln(I_{TM}) +$        | B          | 15% $I_{TM} - I_{TSM}$                             |        |     | 0.185     |       |
| $C \cdot (I_{TM}) + D \cdot (I_{TM})^{1/2}$ | C          |                                                    |        |     | 7.73E-05  |       |
|                                             | D          |                                                    |        |     | -3.20E-03 |       |
| Turn-On Delay Time                          | $t_d$      | $V_D = 0.5 \cdot V_{DRM}$<br>Gate Drive: 40V - 20Ω |        | 3   |           | us    |
| Turn-Off Time                               | $t_q$      | Tj=125°C<br>$dv/dt = 20V/us$ to 67% $V_{DRM}$      |        |     | 600       | us    |
| $dv/dt_{(Crit)}$                            | $dv/dt$    | Tj=125°C Exp. Waveform<br>$V_D = 67\%$ Rated       | 800    |     |           | V/us  |
| Gate Trigger Current                        | $I_{GT}$   | Tj=25°C $V_D = 12V$                                | 30     | 150 | 300       | ma    |
| Gate Trigger Voltage                        | $V_{GT}$   |                                                    | 0.8    | 2.0 | 5.0       | V     |
| Peak Reverse Gate Voltage                   | $V_{GRM}$  |                                                    |        |     | 5         | V     |
| Reverse Recovery Current                    | $I_R(Rec)$ | Tj=125°C $V_R = 100V$                              |        |     | 300       | A     |
| Reverse Recovery Charge                     | QRA        |                                                    |        |     | 10,500    | μCoul |

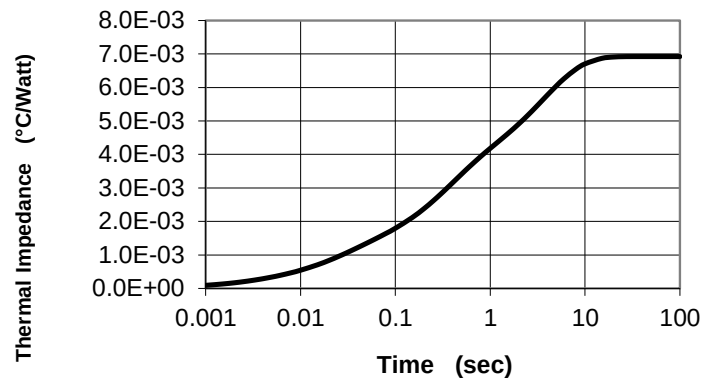
**Thermal Characteristics**

| Characteristic                                                          | Symbol         | Test Conditions    | Rating |        |        | Units   |
|-------------------------------------------------------------------------|----------------|--------------------|--------|--------|--------|---------|
|                                                                         |                |                    | min    | typ    | max    |         |
| Thermal Resistance                                                      |                |                    |        |        |        |         |
| Junction to Case                                                        | $R\theta_{jc}$ | Double side cooled |        | 0.0065 | 0.0070 | °C/Watt |
| Case to Sink                                                            | $R\theta_{cs}$ | Double side cooled |        | 0.001  | 0.0015 | °C/Watt |
| Thermal Impedance Model                                                 | $Z\theta_{jc}$ | Double side cooled |        |        |        |         |
| $Z\theta_{jc}(t) = \Sigma(A(N) \cdot (1 - \exp(-t/\text{Tau}(N))))$     |                |                    |        |        |        |         |
| where: N = 1 2 3 4                                                      |                |                    |        |        |        |         |
| $A(N) = 1.43E-04 \quad 9.08E-04 \quad 2.37E-03 \quad 3.50E-03$          |                |                    |        |        |        |         |
| $\text{Tau}(N) = 2.62E-03 \quad 2.31E-02 \quad 3.05E-01 \quad 3.60E+00$ |                |                    |        |        |        |         |

**Maximum On-State Voltage Drop**

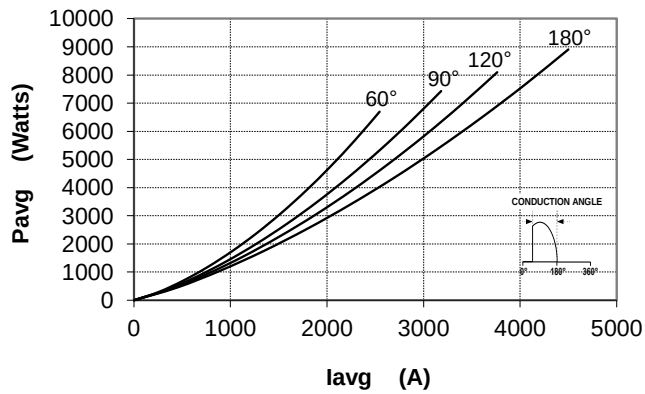


**MAXIMUM TRANSIENT THERMAL IMPEDANCE**



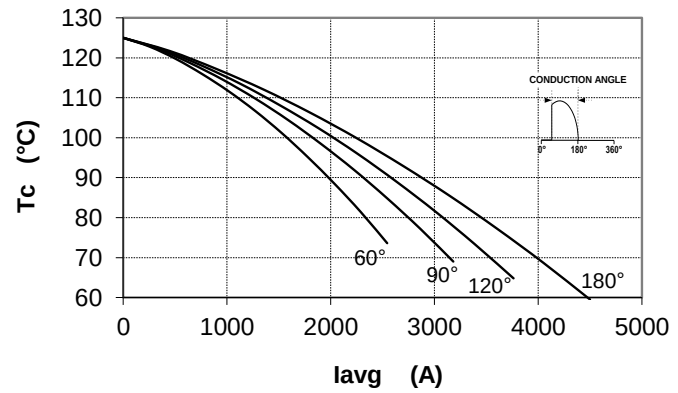
**Maximum On-State Power Dissipation**

Sinusoidal Waveform



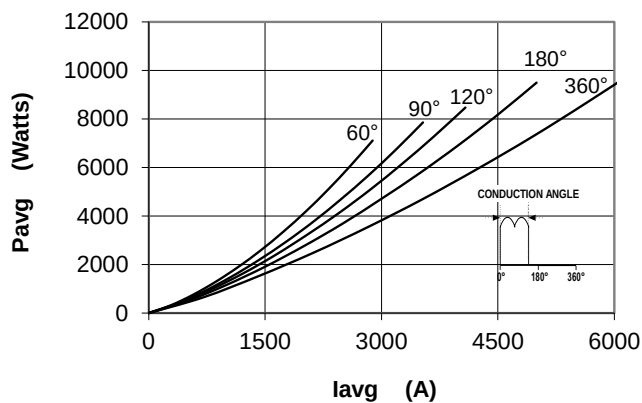
**Maximum Allowable Case Temperature**

Sinusoidal Waveform



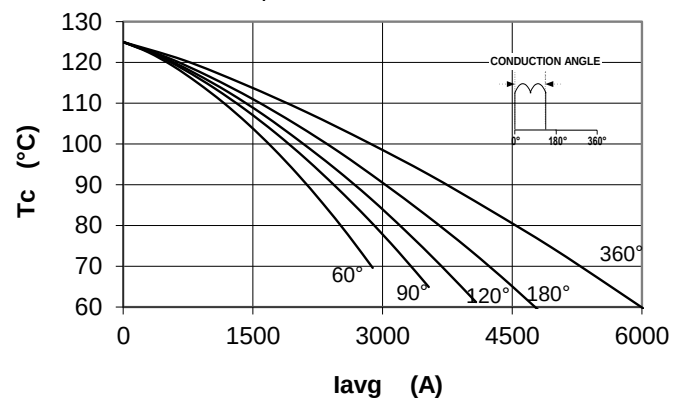
**Maximum On-State Power Dissipation**

Square Waveform

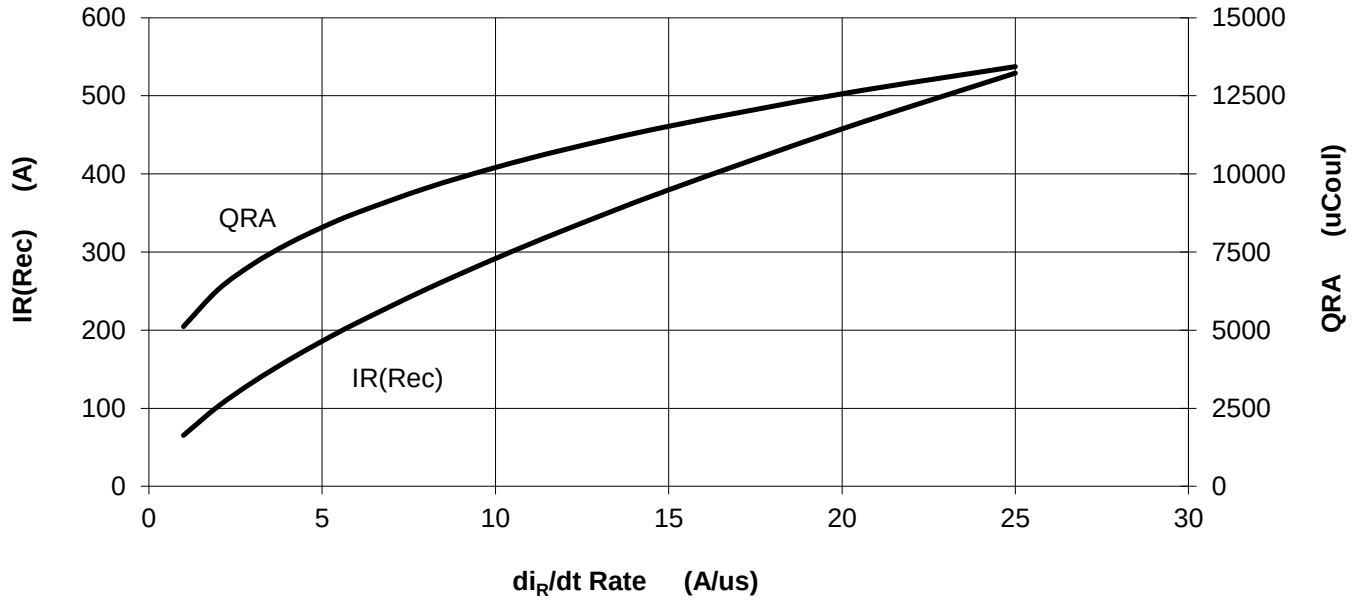


**Maximum Allowable Case Temperature**

Square Waveform



**TDS4304002**



**MULTI-CYCLE SURGE**

**TDS434002**

VR = 0

