

The TCU4 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 I^2t Ratings

APPLICATIONS:

- DC Power Supplies
- Motor Controls
- SS Contactors

ORDERING INFORMATION

Select the complete 12 digit Part Number using the table below.
EXAMPLE: TCU428320HDH is a 2800V-3200A SCR with 250ma IGT and standard 12 inch gate and cathode potential leads.

| PART | Voltage | | Current Rating | Current Code | Turn-Off | Gate | Leads |
|-------------|-----------|-----------|-------------------|-----------------|----------------|----------|-----------|
| | V_{DRM} | V_{RRM} | | | | | |
| TCU4 | 2800 | 28 | 3200 | 32 | 0 | H | DH |
| | 2600 | 26 | | | | | |
| | 2400 | 24 | | | | | |
| | 2200 | 22 | | | | | |
| | | | | 500us (typ.) | 250ma (max) | 12" std. | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Revised:

10/28/2015

Absolute Maximum Ratings

| Characteristic | Symbol | Rating | Units |
|--|-------------------|---------------|-------------|
| Repetitive Peak Voltage | $V_{DRM}-V_{RRM}$ | 2200 to 2800 | Volts |
| Average On-State Current, $T_C=70^{\circ}C$ | $I_{T(Avg.)}$ | 3200 | A |
| RMS On-State Current, $T_C=70^{\circ}C$ | $I_{T(RMS)}$ | 5027 | A |
| Average On-State Current, $T_C=55^{\circ}C$ | $I_{T(Avg.)}$ | 3800 | A |
| RMS On-State Current, $T_C=55^{\circ}C$ | $I_{T(RMS)}$ | 5969 | A |
| Peak One Cycle Surge Current, 60Hz, $V_R=0V$ | I_{TSM} | 77,000 | A |
| Peak One Cycle Surge Current, 50Hz, $V_R=0V$ | I_{TSM} | 72,000 | A |
| Fuse Coordination I^2t , 60Hz | I^2t | 2.47E+07 | A^2s |
| Fuse Coordination I^2t , 50Hz | I^2t | 2.59E+07 | A^2s |
| Critical Rate-of-Rise of On-State Current | di/dt | 200 | A/us |
| Repetitive | | | |
| Critical Rate-of-Rise of On-State Current | di/dt | 400 | 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 | | 3.2 | lb |
| | | 1.45 | Kg |
| Mounting Force | | 12,000-15,000 | lbs |
| | | 53 - 67 | Knewtons |

Information listed is based upon Powerex testing and projected ratings and is subject to change without notice. Powerex makes no implicit or explicit claim to reliability, capability, performance or suitability of this product for a users application. Powerex makes no guarantee of future availability of this product.

Electrical Characteristics, T_j=25°C unless otherwise specified

| Characteristic | Symbol | Test Conditions | Rating | | | Units |
|--|------------------|--|--------|-----|----------|-------|
| | | | min | typ | max | |
| Repetitive Peak Forward Leakage Current | I _{DRM} | T _j =125°C, V _{DRM} =Rated | | | 250 | ma |
| Repetitive Peak Reverse Leakage Current | I _{RRM} | T _j =125°C, V _{RRM} =Rated | | | 250 | ma |
| Peak On-State Voltage | V _{TM} | T _j =125°C, I _{TM} =3000A | | | 1.45 | V |
| V _{TM} Model, Low Level | V ₀ | T _j =125°C | | | 1.062 | V |
| V _{TM} = V ₀ + r•I _{TM} | r | 15% I _{TM} - π•I _{TM} | | | 0.121 | mΩ |
| V _{TM} Model, High Level | V ₀ | T _j =125°C | | | 1.088 | V |
| V _{TM} = V ₀ + r•I _{TM} | r | π•I _{TM} - I _{TSM} | | | 0.1139 | mΩ |
| V _{TM} Model, 4-Term | A | T _j =125°C | | | 0.161 | |
| V _{TM} = A + B•Ln(I _{TM}) + | B | 15%I _{TM} - I _{TSM} | | | 0.151 | |
| C•(I _{TM}) + D•(I _{TM}) ^½ | C | | | | 0.000124 | |
| | D | | | | -0.00538 | |
| Turn-On Delay Time | t _d | V _D = 0.5•V _{DRM} Gate Drive: 40V - 20Ω | | 2.5 | | us |
| Turn-Off Time | t _q | T _j =125°C dv/dt = 20V/us to 80% V _{DRM} | | | 400 | us |
| dv/dt _(Crit) | dv/dt | T _j =125°C Exp. Waveform V _D =80% Rated | 1000 | | | V/us |
| Gate Trigger Current | I _{GT} | T _j =25°C V _D = 12V | 30 | 100 | 250 | 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 _{Θ_{jc}} | Double side cooled | | 0.007 | 0.008 | °C/Watt |
| Case to Sink | R _{Θ_{cs}} | Double side cooled | | 0.0015 | 0.002 | °C/Watt |

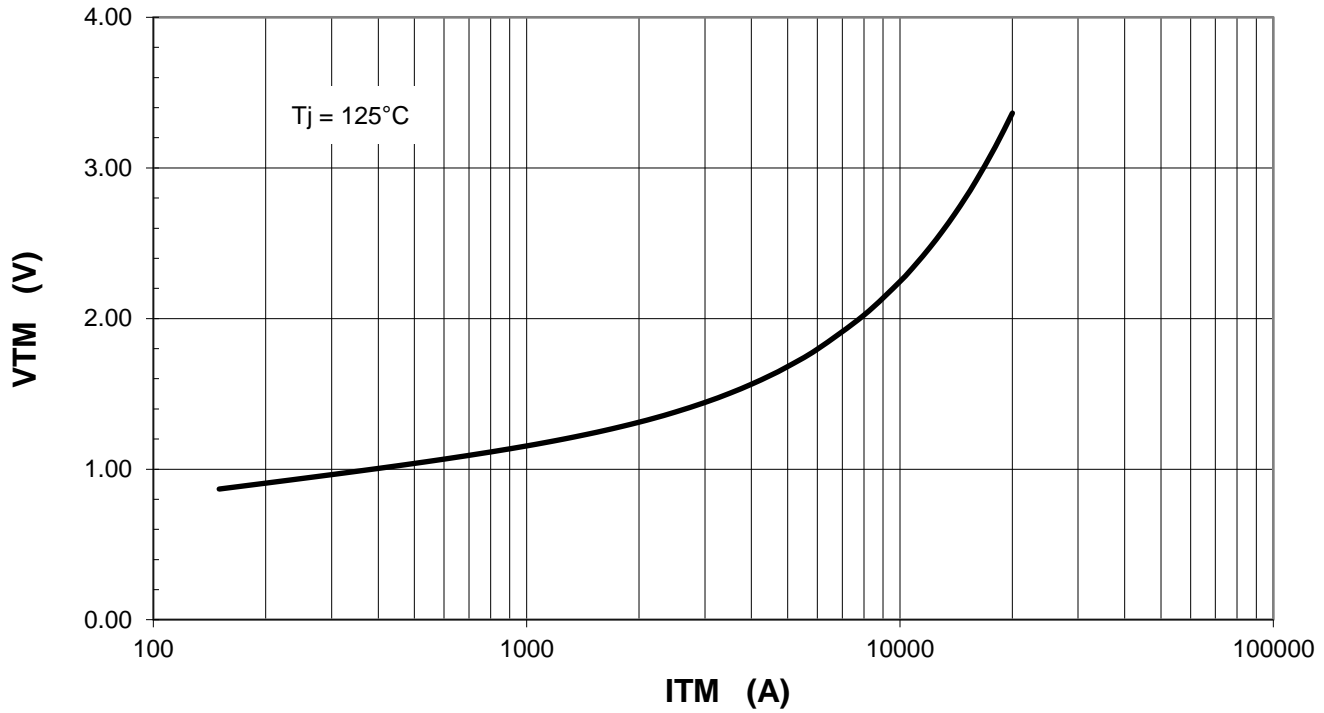
Thermal Impedance Model Z_{Θ_{jc}} Double side cooled

$$Z_{\Theta_{jc}}(t) = \sum(A(N) \cdot (1 - \exp(-t/\text{Tau}(N))))$$

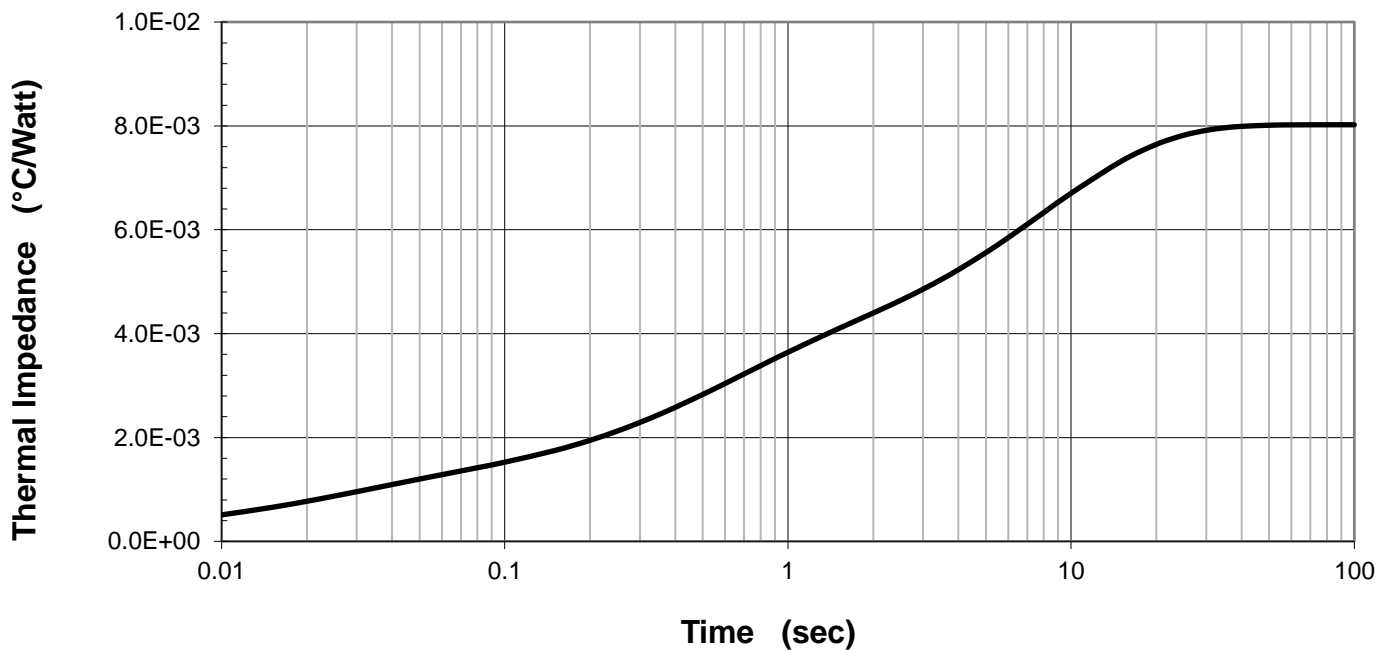
where: N = 1 2 3 4

| | | | | |
|----------|----------|----------|----------|----------|
| A(N) = | 1.43E-04 | 9.08E-04 | 2.37E-03 | 4.60E-03 |
| Tau(N) = | 2.62E-03 | 2.31E-02 | 5.00E-01 | 8.00E+00 |

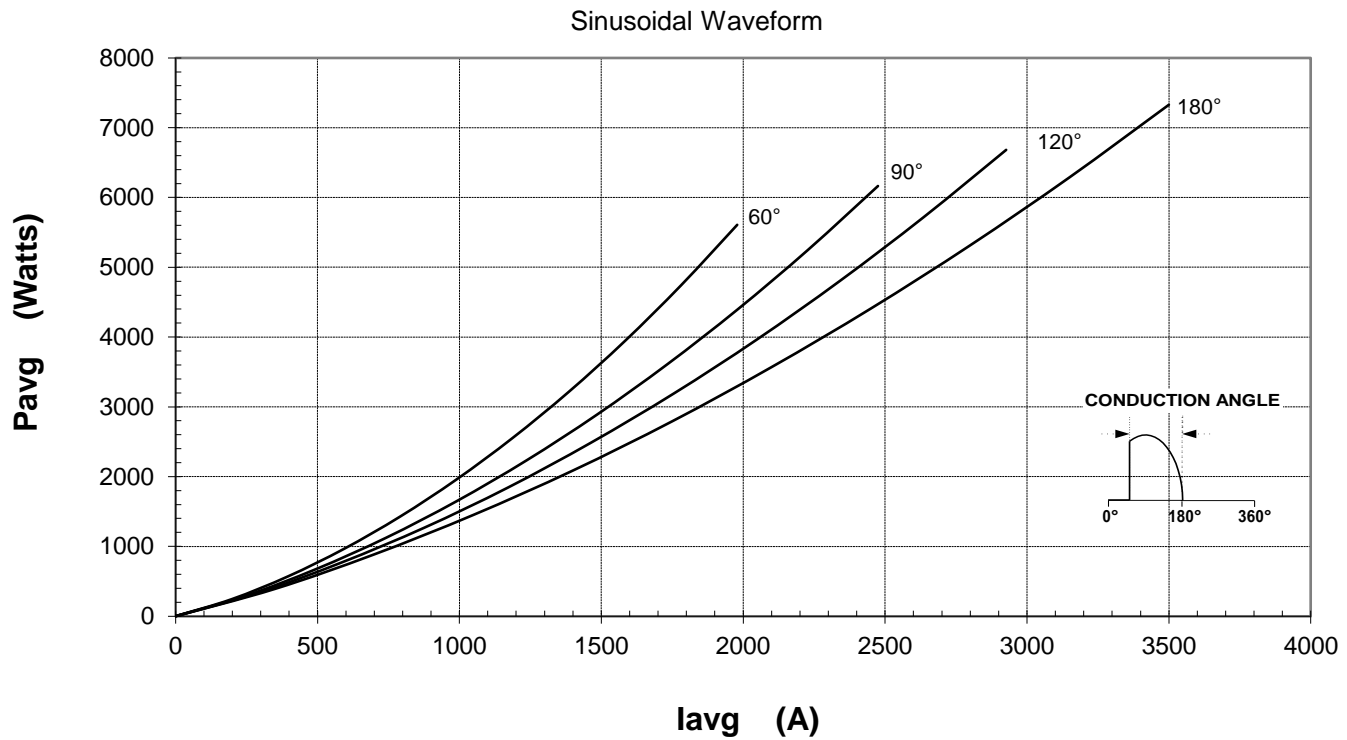
Maximum On-State Voltage Drop



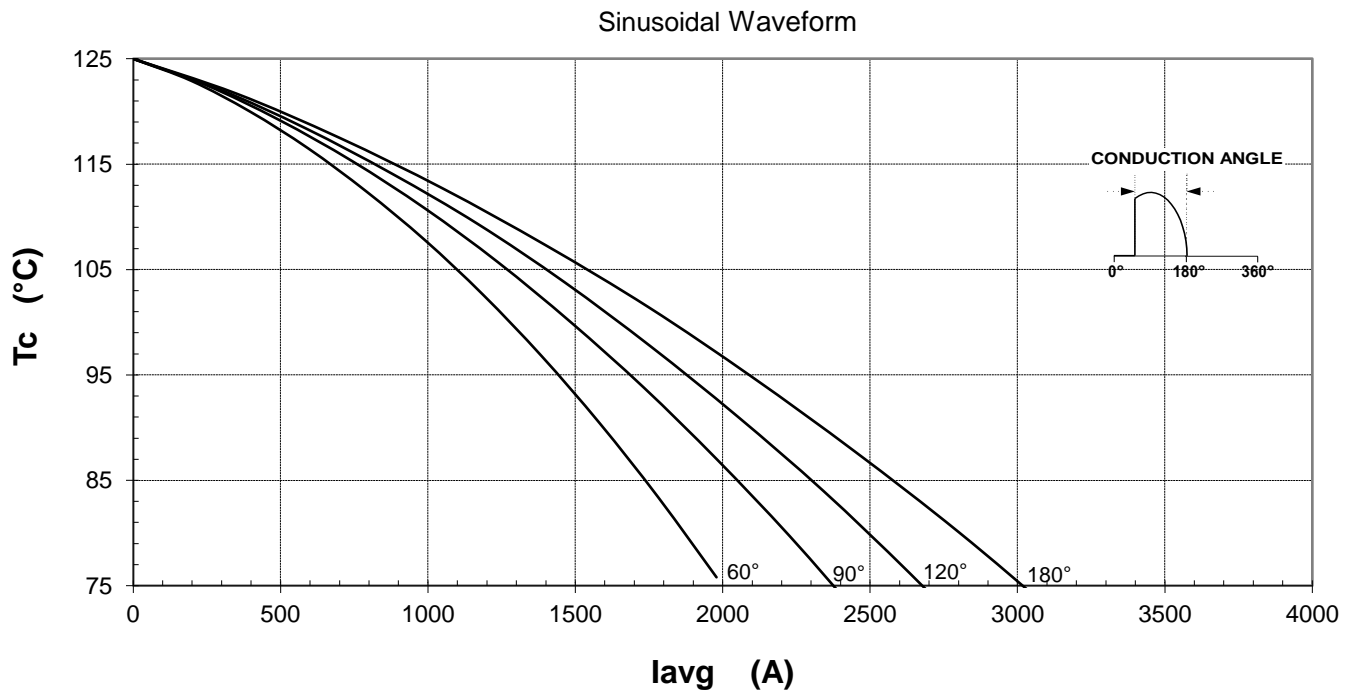
MAXIMUM TRANSIENT THERMAL IMPEDANCE



Maximum On-State Power Dissipation

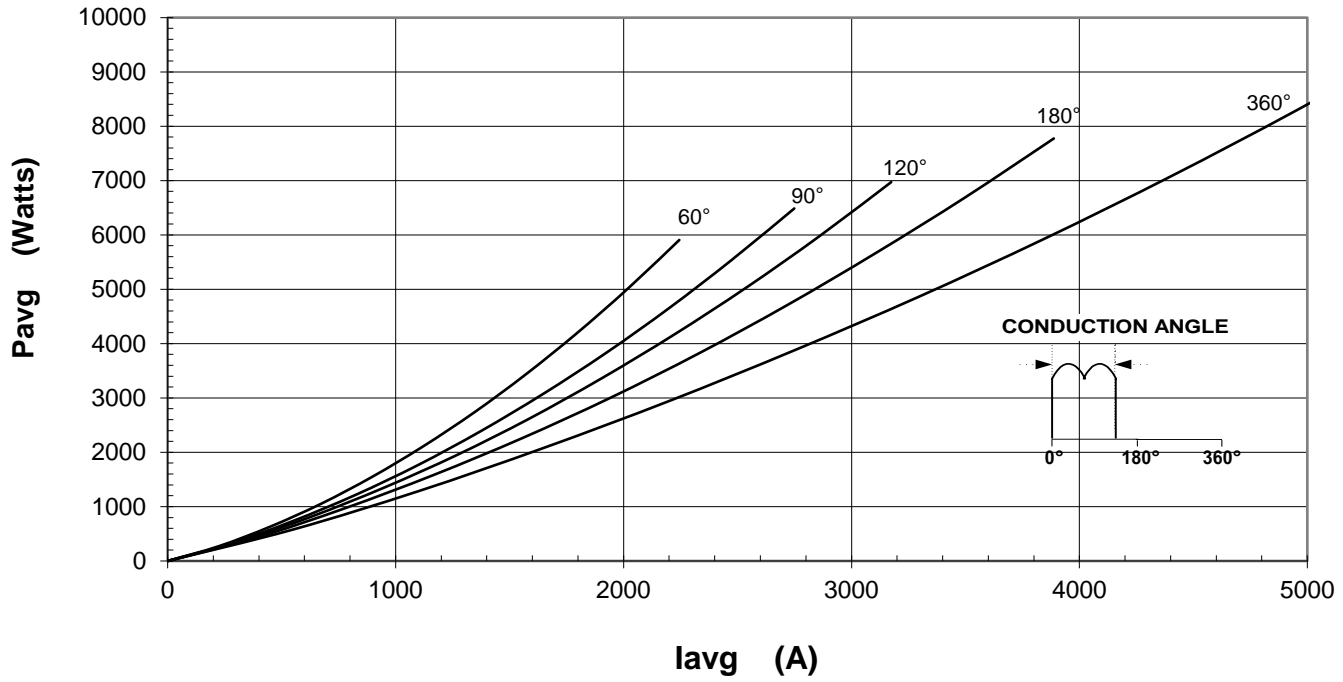


Maximum Allowable Case Temperature



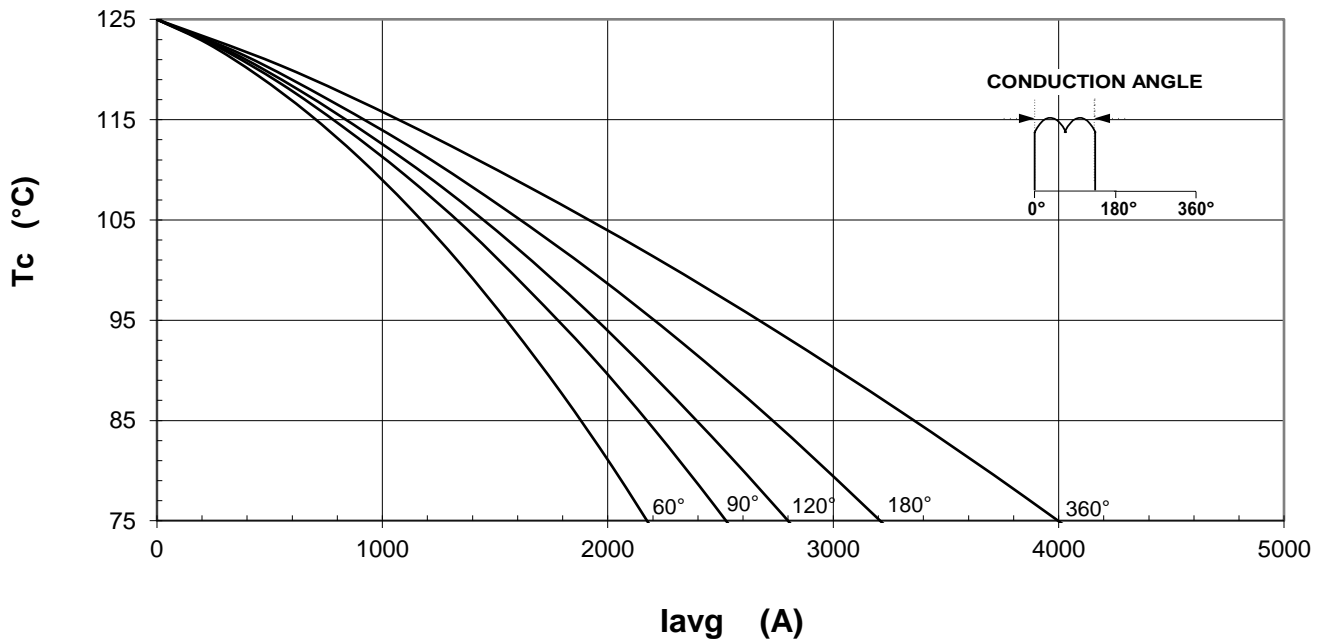
Maximum On-State Power Dissipation

Square Waveform

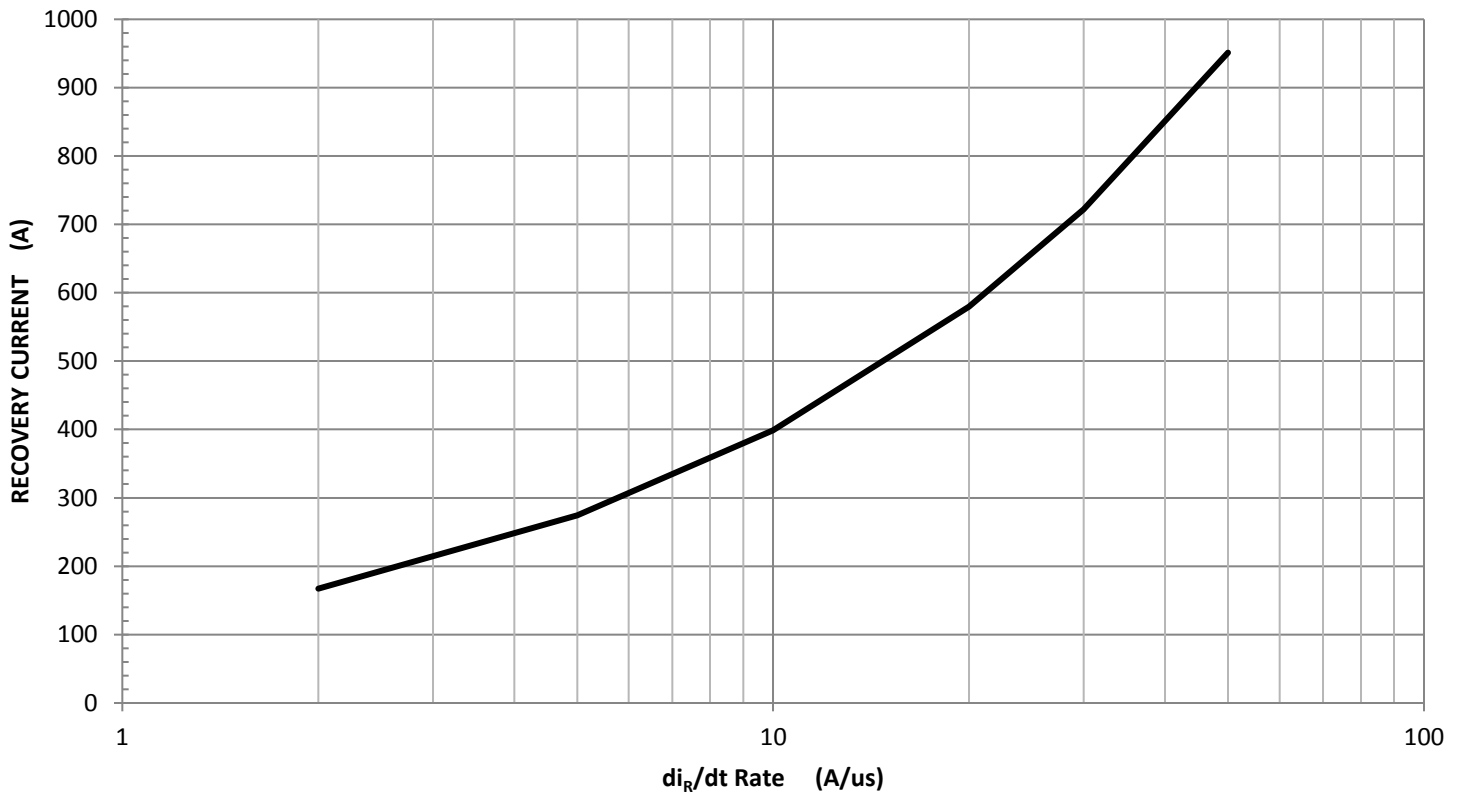


Maximum Allowable Case Temperature

Square Waveform

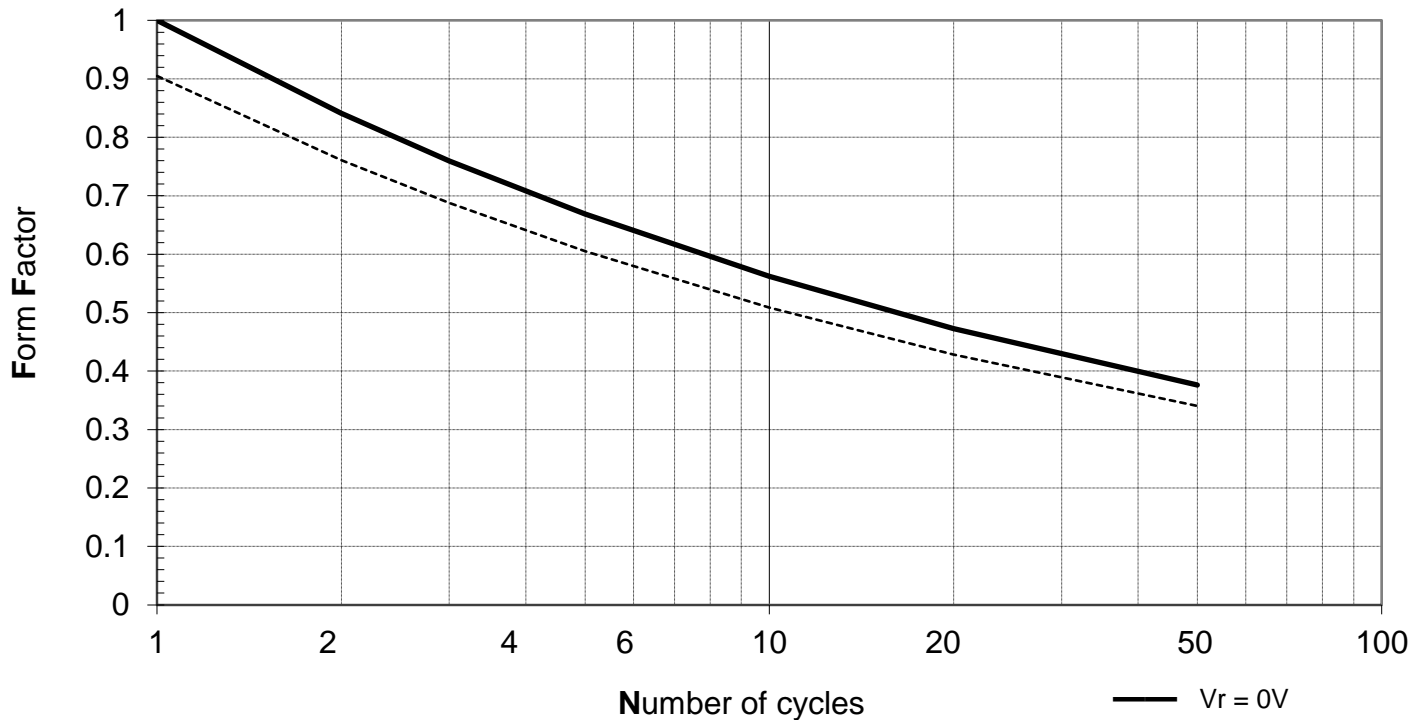


REVERSE RECOVERY CURRENT



MULTI-CYCLE SURGE FORM FACTOR

$ITSM(N) = ITSM(1\sim) \cdot FF(N)$



REVERSE RECOVERY CHARGE

