

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: TCU428340HDH is a 2800V-3400A SCR with 250ma IGT and standard 12 inch gate and cathode potential leads.

PART	Voltage Rating $V_{DRM}$ - $V_{RRM}$	Voltage Code	Current Rating $I_{avg}$	Current Code	Turn-Off $T_q$	Gate $I_{GT}$	Leads
<b>TCU4</b>	2800	<b>28</b>	3400	<b>34</b>	<b>0</b>	<b>H</b>	<b>DH</b>
	2600	<b>26</b>					<b>TM*</b>
	2400	<b>24</b>			500us	250ma	12" std.
	2200	<b>22</b>			(typ.)	(max)	

\* Optional TM lead consist of 20AWG FEP insulated twisted pair wires 17.5 inches in length with ¼" insulated fast-on terminals.

Revised:

10/28/2015

### Absolute Maximum Ratings

Characteristic	Symbol	Rating	Units
Repetitive Peak Voltage	$V_{DRM}-V_{RRM}$	2800	Volts
Average On-State Current, $T_C=70^{\circ}C$	$I_{T(Avg.)}$	3400	A
RMS On-State Current, $T_C=70^{\circ}C$	$I_{T(RMS)}$	5341	A
Average On-State Current, $T_C=54^{\circ}C$	$I_{T(Avg.)}$	4000	A
RMS On-State Current, $T_C=54^{\circ}C$	$I_{T(RMS)}$	6283	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	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, 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, $I_{TM}$ =3000A			1.35	V
$V_{TM}$ Model, Low Level	$V_0$	Tj=125°C			0.978	V
$V_{TM} = V_0 + r \cdot I_{TM}$	r	15% $I_{TM} - \pi \cdot I_{TM}$			0.112	mΩ
$V_{TM}$ Model, High Level	$V_0$	Tj=125°C			1.012	V
$V_{TM} = V_0 + r \cdot I_{TM}$	r	$\pi \cdot I_{TM} - I_{TSM}$			0.1059	mΩ
$V_{TM}$ Model, 4-Term	A	Tj=125°C			0.150	
$V_{TM} = A + B \cdot \ln(I_{TM}) +$	B	15% $I_{TM} - I_{TSM}$			0.140	
$C \cdot (I_{TM}) + D \cdot (I_{TM})^{1/2}$	C				0.000115	
	D				-0.00500	
Turn-On Delay Time	$t_d$	$V_D = 0.5 \cdot V_{DRM}$ Gate Drive: 40V - 20Ω		2.5		us
Turn-Off Time	$t_q$	Tj=125°C $dv/dt = 20V/us$ to 80% $V_{DRM}$			400	us
$dv/dt_{(Crit)}$	$dv/dt$	Tj=125°C Exp. Waveform $V_D = 80\%$ Rated	1000			V/us
Gate Trigger Current	$I_{GT}$	Tj=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	$R_{\theta_{jc}}$	Double side cooled		0.007	0.008	°C/Watt
Case to Sink	$R_{\theta_{cs}}$	Double side cooled		0.0015	0.002	°C/Watt

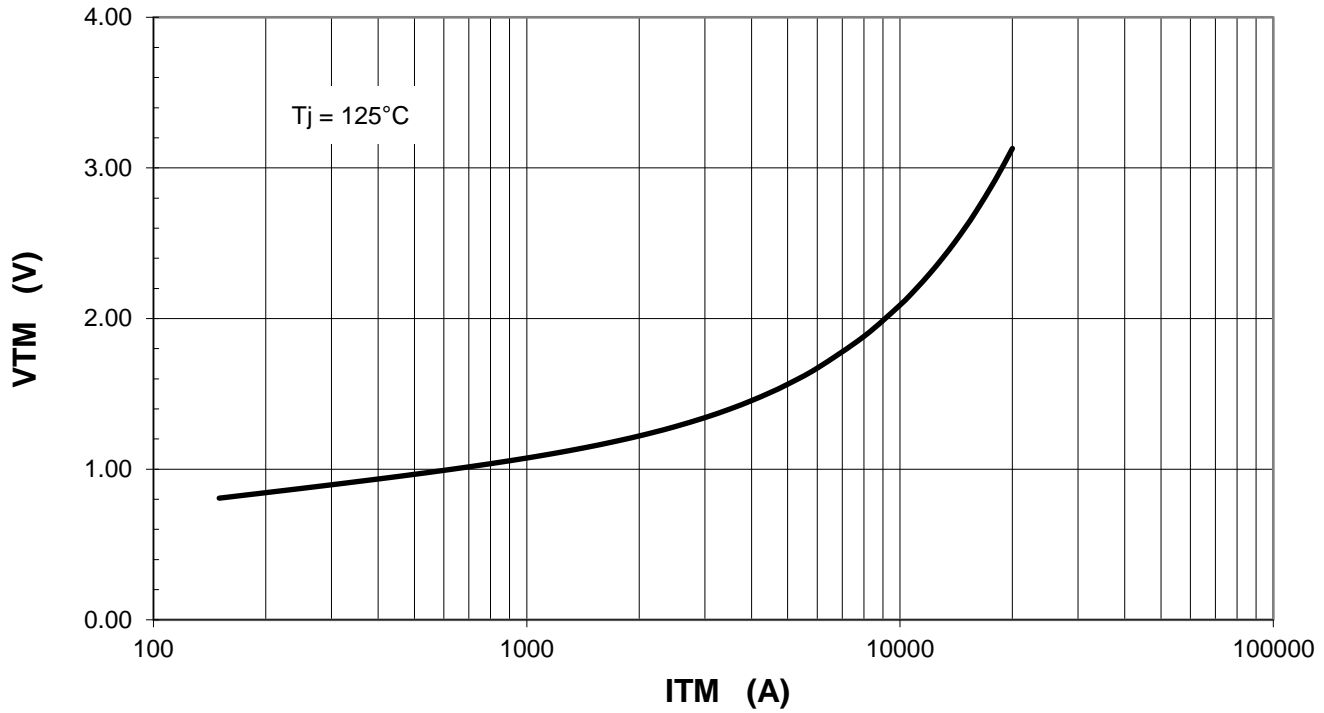
Thermal Impedance Model  $Z_{\theta_{jc}}$  Double side cooled

$$Z_{\theta_{jc}}(t) = \sum(A(N) \cdot (1 - \exp(-t/\tau(N))))$$

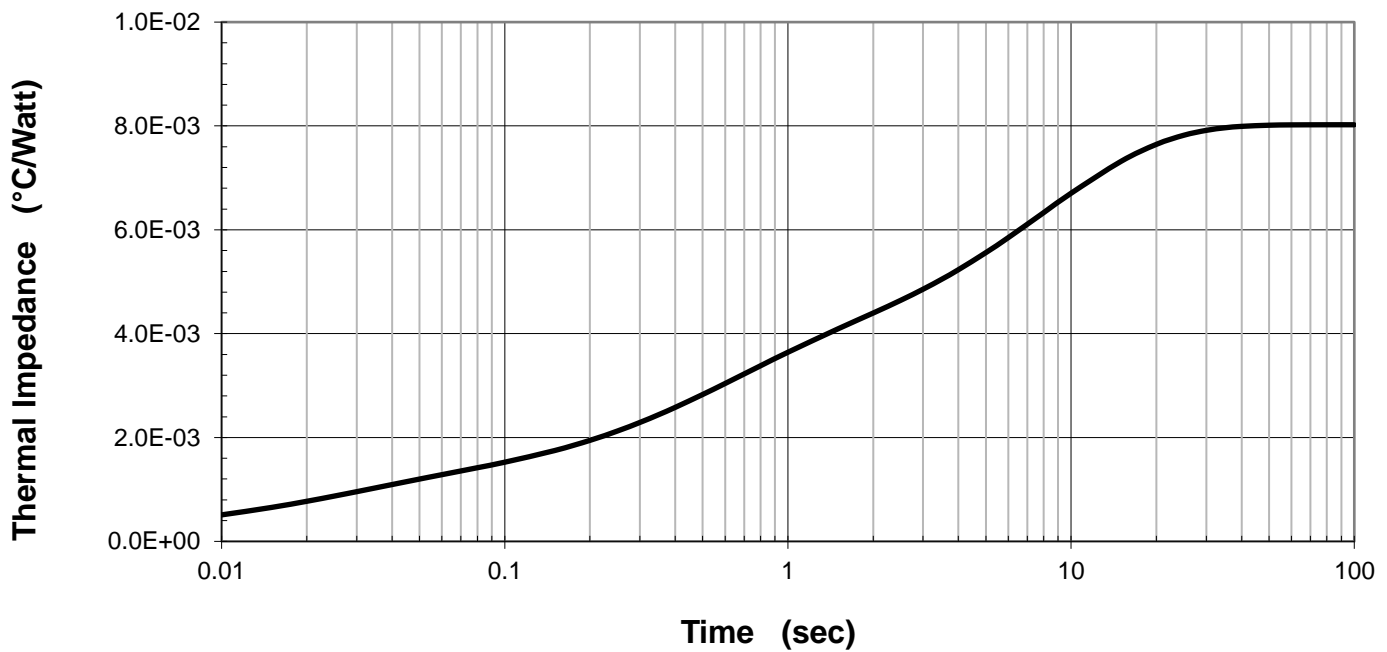
where:

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

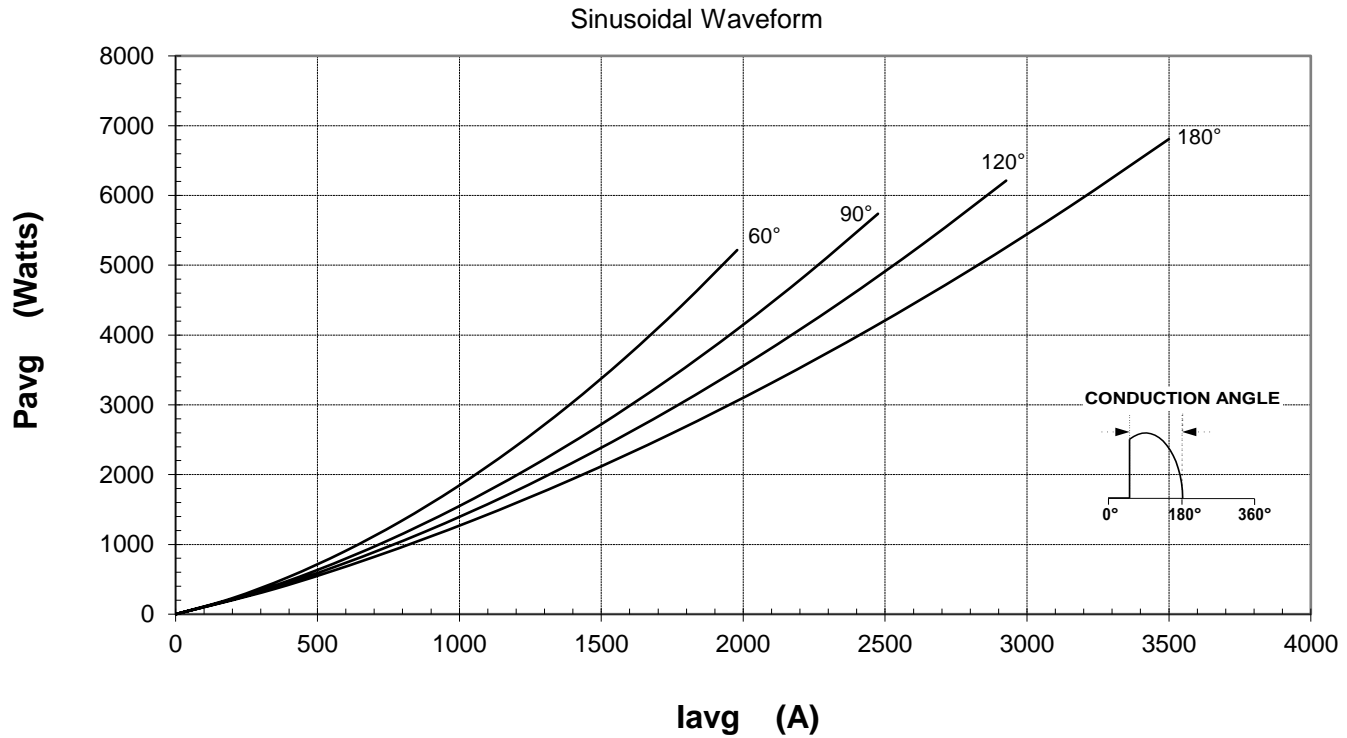
### Maximum On-State Voltage Drop



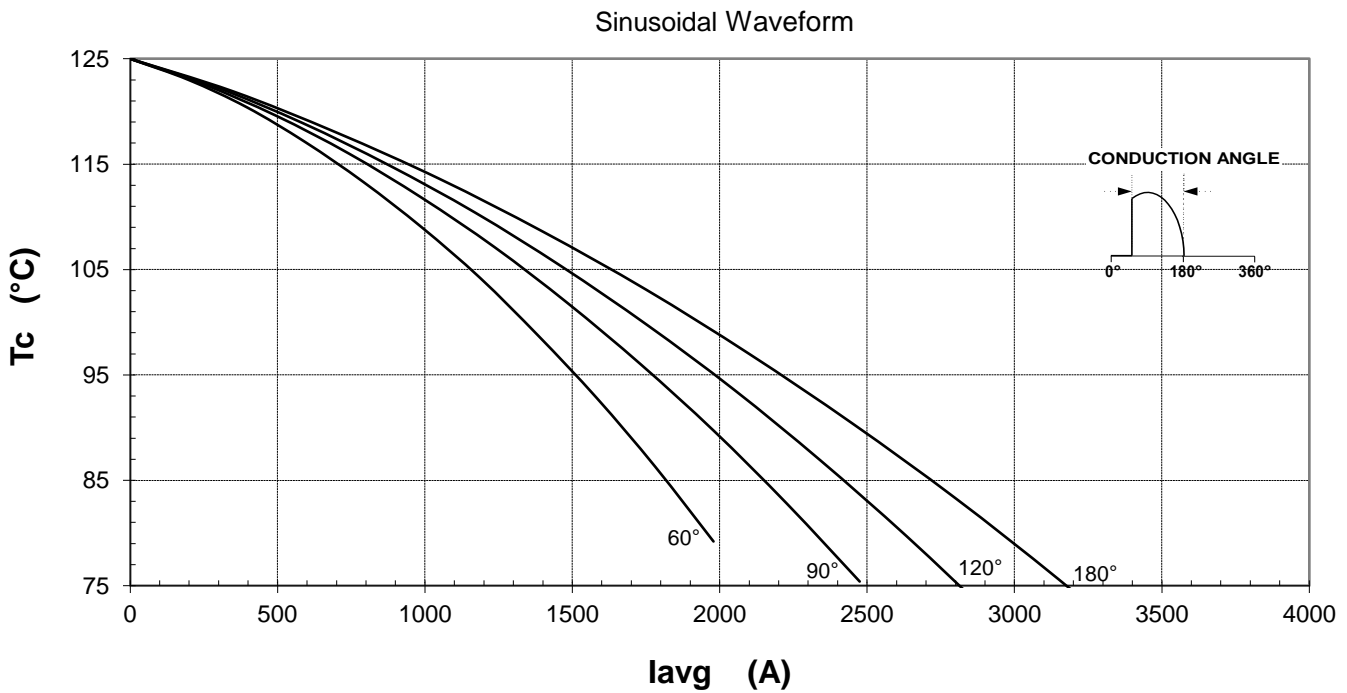
### MAXIMUM TRANSIENT THERMAL IMPEDANCE



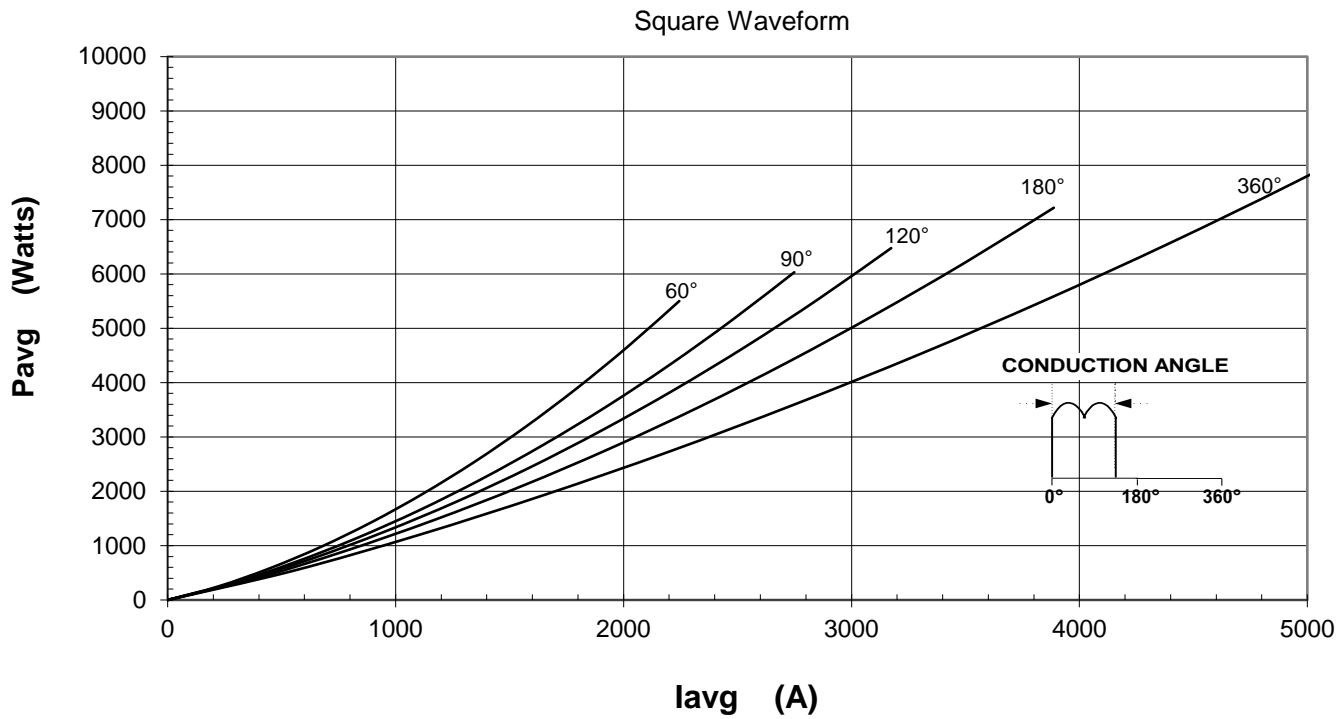
## Maximum On-State Power Dissipation



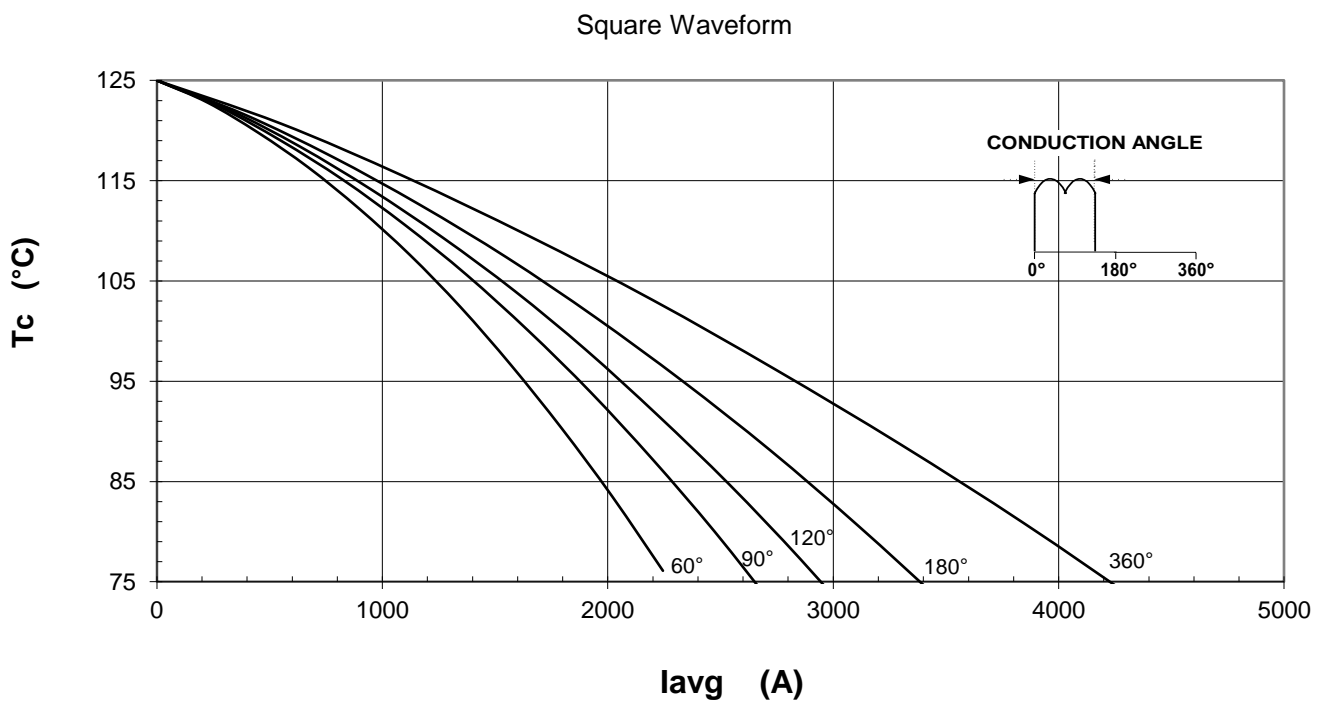
## Maximum Allowable Case Temperature



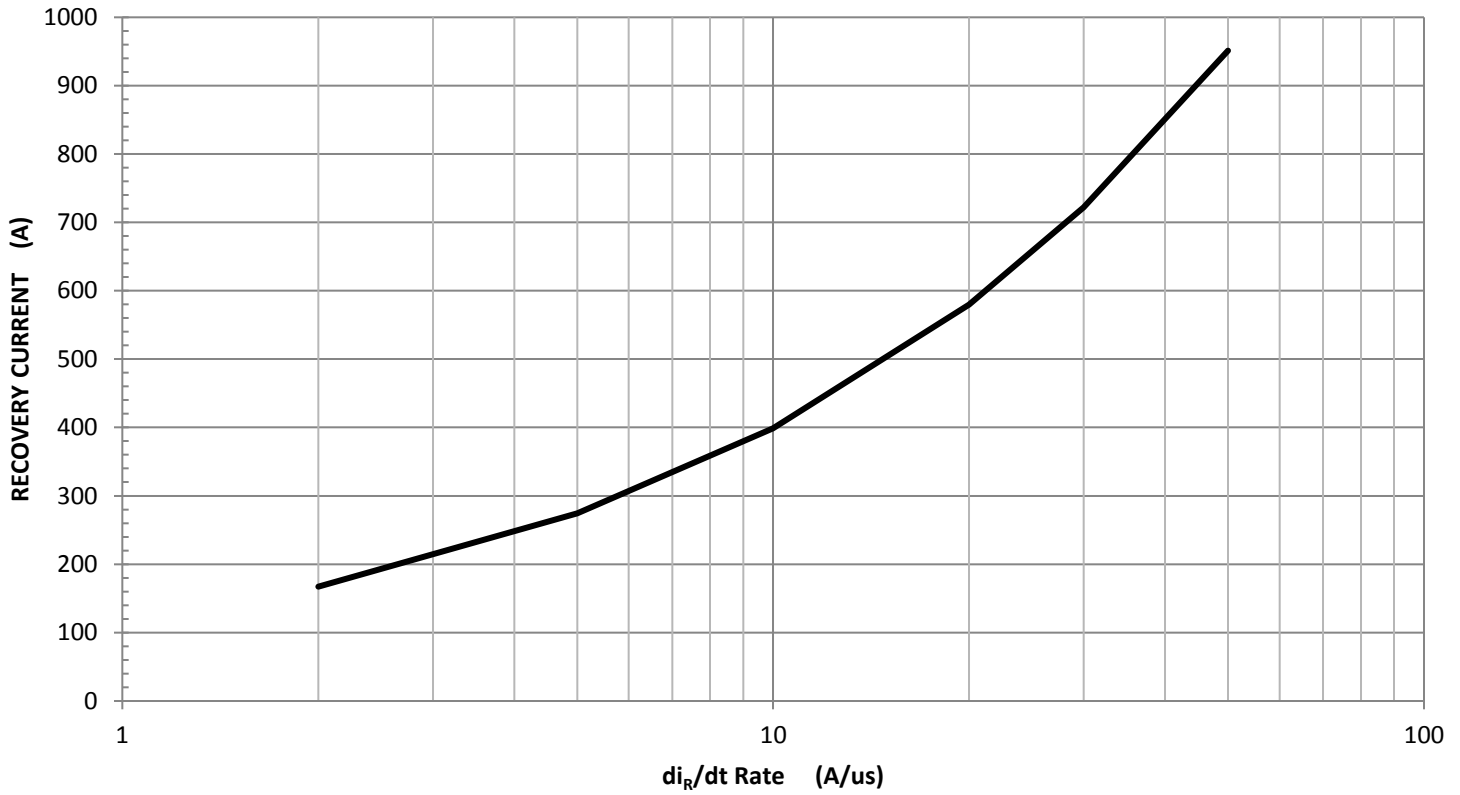
### Maximum On-State Power Dissipation



### Maximum Allowable Case Temperature

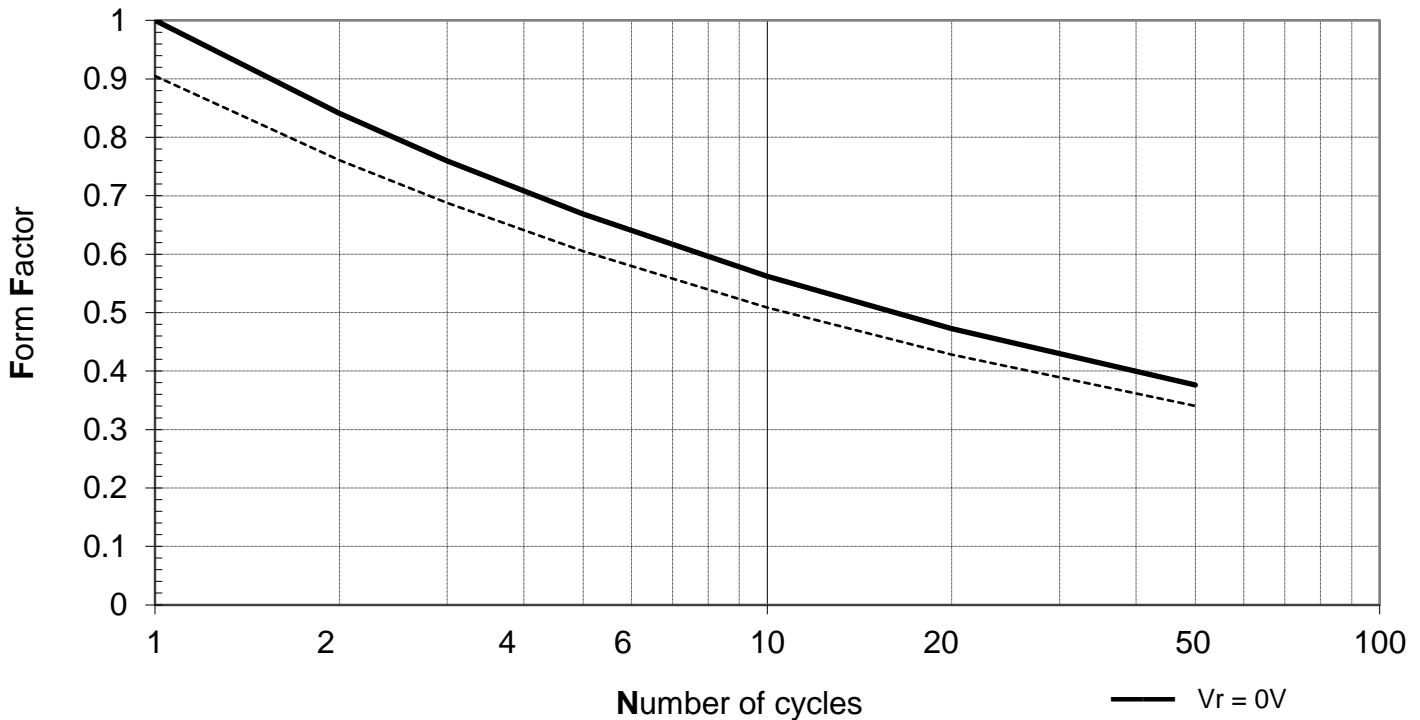


## REVERSE RECOVERY CURRENT



## MULTI-CYCLE SURGE FORM FACTOR

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



## REVERSE RECOVERY CHARGE

