

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}						Code		
TCU4	2800	28	3200	32	0	H	DH			
	2600	26								
	2400	24						500us	250ma	12" std.
	2200	22						(typ.)	(max)	

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, $T_C=70^\circ\text{C}$	$I_{T(Avg.)}$	3200	A
RMS On-State Current, $T_C=70^\circ\text{C}$	$I_{T(RMS)}$	5027	A
Average On-State Current, $T_C=55^\circ\text{C}$	$I_{T(Avg.)}$	3800	A
RMS On-State Current, $T_C=55^\circ\text{C}$	$I_{T(RMS)}$	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	$^\circ\text{C}$
Storage Temperature	$T_{Stg.}$	-50 to+150	$^\circ\text{C}$
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			1.45	V
V_{TM} Model, Low Level	V_0	Tj=125°C			1.062	V
$V_{TM} = V_0 + r \cdot I_{TM}$	r	15% $I_{TM} - \pi \cdot I_{TM}$			0.121	mΩ
V_{TM} Model, High Level	V_0	Tj=125°C			1.088	V
$V_{TM} = V_0 + r \cdot I_{TM}$	r	$\pi \cdot I_{TM} - I_{TSM}$			0.1139	mΩ
V_{TM} Model, 4-Term	A	Tj=125°C			0.161	
$V_{TM} = A + B \cdot \ln(I_{TM}) +$	B	15% $I_{TM} - I_{TSM}$			0.151	
$C \cdot (I_{TM}) + D \cdot (I_{TM})^{1/2}$	C				0.000124	
	D				-0.00538	
Turn-On Delay Time	t_d	$V_D = 0.5 \cdot V_{DRM}$ Gate Drive: 40V - 20Ω		2.5		us
Turn-Off Time	tq	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

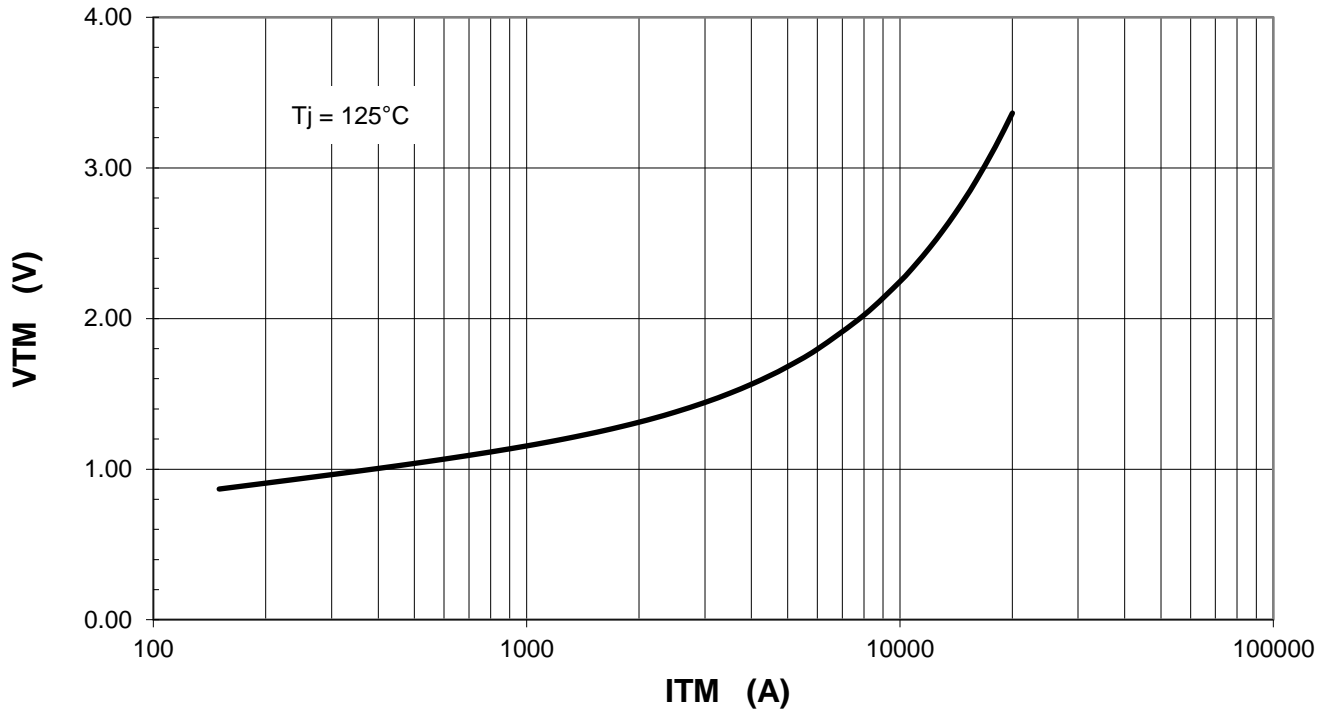
Thermal Impedance Model $Z_{\theta_{jc}}$ Double side cooled

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

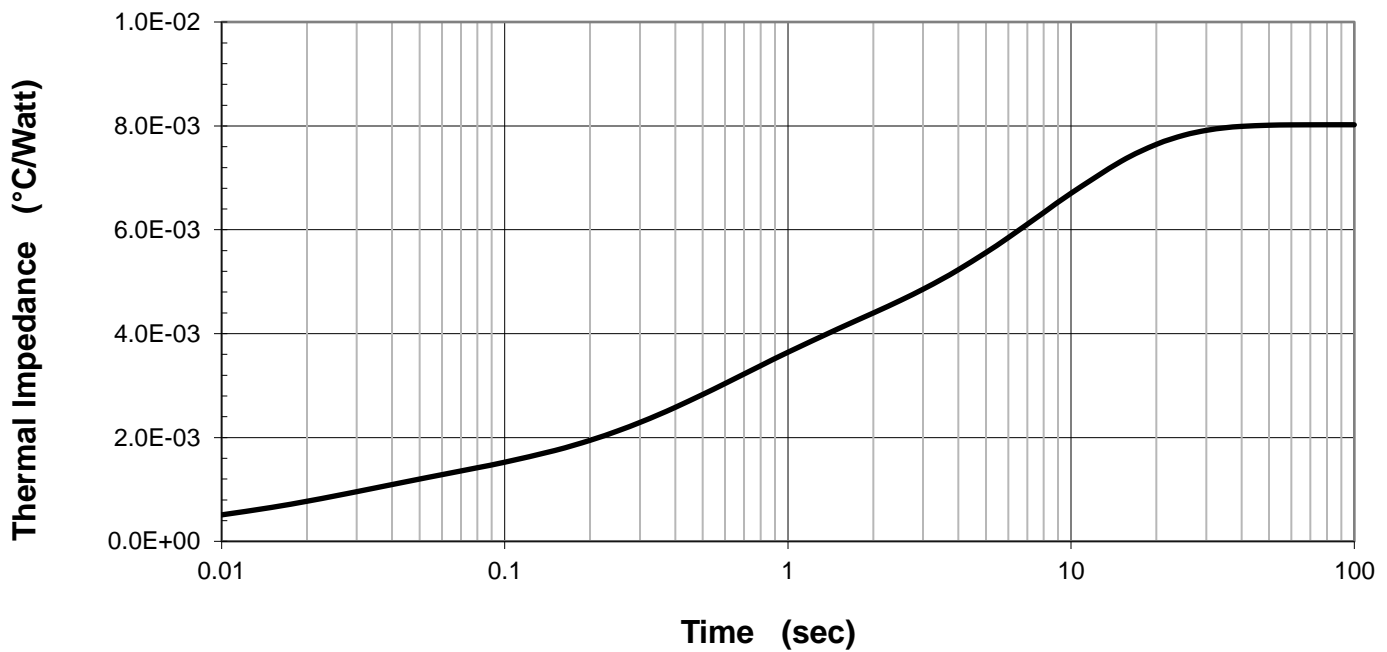
where:

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

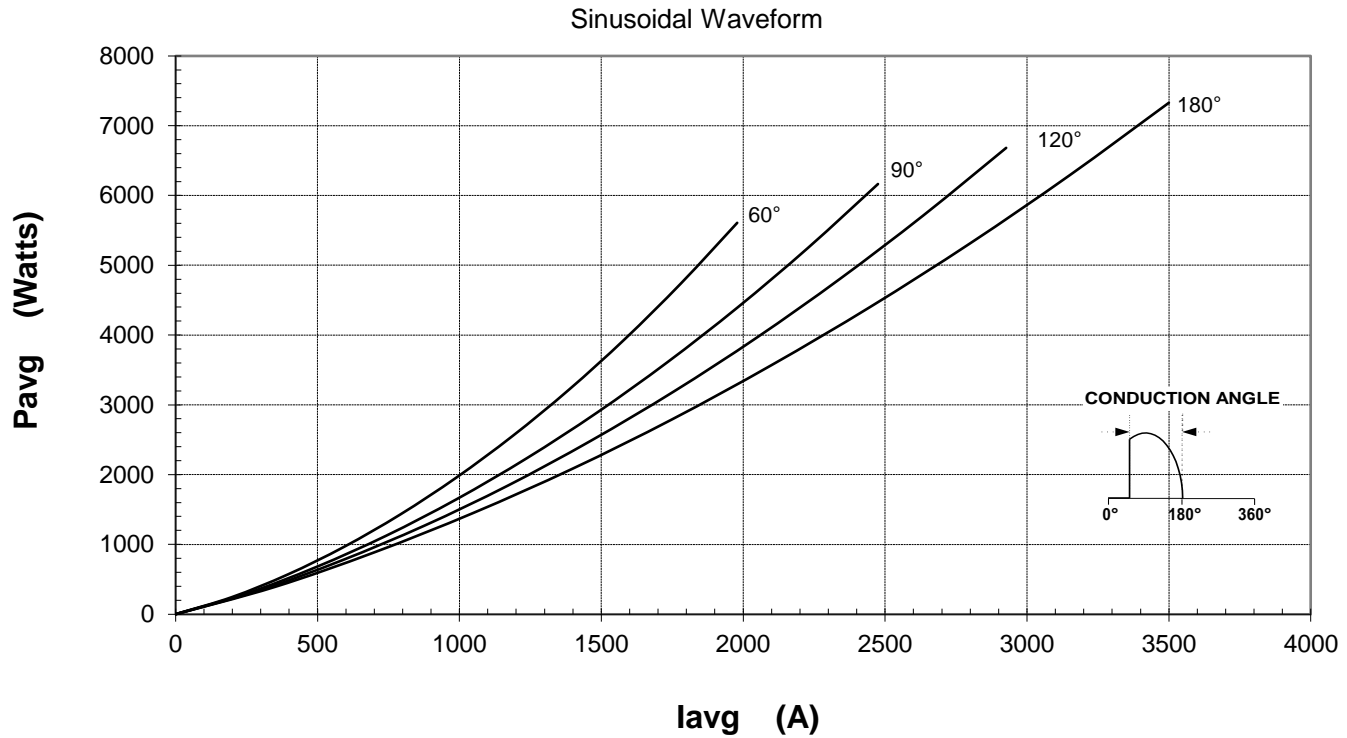
Maximum On-State Voltage Drop



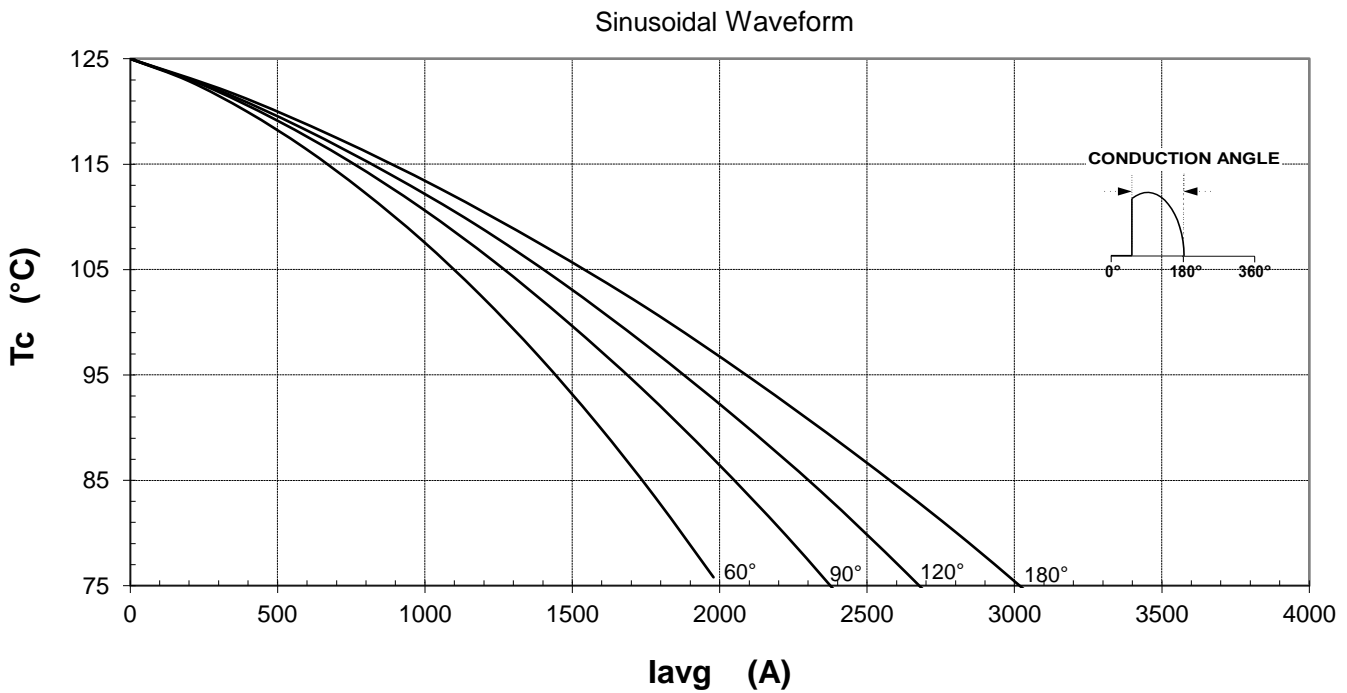
MAXIMUM TRANSIENT THERMAL IMPEDANCE



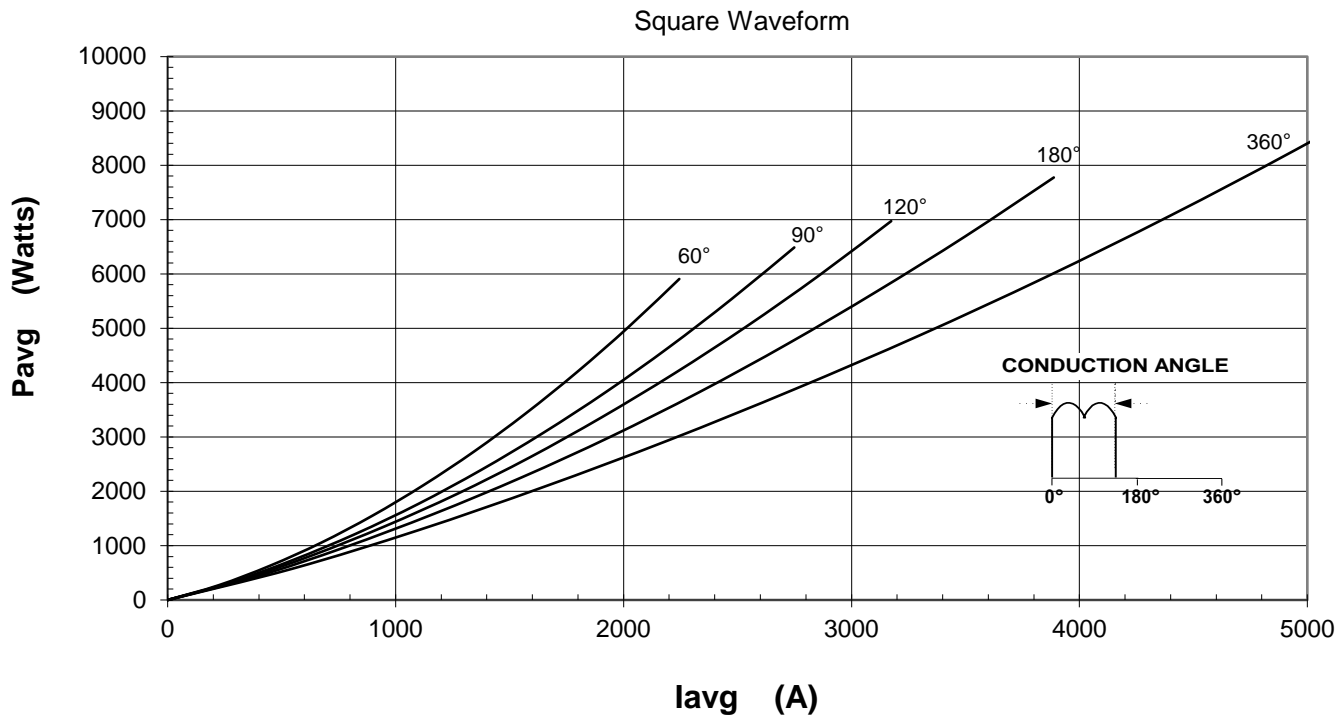
Maximum On-State Power Dissipation



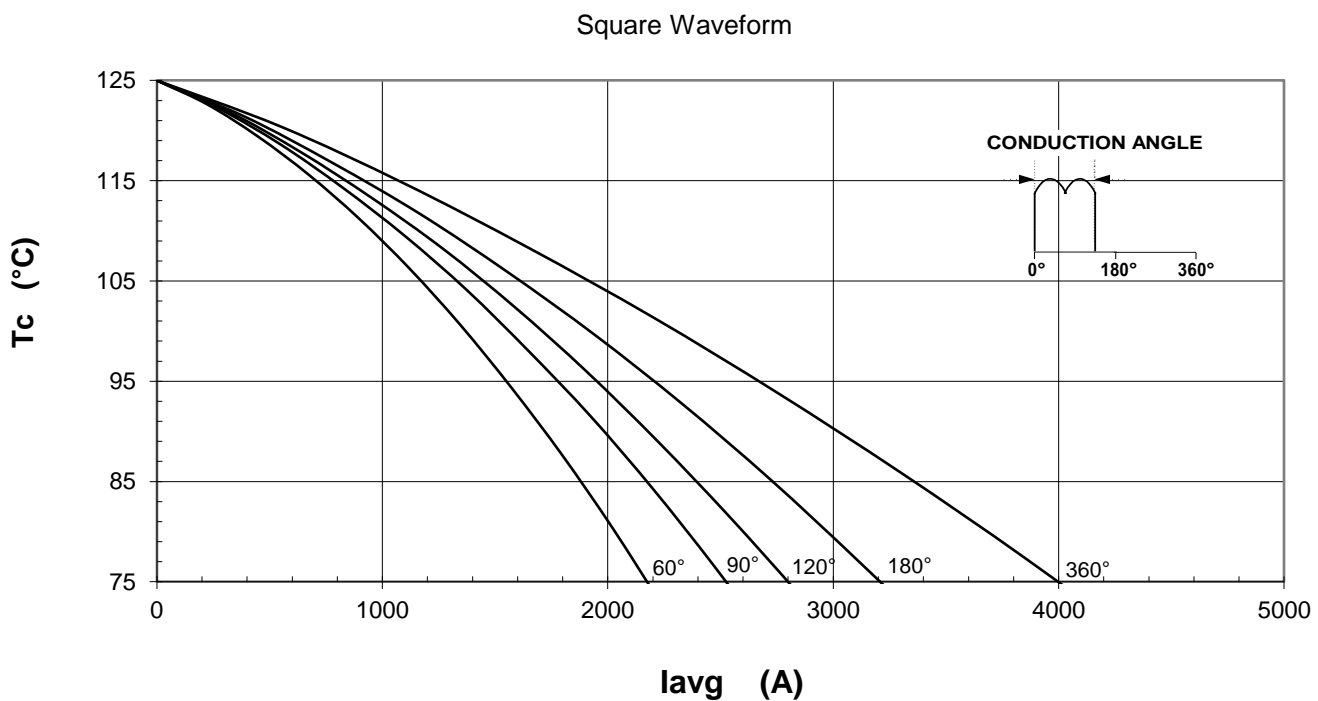
Maximum Allowable Case Temperature



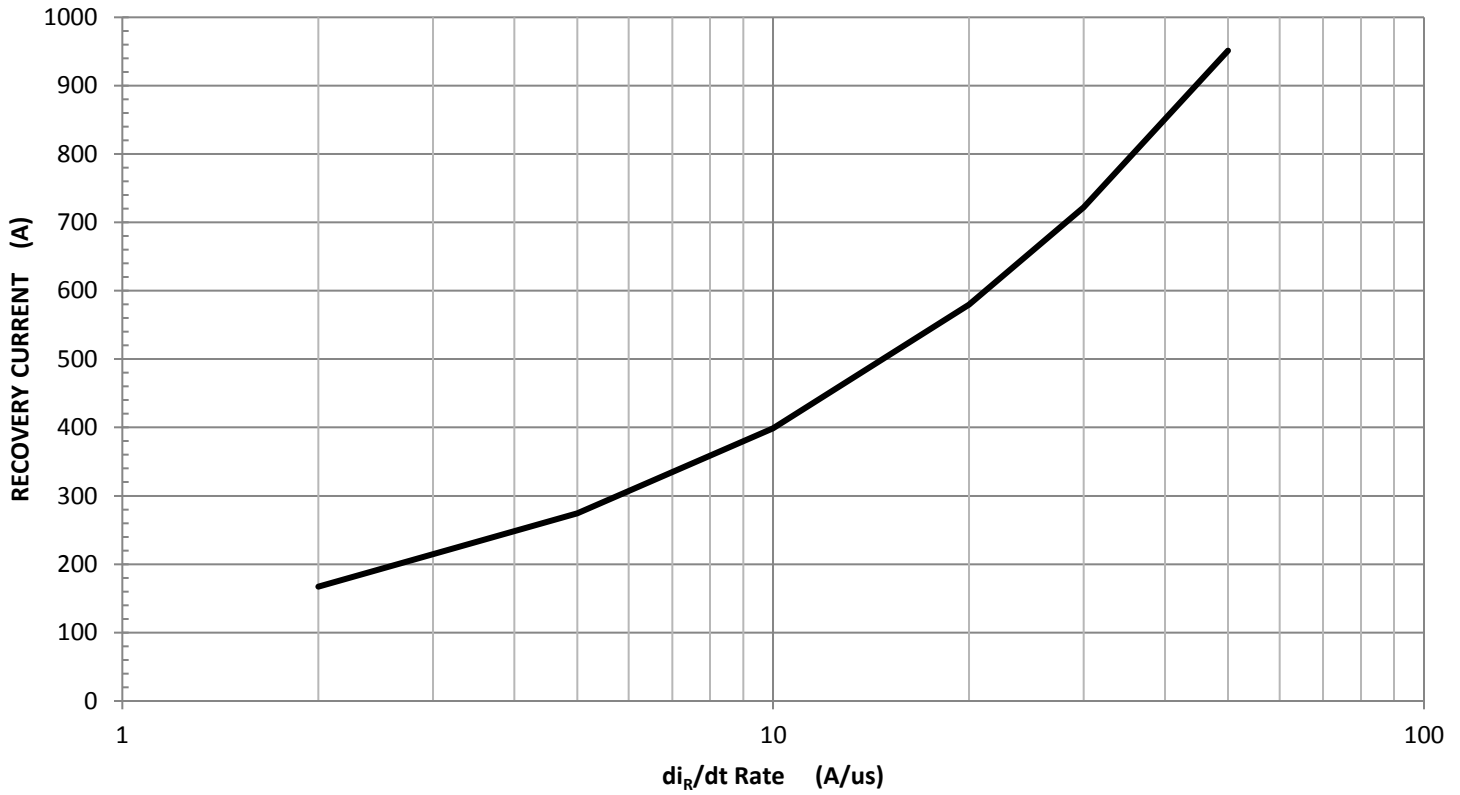
Maximum On-State Power Dissipation



Maximum Allowable Case Temperature

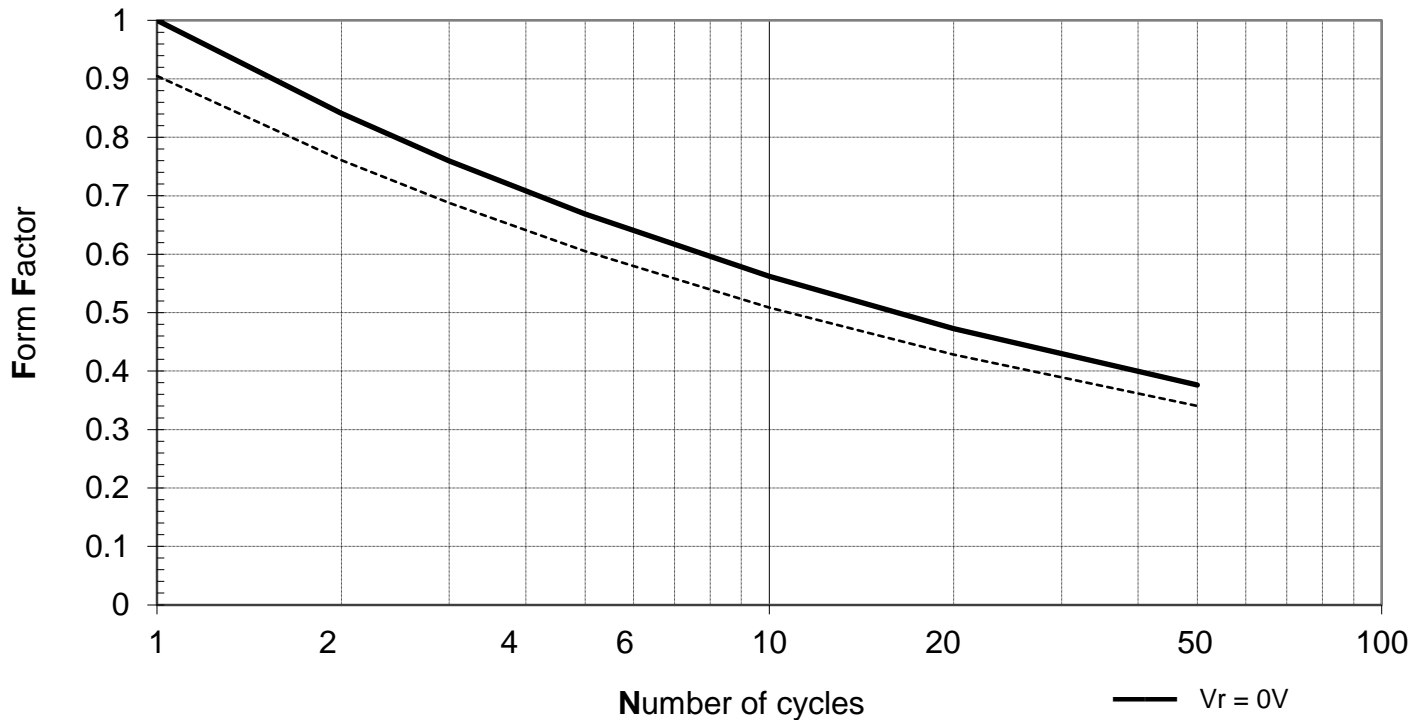


REVERSE RECOVERY CURRENT



MULTI-CYCLE SURGE FORM FACTOR

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



REVERSE RECOVERY CHARGE

