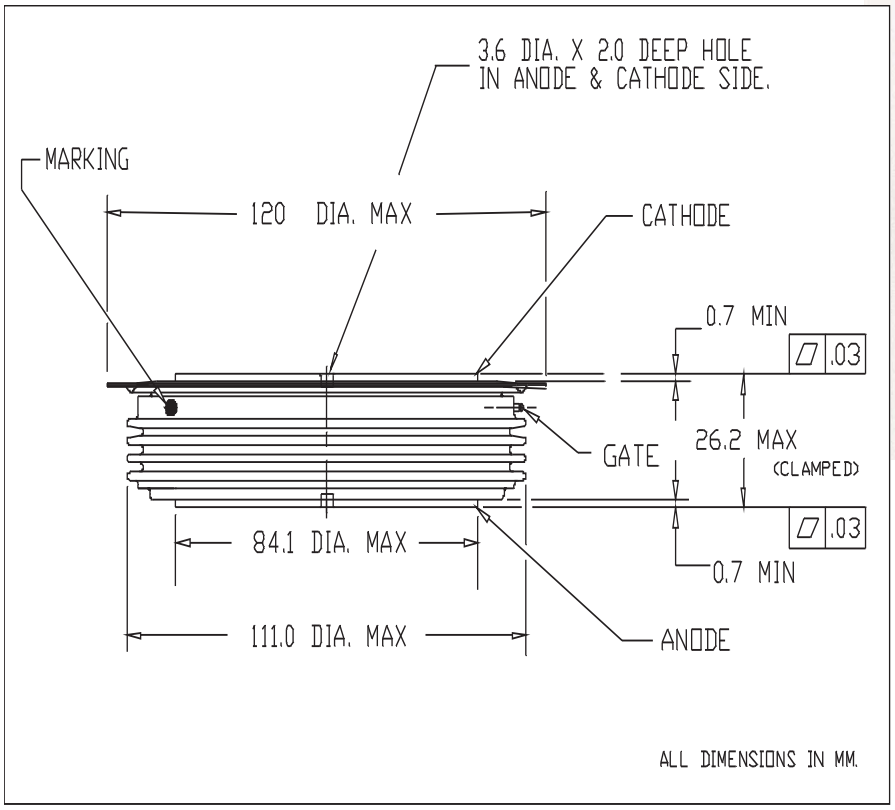
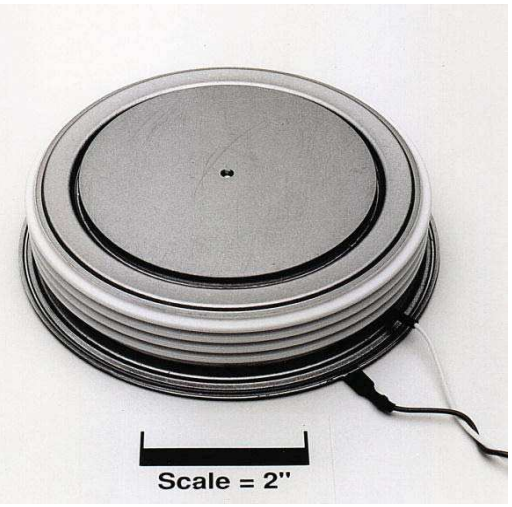
TCU4__320H

Phase Control Thyristor

Powerex, Inc., 173 Pavilion Ln, Youngwood, PA 15697-1800 (724)925-7272 WWW.PWRX.COM

3200 Amperes 2800 Volts





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

Revised: 11/01/2012

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°C	$I_{T(Avg.)}$	3200	A
RMS On-State Current, T_C=70°C	$I_{T(RMS)}$	5027	A
Average On-State Current, T_C=55°C	$I_{T(Avg.)}$	3800	A
RMS On-State Current, T_C=55°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	Tj	-40 to+125	°C
Storage Temperature	$T_{Stg.}$	-50 to+150	°C
Approximate Weight		3.2	lb
		1.45	Kg
Mounting Force		12,000-15,000	lbs
		53 - 67	Knewtons

Electrical Characteristics, Tj=25°C unless otherwise specified

Characteristic	Symbol	Test Conditions	Rating min	Rating typ	Rating max	Units
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
$VTM = V_O + r \bullet I_{TM}$	r	15% I_{TM} - π•I_{TM}			0.121	mΩ
V_{TM} Model, High Level	V_0	Tj=125°C			1.088	V
$VTM = V_O + r \bullet I_{TM}$	r	π•I_{TM} - I_{TSM}			0.1139	mΩ
V_{TM} Model, 4-Term	A	Tj=125°C			0.161	
$V_{TM} = A + B \bullet Ln(I_{TM}) +$	B	15%I_{TM} - I_{TSM}			0.151	
$C \bullet (I_{TM}) + D \bullet (I_{TM})^{½}$	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	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 min	Rating typ	Rating max	Units
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				

$$Z\Theta_{jc}(t) = \Sigma(A(N) \bullet (1-\exp(-t/Tau(N))))$$

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

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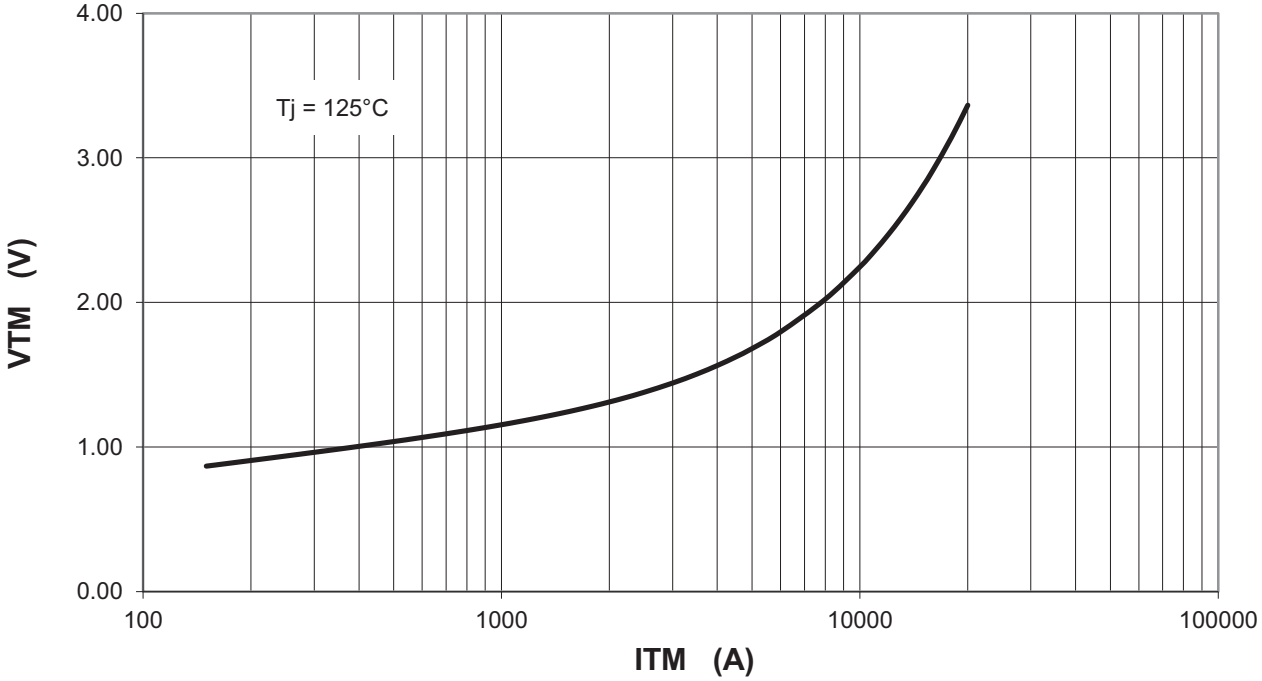
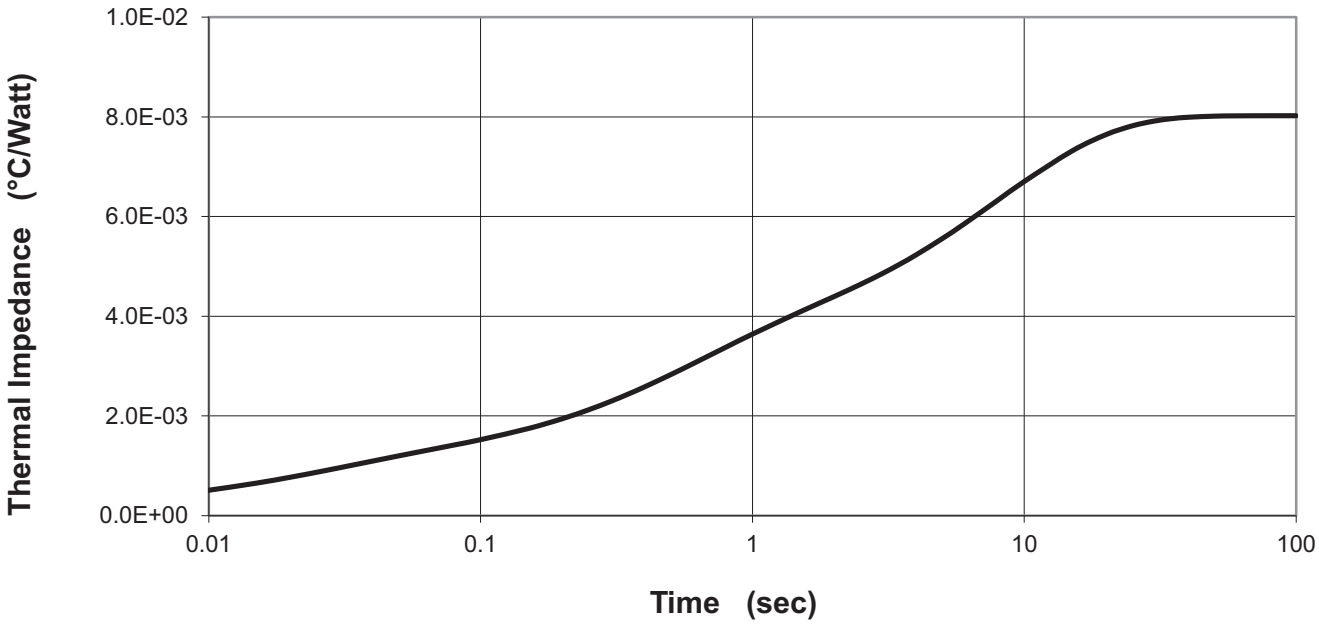
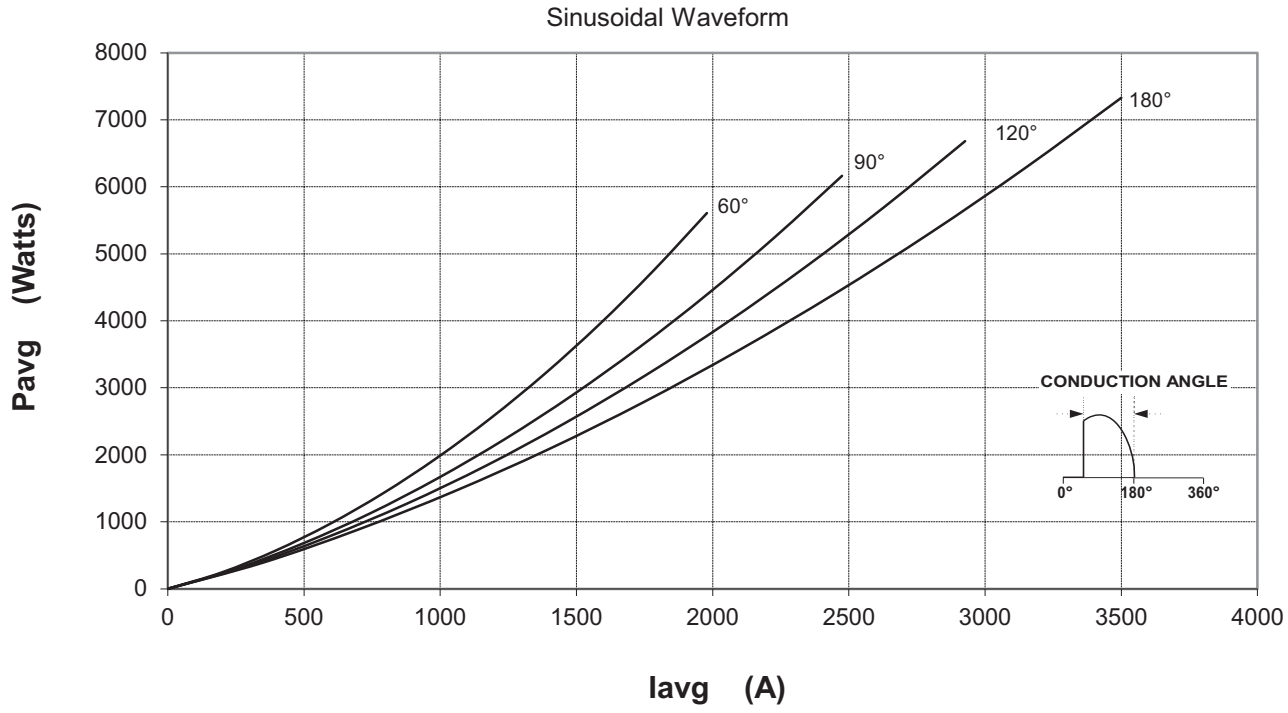
Maximum On-State Voltage Drop



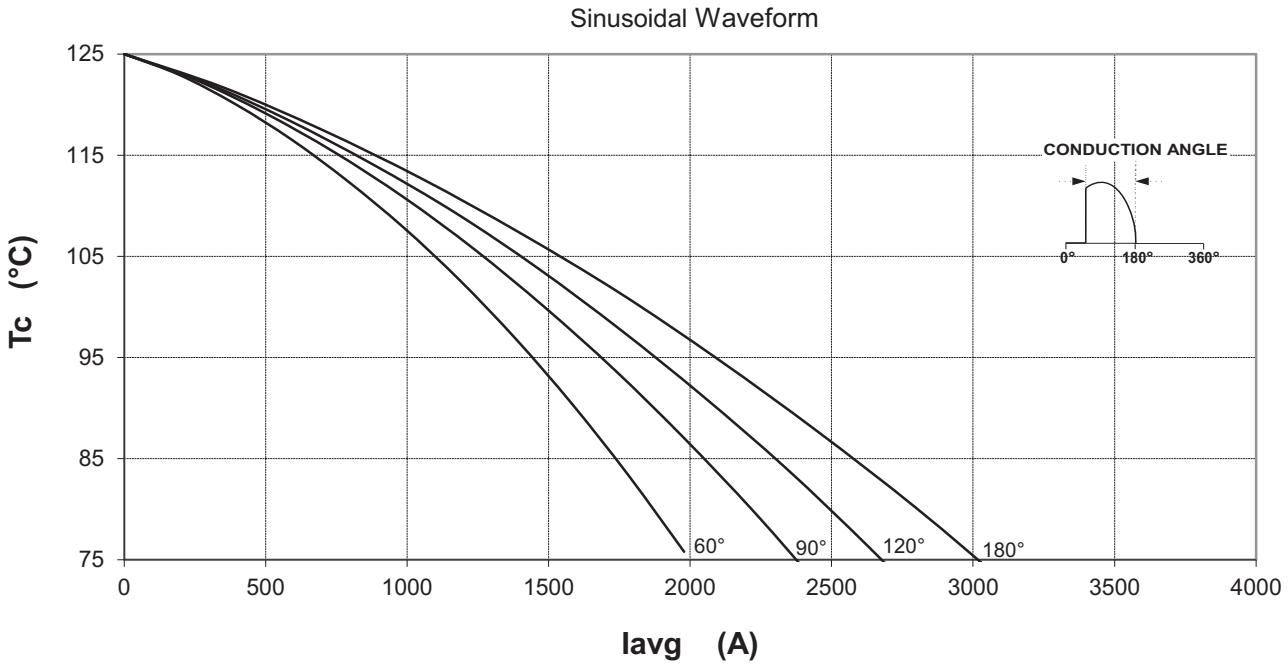
MAXIMUM TRANSIENT THERMAL IMPEDANCE



Maximum On-State Power Dissipation



Maximum Allowable Case Temperature



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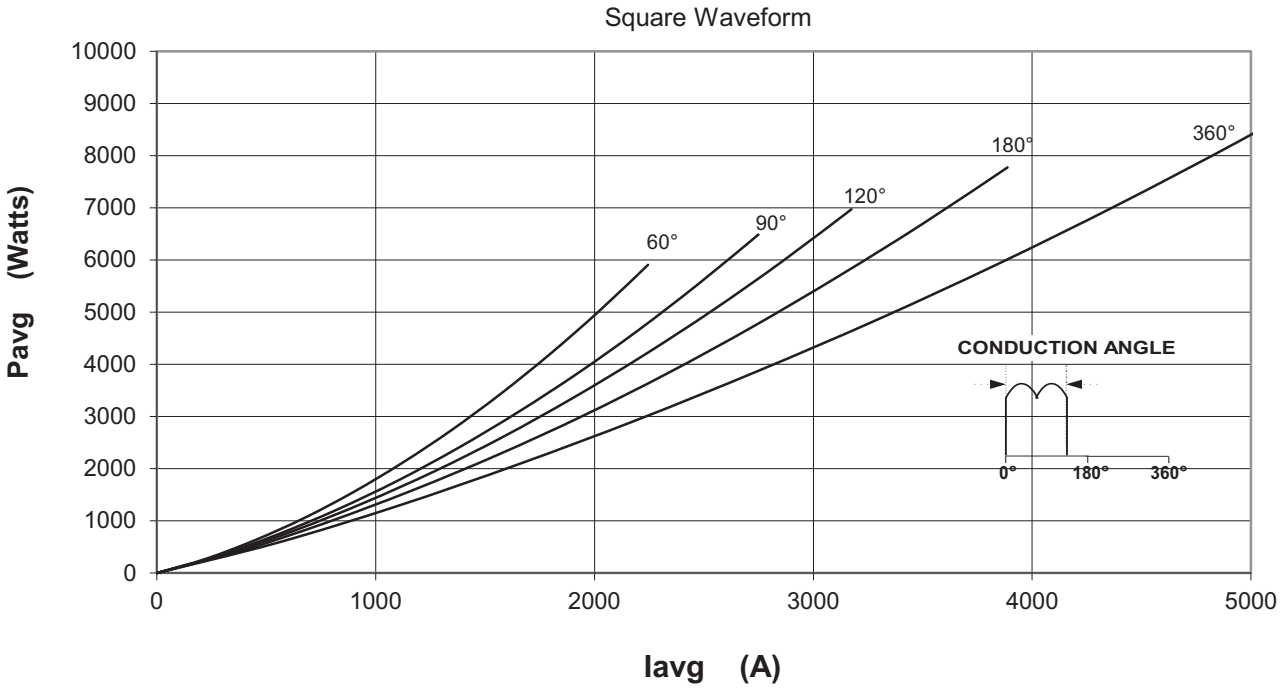
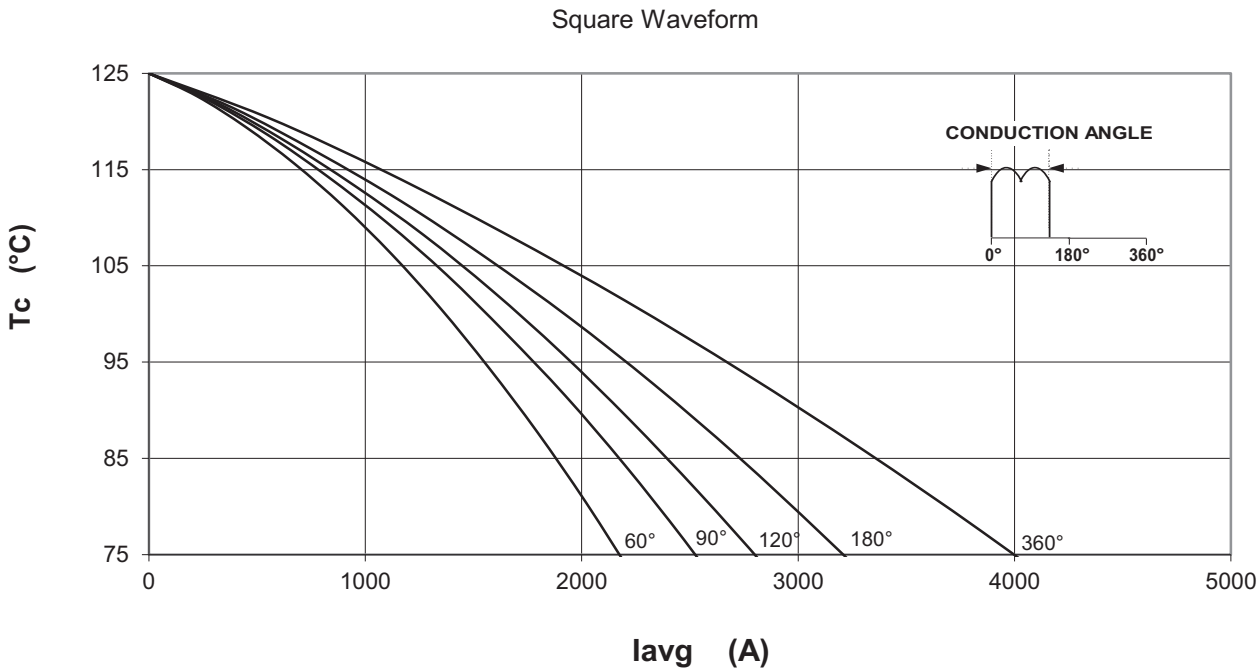
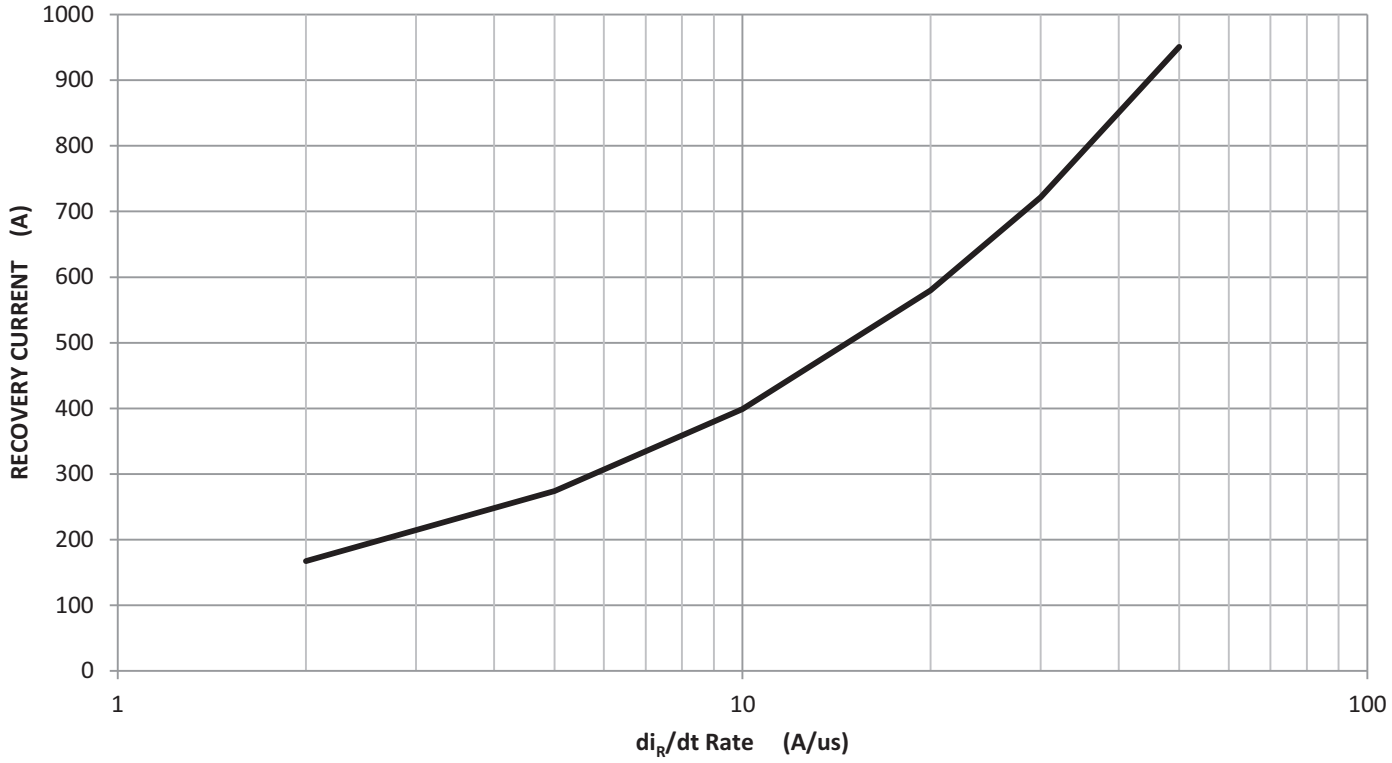


Maximum Allowable Case Temperature

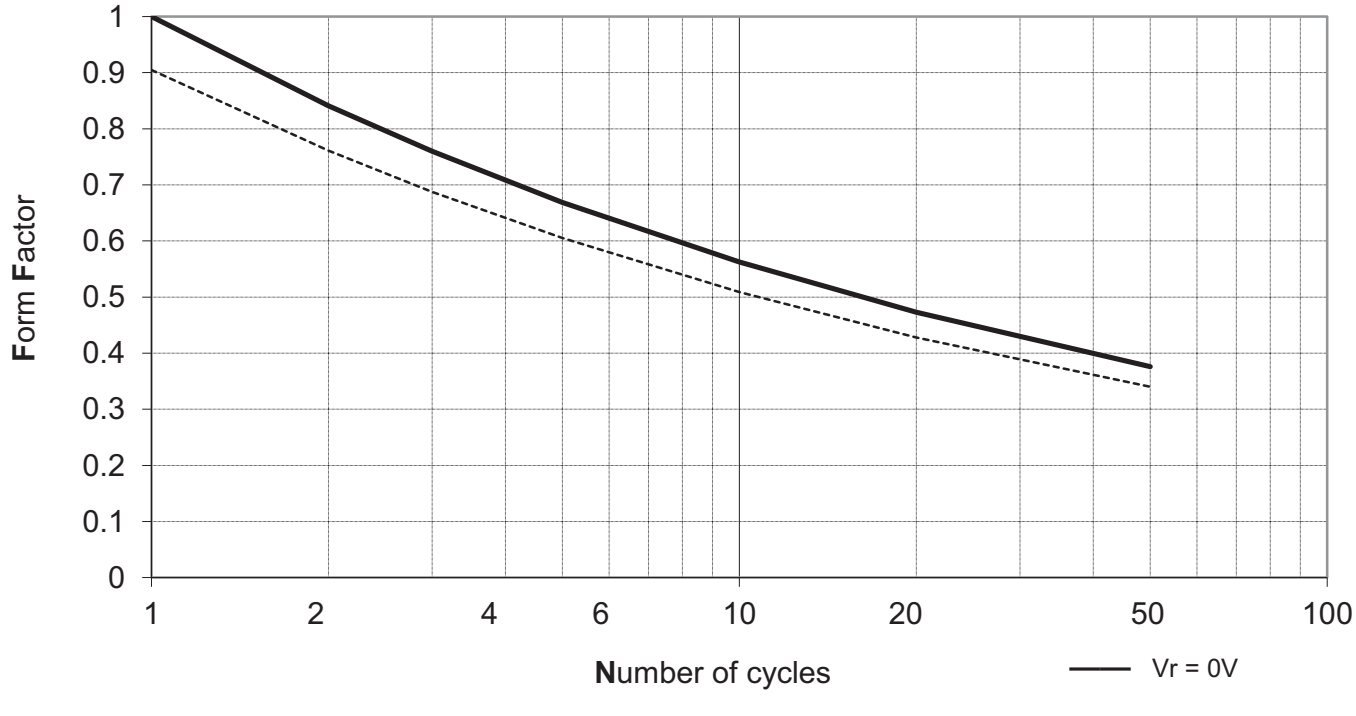


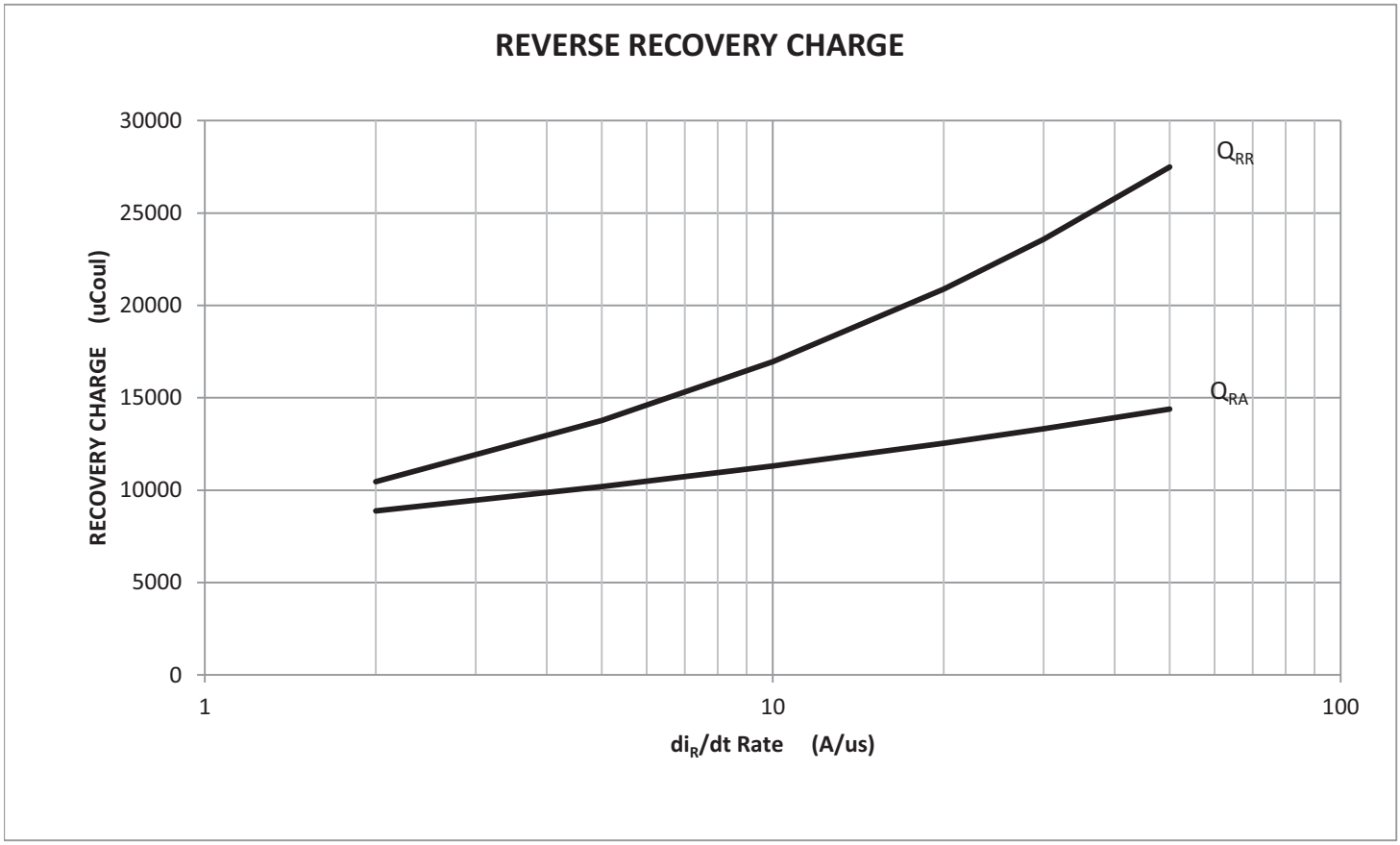
REVERSE RECOVERY CURRENT



MULTI-CYCLE SURGE FORM FACTOR

ITSM(N) = ITSM(1~) • FF(N)




REVERSE RECOVERY CHARGE
RECOVERY CHARGE (uCoul)
30000
25000
20000
15000
10000
5000
0
1
10
100
di_R/dt Rate (A/us)
Q_{RR}
Q_{RA}