

The TCS4 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: TCS444340HDH is a 4400V-3400A SCR with 250ma IGT and 12 inch gate and cathode potential leads.

PART	Voltage Rating		Voltage Code	Current Rating	Current Code	Turn-Off	Gate	Leads
	$V_{DRM}$	$V_{RRM}$						
<b>TCS4</b>	3600		<b>36</b>	3400	<b>34</b>	<b>0</b>	<b>H</b>	<b>DH</b>
	4000		<b>40</b>					
	4200		<b>42</b>			500us	250ma	12"
	4400		<b>44</b>			(typ.)	(max)	
	4500		<b>45</b>					

Revised: 5/1/2012

**Absolute Maximum Ratings**

Characteristic	Symbol	Rating	Units
Repetitive Peak Voltage	$V_{DRM}-V_{RRM}$	3600 - 4500	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, $T_C=50^{\circ}C$	$I_{T(Avg.)}$	4125	A
RMS On-State Current, $T_C=50^{\circ}C$	$I_{T(RMS)}$	6480	A
Peak One Cycle Surge Current, 60Hz, $V_R=0V$	$I_{TSM}$	43,500	A
Peak One Cycle Surge Current, 50Hz, $V_R=0V$	$I_{TSM}$	41,012	A
Fuse Coordination $I^2t$ , 60Hz	$I^2t$	7.88E+06	A <sup>2</sup> s
Fuse Coordination $I^2t$ , 50Hz	$I^2t$	8.41E+06	A <sup>2</sup> s
Critical Rate-of-Rise of On-State Current Repetitive	di/dt	100	A/us
Critical Rate-of-Rise of On-State Current Non-Repetitive	di/dt	300	A/us
Application Specific Repetitive di/dt Rate Linear Rate to 700A followed by 10A/us to $I_{Tavg}$ .	di/dt	400	A/us
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.

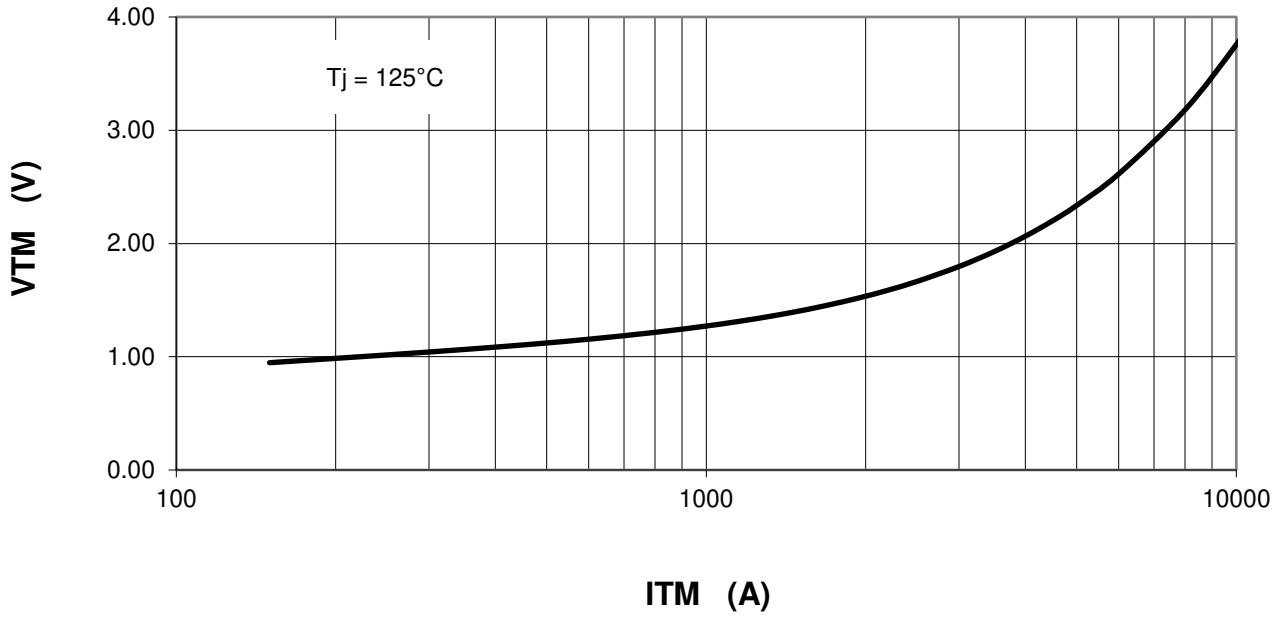
**Electrical Characteristics, T<sub>j</sub>=25°C unless otherwise specified**

Characteristic	Symbol	Test Conditions	Rating			Units
			min	typ	max	
Repetitive Peak Forward Leakage Current	I <sub>DRM</sub>	T <sub>j</sub> =125°C, V <sub>DRM</sub> =Rated			300	ma
Repetitive Peak Reverse Leakage Current	I <sub>RRM</sub>	T <sub>j</sub> =125°C, V <sub>RRM</sub> =Rated			300	ma
Peak On-State Voltage	V <sub>TM</sub>	T <sub>j</sub> =125°C, I <sub>TM</sub> =3000A			1.80	V
V <sub>TM</sub> Model, Low Level	V <sub>0</sub>	T <sub>j</sub> =125°C			0.990	V
V <sub>TM</sub> = V <sub>0</sub> + r•I <sub>TM</sub>	r	15% I <sub>TM</sub> - π•I <sub>TM</sub>			0.271	mΩ
V <sub>TM</sub> Model, High Level	V <sub>0</sub>	T <sub>j</sub> =125°C			0.698	V
V <sub>TM</sub> = V <sub>0</sub> + r•I <sub>TM</sub>	r	π•I <sub>TM</sub> - I <sub>TSM</sub>			0.304	mΩ
V <sub>TM</sub> Model, 4-Term	A	T <sub>j</sub> =125°C			0.191	
V <sub>TM</sub> = A + B•Ln(I <sub>TM</sub> ) +	B	15%I <sub>TM</sub> - I <sub>TSM</sub>			0.181	
C•(I <sub>TM</sub> ) + D•(I <sub>TM</sub> ) <sup>1/2</sup>	C				3.56E-04	
	D				-0.0166	
Turn-On Delay Time	t <sub>d</sub>	V <sub>D</sub> = 0.5•V <sub>DRM</sub> Gate Drive: 40V - 20Q		2.5		us
Turn-Off Time	t <sub>q</sub>	T <sub>j</sub> =125°C dv/dt = 20V/us to 80% V <sub>DRM</sub>			500	us
dv/dt <sub>(Crit)</sub>	dv/dt	T <sub>j</sub> =125°C Exp. Waveform V <sub>D</sub> =80% Rated	1000			V/us
Gate Trigger Current	I <sub>GT</sub>	T <sub>j</sub> =25°C V <sub>D</sub> = 12V	30	100	250	ma
Gate Trigger Voltage	V <sub>GT</sub>		0.8	2.0	4.5	V
Peak Reverse Gate Voltage	V <sub>GDM</sub>				5	V

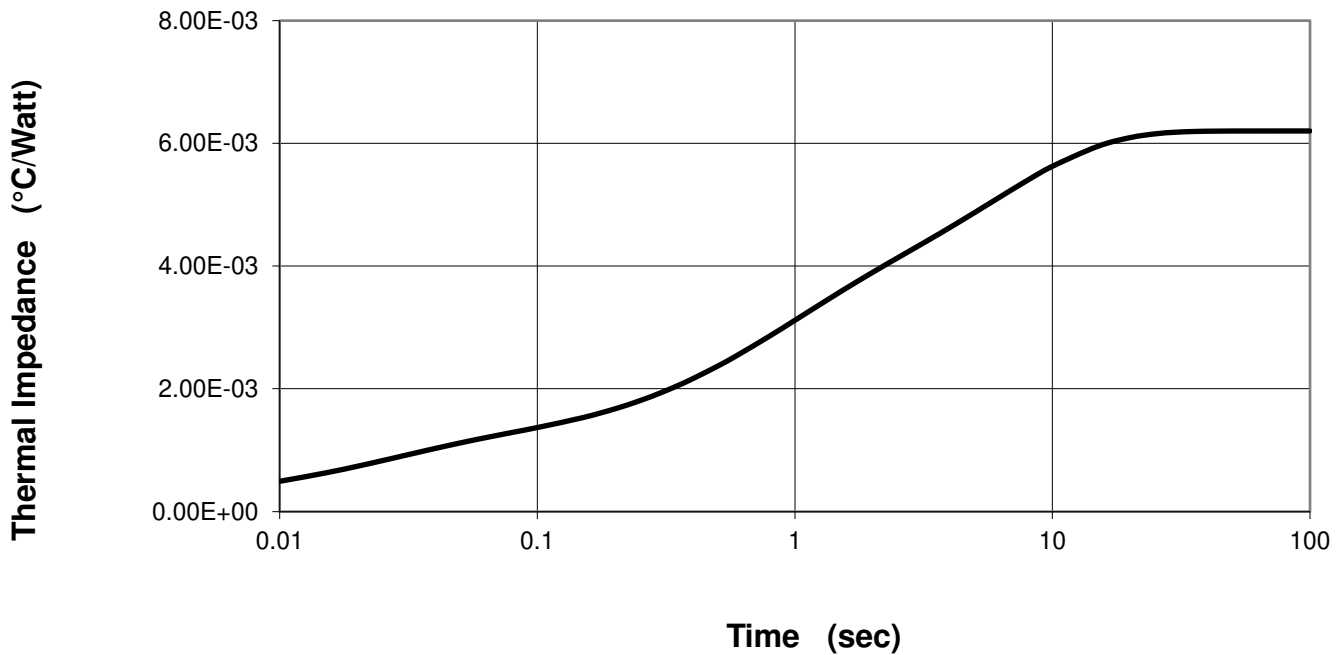
**Thermal Characteristics**

Characteristic	Symbol	Test Conditions	Rating			Units	
			min	typ	max		
Thermal Resistance							
Junction to Case	RΘ <sub>jc</sub>	Double side cooled		0.007	0.008	°C/Watt	
Case to Sink	RΘ <sub>cs</sub>	Double side cooled		0.0015	0.002	°C/Watt	
Thermal Impedance Model	ZΘ <sub>jc</sub>	Double side cooled					
ZΘ <sub>jc</sub> (t) = Σ(A(N)•(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

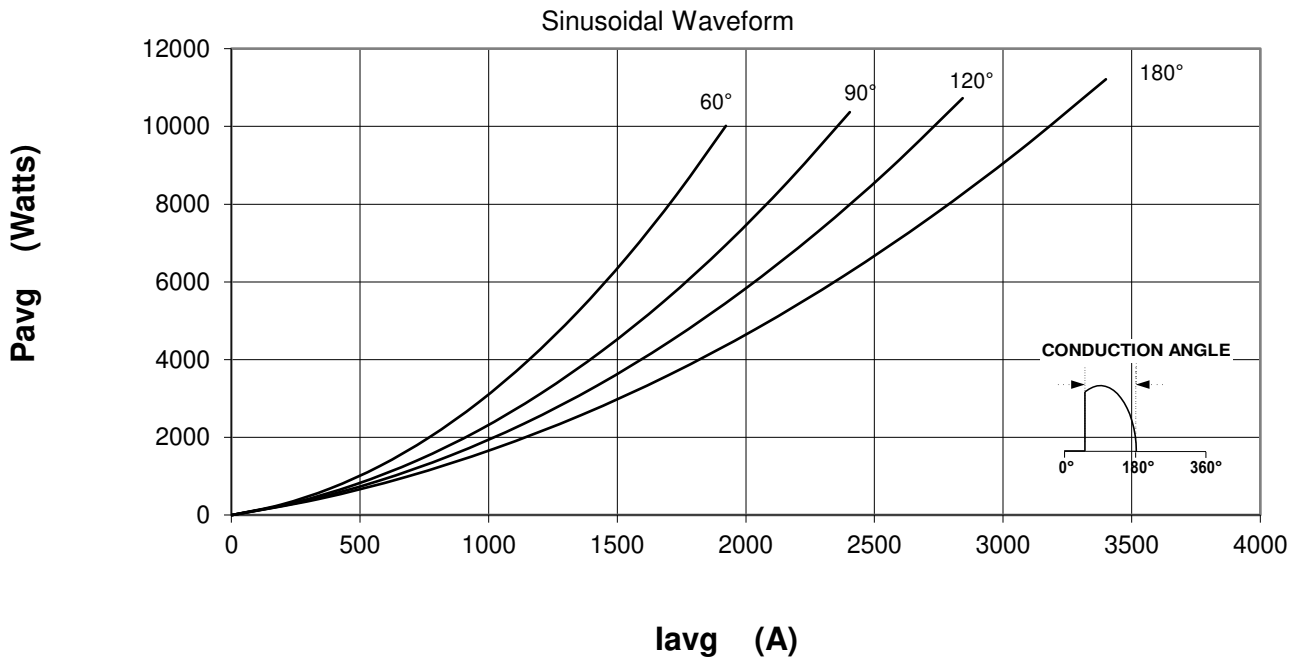
## Maximum On-State Voltage Drop



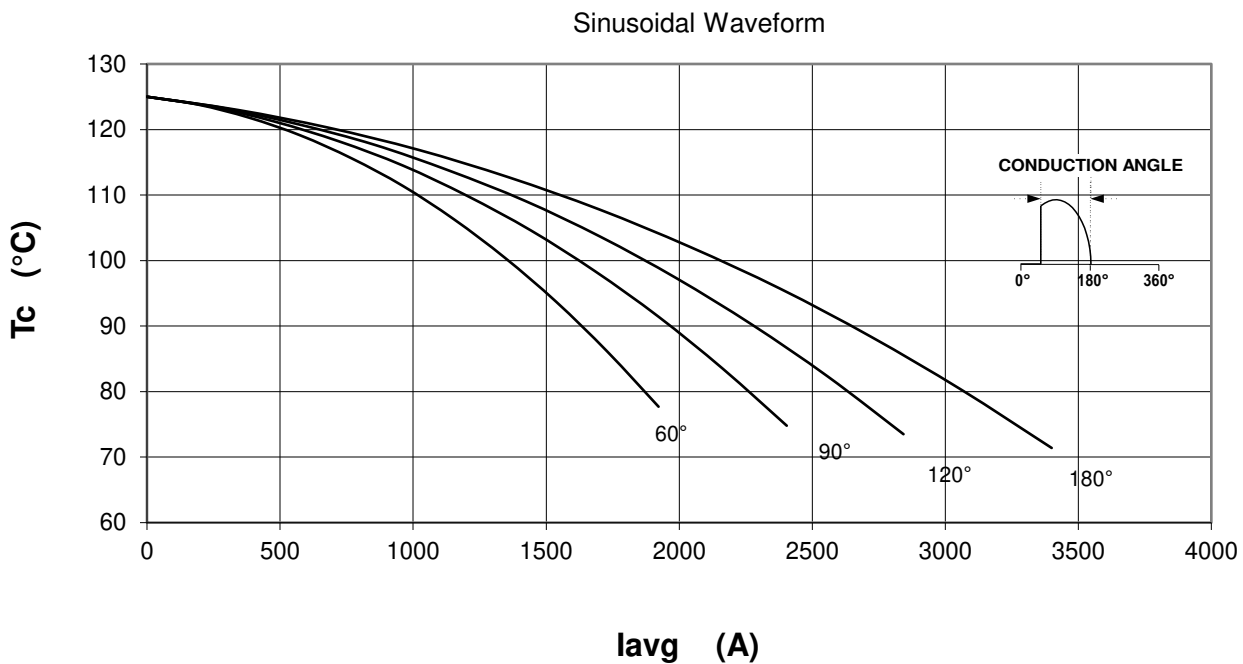
## MAXIMUM TRANSIENT THERMAL IMPEDANCE



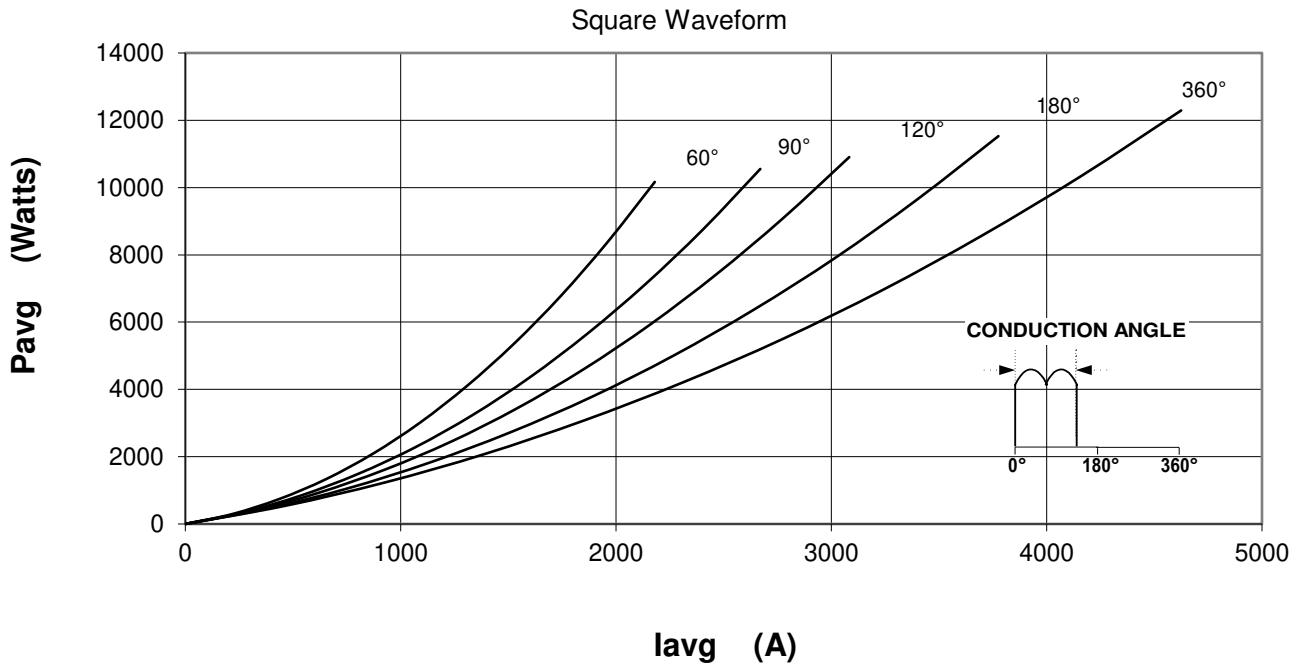
### Maximum On-State Power Dissipation



### Maximum Allowable Case Temperature



## Maximum On-State Power Dissipation



## Maximum Allowable Case Temperature

