

The TC20 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<sup>2</sup>t Ratings

**APPLICATIONS:**

- DC Power Supplies
- Motor Controls

**ORDERING INFORMATION**

Select the complete 12 digit Part Number using the table below.  
EXAMPLE: TC20442402DH is a 4400V-24500A SCR with 300ma IGT and 12 inch gate and cathode potential leads.

PART	Voltage Rating $V_{DRM}-V_{RRM}$	Voltage Code	Current Rating $I_{TAVG}$	Current Code	Turn-Off $T_q$	Gate $I_{GT}$	Leads
<b>TC20</b>	4400	<b>44</b>	2450	<b>24</b>	<b>0</b>	<b>2</b>	
	4200	<b>42</b>					
	4000	<b>40</b>			500us	300ma	12"
	3600	<b>36</b>			(typ.)	(max)	

**Absolute Maximum Ratings**

Characteristic	Symbol	Rating	Units
Repetitive Peak Voltage	$V_{DRM}-V_{RRM}$	4400	Volts
Average On-State Current, $T_C=73^\circ\text{C}$	$I_{T(Avg.)}$	2450	A
RMS On-State Current, $T_C=73^\circ\text{C}$	$I_{T(RMS)}$	3848	A
Average On-State Current, $T_C=55^\circ\text{C}$	$I_{T(Avg.)}$	2920	A
RMS On-State Current, $T_C=55^\circ\text{C}$	$I_{T(RMS)}$	4587	A
Peak One Cycle Surge Current, 60Hz, $V_R=0V$	$I_{TSM}$	30,000	A
Peak One Cycle Surge Current, 50Hz, $V_R=0V$	$I_{TSM}$	28,284	A
Fuse Coordination $I^2t$ , 60Hz	$I^2t$	3.75E+06	$A^2s$
Fuse Coordination $I^2t$ , 50Hz	$I^2t$	4.00E+06	$A^2s$
Critical Rate-of-Rise of On-State Current	$di/dt$	100	A/us
Repetitive			
Critical Rate-of-Rise of On-State Current	$di/dt$	300	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		5.5	lb
		2.49	Kg
Mounting Force		12,000-15,000	lbs
		53 - 67	KNewtons



**PRELIMINARY**

**TC20\_2402**  
Phase Control Thyristor

Powerex, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800 (724)925-7272

**2450Amperes 4400Volts**

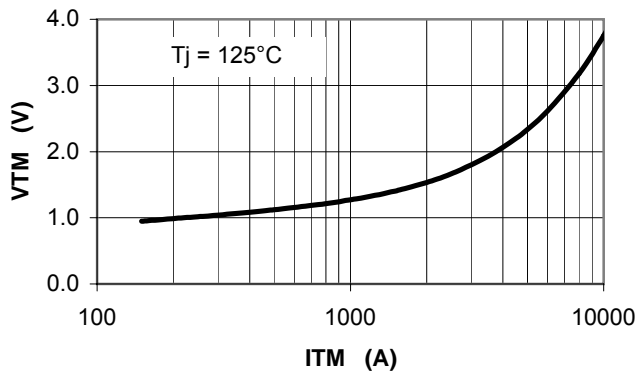
**Electrical Characteristics, Tj=25°C unless otherwise specified**

Characteristic	Symbol	Test Conditions	Rating			Units
			min	typ	max	
Repetitive Peak Forward Leakage Current	$I_{DRM}$	Tj=125°C, $V_{DRM}$ =Rated			300	ma
Repetitive Peak Reverse Leakage Current	$I_{RRM}$	Tj=125°C, $V_{RRM}$ =Rated			300	ma
Peak On-State Voltage	$V_{TM}$	Tj=125°C, $I_{TM}$ =3000A			1.80	V
$V_{TM}$ Model, Low Level	$V_0$	Tj=125°C			0.990	V
$V_{TM} = V_0 + r \cdot I_{TM}$	r	15% $I_{TM} - \pi \cdot I_{TM}$			2.71E-04	$\Omega$
$V_{TM}$ Model, High Level	$V_0$	Tj=125°C			0.698	V
$V_{TM} = V_0 + r \cdot I_{TM}$	r	$\pi \cdot I_{TM} - I_{TSM}$			3.04E-04	$\Omega$
$V_{TM}$ Model, 4-Term	A	Tj=125°C			0.191	
$V_{TM} = A + B \cdot \ln(I_{TM}) +$	B	15% $I_{TM} - I_{TSM}$			0.181	
$C \cdot (I_{TM}) + D \cdot (I_{TM})^{1/2}$	C				3.56E-04	
	D				-1.66E-02	
Turn-On Delay Time	$t_d$	$V_D = 0.5 \cdot V_{DRM}$ Gate Drive: 40V - 20 $\Omega$			1.5	us
Turn-Off Time	tq	Tj=125°C dv/dt = 20V/us to 67% $V_{DRM}$			500	us
dv/dt <sub>(crit)</sub>	dv/dt	Tj=125°C Exp. Waveform $V_D = 67\%$ Rated	400			V/us
Gate Trigger Current	$I_{GT}$	Tj=25°C $V_D = 12V$	30	150	400	ma
Gate Trigger Voltage	$V_{GT}$		0.8	2.0	4.5	V
Peak Reverse Gate Voltage	$V_{GRM}$				5	V

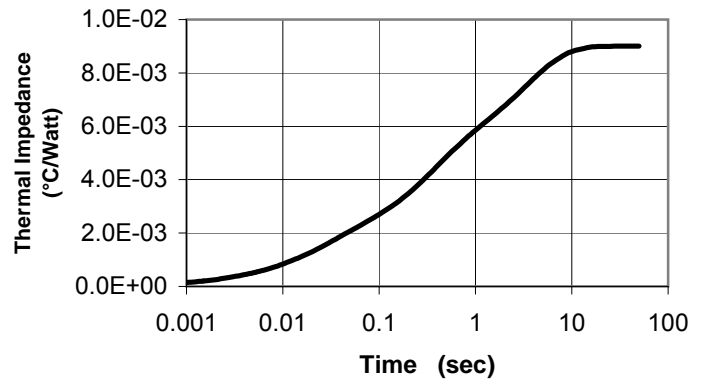
**Thermal Characteristics**

Characteristic	Symbol	Test Conditions	Rating			Units	
			min	typ	max		
Thermal Resistance							
Junction to Case	$R\theta_{jc}$	Double side cooled			0.009	°C/Watt	
Case to Sink	$R\theta_{cs}$	Double side cooled			0.0025	°C/Watt	
Thermal Impedance Model							
$Z\theta_{jc}(t) = \Sigma(A(N) \cdot (1 - \exp(-t/\text{Tau}(N))))$		Double side cooled					
	where:		N =	1	2	3	4
			A(N) =	2.00E-04	1.50E-03	3.20E-03	4.10E-03
			Tau(N) =	2.62E-03	2.31E-02	3.05E-01	3.30E+00

### Maximum On-State Voltage Drop

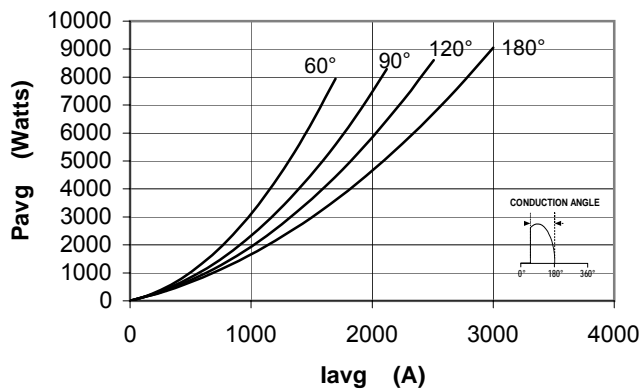


### MAXIMUM TRANSIENT THERMAL IMPEDANCE



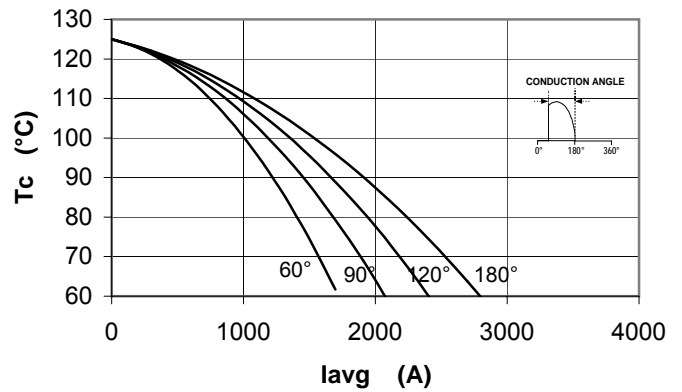
### Maximum On-State Power Dissipation

Sinusoidal Waveform



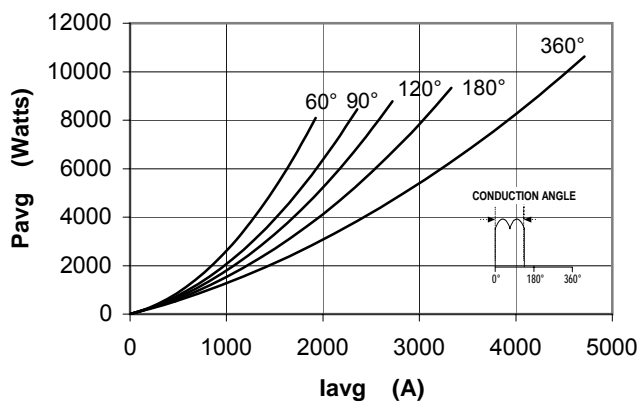
### Maximum Allowable Case Temperature

Sinusoidal Waveform



### Maximum On-State Power Dissipation

Square Waveform



### Maximum Allowable Case Temperature

Square Waveform

