

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-2450A 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, $T_C=73^{\circ}C$	$I_{T(Avg.)}$	2450	A
RMS On-State Current, $T_C=73^{\circ}C$	$I_{T(RMS)}$	3848	A
Average On-State Current, $T_C=55^{\circ}C$	$I_{T(Avg.)}$	2920	A
RMS On-State Current, $T_C=55^{\circ}C$	$I_{T(RMS)}$	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 <sup>2</sup> s
Fuse Coordination $I^2t$ , 50Hz	$I^2t$	4.00E+06	A <sup>2</sup> s
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	$^{\circ}C$
Storage Temperature	$T_{Stg.}$	-50 to+150	$^{\circ}C$
Approximate Weight		5.5	lb
		2.49	Kg
Mounting Force		12,000-15,000	lbs
		53 - 67	KNewtons

Information presented is based upon manufacturers testing and projected capabilities. This information is subject to change without notice. The manufacturer makes no claim as to suitability for use, reliability, capability or future availability of this product.

**Electrical Characteristics,  $T_j=25^\circ\text{C}$  unless otherwise specified**

Characteristic	Symbol	Test Conditions	Rating			Units
			min	typ	max	
Repetitive Peak Forward Leakage Current	$I_{DRM}$	$T_j=125^\circ\text{C}$ , $V_{DRM}=\text{Rated}$			300	ma
Repetitive Peak Reverse Leakage Current	$I_{RRM}$	$T_j=125^\circ\text{C}$ , $V_{RRM}=\text{Rated}$			300	ma
Peak On-State Voltage	$V_{TM}$	$T_j=125^\circ\text{C}$ , $I_{TM}=3000\text{A}$			1.80	V
$V_{TM}$ Model, Low Level	$V_0$	$T_j=125^\circ\text{C}$			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	$V_0$	$T_j=125^\circ\text{C}$			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	$T_j=125^\circ\text{C}$			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	$t_q$	$T_j=125^\circ\text{C}$ $dv/dt = 20\text{V/us}$ to 67% $V_{DRM}$			500	us
$dv/dt_{(crit)}$	$dv/dt$	$T_j=125^\circ\text{C}$ Exp. Waveform $V_D = 67\% \text{ Rated}$	1000			V/us
Gate Trigger Current	$I_{GT}$	$T_j=25^\circ\text{C}$ $V_D = 12\text{V}$	30	150	300	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	$^\circ\text{C/Watt}$
Case to Sink	$R\theta_{cs}$	Double side cooled			0.0025	$^\circ\text{C/Watt}$

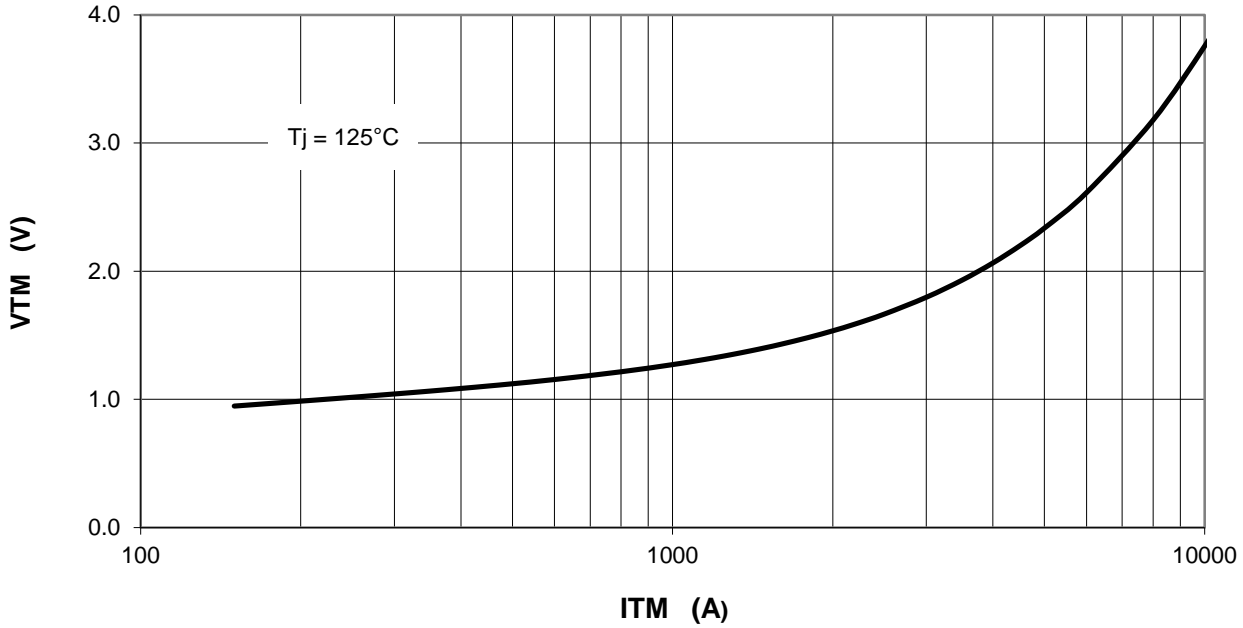
 Thermal Impedance Model  $Z\theta_{jc}$  Double side cooled

$$Z\theta_{jc}(t) = \sum(A(N) \cdot (1 - \exp(-t/\text{Tau}(N))))$$

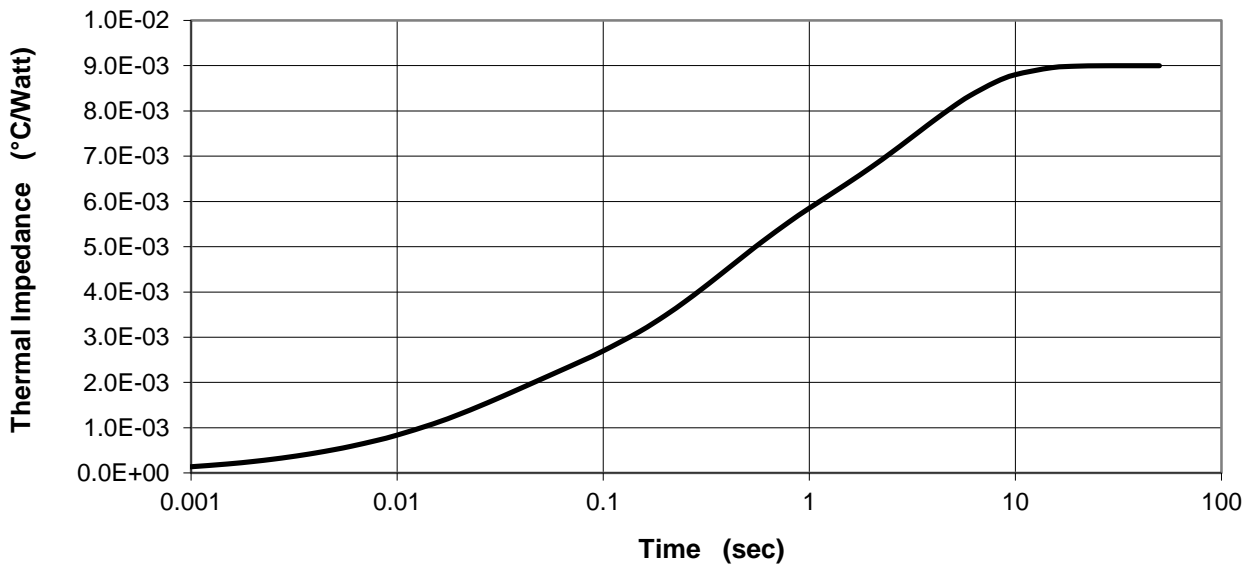
where:

	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

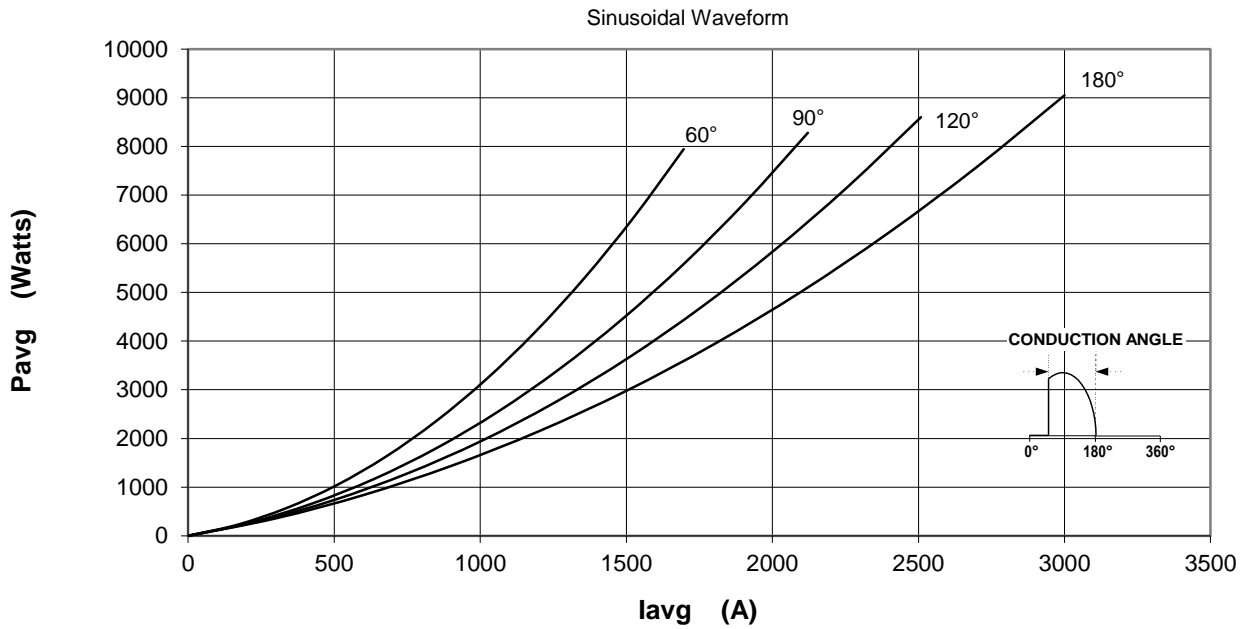
### Maximum On-State Voltage Drop



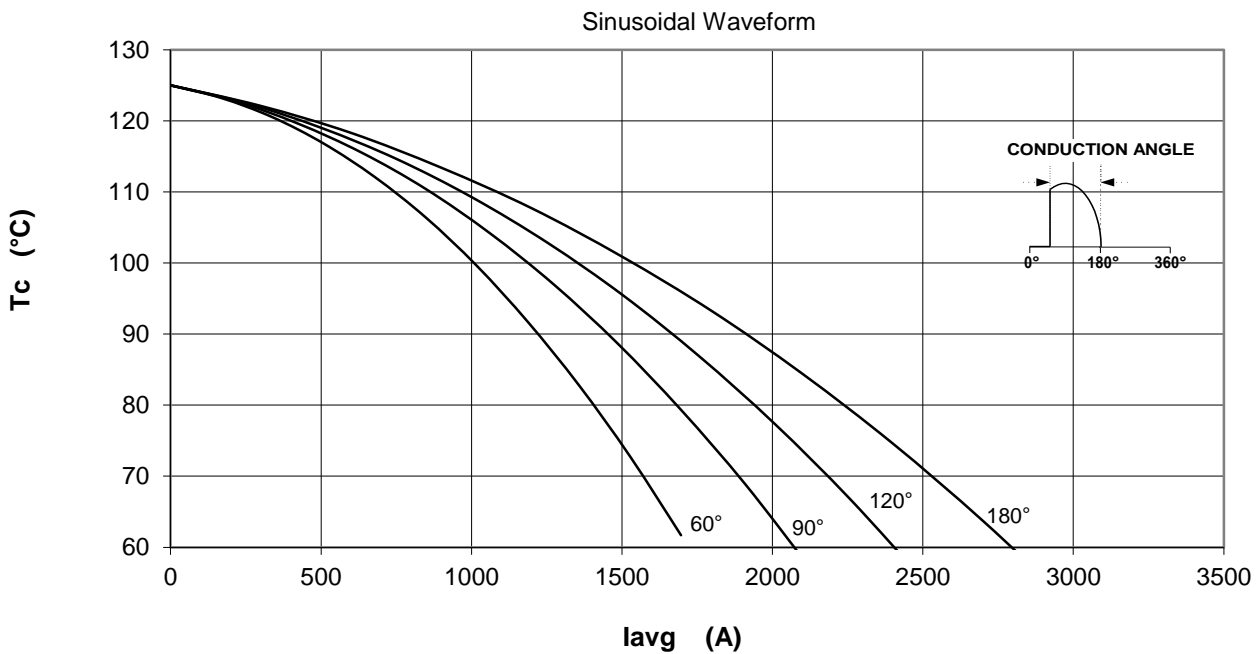
### MAXIMUM TRANSIENT THERMAL IMPEDANCE



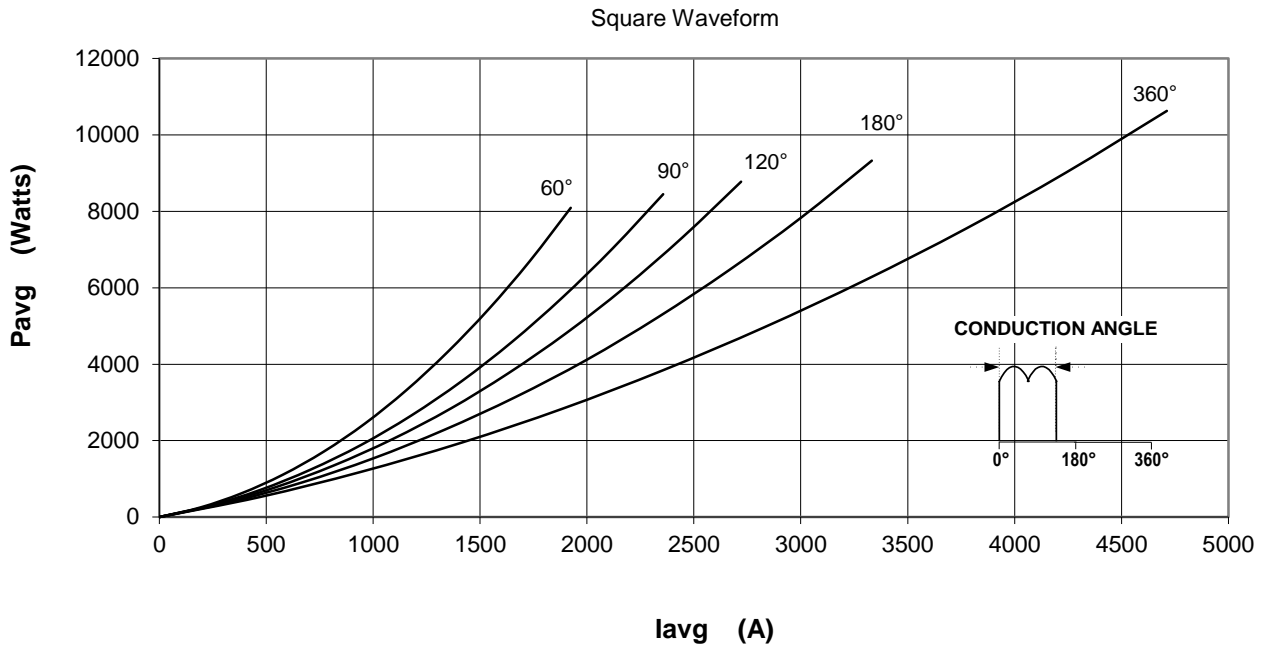
### Maximum On-State Power Dissipation



### Maximum Allowable Case Temperature



### Maximum On-State Power Dissipation



### Maximum Allowable Case Temperature

