

### APPLICATIONS

- High Power Drives.
- High Voltage Power Supplies.
- DC Motor Control.
- Welding.
- Battery Chargers.

### KEY PARAMETERS

$V_{DRM}$	6500V
$I_{T(AV)}$	515A
$I_{TSM}$	10700A
dV/dt	1000V/ $\mu$ s
di/dt	100A/ $\mu$ s

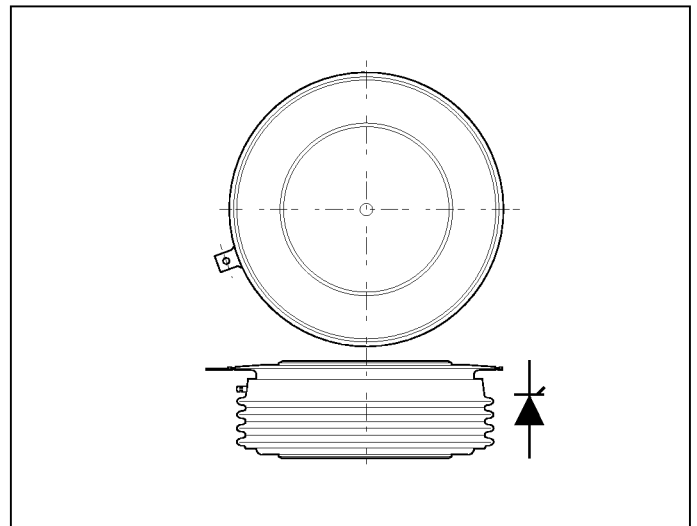
### FEATURES

- Double Side Cooling.
- High Surge Capability.

### VOLTAGE RATINGS

Type Number	Repetitive Peak Voltages $V_{DRM}$ $V_{RRM}$ V	Conditions
DCR1020SF65	6500	$T_{vj} = 0^\circ$ to $125^\circ$ C, $I_{DRM} = I_{RRM} = 150$ mA, $V_{DRM}, V_{RRM} t_p = 10$ ms, $V_{DSM}$ & $V_{RSM} =$ $V_{DRM}$ & $V_{RRM} + 100$ V Respectively
DCR1020SF64	6400	
DCR1020SF63	6300	
DCR1020SF62	6200	
DCR1020SF61	6100	
DCR1020SF60	6000	

Lower voltage grades available.



Outline type code: F. See package outline for further information.

### CURRENT RATINGS

Symbol	Parameter	Conditions	Max.	Units
<b>Double Side Cooled</b>				
$I_{T(AV)}$	Mean on-state current	Half wave resistive load, $T_{case} = 80^\circ$ C	515	A
$I_{T(RMS)}$	RMS value	$T_{case} = 80^\circ$ C	809	A
$I_T$	Continuous (direct) on-state current	$T_{case} = 80^\circ$ C	765	A
<b>Single Side Cooled (Anode side)</b>				
$I_{T(AV)}$	Mean on-state current	Half wave resistive load, $T_{case} = 80^\circ$ C	377	A
$I_{T(RMS)}$	RMS value	$T_{case} = 80^\circ$ C	592	A
$I_T$	Continuous (direct) on-state current	$T_{case} = 80^\circ$ C	530	A

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## SURGE RATINGS

Symbol	Parameter	Conditions	Max.	Units
$I_{TSM}$	Surge (non-repetitive) on-state current	10ms half sine; $T_{case} = 125^{\circ}C$ $V_R = 50\% V_{RRM} - 1/4$ sine	8.5	kA
$I^2t$	$I^2t$ for fusing		$0.36 \times 10^6$	A <sup>2</sup> s
$I_{TSM}$	Surge (non-repetitive) on-state current	10ms half sine; $T_{case} = 125^{\circ}C$ $V_R = 0$	10.7	kA
$I^2t$	$I^2t$ for fusing		$0.562 \times 10^6$	A <sup>2</sup> s

## THERMAL AND MECHANICAL DATA

Symbol	Parameter	Conditions	Min.	Max.	Units	
$R_{th(j-c)}$	Thermal resistance - junction to case	Double side cooled	dc	-	0.022	$^{\circ}C/W$
		Single side cooled	Anode dc	-	0.038	$^{\circ}C/W$
			Cathode dc	-	0.052	$^{\circ}C/W$
$R_{th(c-h)}$	Thermal resistance - case to heatsink	Clamping force 19.5kN with mounting compound	Double side	-	0.004	$^{\circ}C/W$
			Single side	-	0.008	$^{\circ}C/W$
$T_{vj}$	Virtual junction temperature	On-state (conducting)		-	135	$^{\circ}C$
		Reverse (blocking)		-	125	$^{\circ}C$
$T_{stg}$	Storage temperature range			-55	125	$^{\circ}C$
-	Clamping force			18.0	22.0	kN

## DYNAMIC CHARACTERISTICS

Symbol	Parameter	Conditions	Typ.	Max.	Units	
$V_{TM}$	Maximum on-state voltage	At 1800A peak, $T_{case} = 25^{\circ}C$	-	3.6	V	
$I_{RRM}/I_{DRM}$	Peak reverse and off-state current	At $V_{RRM}/V_{DRM}$ , $T_{case} = 125^{\circ}C$	-	150	mA	
dV/dt	Maximum linear rate of rise of off-state voltage	To 67% $V_{DRM}$ , $T_j = 125^{\circ}C$ .	-	1000	V/ $\mu$ s	
dI/dt	Rate of rise of on-state current	From 67% $V_{DRM}$ to 1000A Gate source 30V, 15 $\Omega$ $t_r \leq 0.5\mu$ s, $T_j = 125^{\circ}C$ .	Repetitive 50Hz	-	30	A/ $\mu$ s
			Non-repetitive	-	100	A/ $\mu$ s
$V_{T(TO)}$	Threshold voltage	At $T_{vj} = 125^{\circ}C$	-	1.2	V	
$r_T$	On-state slope resistance	At $T_{vj} = 125^{\circ}C$	-	1.92	m $\Omega$	
$t_{gd}$	Delay time	$V_D = 67\% V_{DRM}$ , Gate source 30V, 15 $\Omega$ Rise time 0.5 $\mu$ s, $T_j = 25^{\circ}C$	0.5	1.5	$\mu$ s	
$t_q$	Turn-off time	$I_T = 1000A$ , $t_p = 1ms$ , $T_j = 125^{\circ}C$ , $V_{RM} = 100V$ , $dI_{RR}/dt = 10A/\mu$ s, $V_{DR} = 67\% V_{DRM}$ , $dV_{DR}/dt = 25V/\mu$ s	600	-	$\mu$ s	
$I_L$	Latching current	$T_j = 25^{\circ}C$ , $V_D = 10V$	-	600	mA	
$I_H$	Holding current	$T_j = 25^{\circ}C$	-	200	mA	

## GATE TRIGGER CHARACTERISTICS AND RATINGS

Symbol	Parameter	Conditions	Typ.	Max.	Units
$V_{GT}$	Gate trigger voltage	$V_{DRM} = 5V$ , $T_{case} = 25^{\circ}C$	-	3.0	V
$I_{GT}$	Gate trigger current	$V_{DRM} = 5V$ , $T_{case} = 25^{\circ}C$	-	300	mA
$V_{GD}$	Gate non-trigger voltage	At $V_{DRM}$ , $T_{case} = 125^{\circ}C$	-	0.25	V
$V_{FGM}$	Peak forward gate voltage	Anode positive with respect to cathode	-	30	V
$V_{FGN}$	Peak forward gate voltage	Anode negative with respect to cathode	-	0.25	V
$V_{RGM}$	Peak reverse gate voltage		-	5	V
$I_{FGM}$	Peak forward gate current	Anode positive with respect to cathode	-	10	A
$P_{G(M)}$	Peak gate power	See Fig.7 Gate Characteristics curve/table	-	150	W
$P_{G(AV)}$	Mean gate power		-	5	W

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## CURVES

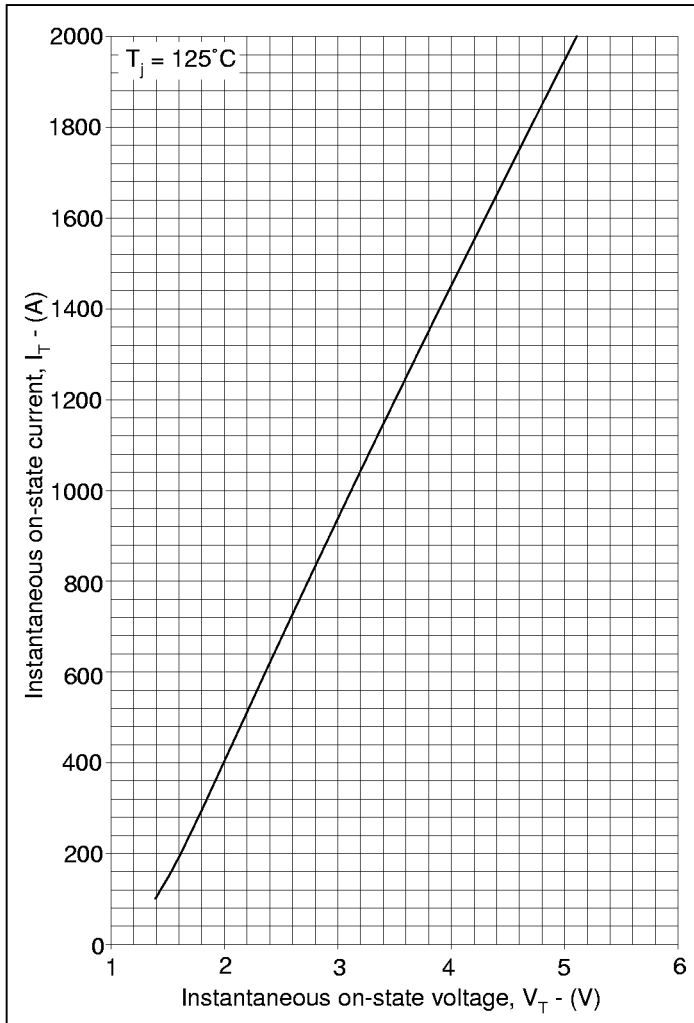


Fig.1 Maximum (limit) on-state characteristics

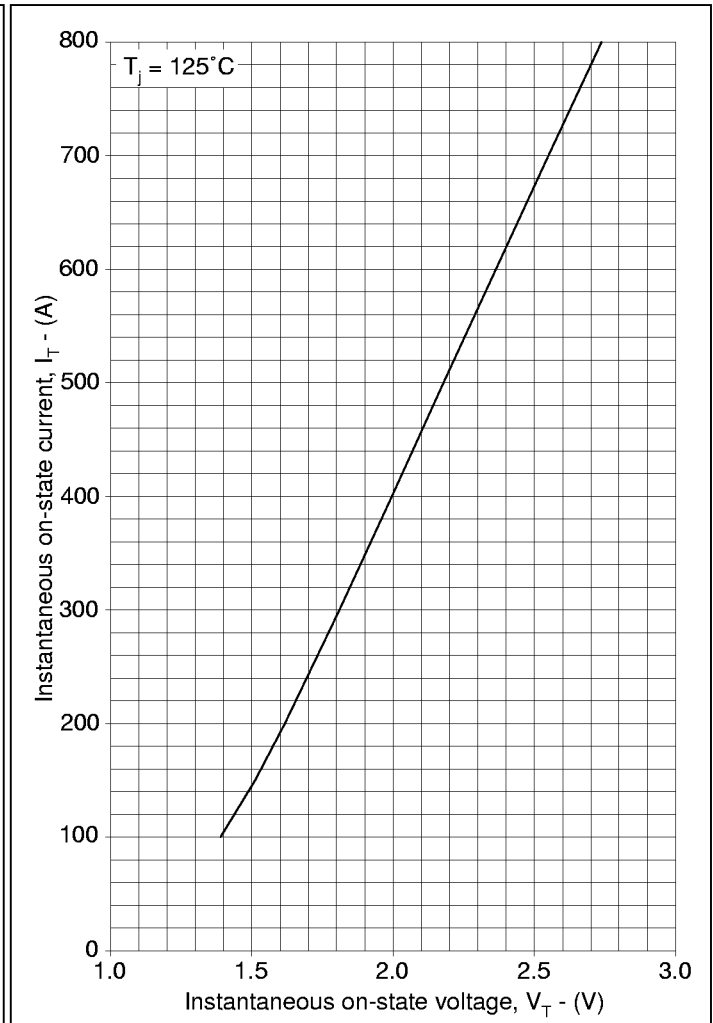


Fig.2 Maximum (limit) on-state characteristics

$V_{TM}$  Equation:-

$$V_{TM} = A + B \ln(I_T) + C \cdot I_T + D \cdot \sqrt{I_T}$$

Where

$$A = 0.25863$$

$$B = 0.322589$$

$$C = 0.002564$$

$$D = -0.061059$$

these values are valid for  $T_j = 125^\circ\text{C}$  for  $I_T$  100A to 2000A

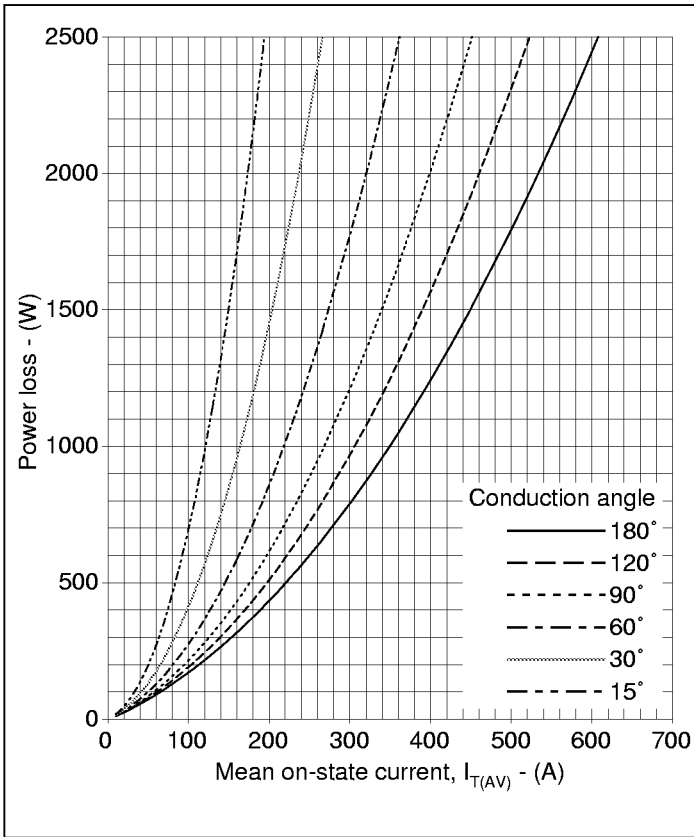


Fig.3 Sine wave power dissipation curves

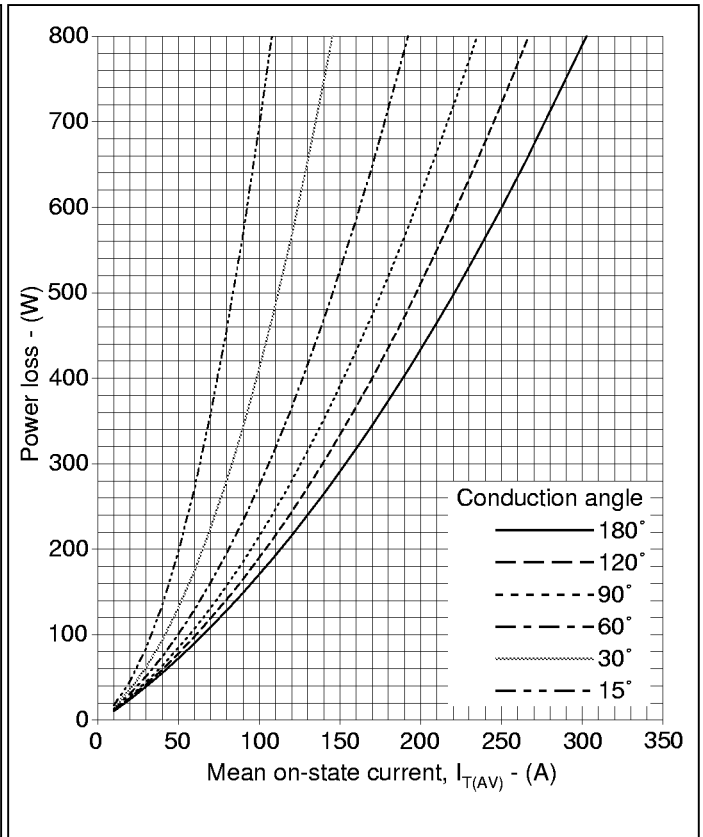


Fig.4 Sine wave power dissipation curves

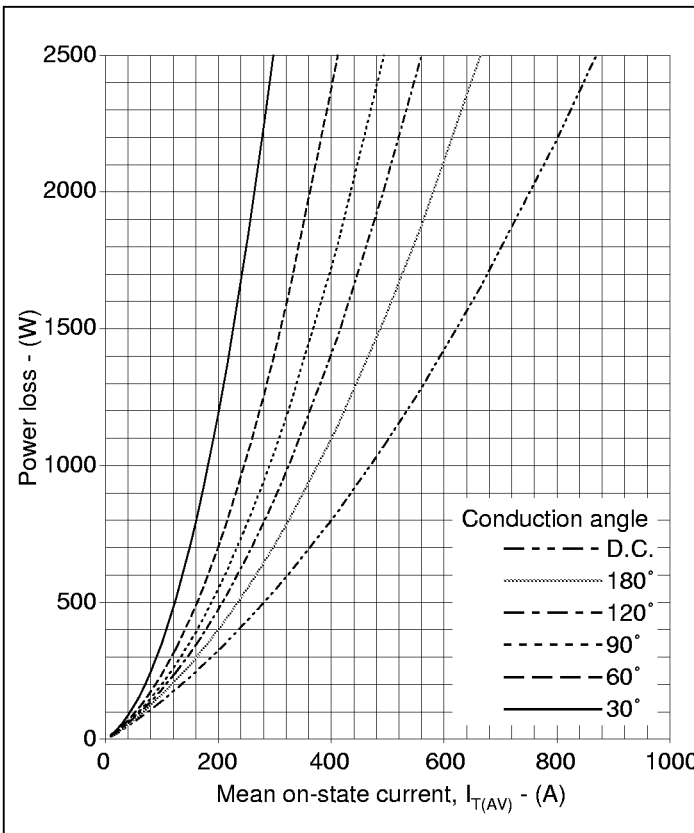


Fig.5 Square wave power dissipation curves

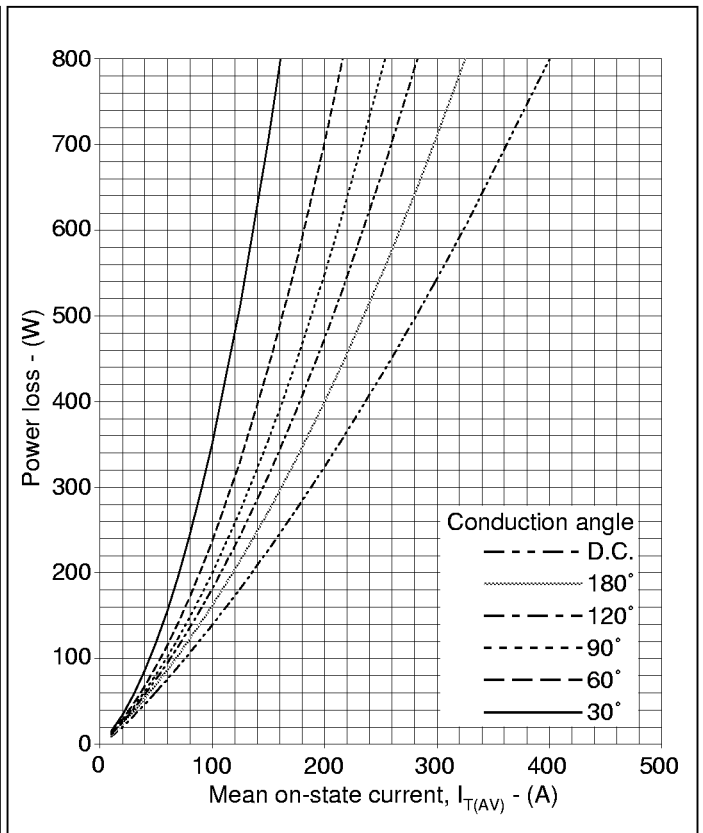


Fig.6 Square wave power dissipation curves

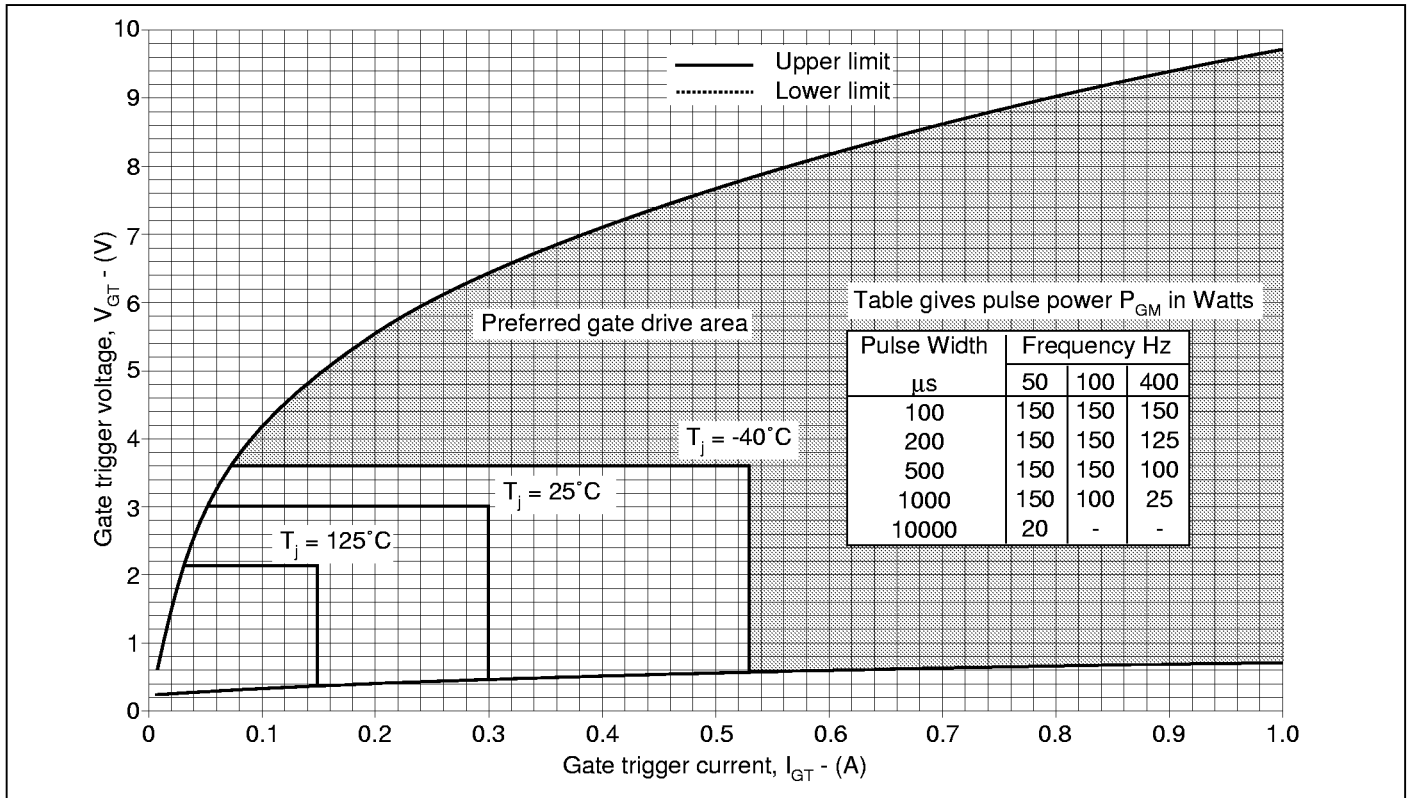


Fig.7 Gate characteristics

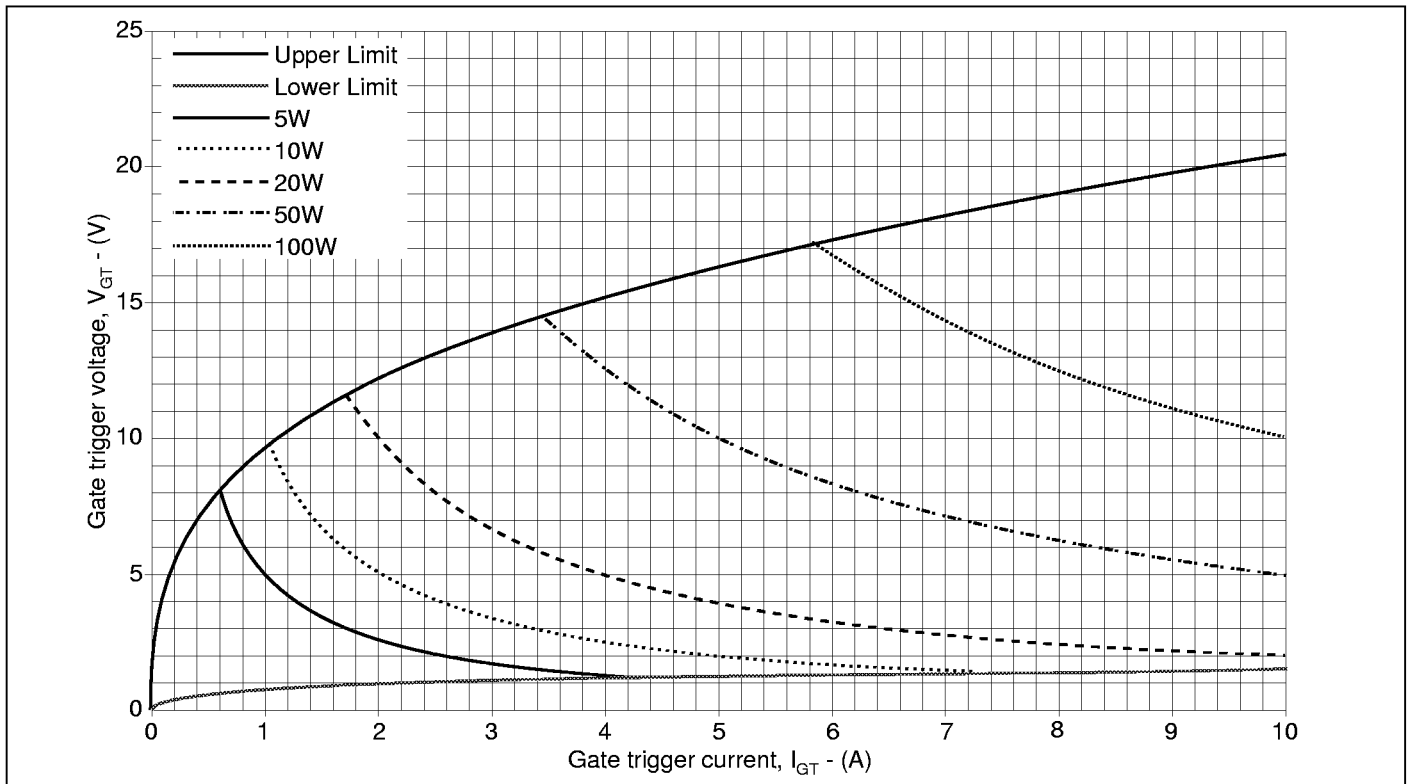


Fig.8 Gate characteristics

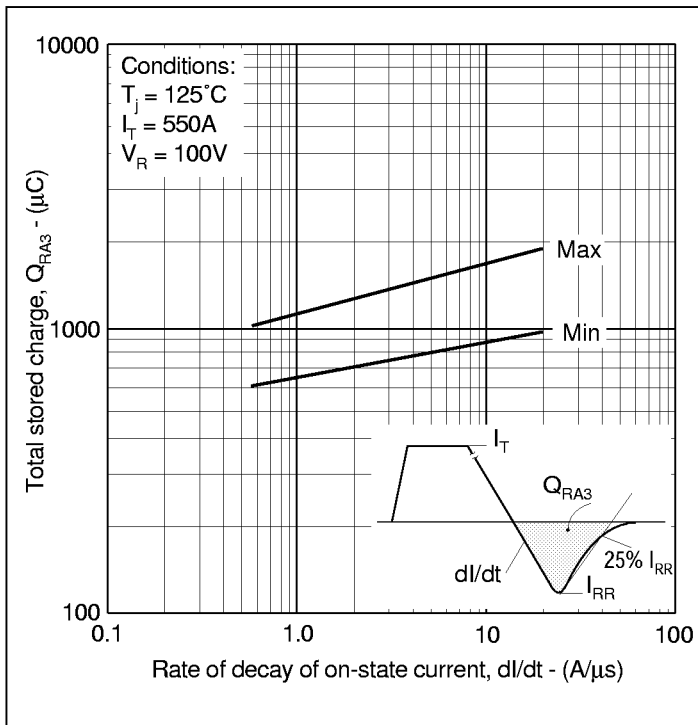


Fig.9 Stored charge

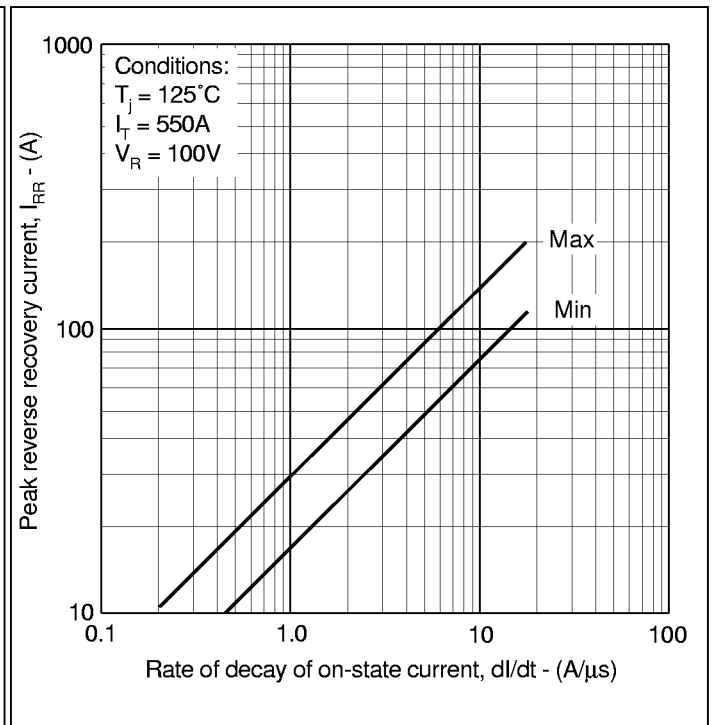


Fig.10 Reverse recovery current

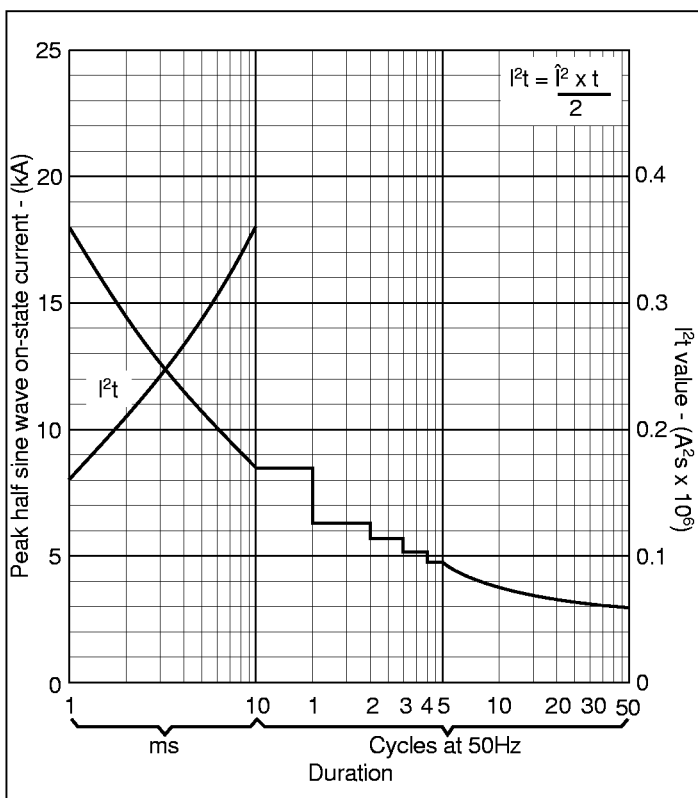


Fig.11 Surge (non-repetitive) on-state current vs time (with 50%  $V_{RRM}$  @  $T_{case} = 125^\circ\text{C}$ )

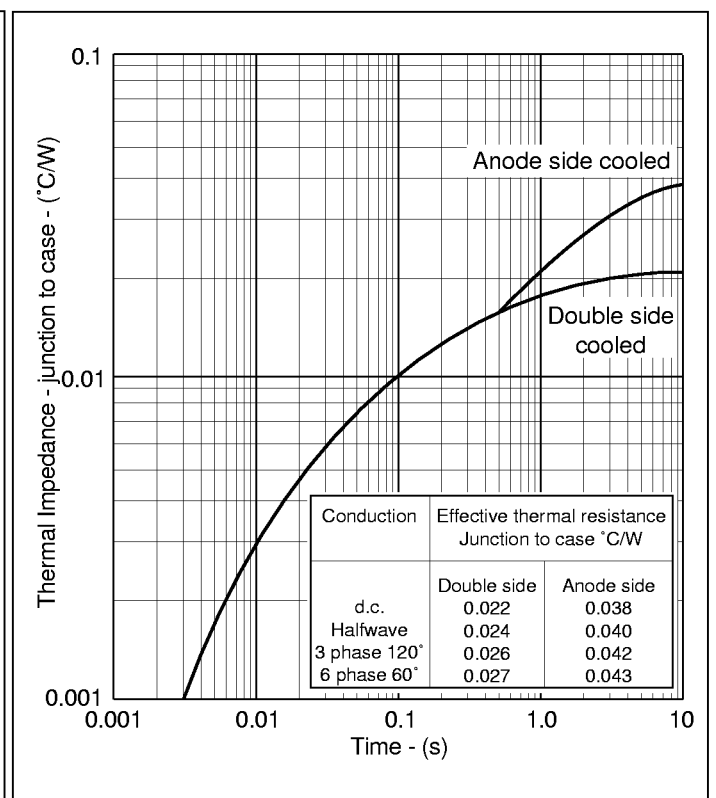
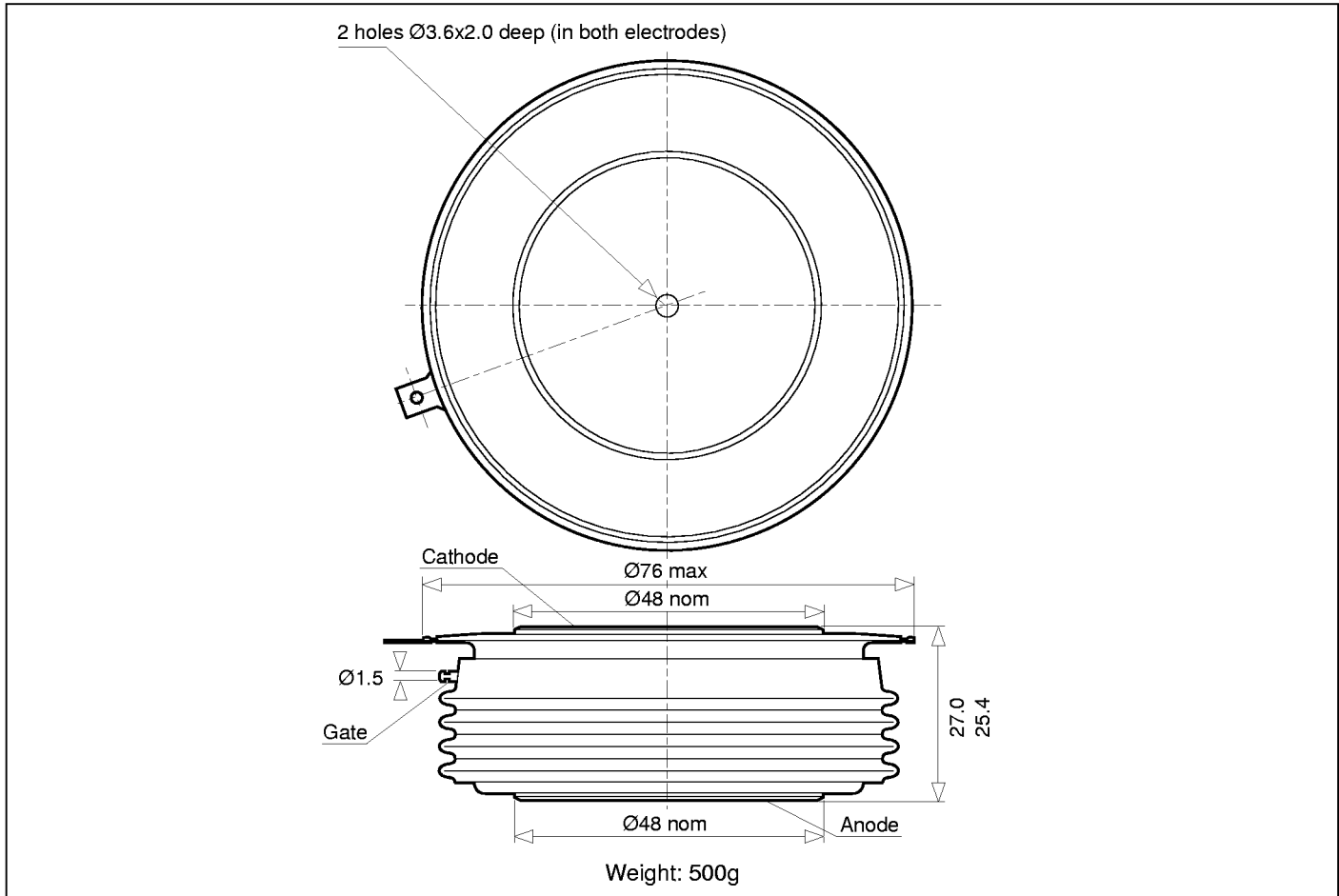


Fig.12 Transient thermal impedance - junction to case

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## PACKAGE OUTLINE - F

For further package information, please contact your local Customer Service Centre. All dimensions in mm, unless stated otherwise. DO NOT SCALE.



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