

### FEATURES

- Double Side Cooling
- High Surge Capability

### APPLICATIONS

- High Power Drives
- High Voltage Power Supplies
- Static Switches

### VOLTAGE RATINGS

Part and Ordering Number	Repetitive Peak Voltages $V_{DRM}$ and $V_{RRM}$ V	Conditions
DCR2450W85*	8500	$T_{vj} = -40^{\circ} \text{C}$ to $125^{\circ} \text{C}$ , $I_{DRM} = I_{RRM} = 300\text{mA}$ , $V_{DRM}, V_{RRM} t_p = 10\text{ms}$ , $V_{DSM} \text{ \& } V_{RSM} =$ $V_{DRM} \text{ \& } V_{RRM} + 100\text{V}$ respectively
DCR2450W80	8000	
DCR2450W75	7500	
DCR2450W70	7000	

Lower voltage grades available.  
 \* 8200V @  $-40^{\circ} \text{C}$ , 6500V @  $0^{\circ} \text{C}$

### ORDERING INFORMATION

When ordering, select the required part number shown in the Voltage Ratings selection table.

For example:

### DCR2450W85

Note: Please use the complete part number when ordering and quote this number in any future correspondence relating to your order.

### KEY PARAMETERS

$V_{DRM}$	<b>8500V</b>
$I_{T(AV)}$	<b>2450A</b>
$I_{TSM}$	<b>32000A</b>
$dV/dt^*$	<b>1500V/<math>\mu\text{s}</math></b>
$dI/dt$	<b>300A/<math>\mu\text{s}</math></b>

\* Higher  $dV/dt$  selections available

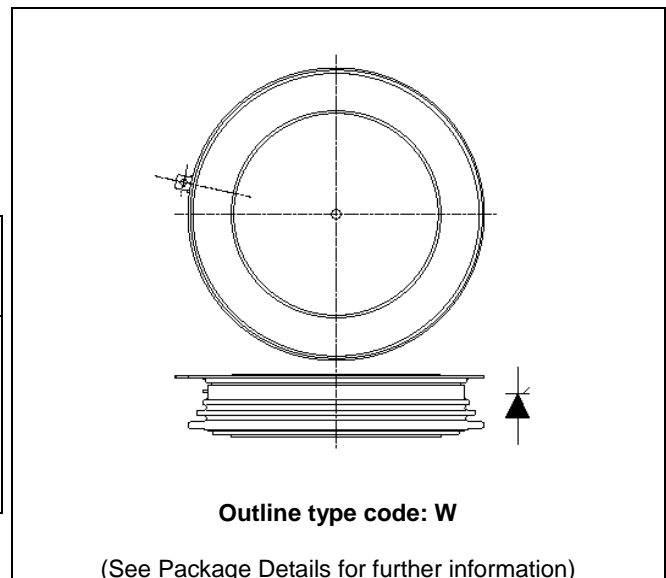


Fig. 1 Package outline

## CURRENT RATINGS

$T_{case} = 60^{\circ} C$  unless stated otherwise

Symbol	Parameter	Test Conditions	Max.	Units
<b>Double Side Cooled</b>				
$I_{T(AV)}$	Mean on-state current	Half wave resistive load	2445	A
$I_{T(RMS)}$	RMS value	-	3840	A
$I_T$	Continuous (direct) on-state current	-	3750	A

## SURGE RATINGS

Symbol	Parameter	Test Conditions	Max.	Units
$I_{TSM}$	Surge (non-repetitive) on-state current	10ms half sine, $T_{case} = 125^{\circ} C$	32.5	kA
$I^2t$	$I^2t$ for fusing	$V_R = 0$	5.28	MA <sup>2</sup> s

## THERMAL AND MECHANICAL RATINGS

Symbol	Parameter	Test Conditions	Min.	Max.	Units	
$R_{th(j-c)}$	Thermal resistance – junction to case	Double side cooled	DC	-	0.00631	$^{\circ} C/W$
		Single side cooled	Anode DC	-	0.01115	$^{\circ} C/W$
			Cathode DC	-	0.01453	$^{\circ} C/W$
$R_{th(c-h)}$	Thermal resistance – case to heatsink	Clamping force 76.0kN (with mounting compound)	Double side	-	0.0014	$^{\circ} C/W$
			Single side	-	0.0028	$^{\circ} C/W$
$T_{vj}$	Virtual junction temperature	Blocking $V_{DRM} / V_{RRM}$	-	125	$^{\circ} C$	
$T_{stg}$	Storage temperature range		-55	125	$^{\circ} C$	
$F_m$	Clamping force		68.0	84.0	kN	

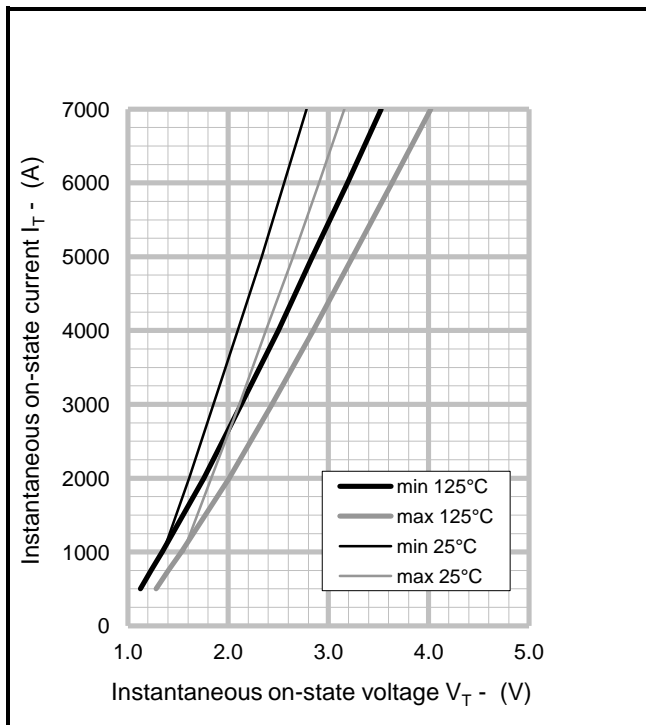
**DYNAMIC CHARACTERISTICS**

Symbol	Parameter	Test Conditions	Min.	Max.	Units	
$I_{RRM}/I_{DRM}$	Peak reverse and off-state current	At $V_{RRM}/V_{DRM}$ , $T_{case} = 125^{\circ}C$	-	300	mA	
$dV/dt$	Max. linear rate of rise of off-state voltage	To 67% $V_{DRM}$ , $T_j = 125^{\circ}C$ , gate open	-	1500	V/ $\mu$ s	
$dI/dt$	Rate of rise of on-state current	From 67% $V_{DRM}$ to $2x I_{T(AV)}$	Repetitive 50Hz	-	150	A/ $\mu$ s
		Gate source 30V, 10 $\Omega$ , $t_r < 0.5\mu$ s, $T_j = 125^{\circ}C$	Non-repetitive	-	300	A/ $\mu$ s
$V_{T(TO)}$	Threshold voltage – Low level	500 to 2400A at $T_{case} = 125^{\circ}C$	-	1.037	V	
	Threshold voltage – High level	2400 to 7200A at $T_{case} = 125^{\circ}C$	-	1.229	V	
$r_T$	On-state slope resistance – Low level	500A to 2400A at $T_{case} = 125^{\circ}C$	-	0.487	m $\Omega$	
	On-state slope resistance – High level	2400A to 7200A at $T_{case} = 125^{\circ}C$	-	0.398	m $\Omega$	
$t_{gd}$	Delay time	$V_D = 67\% V_{DRM}$ , gate source 30V, 10 $\Omega$ $t_r = 0.5\mu$ s, $T_j = 25^{\circ}C$	-	3	$\mu$ s	
$t_q$	Turn-off time	$T_j = 125^{\circ}C$ , $V_R = 200V$ , $dI/dt = 1A/\mu$ s, $dV_{DR}/dt = 20V/\mu$ s linear	-	1000	$\mu$ s	
$Q_S$	Stored charge	$I_T = 2000A$ , $T_j = 125^{\circ}C$ , $dI/dt = 1A/\mu$ s,	2800	9000	$\mu$ C	
$I_L$	Latching current	$T_j = 25^{\circ}C$ , $V_D = 5V$	-	3	A	
$I_H$	Holding current	$T_j = 25^{\circ}C$ , $R_{G-K} = \infty$ , $I_{TM} = 500A$ , $I_T = 5A$	-	300	mA	

**GATE TRIGGER CHARACTERISTICS AND RATINGS**

Symbol	Parameter	Test Conditions	Max.	Units
V <sub>GT</sub>	Gate trigger voltage	V <sub>DRM</sub> = 5V, T <sub>case</sub> = 25° C	1.5	V
V <sub>GD</sub>	Gate non-trigger voltage	At 50% V <sub>DRM</sub> , T <sub>case</sub> = 125°C	0.4	V
I <sub>GT</sub>	Gate trigger current	V <sub>DRM</sub> = 5V, T <sub>case</sub> = 25° C	400	mA
I <sub>GD</sub>	Gate non-trigger current	At 50% V <sub>DRM</sub> , T <sub>case</sub> = 125°C	10	mA

**CURVES**



**Fig.2 Maximum & minimum on-state characteristics**

**V<sub>TM</sub> EQUATION**

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

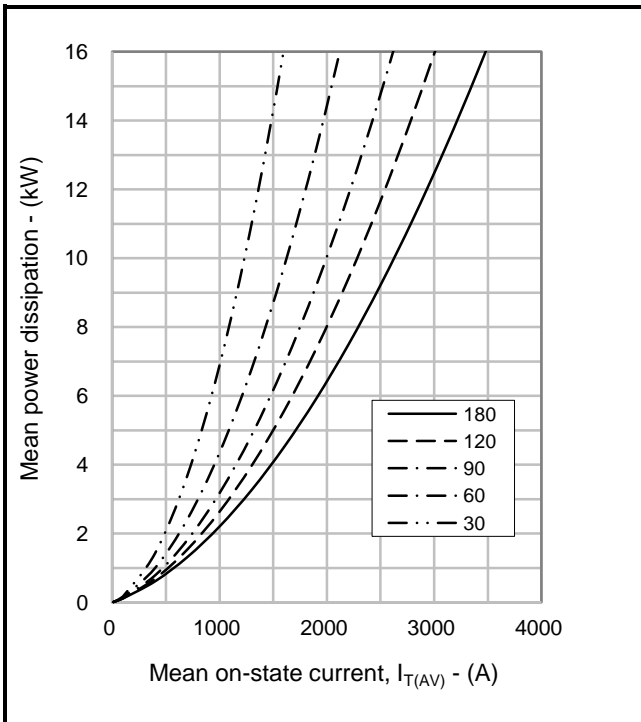
where A = 0.907134

B = -0.011004

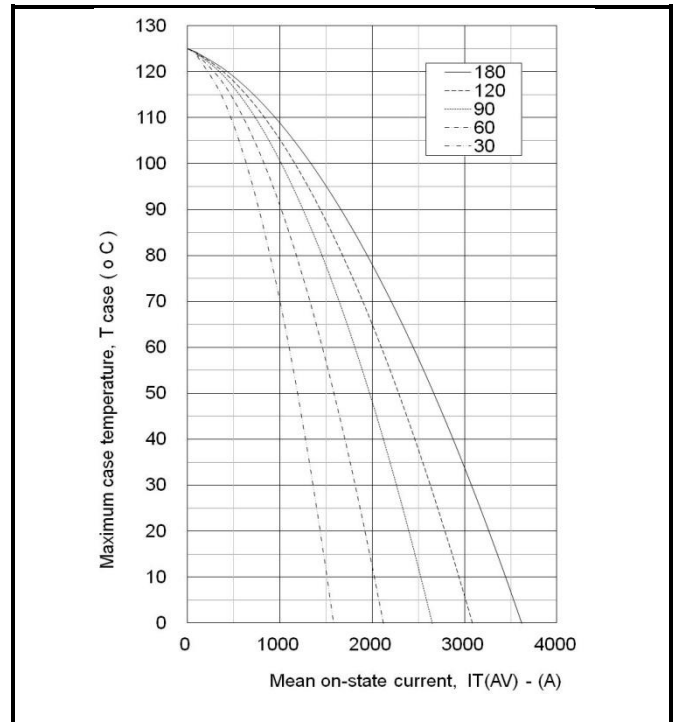
C = 0.000304

D = 0.012936

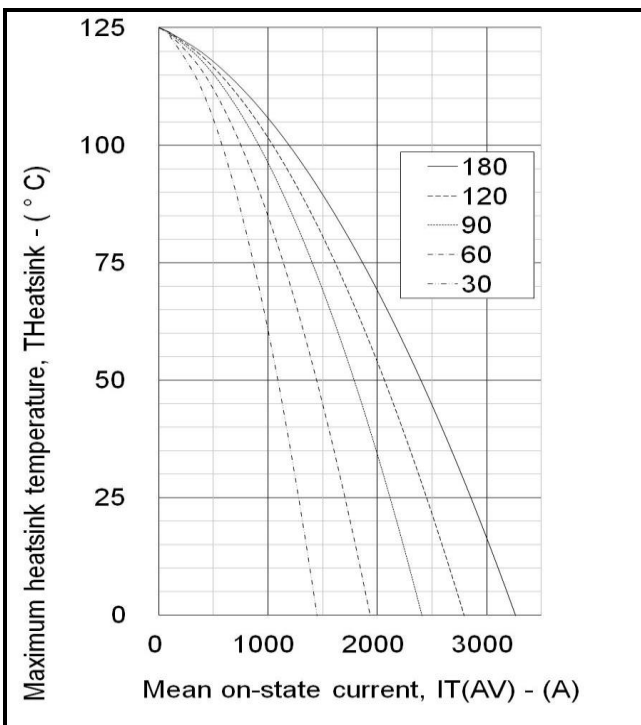
these values are valid for T<sub>j</sub> = 125°C for I<sub>T</sub> 500A to 7200A



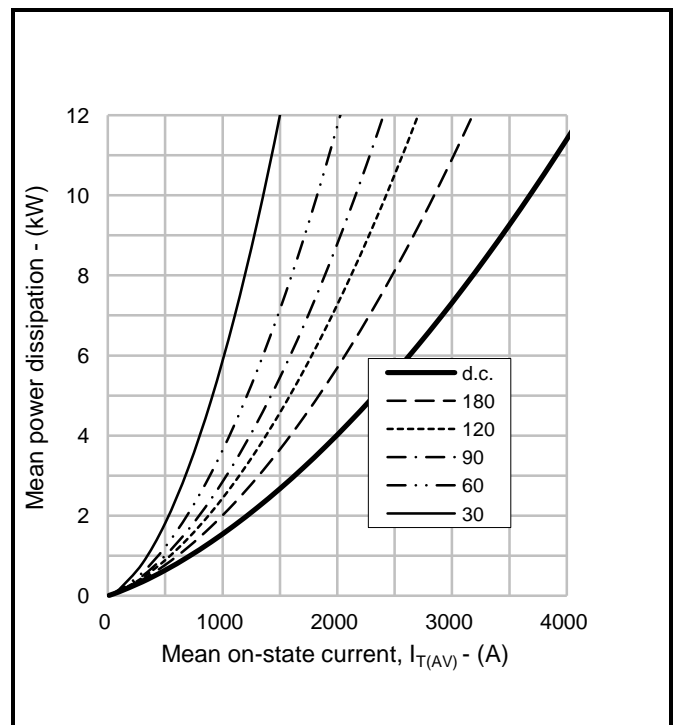
**Fig.3 On-state power dissipation – sine wave**



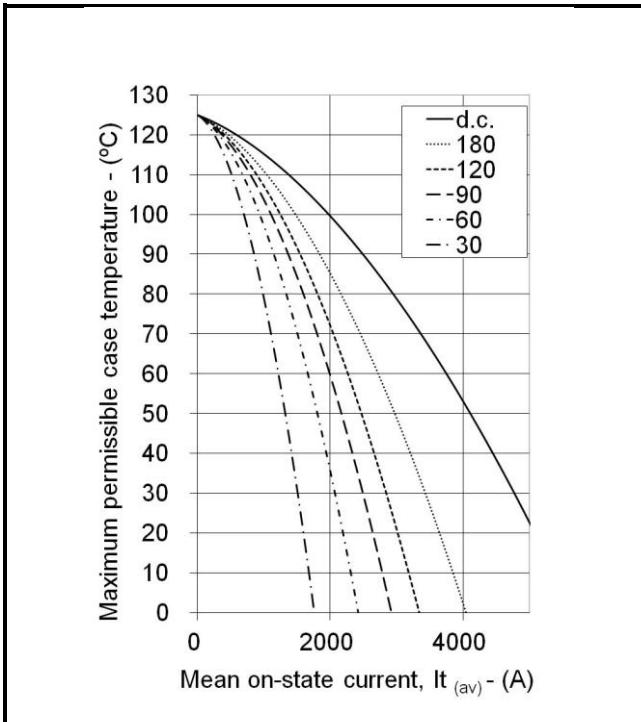
**Fig.4 Maximum permissible case temperature, double side cooled – sine wave**



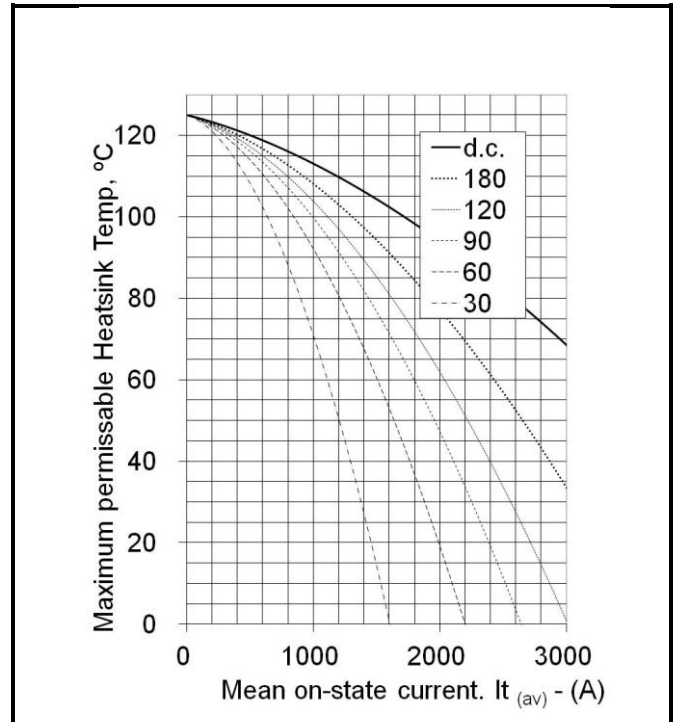
**Fig.5 Maximum permissible heatsink temperature, double side cooled – sine wave**



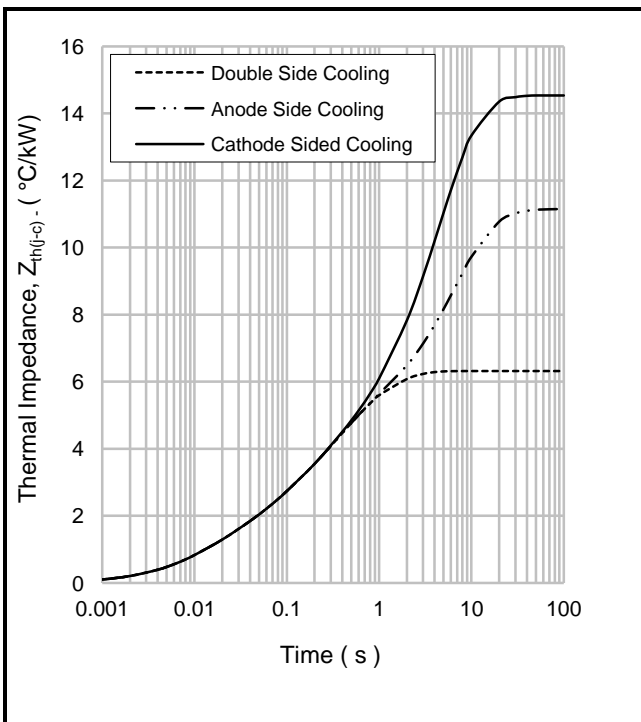
**Fig.6 On-state power dissipation – rectangular wave**



**Fig.7 Maximum permissible case temperature, double side cooled – rectangular wave**



**Fig.8 Maximum permissible heatsink temperature, double side cooled – rectangular wave**



**Fig.9 Maximum (limit) transient thermal impedance – junction to case (° C/kW)**

		1	2	3	4
Double side cooled	$R_{\theta}$ (°C/kW)	0.8816	1.2993	2.8048	1.3305
	$T_i$ (s)	0.0106818	0.058404	0.3584979	1.1285
Anode side cooled	$R_{\theta}$ (°C/kW)	1.5197	3.2398	5.7622	0.6312
	$T_i$ (s)	0.0170581	0.2424644	6.013	15.364
Cathode side cooled	$R_{\theta}$ (°C/kW)	1.4106	2.4667	6.7451	3.9054
	$T_i$ (s)	0.0158344	0.1786951	3.6201	6.196

$$Z_{th} = \sum [R_i \times (1 - \exp. (-t/t_i))] \quad [1]$$

$\Delta R_{th(j-c)}$  Conduction

Tables show the increments of thermal resistance  $R_{th(j-c)}$  when the device operates at conduction angles other than d.c.

$\theta^{\circ}$	Double side cooling	
	sine.	rect.
180	1.00	0.67
120	1.16	0.97
90	1.33	1.13
60	1.48	1.31
30	1.61	1.51
15	1.66	1.61

$\theta^{\circ}$	Anode Side Cooling	
	sine.	rect.
180	0.94	0.64
120	1.08	0.91
90	1.23	1.06
60	1.37	1.22
30	1.47	1.38
15	1.52	1.47

$\theta^{\circ}$	Cathode Sided Cooling	
	sine.	rect.
180	0.95	0.65
120	1.09	0.92
90	1.25	1.07
60	1.38	1.23
30	1.49	1.40
15	1.54	1.49

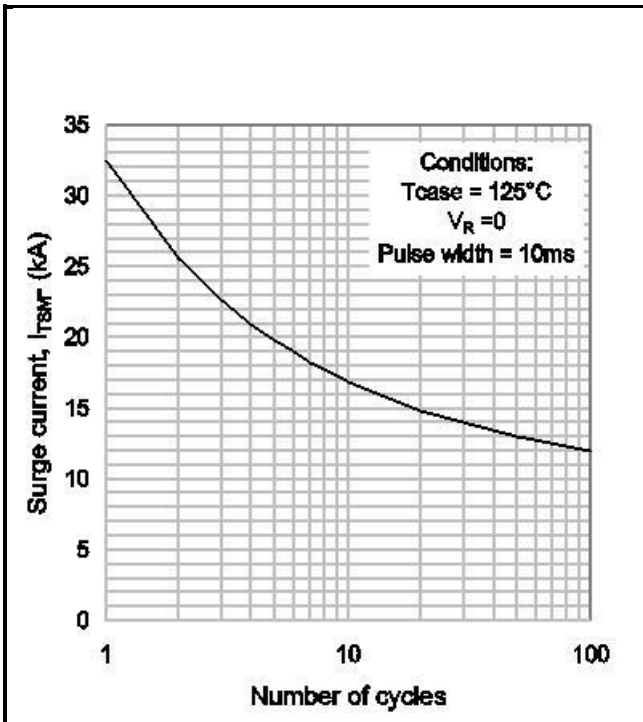


Fig.10 Multi-cycle surge current

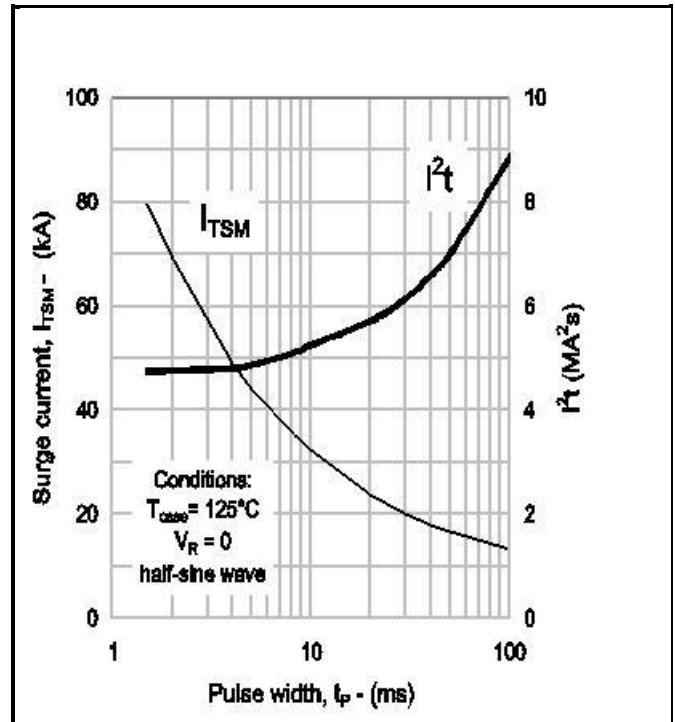


Fig.11 Single-cycle surge current

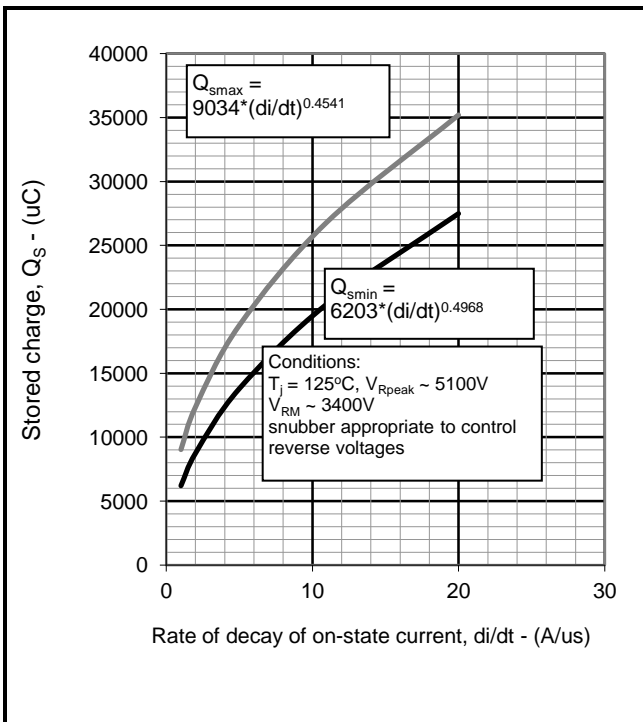


Fig.10 Reverse recovery charge

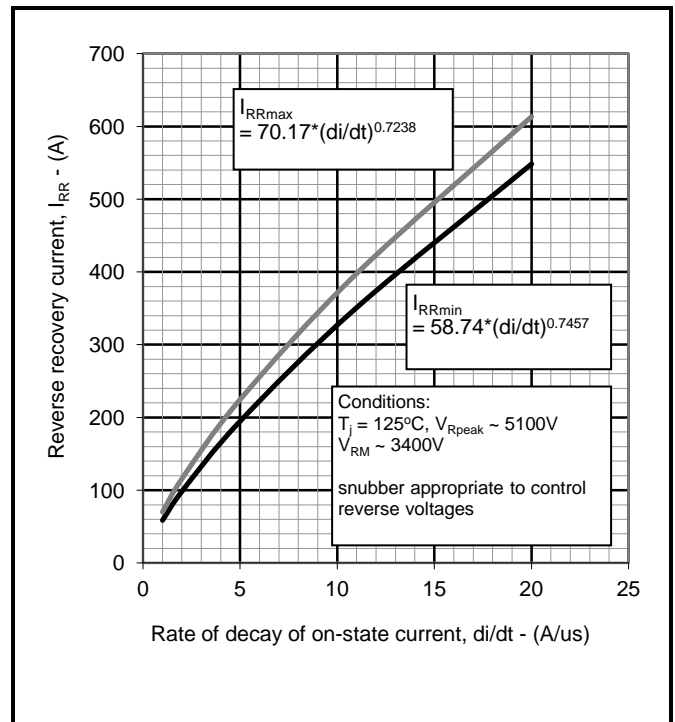
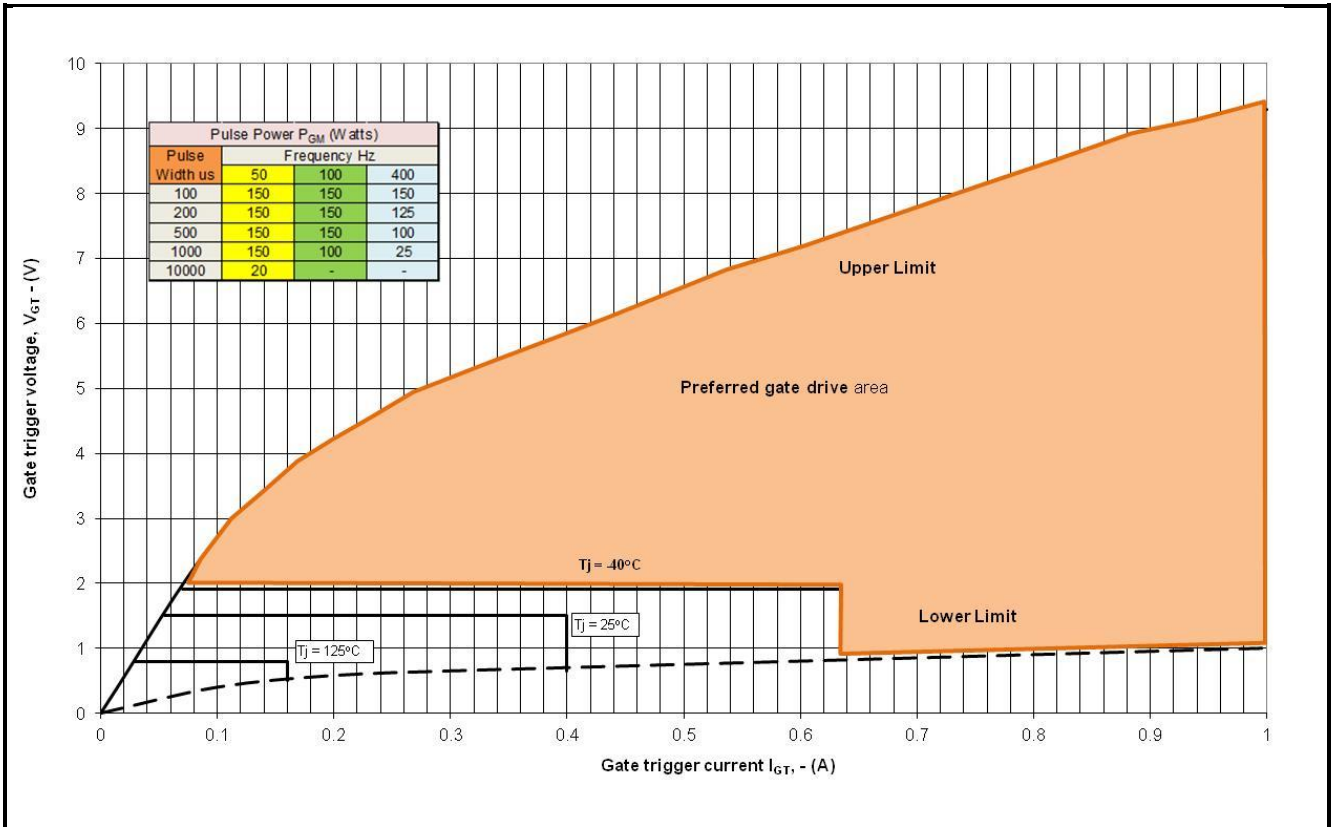
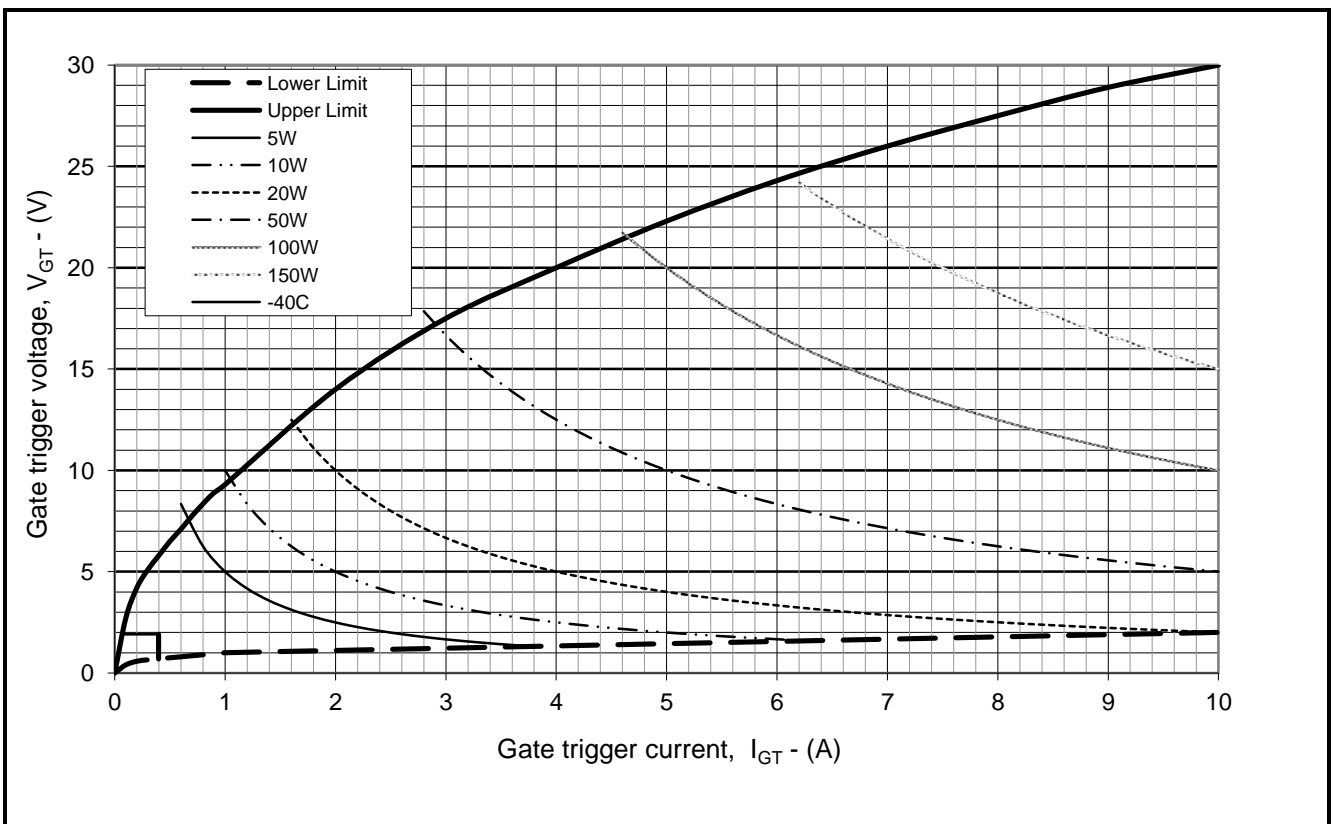


Fig.11 Reverse recovery current



**Fig12 Gate Characteristics**

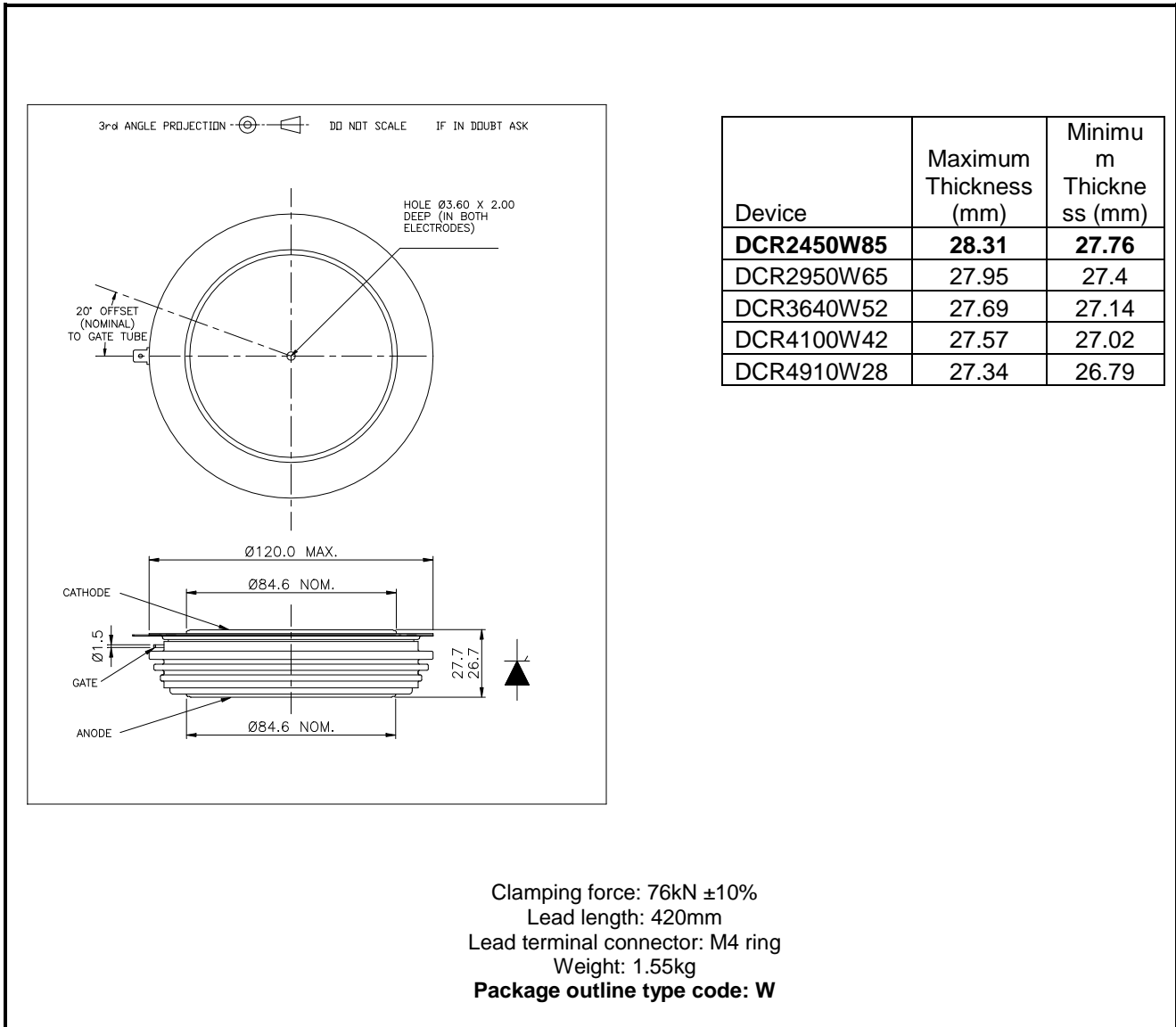


**Fig. 13 Gate characteristics**



**PACKAGE DETAILS**

For further package information, please contact Customer Services. All dimensions in mm, unless stated otherwise. **DO NOT SCALE.**



**Fig.14 Package outline**

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