

### 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 $125^{\circ}\text{C}$ , $I_{DRM} = I_{RRM} = 300\text{mA}$ , $V_{DRM}, V_{RRM} t_p = 10\text{ms}$ , $V_{DSM} \& V_{RSM} =$ $V_{DRM} \& V_{RRM} + 100\text{V}$ respectively
DCR2450W80	8000	
DCR2450W75	7500	
DCR2450W70	7000	

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

### 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

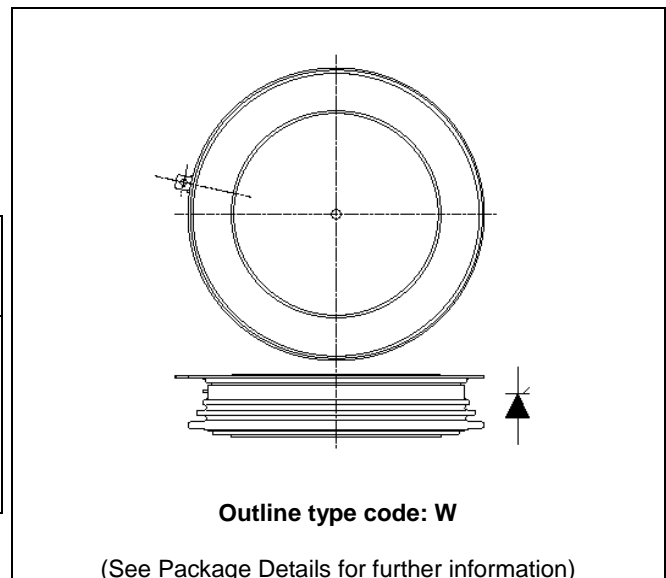


Fig. 1 Package outline

### 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.

## CURRENT RATINGS

$T_{case} = 60^{\circ} \text{C}$  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, $T_{case} = 125^{\circ} \text{C}$	32.5	kA
$I^2t$	$I^2t$ for fusing	$V_R = 0$	5.28	$\text{MA}^2\text{s}$

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

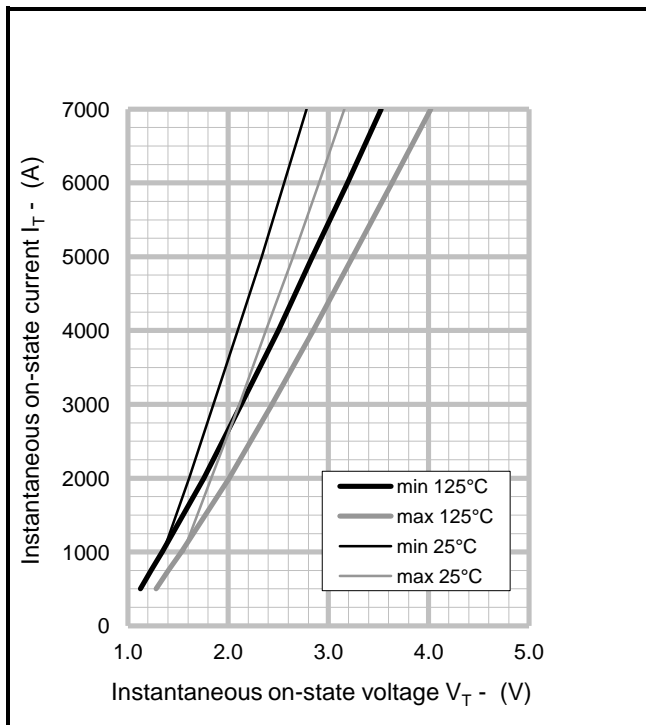
**DYNAMIC CHARACTERISTICS**

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

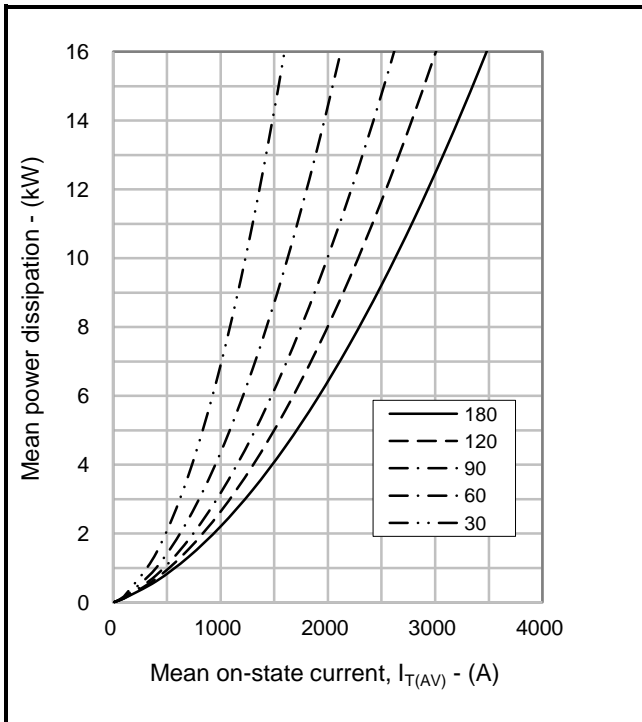


Fig.3 On-state power dissipation – sine wave

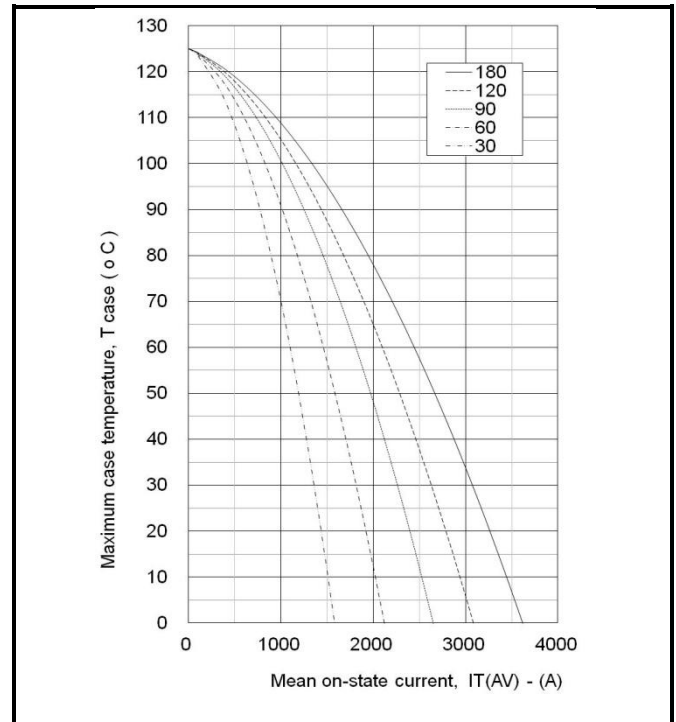


Fig.4 Maximum permissible case temperature, double side cooled – sine wave

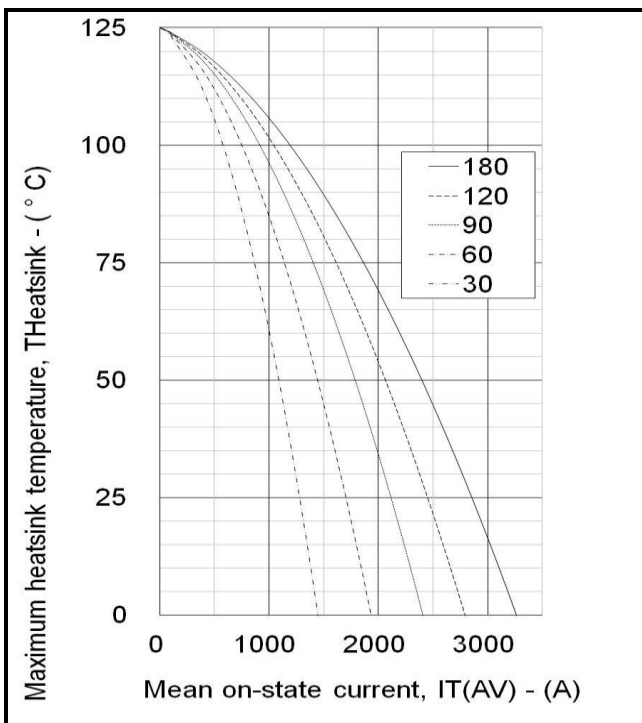


Fig.5 Maximum permissible heatsink temperature, double side cooled – sine wave

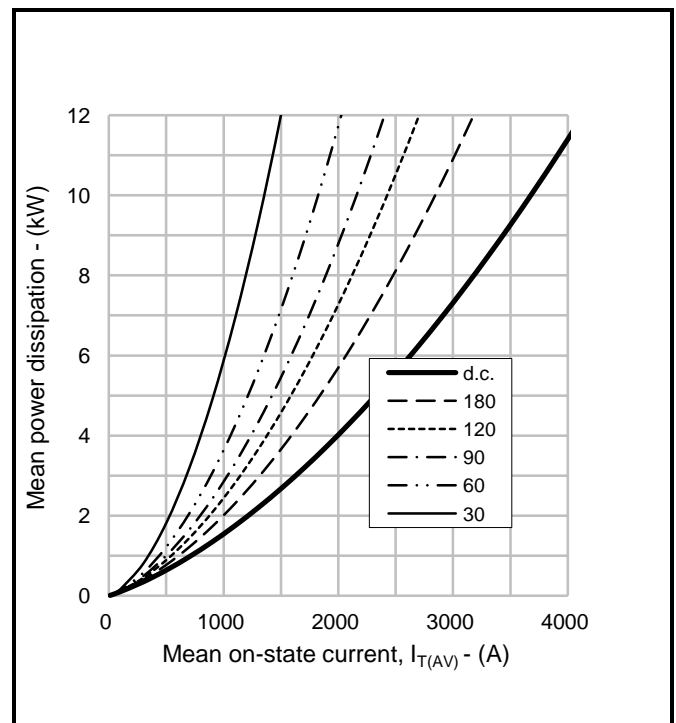
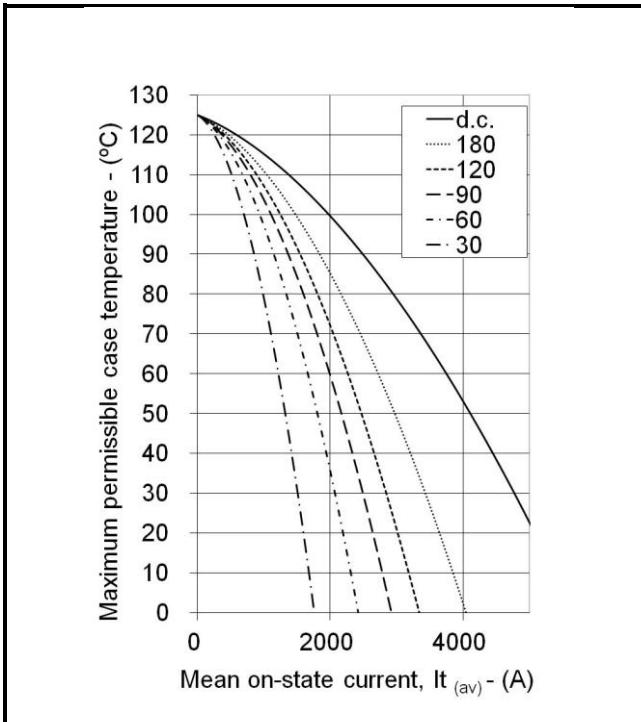
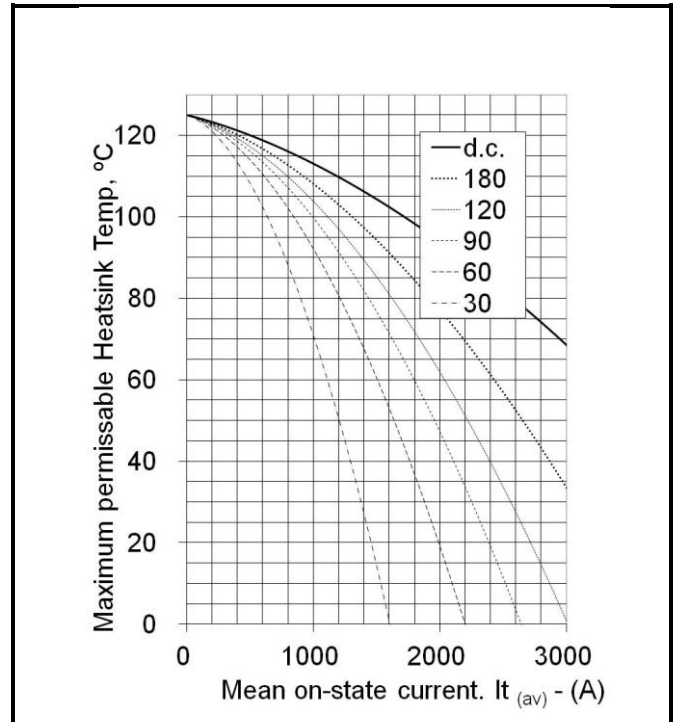


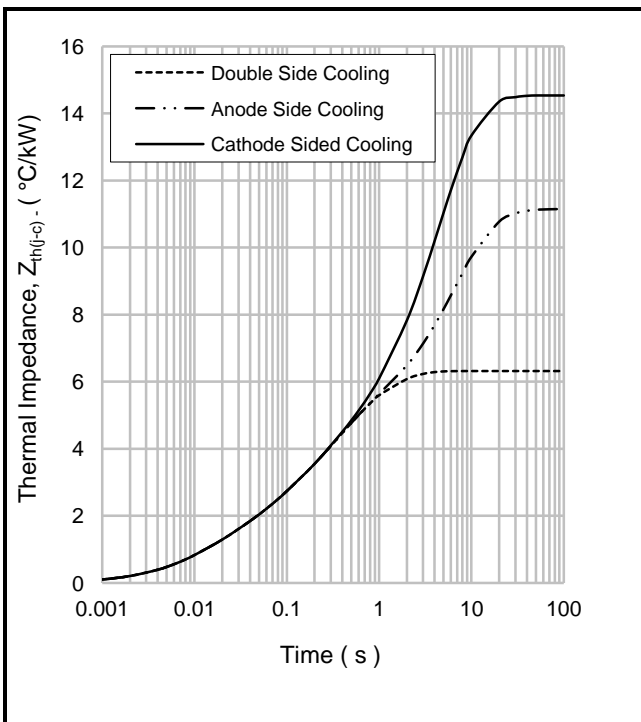
Fig.6 On-state power dissipation – rectangular wave



**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.

Double side cooling			Anode Side Cooling			Cathode Sided Cooling		
$\theta^{\circ}$	$\Delta Z_{th} (z)$		$\theta^{\circ}$	$\Delta Z_{th} (z)$		$\theta^{\circ}$	$\Delta Z_{th} (z)$	
	sine.	rect.		sine.	rect.		sine.	rect.
180	1.00	0.67	180	0.94	0.64	180	0.95	0.65
120	1.16	0.97	120	1.08	0.91	120	1.09	0.92
90	1.33	1.13	90	1.23	1.06	90	1.25	1.07
60	1.48	1.31	60	1.37	1.22	60	1.38	1.23
30	1.61	1.51	30	1.47	1.38	30	1.49	1.40
15	1.66	1.61	15	1.52	1.47	15	1.54	1.49

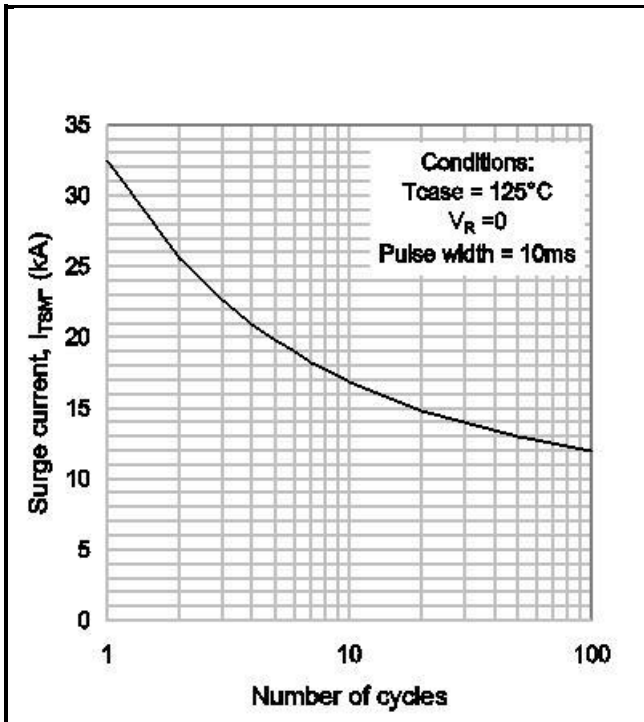


Fig.10 Multi-cycle surge current

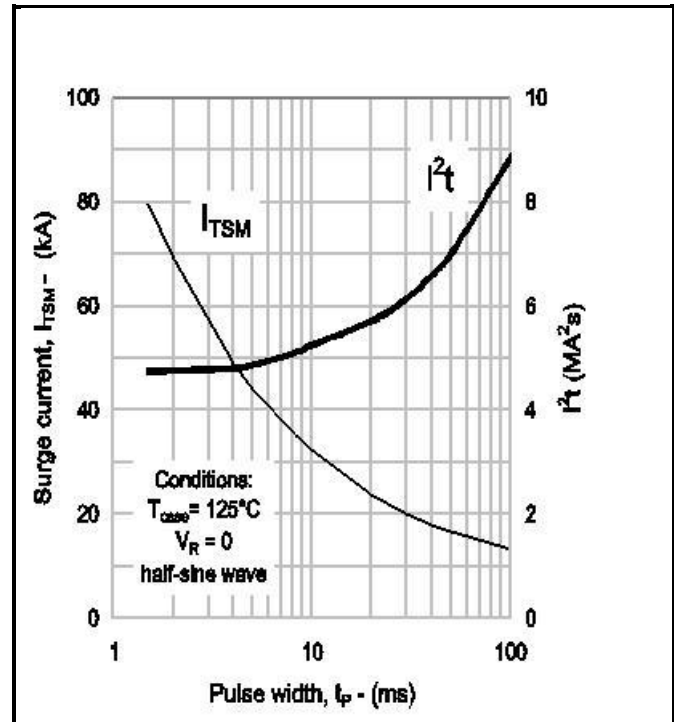


Fig.11 Single-cycle surge current

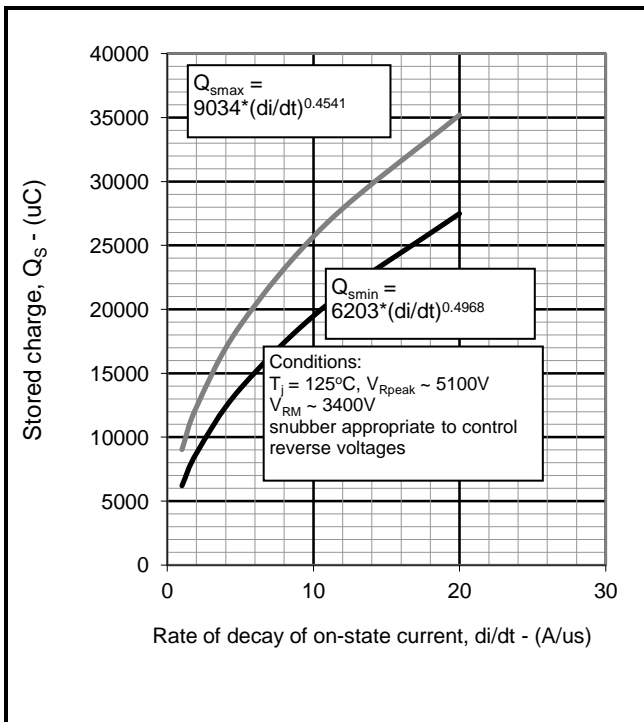


Fig.10 Reverse recovery charge

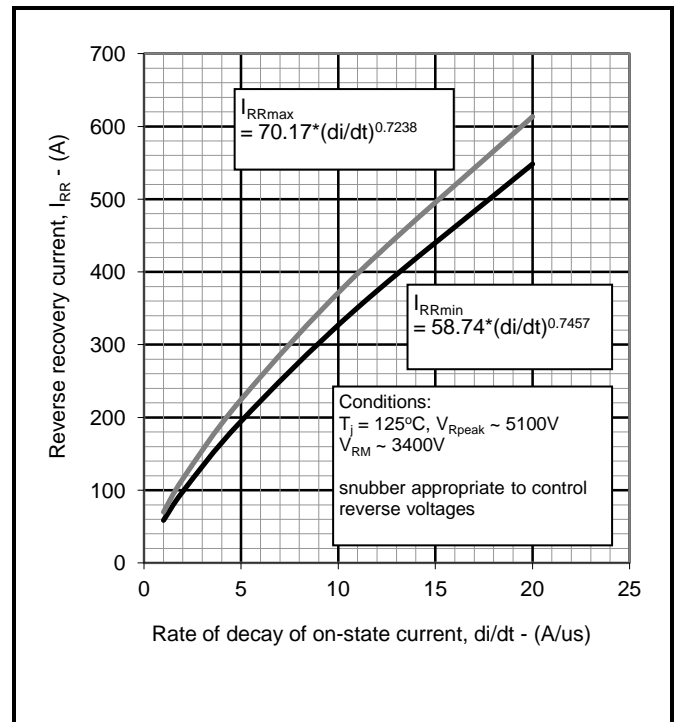
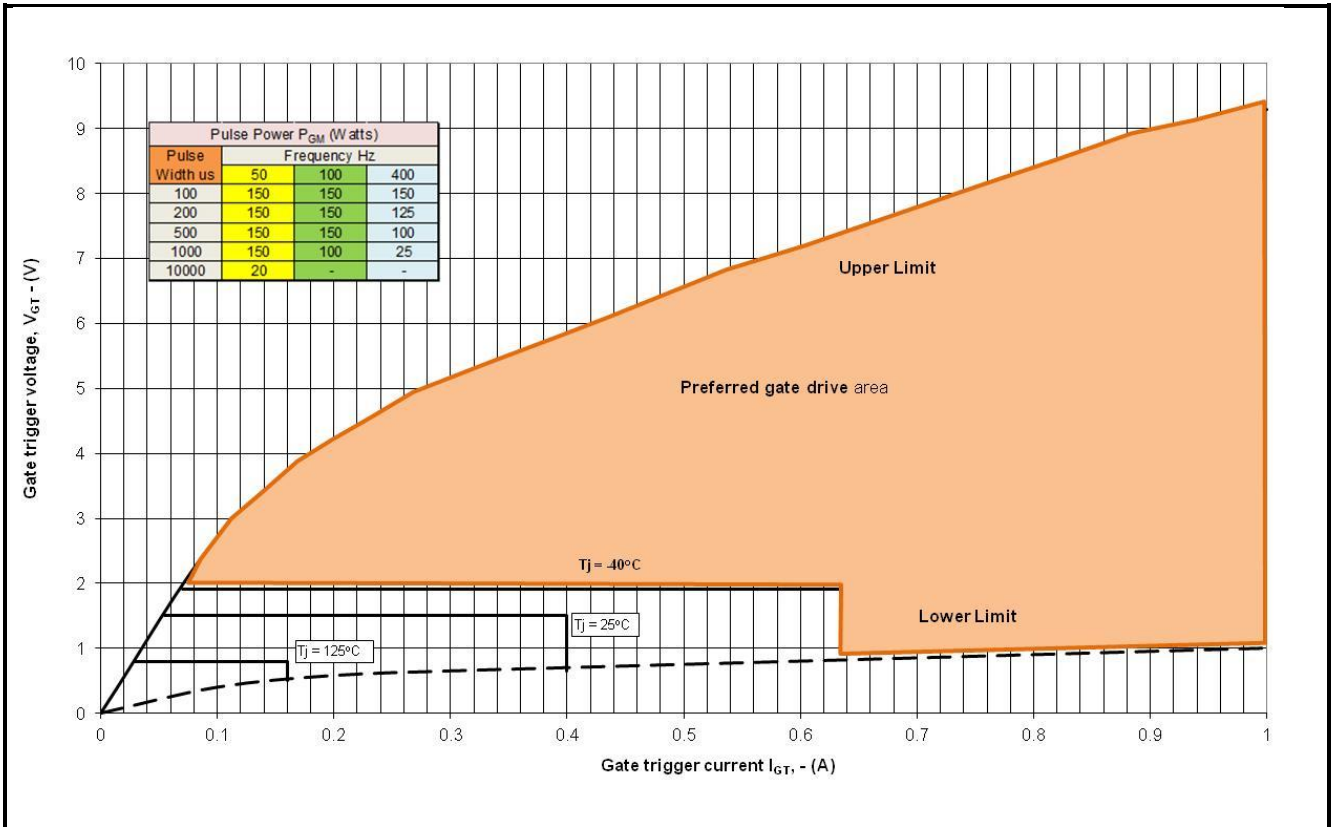
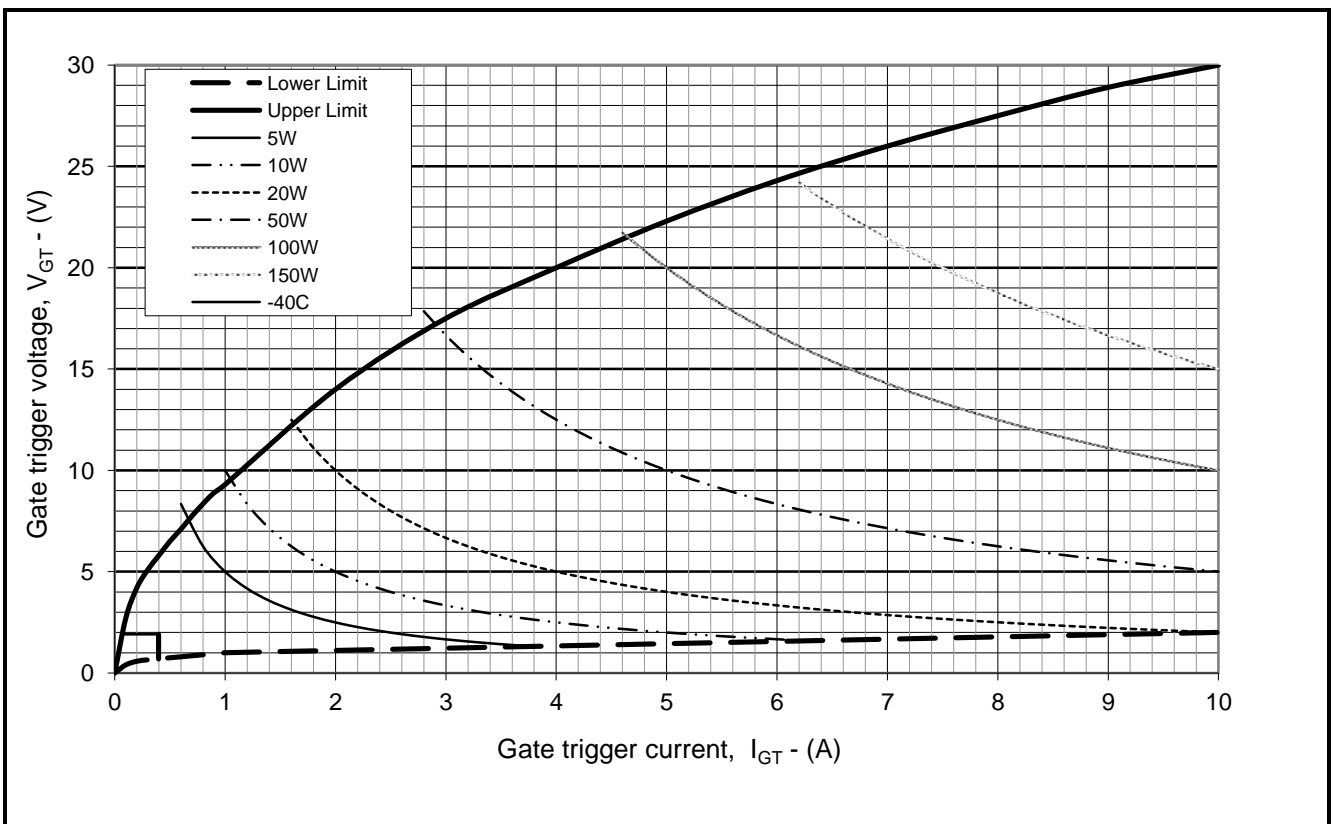


Fig.11 Reverse recovery current



**Fig12 Gate Characteristics**

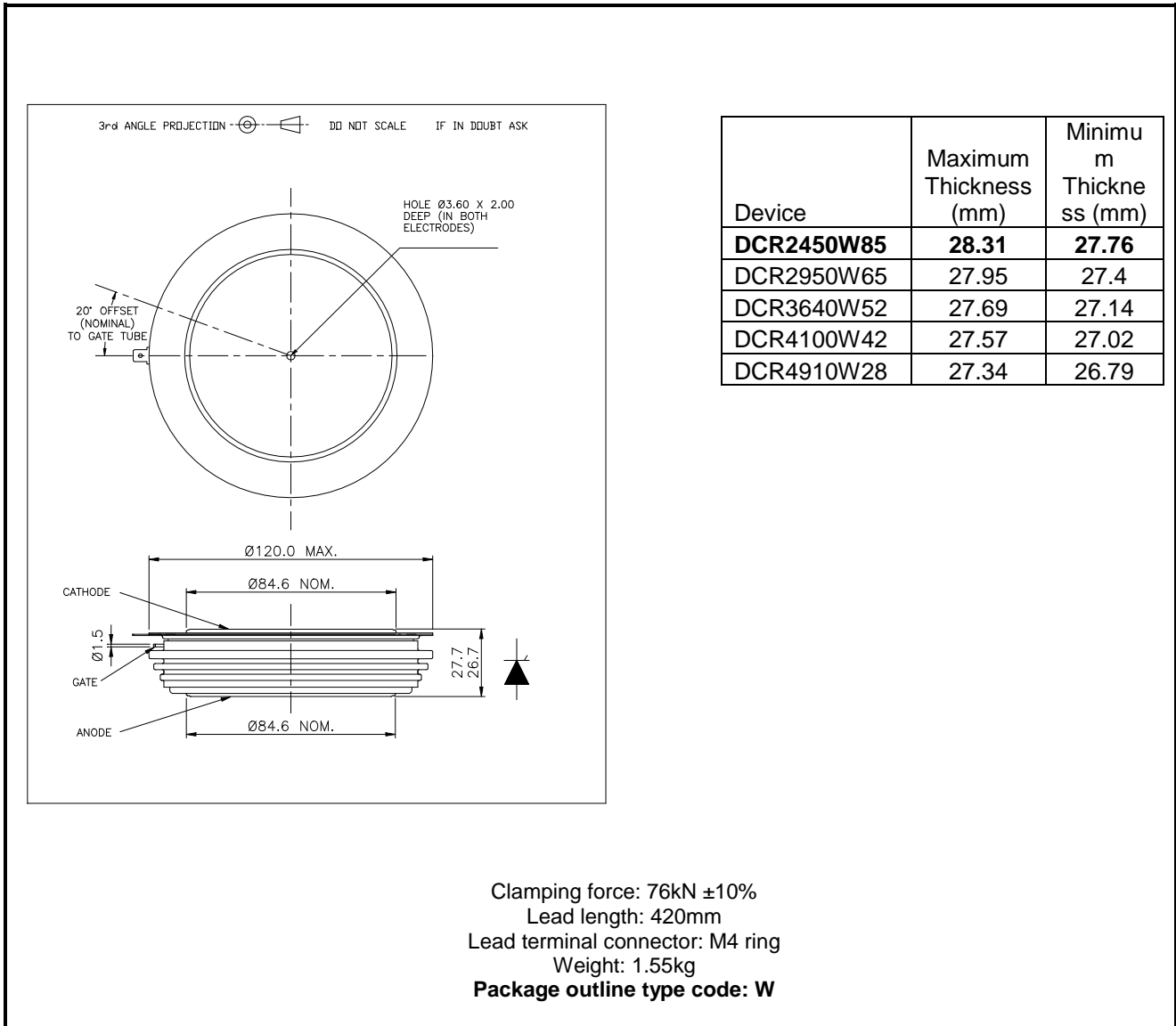


**Fig. 13 Gate characteristics**



**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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