

**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
DCR1910V85* DCR1910V80 DCR1910V75 DCR1910V70	8500 8000 7500 7000	$T_{vj} = -40^{\circ}\text{C}$ 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

Lower voltage grades available.  
 \* 8200V @  $-40^{\circ}\text{C}$ , 8500V @  $0^{\circ}\text{C}$

**ORDERING INFORMATION**

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

For example:

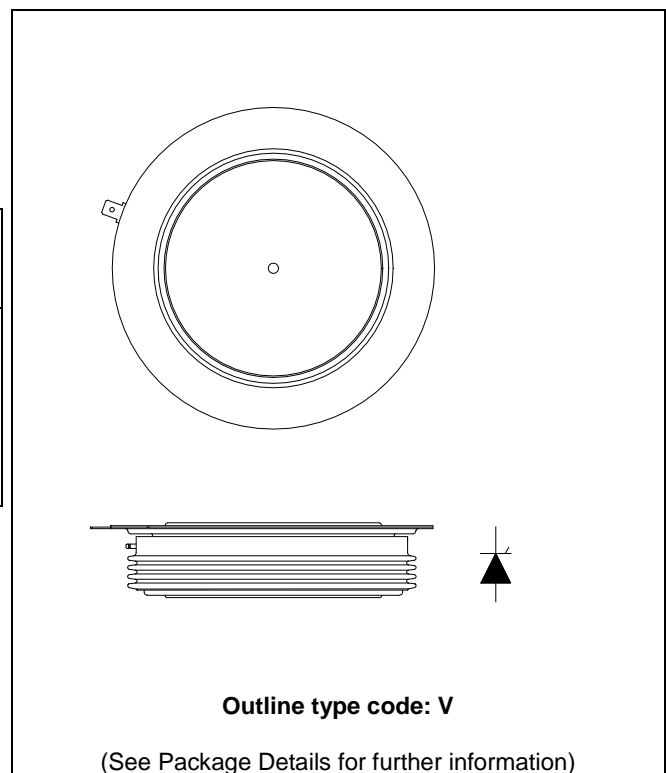
**DCR1910V85**

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>1910A</b>
$I_{TSM}$	<b>25000A</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

$T_{case} = 60^{\circ}\text{C}$  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	1910	A
$I_{T(RMS)}$	RMS value	-	3000	A
$I_T$	Continuous (direct) on-state current	-	2975	A

## SURGE RATINGS

Symbol	Parameter	Test Conditions	Max.	Units
$I_{TSM}$	Surge (non-repetitive) on-state current	10ms half sine, $T_{case} = 125^{\circ}\text{C}$	25.0	kA
$I^2t$	$I^2t$ for fusing	$V_R = 0$	3.125	$\text{MA}^2\text{s}$

## THERMAL AND MECHANICAL RATINGS

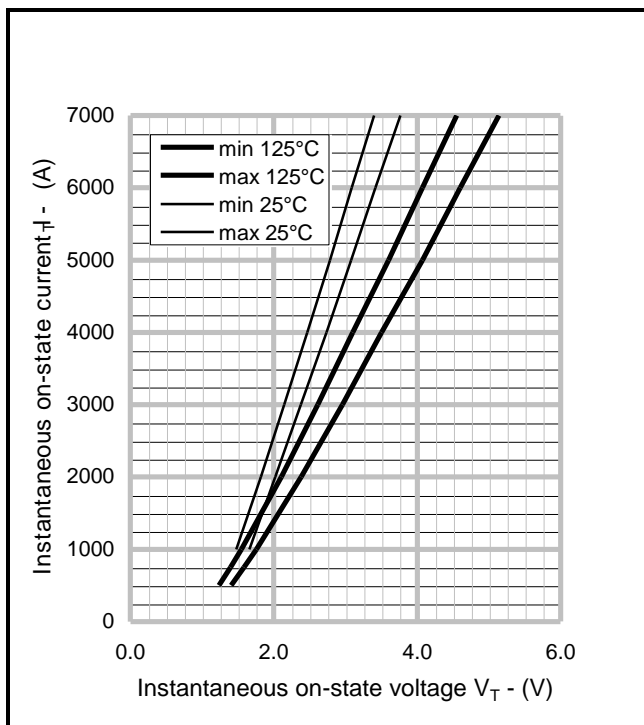
Symbol	Parameter	Test Conditions	Min.	Max.	Units	
$R_{th(j-c)}$	Thermal resistance – junction to case	Double side cooled	DC	-	0.00746	$^{\circ}\text{C/W}$
		Single side cooled	Anode DC	-	0.0130	$^{\circ}\text{C/W}$
			Cathode DC	-	0.0178	$^{\circ}\text{C/W}$
$R_{th(c-h)}$	Thermal resistance – case to heatsink	Clamping force 54.0kN (with mounting compound)	Double side	-	0.002	$^{\circ}\text{C/W}$
			Single side	-	0.004	$^{\circ}\text{C/W}$
$T_{vj}$	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		48	59	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/ $\mu s$	
$dl/dt$	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	100A to 1000A at $T_{case} = 125^{\circ}C$	-	0.9	V	
	Threshold voltage – High level	1000A to 7200A at $T_{case} = 125^{\circ}C$	-	1.3	V	
$r_T$	On-state slope resistance – Low level	100A to 1000A at $T_{case} = 125^{\circ}C$	-	0.888	m $\Omega$	
	On-state slope resistance – High level	1000A to 7200A at $T_{case} = 125^{\circ}C$	-	0.55	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	$T_j = 125^{\circ}C$ , $V_R = 200V$ , $dl/dt = 1A/\mu s$ , $dV_{DR}/dt = 20V/\mu s$ linear	-	1200	$\mu s$	
$Q_S$	Stored charge	$I_T = 2000A$ , $T_j = 125^{\circ}C$ , $dl/dt = 1A/\mu s$ ,	4800	8000	$\mu C$	
$I_L$	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**

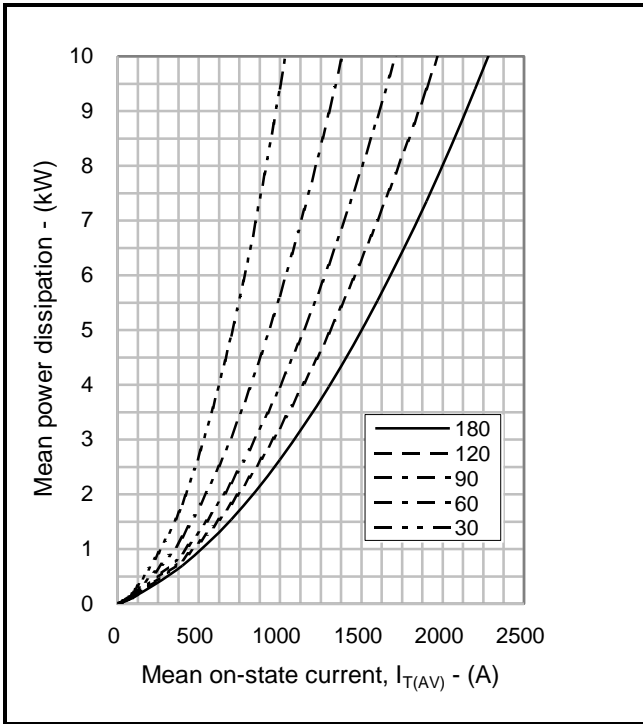
Symbol	Parameter	Test Conditions	Max.	Units
$V_{GT}$	Gate trigger voltage	$V_{DRM} = 5V, T_{case} = 25^{\circ}C$	1.5	V
$V_{GD}$	Gate non-trigger voltage	At 50% $V_{DRM}, T_{case} = 125^{\circ}C$	0.4	V
$I_{GT}$	Gate trigger current	$V_{DRM} = 5V, T_{case} = 25^{\circ}C$	400	mA
$I_{GD}$	Gate non-trigger current	At 50% $V_{DRM}, T_{case} = 125^{\circ}C$	15	mA

**CURVES**

**Fig.2 Maximum & minimum on-state characteristics**
 **$V_{TM}$  EQUATION**

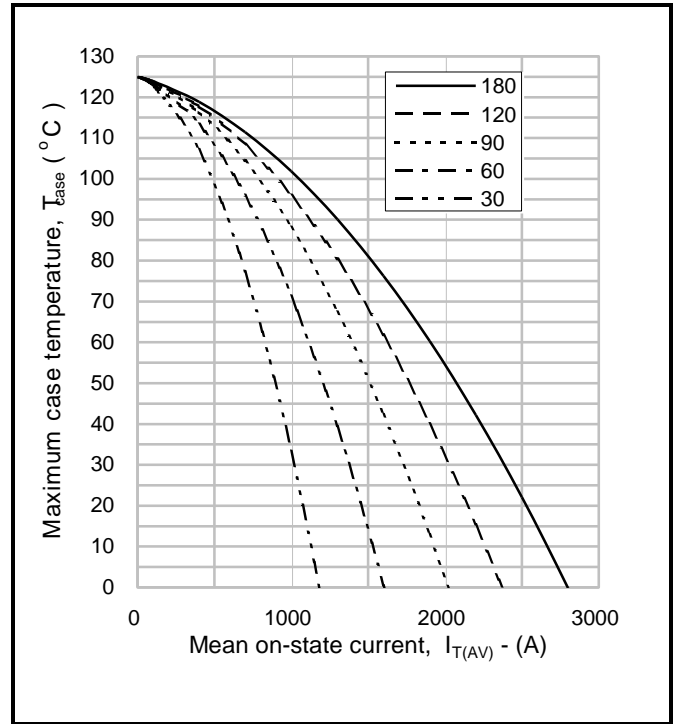
$$V_{TM} = A + B \ln(I_T) + C \cdot I_T + D \cdot \sqrt{I_T}$$

 Where  $A = 0.398265$ 
 $B = 0.121095$ 
 $C = 0.000524$ 
 $D = -0.000007$ 

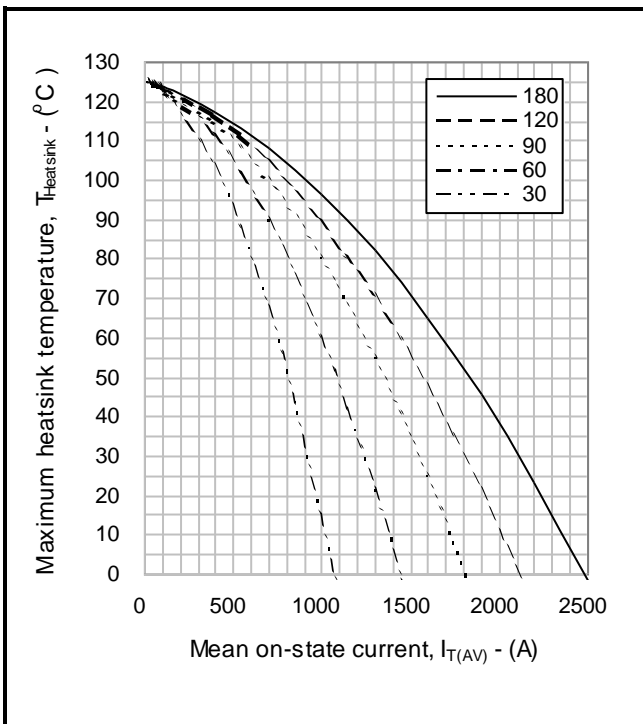
 these values are valid for  $T_j = 125^{\circ}C$  for  $I_T$  500A to 7200A



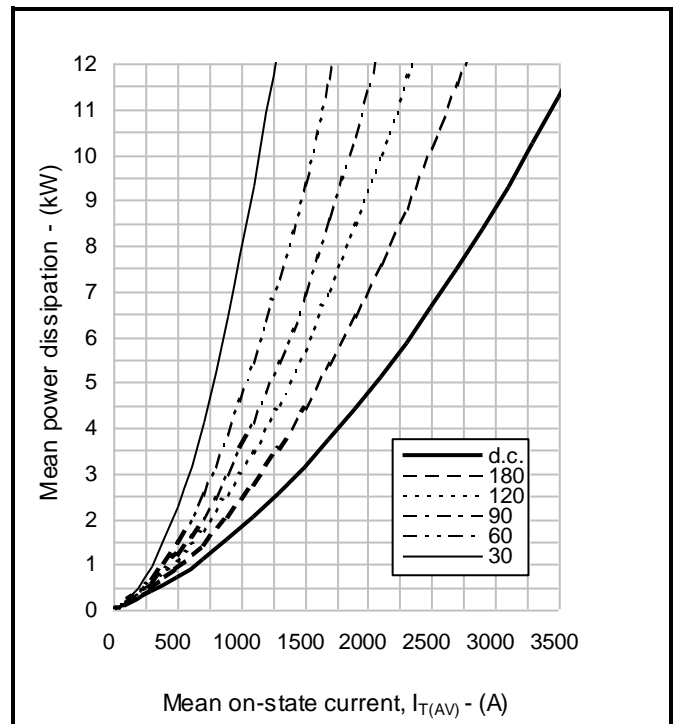
**Fig.3 On-state power dissipation – sine wave**



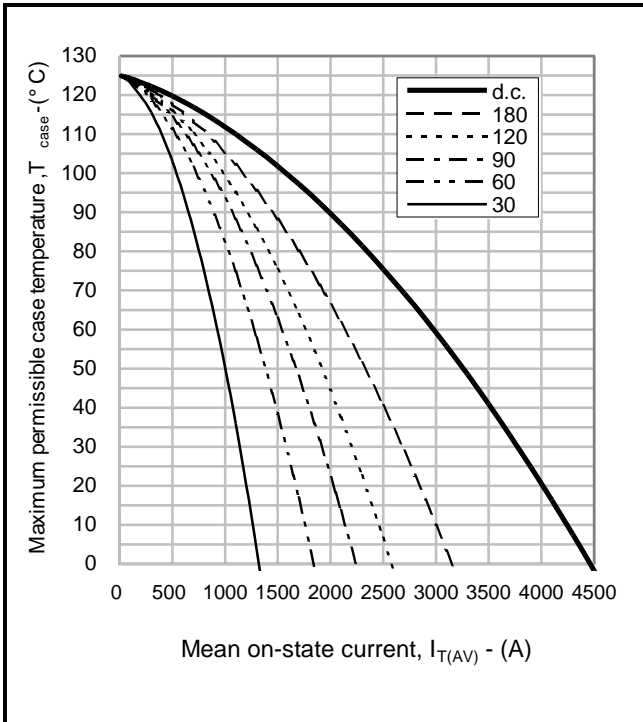
**Fig.4 Maximum permissible case temperature, double side cooled – sine wave**



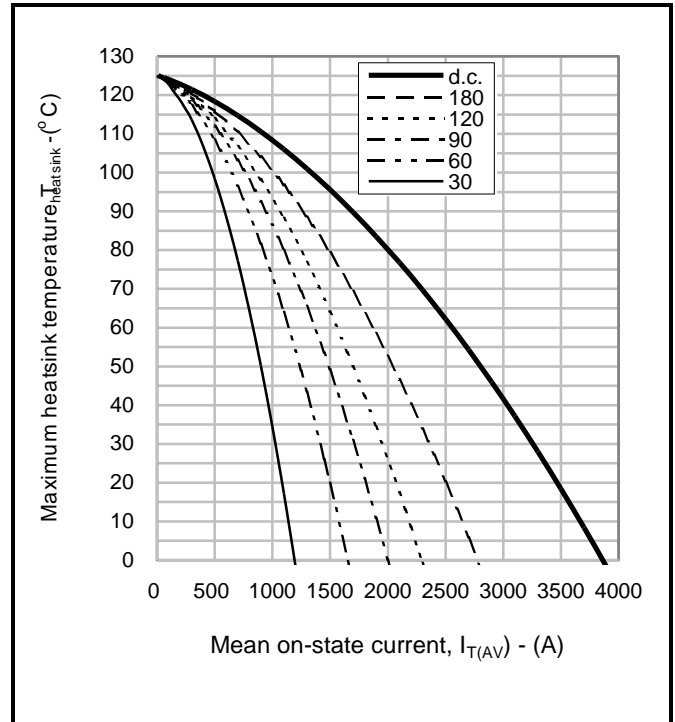
**Fig.5 Maximum permissible heatsink temperature, double side cooled – sine wave**



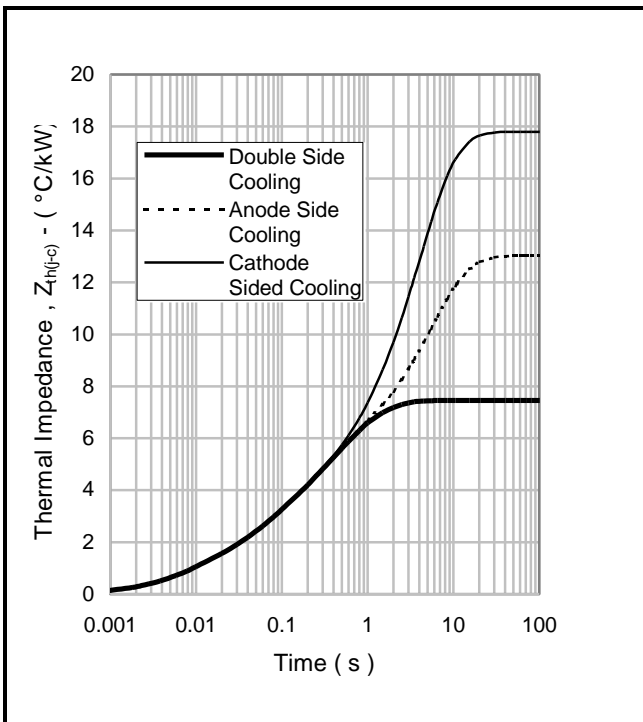
**Fig.6 On-state power dissipation – rectangular wave**



**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 <sub>i</sub> (°C/kW)	0.9206	1.8299	3.4022	1.3044
	T <sub>i</sub> (s)	0.0076807	0.0579454	0.4078613	1.2085
Anode side cooled	R <sub>i</sub> (°C/kW)	0.9032	1.6719	3.0101	7.4269
	T <sub>i</sub> (s)	0.0075871	0.0536531	0.3144537	5.624
Cathode side cooled	R <sub>i</sub> (°C/kW)	0.9478	2.0661	1.6884	13.0847
	T <sub>i</sub> (s)	0.0078442	0.0645541	0.3894389	4.1447

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

$\Delta R_{th(j-c)}$  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		
$\Delta Z_{th} (z)$			$\Delta Z_{th} (z)$			$\Delta Z_{th} (z)$		
$\rho^\circ$	sine.	rect.	$\rho^\circ$	sine.	rect.	$\rho^\circ$	sine.	rect.
180	1.34	0.88	180	1.34	0.88	180	1.33	0.88
120	1.57	1.30	120	1.57	1.30	120	1.57	1.29
90	1.83	1.54	90	1.84	1.54	90	1.83	1.53
60	2.08	1.81	60	2.08	1.81	60	2.07	1.80
30	2.27	2.11	30	2.28	2.11	30	2.26	2.10
15	2.36	2.28	15	2.37	2.28	15	2.35	2.26

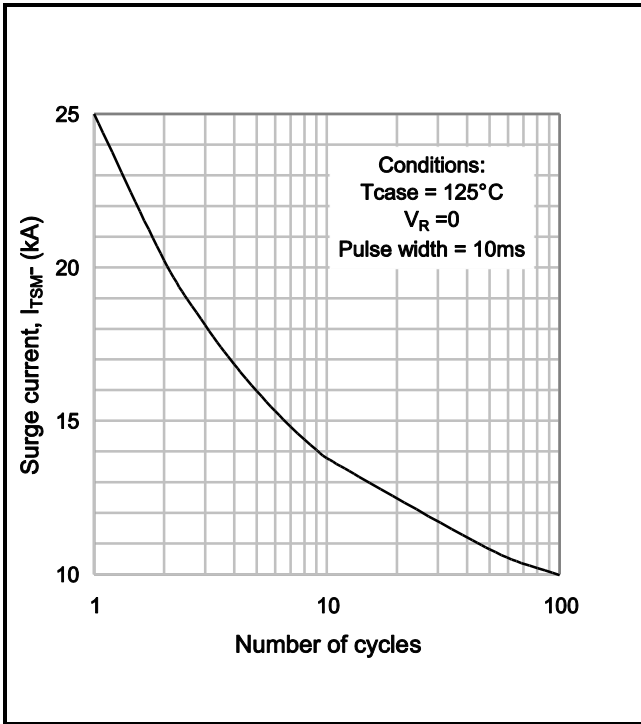


Fig.10 Multi-cycle surge current

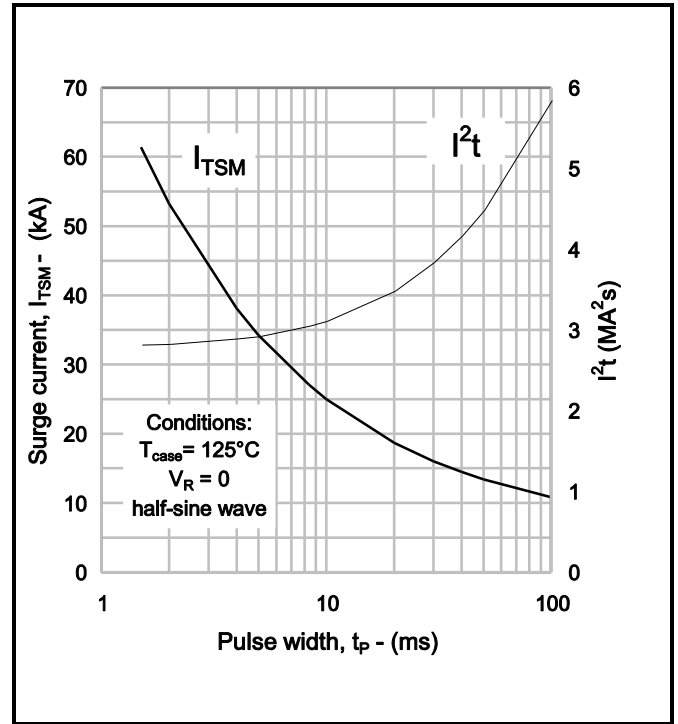


Fig.11 Single-cycle surge current

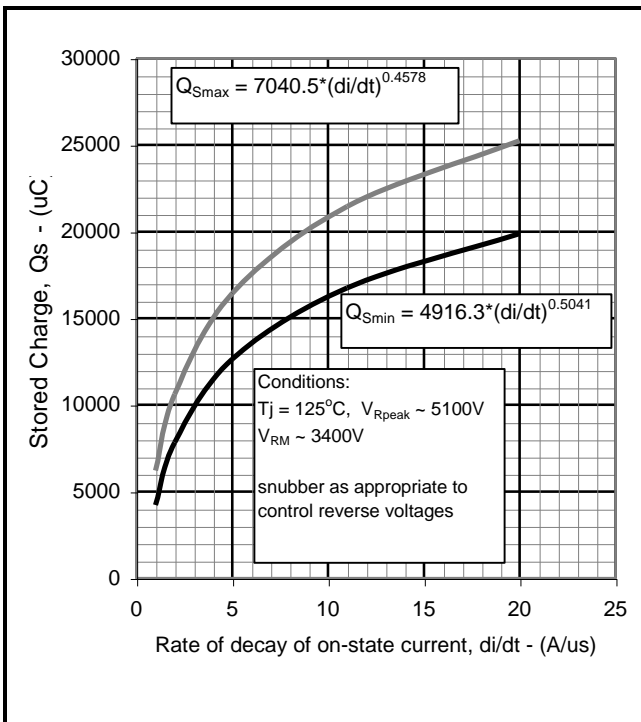


Fig.12 Stored charge

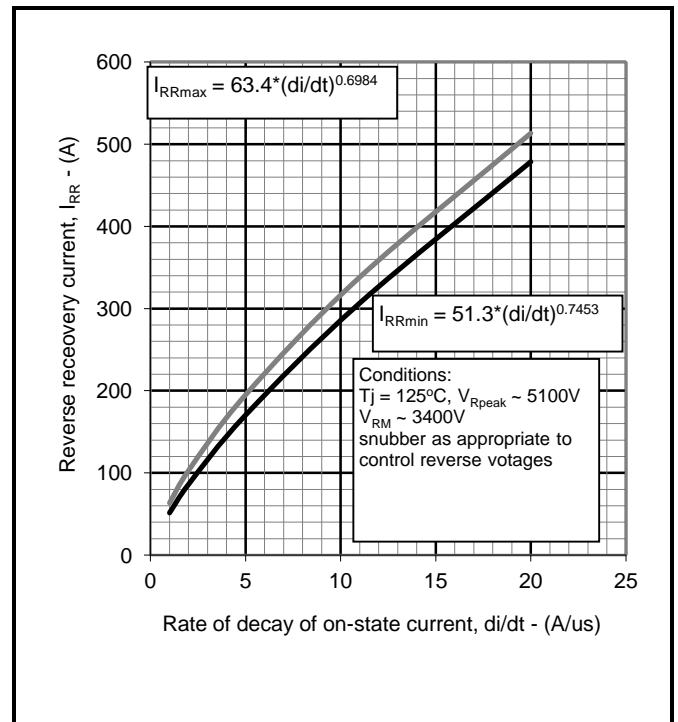
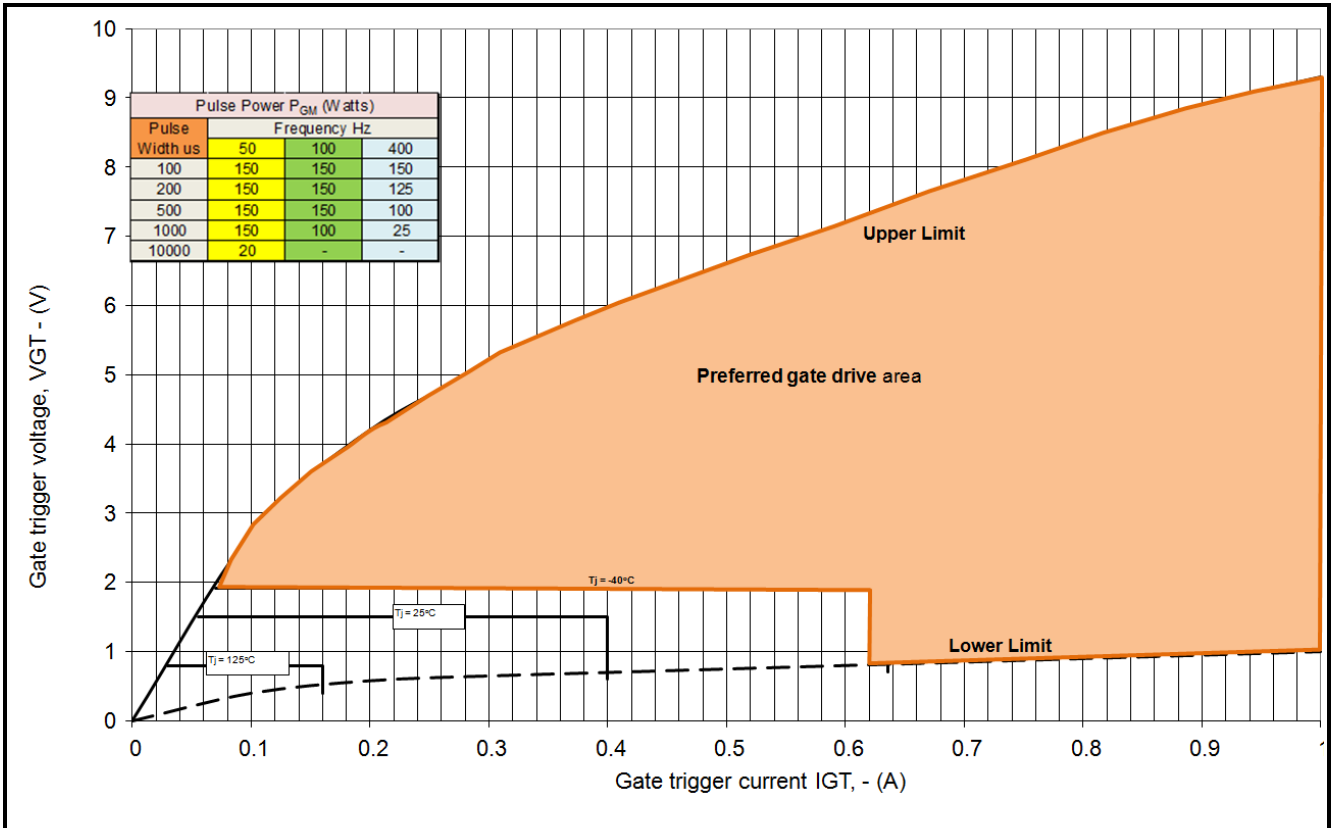
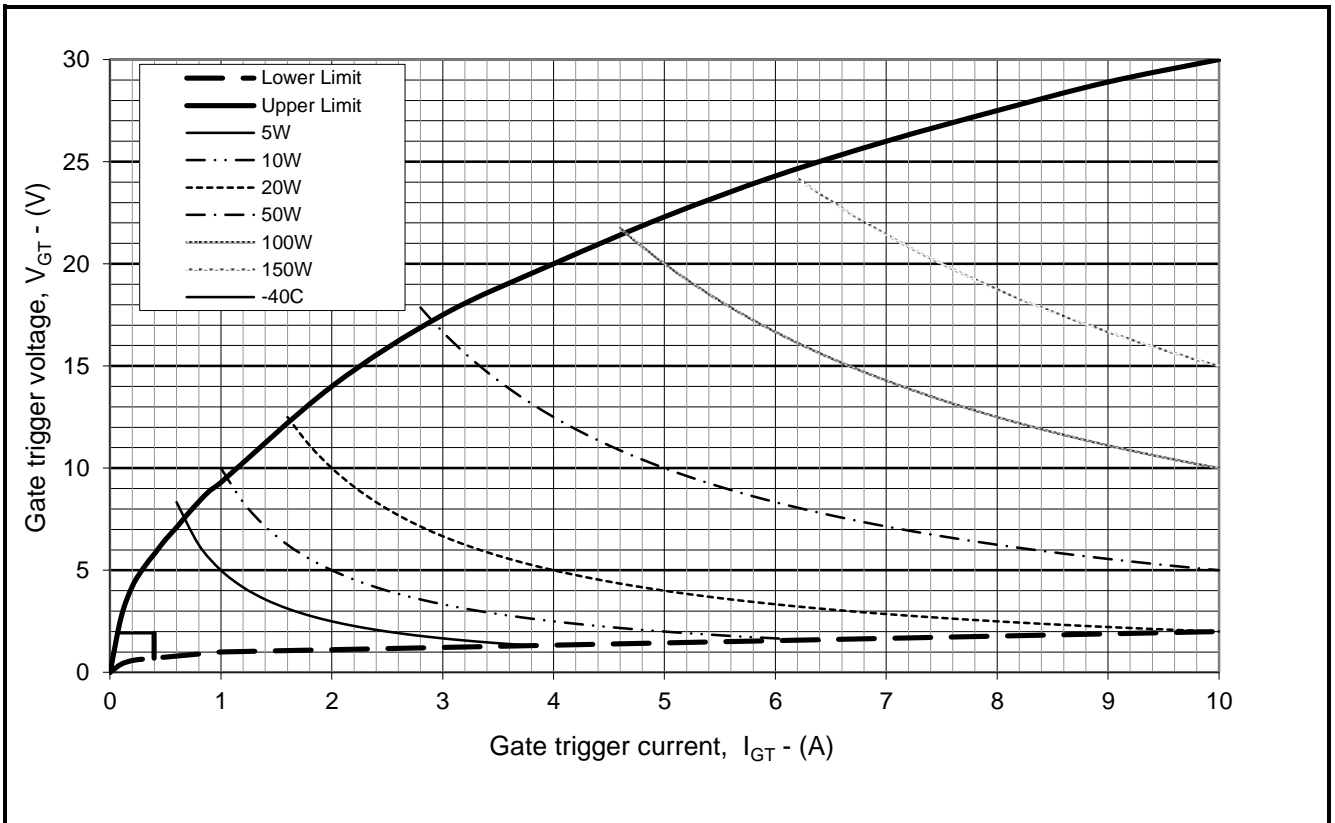


Fig.13 Reverse recovery current



**Fig14 Gate Characteristics**

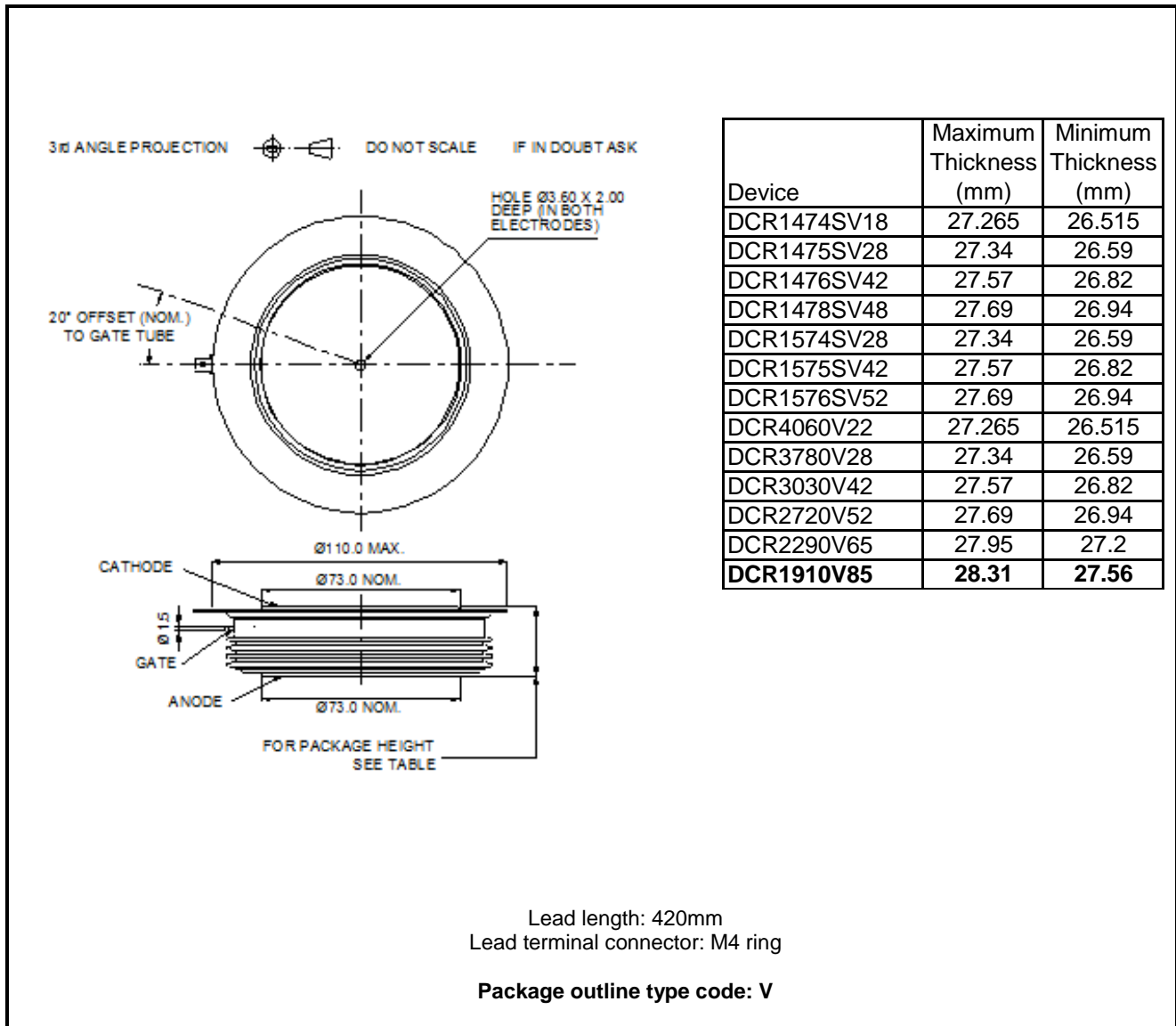


**Fig. 15 Gate characteristics**



**PACKAGE DETAILS**

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



**Fig.16 Package outline**

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