DCR2930Y42

Phase Control Thyristor

Replaces DS5836-3 DS5836-4 May 2023 (LN42583)

FEATURES

- Double Side Cooling
- High Surge Capability

APPLICATIONS

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

KEY PARAMETERS

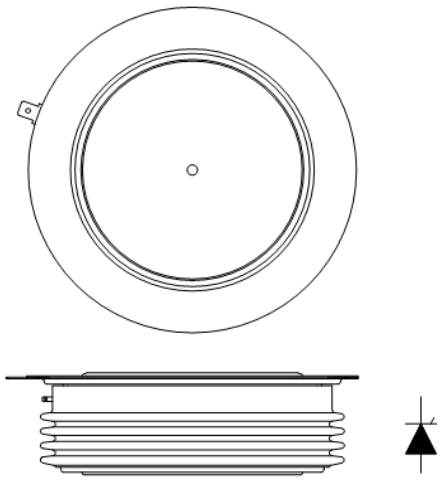
V_{DRM}	**4200V**
$I_{T(AV)}$	**2910A**
I_{TSM}	**40600A**
dV/dt*	**1500V/µs**
dI/dt	**400A/µs**

*** Higher dV/dt selections are available on request**

VOLTAGE RATINGS

Part and Ordering Number	Repetitive Peak Voltages V_{DRM} and V_{RRM} (V)	Conditions
DCR2930Y42 DCR2930Y40 DCR2930Y35 DCR2930Y30	4200 4000 3500 3000	T_{vj} = -40°C to 125°C, I_{DRM} = I_{RRM} = 200mA, V_{DRM}, V_{RRM} t_p = 10ms V_{DSM} & V_{RSM} = V_{DRM} & V_{RRM} + 100V respectively

Lower voltage grades available.



Outline type code: Y

(See Package Details for further information)

Fig. 1 Package outline

ORDERING INFORMATION

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

For example:

DCR2930Y42

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°C unless stated otherwise

Symbol	Parameter	Test Conditions	Max.	Units
Double Side Cooled				
$I_{T(AV)}$	Mean on-state current	Half wave resistive load	2910	A
$I_{T(RMS)}$	RMS value	-	4570	A
I_T	Continuous (direct) on-state current	-	4190	A

SURGE RATINGS

Symbol	Parameter	Test Conditions	Max.	Units
I_{TSM}	Surge (non-repetitive) on-state current	10ms half sine, T_{case} = 125°C V_R = 0	40.6	kA
I^2t	I^2t for fusing		8.24	MA^2s

THERMAL AND MECHANICAL RATINGS

Symbol	Parameter	Test Conditions		Min.	Max.	Units
$R_{th(j-c)}$	Thermal resistance - junction to case	Double side cooled	DC	-	8.4	°C/kW
		Single side cooled	Anode DC	-	13.4	°C/kW
			Cathode DC	-	23.1	°C/kW
$R_{th(c-h)}$	Thermal resistance - case to heatsink	Clamping force 54kN (with mounting compound)	Double side	-	2.0	°C/kW
			Single side	-	4.0	°C/kW
T_{vj}	Virtual junction temperature	Blocking V_{DRM} / V_{RRM}		-	125	°C
T_{stg}	Storage temperature range			-55	125	°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°C		-	200	mA
V_{TM}	Instantaneous forward voltage	At 4000A peak, T_j = 125°C		1.55	1.80	V
dV/dt	Max. linear rate of rise of off-state voltage	To 67% V_{DRM}, T_j = 125°C, gate open		-	1500	V/µs
dI/dt	Rate of rise of on-state current	From 67% V_{DRM} to 2x $I_{T(AV)}$ Gate source 30V, 10Ω t_r < 0.5µs, T_j = 125°C	Repetitive 50Hz	-	150	A/µs
			Non-repetitive	-	400	A/µs
$V_{T(TO)}$	Threshold voltage - Low level	500A to 1800A at T_{case} = 125°C		-	0.82	V
	Threshold voltage - High level	1800A to 7000A at T_{case} = 125°C		-	1.00	V
r_T	On-state slope resistance - Low level	500A to 1800A at T_{case} = 125°C		-	0.30	mΩ
	On-state slope resistance - High level	1800A to 7000A at T_{case} = 125°C		-	0.20	mΩ
t_{gd}	Delay time	V_D = 67% V_{DRM}, gate source 30V, 10Ω t_r = 0.5µs, T_j = 25°C		-	3	µs
t_q	Turn-off time	T_j = 125°C, V_R = 200V, dI/dt = 1A/µs, dV_{DR}/dt = 20V/µs linear		250	500	µs
Q_S	Stored charge	T_j = 125°C, dI/dt = 1A/µs $V_{R(peak)}$ ~ 2500V, V_{RM} ~ 1700V		1360	3400	µC
I_{RR}	Reverse recovery current			30	48	A
I_L	Latching current	T_j = 25°C, V_D = 5V		-	3	A
I_H	Holding current	T_j = 25°C, R_{G-K} = ∞, 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°C	1.5	V
V_{GD}	Gate non-trigger voltage	At 50% V_{DRM}, T_{case} = 125°C	0.4	V
I_{GT}	Gate trigger current	V_{DRM} = 5V, T_{case} = 25°C	350	mA
I_{GD}	Gate non-trigger current	At 50% V_{DRM}, T_{case} = 125°C	10	mA

CURVES

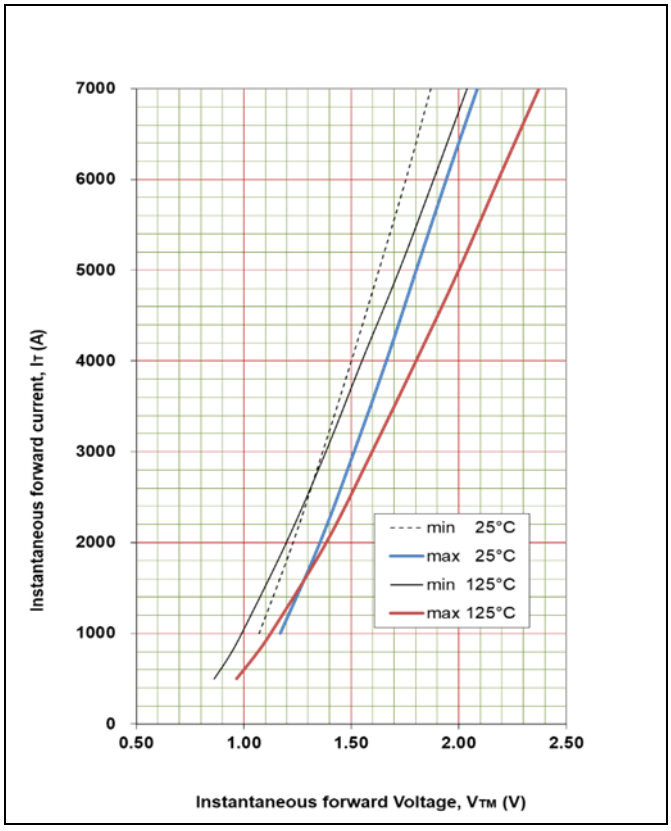


Fig. 2 Maximum & minimum on state characteristics

V_{TM} EQUATION

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

Where A = 0.865481
B = -0.041628
C = 0.000099
D = 0.014074

These values are valid for T_j = 125°C for I_T 500A to 7000A

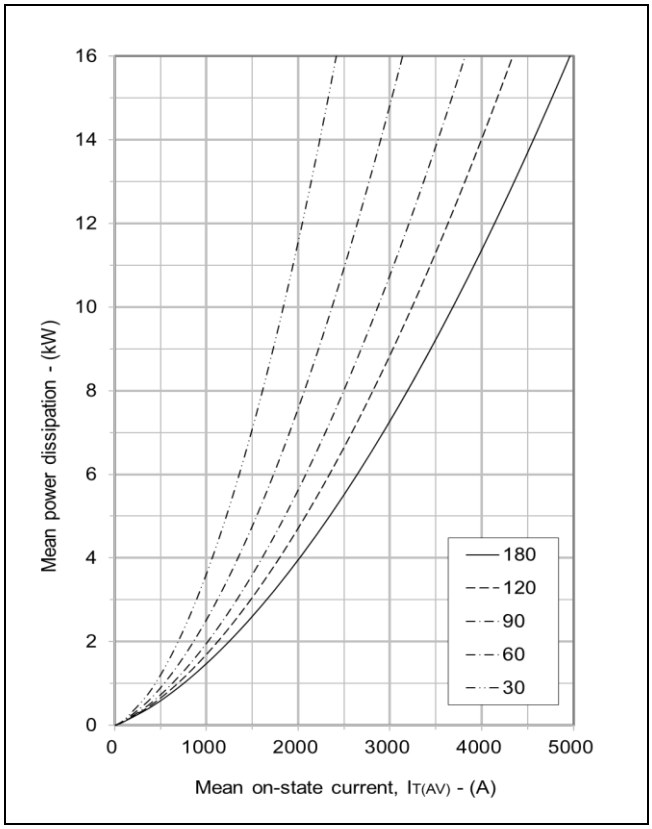


Fig. 3 On-state power dissipation - sine wave

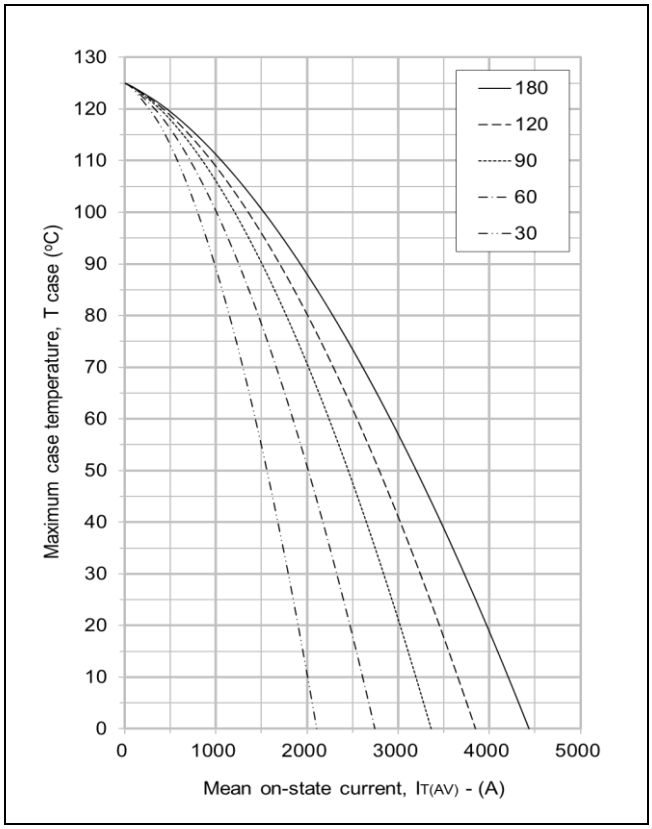


Fig. 4 Maximum permissible case temperature, double side cooled - sine wave

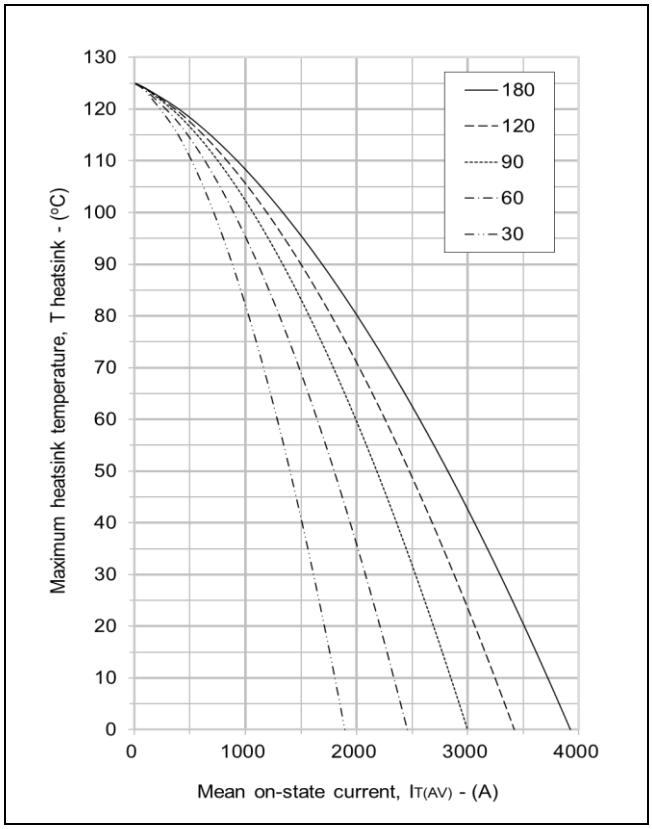


Fig. 5 Maximum permissible heatsink temperature, double side cooled - sine wave

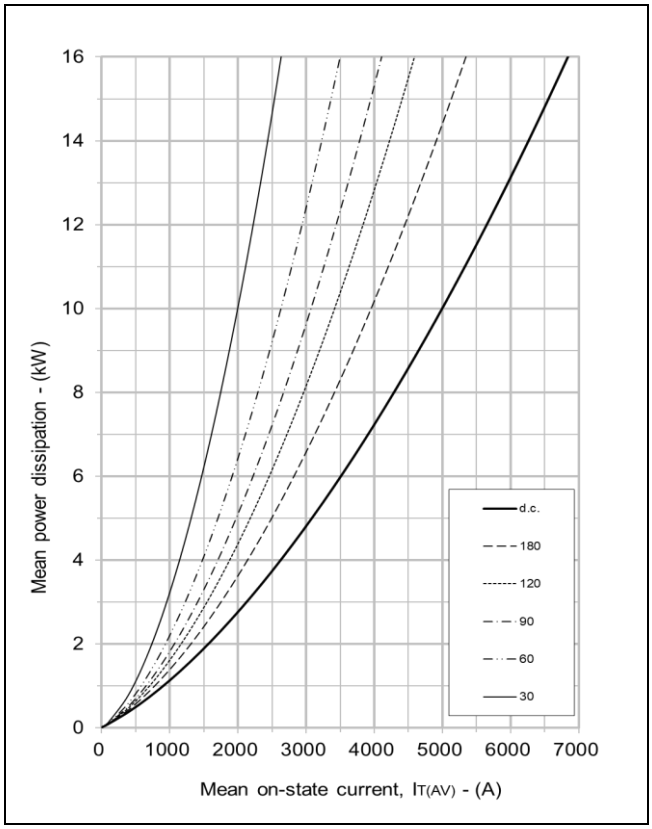


Fig. 6 On-state power dissipation - rectangular wave

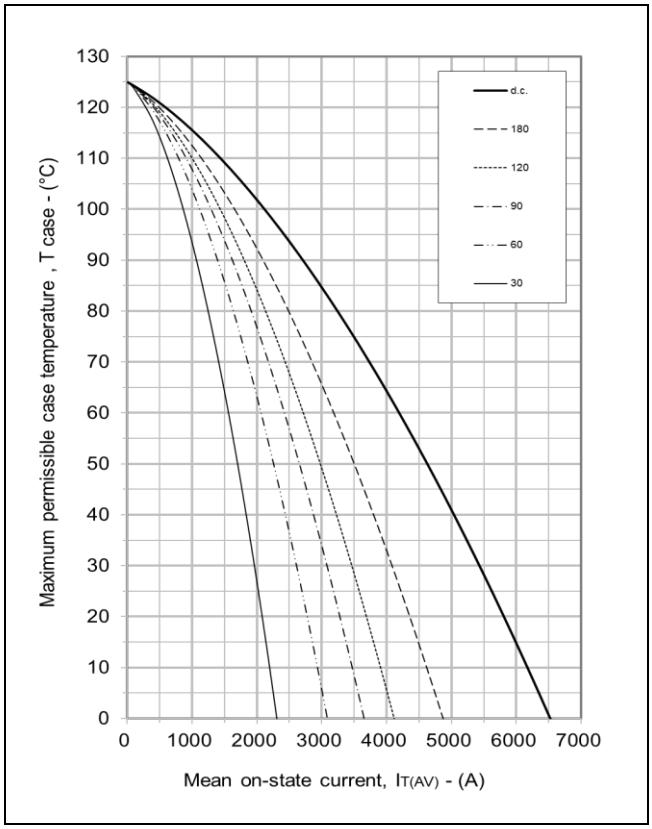


Fig. 7 Maximum permissible case temperature, double side cooled - rectangular wave

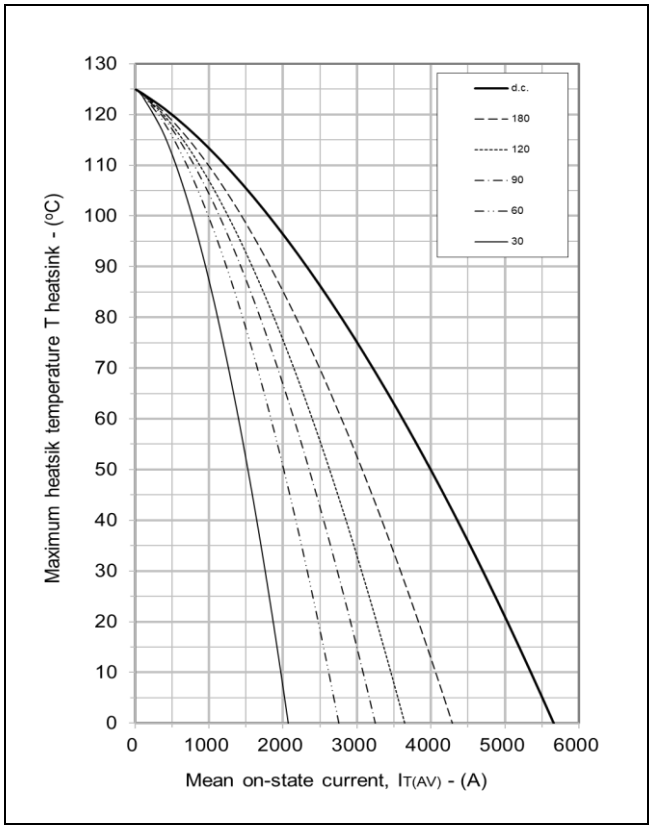
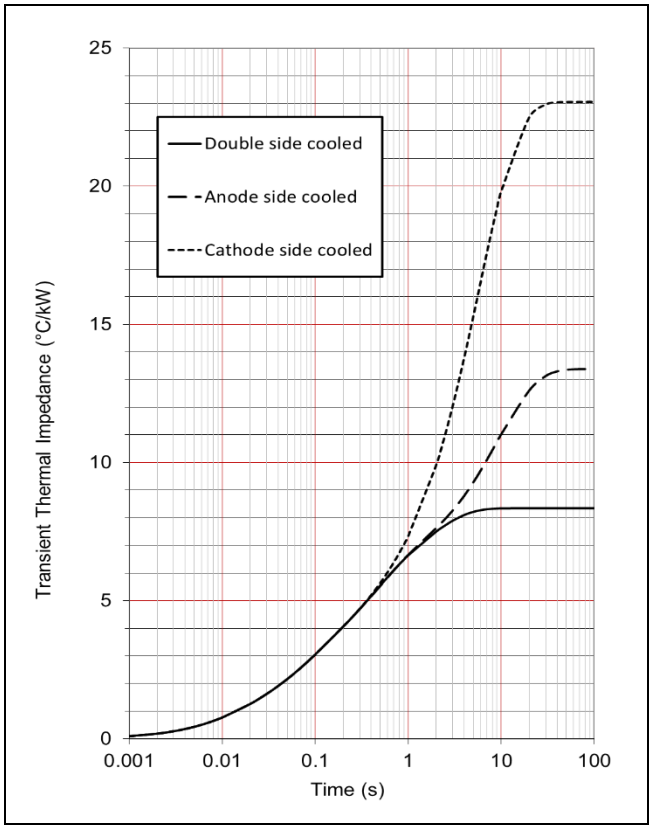


Fig. 8 Maximum permissible heatsink temperature, double side cooled - rectangular wave



		1	2	3	4
Double side cooled	Ri(°C/kW)	0.612	1.772	3.105	2.861
	Ti(s)	0.010	0.056	0.333	1.632
Anode side cooled	Ri(°C/kW)	0.701	1.939	3.610	7.138
	Ti(s)	0.011	0.066	0.420	9.061
Cathode side cooled	Ri(°C/kW)	0.673	2.017	1.731	18.639
	Ti(s)	0.011	0.066	0.304	5.727

$$Z_{th} = \sum_{i=1}^{i=4} R_i \cdot \left(1 - \exp\left(-\frac{T}{T_i}\right)\right)$$

$\Delta R_{th(j-c)}$ 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		
	ΔZ_{th} (z)	
θ°	sine.	rect.
180	0.94	0.65
120	1.09	0.92
90	1.24	1.07
60	1.38	1.23
30	1.49	1.40
15	1.54	1.49

Anode Side Cooling		
	ΔZ_{th} (z)	
θ°	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

Cathode Sided Cooling		
	ΔZ_{th} (z)	
θ°	sine.	rect.
180	0.94	0.64
120	1.08	0.91
90	1.24	1.06
60	1.37	1.22
30	1.48	1.39
15	1.53	1.48

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

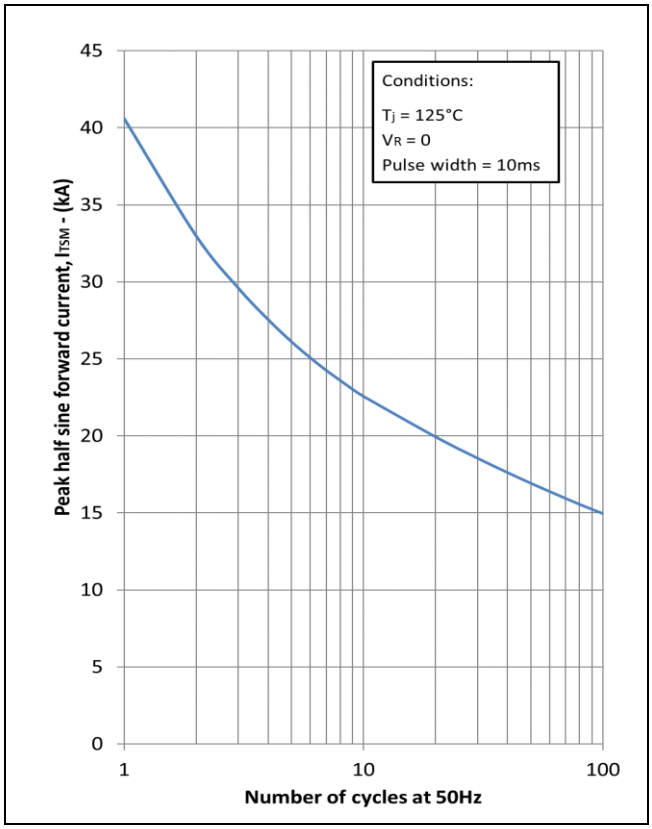


Fig. 10 Multi-cycle surge current

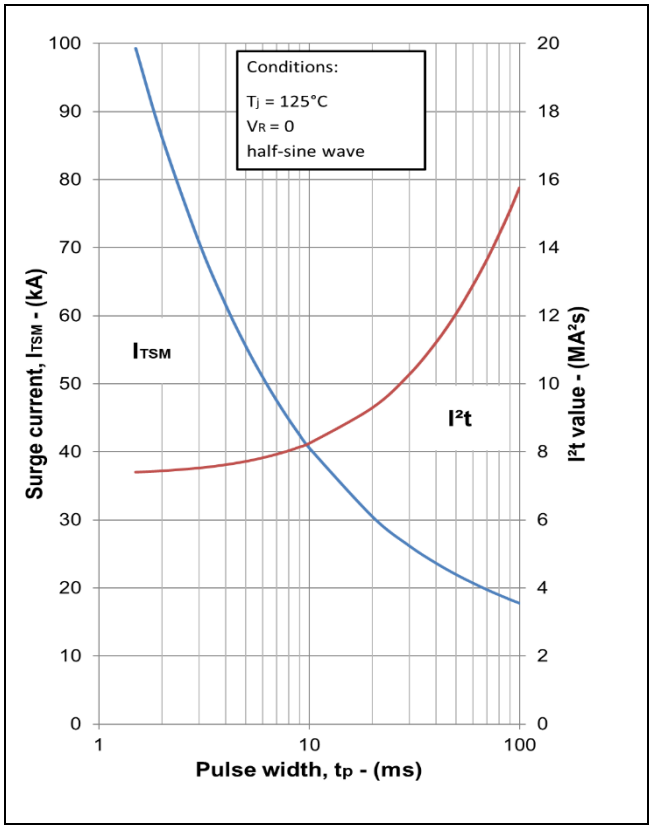


Fig. 11 Single-cycle surge current

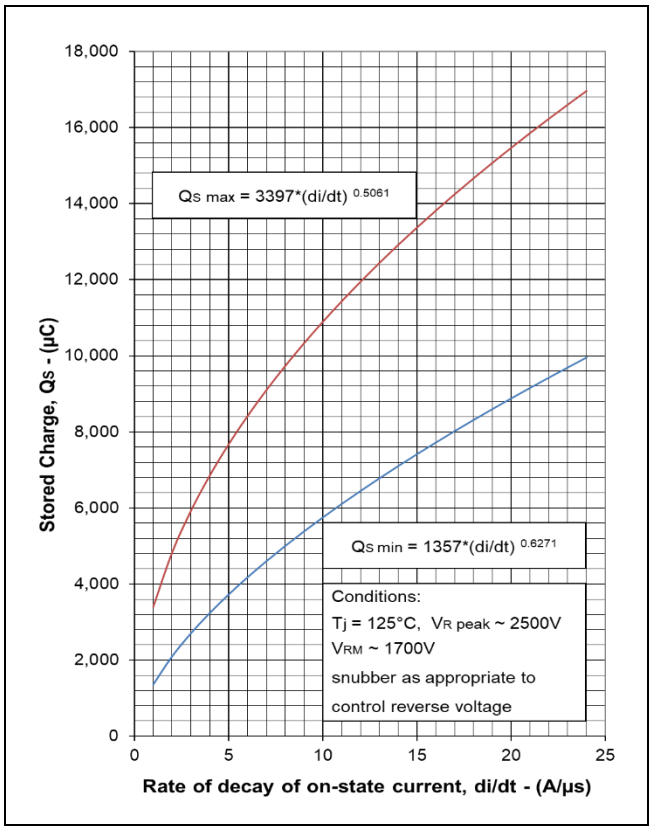


Fig. 12 Stored charge

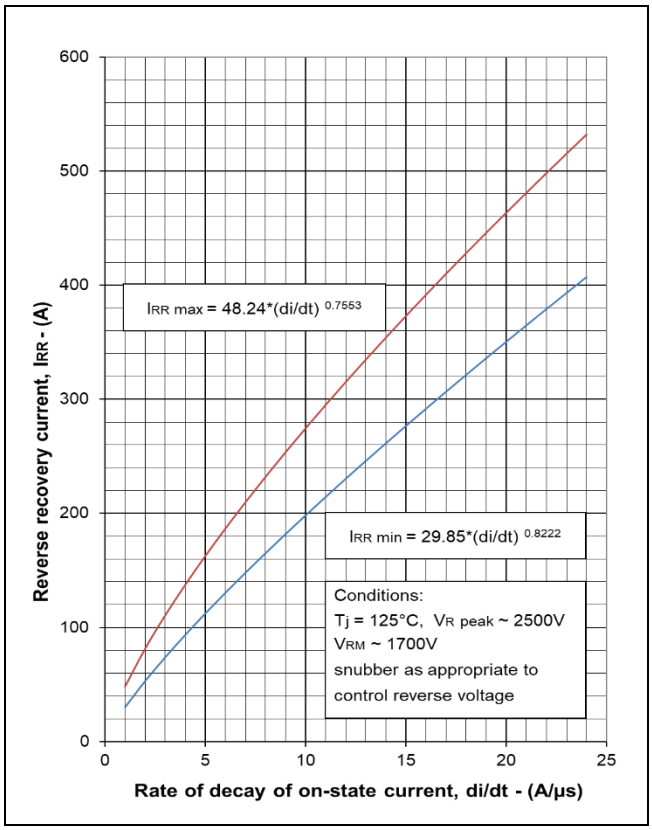


Fig. 13 Reverse recovery current

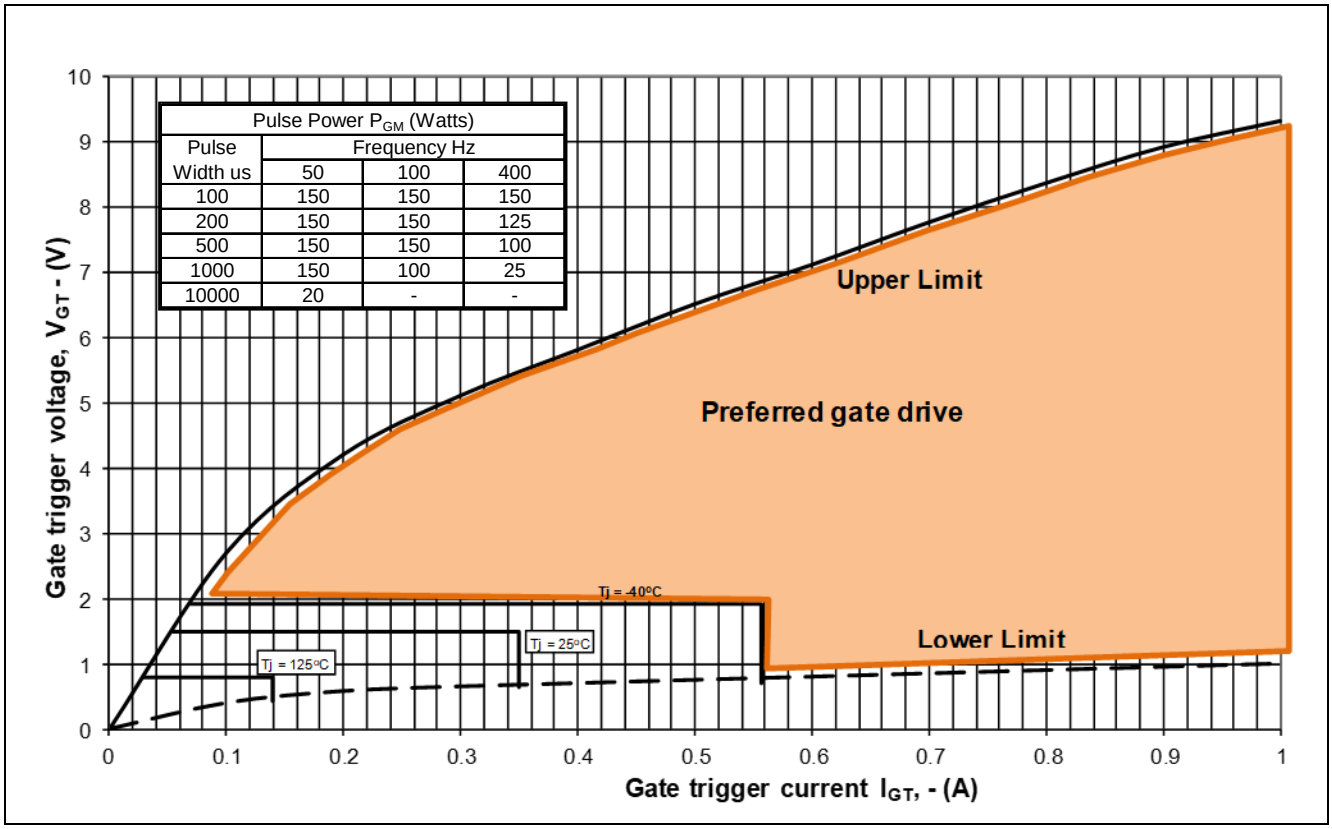


Fig. 14 Gate characteristics

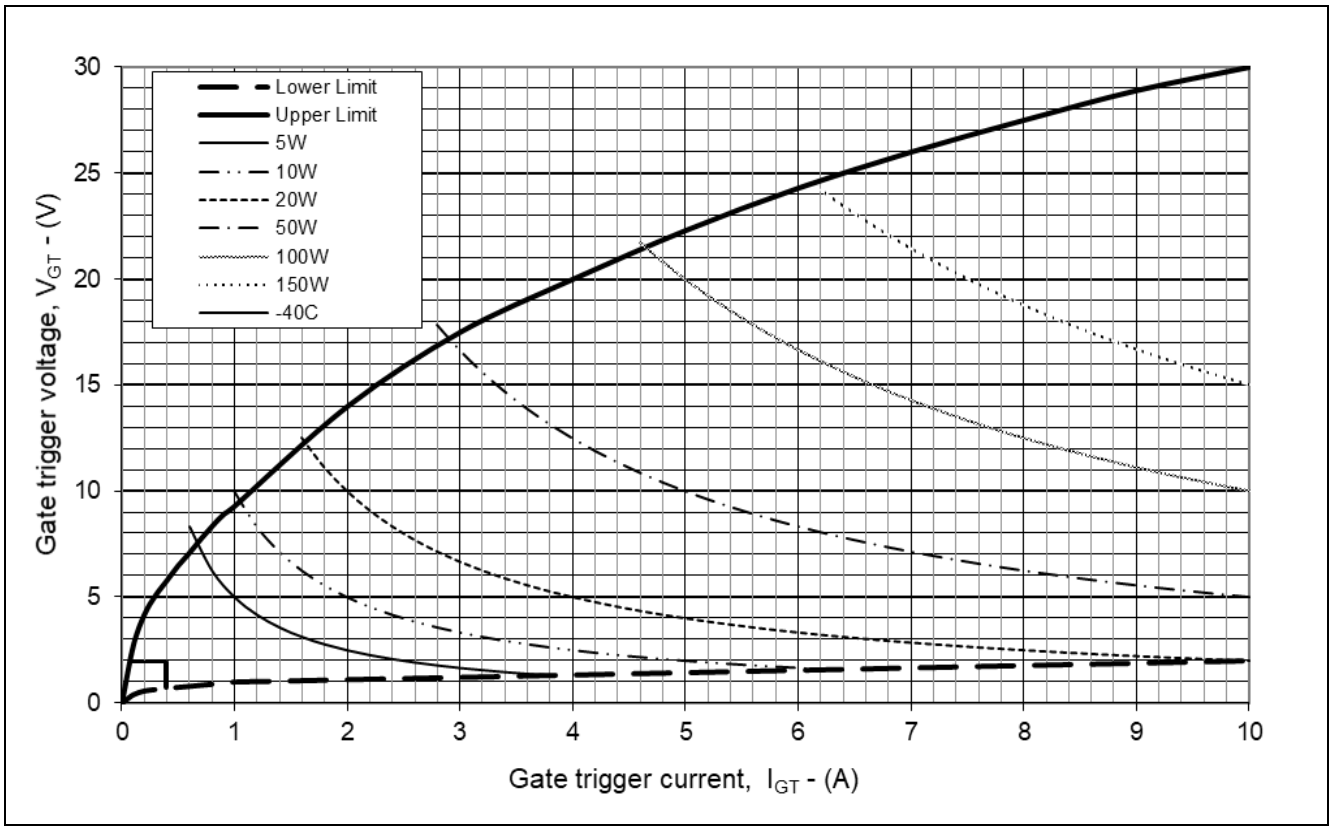


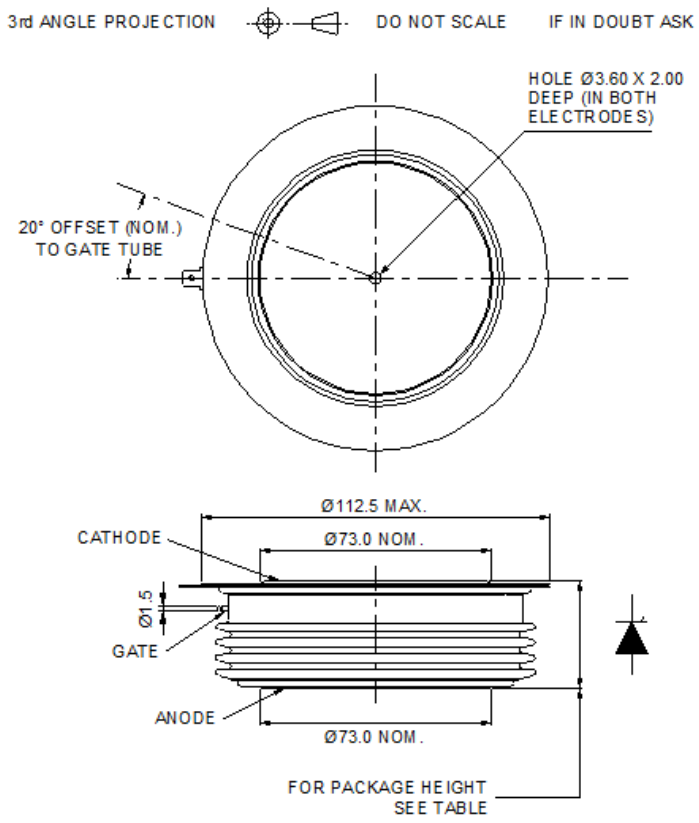
Fig. 15 Gate characteristics

PACKAGE DETAILS

For further package information, please contact Customer services.

All dimensions in mm, unless stated otherwise.

DO NOT SCALE



Device	Maximum Thickness (mm)	Minimum Thickness (mm)
DCR1840Y85	36.1	35.4
DCR2220Y65	35.7	35.1
DCR2630Y52	35.5	34.9
DCR2930Y42	**35.4**	**34.7**
DCR3650Y28	35.1	34.5
DCR3910Y22	35.0	34.4
DCR4740Y18	35.0	34.3

Clamping force: 54kN ± 10%

Lead length: 420mm

Lead terminal connector: M4 ring

Package outline type code: Y

Fig. 16 Package outline

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