DCR2930Y42

Phase Control Thyristor

DS3836-2 March 2013 (LN30239)

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
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.

ORDERING INFORMATION

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

For example:

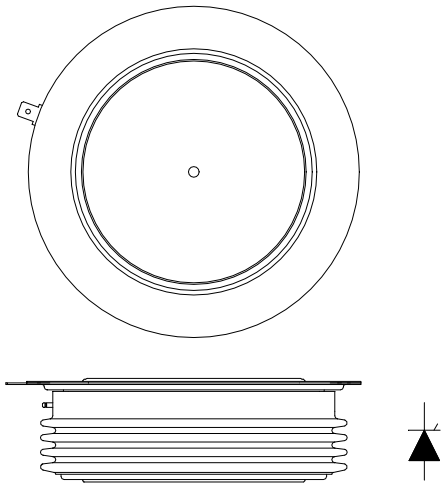
DCR2930Y42

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

KEY PARAMETERS

V_{DRM}	4200V
$I_{T(AV)}$	2930A
I_{TSM}	40600A
dV/dt*	1500V/µs
dI/dt	400A/us

*** Higher dV/dt selections available**



Outline type code: Y

(See Package Details for further information)

Fig. 1 Package outline

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	2930	A
$I_{T(RMS)}$	RMS value	-	4600	A
I_T	Continuous (direct) on-state current	-	4210	A

SURGE RATINGS

Symbol	Parameter	Test Conditions	Max.	Units
I_{TSM}	Surge (non-repetitive) on-state current	10ms half sine, T_{case} = 125°C	40.6	kA
I^2t	I^2t for fusing	V_R = 0	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	-	0.00835	°C/W
		Single side cooled	Anode DC	-	0.0134	°C/W
			Cathode DC	-	0.023	°C/W
$R_{th(c-h)}$	Thermal resistance – case to heatsink	Clamping force 54.0kN	Double side	-	0.002	°C/W
		(with mounting compound)	Single side	-	0.004	°C/W
T_{vj}	Virtual junction temperature	Blocking V_{DRM} / $_{VRRM}$		-	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
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 $I_{T(AV)}$	Repetitive 50Hz	-	150	A/µs
		Gate source 30V, 10Ω, t_r < 0.5µs, T_j = 125°C	Non-repetitive	-	400	A/µs
$V_{T(TO)}$	Threshold voltage – Low level	500A to 3000A at T_{case} = 125°C		-	0.82	V
	Threshold voltage – High level	3000A to 7200A at T_{case} = 125°C		-	0.98	V
r_T	On-state slope resistance – Low level	500A to 3000A at T_{case} = 125°C		-	0.292	mΩ
	On-state slope resistance – High level	3000A to 7200A at T_{case} = 125°C		-	0.198	mΩ
t_{gd}	Delay time	V_D = 67% V_{DRM}, gate source 30V, 10Ω t_r = 0.5µs, T_j = 25°C		TBD	TBD	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	I_T = 2000A, T_j = 125°C, dI/dt – 1A/µs,		1200	3500	µC
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 V_{DRM}, T_{case} = 125°C	TBD	V
I_{GT}	Gate trigger current	V_{DRM} = 5V, T_{case} = 25°C	350	mA
I_{GD}	Gate non-trigger current	V_{DRM} = 5V, T_{case} = 25°C	TBD	mA

CURVES

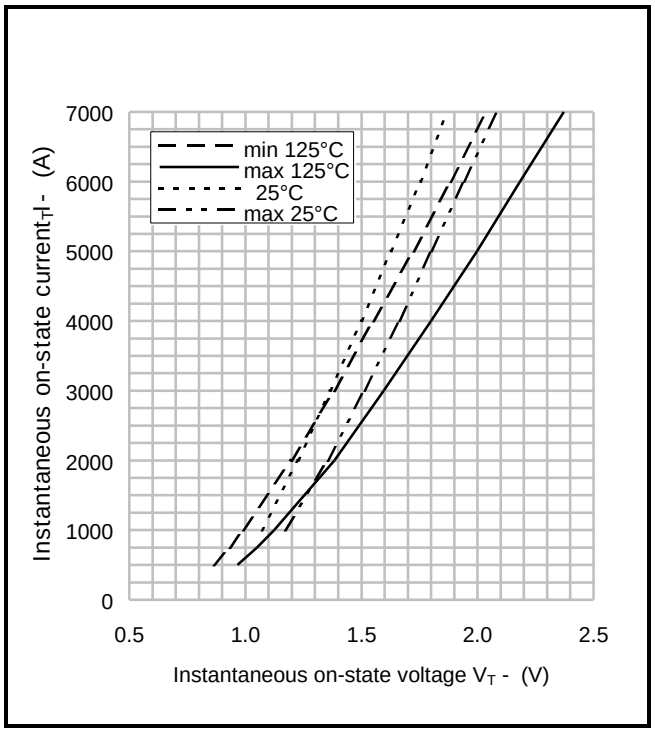


Fig.2 Maximum & minimum on-state characteristics

V_{TM} EQUATION

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

Where A = 0.866995
B = -0.042053
C = 0.000100
D = 0.014062

these values are valid for T_j = 125°C for I_T 500A to 10,000A

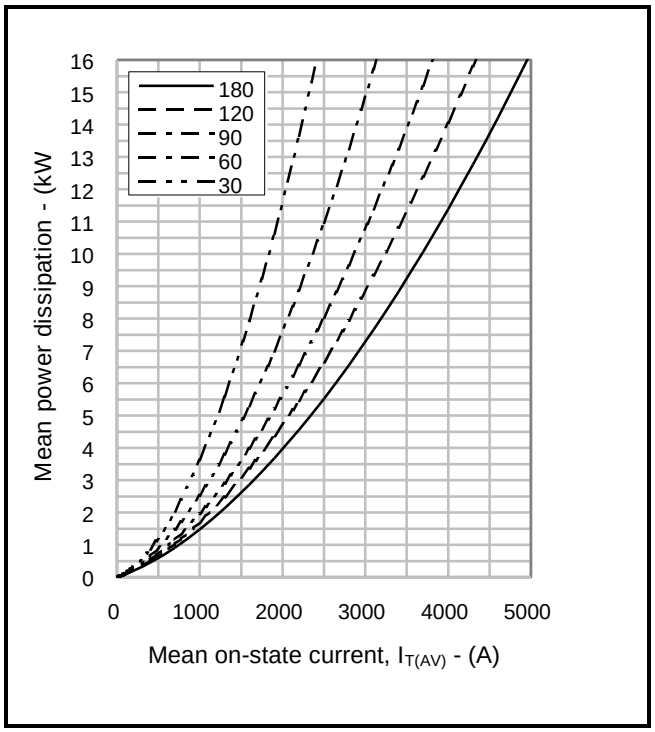


Fig.3 On-state power dissipation – sine wave

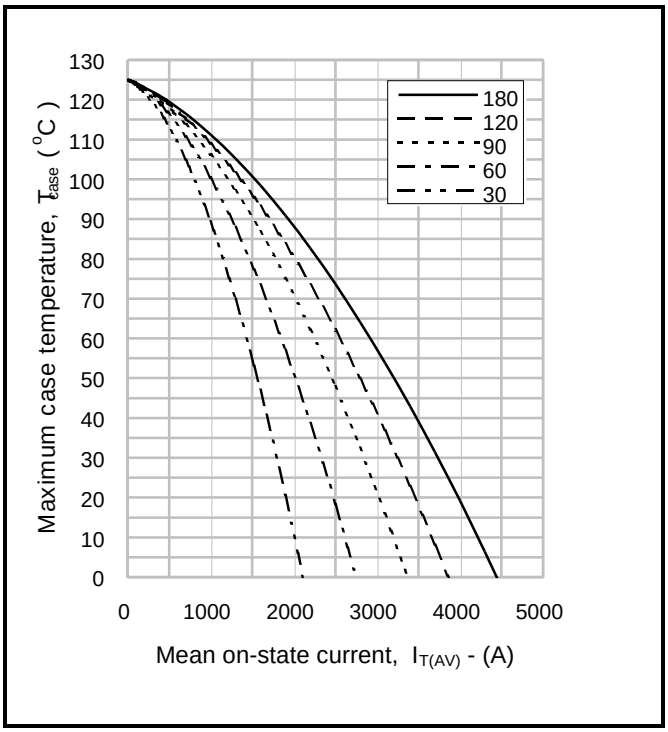


Fig.4 Maximum permissible case temperature, double side cooled – sine wave

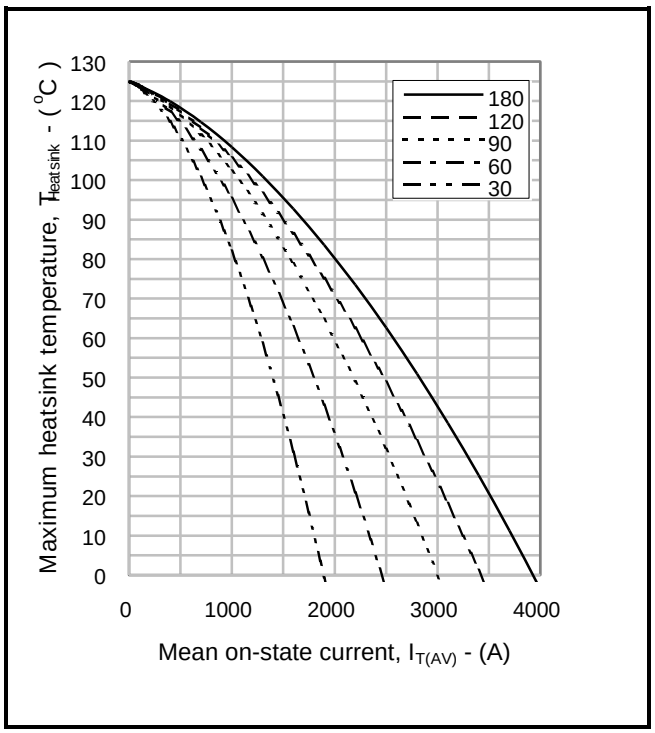


Fig.5 Maximum permissible heatsink temperature, double side cooled – sine wave

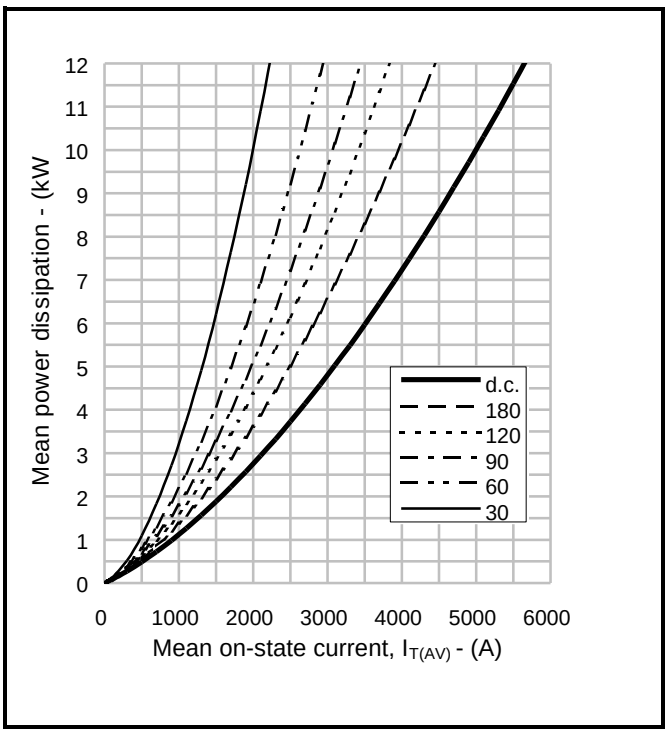


Fig.6 On-state power dissipation – rectangular wave

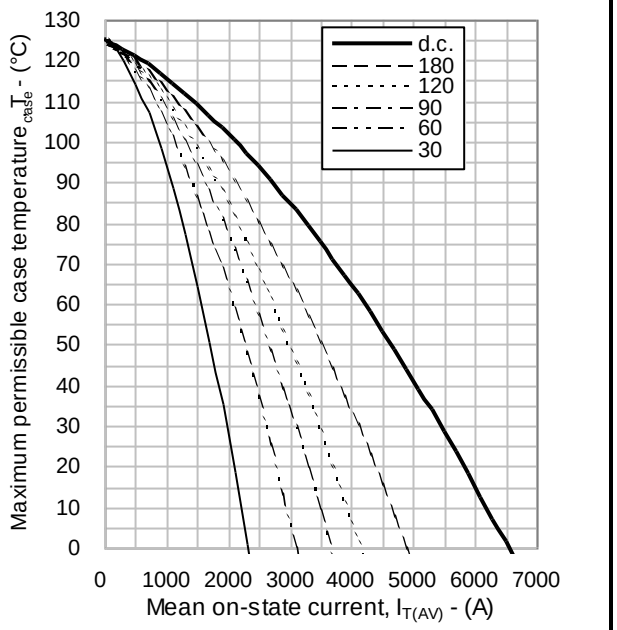


Fig.7 Maximum permissible case temperature, double side cooled – rectangular wave

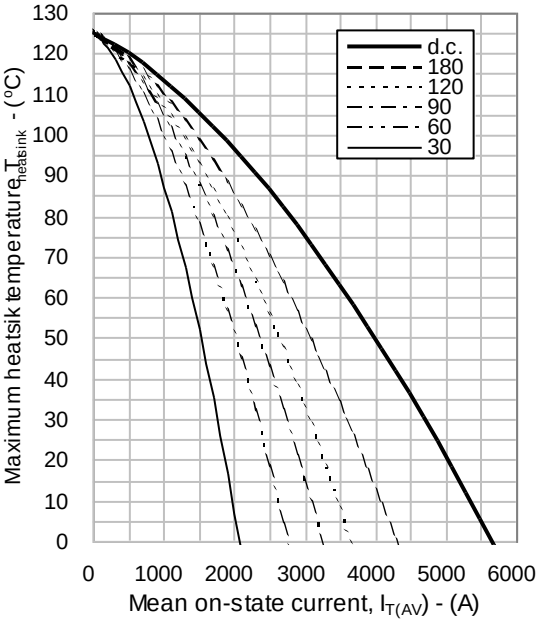
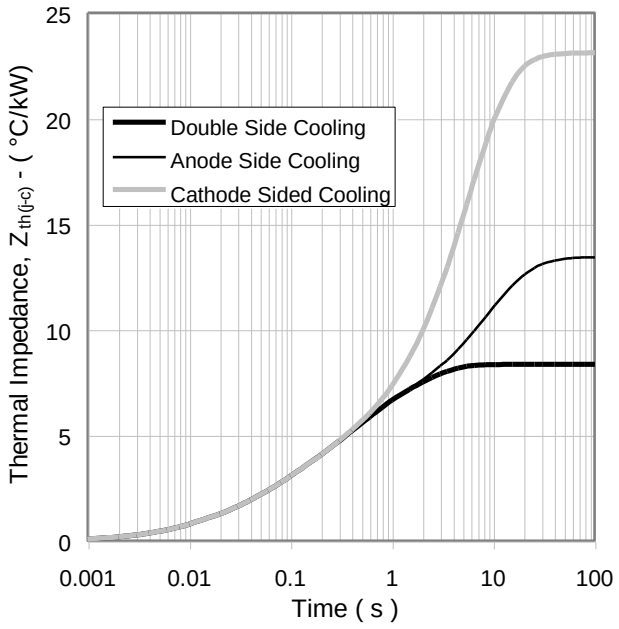


Fig.8 Maximum permissible heatsink temperature, double side cooled – rectangular wave



		1	2	3	4
Double side cooled	R_i (°C/kW)	0.612	1.7721	3.1053	2.8608
	T_i (s)	0.010332	0.056415	0.333082	1.6323
Anode side cooled	R_i (°C/kW)	0.7009	1.9388	3.61	7.1383
	T_i (s)	0.011328	0.065993	0.419695	9.0612
Cathode side cool	R_i (°C/kW)	0.6728	2.0168	1.7306	18.6391
	T_i (s)	0.010954	0.065544	0.30379	5.7274

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

$\Delta R_{th(j-c)}$ 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		
	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 (°C/kW)

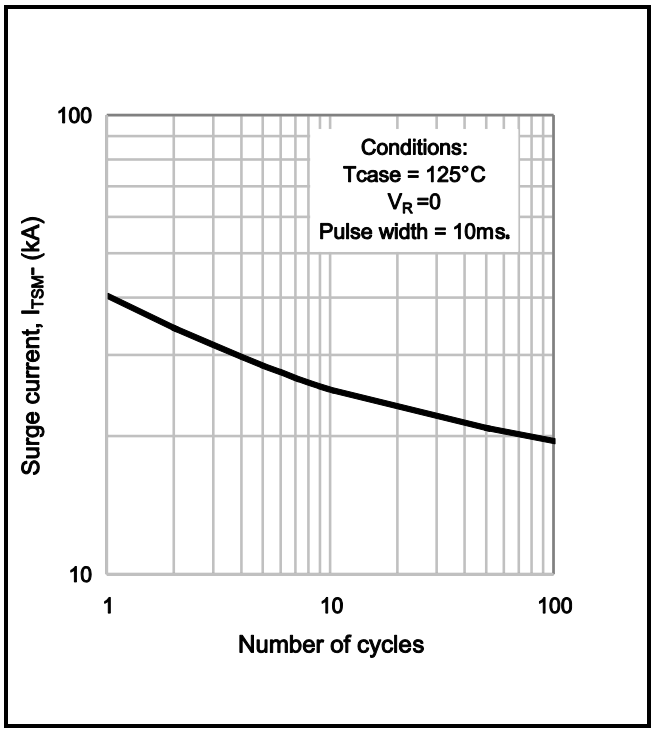


Fig.10 Multi-cycle surge current

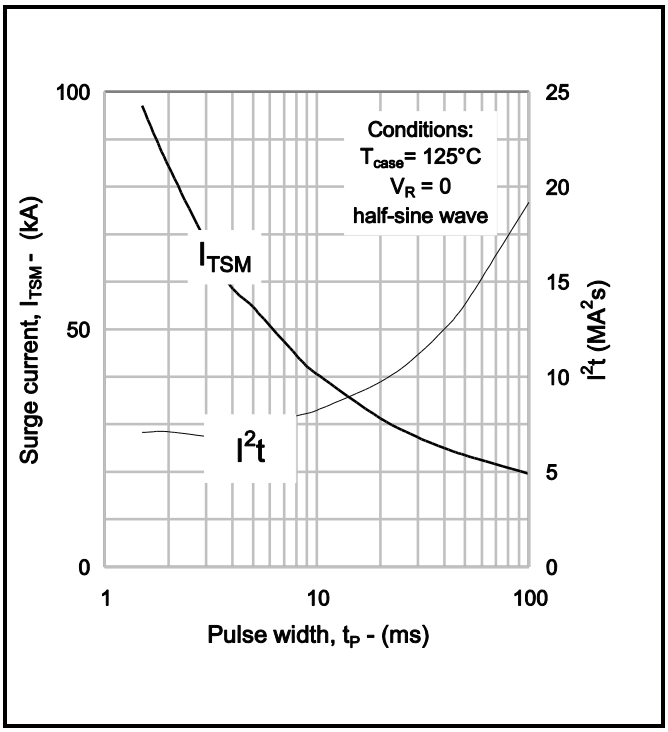


Fig.11 Single-cycle surge current

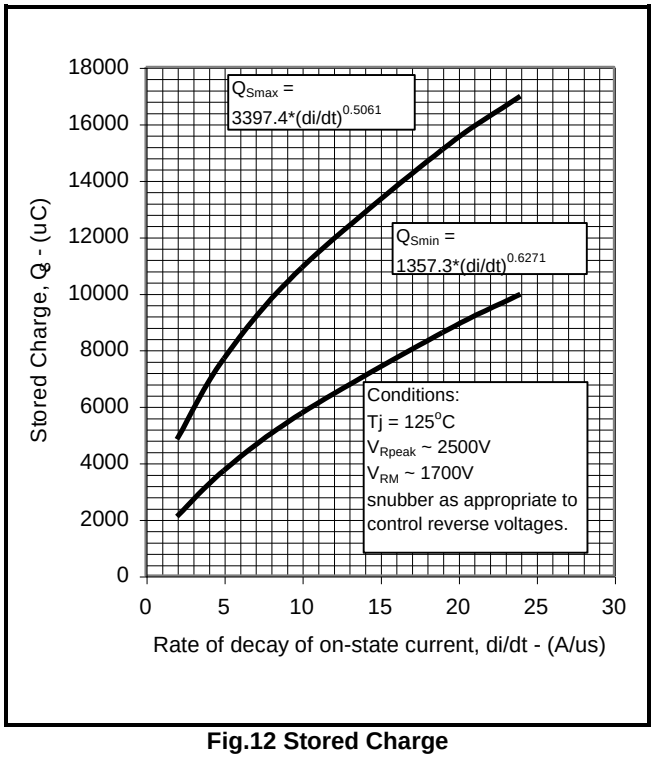


Fig.12 Stored Charge

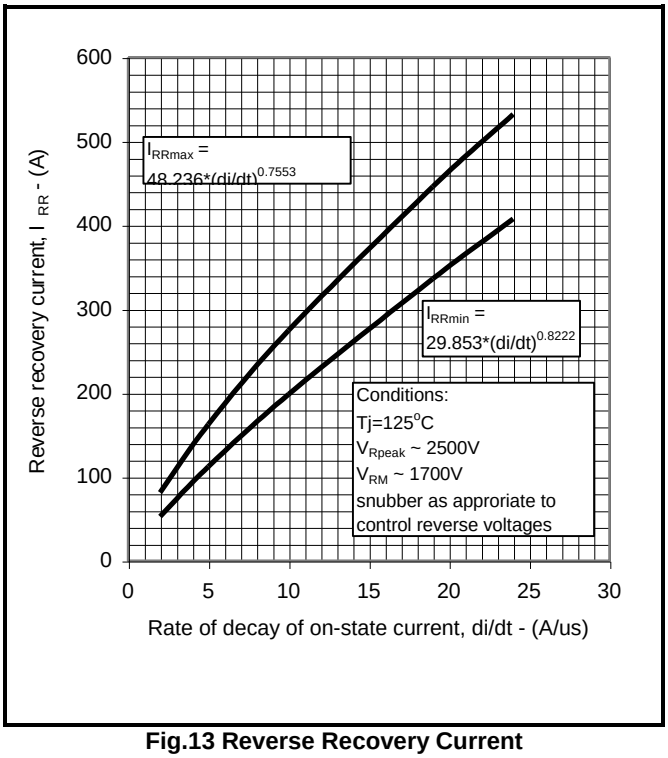


Fig.13 Reverse Recovery Current

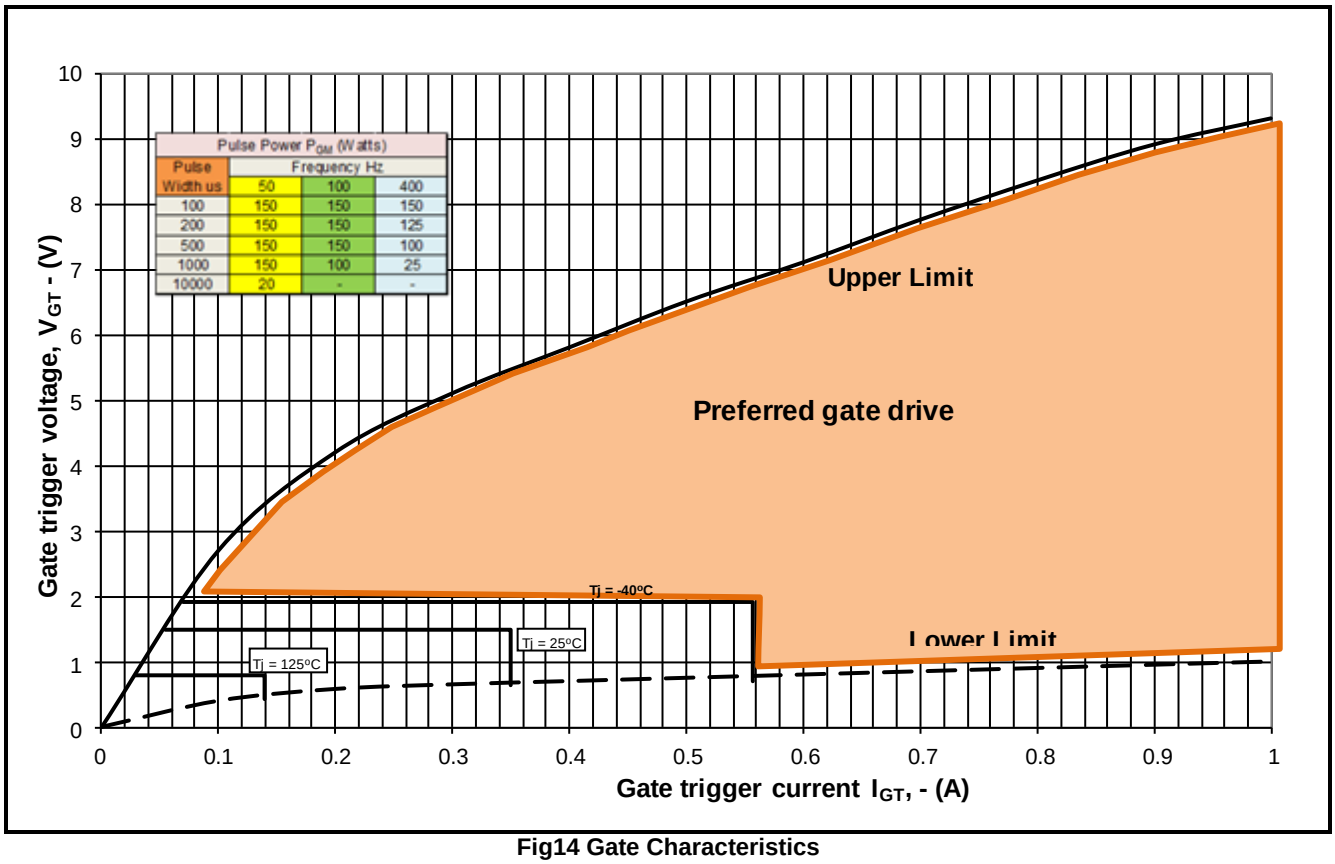


Fig14 Gate Characteristics

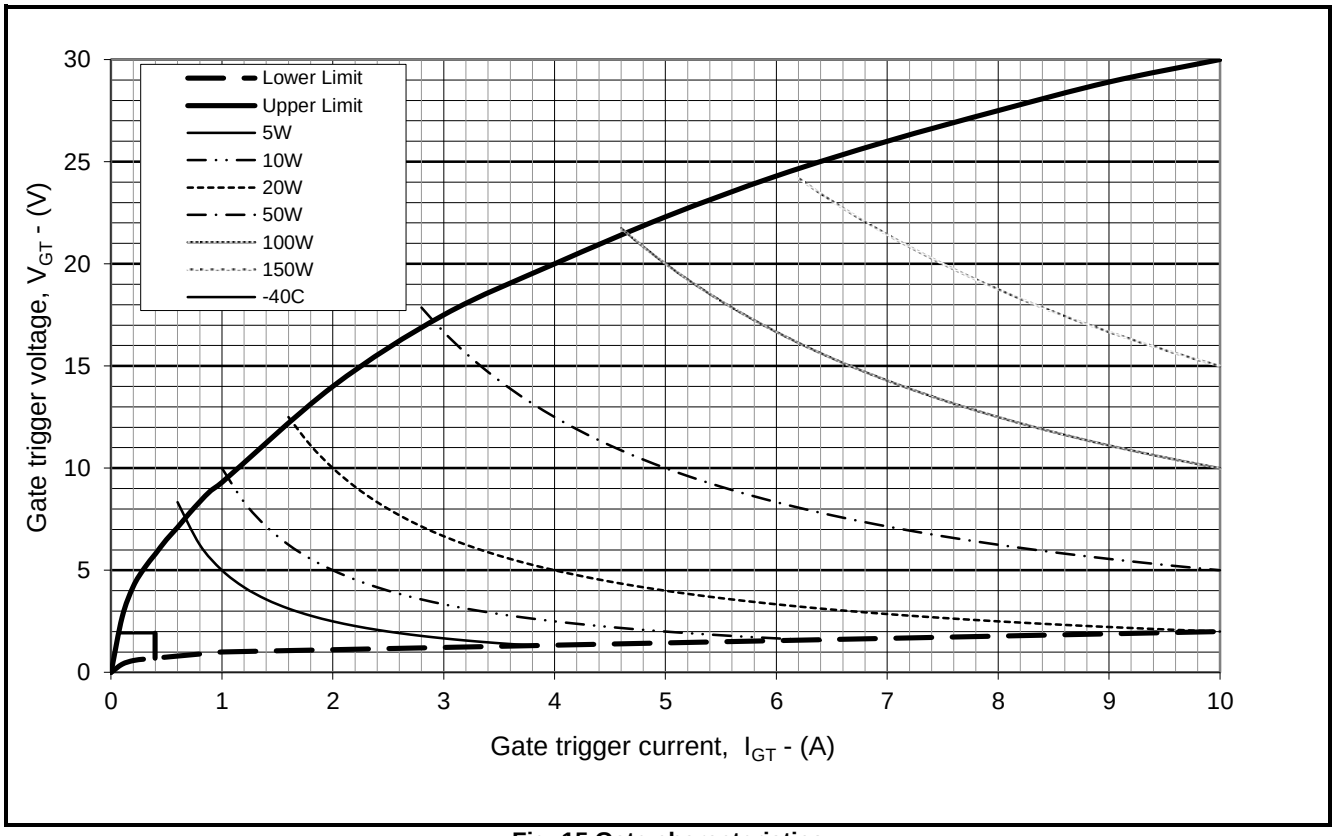
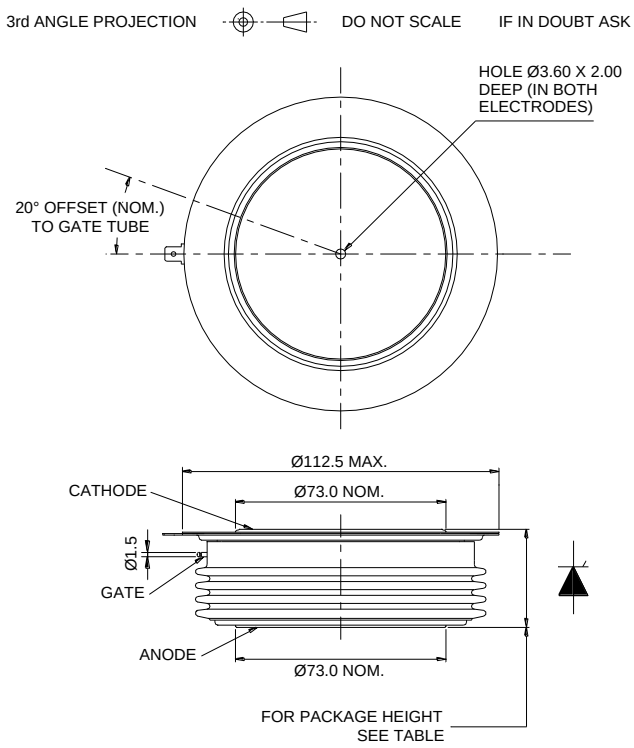


Fig. 15 Gate characteristics

PACKAGE DETAILS

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



Device	Maximum Thickness (mm)	Minimum Thickness (mm)
DCR1474SY18	35.045	34.395
DCR1475SY28	35.12	34.47
DCR1476SY42	35.35	34.7
DCR1478SY48	35.47	34.82
DCR1574SY28	35.12	34.47
DCR1575SY42	35.35	34.7
DCR1576SY52	35.47	34.82
DCR3910Y22	35.045	34.395
DCR3650Y28	35.12	34.47
DCR2930Y42	**35.35**	**34.7**
DCR2630Y52	35.47	34.82
DCR2220Y65	35.73	35.08
DCR1840Y85	36.09	35.44

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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