DCR5790M28

Phase Control Thyristor

DS6121-1 August 2013 (LN30853)

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
DCR5790M28 DCR5790M26 DCR5790M24 DCR5790M22	2800 2600 2400 2200	T_{vj} = -40°C to 125°C, I_{DRM} = I_{RRM} = 400mA, 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:

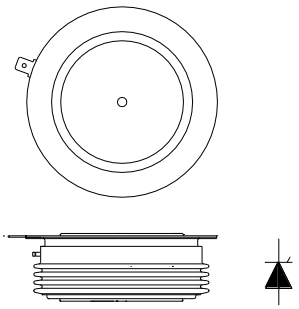
DCR5790M28

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}	**2800 V**
$I_{T(AV)}$	**5790 A**
I_{TSM}	**75000 A**
dV/dt*	**1000 V/µs**
dI/dt	**250 A/µs**

*** Higher dV/dt selections available**



Outline type code: M

(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	5790	A
$I_{T(RMS)}$	RMS value	-	9090	A
I_T	Continuous (direct) on-state current	-	8310	A

SURGE RATINGS

Symbol	Parameter	Test Conditions	Max.	Units
I_{TSM}	Surge (non-repetitive) on-state current	10ms half sine, T_{case} = 125°C	75.0	kA
I^2t	I^2t for fusing	V_R = 0	28.10	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	-	0.005	°C/W
$R_{th(c-h)}$	Thermal resistance – case to heatsink	Double side cooled	DC	-	0.0015	°C/W
T_{vj}	Virtual junction temperature	Blocking V_{DRM} / V_{RRM}		-40	125	°C
T_{stg}	Storage temperature range			-40	140	°C
F_m	Clamping force			80	100	kN

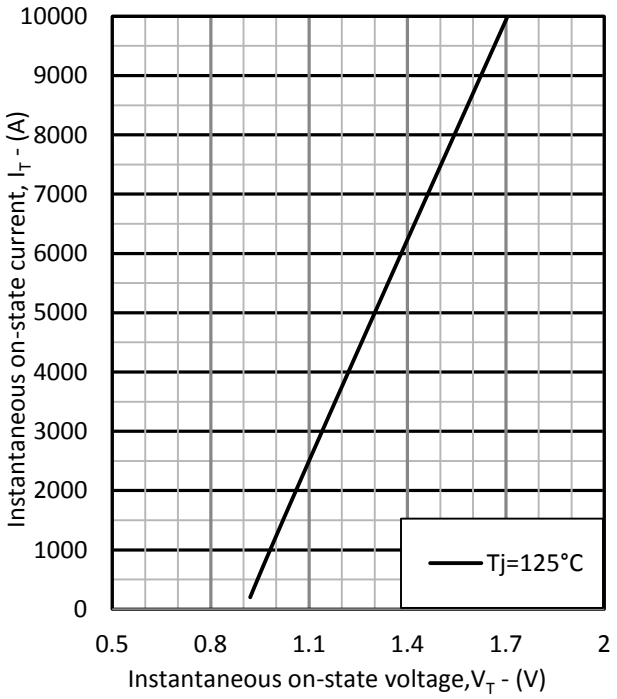
DYNAMIC CHARACTERISTICS

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		-	400	mA
dV/dt	Max. linear rate of rise of off-state voltage	To 67% V_{DRM}, T_j = 125°C, gate open		1000	-	V/µs
dI/dt	Rate of rise of on-state current	From 67% V_{DRM} to 4000A	Repetitive 50Hz	-	250	A/µs
		Gate source 30V, 10Ω, t_r < 0.5µs, T_j = 125°C	Non-repetitive	-	1000	A/µs
V_T	On-state voltage	I_T = 3000A, T_{case} = 125°C			1.14	V
$V_{T(TO)}$	Threshold voltage – Low level	T_{case} = 125°C		-	0.90	V
r_T	On-state slope resistance – Low level	T_{case} = 125°C		-	0.080	mΩ
t_{gd}	Delay time	V_D = 67% V_{DRM}, gate source 30V, 10Ω t_r = 0.5µs, T_j = 25°C		-	3.0	µs
t_q	Turn-off time	T_j = 125°C, V_R = 100V, dI/dt = 1.5A/µs, dV_{DR}/dt = 20V/µs linear to 67% V_{DRM}		-	600	µs
Q_S	Stored charge	I_T = 2000A, tp = 1000us, T_j = 125°C, dI/dt =1.5A/µs,		-	4000	µC
I_{RR}	Reverse recovery current			-	100	A
I_L	Latching current	T_j = 25°C,		-	1	A
I_H	Holding current	T_j = 25°C,		-	200	mA

GATE TRIGGER CHARACTERISTICS AND RATINGS

Symbol	Parameter	Test Conditions	Max.	Units
V_{GT}	Gate trigger voltage	V_{DRM} = 5V, T_{case} = 25°C	3	V
V_{GD}	Gate non-trigger voltage	At 40% $V_{DRM,}$ T_{case} = 125°C	TBD	V
I_{GT}	Gate trigger current	V_{DRM} = 5V, T_{case} = 25°C	300	mA
I_{GD}	Gate non-trigger current	At 40% $V_{DRM,}$ T_{case} = 125°C	TBD	mA

CURVES



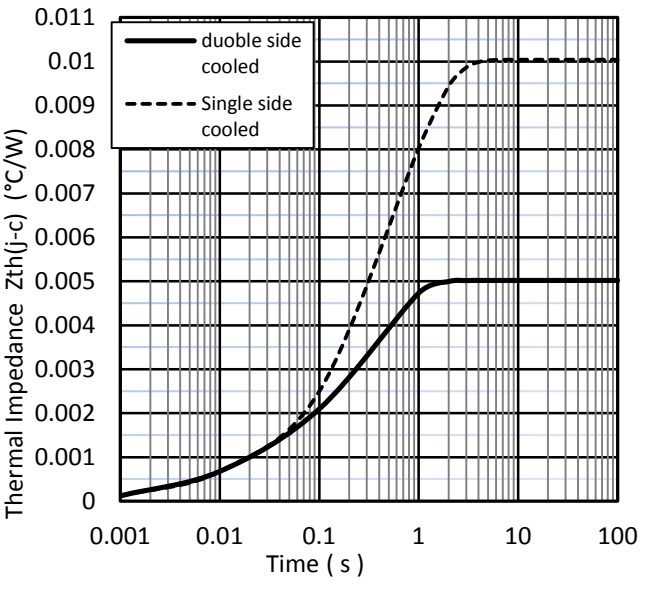
V_{TM} EQUATION

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

Where A = 0.906102
B = 0.000514155
C = 0.0000830504
D = -0.000360161

These values are valid for T_j = 125°C

Fig.2 Maximum &minimum on-state characteristics



$$R_{thjc}(t) = \sum_{i=1}^{n} R_{thi} \cdot \left(1 - e^{-\frac{t}{\tau_i}}\right)$$

i	τ_i (s)	R_{thi} (°C/kW)
1	0.4069	3.359
2	0.0854	0.956
3	0.0118	0.481
4	0.003	0.224

Fig.3 Maximum (limit) transient thermal impedance – junction to case (°C/W)

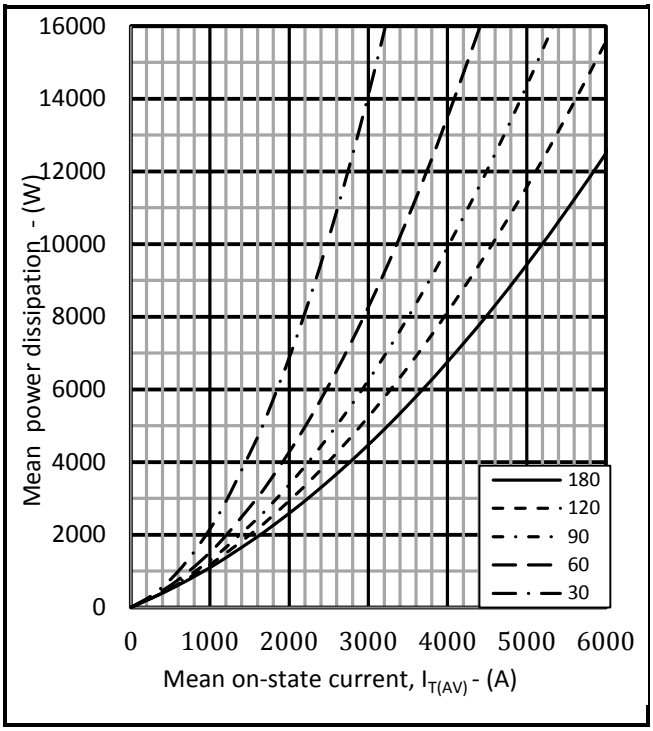


Fig.4 On-state power dissipation – sine wave

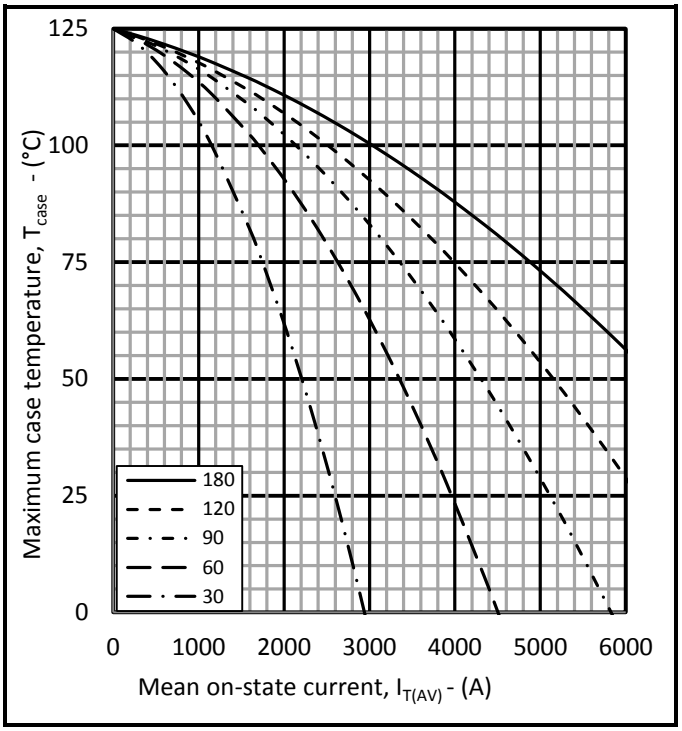


Fig.5 Maximum permissible case temperature, double side cooled – sine wave

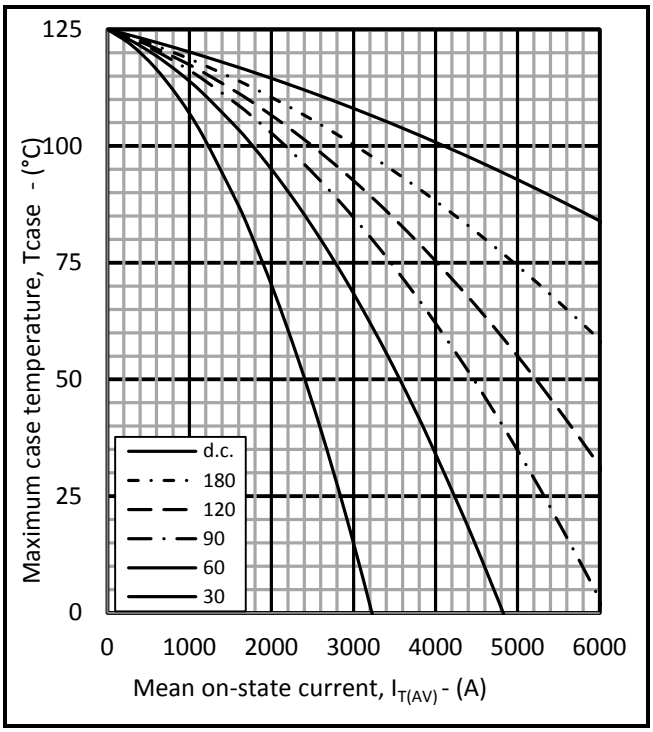


Fig.6 Maximum permissible case temperature, double side cooled – rectangular wave

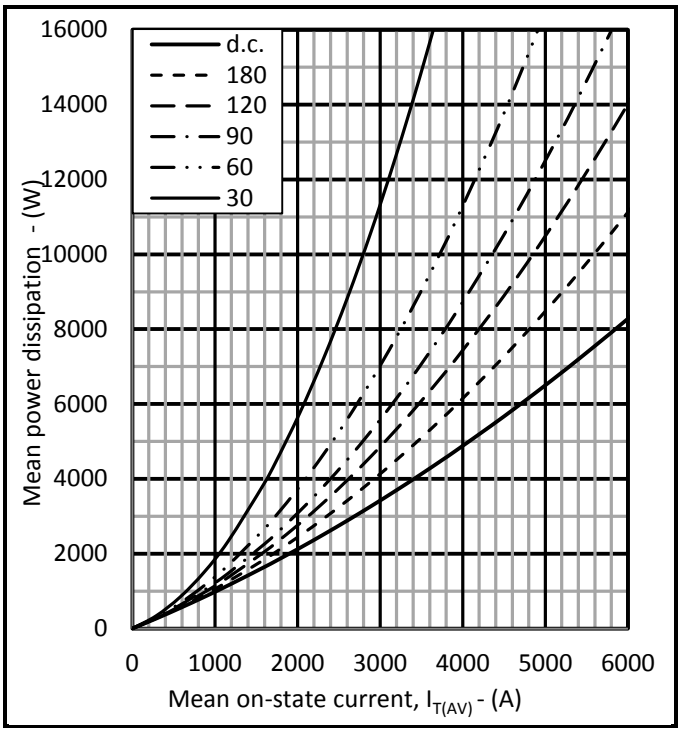


Fig.7 On-state power dissipation – rectangular wave

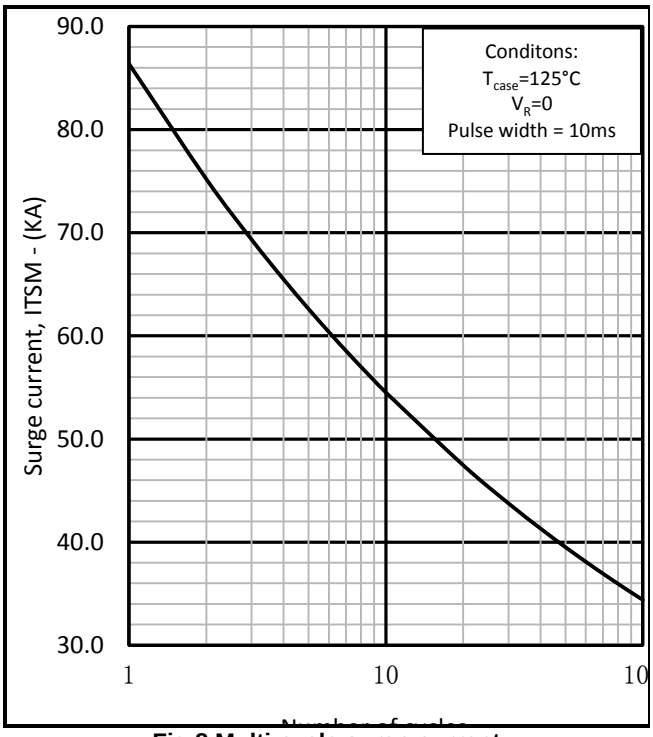


Fig.8 Multi-cycle surge current

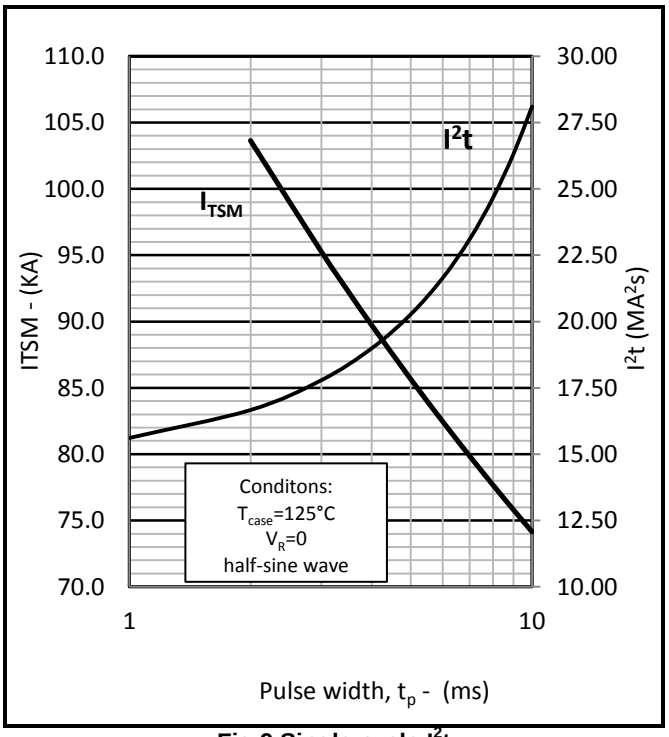


Fig.9 Single-cycle I^2t

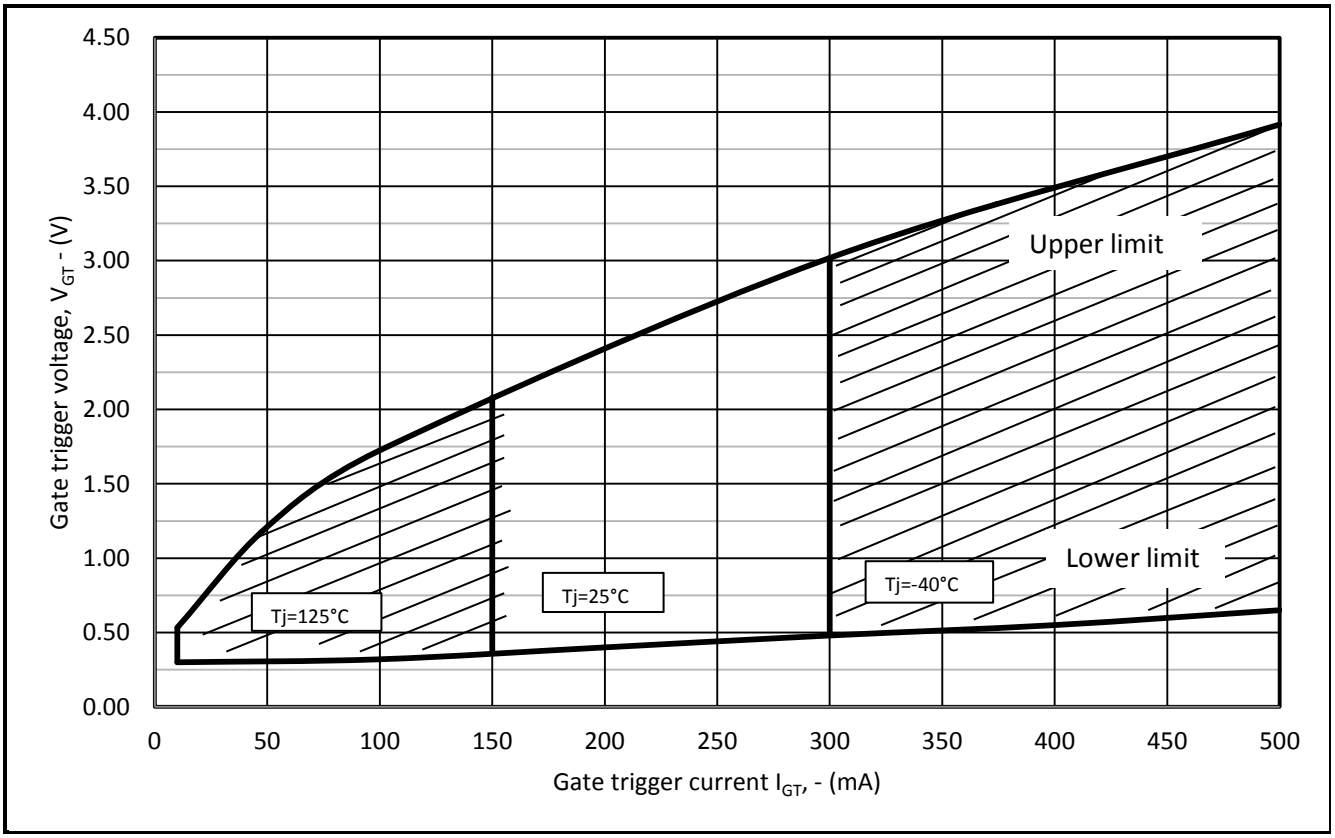
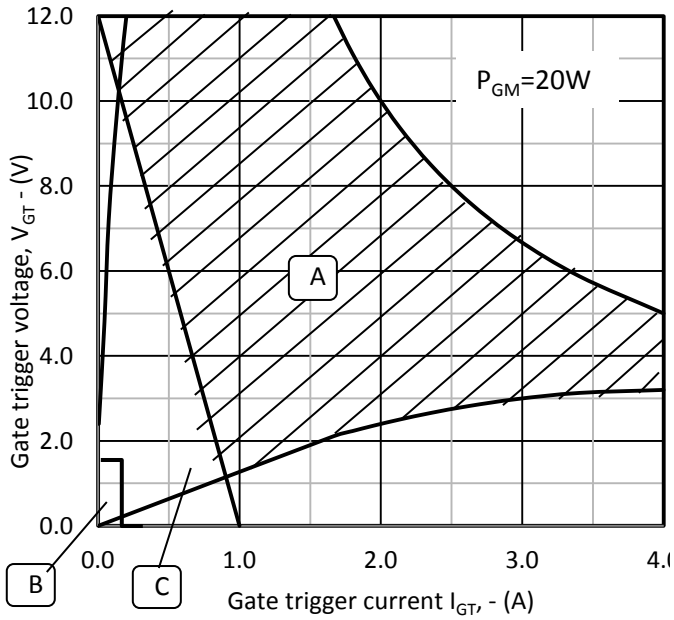


Fig.10 Gate characteristics

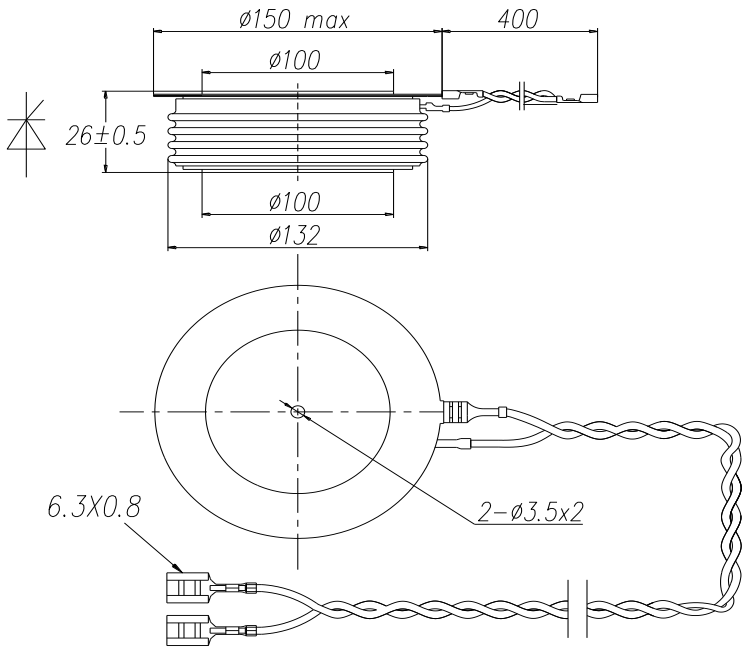


A is Recommended Triggering Area.
B is Unreliable Triggering Area.
C is Recommended Gate Load Line.

Fig.11 Gate characteristics

PACKAGE DETAILS

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



Package outline type code: M

Fig.12 Package outline

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