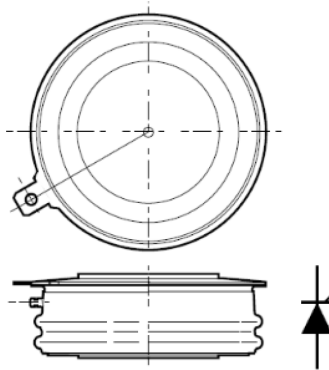


# Phase Control Thyristor

**multicomp** PRO

**RoHS  
Compliant**



Outline type code: E

## Features

- Double Side Cooling
- High Surge Capability

## Applications

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

## Key Parameters

Part Number	Repetitive Peak Voltages $V_{DRM}$ and $V_{RRM}$ V	$I_{T(AV)}$	$I_{TSM}$	$dV/dt^*$	$dI/dt$	Conditions
MPPCT720E180	1800	720 A	8300 A	1000 V/ $\mu$ s	200 A/ $\mu$ s	$T_{vj} = -40^{\circ}\text{C}$ to $125^{\circ}\text{C}$ , $I_{DRM} = I_{RRM} = 30\text{mA}$ , $V_{DRM}, V_{RRM} t_p = 10\text{ms}$ , $V_{DSM} \& V_{RSM} =$ $V_{DRM} \& V_{RRM} + 100\text{V}$ respectively

\* Higher  $dV/dt$  selections are available

## Current Ratings

$T_{case} = 60^{\circ}\text{C}$  unless stated otherwise

Symbol	Parameter	Test Conditions	Max.	Units
$I_{T(AV)}$	Mean on-state current	Half wave resistive load	720	A
$I_{T(RMS)}$	RMS value	-	1230	
$I_T$	Continuous (direct) on-state current	-	970	

## Surge Ratings

Symbol	Parameter	Test Conditions	Max.	Units
$I_{TSM}$	Surge (non-repetitive) on-state current	10ms half sine, $T_{case} = 125^{\circ}\text{C}$ $V_R = 0$	8.3	kA
$I^2t$	$I^2t$ for fusing		0.344	$\text{MA}^2\text{s}$

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## Thermal and Mechanical Ratings

Symbol	Parameter	Test Conditions	Min.	Max.	Units
$R_{th(j-c)}$	Thermal resistance – junction to case	Double side cooled DC	-	0.041	°C/W
$R_{th(c-h)}$	Thermal resistance – case to heatsink			0.01	
$T_{vj}$	Virtual junction temperature	Blocking $V_{DRM} / V_{RRM}$		125	°C
$T_{stg}$	Storage temperature range		-40	140	
$F_m$	Clamping force		4	6	kN

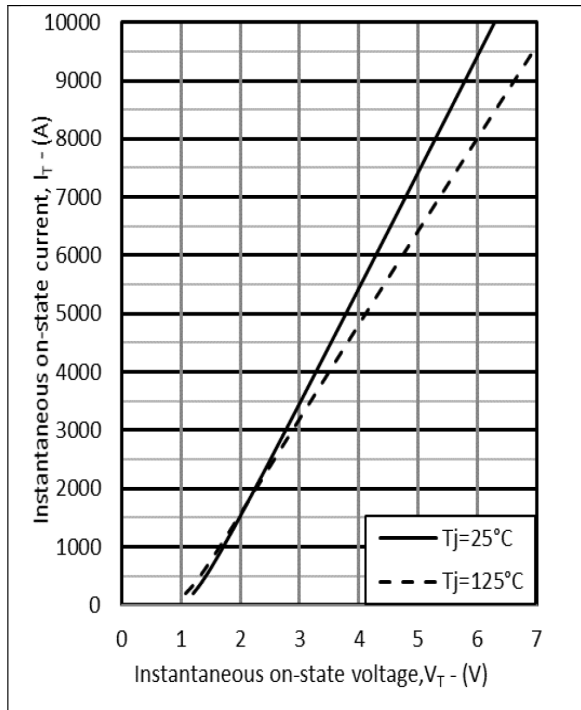
## Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min.	Max.	Units
$I_{RRM}/I_{DRM}$	Peak reverse and off-state current	At $V_{RRM}/V_{DRM}$ , $T_{case} = 125^\circ\text{C}$		30	mA
$dV/dt$	Max. linear rate of rise of off-state voltage	To 67% $V_{DRM}$ , $T_j = 125^\circ\text{C}$ , gate open		1000	V/ $\mu\text{s}$
$di/dt$	Rate of rise of on-state current	From 67% $V_{DRM}$ to 1000A	-	-	A/ $\mu\text{s}$
		Gate source 30V, 10 $\Omega$ , $t_r < 0.5\mu\text{s}$ , $T_j = 125^\circ\text{C}$			
		Repetitive 50Hz			200
		Non-repetitive			1000
$V_T$	On-state voltage	$I_T = 1500\text{A}$ , $T_{case} = 125^\circ\text{C}$		1.97	V
$V_{T(TO)}$	Threshold voltage	$T_{case} = 125^\circ\text{C}$		1.09	
$r_T$	On-state slope resistance	$T_{case} = 125^\circ\text{C}$		0.587	m $\Omega$
$t_{gd}$	Delay time	$V_D = 67\% V_{DRM}$ , gate source 30V, 10 $\Omega$ $t_r = 0.5\mu\text{s}$ , $T_j = 25^\circ\text{C}$		3	$\mu\text{s}$
$t_q$	Turn-off time	$T_j = 125^\circ\text{C}$ , $V_R = 100\text{V}$ , $di/dt = 10\text{A}/\mu\text{s}$ , $dV_{DR}/dt = 20\text{V}/\mu\text{s}$ linear to 67% $V_{DRM}$		150	
$Q_s$	Stored charge	$I_T = 1000\text{A}$ , $T_j = 125^\circ\text{C}$ , $di/dt = 10\text{A}/\mu\text{s}$ , $t_p = 1000\mu\text{s}$		1500	$\mu\text{C}$
$I_{RR}$	Reverse recovery current			110	A
$I_L$	Latching current	$T_j = 25^\circ\text{C}$ ,		1	
$I_H$	Holding current	$T_j = 25^\circ\text{C}$ ,		200	mA

## Gate Trigger Characteristics and Ratings

Symbol	Parameter	Test Conditions	Max.	Units
$V_{GT}$	Gate trigger voltage	$V_{DRM} = 5\text{V}$ , $T_{case} = 25^\circ\text{C}$	3	V
$V_{GD}$	Gate non-trigger voltage	At 40% $V_{DRM}$ , $T_{case} = 125^\circ\text{C}$	0.3	
$I_{GT}$	Gate trigger current	$V_{DRM} = 5\text{V}$ , $T_{case} = 25^\circ\text{C}$	300	mA
$I_{GD}$	Gate non-trigger current	At 40% $V_{DRM}$ , $T_{case} = 125^\circ\text{C}$	20	

## Performance Curves



### $V_{TM}$ EQUATION

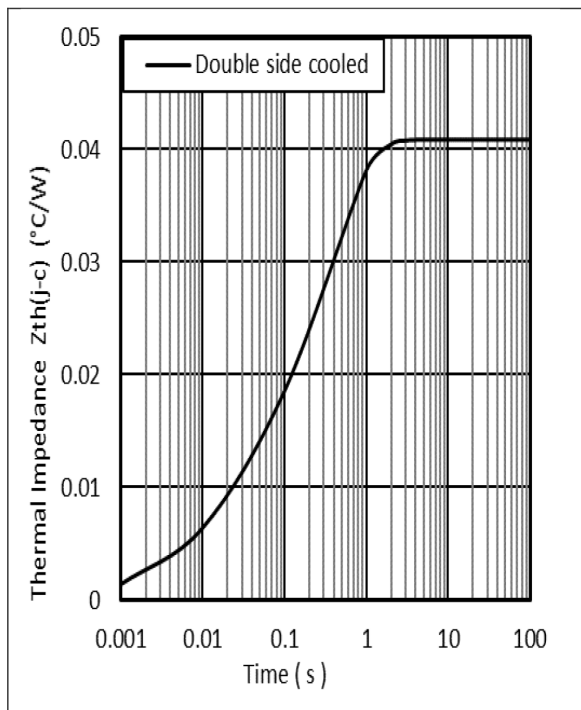
$$V_{TM} = A + B \cdot \ln(I_T) + C \cdot I_T + D \cdot \sqrt{I_T}$$

Where

- A = 0.213846
- B = 0.177258
- C = 0.000692251
- D = -0.0152068

These values are valid for  $T_j = 125^\circ\text{C}$

Fig. 2 Maximum on state characteristics



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

i	$\tau_i$ (s)	$R_{thi}$ (°C/kW)
1	0.5391689	16.5
2	0.1940576	14.19235
3	0.0219527	7.412673
4	0.0021962	2.759765

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

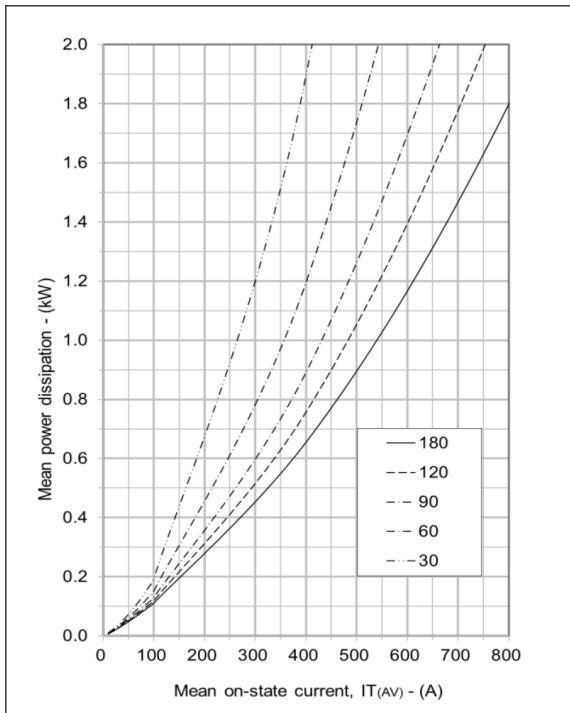


Fig. 4 On-state power dissipation - sine wave

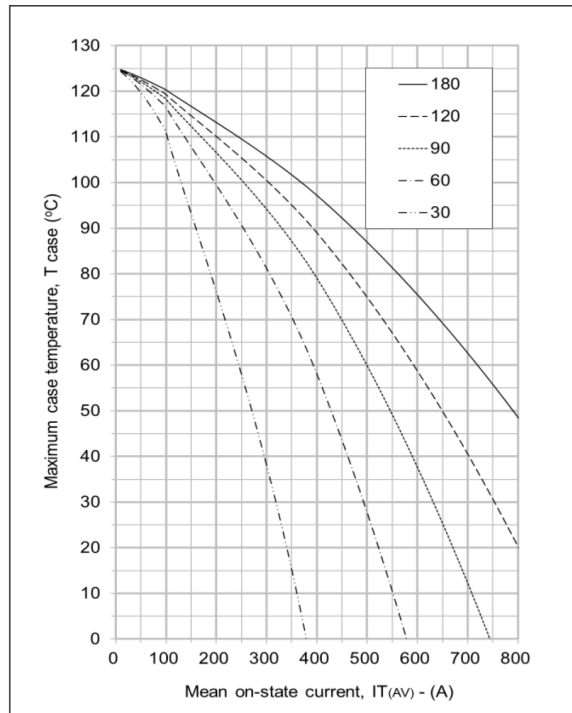


Fig. 5 Maximum permissible case temperature, double side cooled - sine wave

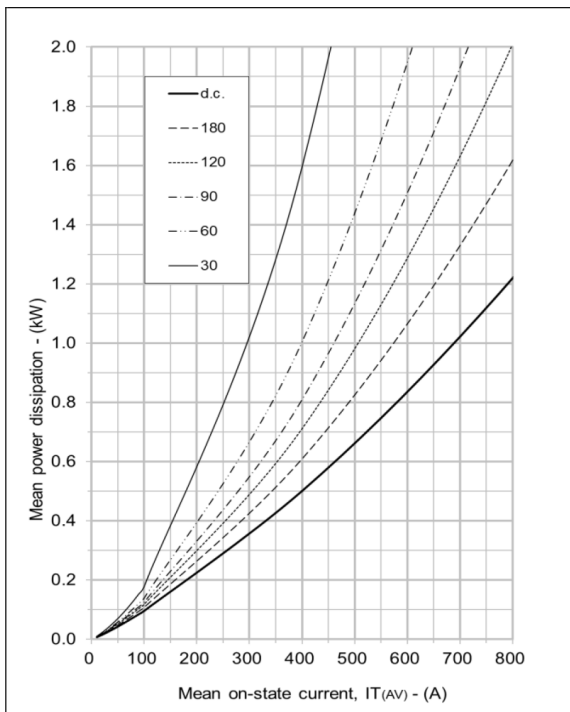


Fig. 6 On-state power dissipation - rectangular wave

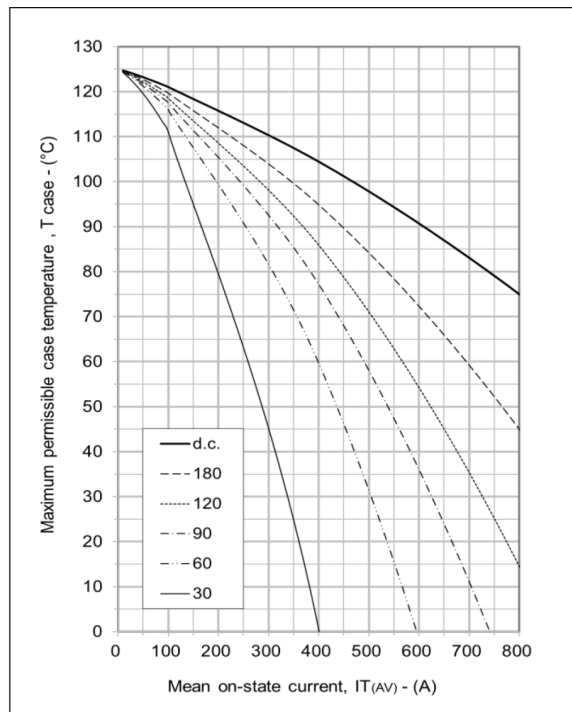


Fig. 7 Maximum permissible case temperature, double side cooled - rectangular wave

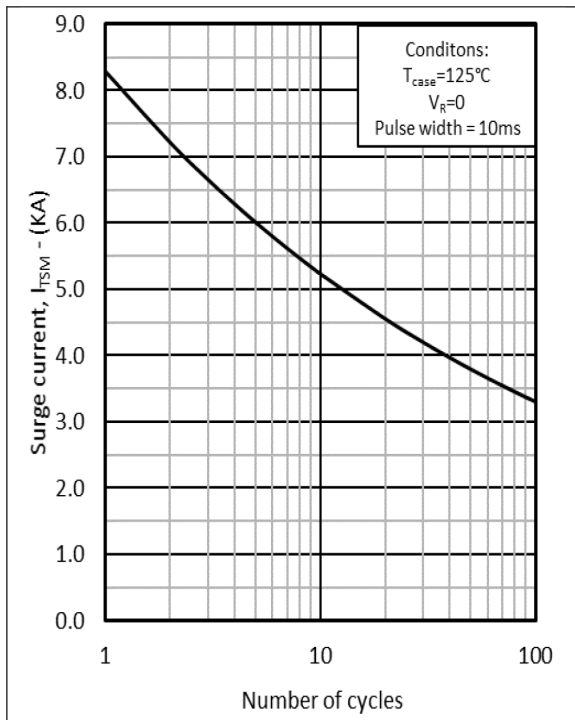


Fig. 8 Multi-cycle surge current

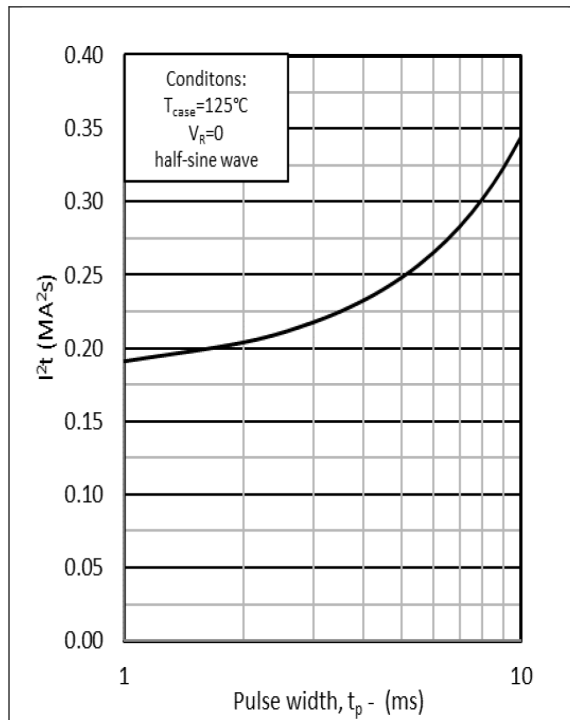


Fig. 9 Single-cycle  $I^2t$

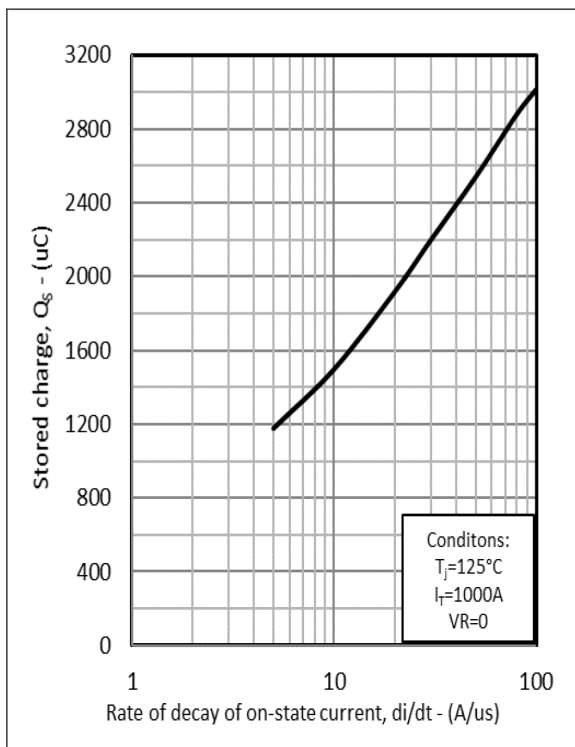


Fig. 10 Reverse recovery charge

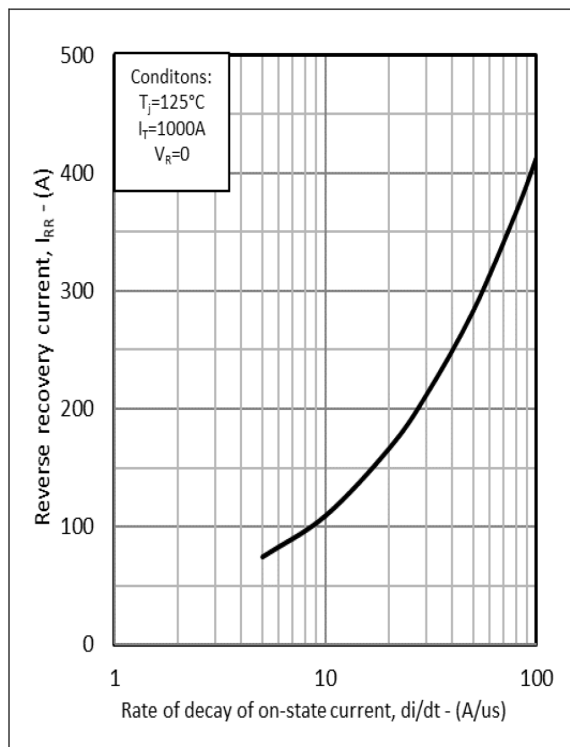


Fig. 11 Reverse recovery current

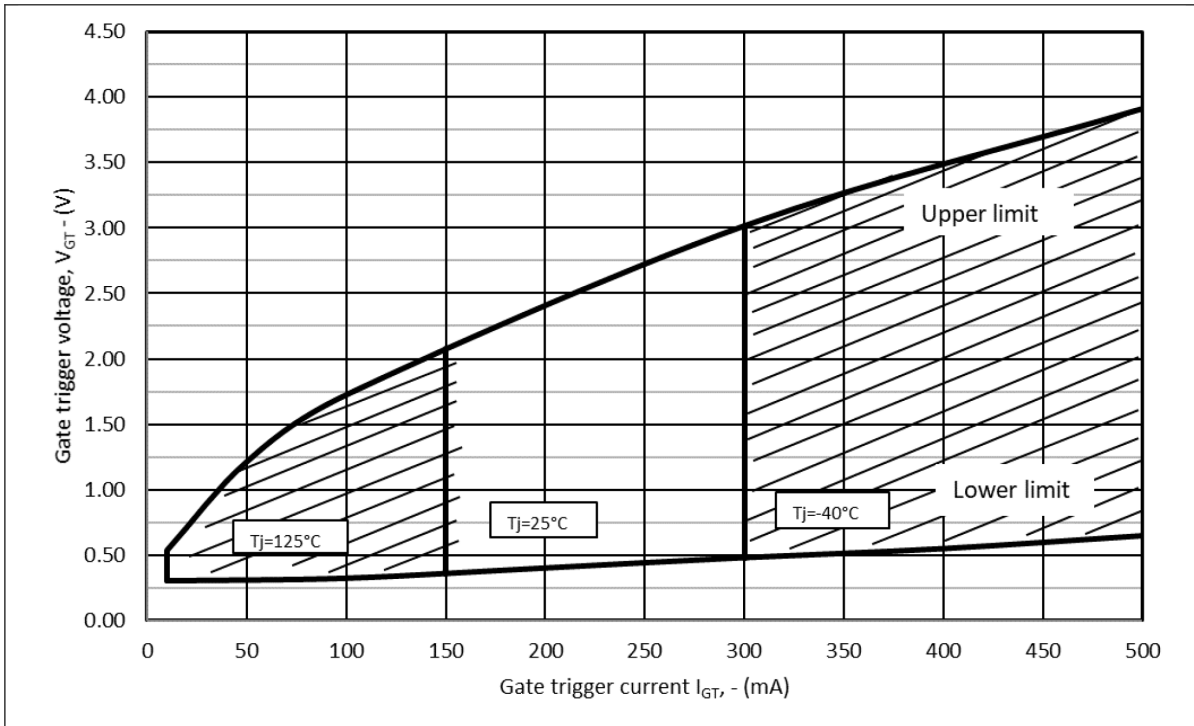


Fig. 12 Gate characteristics

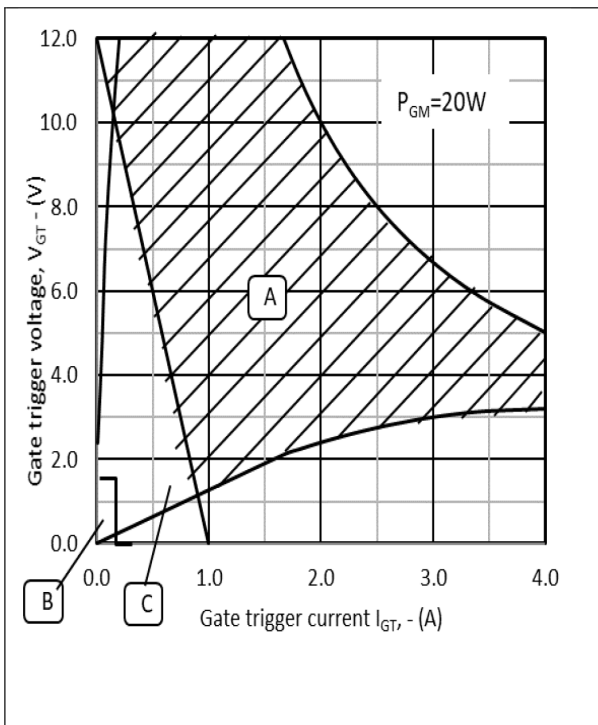
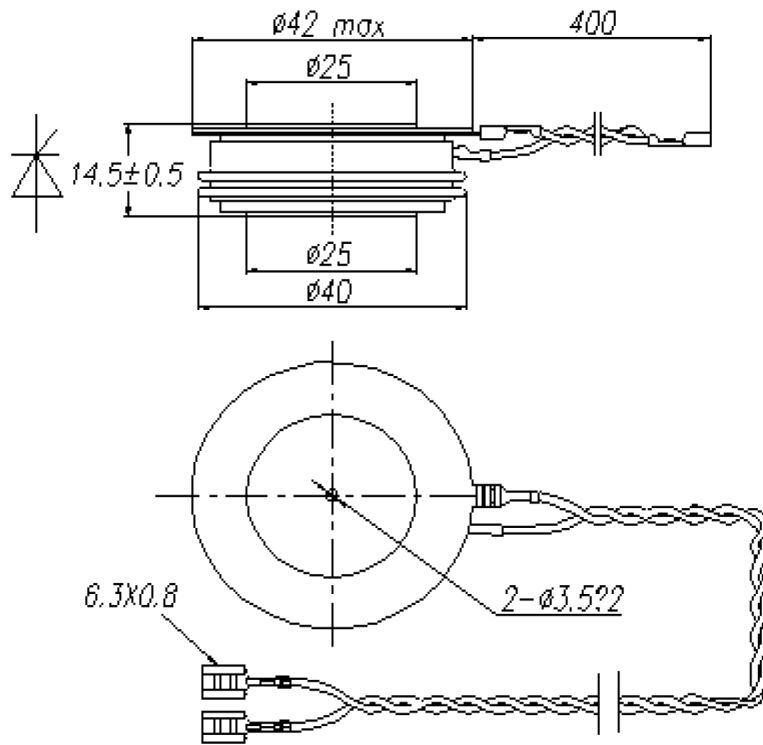


Fig. 13 Gate characteristics

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

# Phase Control Thyristor

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Package outline type code: E

## Part Number Table

Description	Part Number
Phase Control Thyristor Module, 1800V, 720A, E Case Code	MPPCT720E180

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