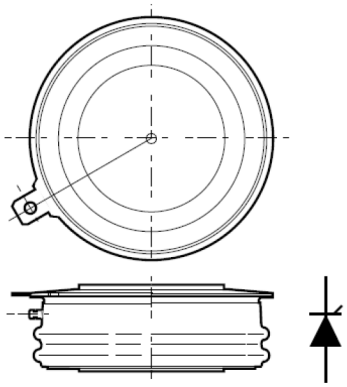
Phase Control Thyristor

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**
MPPCT590E220 MPPCT590E240	2200 2400	590 A	7800 A	1000 V/µs	200 A/µs	Tvj = -40°C to 125°C, I_{DRM} = I_{RRM} = 30mA, V_{DRM}, V_{RRM} t_p = 10ms, V_{DSM} & V_{RSM} = V_{DRM} & V_{RRM} +100V respectively

*** Higher dV/dt selections available**

Current Ratings

T_{case} = 60°C unless stated otherwise

Symbol	Parameter	Test Conditions	Max.	Units
$I_{T(AV)}$	Mean on-state current	Half wave resistive load	590	A
$I_{T(RMS)}$	RMS value	-	930	
I_T	Continuous (direct) on-state current	-	830	

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	7.8	kA
I^2t	I^2t for fusing		0.304	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	-	0.041	°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

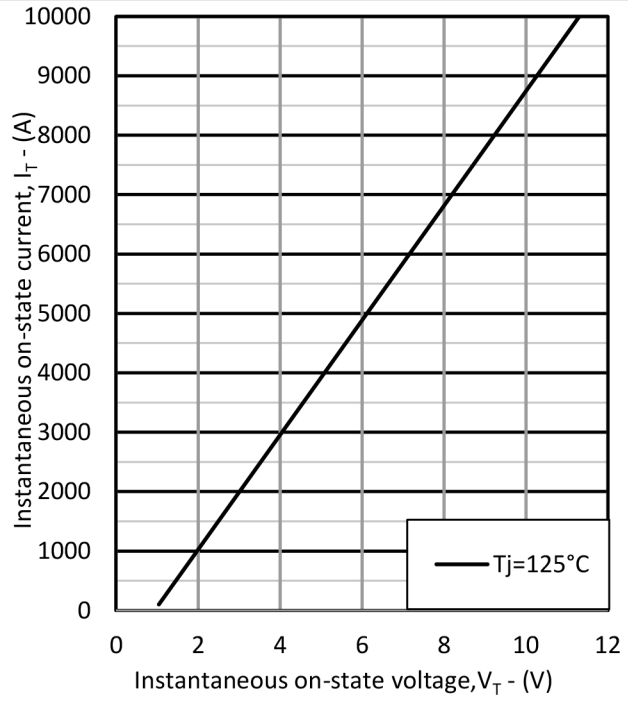
Dynamic Characteristics

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°C		-	30	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 1000A Gate source 30V, 10Ω, t_r < 0.5µs, T_j = 125°C	Repetitive 50Hz	-	200	A/µs
			Non-repetitive		1000	
V_T	On-state voltage	I_T = 1500A, T_{case} = 125°C			2.49	V
$V_{T(TO)}$	Threshold voltage	T_{case} = 125°C			0.94	
r_T	On-state slope resistance	T_{case} = 125°C			1.036	mΩ
t_{gd}	Delay time	V_D = 67% V_{DRM}, gate source 30V, 10Ω t_r = 0.5µs, T_j = 25°C			3	µs
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	0.3	
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	20	

Performance Curves



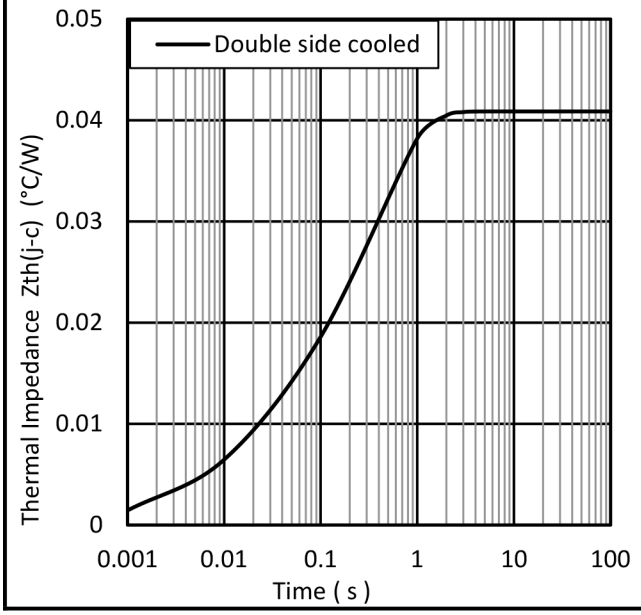
V_{TM} EQUATION

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

Where A = 1.50464
B =-0.132963
C = 0.000997126
D =0.0110102

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	0.5391689	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)

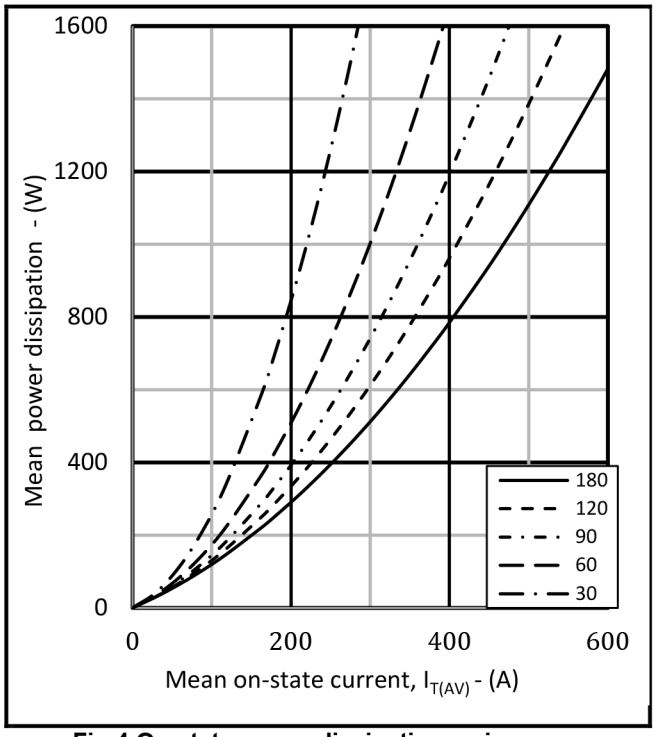


Fig.4 On-state power dissipation – sine wave

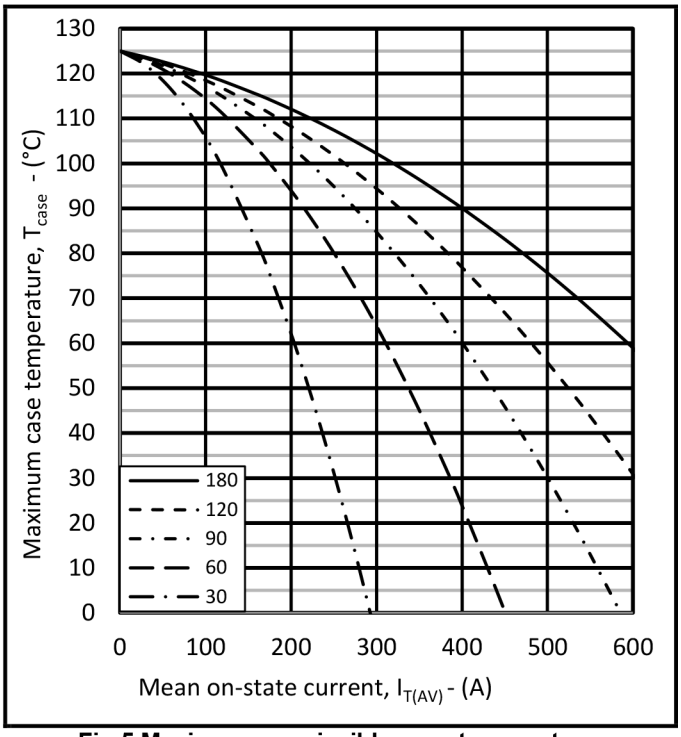


Fig.5 Maximum permissible case temperature, double side cooled – sine wave

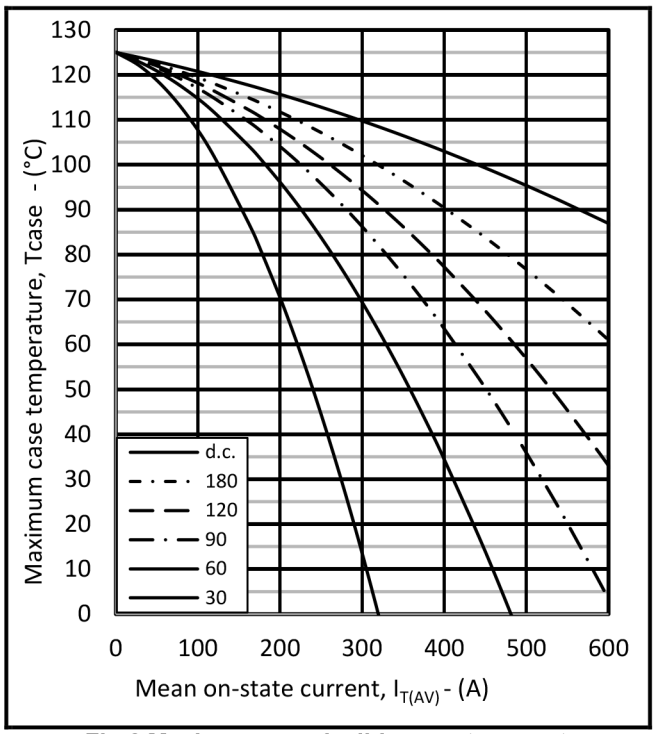


Fig.6 Maximum permissible case temperature, double side cooled – rectangular wave

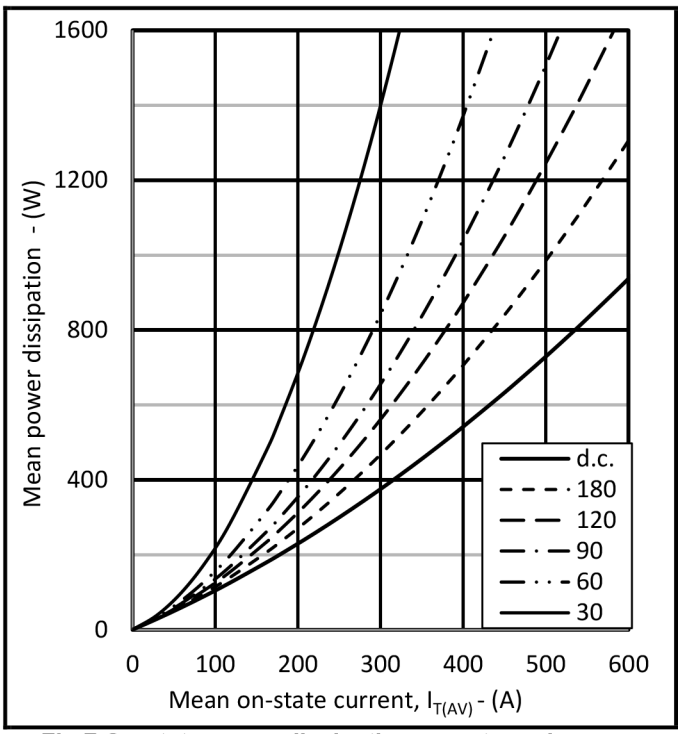


Fig.7 On-state power dissipation – rectangular wave

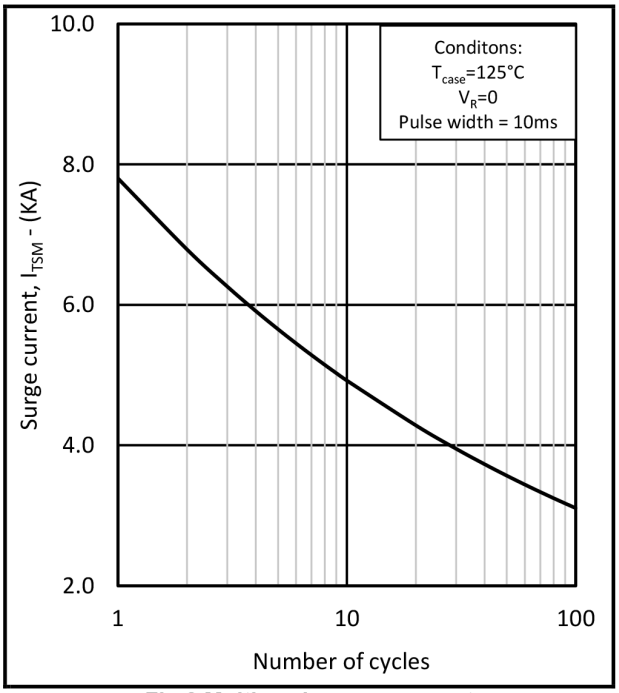


Fig.8 Multi-cycle surge current

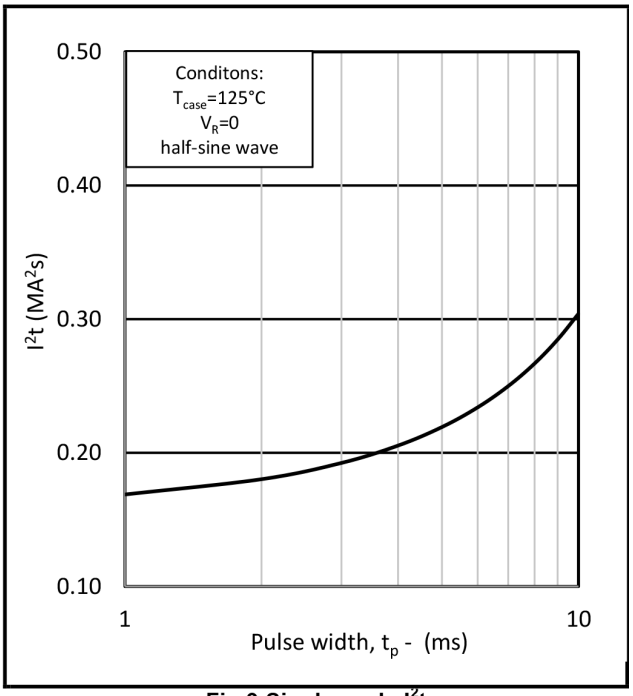


Fig.9 Single-cycle I^2t

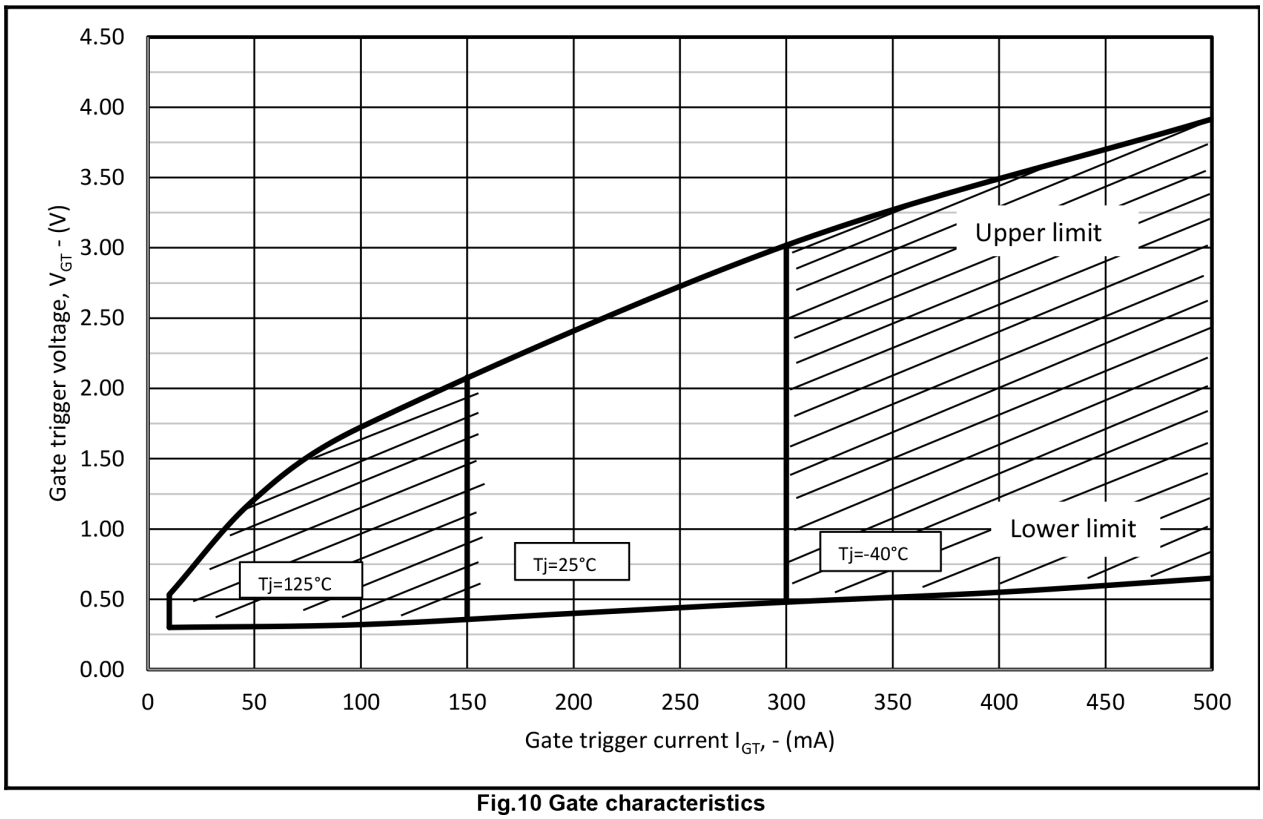


Fig.10 Gate characteristics

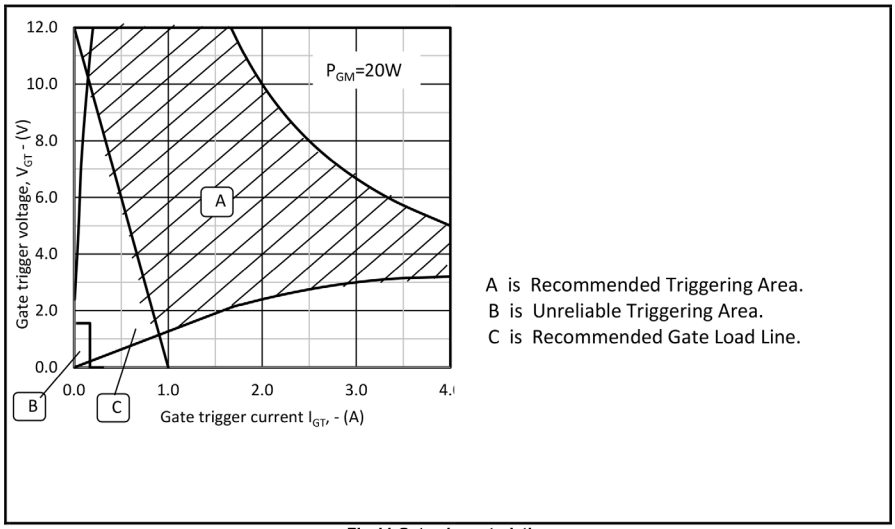
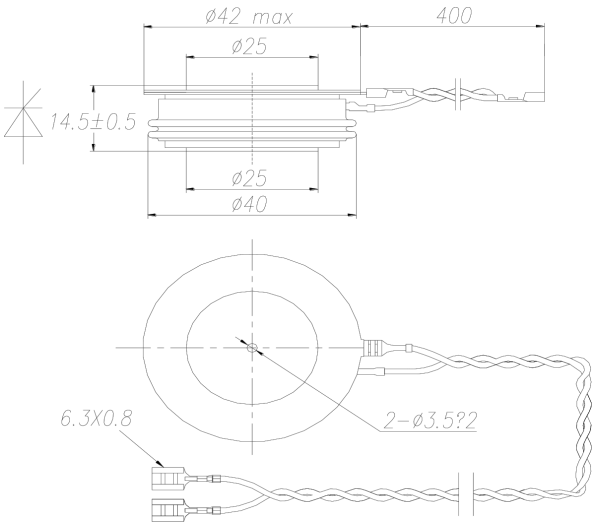


Fig.11 Gate characteristics



Part Number Table

Description	Part Number
Phase Control Thyristor Module, 2200V, 590A, E Case Code	MPPCT590E220
Phase Control Thyristor Module, 2400V, 590A, E Case Code	MPPCT590E240