中国中车 CRRC

TMTO 700

Ver：2021c

Thyristor Modules

Key Parameters

V_{RRM}	**1200**	**V**
$I_{T(AV)}$	**700**	**A**
I_{TSM}	**21**	**kA**
V_{TO}	**0.85**	**V**
r_T	**0.22**	**mΩ**

Applications

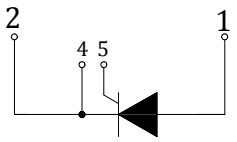
- Various rectifiers
- DC supply for PWM inverter
- Industry converter

- 3000 V_{RMS} isolating voltage with baseplate
- High power capability
- Industrial standard package

Voltage Ratings

Module Type	V_{DRM}/V_{RRM}(V)	Test Conditions
TMTO 700	1200	Tvj = 25，130 °C $I_{DRM} = I_{RRM}$ = 80 mA $V_{DM} = V_{DRM}$ $V_{RM} = V_{RRM}$ t_p = 10 ms $V_{DSM} = V_{DRM}$ $V_{RSM} = V_{RRM}$ + 100

TO



Thermal & Mechanical Data

Symb.	Parameter	Test Conditions	Min	Type	Max	Unit
R_{thJC}	Thermal Resistance Junction to Case	sine.180°,per module DC operation ,per per module	-	-	0.056 0.054	°C / W
R_{thCH}	Thermal resistance case to heatsink	Mounting surface smooth flat and greased	-	-	0.02	°C / W
T_{vj}	Maximum junction operating temperature range		-40	-	130	°C
T_{stg}	Storage temperature		-40	-	125	°C
F	Busbar to module M10	Mounting torque ± 10 %	-	12	-	N·m
	Module to heatsink M6		-	5	-	N·m
W	Weight		-	900	-	g

Current Ratings

$I_{T(AV)}$	Mean on-state current	Half Sine Wave,T_C=82°C	-	-	700	A
$I_{T(RMS)}$	RMS on-state current	T_C=82°C	-	-	1099	A
I_{TSM}	Surge on-state current	t_p=10ms, Half Sine Wave, T_{vj}=130°C, V_R = 0	-	-	21.0	kA
I^2t	Limiting load integral	Sine Wave,t_p=10ms	-	-	221	10^4A^2s

Characteristics

Symb.	Parameter	Test Conditions	Min	Type	Max	Unit
V_{TM}	Peak on-state voltage	T_{vj} = 25 °C， I_{TM} = 1900 A	-	-	1.55	V
I_{DRM} I_{RRM}	Forward leakage current Reverse leakage current	T_{vj} = 25 °C，130 °C， V_{DRM}/V_{RRM}	-	-	80	mA
V_{isol}	Isolation voltage	a.c.; 50 Hz; r.m.s. ; t =1min	-	3000	-	V
		a.c.; 50 Hz; r.m.s. ; t =1S	-	3600	-	V
V_{TO}	Threshold voltage	T_{vj} = 130 °C	-	-	0.85	V
r_T	Slope resistance	T_{vj} = 130 °C	-	-	0.22	mΩ
I_H	Holding current	T_{vj} = 25 °C	-		200	mA
I_L	Latching current	T_{vj} = 25 °C	-	-	1000	mA

Dynamic Parameters

Symb.	Parameter	Test Conditions	Min	Type	Max	Unit
dv/dt	Critical rate of rise of off-state voltage	T_{vj} = 130 ℃， Exp. to 0.67 V_{DRM}	1000	-	-	V/μs
di/dt	Critical rate of rise of on-state current	T_{vj} = 130 °C， V_{DM} = 0.67 V_{DRM}， f = 50 Hz I_{TM} = 1000 A， I_{FG} = 2 A， t_r = 0.5 μs	-	-	250	A/μs
t_q	Turn-off time	T_{vj} = 130 °C， V_{DM} = 0.67 V_{DRM}， I_T = 1000 A dv/dt = 20 V /μs， V_R = 200 V， -di/dt = 10 A/μs	-	150	-	μs
Q_{rr}	Reverse Recovery Charge	T_{vj} = 130 °C， -di/dt = 10 A/μs， I_T = 1000 A， V_R = 200 V	-	1000	-	μC

Gate Parameters

Symb.	Parameter	Test Conditions	Min	Type	Max	Unit
I_{GT}	Gate trigger current	T_{vj} = 25 ℃	-	-	300	mA
V_{GT}	Gate trigger voltage	T_{vj} = 25 ℃	-	-	3	V
V_{GD}	Gate non-trigger voltage	T_{vj} = 130℃， V_D = 0.4V_{DRM}	0.3	-	-	V
V_{FGM}	Peak forward gate voltage		-	-	12	V
V_{RGM}	Peak reverse gate voltage		-	-	5	V
P_{GM}	Gate peak power losses		-	-	20	W
$P_{G(AV)}$	Gate average power losses		-	-	4	W

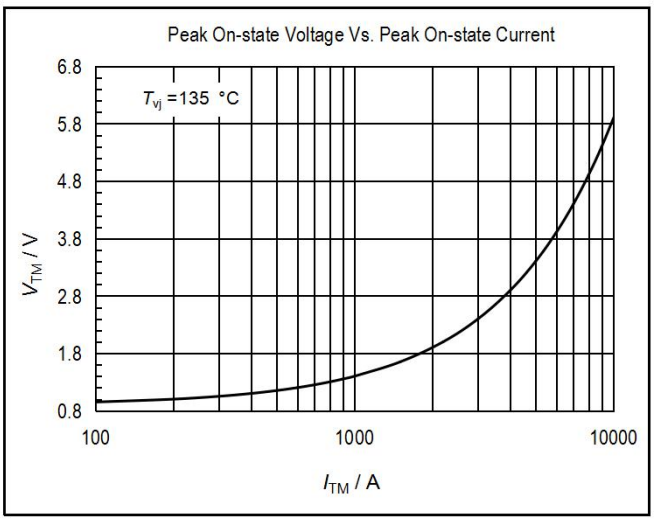


图1. 通态伏安特性曲线

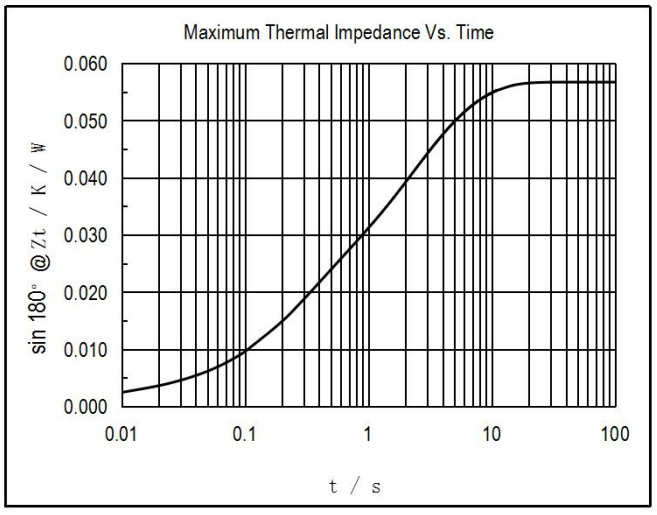


图2. 瞬态热阻抗曲线

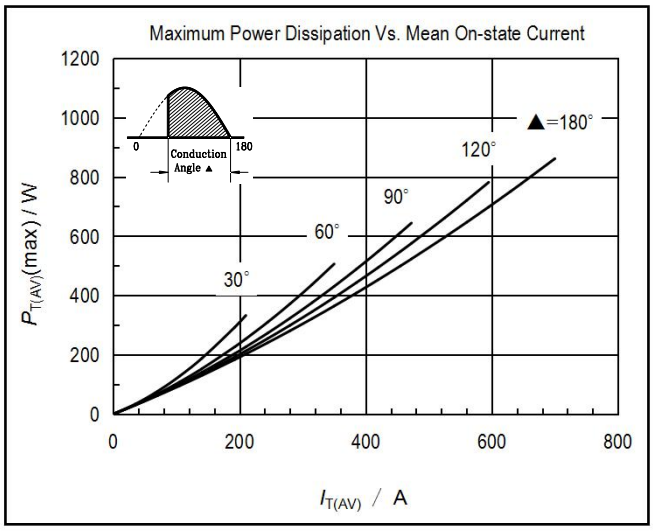


图3. 最大功耗与通态平均电流的关系曲线

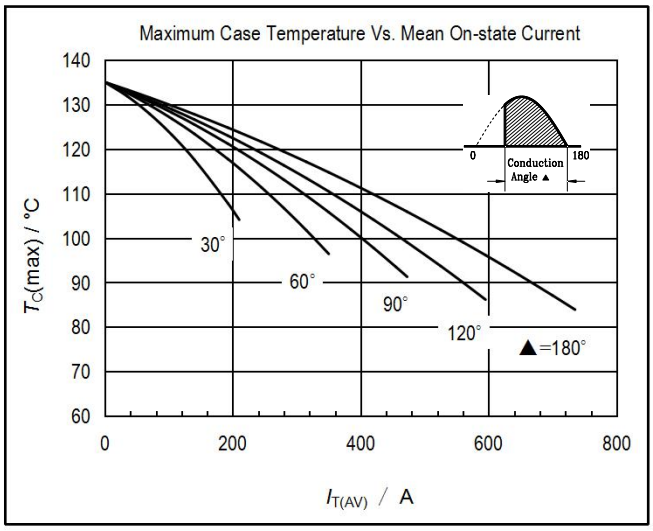


图4. 管壳温度与通态平均电流的关系曲线

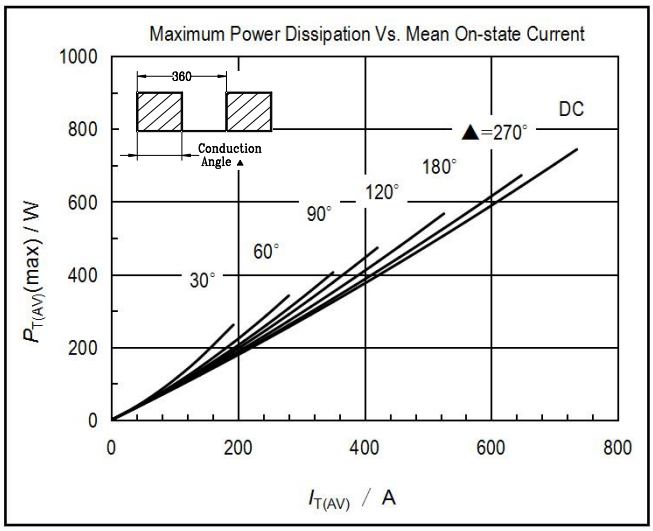


图5. 最大通态功耗与通态平均电流的关系曲线

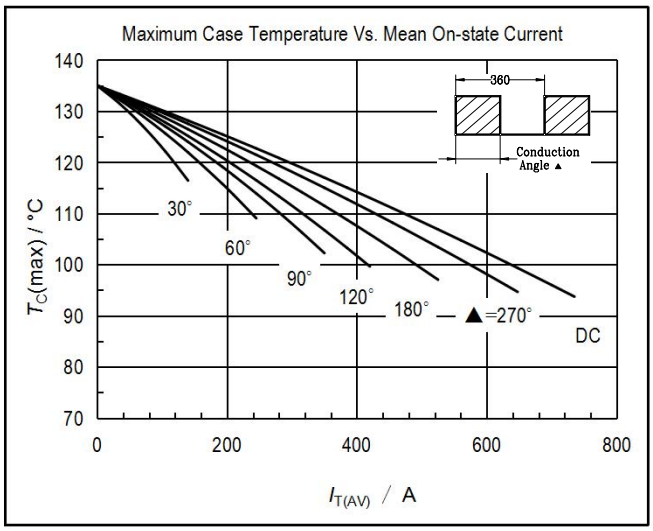


图6. 管壳温度与通态平均电流的关系曲线

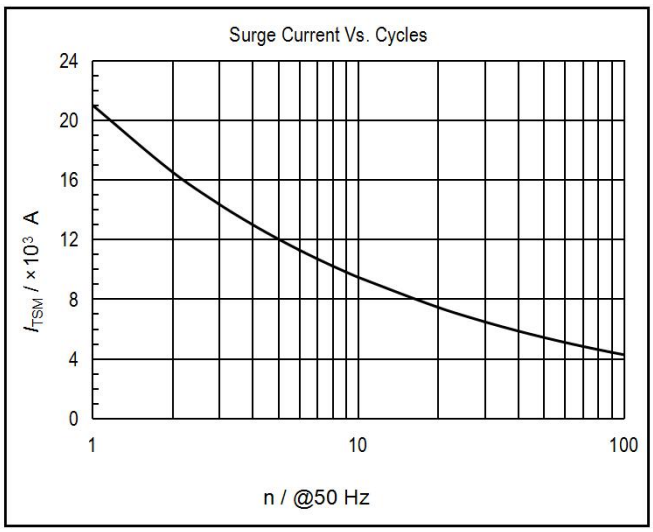


图7. 通态浪涌电流与周波数的关系曲线

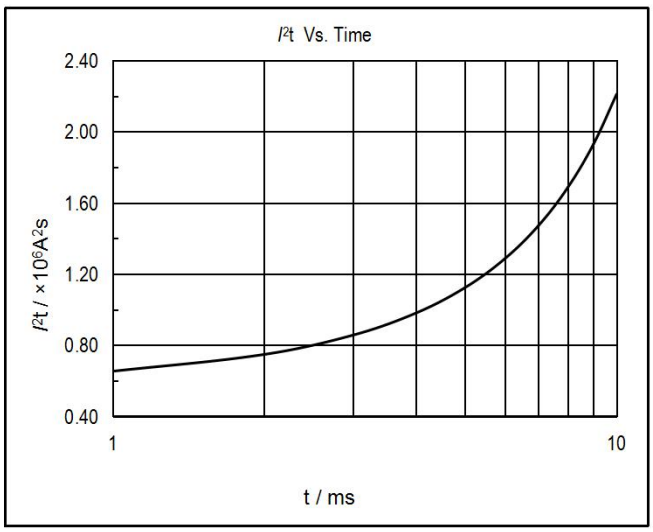


图8. I^2t 特 性 曲 线

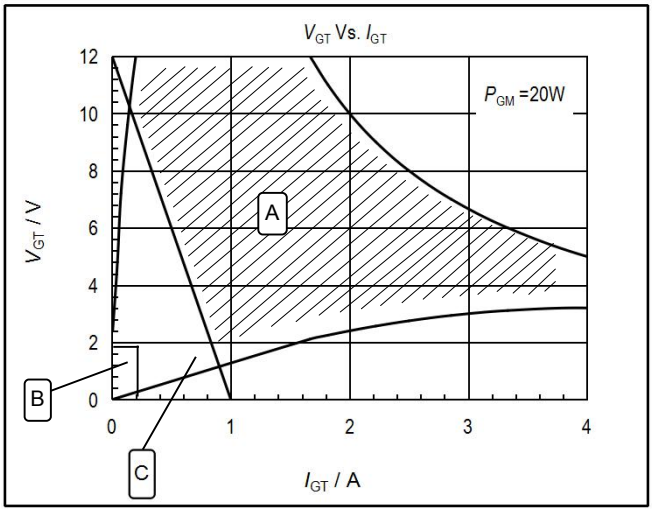


图9. 门极触发特性曲线

A为可靠触发区，
B为不可靠触发区。
C为建议采用的门极负载线。

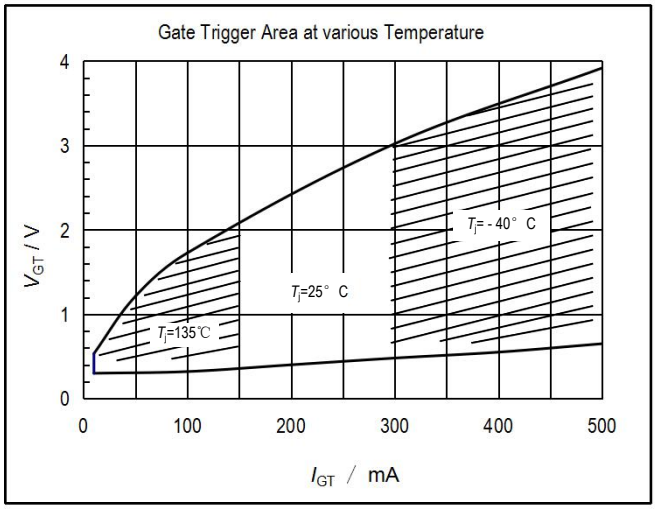


图10. 不同结温下的门极触发区

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

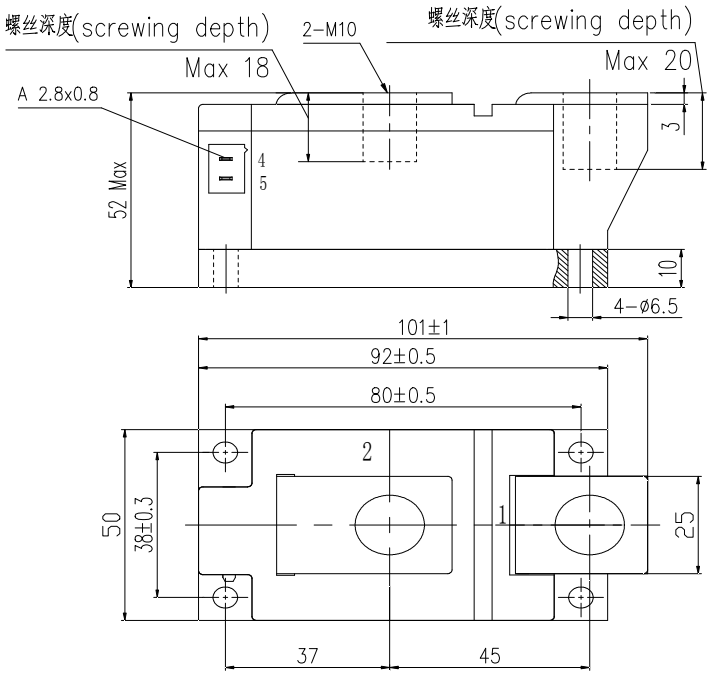


图11. 外形图（outline）

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