中国中车 CRRC

产品数据手册 Product Datasheet 版本 Ver 21.10

TFM3600E2SM17-D200

二极管模块 Diode Module

初版 Preliminary

关键参数 Key Parameters

V_{CES}		1700	V
V_F	Typ.	2.10	V
I_F	Max.	3600	A
I_{FRM}	Max.	7200	A

典型应用 Typical Applications

- 牵引传动 Traction Drives
- 电机控制 Motor Controllers
- 智能电网 Smart Grid
- 高可靠性逆变器 High Reliability Inverters

特点 Features

- AlSiC 基板 AlSiC Baseplate
- AlN 衬板 AlN Substrates
- 高热循环能力 High Thermal Cycling Capability

电路结构 Circuit Configuration

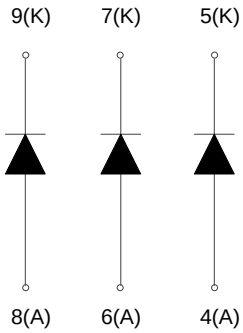


图 1. 电路结构

Fig. 1 Circuit configuration

模块外形 Module Appearance

图 2. 模块外形

Fig. 2 Module appearance

模块标签说明 Module Label Code Instruction

ab1234567890

数据位置 Data position	数据内容 Content of data
1--8	模块批次号 Module batch number
9--12	模块序列号 Module serial number

最大额定值 Absolute Maximum Ratings

符号 Symbol	参数名称 Parameter	测试条件 Test Conditions	数值 Value	单位 Unit
V_{RRM}	重复峰值电压 Repetitive voltage	T_C= 25 °C	1700	V
I_F	正向直流电流 Forward current	DC	3600	A
I_{FRM}	正向重复峰值电流 Peak forward current	t_P = 1ms	7200	A
I_{FSM}	浪涌电流 Surge current	V_R =0V, t_P = 10ms, T_{vj} = 150 °C	21000	A
I^2t	二极管 I^2t 值 Diode I^2t	V_R =0V, t_P = 10ms, T_{vj} = 150 °C	2200	kA^2s
V_{isol}	绝缘电压(模块) Isolation voltage – per module	短接所有端子，端子与基板间施加电压 (Connected terminals to base plate), AC RMS,1 min, 50Hz,T_C= 25 °C	4000	V
Q_{PD}	局部放电电荷(模块) Partial discharge – per module	IEC1287.V_1=1800V,V_2=1300V,50Hz RMS	10	pC

热和机械数据 Thermal & Mechanical Data

参数 Symbol	说明 Explanation	值 Value	单位 Unit
爬电距离 Creepage distance	端子-散热器 Terminal to heatsink	33.0	mm
	端子-端子 Terminal to terminal	34.0	mm
绝缘间隙 Clearance	端子-散热器 Terminal to heatsink	20.0	mm
	端子-端子 Terminal to terminal	20.0	mm
相对漏电起痕指数 CTI (Comparative Tracking Index)		>600	

热和机械数据 Thermal & Mechanical Data

符号 Symbol	参数名称 Parameter	测试条件 Test Conditions	最小值 Min.	典型值 Typ.	最大值 Max.	单位 Unit
$R_{th(J-C)}$	结壳热阻 Thermal resistance – Diode				9.5	K / kW
$R_{th(C-H)}$	接触热阻 Thermal resistance – case to heatsink	安装力矩 5Nm，导热脂 1W/m·K Mounting torque 5Nm, with mounting grease 1W/m·K		10.5		K / kW
$T_{vj\ op}$	工作结温 Operating junction temperature		-40		150	°C
T_{stg}	存储温度 Storage temperature range		-40		150	°C
M	安装力矩 Screw torque	安装紧固用 – M6 Mounting – M6			5	Nm
		电路互连用 - M8 Electrical connections – M8			10	Nm
L_{sAK}	模块杂散电感 Module stray inductance			6		nH
$R_{AA'+KK'}$	模块引线电阻，端子-芯片 Module lead resistance, terminal-chip			85		μΩ

电特性值 Electrical Characteristics

除非特别声明，否则 T_C= 25 °C　　T_C= 25 °C unless otherwise stated

符号 Symbol	参数名称 Parameter	条件 Test Conditions		最小值 Min.	典型值 Typ.	最大值 Max.	单位 Unit
I_{RRM}	重复反向电流 Repetitive reverse current	V_{RM} = V_{RRM}				1	mA
		V_{RM} = V_{RRM}, T_{vj} =125 °C				40	mA
		V_{RM} = V_{RRM}, T_{vj} =150 °C				60	mA
V_F	正向电压 Forward voltage	I_F = 3600A			2.10		V
		I_F = 3600A, T_{vj} = 125 °C			2.25		V
		I_F = 3600A, T_{vj} = 150 °C			2.25		V
Q_{rr}	二极管反向恢复电荷 Diode reverse recovery charge	I_F =3600A, V_{CE} =900V, V_{GE} = ±15V, $R_{G(ON)}$ = 0.5Ω, L_S = 60nH, - di_F/dt =11000A/μs (T_{vj}= 150°C) IGBT: TIM3600E2SM17-TSA000	T_{vj}= 25 °C		815		μC
			T_{vj}= 125 °C		1200		
			T_{vj}= 150 °C		1600		
I_{rr}	二极管反向恢复电流 Diode reverse recovery current		T_{vj}= 25 °C		1850		A
			T_{vj}= 125 °C		2250		
			T_{vj}= 150 °C		2405		
E_{rec}	二极管反向恢复损耗 Diode reverse recovery energy		T_{vj}= 25 °C		590		mJ
			T_{vj}= 125 °C		1020		
			T_{vj}= 150 °C		1125		

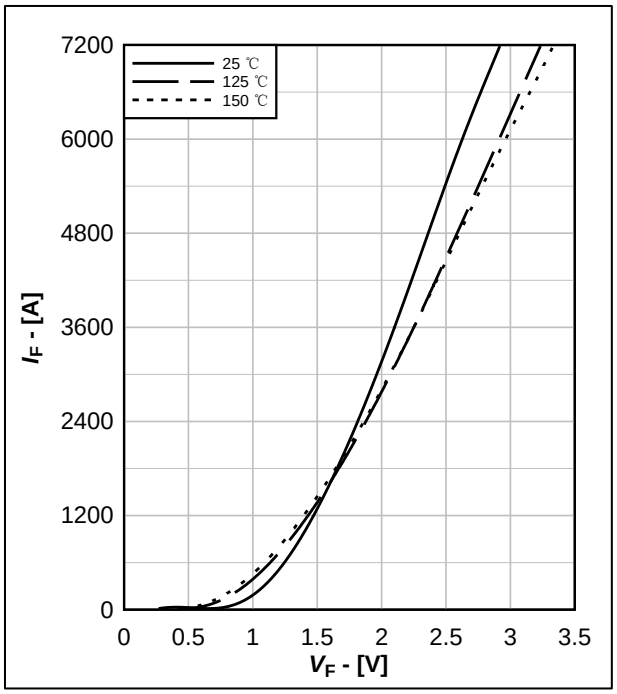


图 3.输出特性典型曲线,I_F = f (V_F)

Fig.3 Typical output characteristics, I_F = f (V_F)

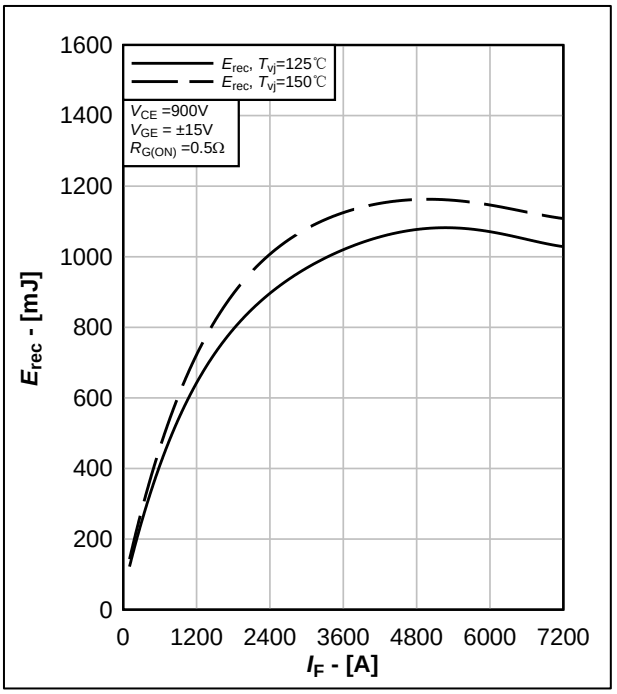


图 4.反向恢复损耗典型曲线, E_{rec}=f(I_F)

Fig.4 Typical switching loss E_{rec}, E_{rec}=f(I_F)

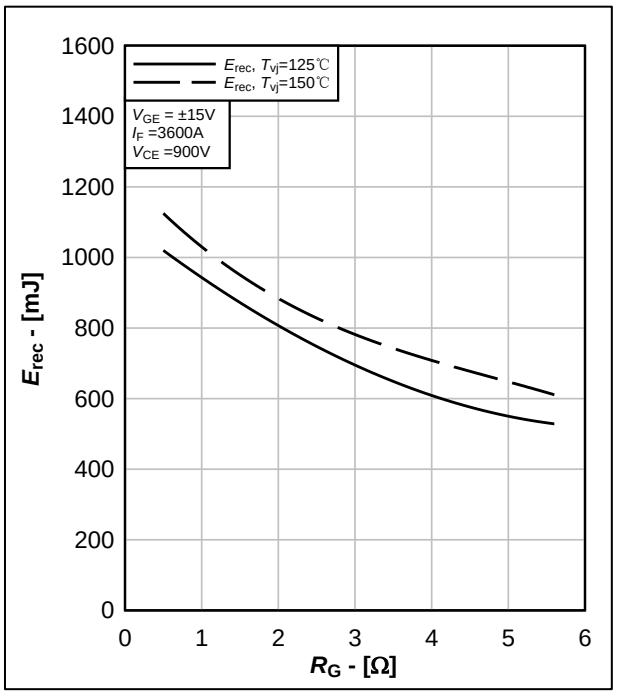


图 5.反向恢复损耗典型曲线, E_{rec}=f(R_G)

Fig.8 Typical switching loss E_{rec}, E_{rec}=f(R_G)

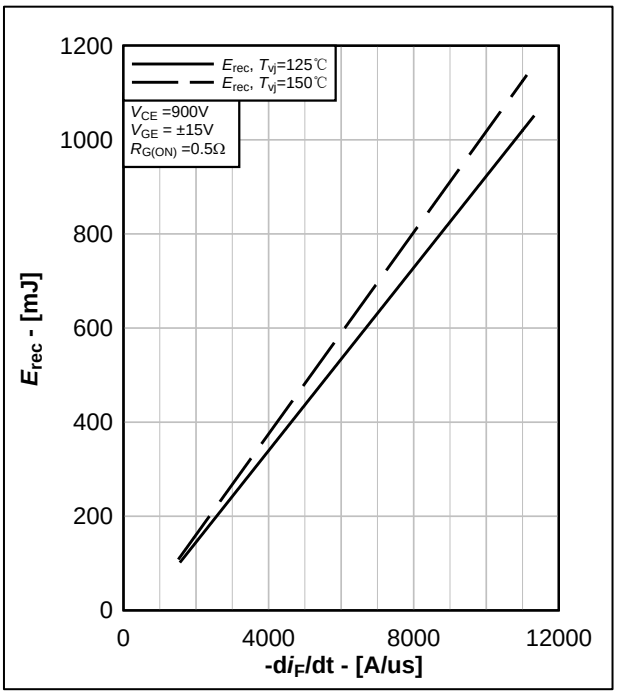


图 6.反向恢复损耗典型曲线, E_{rec}=f(- di_F/dt)

Fig.6 Typical switching loss E_{rec}, E_{rec}=f(- di_F/dt)

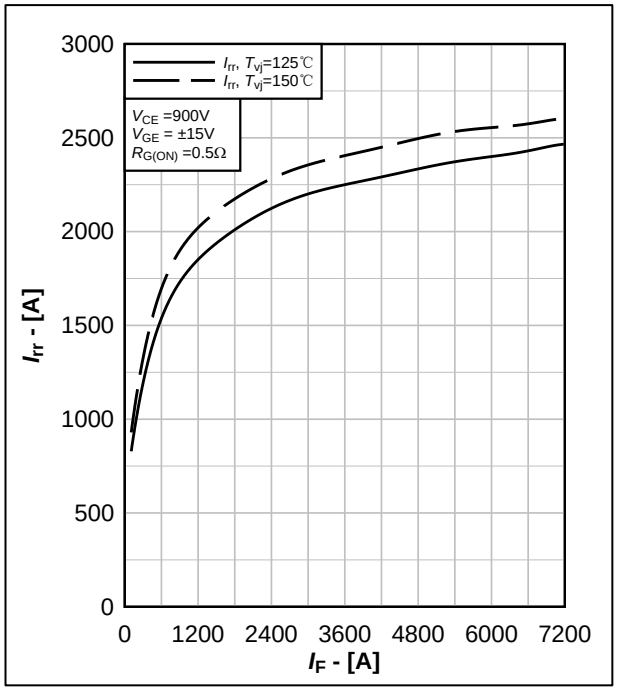


图 7.反向恢复电流典型曲线, I_{rr}= f(I_F)

Fig.7 Typical reverse recovery current, I_{rr}= f(I_F)

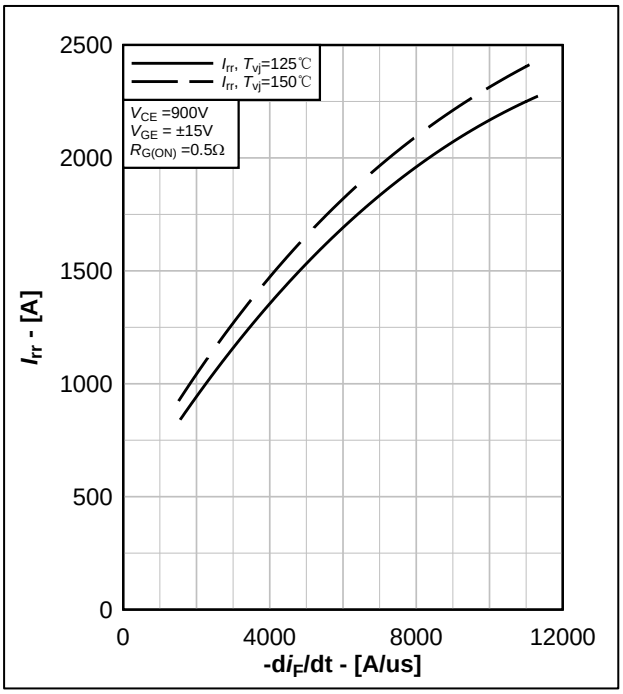


图 8.反向恢复电流典型曲线, I_{rr}= f(- di_F/dt)

Fig.8 Typical reverse recovery current, I_{rr}= f(- di_F/dt)

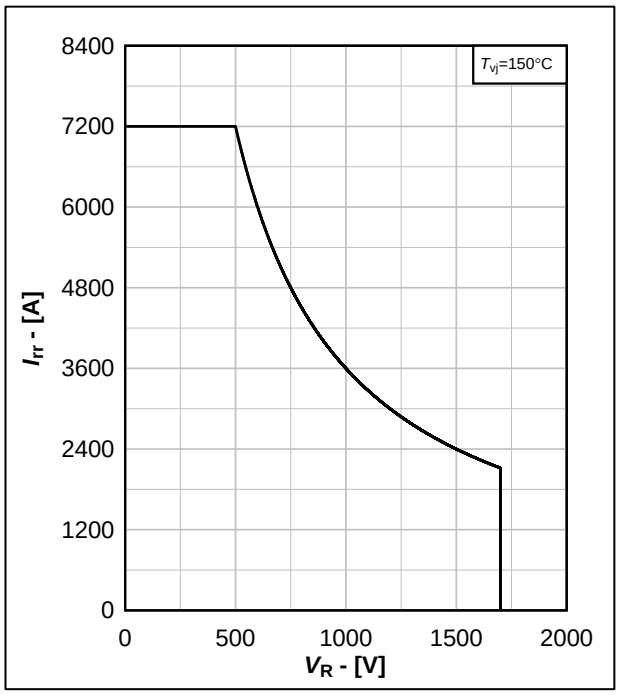


图 9. FRD 反偏安全工作区, I_{rr} = f (V_R)

Fig.9 Reverse bias safe operating area of FRD, I_{rr} = f (V_R)

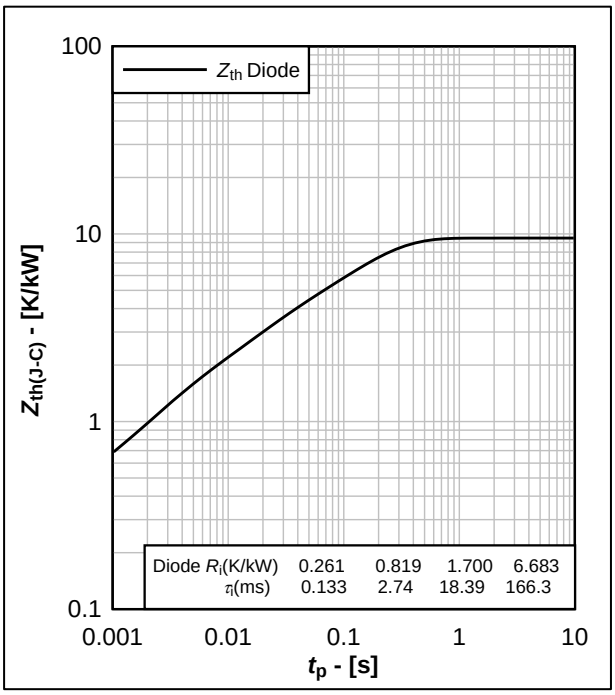
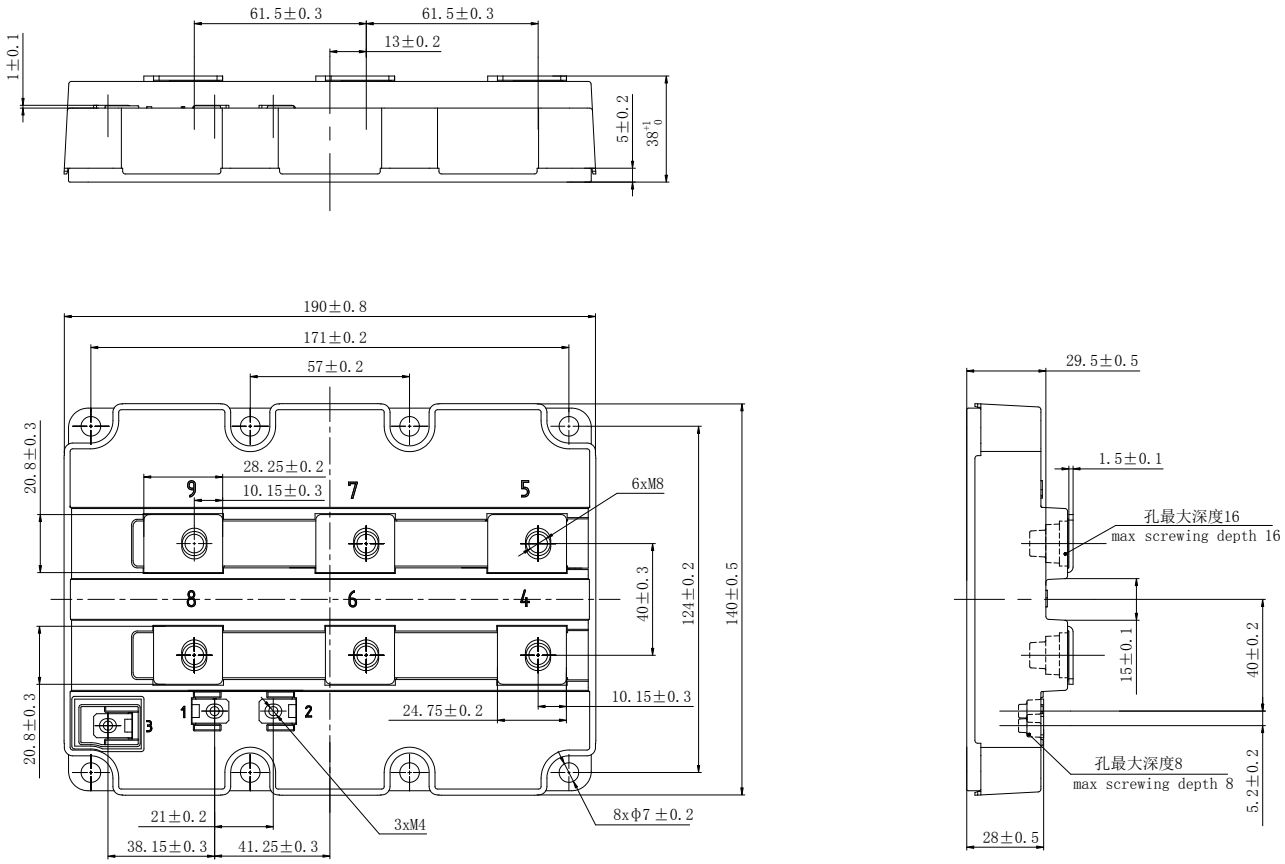


图 10. 瞬态热阻抗曲线, $Z_{th(J-C)}$ = f (t_p)

Fig.10 Transient thermal impedance, $Z_{th(J-C)}$ = f (t_p)



重量 Weight：1080g　　模块外观类型 Module outline code：E2

图 11.　模块外观尺寸

Fig. 11　Module outlines

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