



产品数据手册 Product Datasheet 版本 Ver 23.02

TFM3600E2SM17-D200

二极管模块 Diode Module

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	
● AISiC 基板		AISiC Baseplate	
● AlN 衬板		AlN Substrates	
● 高热循环能力		High Thermal Cycling Capability	

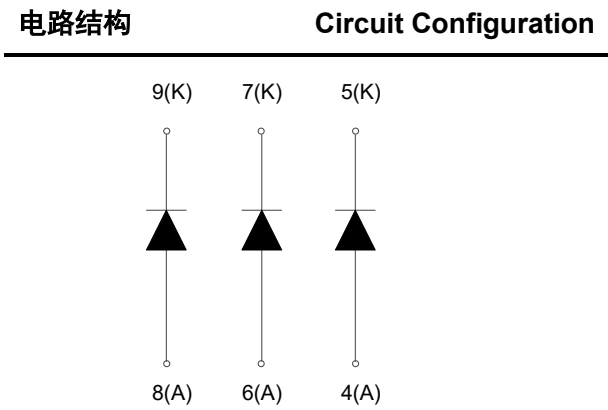


图 1. 电路结构
Fig. 1 Circuit configuration

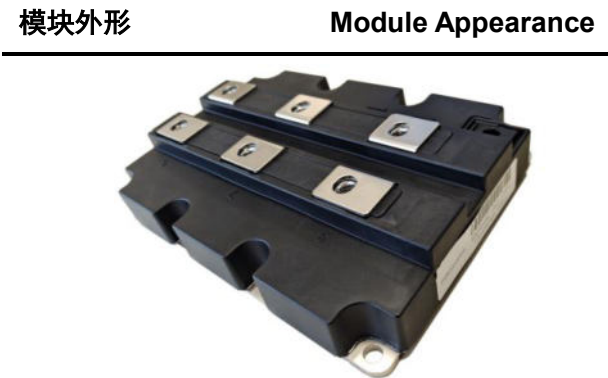


图 2. 模块外形
Fig. 2 Module appearance

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	$T_C = 25\text{ }^{\circ}\text{C}$	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	$t_P = 1\text{ ms}$	7200	A
I_{FSM}	浪涌电流 Surge current	$V_R = 0\text{ V}$, $t_P = 10\text{ ms}$, $T_{vj} = 150\text{ }^{\circ}\text{C}$	21000	A
I^2t	二极管 I^2t 值 Diode I^2t	$V_R = 0\text{ V}$, $t_P = 10\text{ ms}$, $T_{vj} = 150\text{ }^{\circ}\text{C}$	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, $T_C = 25\text{ }^{\circ}\text{C}$	4000	V
Q_{PD}	局部放电电荷(模块) Partial discharge – per module	IEC1287. $V_1 = 1800\text{ V}$, $V_2 = 1300\text{ V}$, 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	



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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		$\mu\Omega$

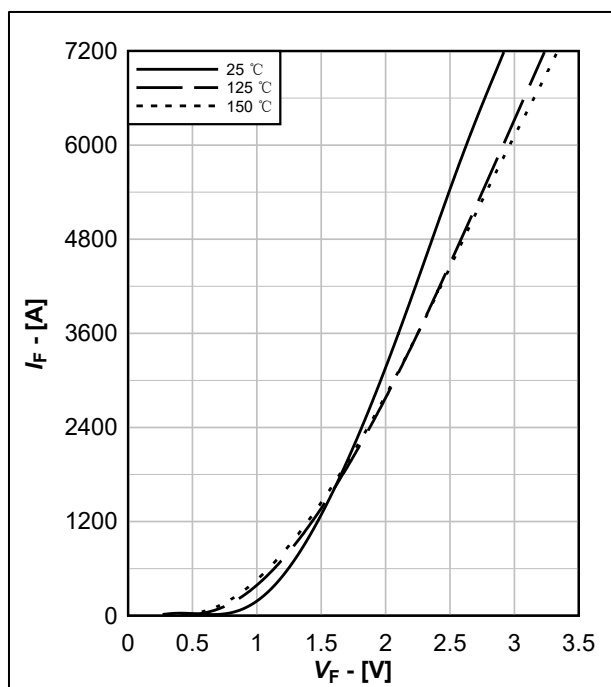
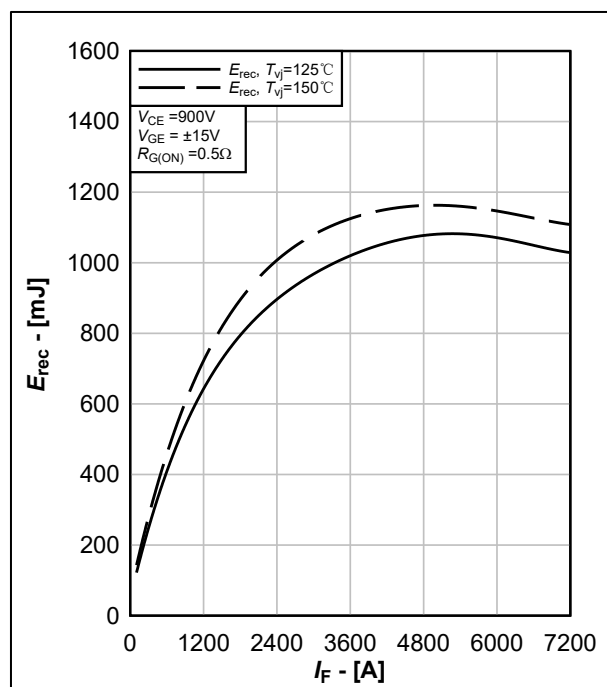
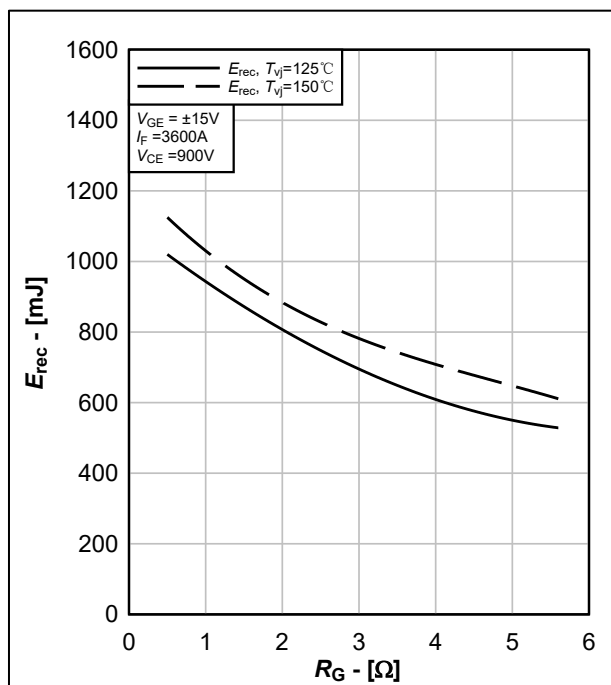
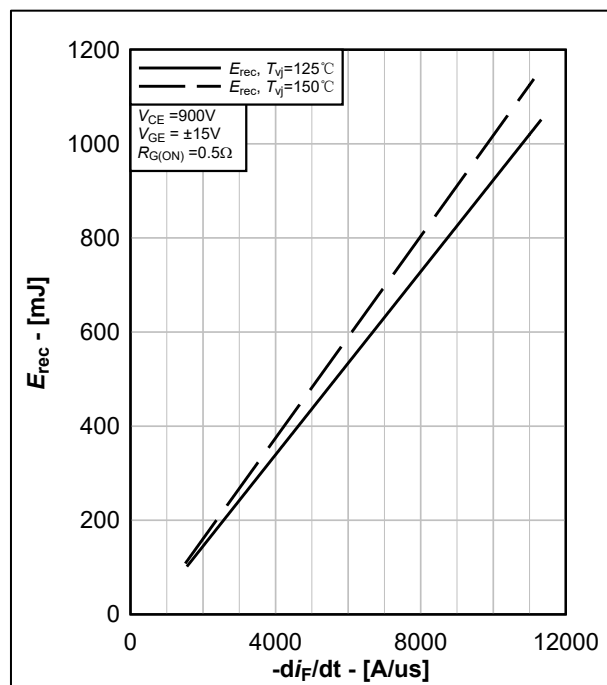
Caution: This device is sensitive to electrostatic discharge. Users should follow ESD handling procedures.

注意: 该器件对静电敏感, 用户须采取 ESD 防护措施。

电特性值
Electrical Characteristics

除非特别声明，否则 $T_C = 25\text{ }^{\circ}\text{C}$
 $T_C = 25\text{ }^{\circ}\text{C}$ 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
		$V_{RM} = V_{RRM}, T_{vj}=125\text{ }^{\circ}\text{C}$				40	mA
		$V_{RM} = V_{RRM}, T_{vj}=150\text{ }^{\circ}\text{C}$				60	mA
V_F	正向电压 Forward voltage	$I_F = 3600\text{A}$			2.10	2.50	V
		$I_F = 3600\text{A}, T_{vj} = 125\text{ }^{\circ}\text{C}$			2.25		V
		$I_F = 3600\text{A}, T_{vj} = 150\text{ }^{\circ}\text{C}$			2.25		V
Q_{rr}	二极管反向恢复电荷 Diode reverse recovery charge	$I_F=3600\text{A},$ $V_{CE}=900\text{V},$ $V_{GE} = \pm 15\text{V},$ $R_{G(ON)} = 0.5\Omega,$ $L_S = 60\text{nH},$ - di_F/dt $=11000\text{A}/\mu\text{s}$ ($T_{vj}= 150^{\circ}\text{C}$) IGBT: TIM3600E2SM1 7-TSA000	$T_{vj}= 25\text{ }^{\circ}\text{C}$		815		μC
			$T_{vj}= 125\text{ }^{\circ}\text{C}$		1200		
			$T_{vj}= 150\text{ }^{\circ}\text{C}$		1600		
I_{rr}	二极管反向恢复电流 Diode reverse recovery current		$T_{vj}= 25\text{ }^{\circ}\text{C}$		1850		A
			$T_{vj}= 125\text{ }^{\circ}\text{C}$		2250		
			$T_{vj}= 150\text{ }^{\circ}\text{C}$		2405		
E_{rec}	二极管反向恢复损耗 Diode reverse recovery energy	$T_{vj}= 25\text{ }^{\circ}\text{C}$		590		mJ	
		$T_{vj}= 125\text{ }^{\circ}\text{C}$		1020			
		$T_{vj}= 150\text{ }^{\circ}\text{C}$		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} , $E_{rec} = f(-di_F/dt)$

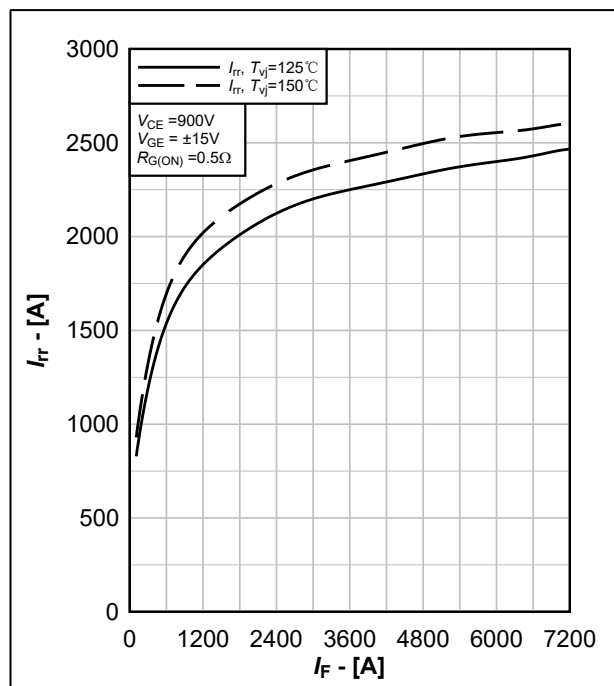

图 7.反向恢复电流典型曲线, $I_{rr} = f(I_F)$

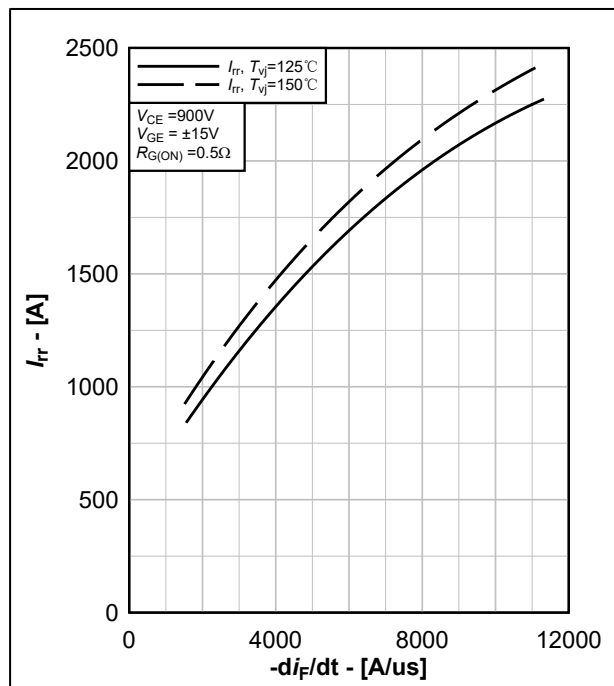
Fig.7 Typical reverse recovery current, $I_{rr} = f(I_F)$

图 8.反向恢复电流典型曲线, $I_{rr} = f(-di_F/dt)$

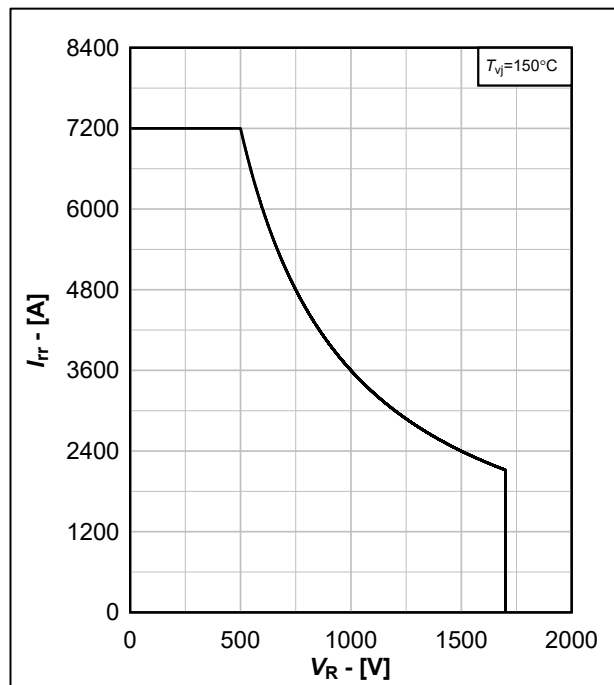
Fig.8 Typical reverse recovery current, $I_{rr} = f(-di_F/dt)$

图 9. FRD 反偏安全工作区, $I_{rr} = f(V_R)$

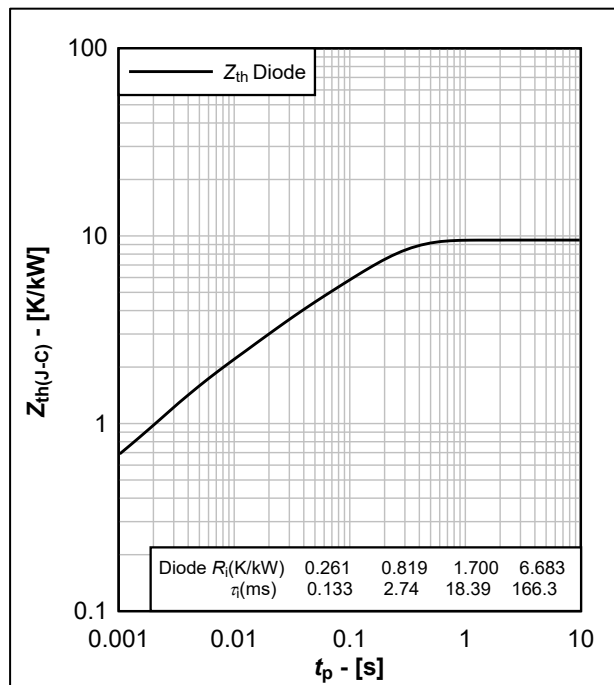
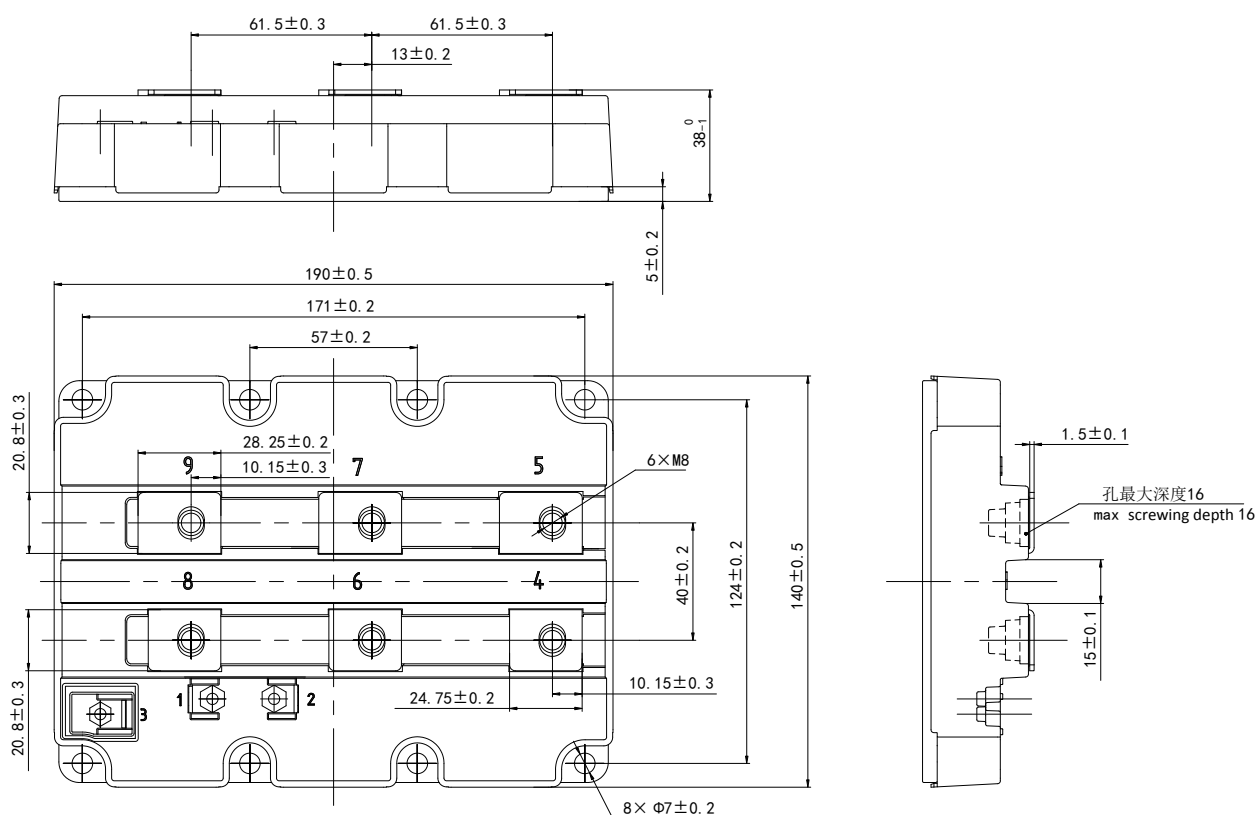
Fig.9 Reverse bias safe operating area of FRD, $I_{rr} = f(V_R)$

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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