



产品数据手册 Product Datasheet 版本 Ver 22.09

TFM1500XDM45-D200
二极管模块 Diode Modules
初版 Preliminary

关键参数		Key Parameters	
V_{RRM}		4500	V
V_F	Typ.	2.60	V
I_F	Max.	1500	A
I_{FRM}	Max.	3000	A

典型应用	Typical Applications
● 工业整流	Industrial Rectification
● 电机控制	Motor Controllers
● 直流斩波器	DC Choppers
● 负载续流	Load Freewheeling

特点	Features
● AISiC 基板	AISiC Baseplate
● AlN 衬板	AlN Substrates
● 高热循环能力	High Thermal Cycling Capability
● 高电流密度	High Current Density

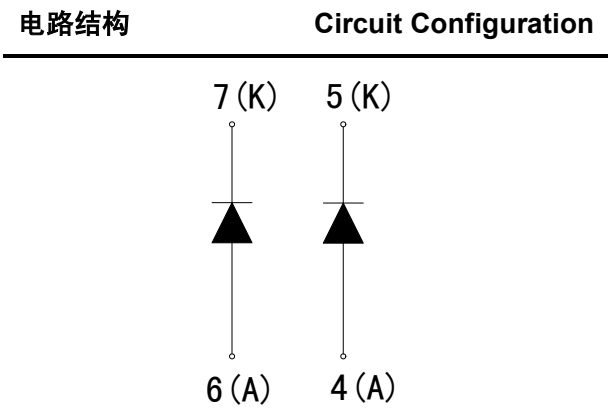


图 1.电路结构
Fig. 1 Circuit configuration



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	$T_C = 25\text{ }^{\circ}\text{C}$	4500	V
I_F	正向直流电流, 每二极管 Forward current (Per Diode)	DC	1500	A
I_{FRM}	正向重复峰值电流, 每二极管 Peak forward current (Per Diode)	$t_P = 1\text{ms}$	3000	A
I_{FSM}	浪涌电流, 每二极管 Surge current (Per Diode)	$V_R = 0\text{V}$, $t_P = 10\text{ms}$, $T_{vj} = 150\text{ }^{\circ}\text{C}$	12000	A
R_t	R_t 值, 每二极管 R_t (Per Diode)	$V_R = 0\text{V}$, $t_P = 10\text{ms}$, $T_{vj} = 150\text{ }^{\circ}\text{C}$	720	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, $T_C = 25\text{ }^{\circ}\text{C}$	10200	V
Q_{PD}	局部放电电荷(模块) Partial discharge – per module	IEC1287. $V_1=6900\text{V}$, $V_2=5100\text{V}$, 50Hz RMS, $T_C = 25\text{ }^{\circ}\text{C}$	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	56.0	mm
	端子-端子 Terminal to terminal	56.0	mm
绝缘间隙 Clearance	端子-散热器 Terminal to heatsink	26.0	mm
	端子-端子 Terminal to terminal	26.0	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	每二极管 Per Diode			16	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		16		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		125	°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_M	模块电感 Module inductance			30		nH
R_{INT}	模块端子-芯片电阻 Internal transistor resistance, terminals - chip	$T_C = 25\text{ °C}$		0.27		mΩ

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
		$V_{RM} = V_{RRM}, T_C = 125\text{ }^{\circ}\text{C}$				60	mA
		$V_{RM} = V_{RRM}, T_C = 150\text{ }^{\circ}\text{C}$				100	mA
$V_F^{(*1)}$	正向电压 Forward voltage	$I_F = 1500\text{A}$			2.60		V
		$I_F = 1500\text{A}, T_{vj} = 125\text{ }^{\circ}\text{C}$			3.00		V
		$I_F = 1500\text{A}, T_{vj} = 150\text{ }^{\circ}\text{C}$			3.05		V
Q_{rr}	反向恢复电荷 Reverse recovery charge	$I_F = 1500\text{A},$ $V_{CC} = 2800\text{V},$	$T_{vj} = 25\text{ }^{\circ}\text{C}$		1200		μC
			$T_{vj} = 125\text{ }^{\circ}\text{C}$		1350		μC
			$T_{vj} = 150\text{ }^{\circ}\text{C}$		1400		μC
I_{rr}	反向恢复电流 Reverse recovery current	$R_{G(ON)} = 1.5\text{ }\Omega,$ $L_S = 70\text{nH},$ - $di_F/dt = 4900\text{A}/\mu\text{s},$ ($T_{vj} = 150\text{ }^{\circ}\text{C}$). IGBT: TIM1500A2SM45-TSA00 0 (Per Diode)	$T_{vj} = 25\text{ }^{\circ}\text{C}$		2090		A
			$T_{vj} = 125\text{ }^{\circ}\text{C}$		2120		A
			$T_{vj} = 150\text{ }^{\circ}\text{C}$		2165		A
E_{rec}	反向恢复损耗 Reverse recovery energy	TIM1500A2SM45-TSA00 0 (Per Diode)	$T_{vj} = 25\text{ }^{\circ}\text{C}$		1970		mJ
			$T_{vj} = 125\text{ }^{\circ}\text{C}$		2220		mJ
			$T_{vj} = 150\text{ }^{\circ}\text{C}$		2290		mJ

注意: 1.(*1)表示该参数基于芯片测试。

Note 1.(*1) indicates it is given at chip level.

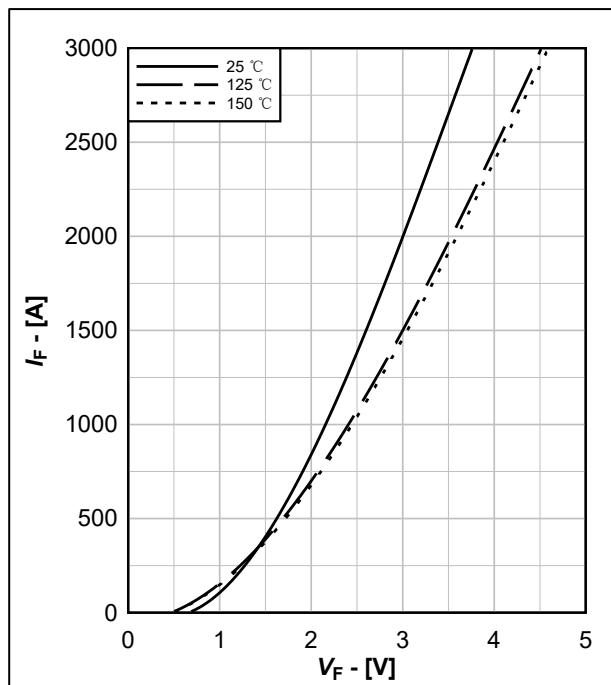


图 3. 输出特性典型曲线, $I_F = f(V_F)$

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

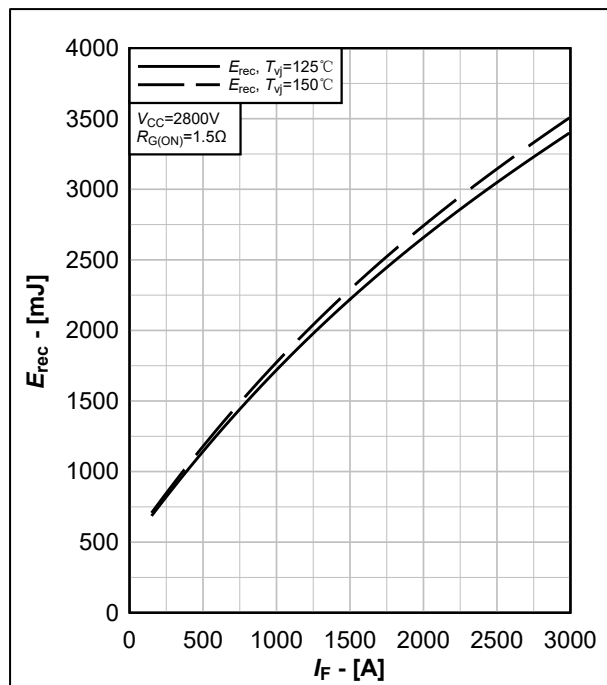


图 4. 反向恢复损耗典型曲线, $E_{rec}=f(I_F)$

Fig.4 Typical reverse recovery energy, $E_{rec}=f(I_F)$

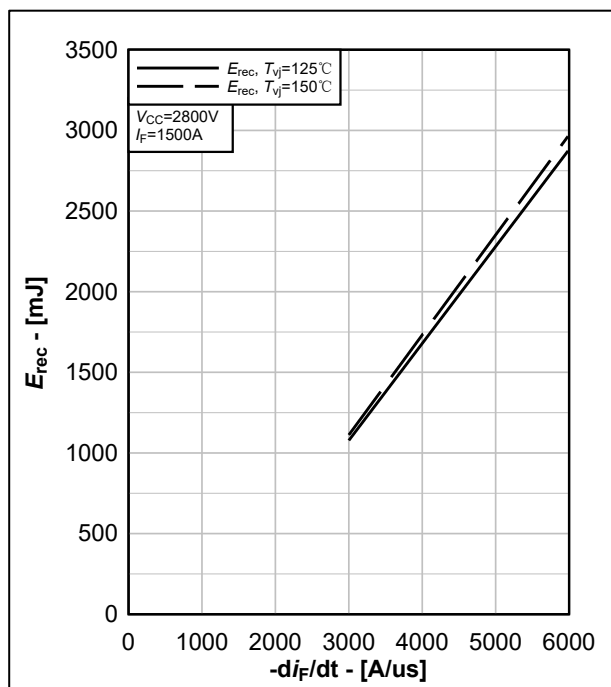


图 5. 反向恢复损耗典型曲线, $E_{rec}=f(-di_F/dt)$

Fig.5 Typical reverse recovery energy, $E_{rec}=f(-di_F/dt)$

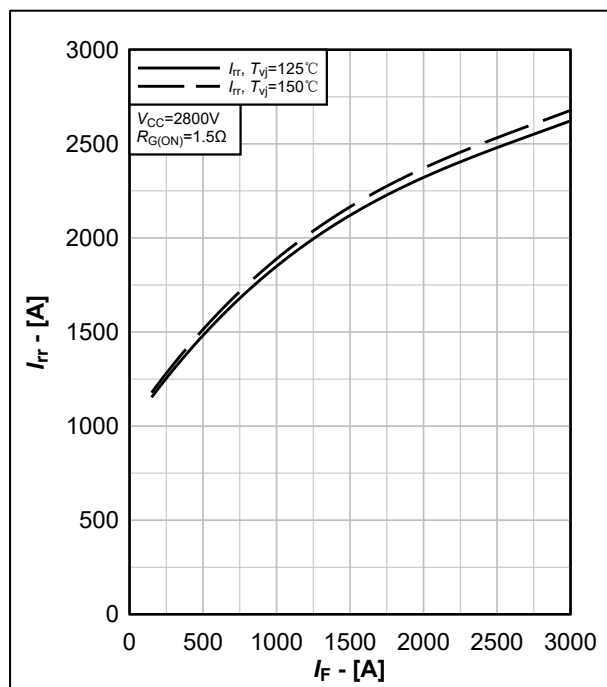


图 6. 反向恢复电流典型曲线, $I_{rr}=f(I_F)$

Fig.6 Typical reverse recovery current, $I_{rr}=f(I_F)$

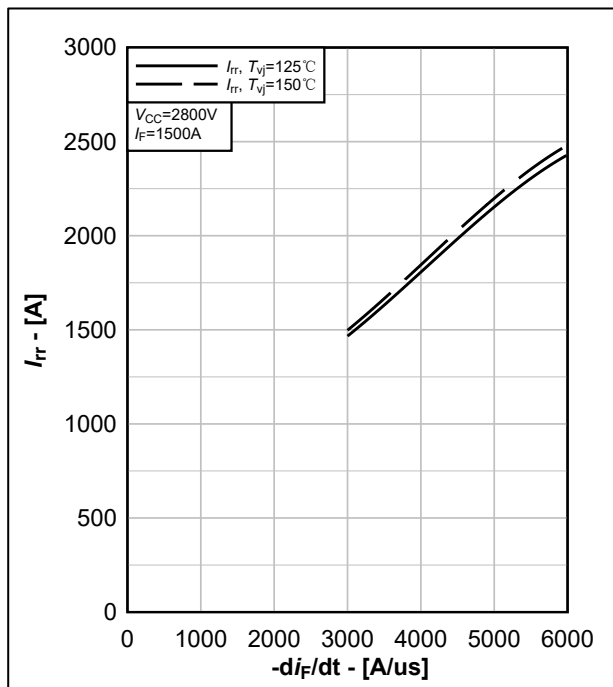


图 7. 反向恢复电流典型曲线, $I_{rr} = f(-di_F/dt)$

Fig.7 Typical reverse recovery current, $I_{rr} = f(-di_F/dt)$

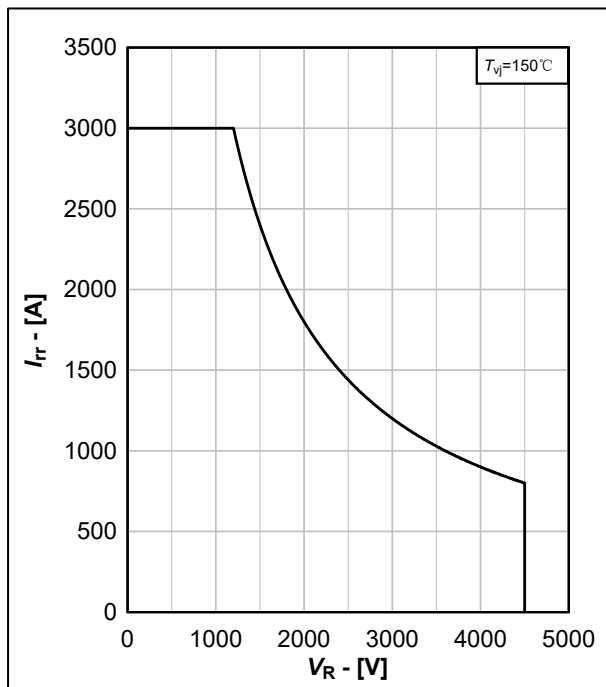


图 8. 二极管反偏安全工作区, $I_{rr} = f(V_R)$

Fig.8 Diode reverse bias safe operating area, $I_{rr} = f(V_R)$

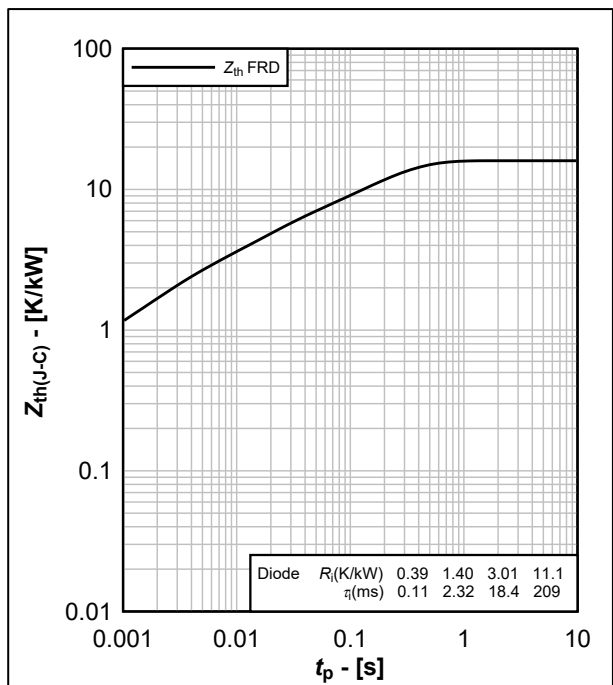
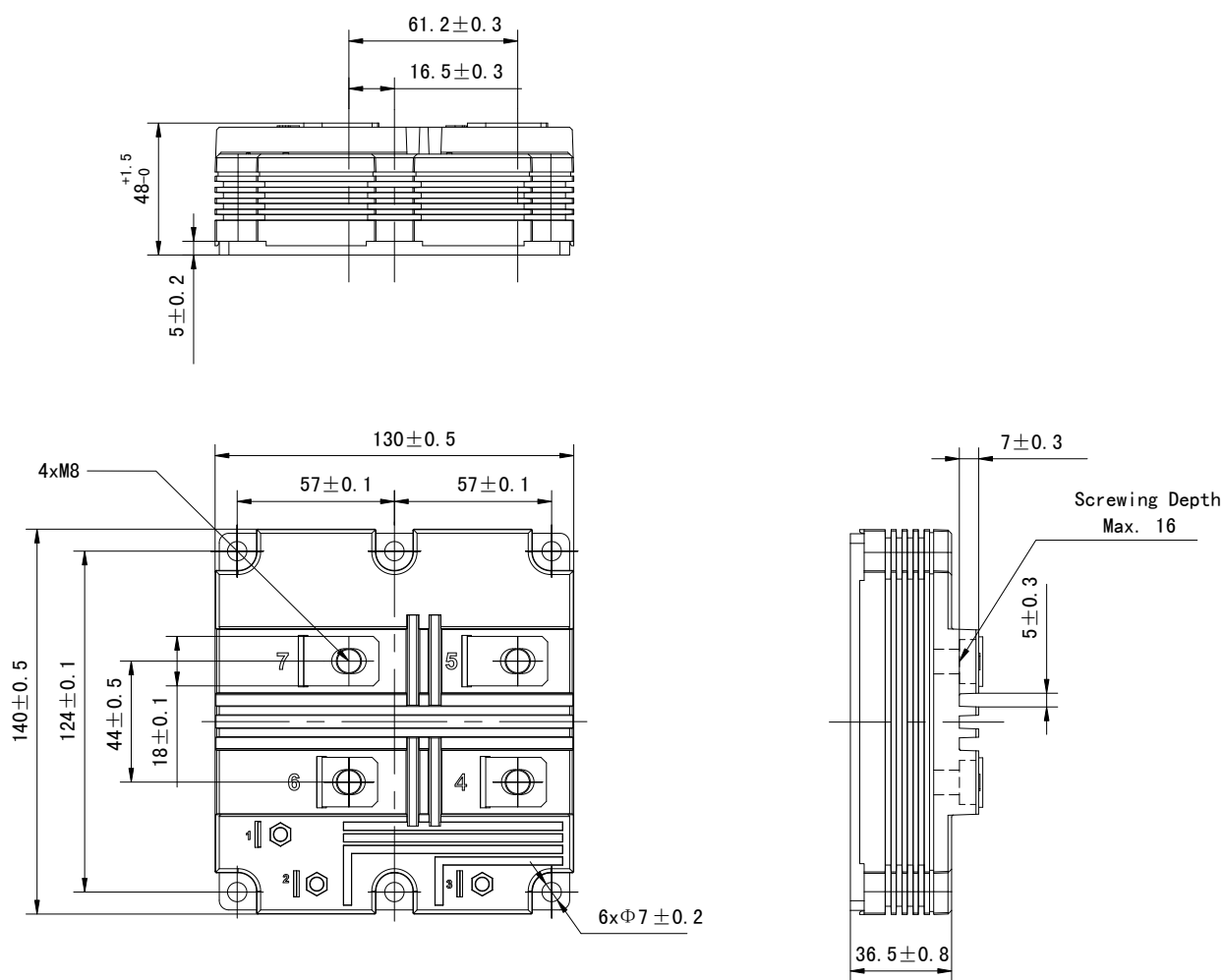


图 9. 瞬态热阻抗曲线, $Z_{th(J-C)} = f(t_p)$

Fig.9 Transient thermal impedance, $Z_{th(J-C)} = f(t_p)$



重量 Weight: 1100g 模块外观类型 Module outline code: X

图 10. 模块外观尺寸

Fig. 10 Module outline drawing

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