



产品数据手册 Product Datasheet 版本 Ver 21.10

TF1500SF33K1-D200
二极管模块 Diode Moudules

关键参数		Key Parameters	
V_{RRM}		3300	V
V_F	Typ.	2.25	V
I_F	Max.	1500	A
I_{FRM}	Max.	3000	A

典型应用		Typical Applications	
●工业整流		Industial 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	

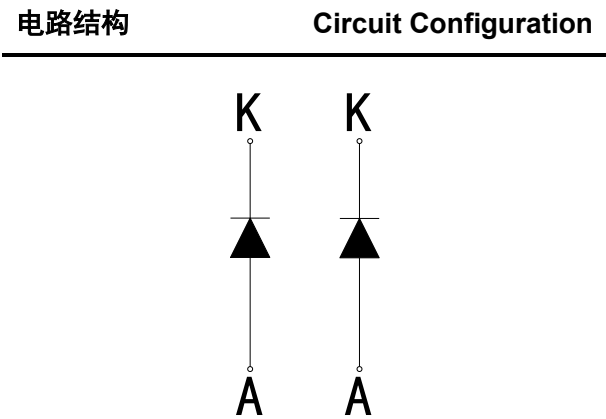


图 1.电路结构
Fig. 1 Circuit configuration



图 2. 模块外形
Fig. 2 Module appearance

模块标签说明		Module Label Code Instruction	
	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	$T_C = 25\text{ }^{\circ}\text{C}$	3300	V
I_F	正向直流电流 Forward current	DC	1500	A
I_{FRM}	正向重复峰值电流 Peak forward current	$t_P = 1\text{ms}$	3000	A
I_{FSM}	浪涌电流 Surge current	$V_R = 0\text{V}$, $t_P = 10\text{ms}$, $T_{vj} = 150\text{ }^{\circ}\text{C}$	12000	A
R_t	R_t 值 R_t	$V_R = 0\text{V}$, $t_P = 10\text{ms}$, $T_{vj} = 150\text{ }^{\circ}\text{C}$	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, $T_C = 25\text{ }^{\circ}\text{C}$	6000	V
Q_{PD}	局部放电电荷(模块) Partial discharge – per module	IEC1287. $V_1 = 3500\text{V}$, $V_2 = 2600\text{V}$, 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	47	mm
	端子-端子 Terminal to terminal	52	mm
绝缘间隙 Clearance	端子-散热器 Terminal to heatsink	35	mm
	端子-端子 Terminal to terminal	20	mm
相对漏电起痕指数 CTI (Comparative Tracking Index)		>600	

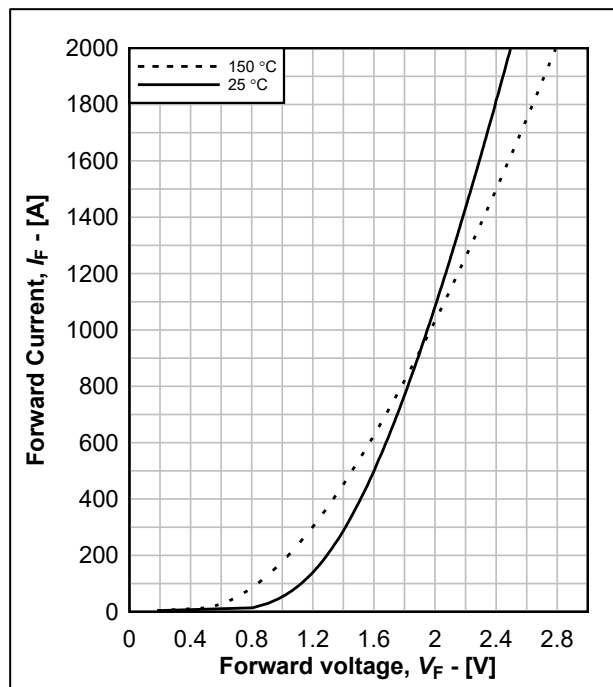
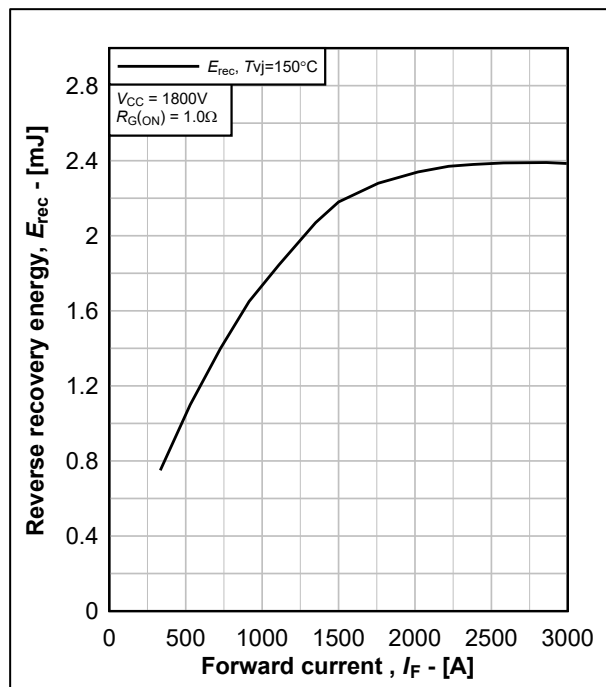
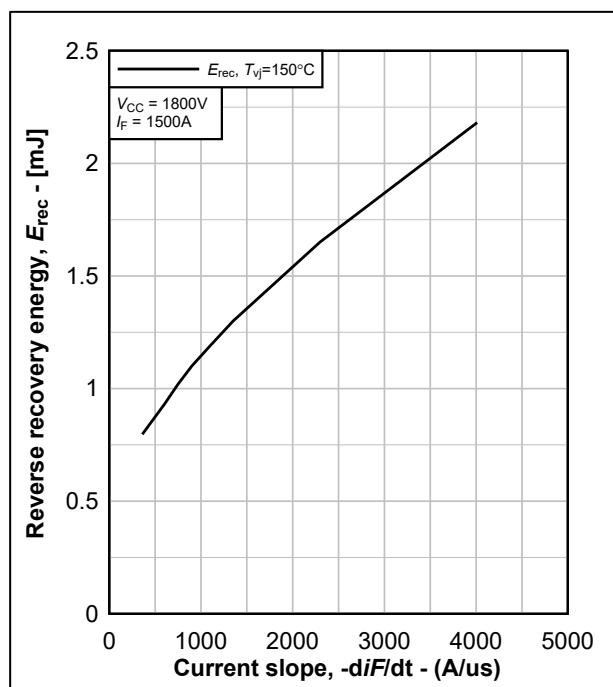
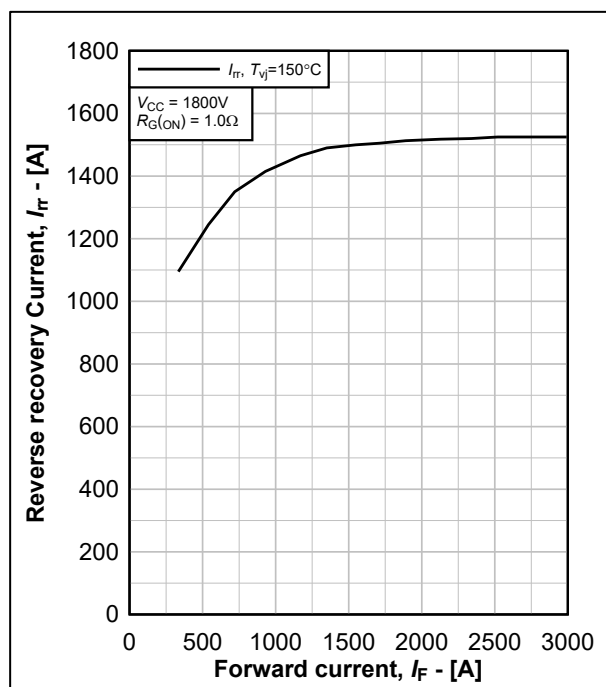
热和机械数据**Thermal & Mechanical Data**

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				14.5	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		12		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	2.9		3.4	Nm
		电路互连用 - M8 Electrical connections - M8	6.7		10.8	Nm
L_M	模块电感 Module inductance			12.3		nH
R_{INT}	模块端子-芯片电阻 Internal transistor resistance, terminals - chip	$T_C = 25\ ^\circ\text{C}$		0.13		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
		$V_{RM} = V_{RRM}, T_C=150\text{ }^{\circ}\text{C}$				100	mA
V_F	正向电压 Forward voltage	$I_F = 1500\text{A}$			2.25	2.65	V
		$I_F = 1500\text{A}, T_{vj} = 150\text{ }^{\circ}\text{C}$			2.40		V
Q_{rr}	反向恢复电荷 Reverse recovery charge	$V_{CC} = 1800\text{V}, I_F = 1500\text{A},$ - $di_F/dt = 4000\text{A}/\mu\text{s},$ $R_{G(ON)} = 1.0\text{ }\Omega,$ $L_S = 200\text{nH},$ ($T_{vj} = 150\text{ }^{\circ}\text{C}$). IGBT: TIM1500ESM33-PSA011	$T_{vj} = 25\text{ }^{\circ}\text{C}$		910		μC
			$T_{vj} = 150\text{ }^{\circ}\text{C}$		1700		μC
I_{rr}	反向恢复电流 Reverse recovery current		$T_{vj} = 25\text{ }^{\circ}\text{C}$		1300		A
			$T_{vj} = 150\text{ }^{\circ}\text{C}$		1500		A
E_{rec}	反向恢复损耗 Reverse recovery energy		$T_{vj} = 25\text{ }^{\circ}\text{C}$		1.20		J
			$T_{vj} = 150\text{ }^{\circ}\text{C}$		2.20		J

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.反向恢复能耗典型曲线, $E_{rec} = f(I_F)$ Fig.4 Typical reverse recovery energy, $E_{rec} = f(I_F)$ 图 5.反向恢复能耗典型曲线, $E_{rec} = f(-di_F/dt)$ 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, $I_{rr} = f(I_F)$

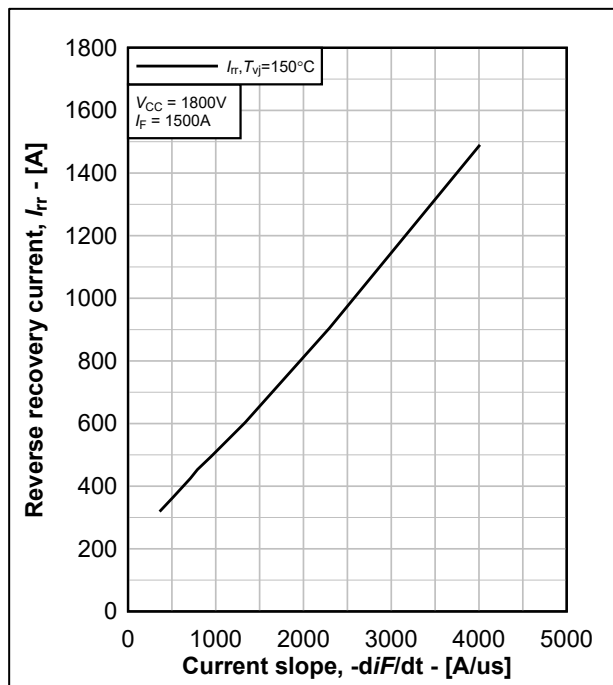


图 7. 反向恢复电流典型曲线, $I_{rr} = f(-di_F/dt)$

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

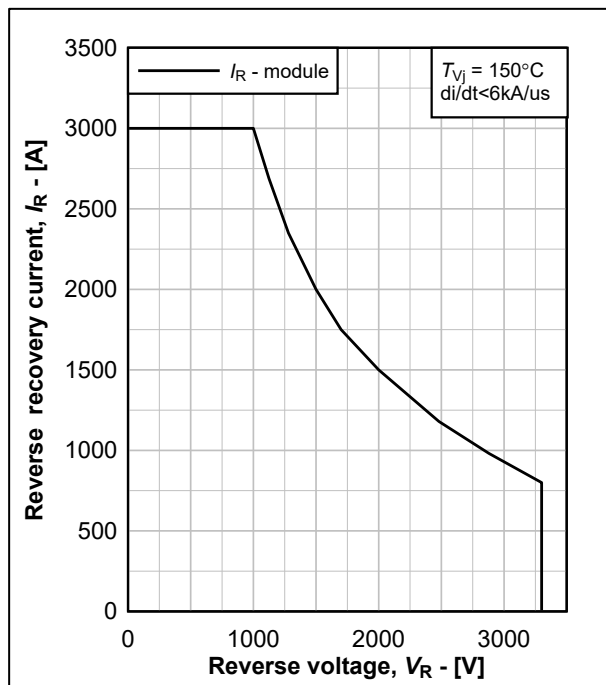


图 8. 二极管反偏安全工作区, $I_R = f(V_R)$

Fig.8 Diode reverse bias safe operating area, $I_R = f(V_R)$

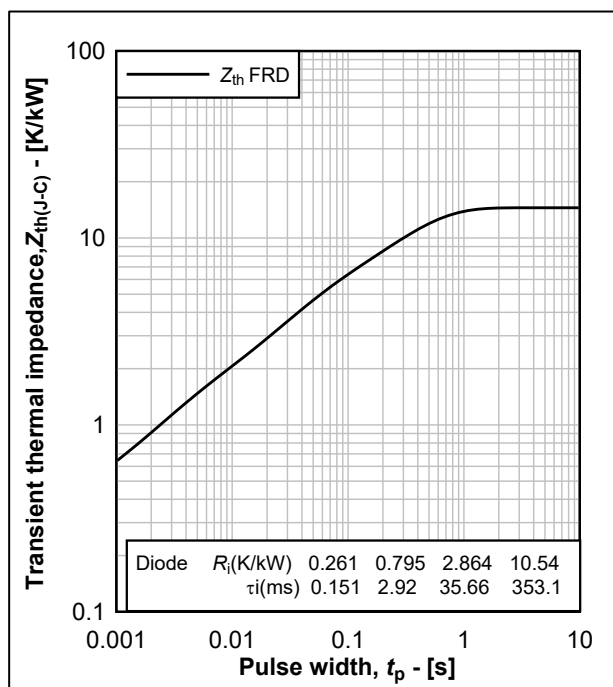
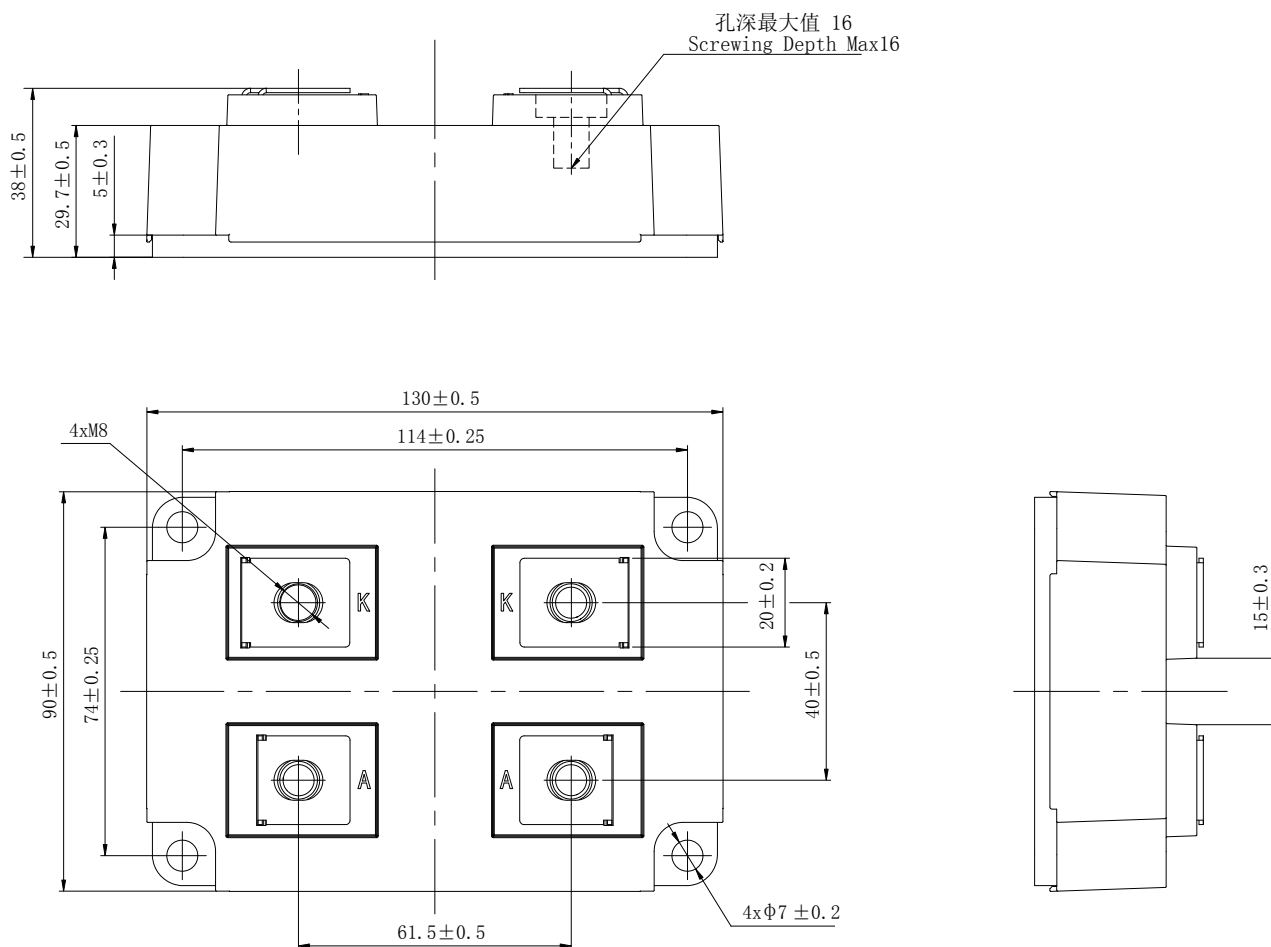


图 9. 瞬态热阻抗曲线, $Z_{th(J-C)} = f(t_p)$

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



重量 Weight: 495g 模块外观类型 Module outline code: K1

图 10. 模块外观尺寸

Fig. 10 Module outline drawing

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