中国中车 CRRC

TFM1500NDM33-D200

二极管模块 Diode Modules

产品数据手册 Product Datasheet 版本 Ver 19.12

关键参数 Key Parameters

V_{RRM}		3300	V
V_F	Typ.	2.40	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

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

电路结构 Circuit Configuration

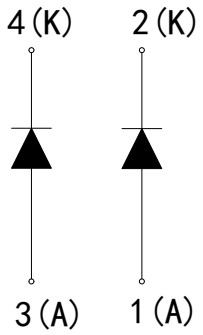


图 1.电路结构

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

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	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 = 1ms	3000	A
I_{FSM}	浪涌电流 Surge current	V_R =0V, t_P = 10ms, T_{vj} = 25 °C	12000	A
I^2t	I^2t 值 I^2t	V_R =0V, t_P = 10ms, T_{vj} = 125 °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 °C	6000	V
Q_{PD}	局部放电电荷(模块) Partial discharge – per module	IEC1287.V_1=3500V, V_2=2600V,50Hz RMS,T_C= 25 °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	73	mm
	端子-端子 Terminal to terminal	33	mm
绝缘间隙 Clearance	端子-散热器 Terminal to heatsink	48	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				15	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·°C Mounting torque 5Nm, with mounting grease 1W/m·°C		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		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_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 °C		0.33		mΩ

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_C=150 °C				100	mA
V_F	正向电压 Forward voltage	I_F = 1500A			2.40		V
		I_F = 1500A,T_{vj} = 150 °C			2.80		V
Q_{rr}	反向恢复电荷 Reverse recovery charge	I_F =1500A, V_{CC} = 1800V, $R_{G(ON)}$=1.0 Ω , C_{GE}=330nF, L_S=150nH, - di_F/dt = 4000A/μs, (T_{vj}= 150 °C). IGBT: TIM1500ESM33-PSA011	T_{vj}= 25 °C		1020		μC
			T_{vj}= 150 °C		1710		μC
I_{rr}	反向恢复电流 Reverse recovery current		T_{vj}= 25 °C		1260		A
			T_{vj}= 150 °C		1450		A
E_{rec}	反向恢复损耗 Reverse recovery energy		T_{vj}= 25 °C		1.50		J
			T_{vj}= 150 °C		2.60		J

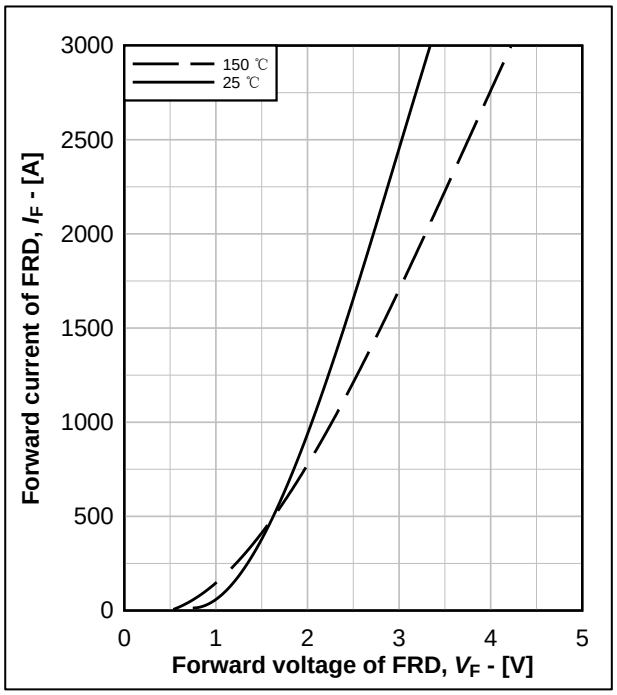


图 3.输出特性典型曲,I_F = f (V_F)

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

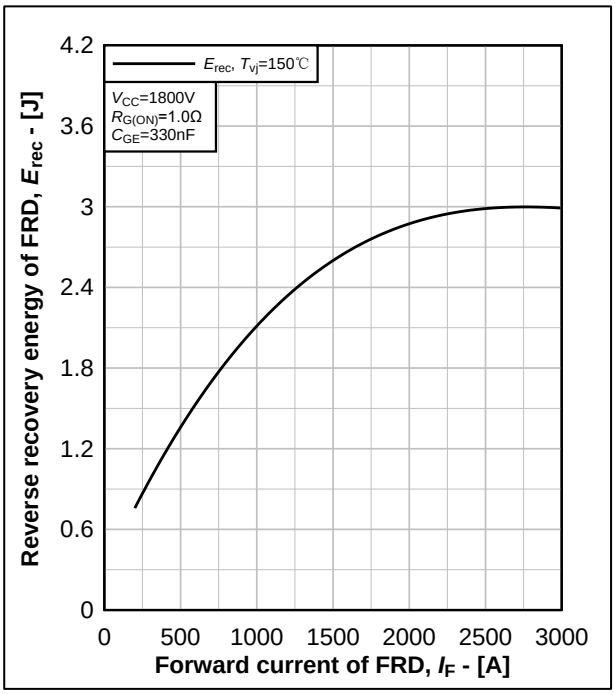


图 4.反向恢复能耗典型曲线,E_{rec}=f(I_F)

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

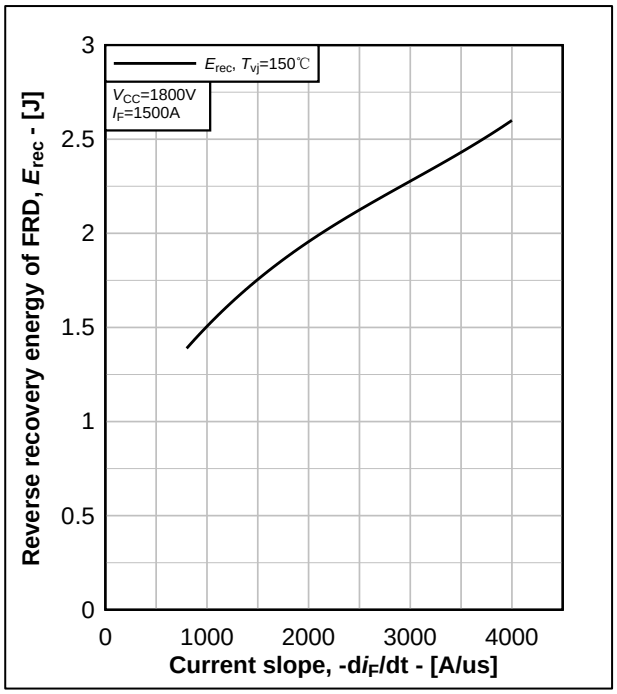


图 5.反向恢复能耗典型曲线,E_{rec}=f(- di_F/dt)

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

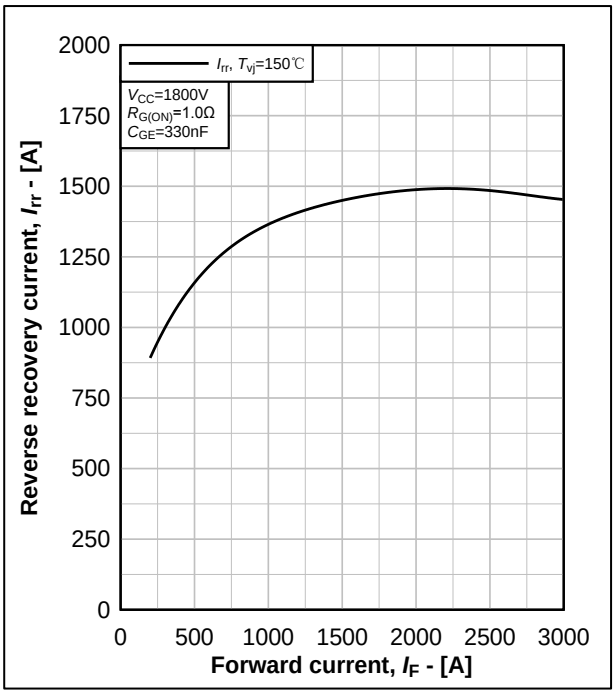


图 6.反向恢复电流典型曲线,I_{rr}= f(I_F)

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

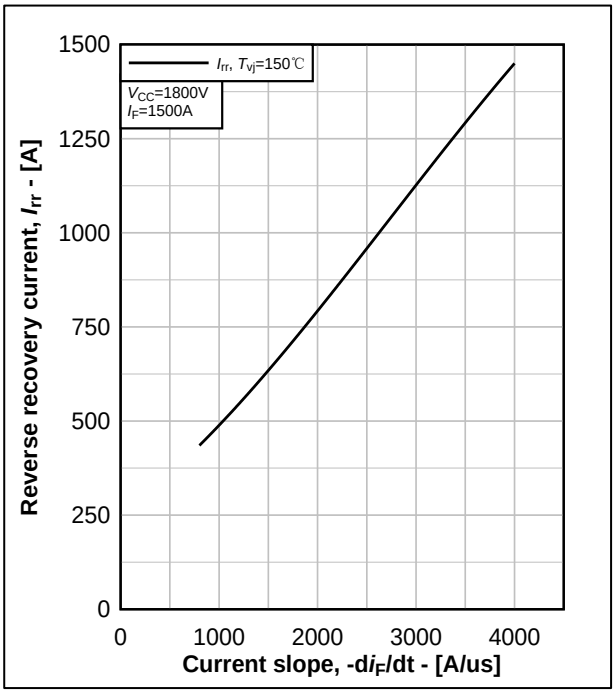


图 7.反向恢复电流典型曲线,I_{rr}= f(- di_F/dt)

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

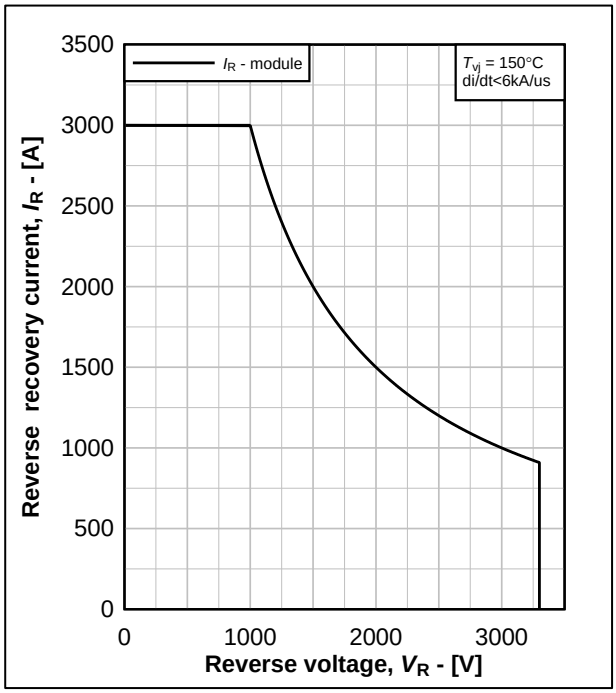


图 8.二极管反偏安全工作区,I_{rr} = f (V_R)

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

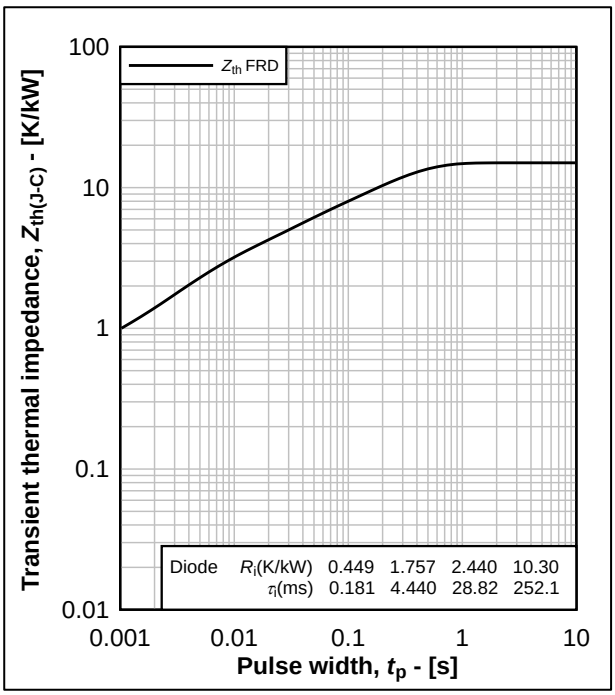
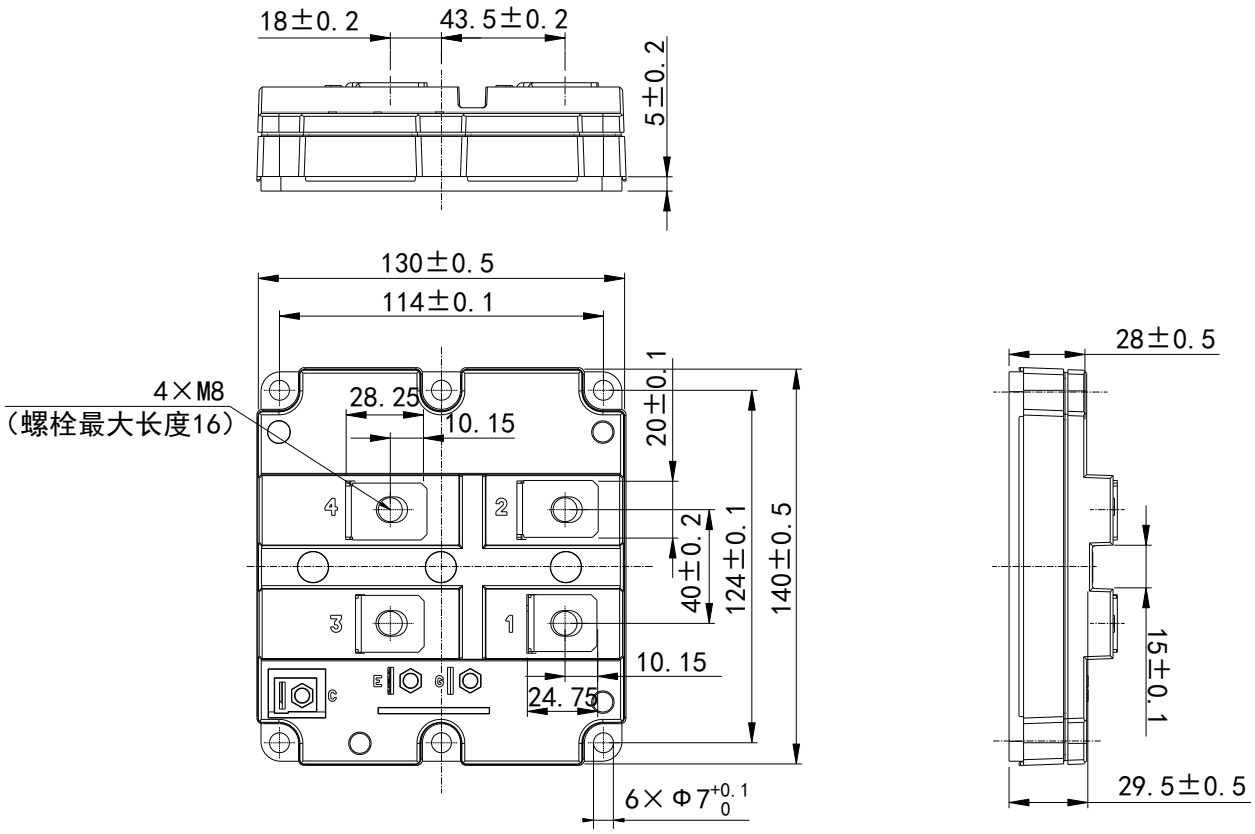


图 9. 瞬态热阻抗曲线,$Z_{th(J-C)}$ = f (t_p)

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



重量 Weight：850g　　模块外观类型 Module outline code：N

图 10.　模块外观尺寸

Fig. 10　Module outline drawing

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