

高绝缘等级模块
high insulated module



$V_{CES} = 4500V$
 $I_{C\ nom} = 400A / I_{CRM} = 800A$

潜在应用

- 中压变流器
- 多电平逆变器
- 大功率变流器
- 牵引变流器
- 电机传动
- 风力发电机

电气特性

- 高冲击电流能力
- 高动态坚固性
- 高直流电压稳定性

机械特性

- 加强绝缘封装，10.4kV 交流 10 第二
- 封装的 CTI > 600
- 碳化硅铝 (AlSiC) 基板提供更高的温度循环能力
- 高爬电距离和电气间隙

Potential Applications

- Medium voltage converters
- Multi level inverter
- High power converters
- Traction drives
- Motor drives
- Wind turbines

Electrical Features

- High surge current capability
- High dynamic robustness
- High DC stability

Mechanical Features

- Package with enhanced insulation of 10.4kV AC 10s
- Package with CTI > 600
- AlSiC base plate for increased thermal cycling capability
- High creepage and clearance distances

Module Label Code

Barcode Code 128



DMX - Code



Content of the Code

Content of the Code	Digit
Module Serial Number	1 - 5
Module Material Number	6 - 11
Production Order Number	12 - 19
Datecode (Production Year)	20 - 21
Datecode (Production Week)	22 - 23

二极管, 逆变器 / Diode, Inverter

最大额定值 / Maximum Rated Values

反向重复峰值电压 Repetitive peak reverse voltage	$T_{vj} = -40^{\circ}\text{C}$ $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	V_{RRM}	4500 4500 4500	V
连续正向直流电流 Continuous DC forward current		I_F	400	A
正向重复峰值电流 Repetitive peak forward current	$t_p = 1 \text{ ms}$	I_{FRM}	800	A
I ² t-值 I ² t - value	$V_R = 0 \text{ V}, t_p = 10 \text{ ms}, T_{vj} = 125^{\circ}\text{C}$	I ² t	65,0	kA ² s
最大损耗功率 Maximum power dissipation	$T_{vj} = 125^{\circ}\text{C}$	P_{RQM}	800	kW
最小开通时间 Minimum turn-on time		$t_{on \text{ min}}$	10,0	μs

特征值 / Characteristic Values

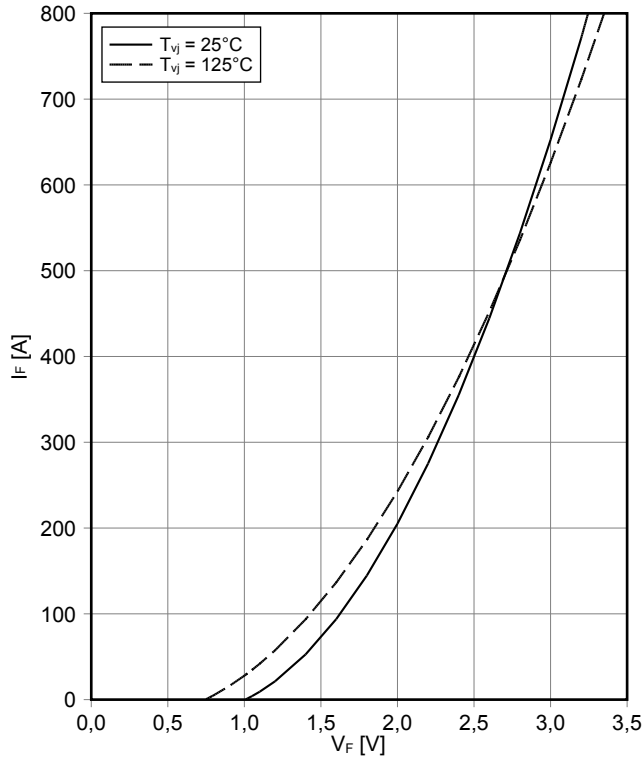
			min.	typ.	max.	
正向电压 Forward voltage	$I_F = 400 \text{ A}, V_{GE} = 0 \text{ V}$ $I_F = 400 \text{ A}, V_{GE} = 0 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	V_F	2,50 2,50	3,10 3,00	V V
反向恢复峰值电流 Peak reverse recovery current	$I_F = 400 \text{ A}, -di_F/dt = 1650 \text{ A}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $V_R = 2800 \text{ V}$ $V_{GE} = -15 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	I_{RM}	500 570		A A
恢复电荷 Recovered charge	$I_F = 400 \text{ A}, -di_F/dt = 1650 \text{ A}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $V_R = 2800 \text{ V}$ $V_{GE} = -15 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	Q_r	390 700		μC μC
反向恢复损耗 (每脉冲) Reverse recovery energy	$I_F = 400 \text{ A}, -di_F/dt = 1650 \text{ A}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $V_R = 2800 \text{ V}$ $V_{GE} = -15 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	E_{rec}	590 1200		mJ mJ
结 - 外壳热阻 Thermal resistance, junction to case	每个二极管 / per diode		R_{thJC}		51,0	K/kW
外壳 - 散热器热阻 Thermal resistance, case to heatsink	每个二极管 / per diode $\lambda_{\text{Paste}} = 1 \text{ W}/(\text{m}\cdot\text{K}) / \lambda_{\text{grease}} = 1 \text{ W}/(\text{m}\cdot\text{K})$		R_{thCH}	42,0		K/kW
在开关状态下温度 Temperature under switching conditions			$T_{vj \text{ op}}$	-50	125	$^{\circ}\text{C}$

模块 / Module

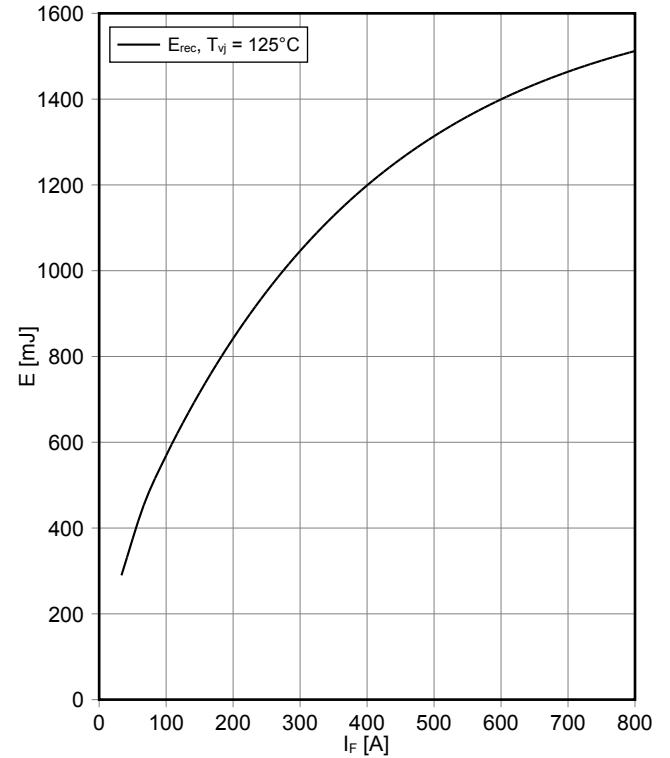
绝缘测试电压 Isolation test voltage	RMS, f = 50 Hz, t = 10 s	V _{ISOL}	10,4		kV
局部放电停止电压 Partial discharge extinction voltage	RMS, f = 50 Hz, Q _{PD} typ 10 pC	V _{ISOL}	3,5		kV
DC 稳定性 DC stability	T _{vj} = 25°C, 100 fit	V _{CE D}	3000		V
模块基板材料 Material of module baseplate			AISiC		
内部绝缘 Internal isolation	基本绝缘 (class 1, IEC 61140) basic insulation (class 1, IEC 61140)		AIN		
爬电距离 Creepage distance	端子至散热器 / terminal to heatsink 端子至端子 / terminal to terminal		56,0 56,0		mm
电气间隙 Clearance	端子至散热器 / terminal to heatsink 端子至端子 / terminal to terminal		26,0 26,0		mm
相对电痕指数 Comperative tracking index		CTI	> 600		
			min.	typ.	max.
杂散电感, 模块 Stray inductance module		L _{sCE}		25	nH
模块引线电阻, 端子-芯片 Module lead resistance, terminals - chip	T _c = 25°C, 每个开关 / per switch	R _{AA'+CC'}		0,37	mΩ
储存温度 Storage temperature		T _{stg}	-55		125 °C
模块安装的安装扭矩 Mounting torque for modul mounting	螺丝 M6 根据相应的应用手册进行安装 Screw M6 - Mounting according to valid application note	M	4,25		5,75 Nm
端子联接扭矩 Terminal connection torque	螺丝 M8 根据相应的应用手册进行安装 Screw M8 - Mounting according to valid application note	M	8,0	-	10 Nm
重量 Weight		G		1000	g

Dynamische Daten gelten in Verbindung mit FZ400R45KL3_B5 Modul
Dynamic data valid in conjunction with FZ400R45KL3_B5 module

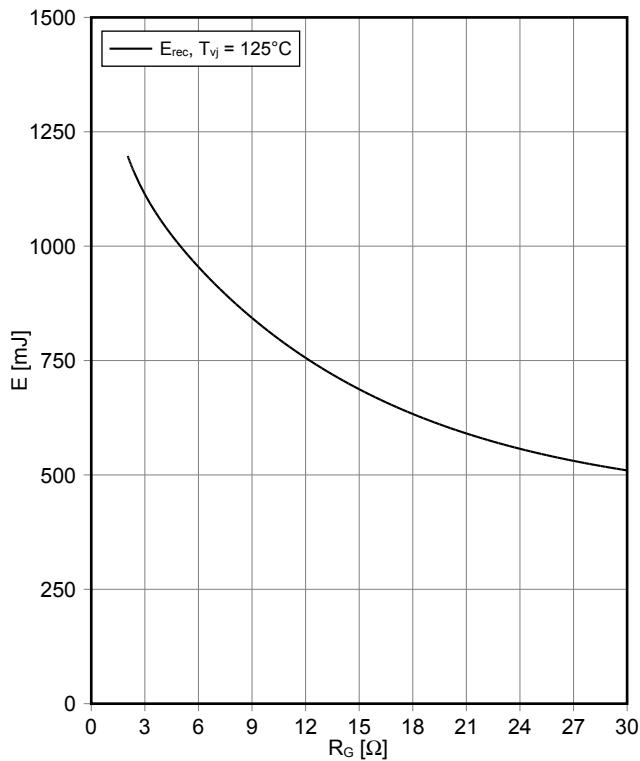
正向偏压特性 二极管,逆变器 (典型)
forward characteristic of Diode, Inverter (typical)
 $I_F = f(V_F)$



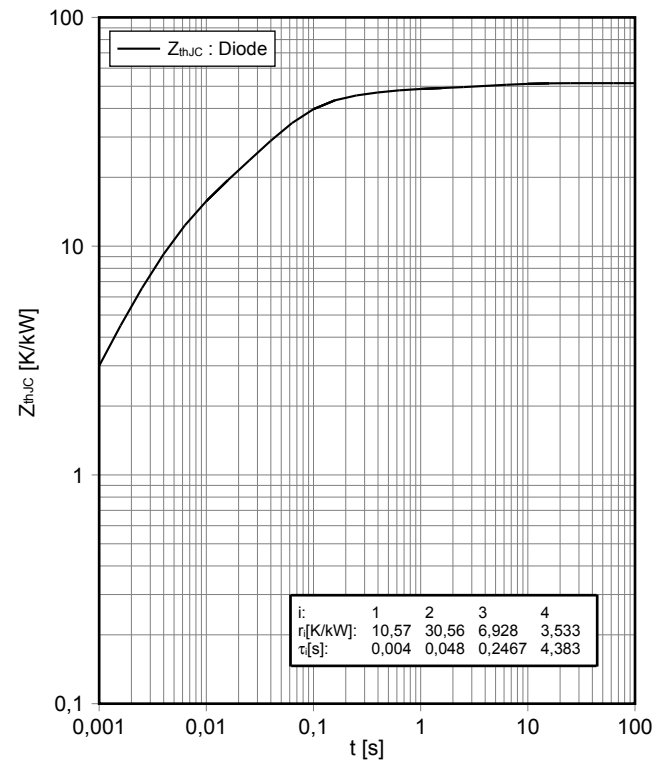
开关损耗 二极管,逆变器 (典型)
switching losses Diode, Inverter (typical)
 $E_{rec} = f(I_F)$
 $-di_F/dt = 1670\text{A}\mu\text{s}, V_{CE} = 2800\text{V}$



开关损耗 二极管,逆变器 (典型)
switching losses Diode, Inverter (typical)
 $E_{rec} = f(R_G)$
 $I_F = 400\text{A}, V_{CE} = 2800\text{V}$

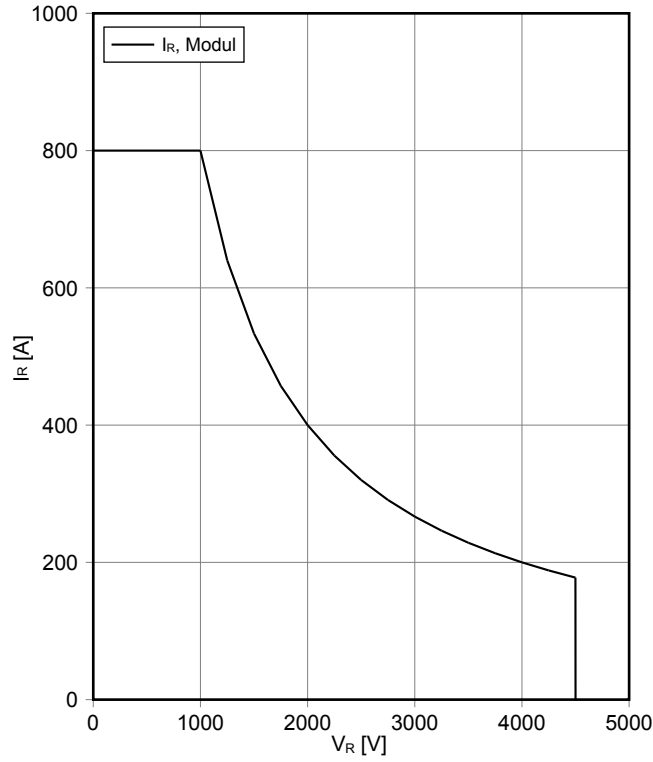


瞬态热阻抗 二极管,逆变器
transient thermal impedance Diode, Inverter
 $Z_{thJC} = f(t)$

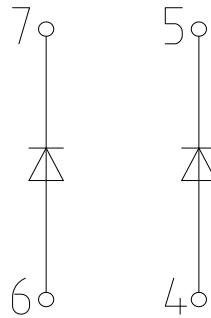


安全工作区 二极管, 逆变器 (SOA)
safe operation area Diode, Inverter (SOA)

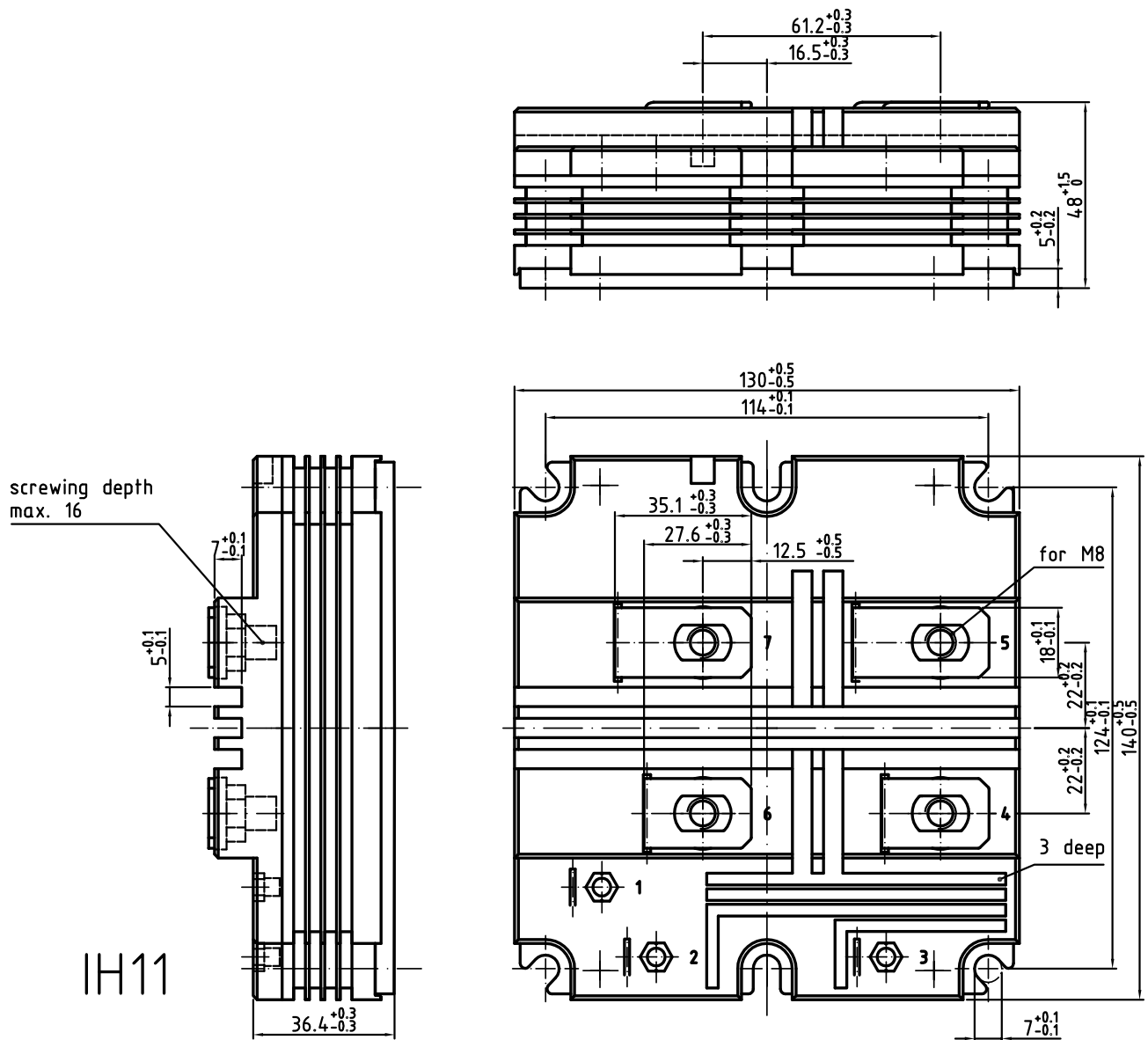
$I_R = f(V_R)$
 $T_{vj} = 125^\circ\text{C}$



接线图 / Circuit diagram



封装尺寸 / Package outlines



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