

初步数据  
Preliminary Data

IGBT, 逆变器 / IGBT, Inverter  
最大额定值 / Maximum Rated Values

集电极 - 发射极电压 Collector-emitter voltage	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = -25^{\circ}\text{C}$	$V_{CES}$	3300 3300	V
连续集电极直流电流 Continuous DC collector current	$T_C = 80^{\circ}\text{C}, T_{vj\max} = 150^{\circ}\text{C}$ $T_C = 25^{\circ}\text{C}, T_{vj\max} = 150^{\circ}\text{C}$	$I_{C\text{nom}}$ $I_C$	200 330	A A
集电极重复峰值电流 Repetitive peak collector current	$t_P = 1\text{ ms}$	$I_{CRM}$	400	A
总功率损耗 Total power dissipation	$T_C = 25^{\circ}\text{C}, T_{vj\max} = 150^{\circ}\text{C}$	$P_{\text{tot}}$	2,20	kW
栅极 - 发射极峰值电压 Gate-emitter peak voltage		$V_{GES}$	+/-20	V

特征值 / Characteristic Values

			min.	typ.	max.		
集电极 - 发射极饱和电压 Collector-emitter saturation voltage	$I_C = 200\text{ A}, V_{GE} = 15\text{ V}$ $I_C = 200\text{ A}, V_{GE} = 15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$V_{CE\text{sat}}$	3,40 4,30	4,25 5,00	V V	
栅极阈值电压 Gate threshold voltage	$I_C = 20,0\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$		$V_{G\text{Eth}}$	4,20	5,10	6,00	V
栅极电荷 Gate charge	$V_{GE} = -15\text{ V} \dots +15\text{ V}, V_{CE} = 1800\text{ V}$		$Q_G$	4,00			$\mu\text{C}$
内部栅极电阻 Internal gate resistor	$T_{vj} = 25^{\circ}\text{C}$		$R_{G\text{int}}$	2,5			$\Omega$
输入电容 Input capacitance	$f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		$C_{\text{ies}}$	25,0			nF
反向传输电容 Reverse transfer capacitance	$f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		$C_{\text{res}}$	1,40			nF
集电极-发射极截止电流 Collector-emitter cut-off current	$V_{CE} = 3300\text{ V}, V_{GE} = 0\text{ V}, T_{vj} = 25^{\circ}\text{C}$		$I_{CES}$		5,0		mA
栅极-发射极漏电流 Gate-emitter leakage current	$V_{CE} = 0\text{ V}, V_{GE} = 20\text{ V}, T_{vj} = 25^{\circ}\text{C}$		$I_{GES}$		400		nA
开通延迟时间(电感负载) Turn-on delay time, inductive load	$I_C = 200\text{ A}, V_{CE} = 1800\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{G\text{on}} = 5,6\ \Omega, C_{GE} = 33,0\text{ nF}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$t_{d\text{on}}$	0,28 0,28			$\mu\text{s}$ $\mu\text{s}$
上升时间(电感负载) Rise time, inductive load	$I_C = 200\text{ A}, V_{CE} = 1800\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{G\text{on}} = 5,6\ \Omega, C_{GE} = 33,0\text{ nF}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$t_r$	0,18 0,20			$\mu\text{s}$ $\mu\text{s}$
关断延迟时间(电感负载) Turn-off delay time, inductive load	$I_C = 200\text{ A}, V_{CE} = 1800\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{G\text{off}} = 7,5\ \Omega, C_{GE} = 33,0\text{ nF}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$t_{d\text{off}}$	1,55 1,70			$\mu\text{s}$ $\mu\text{s}$
下降时间(电感负载) Fall time, inductive load	$I_C = 200\text{ A}, V_{CE} = 1800\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{G\text{off}} = 7,5\ \Omega, C_{GE} = 33,0\text{ nF}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$t_f$	0,20 0,20			$\mu\text{s}$ $\mu\text{s}$
开通损耗能量(每脉冲) Turn-on energy loss per pulse	$I_C = 200\text{ A}, V_{CE} = 1800\text{ V}, L_S = 70\text{ nH}$ $V_{GE} = \pm 15\text{ V}$ $R_{G\text{on}} = 5,6\ \Omega, C_{GE} = 33,0\text{ nF}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$E_{\text{on}}$	235 365			mJ mJ
关断损耗能量(每脉冲) Turn-off energy loss per pulse	$I_C = 200\text{ A}, V_{CE} = 1800\text{ V}, L_S = 70\text{ nH}$ $V_{GE} = \pm 15\text{ V}$ $R_{G\text{off}} = 7,5\ \Omega, C_{GE} = 33,0\text{ nF}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$E_{\text{off}}$	215 255			mJ mJ
短路数据 SC data	$V_{GE} \leq 15\text{ V}, V_{CC} = 2500\text{ V}$ $V_{CE\text{max}} = V_{CES} - L_{S\text{CE}} \cdot di/dt$ $t_P \leq 10\ \mu\text{s}, T_{vj} = 125^{\circ}\text{C}$		$I_{SC}$	1000			A
结 - 外壳热阻 Thermal resistance, junction to case	每个 IGBT / per IGBT		$R_{th\text{JC}}$		57,0		K/kW
外壳 - 散热器热阻 Thermal resistance, case to heatsink	每个 IGBT / per IGBT $\lambda_{\text{Paste}} = 1\text{ W}/(\text{m}\cdot\text{K}) / \lambda_{\text{grease}} = 1\text{ W}/(\text{m}\cdot\text{K})$		$R_{th\text{CH}}$	49,0			K/kW
在开关状态下温度 Temperature under switching conditions			$T_{vj\text{op}}$	-40	125		$^{\circ}\text{C}$

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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	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = -25^{\circ}\text{C}$	$V_{RRM}$	3300 3300	V
连续正向直流电流 Continuous DC forward current		$I_F$	200	A
正向重复峰值电流 Repetitive peak forward current	$t_P = 1 \text{ ms}$	$I_{FRM}$	400	A
$I^2t$ -值 $I^2t$ - value	$V_R = 0 \text{ V}$ , $t_P = 10 \text{ ms}$ , $T_{vj} = 125^{\circ}\text{C}$	$I^2t$	14,0	kA <sup>2</sup> s
最大损耗功率 Maximum power dissipation	$T_{vj} = 125^{\circ}\text{C}$	$P_{RQM}$	400	kW
最小开通时间 Minimum turn-on time		$t_{on \text{ min}}$	10,0	$\mu\text{s}$

特征值 / Characteristic Values

				min.	typ.	max.	
正向电压 Forward voltage	$I_F = 200 \text{ A}$ , $V_{GE} = 0 \text{ V}$ $I_F = 200 \text{ A}$ , $V_{GE} = 0 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$V_F$		2,80 2,80	3,50 3,50	V V
反向恢复峰值电流 Peak reverse recovery current	$I_F = 200 \text{ A}$ , $-di_F/dt = 1100 \text{ A}/\mu\text{s}$ ( $T_{vj}=125^{\circ}\text{C}$ ) $V_R = 1800 \text{ V}$ $V_{GE} = -15 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$I_{RM}$		275 325		A A
恢复电荷 Recovered charge	$I_F = 200 \text{ A}$ , $-di_F/dt = 1100 \text{ A}/\mu\text{s}$ ( $T_{vj}=125^{\circ}\text{C}$ ) $V_R = 1800 \text{ V}$ $V_{GE} = -15 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$Q_r$		120 220		$\mu\text{C}$ $\mu\text{C}$
反向恢复损耗 (每脉冲) Reverse recovery energy	$I_F = 200 \text{ A}$ , $-di_F/dt = 1100 \text{ A}/\mu\text{s}$ ( $T_{vj}=125^{\circ}\text{C}$ ) $V_R = 1800 \text{ V}$ $V_{GE} = -15 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$E_{rec}$		125 255		mJ mJ
结 - 外壳热阻 Thermal resistance, junction to case	每个二极管 / per diode		$R_{thJC}$			108	K/kW
外壳 - 散热器热阻 Thermal resistance, case to heatsink	每个二极管 / per diode $\lambda_{\text{Paste}} = 1 \text{ W}/(\text{m}\cdot\text{K})$ / $\lambda_{\text{grease}} = 1 \text{ W}/(\text{m}\cdot\text{K})$		$R_{thCH}$		93,0		K/kW
在开关状态下温度 Temperature under switching conditions			$T_{vj \text{ op}}$	-40		125	$^{\circ}\text{C}$

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模块 / Module

绝缘测试电压 Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	V <sub>ISOL</sub>	6,0		kV
局部放电停止电压 Partial discharge extinction voltage	RMS, f = 50 Hz, Q <sub>PD</sub> ≤ 10 pC (acc. to IEC 1287)	V <sub>ISOL</sub>	2,6		kV
DC 稳定性 DC stability	T <sub>vj</sub> = 25°C, 100 fit	V <sub>CE D</sub>	1800		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		32,2 32,2		mm
电气间隙 Clearance	端子至散热器 / terminal to heatsink 端子至端子 / terminal to terminal		19,1 19,1		mm
相对电痕指数 Comperative tracking index		CTI	> 400		
			min.	typ.	max.
外壳 - 散热器热阻 Thermal resistance, case to heatsink	每个模块 / per module λ <sub>Paste</sub> = 1 W/(m·K) / λ <sub>grease</sub> = 1 W/(m·K)	R <sub>thCH</sub>	16,0		K/kW
杂散电感, 模块 Stray inductance module		L <sub>sCE</sub>	58		nH
模块引线电阻, 端子-芯片 Module lead resistance, terminals - chip	T <sub>c</sub> = 25°C, 每个开关 / per switch	R <sub>CC+EE'</sub>	0,78		mΩ
储存温度 Storage temperature		T <sub>stg</sub>	-40	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 M5 根据相应的应用手册进行安装 Screw M5 - Mounting according to valid application note	M	3,6	4,2	Nm
重量 Weight		G	500		g

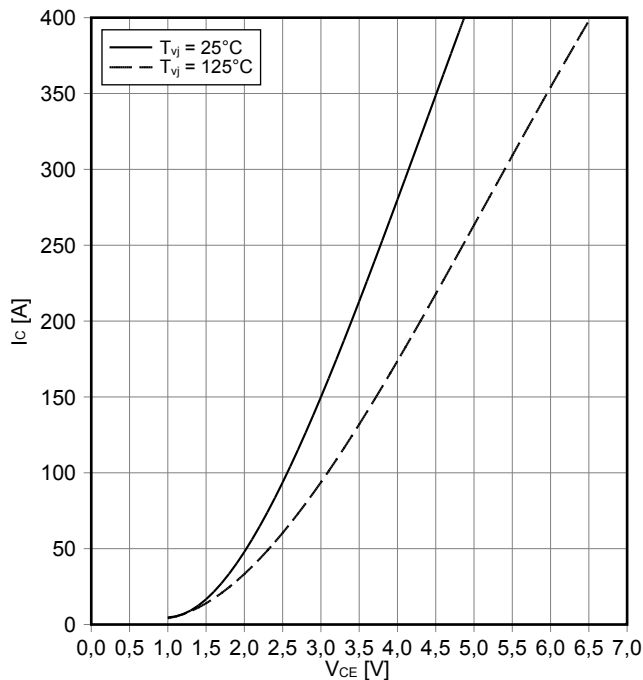
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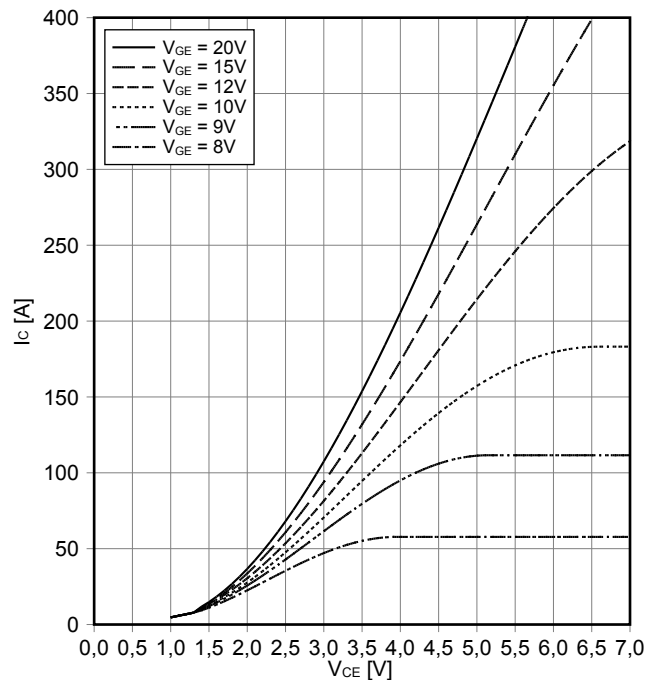
输出特性 IGBT, 逆变器 (典型)  
output characteristic IGBT, Inverter (typical)

$I_C = f(V_{CE})$   
 $V_{GE} = 15\text{ V}$



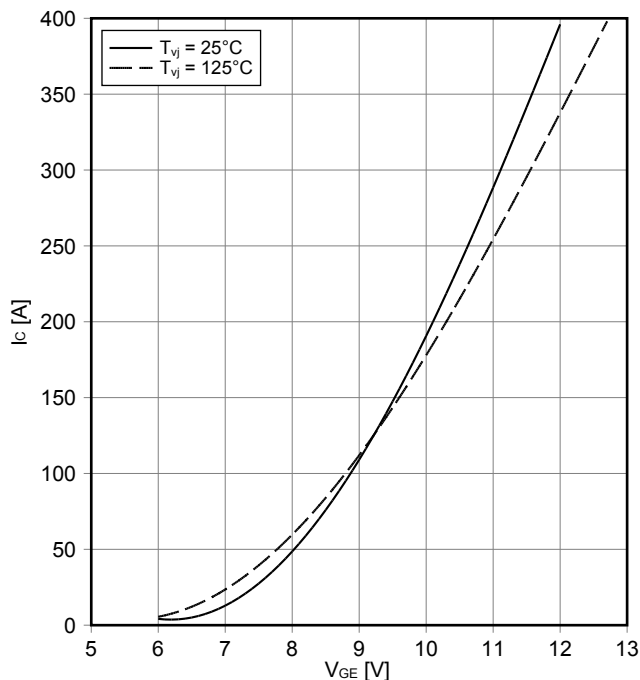
输出特性 IGBT, 逆变器 (典型)  
output characteristic IGBT, Inverter (typical)

$I_C = f(V_{CE})$   
 $T_{vj} = 125^\circ\text{C}$



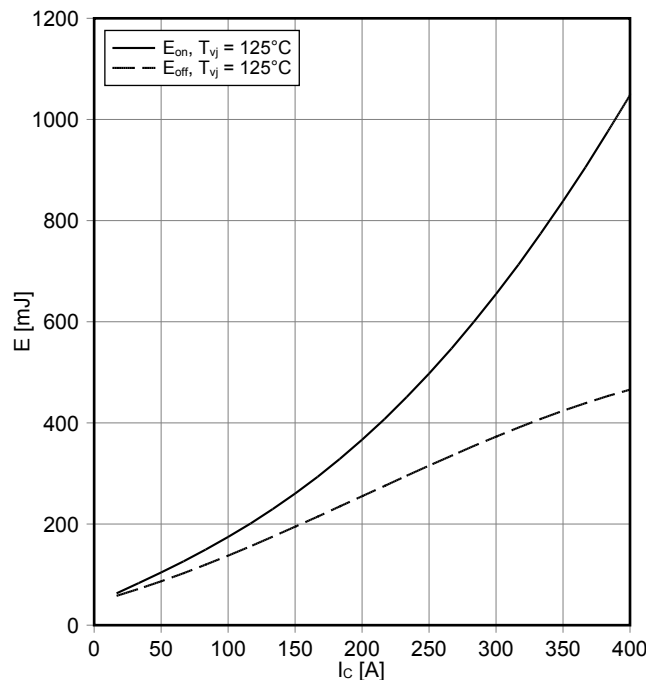
传输特性 IGBT, 逆变器 (典型)  
transfer characteristic IGBT, Inverter (typical)

$I_C = f(V_{GE})$   
 $V_{CE} = 20\text{ V}$



开关损耗 IGBT, 逆变器 (典型)  
switching losses IGBT, Inverter (typical)

$E_{on} = f(I_C)$ ,  $E_{off} = f(I_C)$   
 $V_{GE} = \pm 15\text{ V}$ ,  $R_{Gon} = 5.6\ \Omega$ ,  $R_{Goff} = 7.5\ \Omega$ ,  $V_{CE} = 1800\text{ V}$ ,  $C_{GE} = 33\text{ nF}$

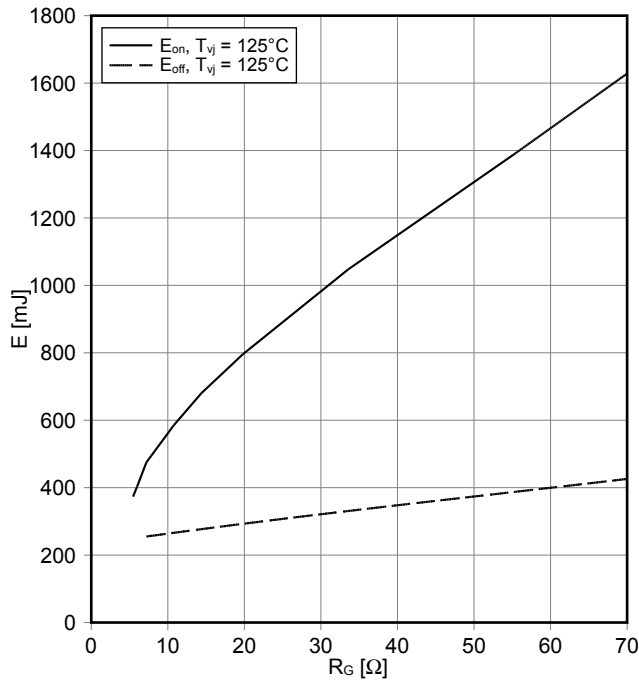


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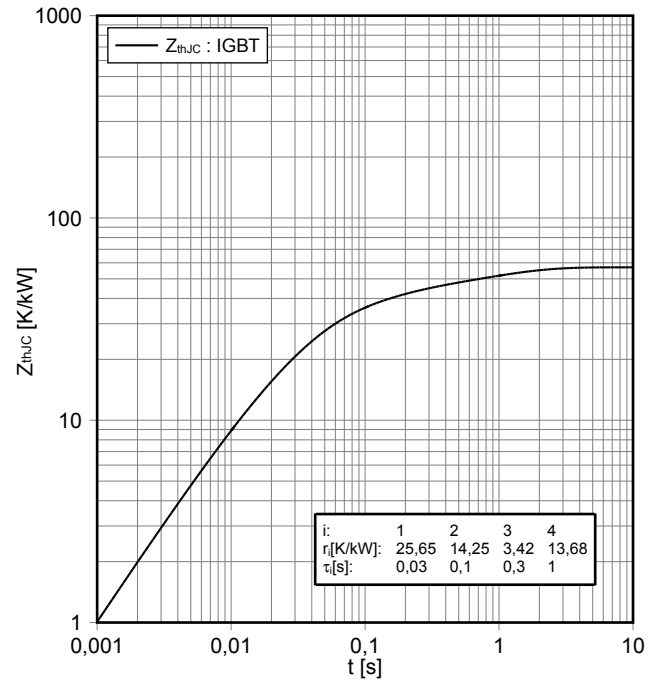
开关损耗 IGBT, 逆变器 (典型)  
switching losses IGBT, Inverter (typical)

$E_{on} = f(R_G)$ ,  $E_{off} = f(R_G)$   
 $V_{GE} = \pm 15\text{ V}$ ,  $I_C = 200\text{ A}$ ,  $V_{CE} = 1800\text{ V}$ ,  $C_{GE} = 33\text{ nF}$



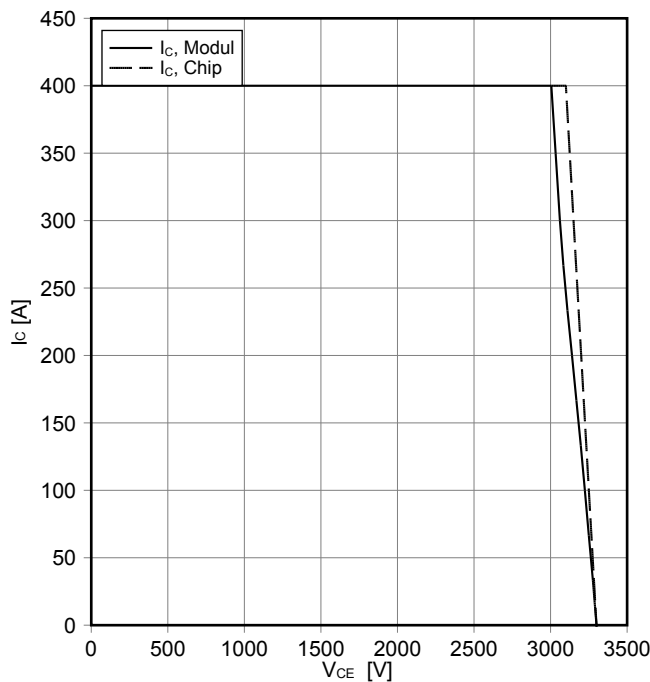
瞬态热阻抗 IGBT, 逆变器

transient thermal impedance IGBT, Inverter  
 $Z_{thJC} = f(t)$



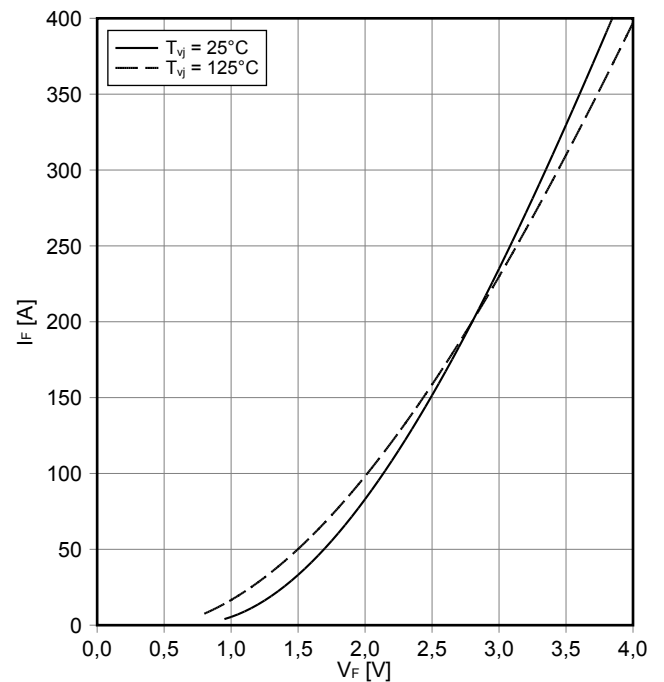
反偏安全工作区 IGBT, 逆变器 (RBSOA)  
reverse bias safe operating area IGBT, Inverter (RBSOA)

$I_C = f(V_{CE})$   
 $V_{GE} = \pm 15\text{ V}$ ,  $R_{Goff} = 7.5\ \Omega$ ,  $T_{vj} = 125^\circ\text{C}$ ,  $C_{GE} = 33\text{ nF}$



正向偏压特性 二极管, 逆变器 (典型)  
forward characteristic of Diode, Inverter (typical)

$I_F = f(V_F)$

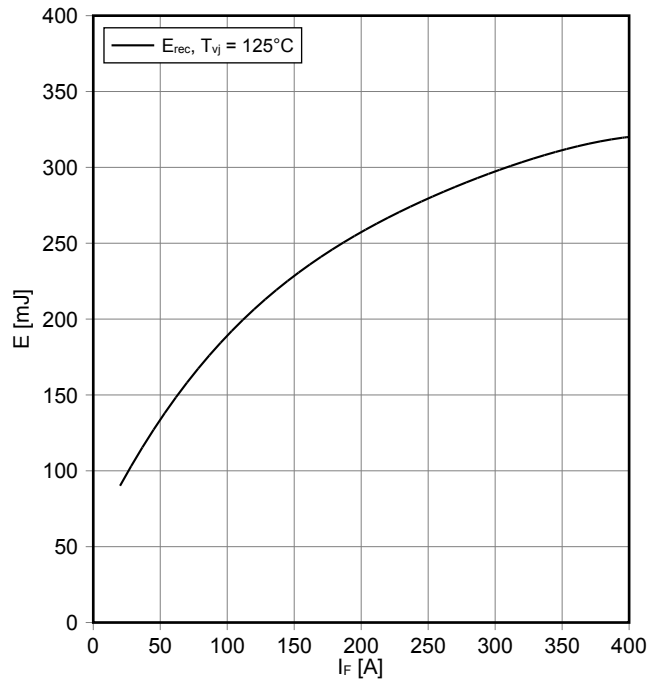


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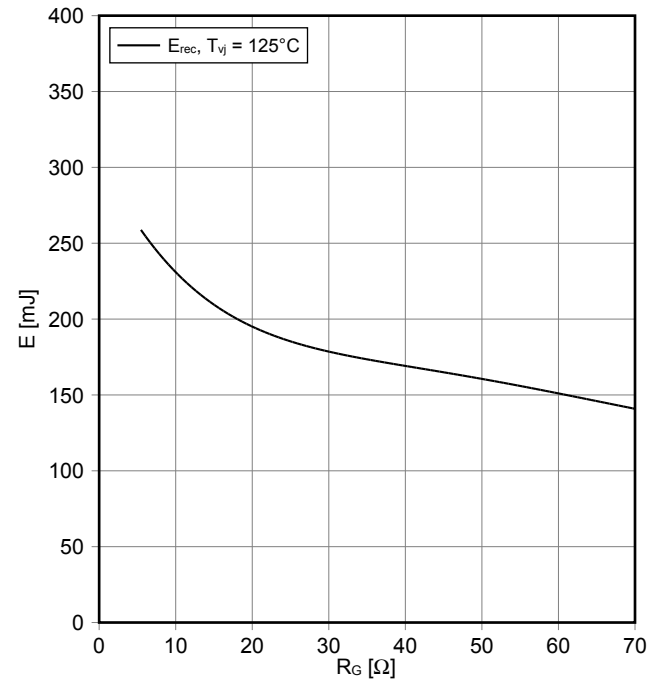
开关损耗 二极管,逆变器 (典型)  
switching losses Diode, Inverter (typical)

$E_{rec} = f(I_F)$   
 $R_{Gon} = 5.6 \Omega, V_{CE} = 1800 V$



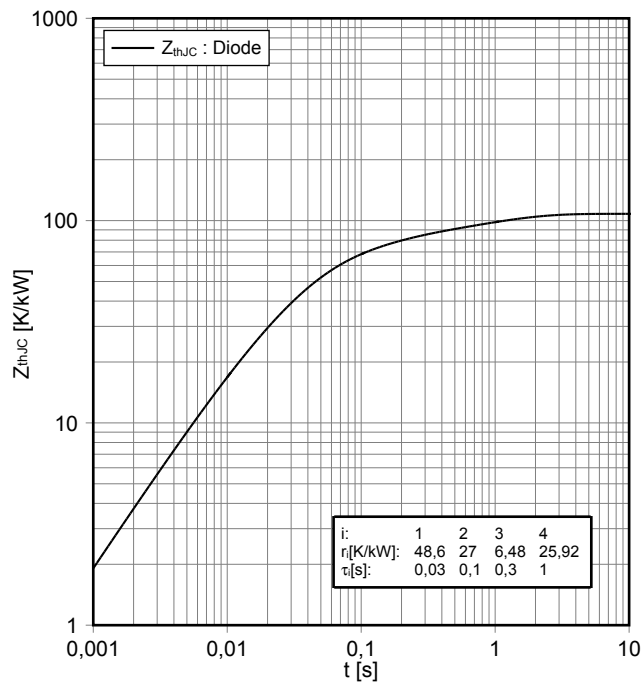
开关损耗 二极管,逆变器 (典型)  
switching losses Diode, Inverter (typical)

$E_{rec} = f(R_G)$   
 $I_F = 200 A, V_{CE} = 1800 V$



瞬态热阻抗 二极管,逆变器  
transient thermal impedance Diode, Inverter

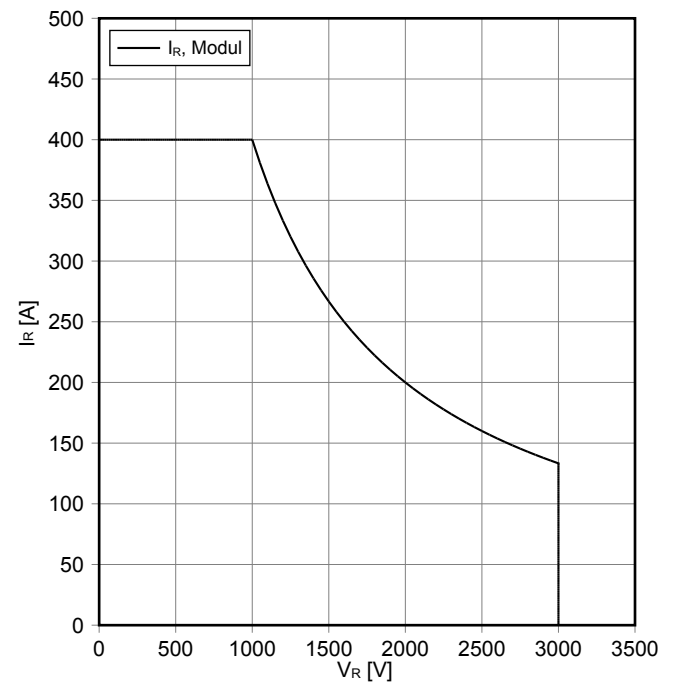
$Z_{thJC} = f(t)$



i:	1	2	3	4
r_i [K/kW]:	48,6	27	6,48	25,92
τ_i [s]:	0,03	0,1	0,3	1

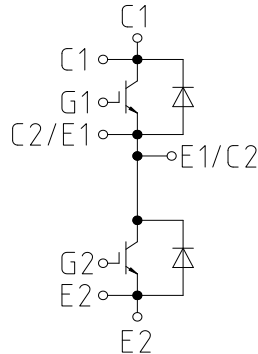
安全工作区 二极管,逆变器 (SOA)  
safe operation area Diode, Inverter (SOA)

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

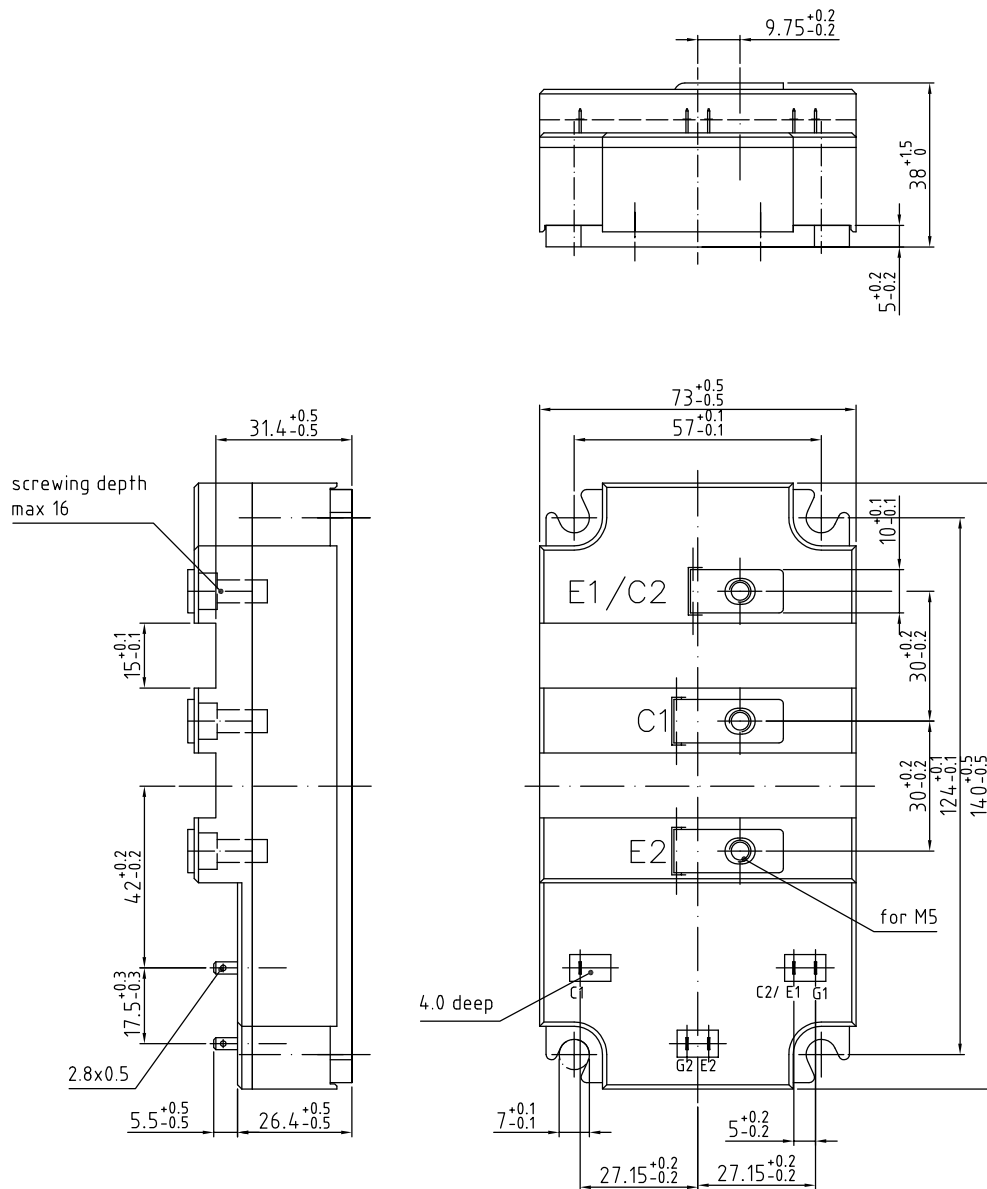


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接线图 / Circuit diagram



封装尺寸 / Package outlines



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**使用条件和条款**

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- the conclusion of Quality Agreements;
- to establish joint measures of an ongoing product survey, and that we may make delivery depended on the realization of any such measures.

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