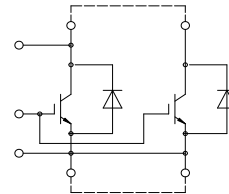


IHM-B 模块 采用软特性的沟槽栅IGBT  
IHM-B module with soft-switching Trench-IGBT4

初步数据 / Preliminary Data



external connection  
(to be done)

$V_{CES} = 1700V$   
 $I_{C\ nom} = 1200A / I_{CRM} = 2400A$

典型应用

- 大功率变流器
- 电机传动

电气特性

- 提高工作结温  $T_{vj\ op}$
- 低  $V_{CEsat}$
- $T_{vj\ op} = 150^{\circ}C$

机械特性

- 4 kV 交流 1分钟 绝缘
- 封装的 CTI > 400
- 高爬电距离和电气间隙
- 高功率密度
- IHM B 封装
- 铜基板

Typical Applications

- High Power Converters
- Motor Drives

Electrical Features

- Extended Operation Temperature  $T_{vj\ op}$
- Low  $V_{CEsat}$
- $T_{vj\ op} = 150^{\circ}C$

Mechanical Features

- 4 kV AC 1min Insulation
- Package with CTI > 400
- High Creepage and Clearance Distances
- High Power Density
- IHM B Housing
- Copper Base Plate

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

prepared by: WB	date of publication: 2013-03-09	
approved by: PL	revision: 2.2	UL approved (E83335)

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	$T_{vj} = 25^{\circ}\text{C}$	$V_{CES}$	1700	V
连续集电极直流电流 Continuous DC collector current	$T_C = 100^{\circ}\text{C}, T_{vj} = 175^{\circ}\text{C}$	$I_{C\text{ nom}}$	1200	A
集电极重复峰值电流 Repetitive peak collector current	$t_P = 1\text{ ms}$	$I_{CRM}$	2400	A
总损耗 Total power dissipation	$T_C = 25^{\circ}\text{C}, T_{vj} = 175^{\circ}\text{C}$	$P_{\text{tot}}$	7,80	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	$I_C = 1200\text{ A}, V_{GE} = 15\text{ V}$ $I_C = 1200\text{ A}, V_{GE} = 15\text{ V}$ $I_C = 1200\text{ A}, V_{GE} = 15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$V_{CE\text{ sat}}$	1,90 2,30 2,40	2,25	V V V
栅极阈值电压 Gate threshold voltage	$I_C = 48,0\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$		$V_{GEth}$	5,2	5,8	6,4 V
栅极电荷 Gate charge	$V_{GE} = -15\text{ V} \dots +15\text{ V}$		$Q_G$	12,5		$\mu\text{C}$
内部栅极电阻 Internal gate resistor	$T_{vj} = 25^{\circ}\text{C}$		$R_{Gint}$	1,6		$\Omega$
输入电容 Input capacitance	$f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		$C_{ies}$	97,0		nF
反向传输电容 Reverse transfer capacitance	$f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		$C_{res}$	3,20		nF
集电极-发射极截止电流 Collector-emitter cut-off current	$V_{CE} = 1700\text{ V}, V_{GE} = 0\text{ V}, T_{vj} = 25^{\circ}\text{C}$		$I_{CES}$		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	$I_C = 1200\text{ A}, V_{CE} = 900\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 0,62\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_{don}$	0,76 0,79 0,82		$\mu\text{s}$ $\mu\text{s}$ $\mu\text{s}$
上升时间(电感负载) Rise time, inductive load	$I_C = 1200\text{ A}, V_{CE} = 900\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 0,62\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_r$	0,13 0,14 0,14		$\mu\text{s}$ $\mu\text{s}$ $\mu\text{s}$
关断延迟时间(电感负载) Turn-off delay time, inductive load	$I_C = 1200\text{ A}, V_{CE} = 900\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 0,8\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_{doff}$	1,10 1,20 1,25		$\mu\text{s}$ $\mu\text{s}$ $\mu\text{s}$
下降时间(电感负载) Fall time, inductive load	$I_C = 1200\text{ A}, V_{CE} = 900\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 0,8\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_f$	0,35 0,52 0,56		$\mu\text{s}$ $\mu\text{s}$ $\mu\text{s}$
开通损耗(每脉冲) Turn-on energy loss per pulse	$I_C = 1200\text{ A}, V_{CE} = 900\text{ V}, L_S = 50\text{ nH}$ $V_{GE} = \pm 15\text{ V}, di/dt = 8750\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $R_{Gon} = 0,62\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$E_{on}$	265 365 375		mJ mJ mJ
关断损耗(每脉冲) Turn-off energy loss per pulse	$I_C = 1200\text{ A}, V_{CE} = 900\text{ V}, L_S = 50\text{ nH}$ $V_{GE} = \pm 15\text{ V}, du/dt = 3200\text{ V}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $R_{Goff} = 0,8\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$E_{off}$	320 415 440		mJ mJ mJ
短路数据 SC data	$V_{GE} \leq 15\text{ V}, V_{CC} = 1000\text{ V}$ $V_{CEmax} = V_{CES} - L_{SCE} \cdot di/dt$ $t_P \leq 10\ \mu\text{s}, T_{vj} = 150^{\circ}\text{C}$		$I_{SC}$	5000		A
结 - 壳热阻 Thermal resistance, junction to case	每个 IGBT / per IGBT		$R_{thJC}$		19,0	K/kW
壳 - 散热器热阻 Thermal resistance, case to heatsink	每个 IGBT / per IGBT $\lambda_{\text{Paste}} = 1\text{ W}/(\text{m}\cdot\text{K})$ / $\lambda_{\text{grease}} = 1\text{ W}/(\text{m}\cdot\text{K})$		$R_{thCH}$	10,0		K/kW

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初步数据  
Preliminary Data

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	$T_{vj} = 25^{\circ}\text{C}$	$V_{RRM}$	1700	V
连续正向直流电流 Continuous DC forward current		$I_F$	1200	A
正向重复峰值电流 Repetitive peak forward current	$t_P = 1\text{ ms}$	$I_{FRM}$	2400	A
I <sup>2</sup> t-值 I <sup>2</sup> t - value	$V_R = 0\text{ V}, t_P = 10\text{ ms}, T_{vj} = 125^{\circ}\text{C}$ $V_R = 0\text{ V}, t_P = 10\text{ ms}, T_{vj} = 150^{\circ}\text{C}$	I <sup>2</sup> t	265 250	kA <sup>2</sup> s kA <sup>2</sup> s
最大耗散功率 Maximum power dissipation	$T_{vj} = 125^{\circ}\text{C}$	$P_{RQM}$	1200	kW
最小开通时间 Minimum turn-on time		$t_{on\ min}$	10,0	μs

特征值 / Characteristic Values

			min.	typ.	max.	
正向电压 Forward voltage	$I_F = 1200\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 1200\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 1200\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$V_F$	1,80 1,90 1,95	2,20	V V V
反向恢复峰值电流 Peak reverse recovery current	$I_F = 1200\text{ A}, -di_F/dt = 8750\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 900\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$I_{RM}$	1350 1550 1550		A A A
恢复电荷 Recovered charge	$I_F = 1200\text{ A}, -di_F/dt = 8750\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 900\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$Q_r$	305 500 560		μC μC μC
反向恢复损耗 (每脉冲) Reverse recovery energy	$I_F = 1200\text{ A}, -di_F/dt = 8750\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 900\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$E_{rec}$	175 315 350		mJ mJ mJ
结 - 壳热阻 Thermal resistance, junction to case	每个二极管 / per diode		$R_{thJC}$		32,0	K/kW
壳 - 散热器热阻 Thermal resistance, case to heatsink	每个二极管 / per diode $\lambda_{Paste} = 1\text{ W}/(\text{m}\cdot\text{K})$ / $\lambda_{grease} = 1\text{ W}/(\text{m}\cdot\text{K})$		$R_{thCH}$	11,0		K/kW

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初步数据  
Preliminary Data

模块 / Module

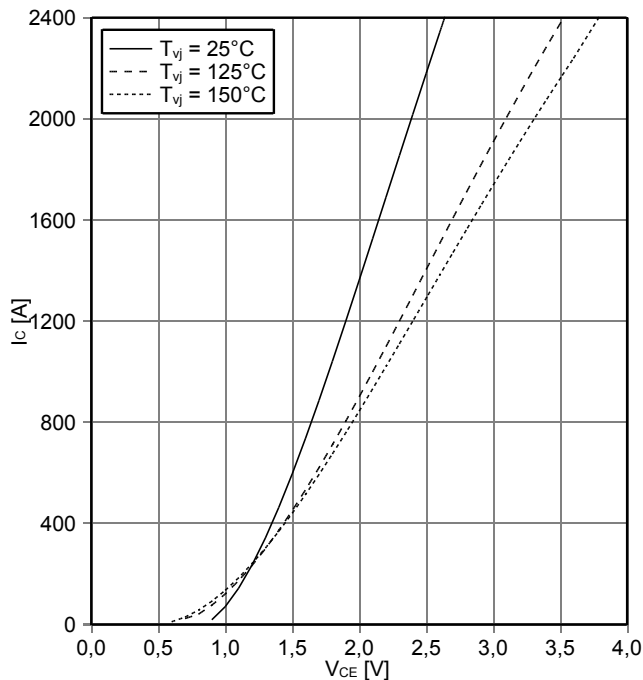
绝缘测试电压 Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	V <sub>ISOL</sub>	4,0		kV
模块基板材料 Material of module baseplate			Cu		
内部绝缘材料 Internal isolation	基本绝缘 (class 1, IEC 61140) basic insulation (class 1, IEC 61140)		Al <sub>2</sub> O <sub>3</sub>		
爬电距离 Creepage distance	如何与取得联系- 散热片 / terminal to heatsink 如何与取得联系- 如何与取得联系 / terminal to terminal		32,2 32,2		mm
电气间隙 Clearance	如何与取得联系- 散热片 / terminal to heatsink 如何与取得联系- 如何与取得联系 / terminal to terminal		19,1 19,1		mm
相对电痕指数 Comperative tracking index		CTI	> 400		
			min.	typ.	max.
杂散电感, 模块 Stray inductance module		L <sub>sCE</sub>	9,0		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>	0,18		mΩ
最大结温 Maximum junction temperature	逆变器, 制动-斩波器 / inverter, brake-chopper	T <sub>vj max</sub>			175 °C
在开关状态下温度 Temperature under switching conditions	逆变器, 制动-斩波器 / inverter, brake-chopper	T <sub>vj op</sub>	-40		150 °C
储存温度 Storage temperature		T <sub>stg</sub>	-40		150 °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	1,8 8,0	-	2,1 10 Nm
重量 Weight		G		1300	g

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初步数据  
Preliminary Data

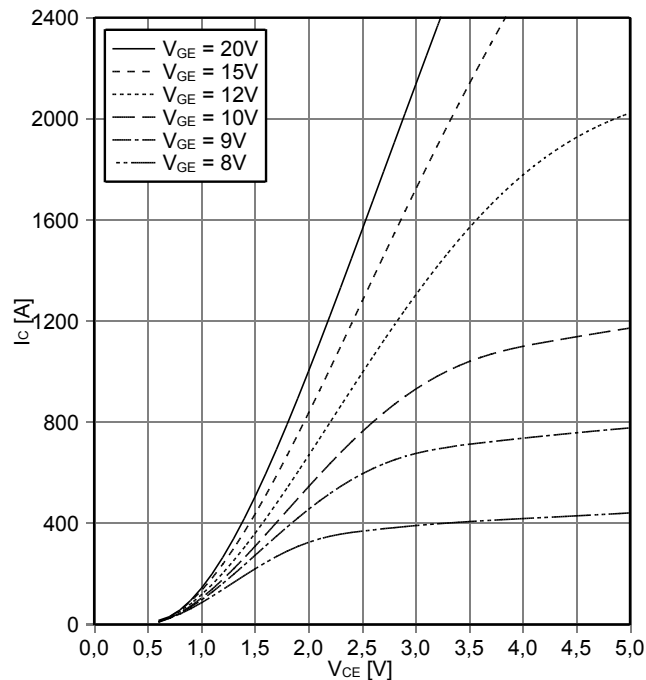
输出特性 IGBT, 逆变器 (典型)  
output characteristic IGBT, Inverter (typical)

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



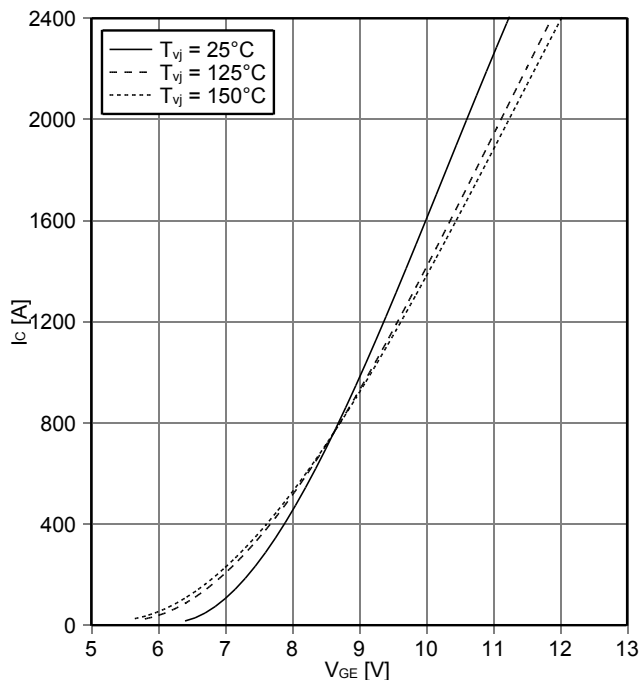
输出特性 IGBT, 逆变器 (典型)  
output characteristic IGBT, Inverter (typical)

$I_C = f(V_{CE})$   
 $T_{vj} = 150^\circ\text{C}$



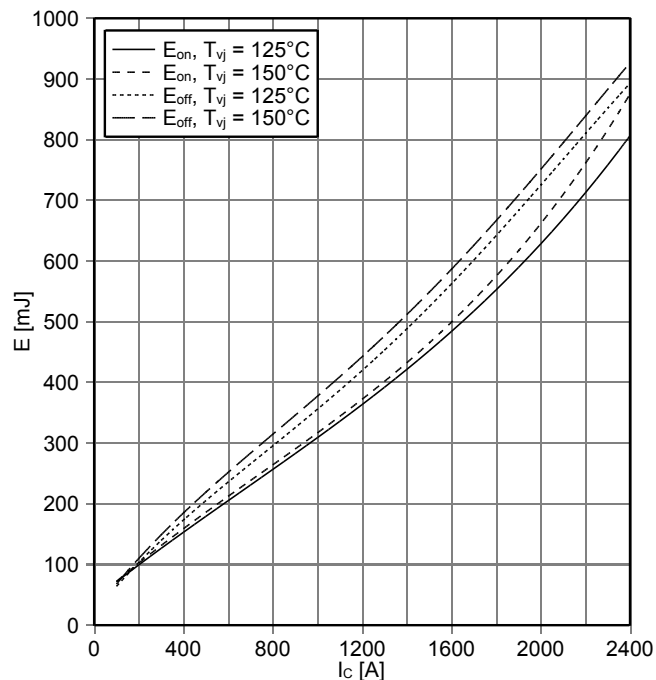
传输特性 IGBT, 逆变器 (典型)  
transfer characteristic IGBT, Inverter (typical)

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



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

$E_{on} = f(I_C)$ ,  $E_{off} = f(I_C)$   
 $V_{GE} = \pm 15\text{ V}$ ,  $R_{Gon} = 0.62\ \Omega$ ,  $R_{Goff} = 0.8\ \Omega$ ,  $V_{CE} = 900\text{ V}$

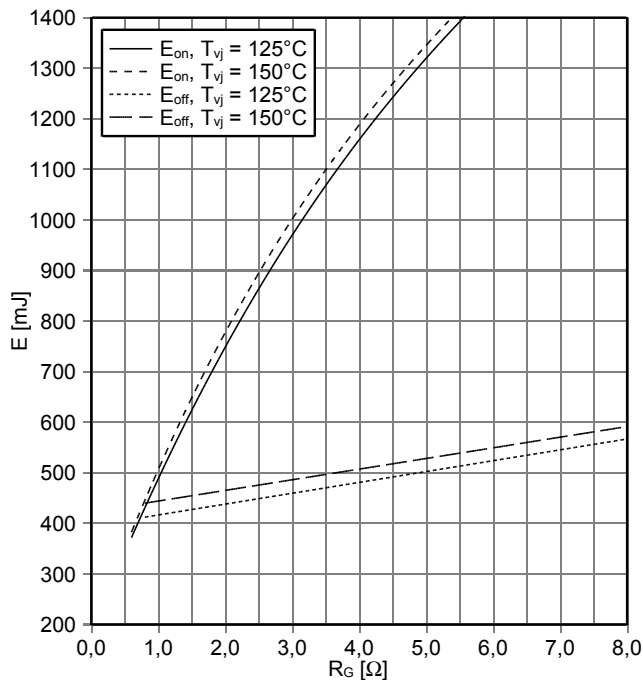


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初步数据  
Preliminary Data

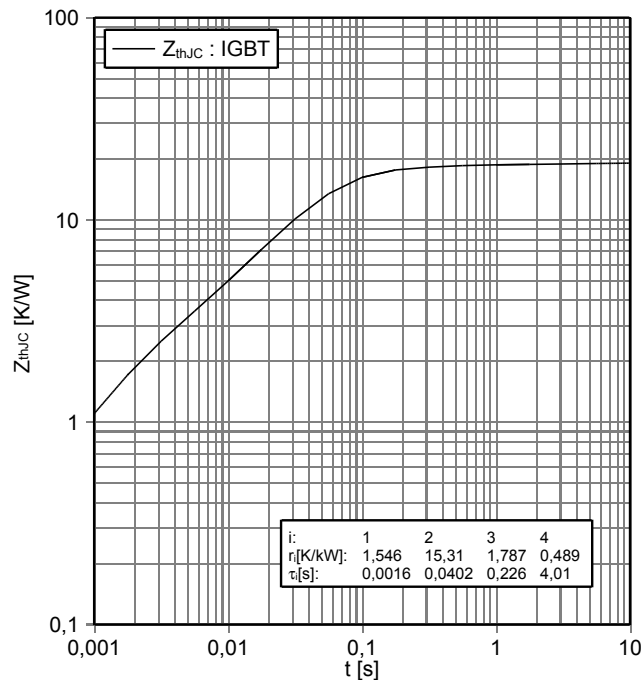
开关损耗 IGBT, 逆变器 (典型)  
switching losses IGBT, Inverter (typical)

$E_{on} = f(R_G), E_{off} = f(R_G)$   
 $V_{GE} = \pm 15 V, I_C = 1200 A, V_{CE} = 900 V$



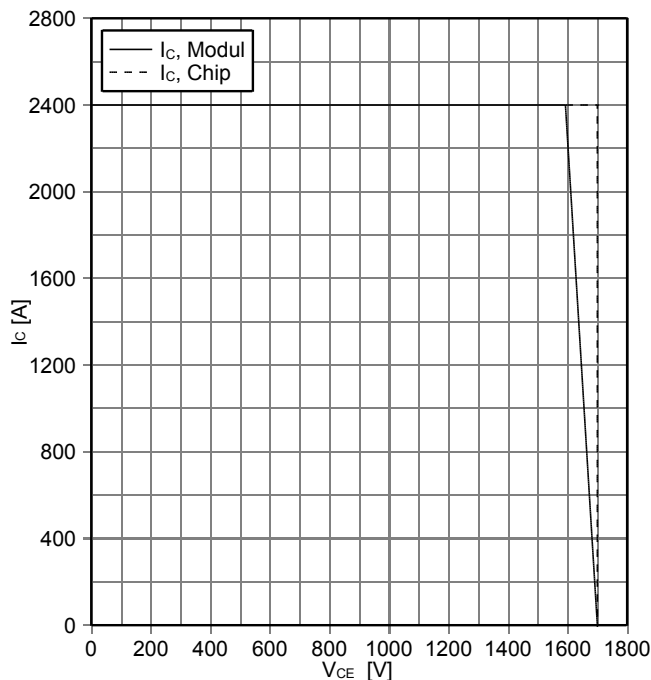
瞬态热阻抗 IGBT, 逆变器  
transient thermal impedance IGBT, Inverter

$Z_{thJC} = f(t)$



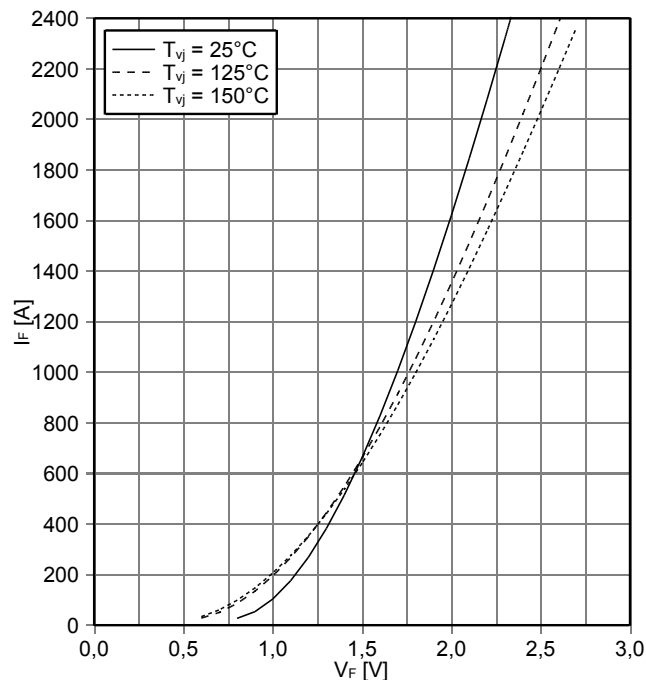
反偏安全工作区 IGBT, 逆变器 (RBSOA)  
reverse bias safe operating area IGBT, Inverter (RBSOA)

$I_C = f(V_{CE})$   
 $V_{GE} = \pm 15 V, R_{Goff} = 0.8 \Omega, T_{vj} = 150^\circ C$



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

$I_F = f(V_F)$

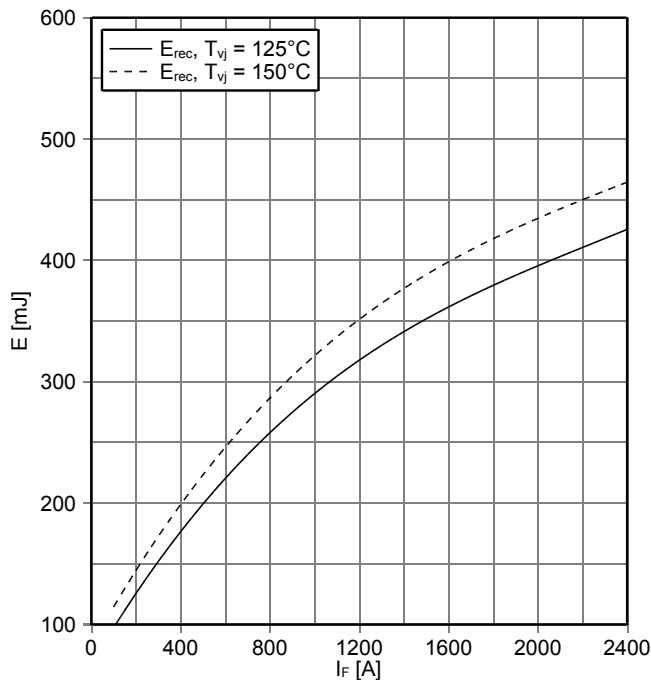


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初步数据  
Preliminary Data

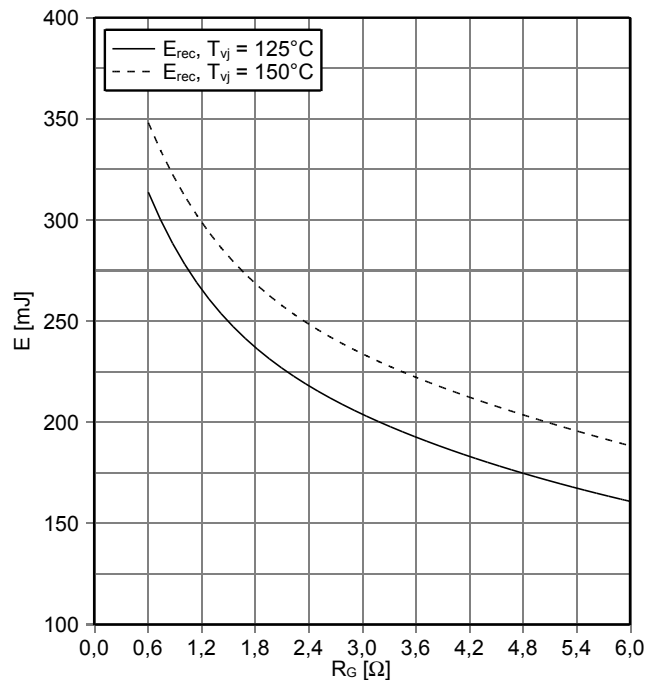
开关损耗 二极管, 逆变器 (典型)  
switching losses Diode, Inverter (typical)

$E_{rec} = f(I_F)$   
 $R_{Gon} = 0.62 \Omega, V_{CE} = 900 V$



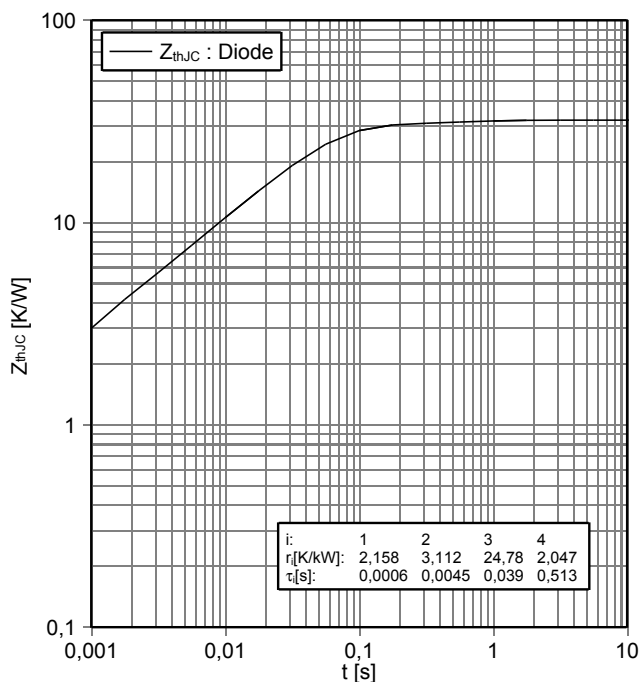
开关损耗 二极管, 逆变器 (典型)  
switching losses Diode, Inverter (typical)

$E_{rec} = f(R_G)$   
 $I_F = 1200 A, V_{CE} = 900 V$



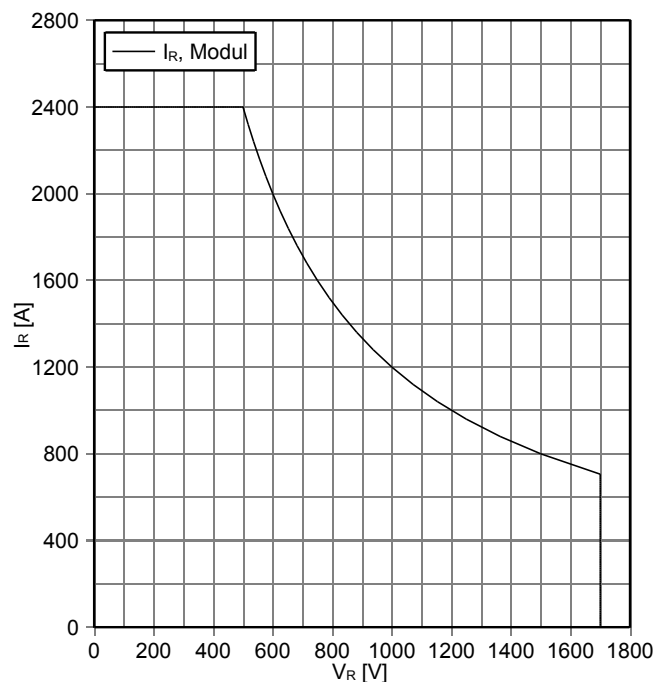
瞬态热阻抗 二极管, 逆变器  
transient thermal impedance Diode, Inverter

$Z_{thJC} = f(t)$



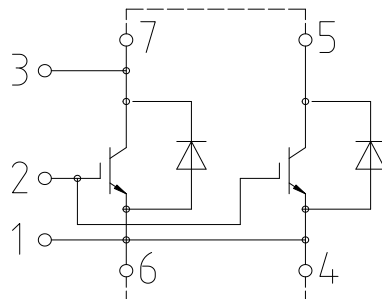
安全工作区 二极管, 逆变器 (SOA)  
safe operation area Diode, Inverter (SOA)

$I_R = f(V_R)$   
 $T_{vj} = 150^\circ C$



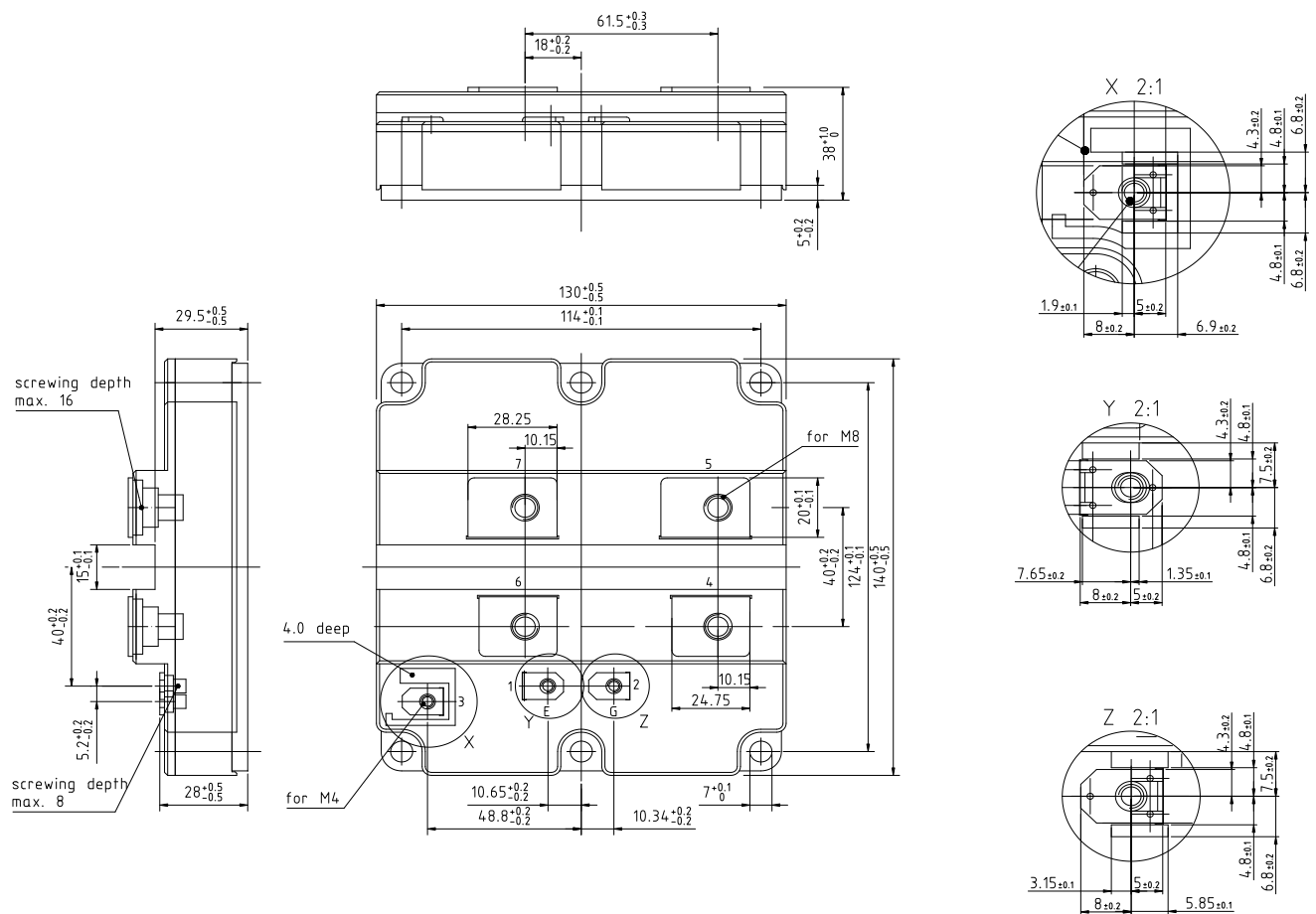
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接线图 / circuit\_diagram\_headline



external connection  
(to be done)

封装尺寸 / package outlines



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**使用条件和条款**

**使用条件和条款**

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- to perform joint Risk and Quality Assessments;
- 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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approved by: PL	revision: 2.2

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