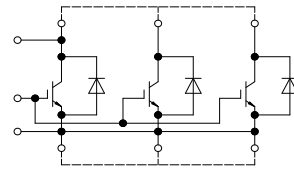


IHM-B 模块 采用第四代高速沟槽栅/场终止IGBT和第四代发射极控制二极管 和预涂导热介质  
 IHM-B module with fast Trench/Fieldstop IGBT4 and Emitter Controlled 4 diode and pre-applied Thermal Interface Material



external connection  
(to be done)

$V_{CES} = 1200V$   
 $I_{C\ nom} = 2400A / I_{CRM} = 4800A$

### 典型应用

- 大功率变流器
- 电机传动

### 电气特性

- 提高工作结温  $T_{vj\ op}$
- 低开关损耗

### 机械特性

- 封装的 CTI > 400
- 高功率密度
- IHM B 封装
- 符合RoHS
- 预涂导热介质

### Typical Applications

- High power converters
- Motor drives

### Electrical Features

- Extended operating temperature  $T_{vj\ op}$
- Low switching losses

### Mechanical Features

- Package with CTI > 400
- High power density
- IHM B housing
- RoHS compliant
- Pre-applied Thermal Interface Material

## 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

## 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	$T_{vj} = 25^{\circ}\text{C}$	$V_{CES}$	1200	V
连续集电极直流电流 Continuous DC collector current	$T_H = 90^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$	$I_{C\text{nom}}$	2400	A
集电极重复峰值电流 Repetitive peak collector current	$t_P = 1\text{ ms}$	$I_{CRM}$	4800	A
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	$I_C = 2400\text{ A}, V_{GE} = 15\text{ V}$		1,75	2,10	V	
	$I_C = 2400\text{ A}, V_{GE} = 15\text{ V}$		2,00	2,40	V	
	$I_C = 2400\text{ A}, V_{GE} = 15\text{ V}$		2,05	2,45	V	
栅极阈值电压 Gate threshold voltage	$I_C = 91,0\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$	$V_{GEth}$	5,20	5,80	6,40	V
栅极电荷 Gate charge	$V_{GE} = -15\text{ V} \dots +15\text{ V}$	$Q_G$		18,5	$\mu\text{C}$	
内部栅极电阻 Internal gate resistor	$T_{vj} = 25^{\circ}\text{C}$	$R_{Gint}$		0,98	$\Omega$	
输入电容 Input capacitance	$f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$	$C_{ies}$		150	nF	
反向传输电容 Reverse transfer capacitance	$f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$	$C_{res}$		8,30	nF	
集电极-发射极截止电流 Collector-emitter cut-off current	$V_{CE} = 1200\text{ V}, V_{GE} = 0\text{ V}, T_{vj} = 25^{\circ}\text{C}$	$I_{CES}$			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	$I_C = 2400\text{ A}, V_{CE} = 600\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$		0,50	$\mu\text{s}$	
	$V_{GE} = \pm 15\text{ V}$	$T_{vj} = 125^{\circ}\text{C}$		0,54	$\mu\text{s}$	
	$R_{Gon} = 1,5\ \Omega$	$T_{vj} = 150^{\circ}\text{C}$		0,55	$\mu\text{s}$	
上升时间(电感负载) Rise time, inductive load	$I_C = 2400\text{ A}, V_{CE} = 600\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$		0,33	$\mu\text{s}$	
	$V_{GE} = \pm 15\text{ V}$	$T_{vj} = 125^{\circ}\text{C}$		0,33	$\mu\text{s}$	
	$R_{Gon} = 1,5\ \Omega$	$T_{vj} = 150^{\circ}\text{C}$		0,33	$\mu\text{s}$	
关断延迟时间(电感负载) Turn-off delay time, inductive load	$I_C = 2400\text{ A}, V_{CE} = 600\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$		1,00	$\mu\text{s}$	
	$V_{GE} = \pm 15\text{ V}$	$T_{vj} = 125^{\circ}\text{C}$		1,15	$\mu\text{s}$	
	$R_{Goff} = 0,22\ \Omega$	$T_{vj} = 150^{\circ}\text{C}$		1,15	$\mu\text{s}$	
下降时间(电感负载) Fall time, inductive load	$I_C = 2400\text{ A}, V_{CE} = 600\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$		0,24	$\mu\text{s}$	
	$V_{GE} = \pm 15\text{ V}$	$T_{vj} = 125^{\circ}\text{C}$		0,16	$\mu\text{s}$	
	$R_{Goff} = 0,22\ \Omega$	$T_{vj} = 150^{\circ}\text{C}$		0,17	$\mu\text{s}$	
开通损耗能量(每脉冲) Turn-on energy loss per pulse	$I_C = 2400\text{ A}, V_{CE} = 600\text{ V}, L_S = 50\text{ nH}$	$T_{vj} = 25^{\circ}\text{C}$		365	mJ	
	$V_{GE} = \pm 15\text{ V}, di/dt = 6250\text{ A}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$	$T_{vj} = 125^{\circ}\text{C}$		460	mJ	
	$R_{Gon} = 1,5\ \Omega$	$T_{vj} = 150^{\circ}\text{C}$		505	mJ	
关断损耗能量(每脉冲) Turn-off energy loss per pulse	$I_C = 2400\text{ A}, V_{CE} = 600\text{ V}, L_S = 50\text{ nH}$	$T_{vj} = 25^{\circ}\text{C}$		430	mJ	
	$V_{GE} = \pm 15\text{ V}, du/dt = 2750\text{ V}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$	$T_{vj} = 125^{\circ}\text{C}$		455	mJ	
	$R_{Goff} = 0,22\ \Omega$	$T_{vj} = 150^{\circ}\text{C}$		480	mJ	
短路数据 SC data	$V_{GE} \leq 15\text{ V}, V_{CC} = 800\text{ V}$ $V_{CEmax} = V_{CES} - L_{SCE} \cdot di/dt$	$t_P \leq 10\ \mu\text{s}, T_{vj} = 150^{\circ}\text{C}$	$I_{SC}$	9600	A	
结 - 散热器热阻 Thermal resistance, junction to heatsink	每个 IGBT / per IGBT valid with IFX pre-applied thermal interface material	$R_{thJH}$		14,0	K/kW	
在开关状态下温度 Temperature under switching conditions		$T_{vj\text{op}}$	-40	150	$^{\circ}\text{C}$	

## 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	$T_{vj} = 25^{\circ}\text{C}$	$V_{RRM}$	1200	V
连续正向直流电流 Continuous DC forward current		$I_F$	2400	A
正向重复峰值电流 Repetitive peak forward current	$t_P = 1\text{ ms}$	$I_{FRM}$	4800	A
$I^2t$ -值 $I^2t$ - value	$V_R = 0\text{ V}, t_P = 10\text{ ms}, T_{vj} = 125^{\circ}\text{C}$ $V_R = 0\text{ V}, t_P = 10\text{ ms}, T_{vj} = 150^{\circ}\text{C}$	$I^2t$	750 725	$\text{kA}^2\text{s}$ $\text{kA}^2\text{s}$

### 特征值 / Characteristic Values

		min. typ. max.				
正向电压 Forward voltage	$I_F = 2400\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$		1,80	2,35	V
	$I_F = 2400\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 125^{\circ}\text{C}$	$V_F$	1,75	2,30	V
	$I_F = 2400\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 150^{\circ}\text{C}$		1,70	2,25	V
反向恢复峰值电流 Peak reverse recovery current	$I_F = 2400\text{ A}, -di_F/dt = 6250\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$	$T_{vj} = 25^{\circ}\text{C}$		805		A
	$V_R = 600\text{ V}$	$T_{vj} = 125^{\circ}\text{C}$	$I_{RM}$	1150		A
	$V_{GE} = -15\text{ V}$	$T_{vj} = 150^{\circ}\text{C}$		1200		A
恢复电荷 Recovered charge	$I_F = 2400\text{ A}, -di_F/dt = 6250\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$	$T_{vj} = 25^{\circ}\text{C}$		245		$\mu\text{C}$
	$V_R = 600\text{ V}$	$T_{vj} = 125^{\circ}\text{C}$	$Q_r$	430		$\mu\text{C}$
	$V_{GE} = -15\text{ V}$	$T_{vj} = 150^{\circ}\text{C}$		490		$\mu\text{C}$
反向恢复损耗 (每脉冲) Reverse recovery energy	$I_F = 2400\text{ A}, -di_F/dt = 6250\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$	$T_{vj} = 25^{\circ}\text{C}$		105		mJ
	$V_R = 600\text{ V}$	$T_{vj} = 125^{\circ}\text{C}$	$E_{rec}$	185		mJ
	$V_{GE} = -15\text{ V}$	$T_{vj} = 150^{\circ}\text{C}$		210		mJ
结 - 散热器热阻 Thermal resistance, junction to heatsink	每个二极管 / per diode valid with IFX pre-applied thermal interface material		$R_{thJH}$		21,2	K/kW
在开关状态下温度 Temperature under switching conditions		$T_{vj\text{ op}}$	-40		150	$^{\circ}\text{C}$

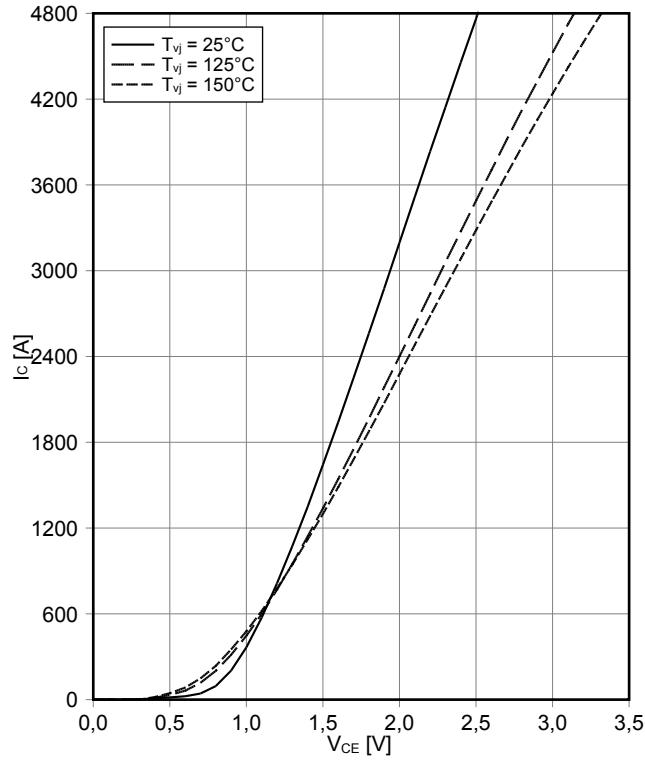
## 模块 / Module

绝缘测试电压 Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	V <sub>ISOL</sub>	2,5		kV
模块基板材料 Material of module baseplate			Cu		
内部绝缘 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	端子至散热器 / terminal to heatsink 端子至端子 / terminal to terminal		32,0 32,0		mm
电气间隙 Clearance	端子至散热器 / terminal to heatsink 端子至端子 / terminal to terminal		19,0 19,0		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>		6,0	nH
模块引线电阻, 端子-芯片 Module lead resistance, terminals - chip	T <sub>H</sub> = 25°C, 每个开关 / per switch	R <sub>CC+EE'</sub>		0,10	mΩ
储存温度 Storage temperature		T <sub>stg</sub>	-40		125 °C
最高基板工作温度 Maximum baseplate operation temperature		T <sub>BPmax</sub>			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 M4 根据相应的应用手册进行安装 Screw M4 - Mounting according to valid application note 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	1,7 8,0	- -	2,1 10 Nm
重量 Weight		G		1900	g

Lagerung und Transport von Modulen mit TIM laut AN2012-07  
Storage and shipment of modules with TIM according to AN2012-07

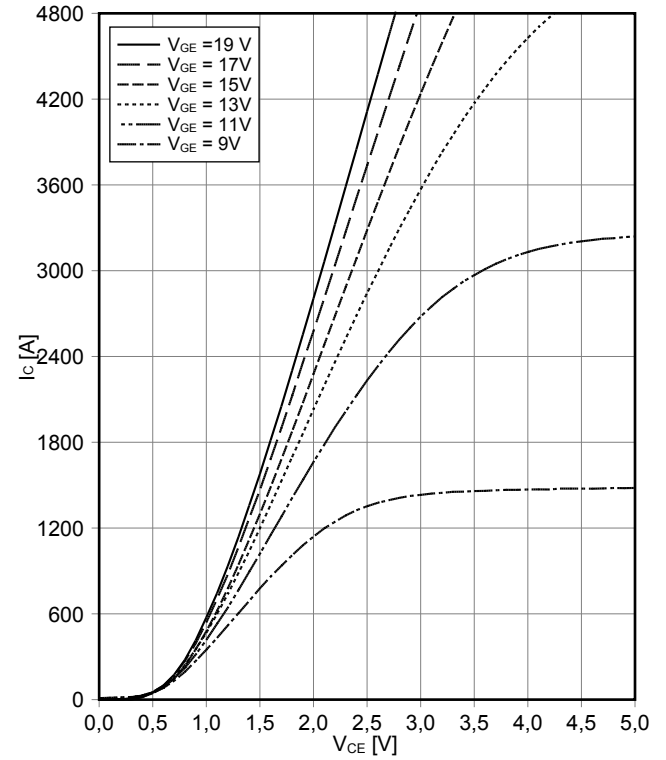
输出特性 IGBT, 逆变器 (典型)  
output characteristic IGBT, Inverter (typical)

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



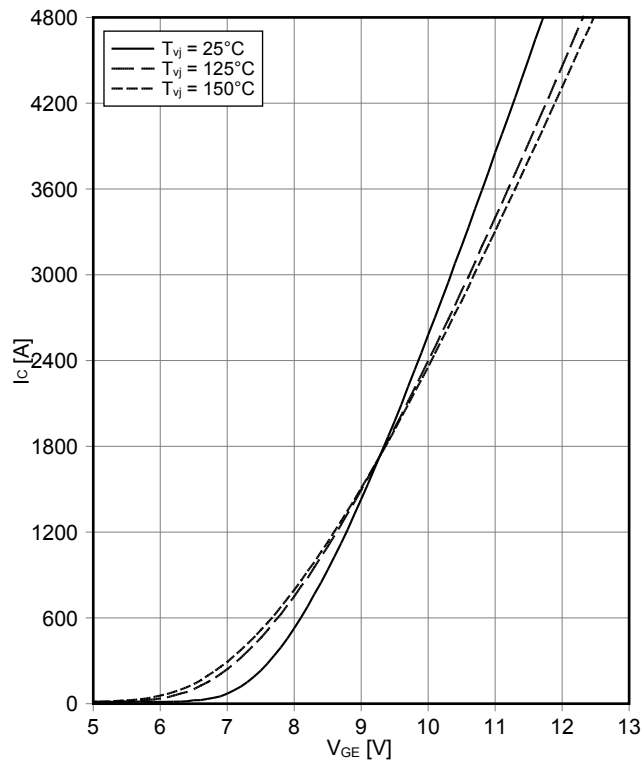
输出特性 IGBT, 逆变器 (典型)  
output characteristic IGBT, Inverter (typical)

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



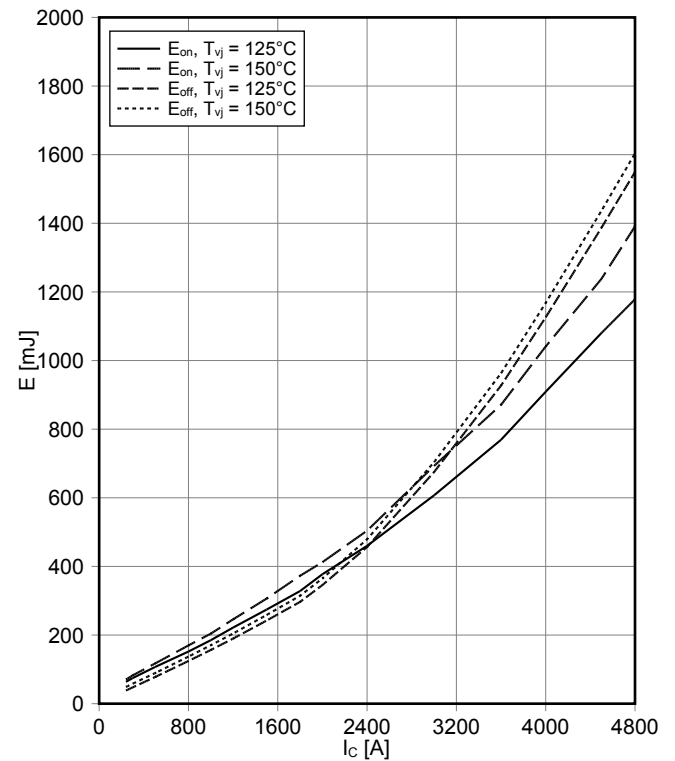
传输特性 IGBT, 逆变器 (典型)  
transfer characteristic IGBT, Inverter (typical)

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



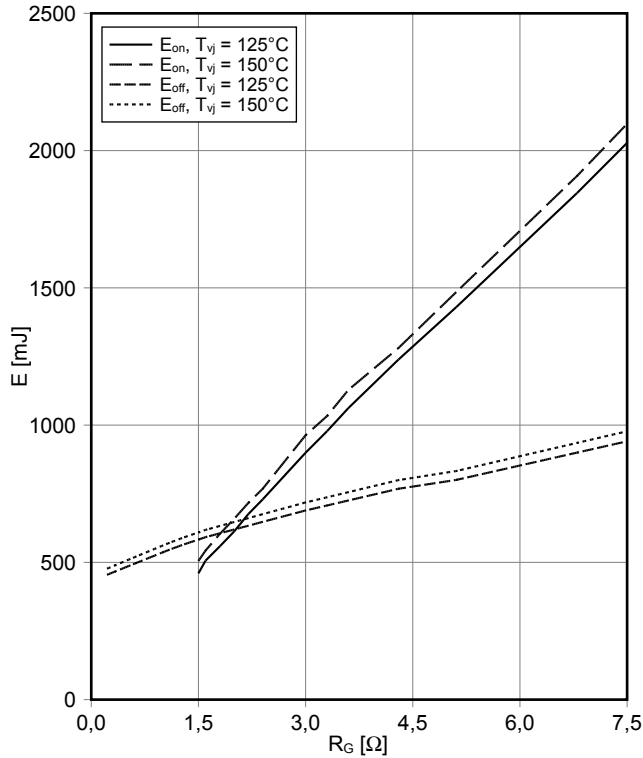
开关损耗 IGBT, 逆变器 (典型)  
switching losses IGBT, Inverter (typical)

$E_{on} = f(I_C)$ ,  $E_{off} = f(I_C)$   
 $V_{GE} = \pm 15\text{ V}$ ,  $R_{Gon} = 1.5\ \Omega$ ,  $R_{Goff} = 0.22\ \Omega$ ,  $V_{CE} = 600\text{ V}$

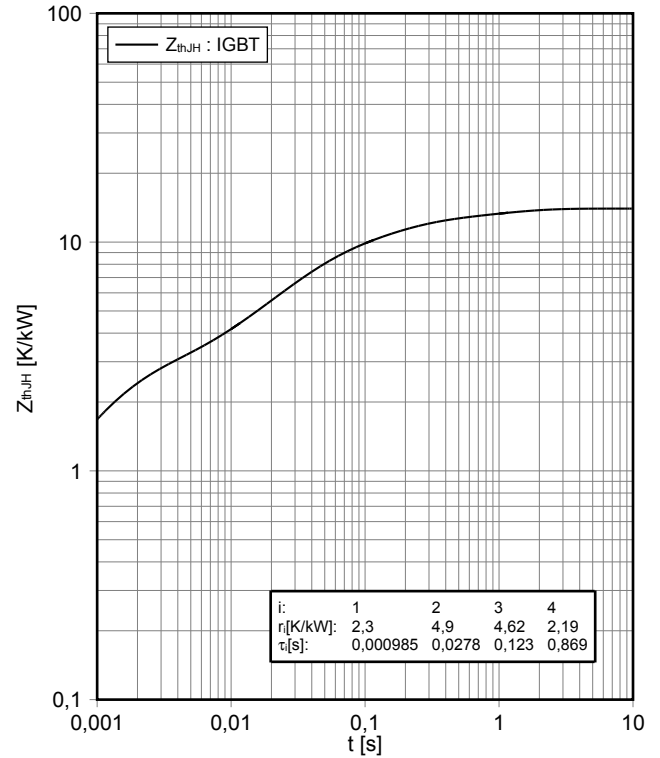


**开关损耗 IGBT, 逆变器 (典型)**  
**switching losses IGBT, Inverter (typical)**

$E_{on} = f(R_G), E_{off} = f(R_G)$   
 $V_{GE} = \pm 15 V, I_C = 2400 A, V_{CE} = 600 V$

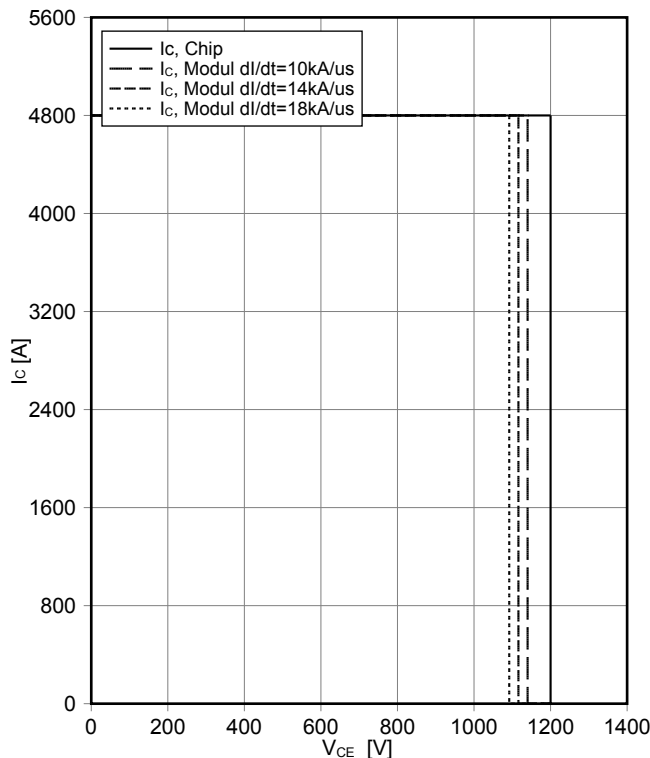


**瞬态热阻抗 IGBT, 逆变器**  
**transient thermal impedance IGBT, Inverter**  
 $Z_{thJH} = f(t)$



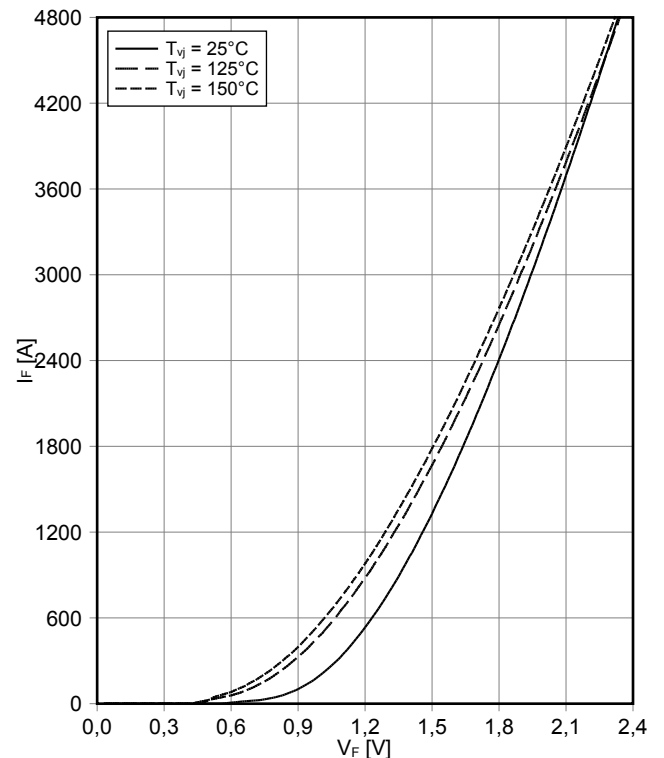
**反偏安全工作区 IGBT, 逆变器 (RBSOA)**  
**reverse bias safe operating area IGBT, Inverter (RBSOA)**

$I_C = f(V_{CE}) = f(dI/dt_{max}, L_S + L_{SCE})$  ( $V_{CE} = 1200V - L_{SCE} * dI/dt_{max}$ )  
 $V_{GE} = \pm 15 V, R_{Goff} = 0.22 \Omega, T_{vj} = 150^\circ C$



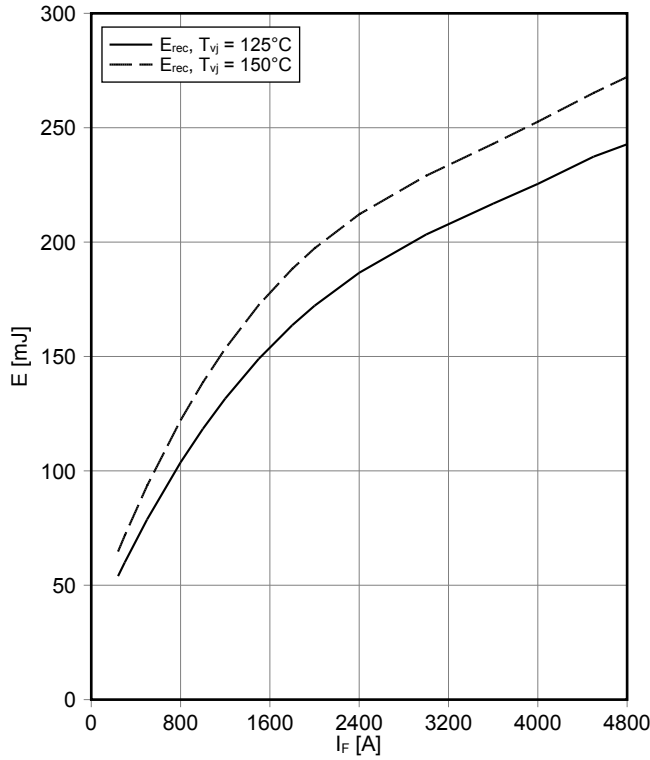
**正向偏压特性 二极管, 逆变器 (典型)**  
**forward characteristic of Diode, Inverter (typical)**

$I_F = f(V_F)$



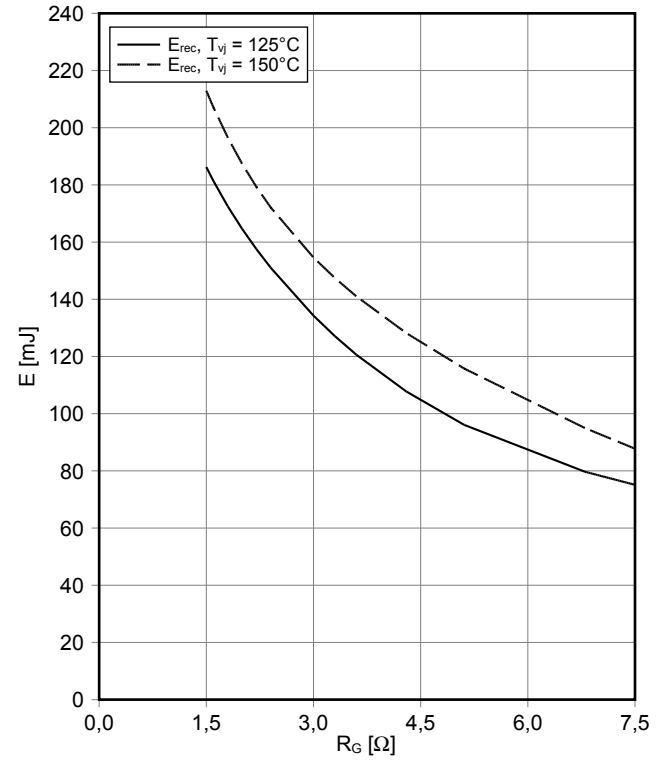
开关损耗 二极管,逆变器 (典型)  
switching losses Diode, Inverter (typical)

$E_{rec} = f(I_F)$   
 $R_{Gon} = 1.5 \Omega, V_{CE} = 600 V$



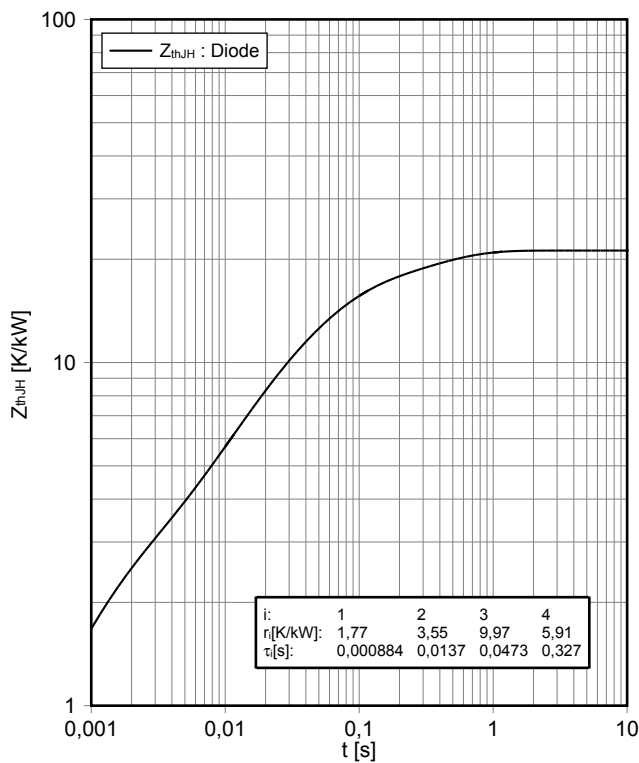
开关损耗 二极管,逆变器 (典型)  
switching losses Diode, Inverter (typical)

$E_{rec} = f(R_G)$   
 $I_F = 2400 A, V_{CE} = 600 V$

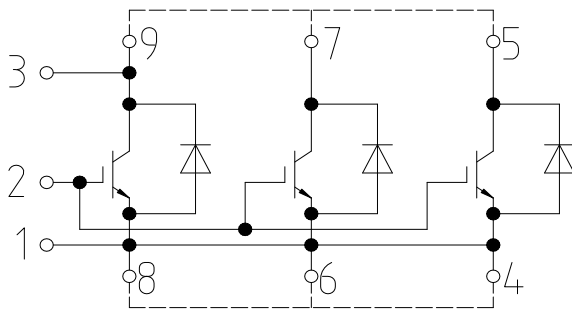


瞬态热阻抗 二极管,逆变器  
transient thermal impedance Diode, Inverter

$Z_{thJH} = f(t)$

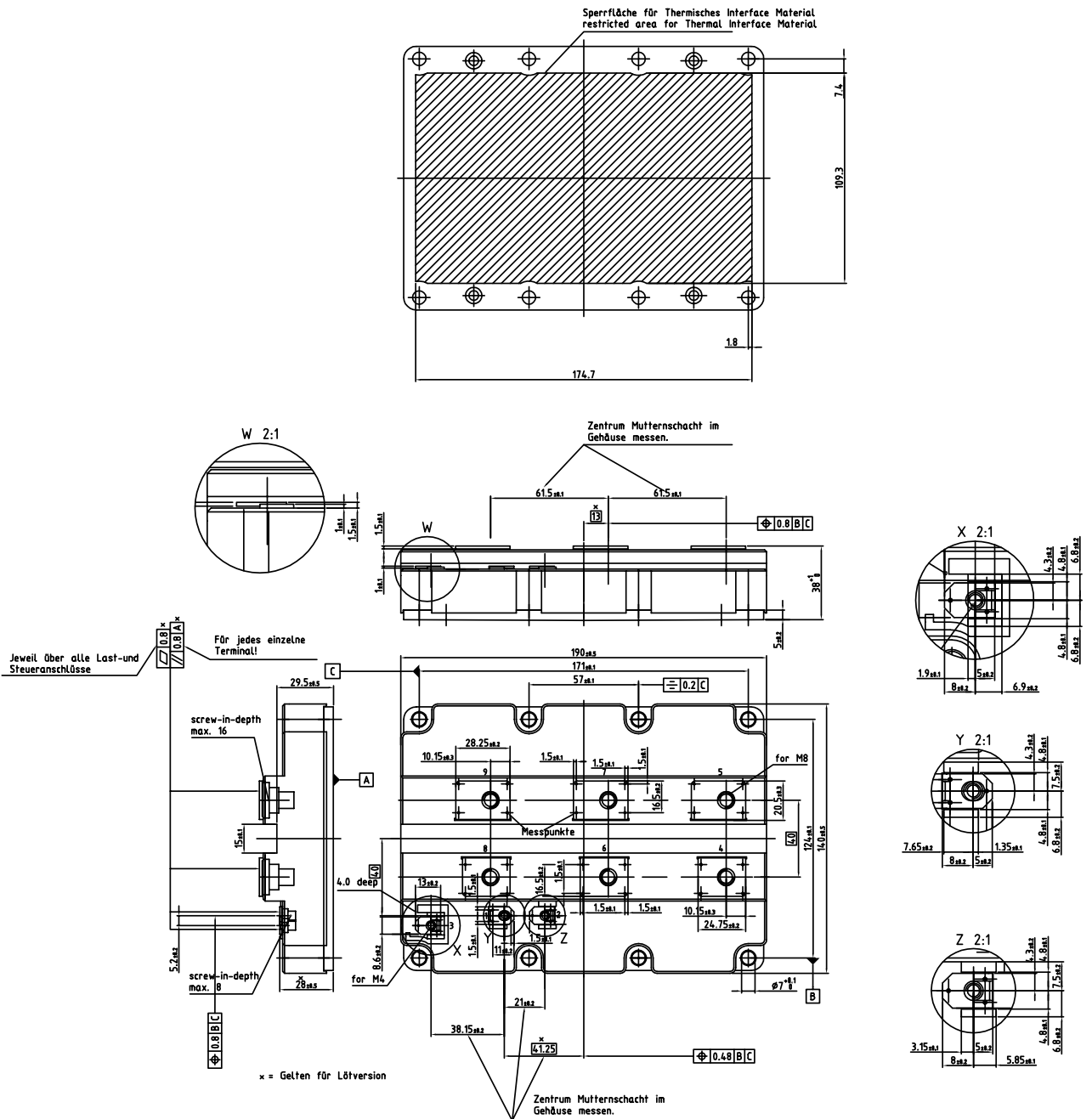


## 接线图 / Circuit diagram



external connection  
(to be done)

## 封装尺寸 / Package outlines





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