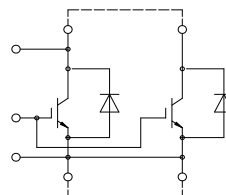
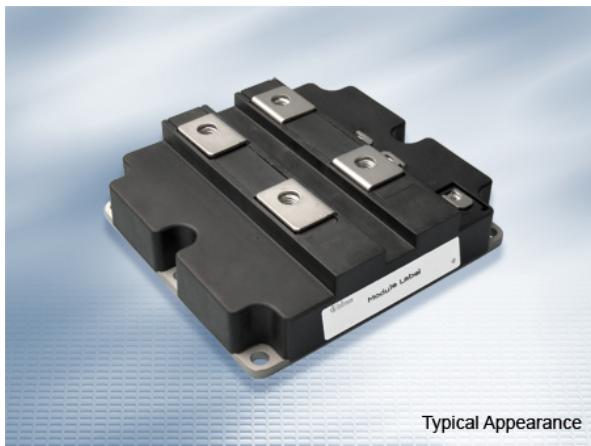


IHM-B 模块 采用第四代沟槽栅/场终止IGBT4和第四代发射极控制二极管  
IHM-B module with Trench/Fieldstop IGBT4 and Emitter Controlled 4 diode

## 初步数据 / Preliminary Data



external connection  
(to be done)

$V_{CES} = 1200V$

$I_{C\ nom} = 1200A / I_{CRM} = 2400A$

## 典型应用

- 大功率变流器
- 电机传动

## 电气特性

- 提高工作结温  $T_{vj\ op}$
- 低开关损耗

## 机械特性

- 封装的 CTI > 400
- 高功率密度
- IHM B 封装

## 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

## 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: 2015-09-29 |                      |
| approved by: IB | revision: V2.4                  | 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<br>Collector-emitter voltage       | $T_{vj} = 25^{\circ}\text{C}$                                                                                                 | $V_{CES}$                   | 1200         | V      |
| 连续集电极直流电流<br>Continuous DC collector current   | $T_C = 100^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$<br>$T_C = 25^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$ | $I_{C\text{ nom}}$<br>$I_C$ | 1200<br>1825 | A<br>A |
| 集电极重复峰值电流<br>Repetitive peak collector current | $t_P = 1\text{ ms}$                                                                                                           | $I_{CRM}$                   | 2400         | A      |
| 总功率损耗<br>Total power dissipation               | $T_C = 25^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$                                                                  | $P_{\text{tot}}$            | 7,15         | kW     |
| 栅极 - 发射极峰值电压<br>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<br>Collector-emitter saturation voltage | $I_C = 1200\text{ A}, V_{GE} = 15\text{ V}$<br>$I_C = 1200\text{ A}, V_{GE} = 15\text{ V}$<br>$I_C = 1200\text{ A}, V_{GE} = 15\text{ V}$                                                     | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $V_{CE\text{ sat}}$ | 1,75<br>2,00<br>2,05 | 2,10 | V<br>V<br>V                                     |
| 栅极阈值电压<br>Gate threshold voltage                      | $I_C = 45,5\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$                                                                                                                          |                                                                                                   | $V_{GEth}$          | 5,20                 | 5,80 | 6,40 V                                          |
| 栅极电荷<br>Gate charge                                   | $V_{GE} = -15\text{ V} \dots +15\text{ V}$                                                                                                                                                    |                                                                                                   | $Q_G$               | 9,25                 |      | $\mu\text{C}$                                   |
| 内部栅极电阻<br>Internal gate resistor                      | $T_{vj} = 25^{\circ}\text{C}$                                                                                                                                                                 |                                                                                                   | $R_{Gint}$          | 1,6                  |      | $\Omega$                                        |
| 输入电容<br>Input capacitance                             | $f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$                                                                                                    |                                                                                                   | $C_{ies}$           | 74,0                 |      | nF                                              |
| 反向传输电容<br>Reverse transfer capacitance                | $f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$                                                                                                    |                                                                                                   | $C_{res}$           | 4,10                 |      | nF                                              |
| 集电极-发射极截止电流<br>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<br>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)<br>Turn-on delay time, inductive load    | $I_C = 1200\text{ A}, V_{CE} = 600\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Gon} = 1,6\ \Omega$                                                                                         | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_{d\text{ on}}$   | 0,41<br>0,46<br>0,46 |      | $\mu\text{s}$<br>$\mu\text{s}$<br>$\mu\text{s}$ |
| 上升时间(电感负载)<br>Rise time, inductive load               | $I_C = 1200\text{ A}, V_{CE} = 600\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Gon} = 1,6\ \Omega$                                                                                         | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_r$               | 0,20<br>0,20<br>0,20 |      | $\mu\text{s}$<br>$\mu\text{s}$<br>$\mu\text{s}$ |
| 关断延迟时间(电感负载)<br>Turn-off delay time, inductive load   | $I_C = 1200\text{ A}, V_{CE} = 600\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Goff} = 0,62\ \Omega$                                                                                       | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_{d\text{ off}}$  | 0,82<br>0,93<br>0,96 |      | $\mu\text{s}$<br>$\mu\text{s}$<br>$\mu\text{s}$ |
| 下降时间(电感负载)<br>Fall time, inductive load               | $I_C = 1200\text{ A}, V_{CE} = 600\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Goff} = 0,62\ \Omega$                                                                                       | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_f$               | 0,11<br>0,14<br>0,17 |      | $\mu\text{s}$<br>$\mu\text{s}$<br>$\mu\text{s}$ |
| 开通损耗能量(每脉冲)<br>Turn-on energy loss per pulse          | $I_C = 1200\text{ A}, V_{CE} = 600\text{ V}, L_S = 54\text{ nH}$<br>$V_{GE} = \pm 15\text{ V}, di/dt = 5900\text{ A}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$<br>$R_{Gon} = 1,6\ \Omega$   | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $E_{on}$            | 115<br>155<br>175    |      | mJ<br>mJ<br>mJ                                  |
| 关断损耗能量(每脉冲)<br>Turn-off energy loss per pulse         | $I_C = 1200\text{ A}, V_{CE} = 600\text{ V}, L_S = 54\text{ nH}$<br>$V_{GE} = \pm 15\text{ V}, du/dt = 2750\text{ V}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$<br>$R_{Goff} = 0,62\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $E_{off}$           | 145<br>180<br>195    |      | mJ<br>mJ<br>mJ                                  |
| 短路数据<br>SC data                                       | $V_{GE} \leq 15\text{ V}, V_{CC} = 800\text{ V}$<br>$V_{CE\text{ max}} = V_{CES} - L_{SCE} \cdot di/dt$<br>$t_P \leq 10\ \mu\text{s}, T_{vj} = 150^{\circ}\text{C}$                           |                                                                                                   | $I_{SC}$            | 4800                 |      | A                                               |
| 结 - 外壳热阻<br>Thermal resistance, junction to case      | 每个 IGBT / per IGBT                                                                                                                                                                            |                                                                                                   | $R_{thJC}$          |                      | 21,0 | K/kW                                            |
| 外壳 - 散热器热阻<br>Thermal resistance, case to heatsink    | 每个 IGBT / per IGBT<br>$\lambda_{\text{Paste}} = 1\text{ W}/(\text{m}\cdot\text{K}) / \lambda_{\text{grease}} = 1\text{ W}/(\text{m}\cdot\text{K})$                                            |                                                                                                   | $R_{thCH}$          | 13,5                 |      | K/kW                                            |
| 在开关状态下温度<br>Temperature under switching conditions    |                                                                                                                                                                                               |                                                                                                   | $T_{vj\text{ op}}$  | -40                  | 150  | $^{\circ}\text{C}$                              |

prepared by: WB

date of publication: 2015-09-29

approved by: IB

revision: V2.4

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<br>Repetitive peak reverse voltage | $T_{vj} = 25^{\circ}\text{C}$                                                                                                                    | $V_{RRM}$ | 1200       | V                                              |
| 连续正向直流电流<br>Continuous DC forward current   |                                                                                                                                                  | $I_F$     | 1200       | A                                              |
| 正向重复峰值电流<br>Repetitive peak forward current | $t_P = 1 \text{ ms}$                                                                                                                             | $I_{FRM}$ | 2400       | A                                              |
| $I_{2t}$ -值<br>$I_{2t}$ -value              | $V_R = 0 \text{ V}, t_P = 10 \text{ ms}, T_{vj} = 125^{\circ}\text{C}$<br>$V_R = 0 \text{ V}, t_P = 10 \text{ ms}, T_{vj} = 150^{\circ}\text{C}$ | $I_{2t}$  | 195<br>190 | $\text{kA}^2\text{s}$<br>$\text{kA}^2\text{s}$ |

特征值 / Characteristic Values

|                                                    |                                                                                                                                                       |                                                                                                   | min.                | typ. | max.                 |                                                 |
|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|---------------------|------|----------------------|-------------------------------------------------|
| 正向电压<br>Forward voltage                            | $I_F = 1200 \text{ A}, V_{GE} = 0 \text{ V}$<br>$I_F = 1200 \text{ A}, V_{GE} = 0 \text{ V}$<br>$I_F = 1200 \text{ A}, V_{GE} = 0 \text{ V}$          | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $V_F$               |      | 1,80<br>1,75<br>1,70 | 2,35<br>V<br>V<br>V                             |
| 反向恢复峰值电流<br>Peak reverse recovery current          | $I_F = 1200 \text{ A}, -di_F/dt = 5900 \text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$<br>$V_R = 600 \text{ V}$<br>$V_{GE} = -15 \text{ V}$       | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $I_{RM}$            |      | 535<br>755<br>805    | A<br>A<br>A                                     |
| 恢复电荷<br>Recovered charge                           | $I_F = 1200 \text{ A}, -di_F/dt = 5900 \text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$<br>$V_R = 600 \text{ V}$<br>$V_{GE} = -15 \text{ V}$       | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $Q_r$               |      | 110<br>220<br>250    | $\mu\text{C}$<br>$\mu\text{C}$<br>$\mu\text{C}$ |
| 反向恢复损耗 (每脉冲)<br>Reverse recovery energy            | $I_F = 1200 \text{ A}, -di_F/dt = 5900 \text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$<br>$V_R = 600 \text{ V}$<br>$V_{GE} = -15 \text{ V}$       | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $E_{rec}$           |      | 50,0<br>105<br>120   | mJ<br>mJ<br>mJ                                  |
| 结 - 外壳热阻<br>Thermal resistance, junction to case   | 每个二极管 / per diode                                                                                                                                     |                                                                                                   | $R_{thJC}$          |      |                      | 35,0 K/kW                                       |
| 外壳 - 散热器热阻<br>Thermal resistance, case to heatsink | 每个二极管 / per diode<br>$\lambda_{\text{Paste}} = 1 \text{ W}/(\text{m}\cdot\text{K})$ / $\lambda_{\text{grease}} = 1 \text{ W}/(\text{m}\cdot\text{K})$ |                                                                                                   | $R_{thCH}$          |      | 14,3                 | K/kW                                            |
| 在开关状态下温度<br>Temperature under switching conditions |                                                                                                                                                       |                                                                                                   | $T_{vj \text{ op}}$ | -40  |                      | 150 $^{\circ}\text{C}$                          |

初步数据  
Preliminary Data

模块 / Module

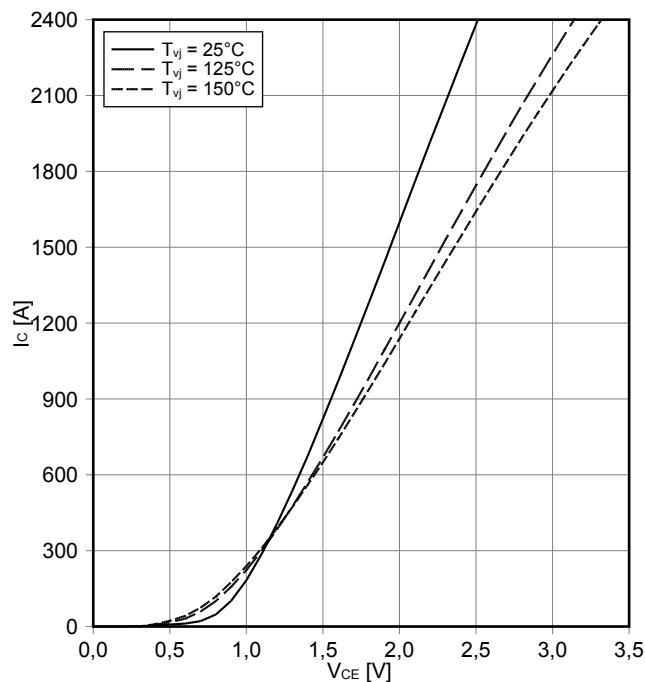
|                                                           |                                                                                                                                                                  |                      |                                |                     |
|-----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|--------------------------------|---------------------|
| 绝缘测试电压<br>Isolation test voltage                          | RMS, f = 50 Hz, t = 1 min.                                                                                                                                       | V <sub>ISOL</sub>    | 2,5                            | kV                  |
| 模块基板材料<br>Material of module baseplate                    |                                                                                                                                                                  |                      | Cu                             |                     |
| 内部绝缘<br>Internal isolation                                | 基本绝缘 (class 1, IEC 61140)<br>basic insulation (class 1, IEC 61140)                                                                                               |                      | Al <sub>2</sub> O <sub>3</sub> |                     |
| 爬电距离<br>Creepage distance                                 | 端子至散热器 / terminal to heatsink<br>端子至端子 / terminal to terminal                                                                                                    |                      | 32,0<br>32,0                   | mm                  |
| 电气间隙<br>Clearance                                         | 端子至散热器 / terminal to heatsink<br>端子至端子 / terminal to terminal                                                                                                    |                      | 19,0<br>19,0                   | mm                  |
| 相对电痕指数<br>Comperative tracking index                      |                                                                                                                                                                  | CTI                  | > 400                          |                     |
|                                                           |                                                                                                                                                                  |                      |                                |                     |
| 杂散电感, 模块<br>Stray inductance module                       |                                                                                                                                                                  | L <sub>sCE</sub>     | min. 9,0                       | typ. max. nH        |
| 模块引线电阻, 端子-芯片<br>Module lead resistance, terminals - chip | T <sub>C</sub> = 25°C, 每个开关 / per switch                                                                                                                         | R <sub>CC'+EE'</sub> | 0,17                           | mΩ                  |
| 储存温度<br>Storage temperature                               |                                                                                                                                                                  | T <sub>stg</sub>     | -40                            | 150 °C              |
| 模块安装的安装扭矩<br>Mounting torque for modul mounting           | 螺丝 M6 根据相应的应用手册进行安装<br>Screw M6 - Mounting according to valid application note                                                                                   | M                    | 4,25                           | 5,75 Nm             |
| 端子联接扭矩<br>Terminal connection torque                      | 螺丝 M4 根据相应的应用手册进行安装<br>Screw M4 - Mounting according to valid application note<br>螺丝 M8 根据相应的应用手册进行安装<br>Screw M8 - Mounting according to valid application note | M                    | 1,7<br>8,0                     | -<br>- 2,1<br>10 Nm |
| 重量<br>Weight                                              |                                                                                                                                                                  | G                    | 1300                           | g                   |

|                 |                                 |
|-----------------|---------------------------------|
| prepared by: WB | date of publication: 2015-09-29 |
| approved by: IB | revision: V2.4                  |

初步数据  
Preliminary Data

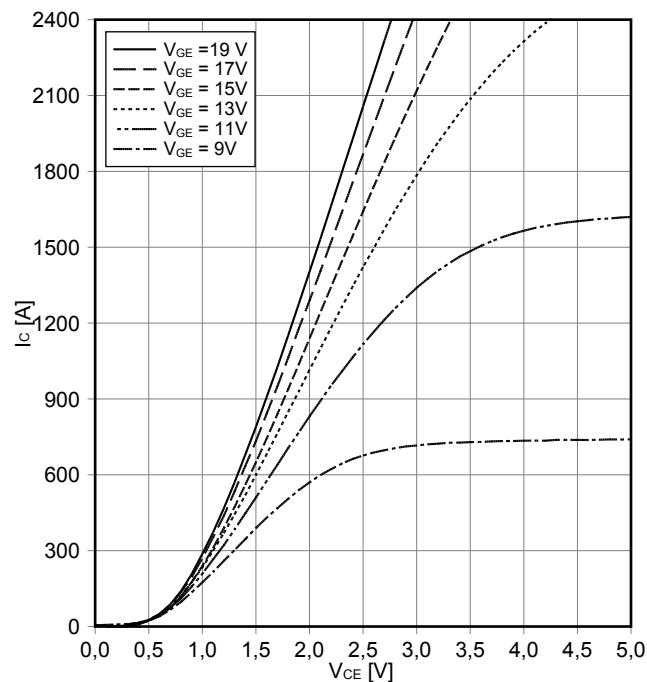
输出特性 IGBT, 逆变器 (典型)  
output characteristic IGBT, Inverter (typical)

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



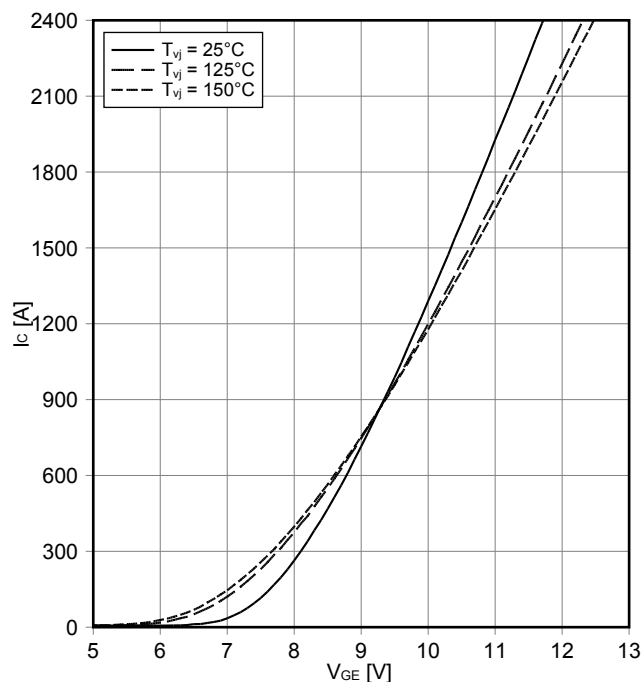
输出特性 IGBT, 逆变器 (典型)  
output characteristic IGBT, Inverter (typical)

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



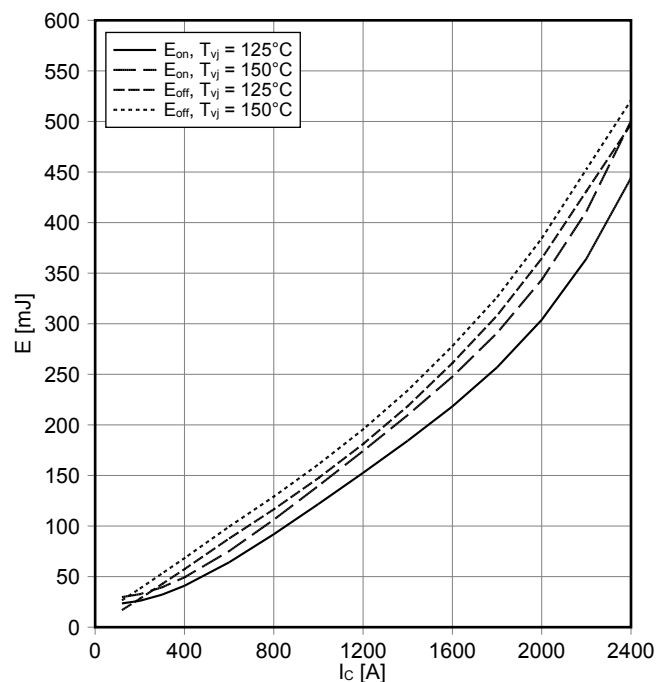
传输特性 IGBT, 逆变器 (典型)  
transfer characteristic IGBT, Inverter (typical)

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



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

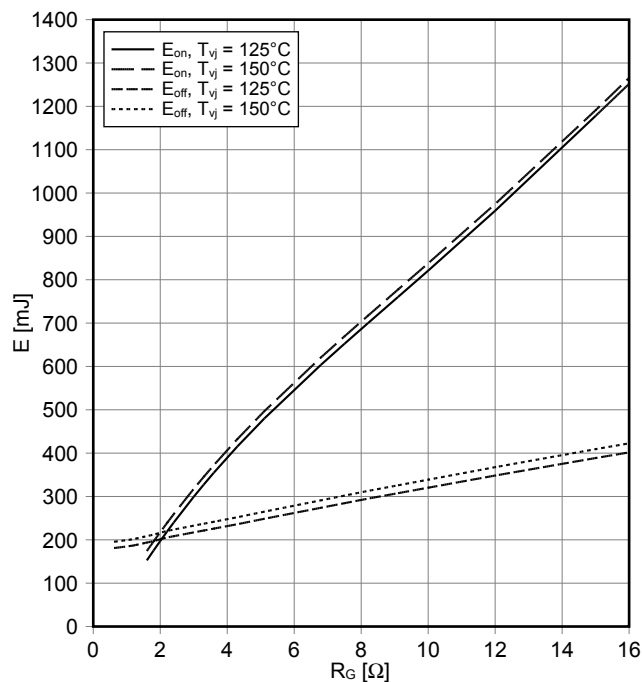
$E_{on} = f(I_C)$ ,  $E_{off} = f(I_C)$   
 $V_{GE} = \pm 15\text{ V}$ ,  $R_{Gon} = 1.6\ \Omega$ ,  $R_{Goff} = 0.62\ \Omega$ ,  $V_{CE} = 600\text{ V}$



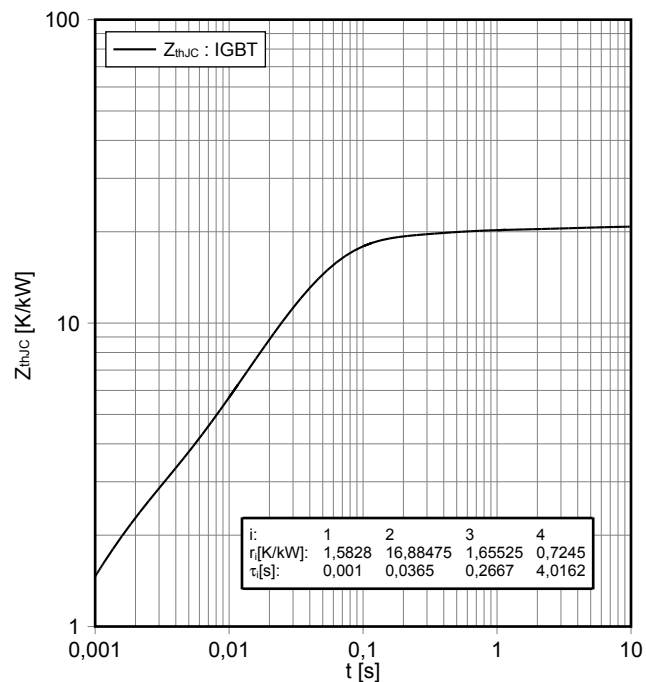
初步数据  
Preliminary Data

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

$E_{on} = f(R_G)$ ,  $E_{off} = f(R_G)$   
 $V_{GE} = \pm 15 \text{ V}$ ,  $I_C = 1200 \text{ A}$ ,  $V_{CE} = 600 \text{ V}$

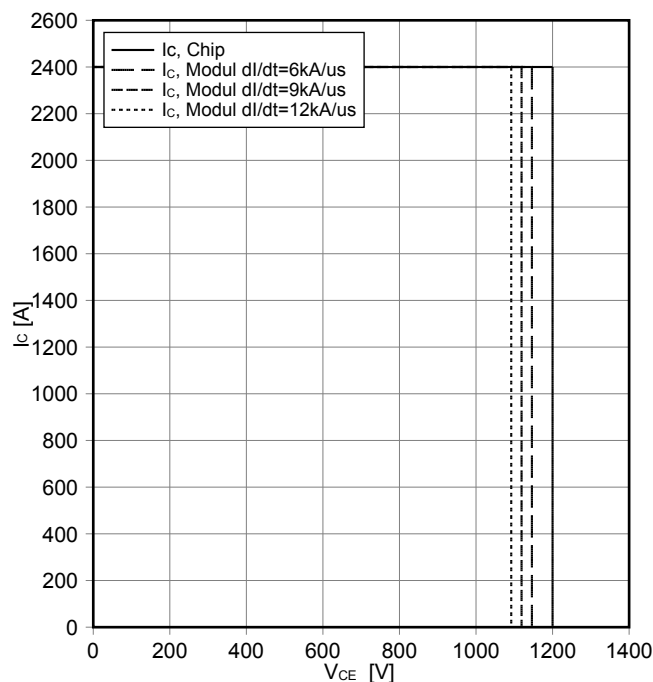


瞬态热阻抗 IGBT, 逆变器  
transient thermal impedance IGBT, Inverter  
 $Z_{thJC} = f(t)$

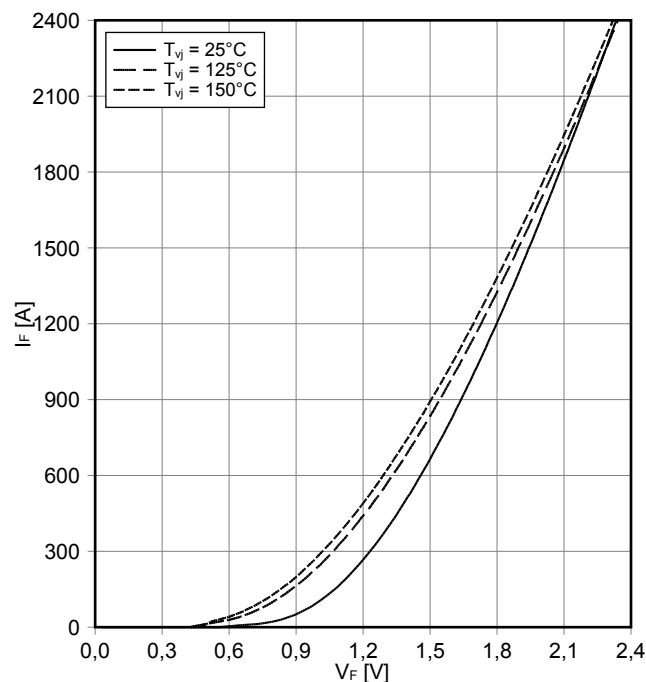


反偏安全工作区 IGBT, 逆变器 (RBSOA)  
reverse bias safe operating area IGBT, Inverter (RBSOA)

$I_C = f(V_{CE}) = f(dI/dt_{max}, L_S + L_{SCE})$  ( $V_{CE} = 1200 \text{ V} - L_{SCE} \cdot dI/dt_{max}$ )  
 $V_{GE} = \pm 15 \text{ V}$ ,  $R_{Goff} = 0.62 \Omega$ ,  $T_{vj} = 150^\circ\text{C}$



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

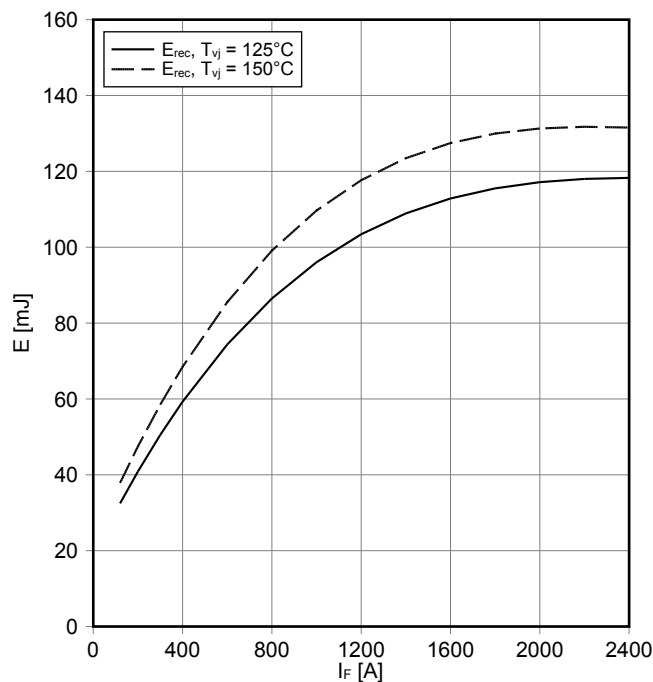


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初步数据  
Preliminary Data

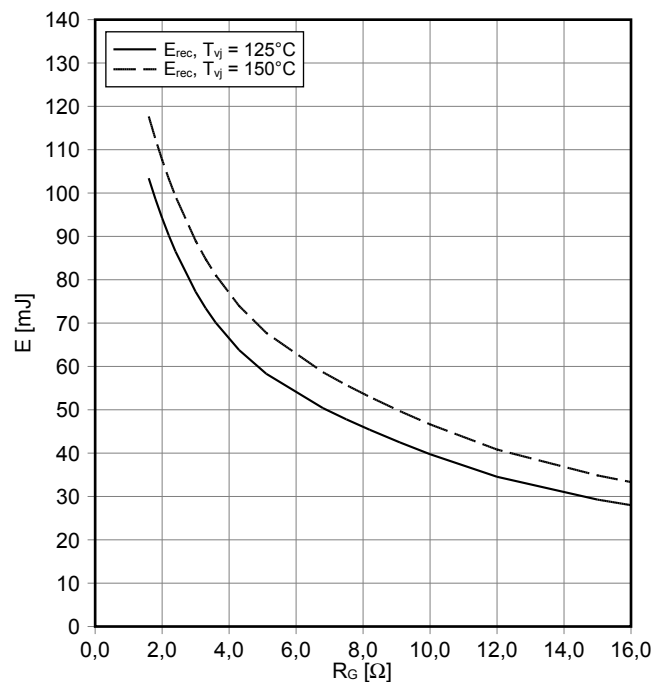
开关损耗 二极管,逆变器 (典型)  
switching losses Diode, Inverter (typical)

$E_{rec} = f(I_F)$   
 $R_{Gon} = 1.6 \Omega$ ,  $V_{CE} = 600 V$



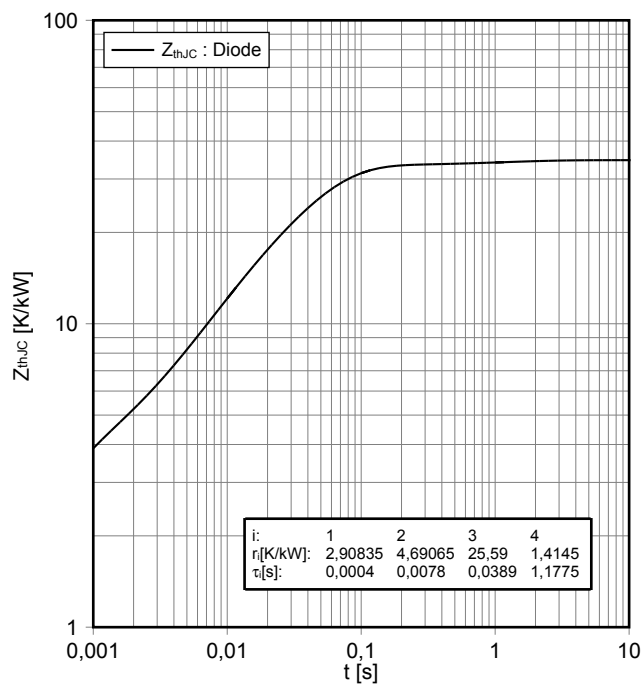
开关损耗 二极管,逆变器 (典型)  
switching losses Diode, Inverter (typical)

$E_{rec} = f(R_G)$   
 $I_F = 1200 A$ ,  $V_{CE} = 600 V$



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

$Z_{thJC} = f(t)$



prepared by: WB

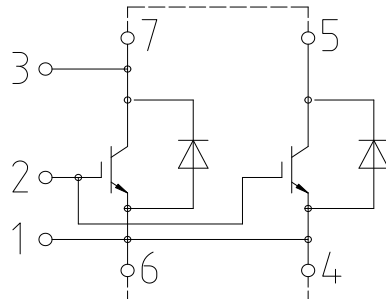
date of publication: 2015-09-29

approved by: IB

revision: V2.4

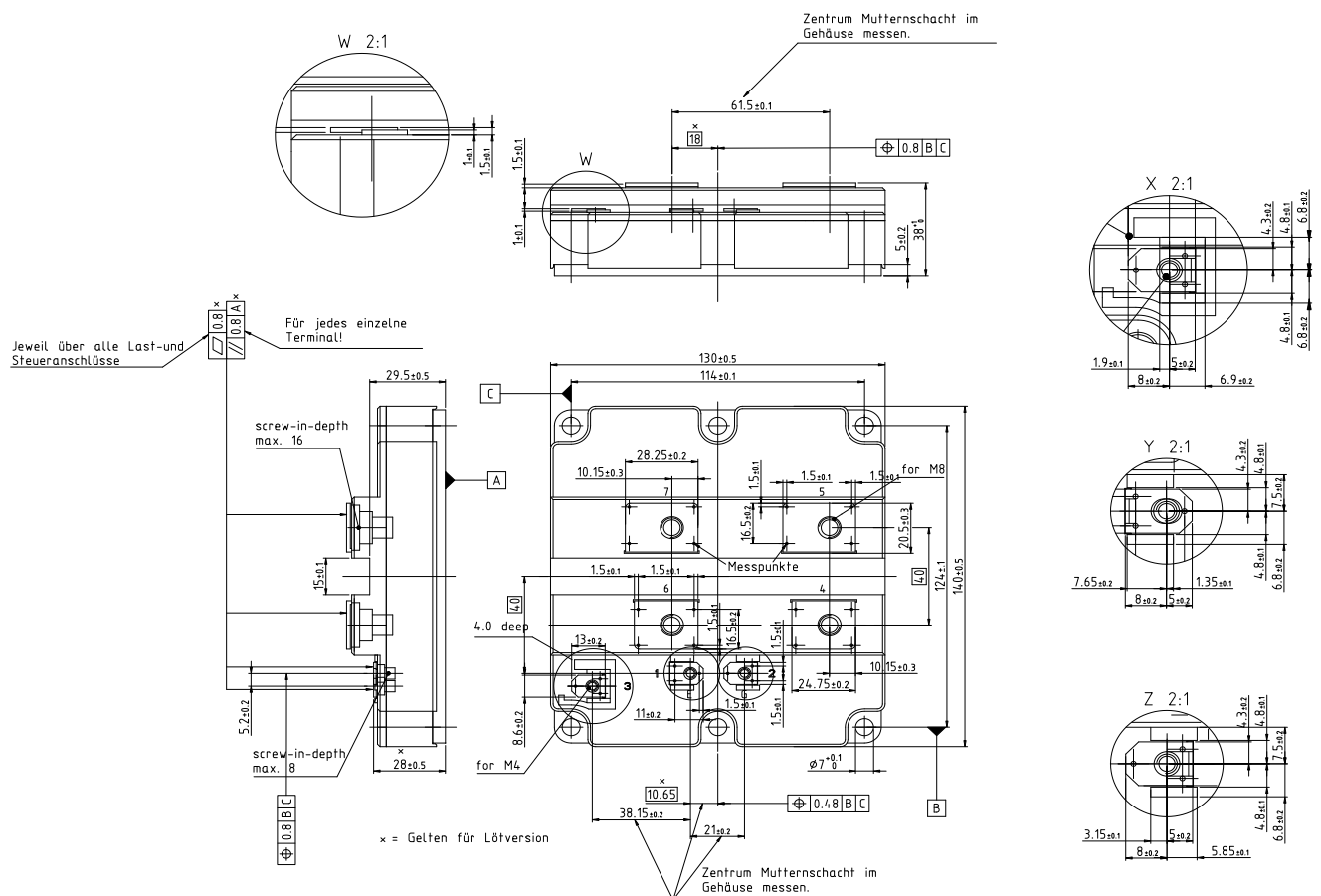
## 初步数据 Preliminary Data

### 接线图 / Circuit diagram



```
external connection
(to be done)
```

## 封装尺寸 / Package outlines



|                 |                                 |
|-----------------|---------------------------------|
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### 初步数据 Preliminary Data

#### 使用条件和条款

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- 建立联合的测试和出厂产品检查，我们可以根据测试的实际情况供货

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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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