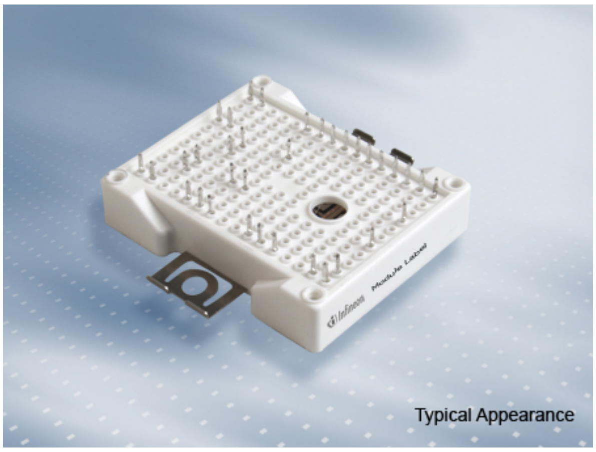
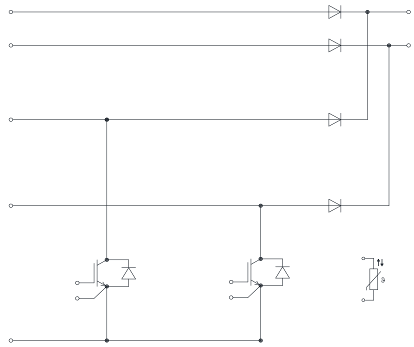
IGBT-模块
IGBT-modules

# DF80R12W2H3_B11

**初步数据 / Preliminary Data**



$V_{CES}$ = 1200V
$I_{C\ nom}$ = 80A / $I_{CRM}$ = 160A

**典型应用**
- 太阳能应用
- UPS系统

**Typical Applications**
- Solar Applications
- UPS Systems

**电气特性**
- 高速IGBT H3
- 低开关损耗

**Electrical Features**
- High Speed IGBT H3
- Low Switching Losses

**机械特性**
- 低热阻的三氧化二铝（ $Al_2O_3$ 衬底
- 集成NTC温度传感器
- 紧凑型设计
- PressFIT 压接技术

**Mechanical Features**
- $Al_2O_3$ Substrate with Low Thermal Resistance
- Integrated NTC temperature sensor
- Compact design
- PressFIT Contact Technology

## Module Label Code

**Barcode Code 128**

00000123456000000000000

**DMX - 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: CM | date of publication: 2013-11-11 | |
| approved by: MB | revision: 2.0 | UL approved (E83335) |

初步数据
Preliminary Data

## 旁路二极管 / Bypass-Diode

### 最大额定值 / Maximum Rated Values

| | | | | |
|---|---|---|---|---|
| 反向重复峰值电压<br>Repetitive peak reverse voltage | $T_{vj}$ = 25°C | $V_{RRM}$ | 1200 | V |
| 最大正向均方根电流(每芯片)<br>Maximum RMS forward current per chip | $T_C$ = 80°C | $I_{FRMSM}$ | 50 | A |
| 最大整流器输出均方根电流<br>Maximum RMS current at rectifier output | $T_C$ = 80°C | $I_{RMSM}$ | 60 | A |
| 正向浪涌电流<br>Surge forward current | $t_p$ = 10 ms, $T_{vj}$ = 25°C<br>$t_p$ = 10 ms, $T_{vj}$ = 150°C | $I_{FSM}$ | 450<br>360 | A<br>A |
| I2t-值<br>$I^2t$ - value | $t_p$ = 10 ms, $T_{vj}$ = 25°C<br>$t_p$ = 10 ms, $T_{vj}$ = 150°C | $I^2t$ | 1000<br>650 | $A^2s$<br>$A^2s$ |

### 特征值 / Characteristic Values

| | | | min. | typ. | max. | |
|---|---|---|---|---|---|---|
| 正向电压<br>Forward voltage | $T_{vj}$ = 150°C, $I_F$ = 30 A | $V_F$ | | 0,95 | | V |
| 反向电流<br>Reverse current | $T_{vj}$ = 150°C, $V_R$ = 1200 V | $I_R$ | | 0,10 | | mA |
| 结 - 外壳热阻<br>Thermal resistance, junction to case | 每个二极管 / per diode | $R_{thJC}$ | | 0,80 | 1,05 | K/W |
| 外壳 - 散热器热阻<br>Thermal resistance, case to heatsink | 每个二极管 / per diode<br>$\lambda_{Paste}$ = 1 W/(m·K) / $\lambda_{grease}$ = 1 W/(m·K) | $R_{thCH}$ | | 0,80 | | K/W |
| 在开关状态下温度<br>Temperature under switching conditions | | $T_{vj\ op}$ | | | | °C |

## 反极性保护二极管A / Inverse-polarity protection diode A

### 最大额定值 / Maximum Rated Values

| | | | | |
|---|---|---|---|---|
| 反向重复峰值电压<br>Repetitive peak reverse voltage | $T_{vj}$ = 25°C | $V_{RRM}$ | 1200 | V |
| 最大正向均方根电流(每芯片)<br>Maximum RMS forward current per chip | $T_C$ = 80°C | $I_{FRMSM}$ | 30 | A |
| 最大整流器输出均方根电流<br>Maximum RMS current at rectifier output | $T_C$ = 80°C | $I_{RMSM}$ | 60 | A |
| 正向浪涌电流<br>Surge forward current | $t_p$ = 10 ms, $T_{vj}$ = 25°C<br>$t_p$ = 10 ms, $T_{vj}$ = 150°C | $I_{FSM}$ | 290<br>245 | A<br>A |
| I2t-值<br>$I^2t$ - value | $t_p$ = 10 ms, $T_{vj}$ = 25°C<br>$t_p$ = 10 ms, $T_{vj}$ = 150°C | $I^2t$ | 420<br>300 | $A^2s$<br>$A^2s$ |

### 特征值 / Characteristic Values

| | | | min. | typ. | max. | |
|---|---|---|---|---|---|---|
| 正向电压<br>Forward voltage | $T_{vj}$ = 150°C, $I_F$ = 20 A | $V_F$ | | 1,00 | | V |
| 反向电流<br>Reverse current | $T_{vj}$ = 150°C, $V_R$ = 1200 V | $I_R$ | | 0,10 | | mA |
| 结 - 外壳热阻<br>Thermal resistance, junction to case | 每个二极管 / per diode | $R_{thJC}$ | | 1,20 | 1,35 | K/W |
| 外壳 - 散热器热阻<br>Thermal resistance, case to heatsink | 每个二极管 / per diode<br>$\lambda_{Paste}$ = 1 W/(m·K) / $\lambda_{grease}$ = 1 W/(m·K) | $R_{thCH}$ | | 1,15 | | K/W |
| 在开关状态下温度<br>Temperature under switching conditions | | $T_{vj\ op}$ | | | | °C |



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|---|---|
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初步数据
**Preliminary Data**

## IGBT, 斩波器 / IGBT-Chopper

### 最大额定值 / Maximum Rated Values

| | | | | |
|---|---|---|---|---|
| 集电极 - 发射极电压<br>Collector-emitter voltage | $T_{vj}$ = 25°C | $V_{CES}$ | 1200 | V |
| 集电极电流<br>Implemented collector current | | $I_{CN}$ | 40 | A |
| 连续集电极直流电流<br>Continuous DC collector current | $T_C$ = 100°C, $T_{vj\,max}$ = 175°C<br>$T_C$ = 25°C, $T_{vj\,max}$ = 175°C | $I_{C\,nom}$<br>$I_C$ | 20<br>50 | A<br>A |
| 集电极重复峰值电流<br>Repetitive peak collector current | $t_P$ = 1 ms | $I_{CRM}$ | 80 | A |
| 总功率损耗<br>Total power dissipation | $T_C$ = 25°C, $T_{vj\,max}$ = 175°C | $P_{tot}$ | 190 | W |
| 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 | $I_C$ = 20 A, $V_{GE}$ = 15 V<br>$I_C$ = 20 A, $V_{GE}$ = 15 V<br>$I_C$ = 20 A, $V_{GE}$ = 15 V | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $V_{CE\,sat}$ | | 1,55<br>1,70<br>1,75 | 1,70 | V<br>V<br>V |
| 栅极阈值电压<br>Gate threshold voltage | $I_C$ = 1,00 mA, $V_{CE}$ = $V_{GE}$, $T_{vj}$ = 25°C | | $V_{GEth}$ | 5,0 | 5,8 | 6,5 | V |
| 栅极电荷<br>Gate charge | $V_{GE}$ = -15 V ... +15 V | | $Q_G$ | | 0,32 | | µC |
| 内部栅极电阻<br>Internal gate resistor | $T_{vj}$ = 25°C | | $R_{Gint}$ | | 0,0 | | Ω |
| 输入电容<br>Input capacitance | f = 1 MHz, $T_{vj}$ = 25°C, $V_{CE}$ = 25 V, $V_{GE}$ = 0 V | | $C_{ies}$ | | 2,35 | | nF |
| 反向传输电容<br>Reverse transfer capacitance | f = 1 MHz, $T_{vj}$ = 25°C, $V_{CE}$ = 25 V, $V_{GE}$ = 0 V | | $C_{res}$ | | 0,13 | | nF |
| 集电极-发射极截止电流<br>Collector-emitter cut-off current | $V_{CE}$ = 1200 V, $V_{GE}$ = 0 V, $T_{vj}$ = 25°C | | $I_{CES}$ | | | 1,0 | mA |
| 栅极-发射极漏电流<br>Gate-emitter leakage current | $V_{CE}$ = 0 V, $V_{GE}$ = 20 V, $T_{vj}$ = 25°C | | $I_{GES}$ | | | 100 | nA |
| 开通延迟时间(电感负载)<br>Turn-on delay time, inductive load | $I_C$ = 20 A, $V_{CE}$ = 600 V<br>$V_{GE}$ = ±15 V<br>$R_{Gon}$ = 12 Ω | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $t_{d\,on}$ | | 0,035<br>0,035<br>0,035 | | µs<br>µs<br>µs |
| 上升时间(电感负载)<br>Rise time, inductive load | $I_C$ = 20 A, $V_{CE}$ = 600 V<br>$V_{GE}$ = ±15 V<br>$R_{Gon}$ = 12 Ω | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $t_r$ | | 0,01<br>0,012<br>0,014 | | µs<br>µs<br>µs |
| 关断延迟时间(电感负载)<br>Turn-off delay time, inductive load | $I_C$ = 20 A, $V_{CE}$ = 600 V<br>$V_{GE}$ = ±15 V<br>$R_{Goff}$ = 12 Ω | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $t_{d\,off}$ | | 0,25<br>0,32<br>0,35 | | µs<br>µs<br>µs |
| 下降时间(电感负载)<br>Fall time, inductive load | $I_C$ = 20 A, $V_{CE}$ = 600 V<br>$V_{GE}$ = ±15 V<br>$R_{Goff}$ = 12 Ω | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $t_f$ | | 0,016<br>0,023<br>0,25 | | µs<br>µs<br>µs |
| 开通损耗能量 (每脉冲)<br>Turn-on energy loss per pulse | $I_C$ = 20 A, $V_{CE}$ = 600 V, $L_S$ = 30 nH<br>$V_{GE}$ = ±15 V, di/dt = 1800 A/µs ($T_{vj}$ = 150°C)<br>$R_{Gon}$ = 12 Ω | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $E_{on}$ | | 0,90<br>1,55<br>1,75 | | mJ<br>mJ<br>mJ |
| 关断损耗能量 (每脉冲 )<br>Turn-off energy loss per pulse | $I_C$ = 20 A, $V_{CE}$ = 600 V, $L_S$ = 30 nH<br>$V_{GE}$ = ±15 V, du/dt = 3200 V/µs ($T_{vj}$ = 150°C)<br>$R_{Goff}$ = 12 Ω | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $E_{off}$ | | 0,80<br>1,20<br>1,40 | | mJ<br>mJ<br>mJ |
| 短路数据<br>SC data | $V_{GE}$ ≤ 15 V, $V_{CC}$ = 800 V<br>$V_{CEmax}$ = $V_{CES}$ -$L_{sCE}$ ·di/dt | $t_P$ ≤ 10 µs, $T_{vj}$ = 150°C | $I_{SC}$ | | 130 | | A |
| 结 - 外壳热阻<br>Thermal resistance, junction to case | 每个 IGBT / per IGBT | | $R_{thJC}$ | | 0,55 | 0,65 | K/W |

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 外壳 - 散热器热阻<br>Thermal resistance, case to heatsink | 每个 IGBT / per IGBT<br>$\lambda_{Paste}$ = 1 W/(m·K) / $\lambda_{grease}$ = 1 W/(m·K) | | $R_{thCH}$ | | 0,55 | | K/W |
| 在开关状态下温度<br>Temperature under switching conditions | | | $T_{vj\ op}$ | -40 | | 150 | °C |

## Diode-斩波器 / Diode-Chopper

### 最大额定值 / Maximum Rated Values

| | | | | |
|---|---|---|---|---|
| 反向重复峰值电压<br>Repetitive peak reverse voltage | $T_{vj}$ = 25°C | $V_{RRM}$ | 1200 | V |
| 连续正向直流电流<br>Continuous DC forward current | | $I_F$ | 20 | A |
| 正向重复峰值电流<br>Repetitive peak forward current | $t_P$ = 1 ms | $I_{FRM}$ | 70 | A |
| I2t-值<br>I²t - value | $V_R$ = 0 V, $t_P$ = 10 ms, $T_{vj}$ = 125°C | $I^2t$ | 360 | A²s |

### 特征值 / Characteristic Values

| | | | | min. | typ. | max. | |
|---|---|---|---|---|---|---|---|
| 正向电压<br>Forward voltage | $I_F$ = 20 A, $V_{GE}$ = 0 V<br>$I_F$ = 20 A, $V_{GE}$ = 0 V<br>$I_F$ = 20 A, $V_{GE}$ = 0 V | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $V_F$ | | 1,70<br>1,35<br>1,30 | 2,00 | V<br>V<br>V |
| 反向恢复峰值电流<br>Peak reverse recovery current | $I_F$ = 20 A, - $di_F/dt$ = 1800 A/µs ($T_{vj}$=150°C)<br>$V_R$ = 600 V | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $I_{RM}$ | | 36,0<br>53,0<br>58,0 | | A<br>A<br>A |
| 恢复电荷<br>Recovered charge | $I_F$ = 20 A, - $di_F/dt$ = 1800 A/µs ($T_{vj}$=150°C)<br>$V_R$ = 600 V | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $Q_r$ | | 1,65<br>3,90<br>5,00 | | µC<br>µC<br>µC |
| 反向恢复损耗（每脉冲）<br>Reverse recovery energy | $I_F$ = 20 A, - $di_F/dt$ = 1800 A/µs ($T_{vj}$=150°C)<br>$V_R$ = 600 V | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $E_{rec}$ | | 0,86<br>1,90<br>2,40 | | mJ<br>mJ<br>mJ |
| 结 - 外壳热阻<br>Thermal resistance, junction to case | 每个二极管 / per diode | | $R_{thJC}$ | | 0,70 | 0,75 | K/W |
| 外壳 - 散热器热阻<br>Thermal resistance, case to heatsink | 每个二极管 / per diode<br>$\lambda_{Paste}$ = 1 W/(m·K) / $\lambda_{grease}$ = 1 W/(m·K) | | $R_{thCH}$ | | 0,70 | | K/W |
| 在开关状态下温度<br>Temperature under switching conditions | | | $T_{vj\ op}$ | -40 | | 150 | °C |

## 负温度系数热敏电阻 / NTC-Thermistor

### 特征值 / Characteristic Values

| | | | min. | typ. | max. | |
|---|---|---|---|---|---|---|
| 额定电阻值<br>Rated resistance | $T_C$ = 25°C | $R_{25}$ | | 5,00 | | kΩ |
| R100 偏差<br>Deviation of R100 | $T_C$ = 100°C, $R_{100}$ = 493 Ω | ΔR/R | -5 | | 5 | % |
| 耗散功率<br>Power dissipation | $T_C$ = 25°C | $P_{25}$ | | | 20,0 | mW |
| B-值<br>B-value | $R_2 = R_{25}\ exp\ [B_{25/50}(1/T_2 - 1/(298,15\ K))]$ | $B_{25/50}$ | | 3375 | | K |
| B-值<br>B-value | $R_2 = R_{25}\ exp\ [B_{25/80}(1/T_2 - 1/(298,15\ K))]$ | $B_{25/80}$ | | 3411 | | K |
| B-值<br>B-value | $R_2 = R_{25}\ exp\ [B_{25/100}(1/T_2 - 1/(298,15\ K))]$ | $B_{25/100}$ | | 3433 | | K |

根据应用手册标定
Specification according to the valid application note.


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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. | $V_{ISOL}$ | | 2,5 | | kV |
| 内部绝缘<br>Internal isolation | 基本绝缘 (class 1, IEC 61140)<br>basic insulation (class 1, IEC 61140) | | | $Al_2O_3$ | | |
| 爬电距离<br>Creepage distance | 端子- 散热片 / terminal to heatsink<br>端子- 端子 / terminal to terminal | | | 11,5<br>6,3 | | mm |
| 电气间隙<br>Clearance | 端子- 散热片 / terminal to heatsink<br>端子- 端子 / terminal to terminal | | | 10,0<br>5,0 | | mm |
| 相对电痕指数<br>Comperative tracking index | | CTI | | > 200 | | |
| | | | min. | typ. | max. | |
| 杂散电感,模块<br>Stray inductance module | | $L_{sCE}$ | | 25 | | nH |
| 储存温度<br>Storage temperature | | $T_{stg}$ | -40 | | 125 | °C |
| Anpresskraft für mech. Bef. pro Feder<br>mountig force per clamp | | F | 40 | - | 80 | N |
| 重量<br>Weight | | G | | 36 | | g |

Der Strom im Dauerbetrieb ist auf 25A effektiv pro Anschlusspin begrenzt
The current under continuous operation is limited to 25A rms per connector pin.

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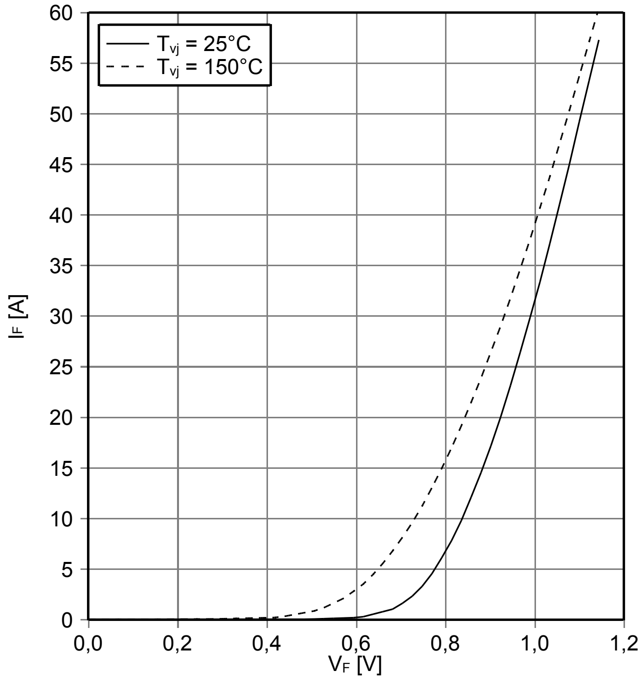
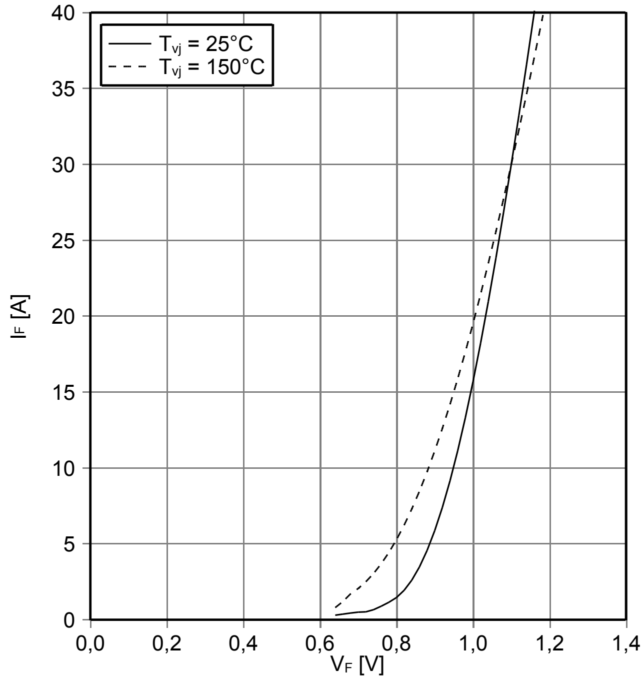
初步数据
**Preliminary Data**

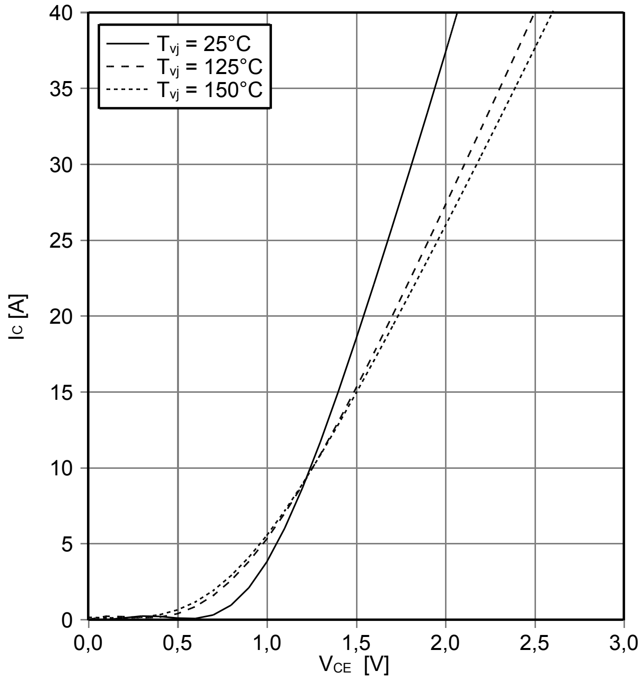
**正向偏压特性 旁路二极管 （典型)**
**forward characteristic of Bypass-Diode (typical)**
$I_F = f(V_F)$



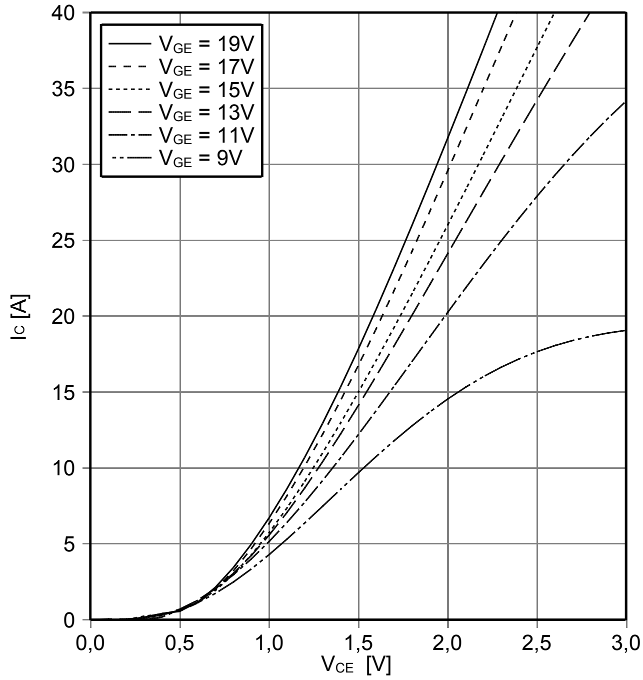

**正向偏压特性 反极性保护二极管A （典型)**
**forward characteristic of Inverse-polarity protection diode A (typical)**
$I_F = f(V_F)$




**输出特性 IGBT, 斩波器 （典型)**
**output characteristic IGBT-Chopper (typical)**
$I_C = f(V_{CE})$
$V_{GE} = 15$ V




**输出特性 IGBT, 斩波器 （典型)**
**output characteristic IGBT-Chopper (typical)**
$I_C = f(V_{CE})$
$T_{vj} = 150°C$

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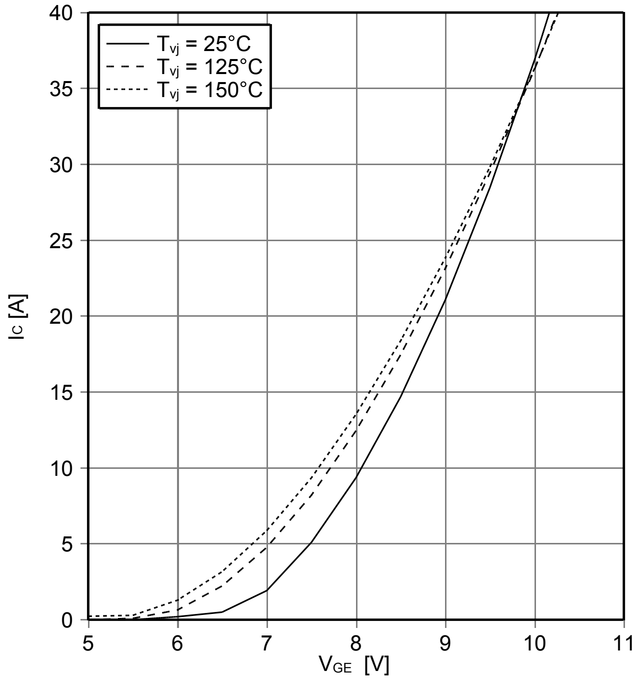
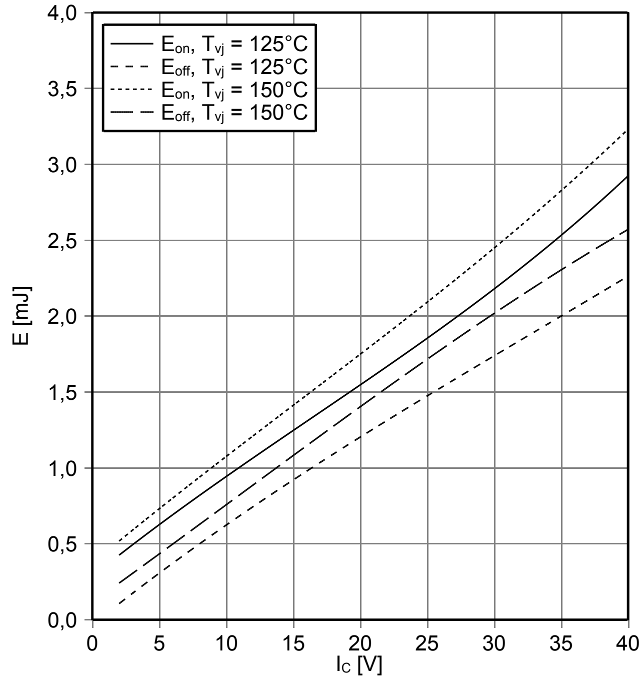
|---|---|
| approved by: MB | revision: 2.0 |

**初步数据**
**Preliminary Data**

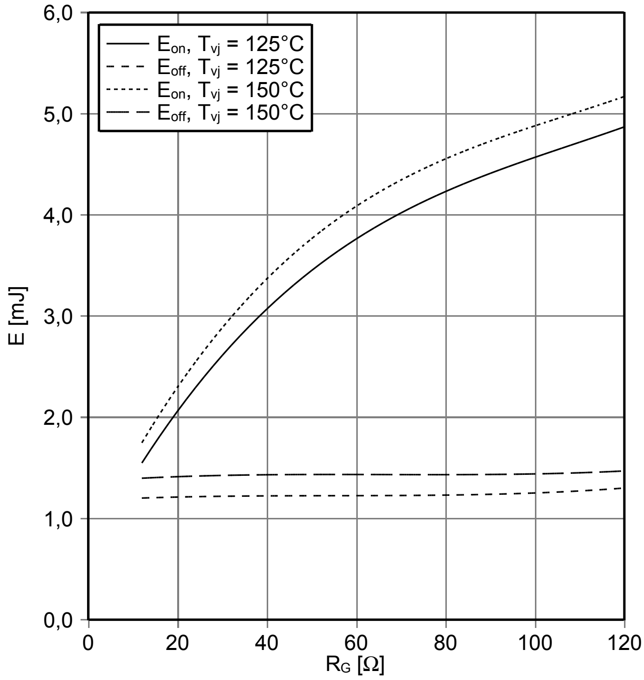
**传输特性 IGBT, 斩波器 (典型)**
**transfer characteristic IGBT-Chopper (typical)**
$I_C = f(V_{GE})$
$V_{CE} = 20$ V



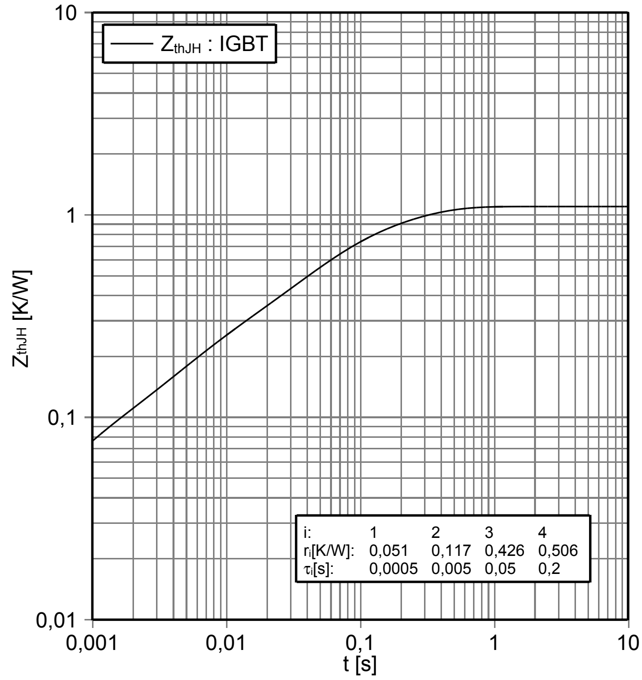

**开关损耗 IGBT, 斩波器 ( 典型)**
**switching losses IGBT-Chopper (typical)**
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
$V_{GE} = \pm 15$ V, $R_{Gon} = 12\ \Omega$, $R_{Goff} = 12\ \Omega$, $V_{CE} = 600$ V




**开关损耗 IGBT, 斩波器 ( 典型)**
**switching losses IGBT-Chopper (typical)**
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
$V_{GE} = \pm 15$ V, $I_C = 20$ A, $V_{CE} = 600$ V




**瞬态热阻抗 IGBT, 斩波器**
**transient thermal impedance IGBT-Chopper**
$Z_{thJH} = f(t)$

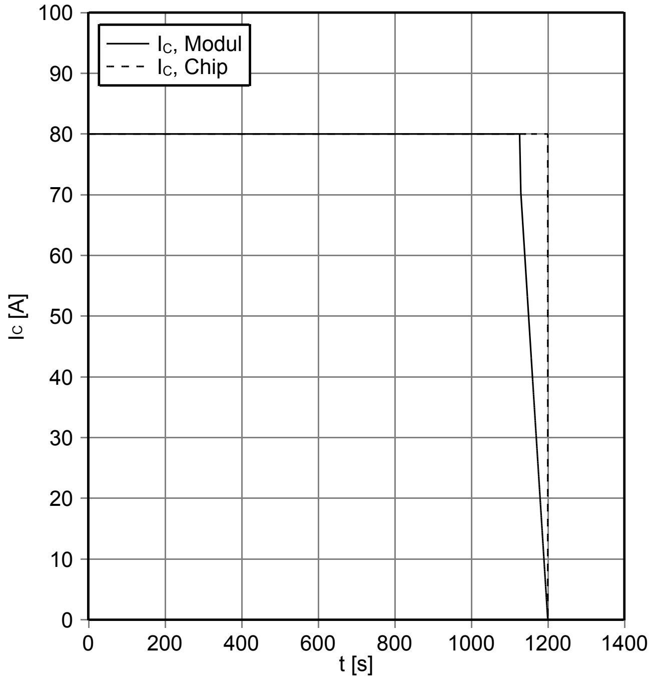



| i: | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| $r_i$[K/W]: | 0,051 | 0,117 | 0,426 | 0,506 |
| $\tau_i$[s]: | 0,0005 | 0,005 | 0,05 | 0,2 |

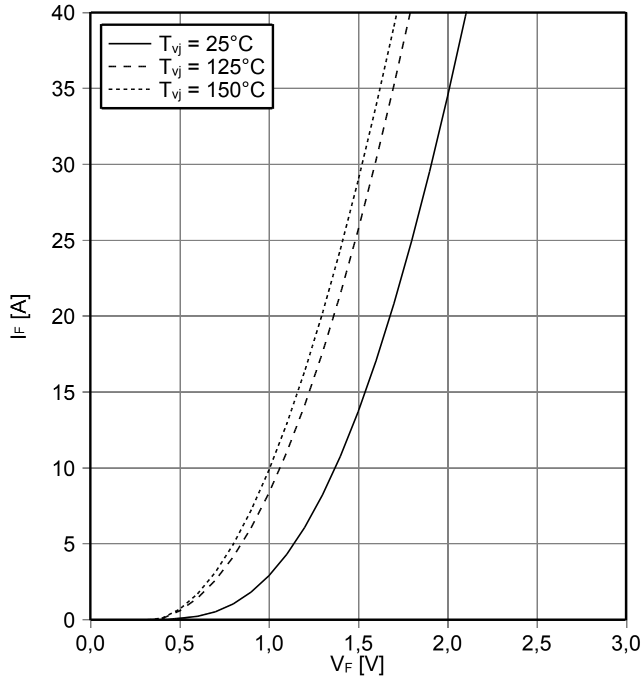
| prepared by: CM | date of publication: 2013-11-11 |
|---|---|
| approved by: MB | revision: 2.0 |

**初步数据**
**Preliminary Data**

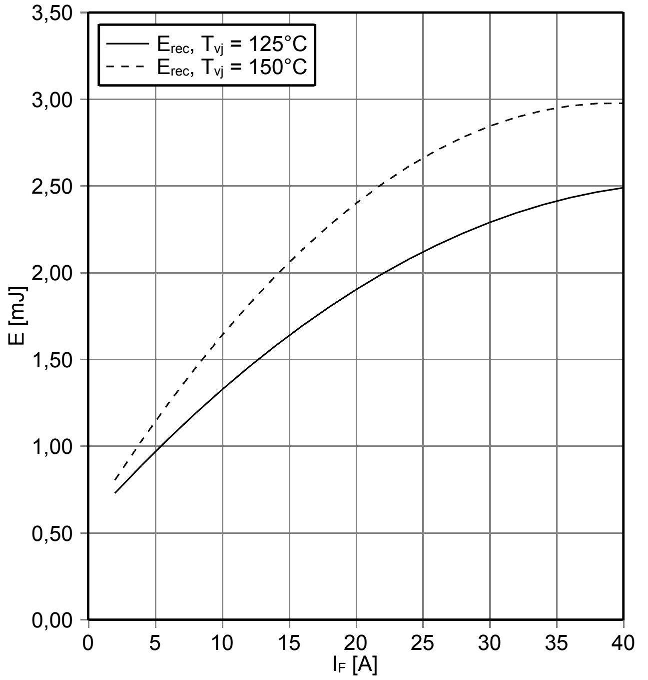
**反偏安全工作区 IGBT, 斩波器 （RBSOA）**
**reverse bias safe operating area IGBT-Chopper (RBSOA)**
$I_C = f(V_{CE})$
$V_{GE} = \pm15$ V, $R_{Goff} = 12\ \Omega$, $T_{vj} = 150°C$



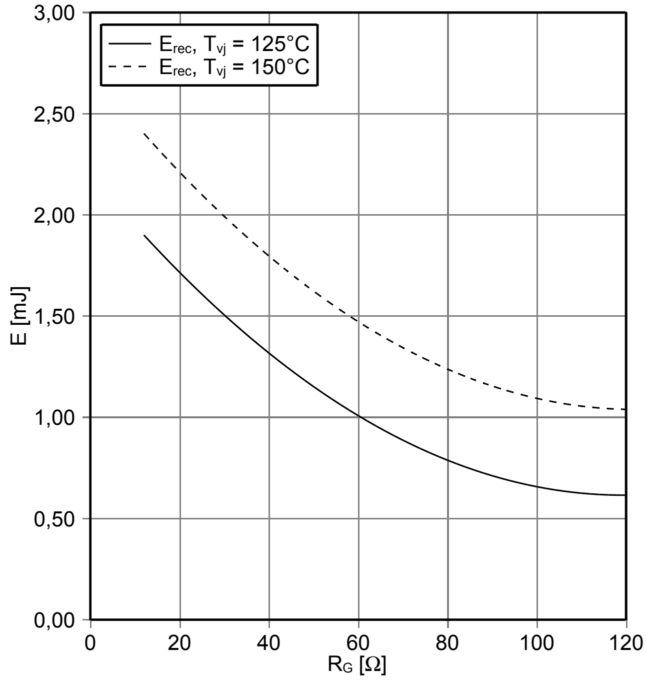

**正向偏压特性 Diode-斩波器 （典型)**
**forward characteristic of Diode-Chopper (typical)**
$I_F = f(V_F)$




**开关损耗 Diode-斩波器 （典型)**
**switching losses Diode-Chopper (typical)**
$E_{rec} = f(I_F)$
$R_{Gon} = 12\ \Omega$, $V_{CE} = 600$ V




**开关损耗 Diode-斩波器 （典型)**
**switching losses Diode-Chopper (typical)**
$E_{rec} = f(R_G)$
$I_F = 20$ A, $V_{CE} = 600$ V

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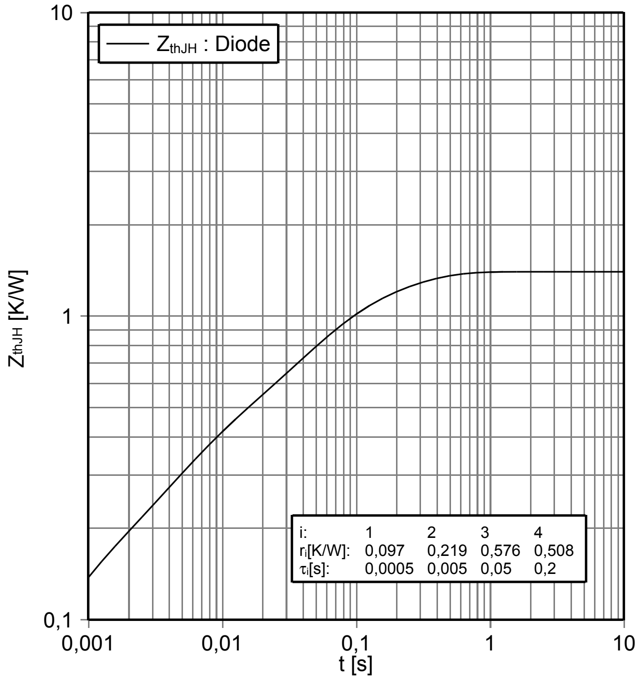
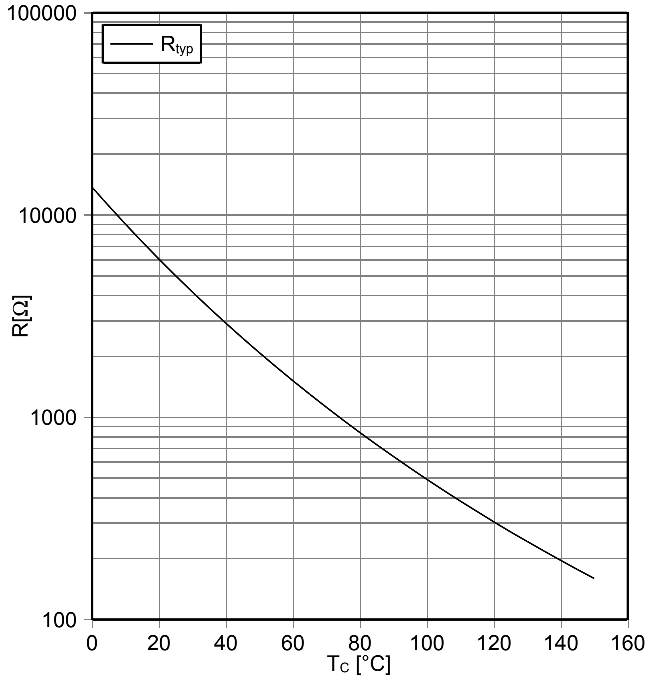
**初步数据**
**Preliminary Data**

**瞬态热阻抗 Diode-斩波器**
**transient thermal impedance Diode-Chopper**
$Z_{thJH} = f(t)$




**负温度系数热敏电阻 温度特性**
**NTC-Thermistor-temperature characteristic (typical)**
$R = f(T)$

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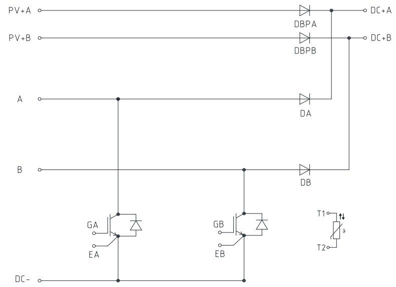
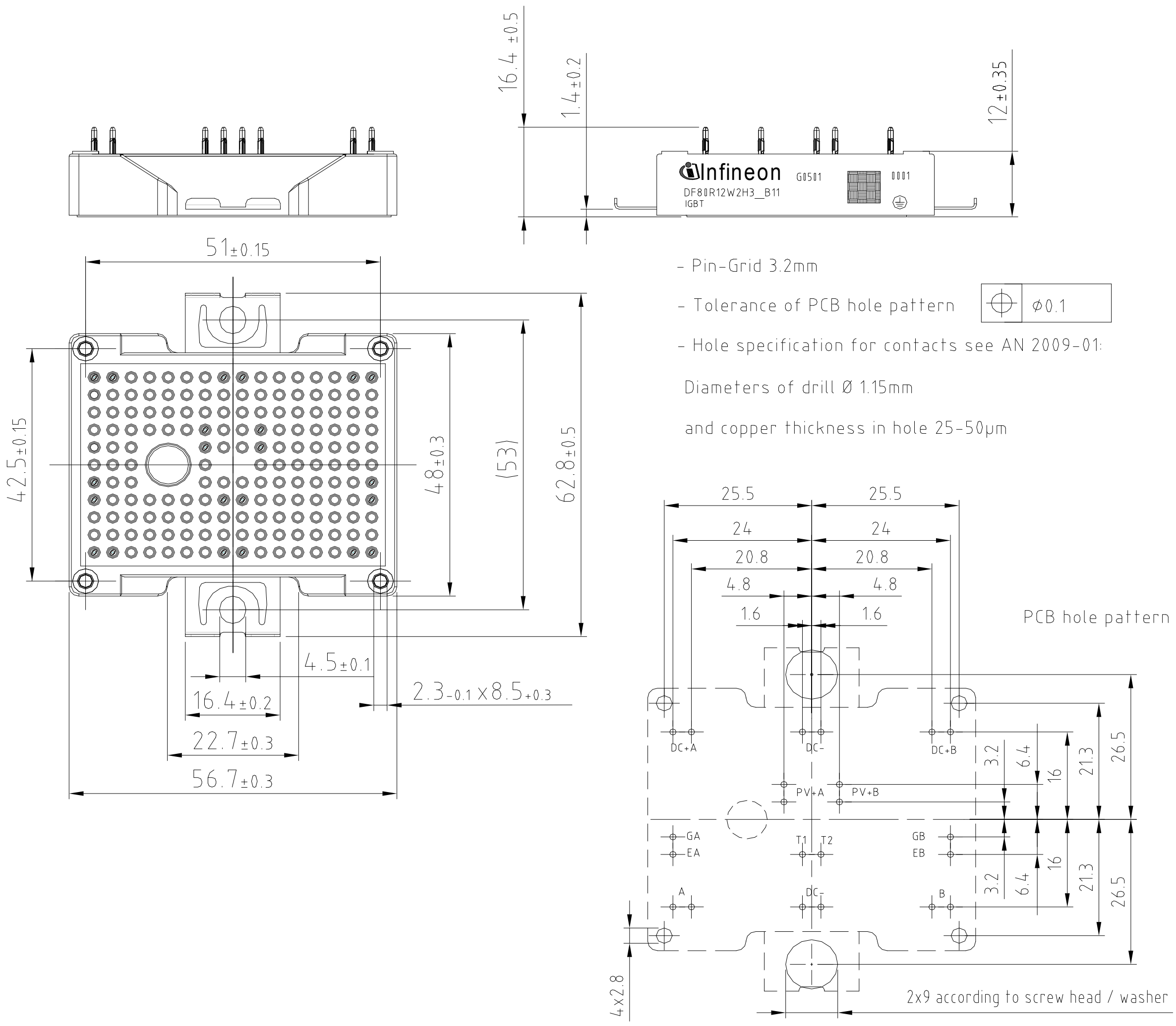
初步数据
**Preliminary Data**

## 接线图 / circuit_diagram_headline




## 封装尺寸 / package outlines

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**初步数据**
**Preliminary Data**

## 使用条件和条款

使用条件和条款
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