

IGBT, 逆变器 / IGBT, Inverter

最大额定值 / Maximum Rated Values

**初步数据
Preliminary Data**

| | | | | |
|--|--|----------------------------|------------|--------|
| 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 | $T_C = 80^{\circ}\text{C}, T_{vj\text{max}} = 150^{\circ}\text{C}$ $T_C = 25^{\circ}\text{C}, T_{vj\text{max}} = 150^{\circ}\text{C}$ | $I_{C\text{nom}}$ I_C | 100 145 | A A |
| 集电极重复峰值电流 Repetitive peak collector current | $t_P = 1\text{ms}$ | I_{CRM} | 200 | A |
| 总功率损耗 Total power dissipation | $T_C = 25^{\circ}\text{C}, T_{vj\text{max}} = 150$ | P_{tot} | 555 | W |
| 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 | $I_C = 100\text{A}, V_{GE} = 15\text{V}$ $I_C = 100\text{A}, V_{GE} = 15\text{V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ | $V_{CE\text{sat}}$ | 2,00 2,40 | 2,45 | V V |
| 栅极阈值电压 Gate threshold voltage | $I_C = 4,00\text{mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$ | | $V_{G\text{Eth}}$ | 5,2 | 5,8 | 6,4 V |
| 栅极电荷 Gate charge | $V_{GE} = -15\text{V} \dots +15\text{V}$ | | Q_G | 1,20 | | μC |
| 内部栅极电阻 Internal gate resistor | $T_{vj} = 25^{\circ}\text{C}$ | | $R_{G\text{int}}$ | 7,5 | | Ω |
| 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} | 9,00 | | 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} | 0,29 | | 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 | $I_C = 100\text{A}, V_{CE} = 900\text{V}$ $V_{GE} = \pm 15\text{V}$ $R_{Gon} = 4,0\Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ | $t_{d\text{on}}$ | 0,37 0,40 | | μs μs |
| 上升时间(电感负载) Rise time, inductive load | $I_C = 100\text{A}, V_{CE} = 900\text{V}$ $V_{GE} = \pm 15\text{V}$ $R_{Gon} = 4,0\Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ | t_r | 0,04 0,05 | | μs μs |
| 关断延迟时间(电感负载) Turn-off delay time, inductive load | $I_C = 100\text{A}, V_{CE} = 900\text{V}$ $V_{GE} = \pm 15\text{V}$ $R_{Goff} = 4,0\Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ | $t_{d\text{off}}$ | 0,65 0,80 | | μs μs |
| 下降时间(电感负载) Fall time, inductive load | $I_C = 100\text{A}, V_{CE} = 900\text{V}$ $V_{GE} = \pm 15\text{V}$ $R_{Goff} = 4,0\Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ | t_f | 0,18 0,30 | | μs μs |
| 开通损耗能量(每脉冲) Turn-on energy loss per pulse | $I_C = 100\text{A}, V_{CE} = 900\text{V}, L_S = 30\text{nH}$ $V_{GE} = \pm 15\text{V}$ $R_{Gon} = 4,0\Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ | E_{on} | 22,0 32,0 | | mJ mJ |
| 关断损耗能量(每脉冲) Turn-off energy loss per pulse | $I_C = 100\text{A}, V_{CE} = 900\text{V}, L_S = 30\text{nH}$ $V_{GE} = \pm 15\text{V}$ $R_{Goff} = 4,0\Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ | E_{off} | 21,5 31,5 | | mJ mJ |
| 短路数据 SC data | $V_{GE} \leq 15\text{V}, V_{CC} = 1000\text{V}$ $V_{CE\text{max}} = V_{CES} - L_{SCE} \cdot di/dt$ | $t_P \leq 10\mu\text{s}, T_{vj} = 125^{\circ}\text{C}$ | I_{SC} | 400 | | A |
| 结 - 外壳热阻 Thermal resistance, junction to case | 每个 IGBT / per IGBT | | R_{thJC} | | 0,225 | K/W |
| 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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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 | 100 | A |
| 正向重复峰值电流 Repetitive peak forward current | $t_P = 1\text{ ms}$ | I_{FRM} | 200 | A |
| I ² t-值 I ² t - value | $V_R = 0\text{ V}, t_P = 10\text{ ms}, T_{vj} = 125^{\circ}\text{C}$ | I^2t | 1800 | A ² s |

特征值 / Characteristic Values

| | | | min. | typ. | max. | |
|--|--|---|--------------------|--------------|------|--------------------------------|
| 正向电压 Forward voltage | $I_F = 100\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 100\text{ A}, V_{GE} = 0\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ | V_F | 1,80 1,90 | 2,20 | V V |
| 反向恢复峰值电流 Peak reverse recovery current | $I_F = 100\text{ A}, -di_F/dt = 2450\text{ A}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $V_R = 900\text{ V}$ $V_{GE} = -15\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ | I_{RM} | 155 165 | | A A |
| 恢复电荷 Recovered charge | $I_F = 100\text{ A}, -di_F/dt = 2450\text{ A}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $V_R = 900\text{ V}$ $V_{GE} = -15\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ | Q_r | 29,0 48,5 | | μC μC |
| 反向恢复损耗 (每脉冲) Reverse recovery energy | $I_F = 100\text{ A}, -di_F/dt = 2450\text{ A}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $V_R = 900\text{ V}$ $V_{GE} = -15\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ | E_{rec} | 15,5 27,5 | | mJ mJ |
| 结 - 外壳热阻 Thermal resistance, junction to case | 每个二极管 / per diode | | R_{thJC} | | 0,39 | K/W |
| 在开关状态下温度 Temperature under switching conditions | | | $T_{vj\text{ op}}$ | -40 | 125 | $^{\circ}\text{C}$ |

负温度系数热敏电阻 / NTC-Thermistor

特征值 / Characteristic Values

| | | | min. | typ. | max. | |
|------------------------------|---|--|--------------|--------|------|------------|
| 额定电阻值 Rated resistance | $T_C = 25^{\circ}\text{C}$ | | R_{25} | 5,00 | | k Ω |
| R100 偏差 Deviation of R100 | $T_C = 100^{\circ}\text{C}, R_{100} = 493\ \Omega$ | | $\Delta R/R$ | -5 | 5 | % |
| 耗散功率 Power dissipation | $T_C = 25^{\circ}\text{C}$ | | P_{25} | | 20,0 | mW |
| B-值 B-value | $R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298,15\text{ K}))]$ | | $B_{25/50}$ | 3375 | | K |
| B-值 B-value | $R_2 = R_{25} \exp [B_{25/80}(1/T_2 - 1/(298,15\text{ K}))]$ | | $B_{25/80}$ | t.b.d. | | K |
| B-值 B-value | $R_2 = R_{25} \exp [B_{25/100}(1/T_2 - 1/(298,15\text{ K}))]$ | | $B_{25/100}$ | t.b.d. | | 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

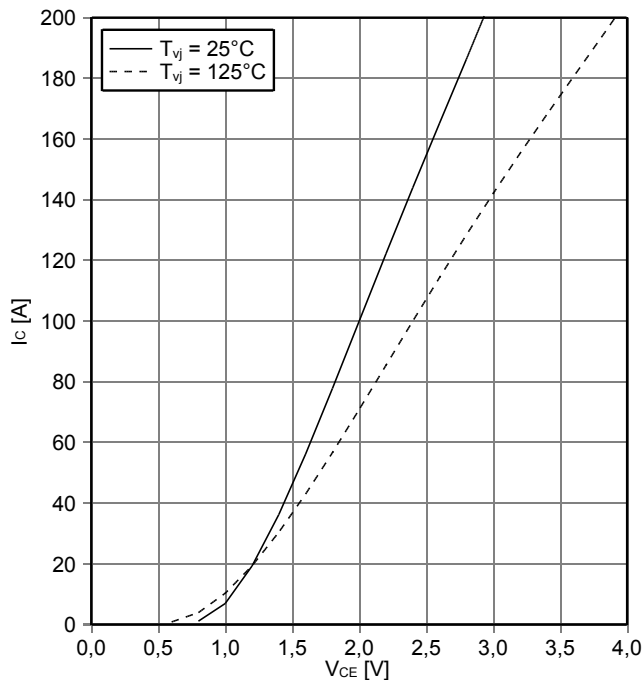
| | | | | | |
|---|---|---------------------|--------------------------------|------|---------|
| 绝缘测试电压 Isolation test voltage | RMS, f = 50 Hz, t = 1 min. | V _{ISOL} | 3,4 | | kV |
| 模块基板材料 Material of module baseplate | | | Cu | | |
| 内部绝缘 Internal isolation | 基本绝缘 (class 1, IEC 61140) basic insulation (class 1, IEC 61140) | | Al ₂ O ₃ | | |
| 爬电距离 Creepage distance | 端子- 散热片 / terminal to heatsink 端子- 端子 / terminal to terminal | | 10,0 10,0 | | mm |
| 电气间隙 Clearance | 端子- 散热片 / terminal to heatsink 端子- 端子 / terminal to terminal | | 7,5 7,5 | | mm |
| 相对电痕指数 Comperative tracking index | | CTI | > 225 | | |
| | | | min. | typ. | max. |
| 外壳 - 散热器热阻 Thermal resistance, case to heatsink | 每个模块 / per module $\lambda_{\text{Paste}} = 1 \text{ W/(m}\cdot\text{K)} / \lambda_{\text{grease}} = 1 \text{ W/(m}\cdot\text{K)}$ | R _{thCH} | 0,009 | | K/W |
| 杂散电感, 模块 Stray inductance module | | L _{sCE} | 21 | | nH |
| 模块引线电阻, 端子-芯片 Module lead resistance, terminals - chip | T _C = 25°C, 每个开关 / per switch | R _{CC+EE'} | 1,80 | | mΩ |
| 储存温度 Storage temperature | | T _{stg} | -40 | 125 | °C |
| 模块安装的安装扭矩 Mounting torque for modul mounting | 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 | 3,00 | - | 6,00 Nm |
| 重量 Weight | | G | 300 | | g |

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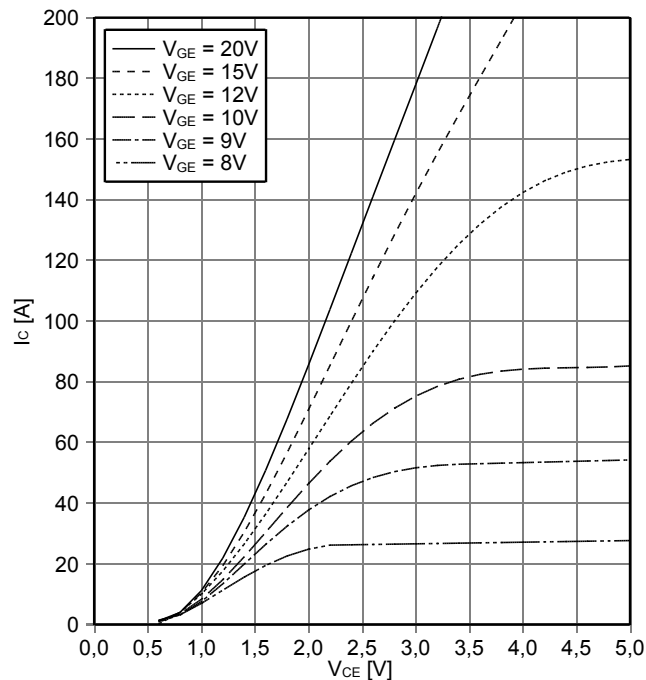
输出特性 IGBT, 逆变器 (典型)
output characteristic IGBT, Inverter (typical)

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



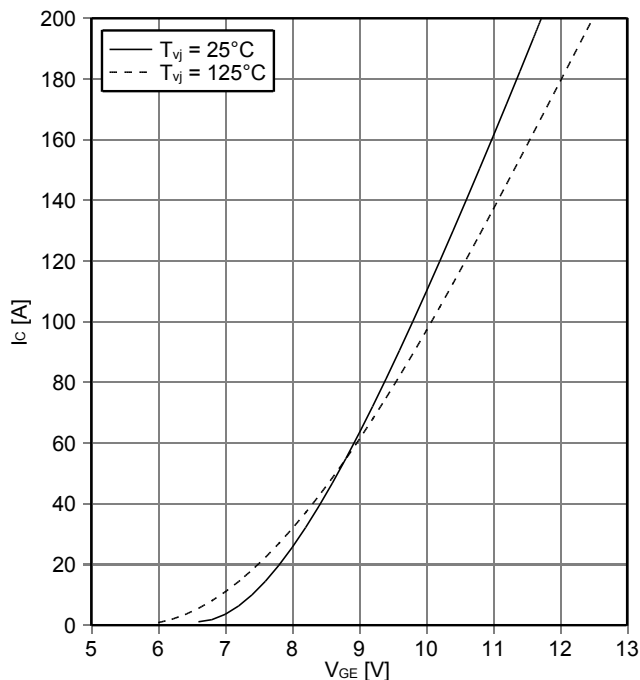
输出特性 IGBT, 逆变器 (典型)
output characteristic IGBT, Inverter (typical)

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



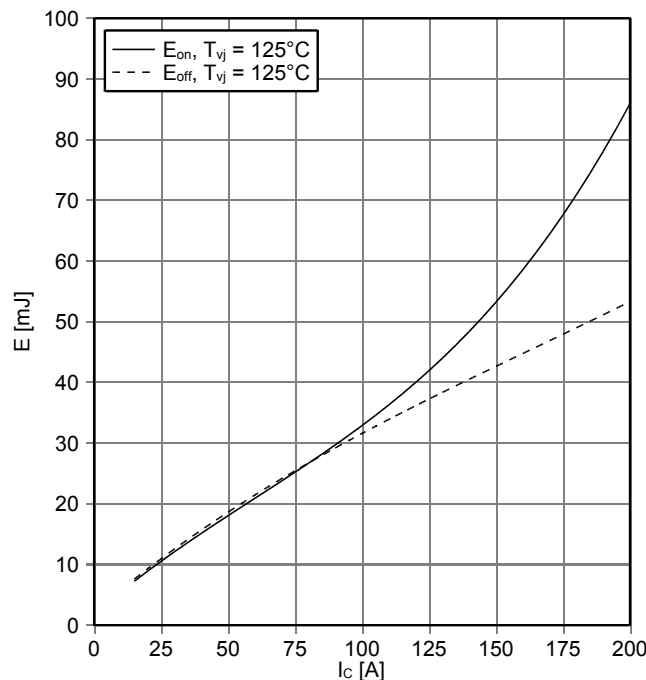
传输特性 IGBT, 逆变器 (典型)
transfer characteristic IGBT, Inverter (typical)

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



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

$E_{on} = f(I_C), E_{off} = f(I_C)$
 $V_{GE} = \pm 15\text{ V}, R_{Gon} = 4\ \Omega, R_{Goff} = 4\ \Omega, V_{CE} = 900\text{ V}$



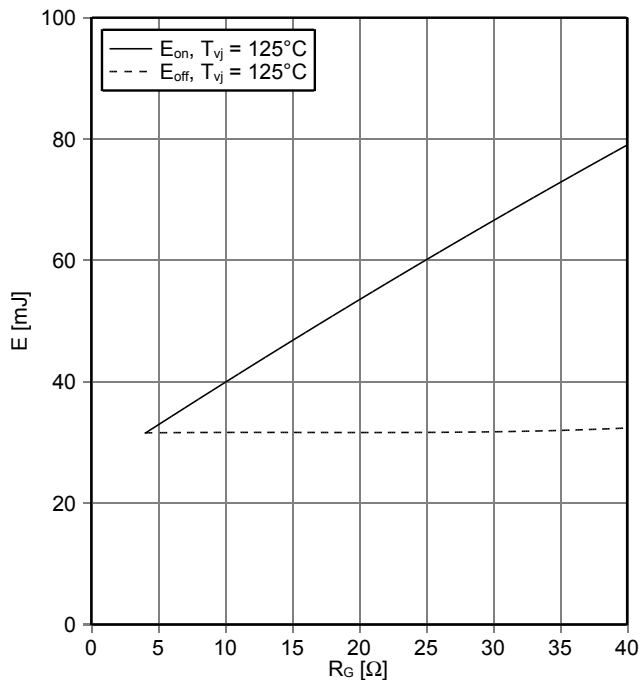
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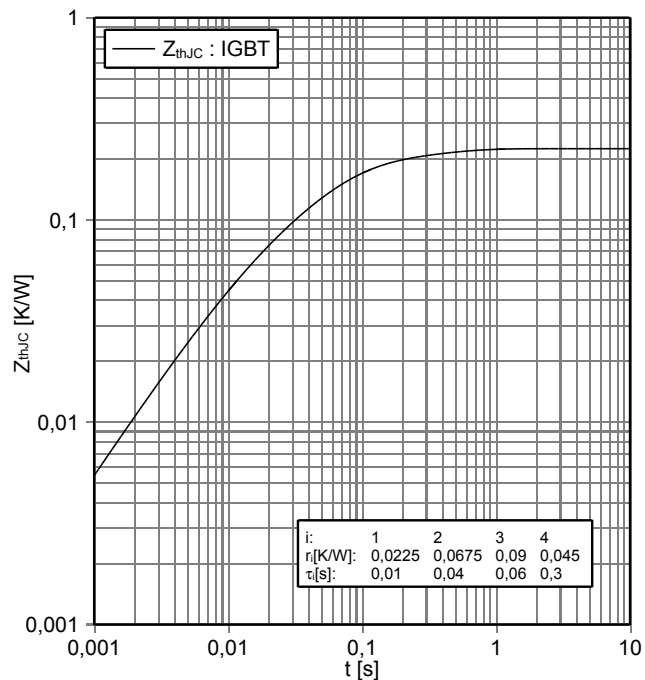
开关损耗 IGBT, 逆变器 (典型)
switching losses IGBT, Inverter (typical)

$E_{on} = f(R_G), E_{off} = f(R_G)$
 $V_{GE} = \pm 15\text{ V}, I_C = 100\text{ A}, V_{CE} = 900\text{ V}$



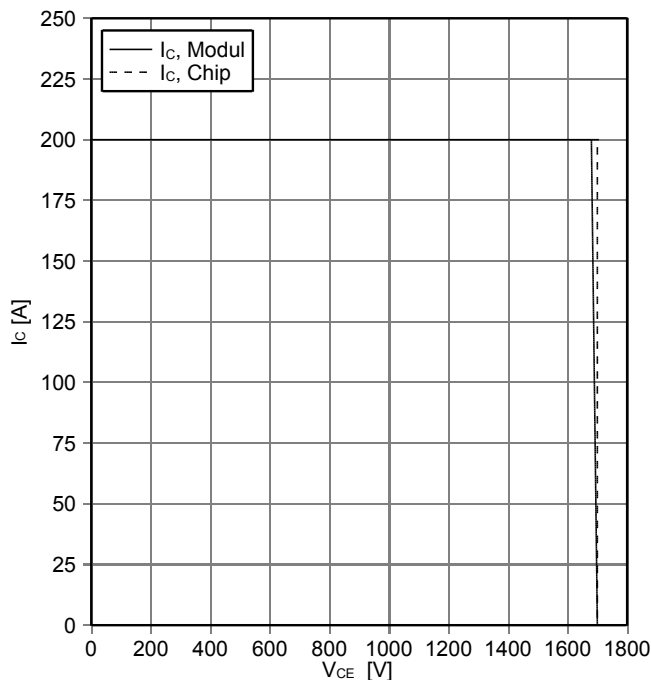
瞬态热阻抗 IGBT, 逆变器
transient thermal impedance IGBT, Inverter

$Z_{thJC} = f(t)$



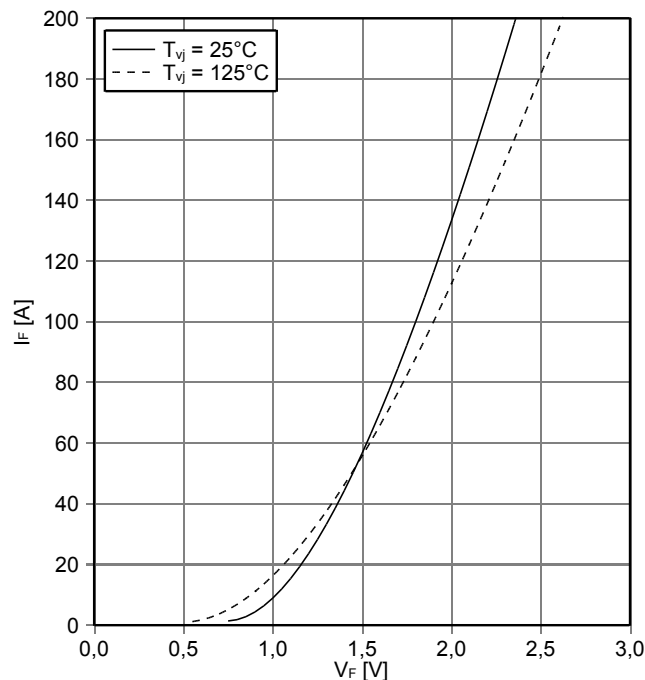
反偏安全工作区 IGBT, 逆变器 (RBSOA)
reverse bias safe operating area IGBT, Inverter (RBSOA)

$I_C = f(V_{CE})$
 $V_{GE} = \pm 15\text{ V}, R_{Goff} = 4\ \Omega, T_{vj} = 125^\circ\text{C}$



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

$I_F = f(V_F)$

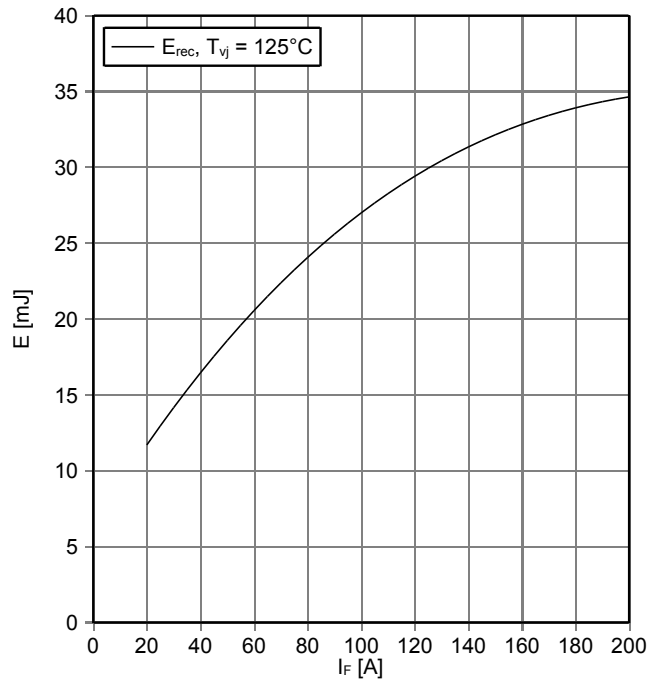


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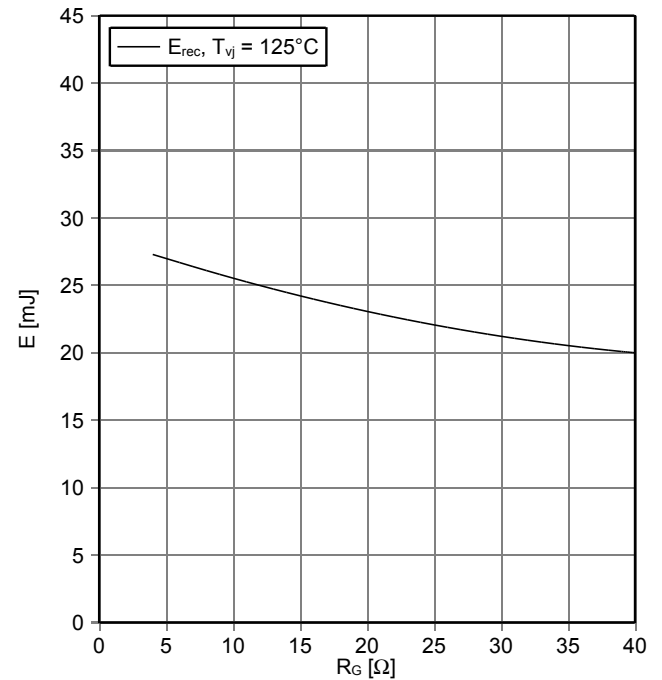
开关损耗 二极管, 逆变器 (典型)
switching losses Diode, Inverter (typical)

$E_{rec} = f(I_F)$
 $R_{Gon} = 4 \Omega, V_{CE} = 900 V$



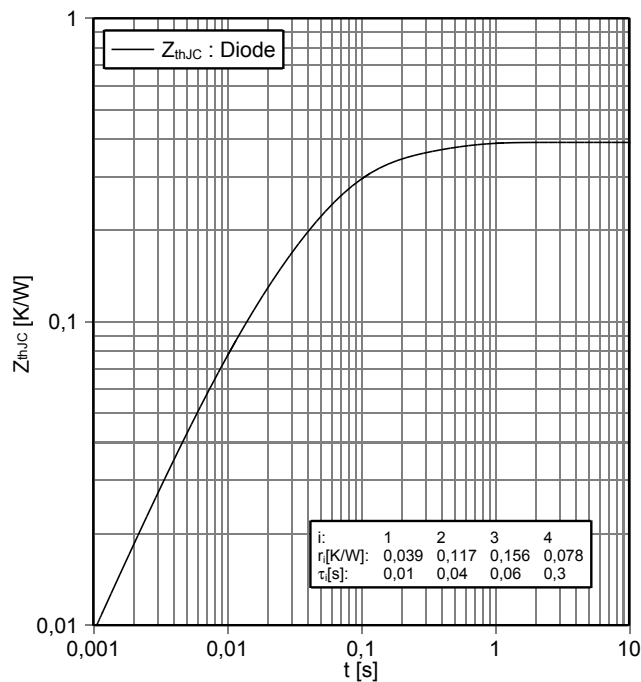
开关损耗 二极管, 逆变器 (典型)
switching losses Diode, Inverter (typical)

$E_{rec} = f(R_G)$
 $I_F = 100 A, V_{CE} = 900 V$



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

$Z_{thJC} = f(t)$

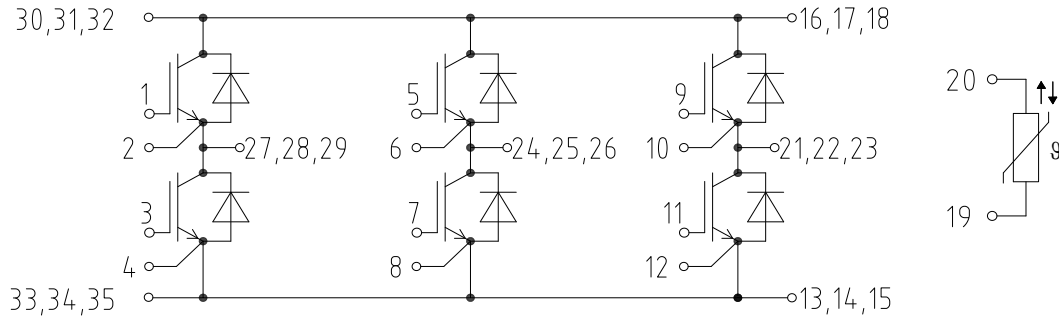


| i: | 1 | 2 | 3 | 4 |
|-----------------------|-------|-------|-------|-------|
| r _f [K/W]: | 0,039 | 0,117 | 0,156 | 0,078 |
| τ _f [s]: | 0,01 | 0,04 | 0,06 | 0,3 |

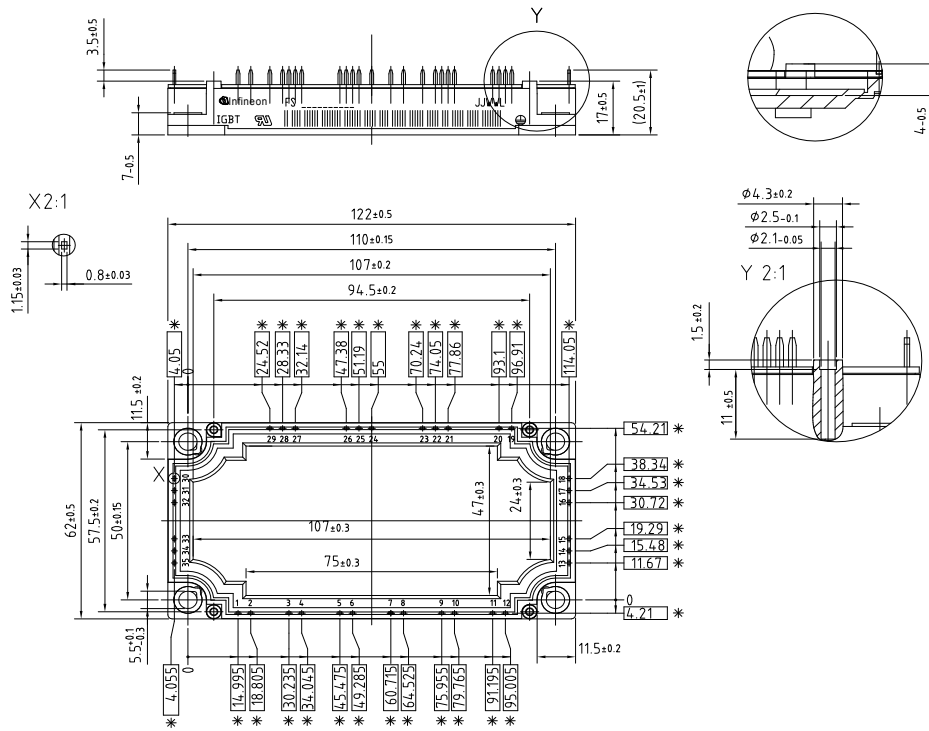
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初步数据
Preliminary Data

接线图 / circuit_diagram_headline



封装尺寸 / package outlines



* = alle Maße mit einer Toleranz von ± 0.5
 * = all dimensions with tolerance of ± 0.5

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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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