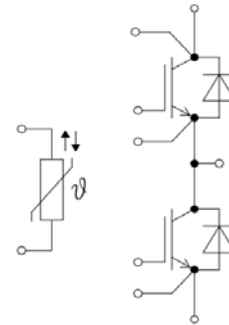


采用沟槽栅/场终止型 IGBT，超快恢复二极管。
Discrete with Trench / Field stop IGBT, ultra fast recovery diode.



特征/Features

- 低开关损耗 / Low Switching Losses
- 沟槽栅/场终止工艺 / Trench+ Field Stop Technology
- 最高工作温度 150°C / Operating Temperature up to 150°C
- 低饱和压降 / Low $V_{CE\ sat}$

典型应用/Typical Applications

- UPS 系统 / UPS Systems
- 电机传动 / Motor Drives
- 太阳能应用 / Solar Applications

最大额定值/Maximum Rated Values

初步数据/Preliminary Data

IGBT-逆变器/IGBT-Inverter

| 参数 Parameter | 测试条件 Test Conditions | 符号 Symbol | 数值 Value | 单位 Unit |
|--|---|--------------|-------------|------------|
| 集电极-发射极电压 Collector-emitter voltage | $T_{vj}=25^{\circ}\text{C}$ | V_{CES} | 650 | V |
| 连续集电极直流电流 Continuous DC collector current | $T_C=100^{\circ}\text{C}$, $T_{vj\ max}=175^{\circ}\text{C}$ | I_C | 600 | A |
| 集电极重复峰值电流 Repetitive peak collector current | $T_P=1\text{ms}$ | I_{CRM} | 1200 | A |
| 总功率损耗 Total power dissipation | $T_C=25^{\circ}\text{C}$, $T_{vj\ max}=175^{\circ}\text{C}$ | P_{tot} | 1660 | W |
| 栅极-发射极峰值电压 Gate-emitter peak voltage | | V_{GES} | ± 20 | V |

二极管-逆变器/Diode-Inverter

| | | | | |
|---|--|-----------|-------|----------------------|
| 反向重复峰值电压 Repetitive peak reverse voltage | $T_{vj}=25^{\circ}\text{C}$ | V_{RRM} | 650 | V |
| 连续正向直流电流 Continuous DC forward current | | I_F | 600 | A |
| 正向重复峰值电流 Repetitive peak forward current | $T_P=1\text{ms}$ | I_{FRM} | 1200 | A |
| I^2t -值 I^2t -value | $V_R=0\text{V}$, $T_P=10\text{ms}$, $T_{vj}=125^{\circ}\text{C}$ | I^2t | 18000 | A^2s |

特征值/Characteristic Values

初步数据/Preliminary Data

IGBT-逆变器/IGBT-Inverter

| 参数 Parameter | 测试条件 Test Conditions | 符号 Symbol | Min. | Typ. | Max. | Unit |
|---|---|--|---------------|----------------------|------|----------|
| 集电极-发射极饱和电压 Collector-emitter saturation voltage | $I_C=600A, V_{GE}=15V$ | $T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$ | $V_{CE\ sat}$ | 1.50 1.65 1.75 | | V |
| 栅极阈值电压 Gate threshold voltage | $I_C=12mA, V_{CE}=V_{GE}$ | $T_{vj}=25^{\circ}C$ | V_{GEth} | 5.0 | 7.0 | V |
| 栅极-发射极漏电流 Gate-emitter leakage current | $V_{GE}=20V, V_{CE}=0V$ | $T_{vj}=25^{\circ}C$ | I_{GES} | -600 | 600 | nA |
| 集电极-发射极截止电流 Collector-emitter leakage current | $V_{CE}=650V, V_{GE}=0V$ | $T_{vj}=25^{\circ}C$ | I_{CES} | | 1 | mA |
| 内部栅极电阻 Internal gate resistor | | $T_{vj}=25^{\circ}C$ | R_{Gint} | 0.67 | | Ω |
| 栅极电荷 Gate charge | $V_{GE}=-15V \dots +15V$ | | Q_G | 6.40 | | μC |
| 输入电容 Input capacitance | | | C_{ies} | 48 | | nF |
| 输出电容 Output capacitance | $f=1\ MHz, V_{CE}=25V,$ $V_{GE}=0V$ | $T_{vj}=25^{\circ}C$ | C_{oes} | 2.0 | | nF |
| 反向传输电容 Reverse transfer capacitance | | | C_{res} | 1.1 | | nF |
| 开通延迟时间 Turn-on delay time | | $T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$ | $T_{d\ on}$ | 70 81 89 | | ns |
| 关断延迟时间 Turn-off delay time | | $T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$ | $T_{d\ off}$ | 480 520 540 | | ns |
| 上升时间 Rise time | $I_C=600A, V_{CE}=300V$ $V_{GE}=\pm 15V$ | $T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$ | T_r | 80 85 90 | | ns |
| 下降时间 Fall time | $R_{Gon}=3.3\Omega, R_{Goff}=3.3\Omega$ 电感负载 (Inductive load) | $T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$ | T_f | 70 75 76 | | ns |
| 开通损耗 (每脉冲) Turn-on energy loss per pulse | | $T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$ | E_{on} | 8.1 9.2 10.1 | | mJ |
| 关断损耗 (每脉冲) Turn-off energy loss per pulse | | $T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$ | E_{off} | 18.5 23.1 24.5 | | mJ |
| 短路数据 Short circuit data | $V_{GE}\leq 15V, V_{CC}=360V$ $V_{CEmax}=V_{CES}-L_{sCE}\cdot di/dt$ | $T_P\leq 10\mu s$ $T_{vj}=150^{\circ}C$ | I_{sc} | 2800 | | A |
| 结-外壳热阻 Thermal resistance, junction to case | 每个 IGBT/Per IGBT | | R_{thJC} | | 0.09 | K/W |

| | | | | | | |
|--|---|--------------|--|-------------|-----------------------|------------------|
| 在开关状态下温度 Temperature under switching conditions | | $T_{vj\ op}$ | -40 | | 150 | °C |
| 二极管-逆变器/Diode-Inverter | | | | | | |
| 参数 Parameter | 测试条件 Test Conditions | | 符号 Symbol | Min. | Typ. | Max. Unit |
| 正向电压 Forward voltage | $I_F=600A, V_{GE}=0V$ | | $T_{vj}=25^\circ C$ $T_{vj}=125^\circ C$ $T_{vj}=150^\circ C$ V_F | | 1.70 1.60 1.60 | V |
| 反向恢复峰值电流 Peak reverse recovery current | $I_F=600A, V_R=300V$ $V_{GE}=-15V$ | | $T_{vj}=25^\circ C$ $T_{vj}=125^\circ C$ $T_{vj}=150^\circ C$ I_{RM} | | 204 301 330 | A |
| 恢复电荷 Recovered charge | | | $T_{vj}=25^\circ C$ $T_{vj}=125^\circ C$ $T_{vj}=150^\circ C$ Q_r | | 16.9 35.2 40.0 | μC |
| 反向恢复损耗（每脉冲） Reverse recovery energy | | | $T_{vj}=25^\circ C$ $T_{vj}=125^\circ C$ $T_{vj}=150^\circ C$ E_{rec} | | 3.89 9.10 10.40 | mJ |
| 结-外壳热阻 Thermal resistance, junction to case | 每个二极管/Per diode | | R_{thJC} | | 0.15 | K/W |
| 在开关状态下温度 Temperature under switching conditions | | $T_{vj\ op}$ | -40 | | 150 | °C |
| 负温度系数热敏电阻/NTC-Thermistor | | | | | | |
| 参数 Parameter | 测试条件 Test Conditions | | 符号 Symbol | Min. | Typ. | Max. Unit |
| 额定电阻值 Rated resistance | $T_C=25^\circ C$ | | R_{25} | | 5.00 | k Ω |
| R100 偏差 Deviation of R100 | $T_C=100^\circ C, R_{100}=493\Omega$ | | $\Delta R/R$ | -5 | 5 | % |
| 耗散功率 Power dissipation | $T_C=25^\circ C$ | | P_{25} | | 20.0 | mW |
| B-值 B-value | $B=[(T_a * T_b)/(T_b - T_a)] * \ln(R_a/R_b)$ $T_b=50^\circ C \pm 0.01^\circ C$ | | $B_{25/50}$ | | 3381 | K |

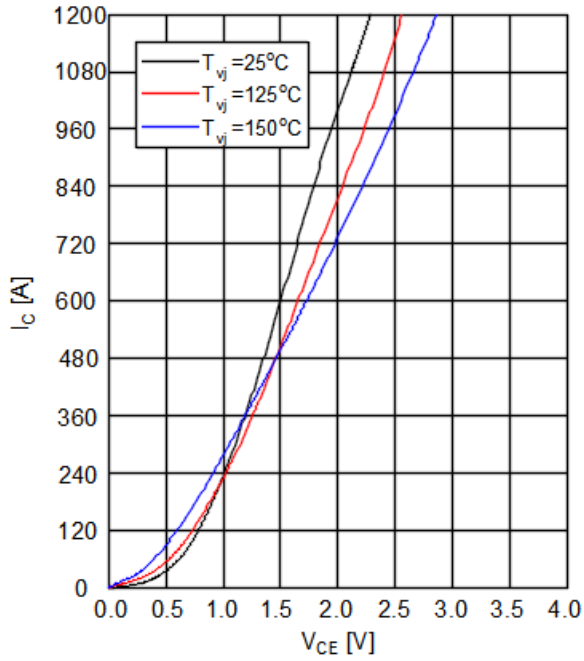
| 模块/Module | | 初步数据/Preliminary Data | | | |
|--|----------------------------|------------------------------|--|--------------------------------|----|
| 绝缘测试电压 Isolation test voltage | RMS, f=50Hz, t=1min | V_{ISOL} | | 4.0 | kV |
| 模块基板材料 Material of module baseplate | | | | Cu | |
| 内部绝缘 Internal isolation | | | | Al ₂ O ₃ | |
| 爬电距离 Creepage distance | 端子-端子/Terminal to terminal | | | 13.0 | mm |
| 电气间隙 Clearance | 端子-端子/Terminal to terminal | | | 10.0 | mm |

| | | | min. | typ. | max. | |
|---|-------------------------------------|---------------|------|------|------|-------------|
| 杂散电感, 模块 Stray inductance module | | L_{sCE} | | 20 | | nH |
| 模块引线电阻, 端子-芯片 Module lead resistance, terminals-chip | $T_C=25^{\circ}C$, 每个开关/Per switch | $R_{CC'+EE'}$ | | 1.10 | | m Ω |
| 储存温度 Storage temperature | | T_{stg} | -40 | | 125 | $^{\circ}C$ |
| 模块安装的安装扭矩 Mounting torque for module mounting | | M | 3.00 | - | 6.00 | Nm |
| 重量 Weight | | G | | 345 | | g |

初步数据/Preliminary Data

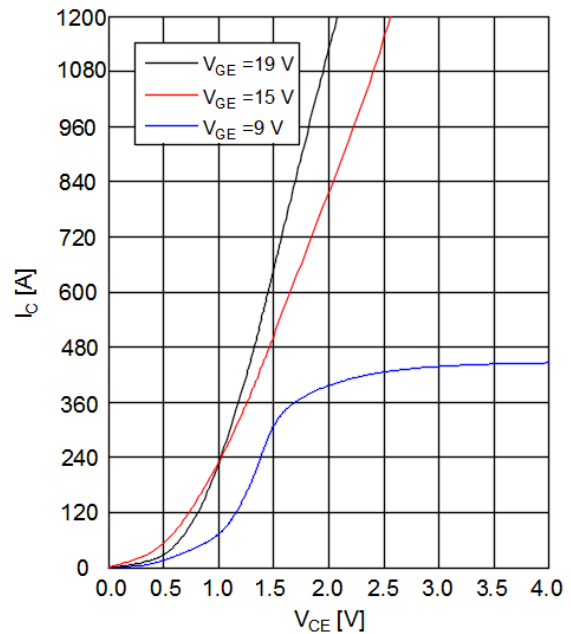
输出特性 IGBT-逆变器 (典型)
Output characteristic IGBT-Inverter (Typical)

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



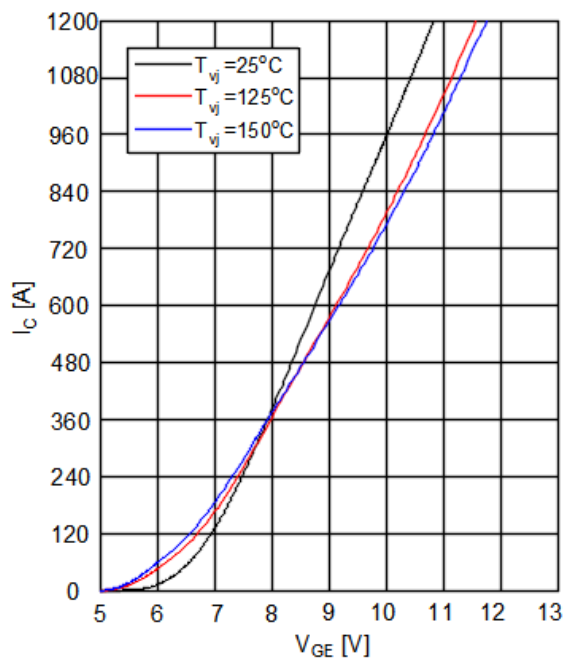
输出特性 IGBT-逆变器 (典型)
Output characteristic IGBT-Inverter (Typical)

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



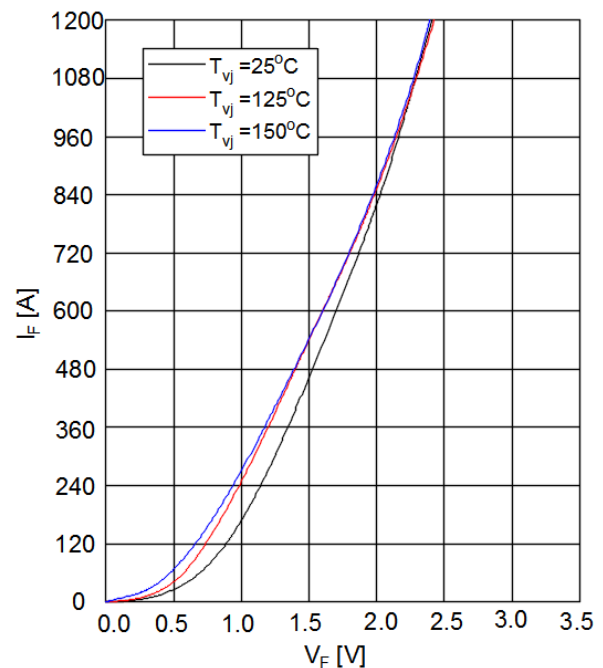
传输特性 IGBT-逆变器 (典型)
Transfer characteristic IGBT-Inverter (Typical)

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



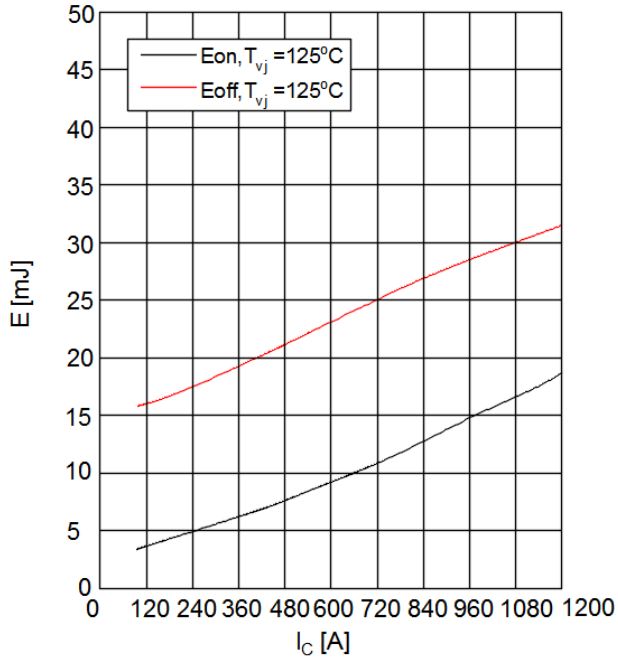
正向偏压特性二极管-逆变器 (典型)
Forward characteristic of Diode-Inverter (Typical)

$I_F = f(V_F)$



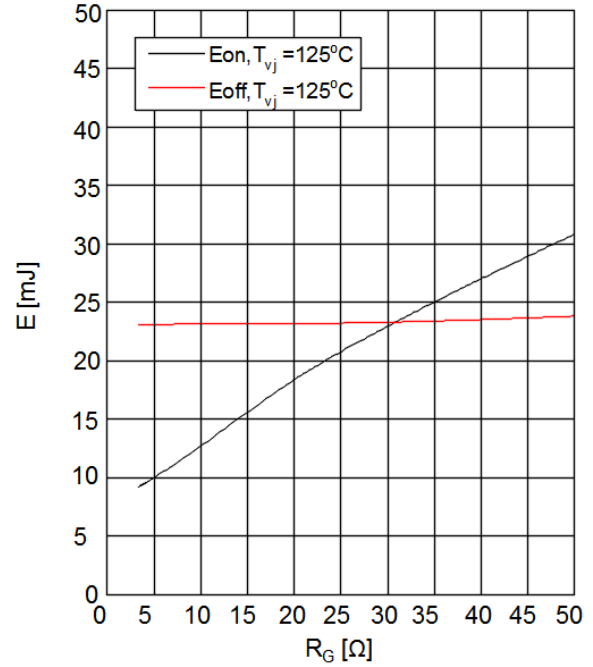
开关损耗 IGBT-逆变器 (典型)
Switching losses IGBT-Inverter (Typical)

$E_{on}=f(I_C)$, $E_{off}=f(I_C)$
 $V_{CE}=300V$, $R_{Gon}=3.3\Omega$, $R_{Goff}=3.3\Omega$, $V_{GE}=\pm 15V$



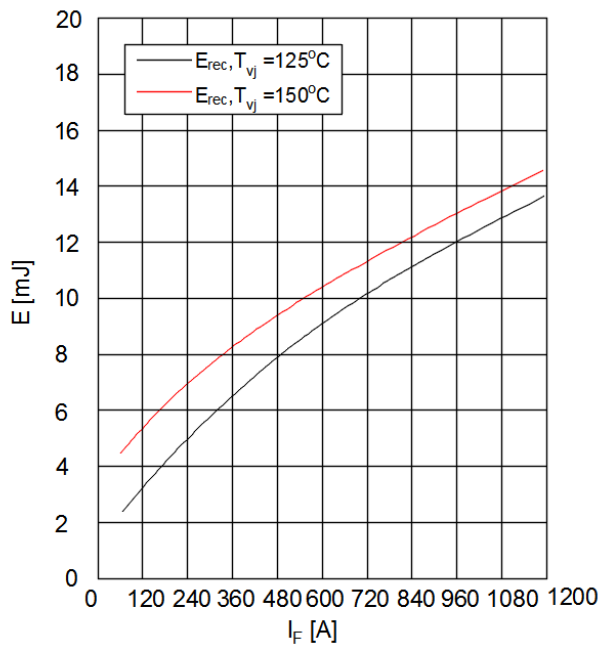
开关损耗 IGBT-逆变器 (典型)
Switching losses IGBT-Inverter (Typical)

$E_{on}=f(R_G)$, $E_{off}=f(R_G)$
 $V_{CE}=300V$, $I_C=600A$, $V_{GE}=\pm 15V$



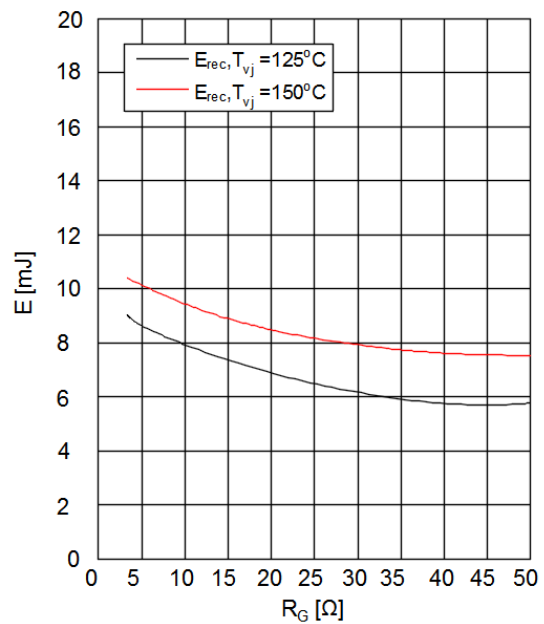
开关损耗二极管-逆变器 (典型)
Switching losses Diode-Inverter (Typical)

$E_{rec}=f(I_F)$
 $V_{CE}=300V$, $R_{Gon}=3.3\Omega$



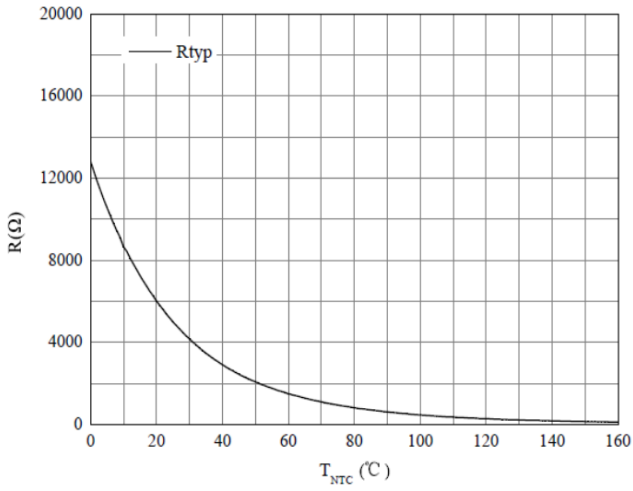
开关损耗二极管-逆变器 (典型)
Switching losses Diode-Inverter (Typical)

$E_{rec}=f(R_G)$
 $V_{CE}=300V$, $I_F=600A$



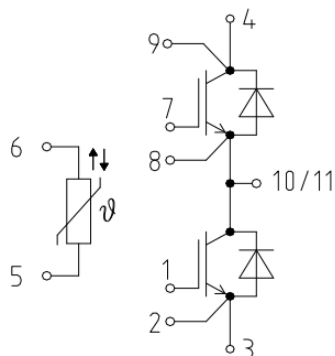
负温度系数热敏电阻 温度特性（典型）
NTC-Thermistor-temperature characteristic (Typical)

$R=f(T)$

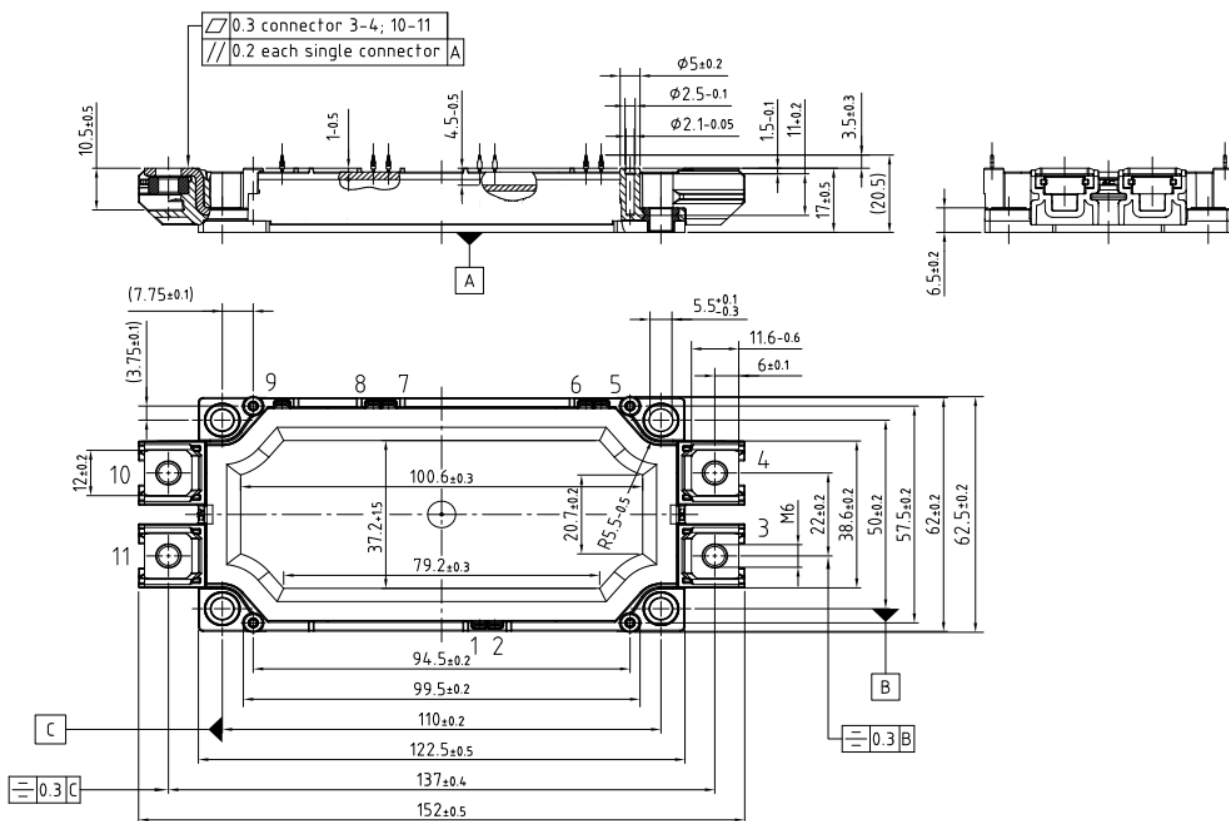


接线图/Circuit diagram

初步数据/Preliminary Data



封装尺寸/Package outlines



● 重要提示:

产品规格书包含了产品的基本参数和适用范围。

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