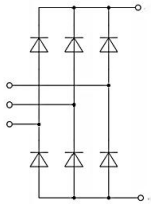
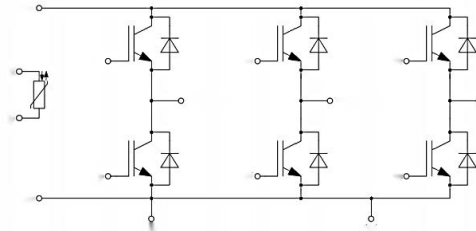


# GCP150GX120PGB2N

## 等效电路原理图



## Equivalent Circuit Schematic



150A/1200V

## 说明

翠展 IGBT 功率模块具有超低的导通损耗以及良好的短路可靠性。

该产品是为了通用逆变器以及不间断电源等应用所设计。

## 典型应用

- 辅助逆变器
- 医疗应用
- 电机传动
- 伺服驱动器

## 电气特性

- 低开关损耗
- 最大结温 175°C
- $V_{CEsat}$  带正温度系数
- 低  $V_{CEsat}$

## 机械特性

- 高功率循环和温度循环能力
- 铜基板
- 焊接技术
- 标准封装

## Description

GRECON IGBT Power Module provides ultra low conduction loss as well as short circuit ruggedness.

They are designed for the applications such as general inverters and UPS.

## Typical Applications

- Auxiliary Inverters
- Medical Applications
- Motor Drives
- Servo Drives

## Electrical Features

- Low Switching Losses
- Maximum junction temperature 175°C
- $V_{CEsat}$  with positive Temperature Coefficient
- Low  $V_{CEsat}$

## Mechanical Features

- High Power and Thermal Cycling Capability
- Copper Base Plate
- Solder Contact Technology
- Standard Housing

IGBT,逆变器 / IGBT,Inverter

最大额定值 / Maximum Rated Values

| Parameter                                      | Symbol             | Conditions                                       | Value | Unit |
|------------------------------------------------|--------------------|--------------------------------------------------|-------|------|
| 集电极-发射极电压<br>Collector-emitter voltage         | V <sub>CES</sub>   | T <sub>vj</sub> =25°C                            | 1200  | V    |
| 连续集电极直流电流<br>Continuous DC collector current   | I <sub>C nom</sub> | T <sub>C</sub> =95°C, T <sub>vj max</sub> =175°C | 150   | A    |
| 集电极重复峰值电流<br>Repetitive peak collector current | I <sub>CRM</sub>   | t <sub>p</sub> =1ms                              | 300   | A    |
| 总功率损耗<br>Total power dissipation               | P <sub>tot</sub>   | T <sub>C</sub> =25°C, T <sub>vj max</sub> =175°C | 780   | W    |
| 栅极-发射极峰值电压<br>Gate-emitter peak voltage        | V <sub>GES</sub>   | T <sub>vj</sub> =25°C                            | ±20   | V    |

特征值 / Characteristic Values

| Parameter                                           | Symbol              | Conditions                                                                         | Value |       |      | Unit |
|-----------------------------------------------------|---------------------|------------------------------------------------------------------------------------|-------|-------|------|------|
|                                                     |                     |                                                                                    | Min   | Typ   | Max  |      |
| 栅极阈值电压<br>Gate threshold voltage                    | V <sub>GEth</sub>   | V <sub>GE</sub> =V <sub>CE</sub> , I <sub>C</sub> =3.8mA,<br>T <sub>vj</sub> =25°C |       | 5.80  | 6.50 | V    |
| 栅极-发射极漏电流<br>Gate-emitter leakage current           | I <sub>GES</sub>    | V <sub>CE</sub> =0V, V <sub>GE</sub> =20V,<br>T <sub>vj</sub> =25 °C               |       |       | 100  | nA   |
| 集电极-发射极截止电流<br>Collector-emitter cut-off current    | I <sub>CES</sub>    | V <sub>CE</sub> =1200V, V <sub>GE</sub> =0V,<br>T <sub>vj</sub> =25°C              |       |       | 1    | mA   |
| 集电极-发射极饱和电压<br>Collector-emitter saturation voltage | V <sub>CE sat</sub> | I <sub>C</sub> =150A, V <sub>GE</sub> =15V,<br>T <sub>vj</sub> =25°C               |       | 1.95  | 2.15 | V    |
|                                                     |                     | I <sub>C</sub> =150A, V <sub>GE</sub> =15V,<br>T <sub>vj</sub> =125°C              |       | 2.40  |      |      |
|                                                     |                     | I <sub>C</sub> =150A, V <sub>GE</sub> =15V,<br>T <sub>vj</sub> =150°C              |       | 2.50  |      |      |
| 内部栅极电阻<br>Internal gate resistance                  | R <sub>gint</sub>   | T <sub>vj</sub> =25°C                                                              |       | 5.85  |      | Ω    |
| 栅极电荷<br>Gate charge                                 | Q <sub>G</sub>      | V <sub>GE</sub> =-8V~+15V, V <sub>CE</sub> =600V                                   |       | 1.44  |      | uC   |
| 输入电容<br>Input capacitance                           | C <sub>ies</sub>    | V <sub>CE</sub> =25V, V <sub>GE</sub> =0V, f=1MHz,<br>T <sub>vj</sub> =25°C        |       | 20.32 |      | nF   |
| 反向传输电容<br>Reverse transfer capacitance              | C <sub>res</sub>    |                                                                                    |       | 0.14  |      |      |

| Parameter                                            | Symbol       | Conditions                                                                                                                                            | Value |      |     | Unit |
|------------------------------------------------------|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|-----|------|
|                                                      |              |                                                                                                                                                       | Min   | Typ  | Max |      |
| 开通延迟时间（电感负载）<br>Turn-on delay time , inductive load  | $t_{d\ on}$  | $I_c=150A, V_{CE}=600V$<br>$R_{gon}=R_{goff}=2\Omega$<br>$V_{GE}=-8V/+15V$<br>$di/dt_{on}=975A/us$<br>$dv/dt_{off}=8200V/us$<br>$T_{vj}=25^{\circ}C$  |       | 272  |     | ns   |
| 上升时间（电感负载）<br>Rise time , inductive load             | $t_r$        |                                                                                                                                                       |       | 116  |     |      |
| 关断延迟时间（电感负载）<br>Turn-off delay time , inductive load | $t_{d\ off}$ |                                                                                                                                                       |       | 315  |     |      |
| 下降时间（电感负载）<br>Fall time , inductive load             | $t_f$        |                                                                                                                                                       |       | 184  |     |      |
| 开通损耗能量（每脉冲）<br>Turn-on energy loss per pulse         | $E_{on}$     |                                                                                                                                                       |       | 16.3 |     | mJ   |
| 关断损耗能量（每脉冲）<br>Turn-off energy loss per pulse        | $E_{off}$    |                                                                                                                                                       |       | 10.5 |     |      |
| 开通延迟时间（电感负载）<br>Turn-on delay time , inductive load  | $t_{d\ on}$  | $I_c=150A, V_{CE}=600V$<br>$R_{gon}=R_{goff}=2\Omega$<br>$V_{GE}=-8V/+15V$<br>$di/dt_{on}=850A/us$<br>$dv/dt_{off}=7100V/us$<br>$T_{vj}=125^{\circ}C$ |       | 288  |     | ns   |
| 上升时间（电感负载）<br>Rise time , inductive load             | $t_r$        |                                                                                                                                                       |       | 141  |     |      |
| 关断延迟时间（电感负载）<br>Turn-off delay time , inductive load | $t_{d\ off}$ |                                                                                                                                                       |       | 344  |     |      |
| 下降时间（电感负载）<br>Fall time , inductive load             | $t_f$        |                                                                                                                                                       |       | 290  |     |      |
| 开通损耗能量（每脉冲）<br>Turn-on energy loss per pulse         | $E_{on}$     |                                                                                                                                                       |       | 24.7 |     | mJ   |
| 关断损耗能量（每脉冲）<br>Turn-off energy loss per pulse        | $E_{off}$    |                                                                                                                                                       |       | 13.3 |     |      |
| 开通延迟时间（电感负载）<br>Turn-on delay time , inductive load  | $t_{d\ on}$  | $I_c=150A, V_{CE}=600V$<br>$R_{gon}=R_{goff}=2\Omega$<br>$V_{GE}=-8V/+15V$<br>$di/dt_{on}=930A/us$<br>$dv/dt_{off}=6800V/us$<br>$T_{vj}=150^{\circ}C$ |       | 295  |     | ns   |
| 上升时间（电感负载）<br>Rise time , inductive load             | $t_r$        |                                                                                                                                                       |       | 145  |     |      |
| 关断延迟时间（电感负载）<br>Turn-off delay time , inductive load | $t_{d\ off}$ |                                                                                                                                                       |       | 349  |     |      |
| 下降时间（电感负载）<br>Fall time , inductive load             | $t_f$        |                                                                                                                                                       |       | 371  |     |      |
| 开通损耗能量（每脉冲）<br>Turn-on energy loss per pulse         | $E_{on}$     |                                                                                                                                                       |       | 25.9 |     | mJ   |
| 关断损耗能量（每脉冲）<br>Turn-off energy loss per pulse        | $E_{off}$    |                                                                                                                                                       |       | 14.4 |     |      |

| Parameter                                          | Symbol             | Conditions                                                                                                              | Value |       |       | Unit |
|----------------------------------------------------|--------------------|-------------------------------------------------------------------------------------------------------------------------|-------|-------|-------|------|
|                                                    |                    |                                                                                                                         | Min   | Typ   | Max   |      |
| 短路数据<br>SC data                                    | I <sub>SC</sub>    | t <sub>p</sub> ≤8us, V <sub>GE</sub> =15V,<br>V <sub>ce</sub> =800V, V <sub>CEM</sub> ≤1200V,<br>T <sub>vj</sub> =150°C |       | 500   |       | A    |
| 结-外壳热阻<br>Thermal resistance,junction to case      | R <sub>thJC</sub>  | 每个 IGBT / per IGBT                                                                                                      |       |       | 0.190 | K/W  |
| 外壳-散热器热阻<br>Thermal resistance,case to heatsink    | R <sub>thCH</sub>  | 每个 IGBT / per IGBT<br>λ <sub>grease</sub> =1W/(m • K)                                                                   |       | 0.165 |       | K/W  |
| 在开关状态下温度<br>Temperature under switching conditions | T <sub>vj op</sub> |                                                                                                                         | -40   |       | 150   | °C   |

二极管,逆变器 / Diode,Inverter

最大额定值 / Maximum Ratings

| Parameter                                   | Symbol    | Conditions                          | Value | Unit |
|---------------------------------------------|-----------|-------------------------------------|-------|------|
| 反向重复峰值电压<br>Repetitive peak reverse voltage | $V_{RRM}$ | $T_{vj}=25\text{ }^{\circ}\text{C}$ | 1200  | V    |
| 连续正向直流电流<br>Continuous DC forward current   | $I_F$     |                                     | 150   | A    |
| 正向重复峰值电流<br>Repetitive peak forward current | $I_{FRM}$ | $t_p=1\text{ms}$                    | 300   | A    |

特征值 / Characteristic Values

| Parameter                                 | Symbol    | Conditions                                                                                      | Value |      |      | Unit          |
|-------------------------------------------|-----------|-------------------------------------------------------------------------------------------------|-------|------|------|---------------|
|                                           |           |                                                                                                 | Min   | Typ  | Max  |               |
| 正向电压<br>Forward voltage                   | $V_F$     | $I_F=150\text{A}, V_{GE}=0\text{V}, T_{vj}=25^{\circ}\text{C}$                                  |       | 2.60 | 3.00 | V             |
|                                           |           | $I_F=150\text{A}, V_{GE}=0\text{V}, T_{vj}=125^{\circ}\text{C}$                                 |       | 2.12 |      |               |
|                                           |           | $I_F=150\text{A}, V_{GE}=0\text{V}, T_{vj}=150^{\circ}\text{C}$                                 |       | 2.01 |      |               |
| 恢复电荷<br>Recovered charge                  | $Q_{rr}$  | $I_F=150\text{A}, V_R=600\text{V}$<br>$-di_F/dt=960\text{A/us}$<br>$T_{vj}=25^{\circ}\text{C}$  |       | 4.2  |      | $\mu\text{C}$ |
| 反向恢复峰值电流<br>Peak reverse recovery current | $I_{RM}$  |                                                                                                 |       | 30   |      | A             |
| 反向恢复损耗（每脉冲）<br>Reverse recovery energy    | $E_{rec}$ |                                                                                                 |       | 1.25 |      | mJ            |
| 恢复电荷<br>Recovered charge                  | $Q_{rr}$  | $I_F=150\text{A}, V_R=600\text{V}$<br>$-di_F/dt=850\text{A/us}$<br>$T_{vj}=125^{\circ}\text{C}$ |       | 12.5 |      | $\mu\text{C}$ |
| 反向恢复峰值电流<br>Peak reverse recovery current | $I_{RM}$  |                                                                                                 |       | 55   |      | A             |
| 反向恢复损耗（每脉冲）<br>Reverse recovery energy    | $E_{rec}$ |                                                                                                 |       | 3.3  |      | mJ            |
| 恢复电荷<br>Recovered charge                  | $Q_{rr}$  | $I_F=150\text{A}, V_R=600\text{V}$<br>$-di_F/dt=820\text{A/us}$<br>$T_{vj}=150^{\circ}\text{C}$ |       | 16.1 |      | $\mu\text{C}$ |
| 反向恢复峰值电流<br>Peak reverse recovery current | $I_{RM}$  |                                                                                                 |       | 67   |      | A             |
| 反向恢复损耗（每脉冲）<br>Reverse recovery energy    | $E_{rec}$ |                                                                                                 |       | 4.7  |      | mJ            |

| Parameter                                          | Symbol       | Conditions                                             | Value |       |       | Unit |
|----------------------------------------------------|--------------|--------------------------------------------------------|-------|-------|-------|------|
|                                                    |              |                                                        | Min   | Typ   | Max   |      |
| 结-外壳热阻<br>Thermal resistance,junction to case      | $R_{thJC}$   | 每个二极管 / per diode                                      |       |       | 0.314 | K/W  |
| 外壳-散热器热阻<br>Thermal resistance,case to heatsink    | $R_{thCH}$   | 每个二极管 / per diode<br>$\lambda_{grease}=1W/(m \cdot K)$ |       | 0.275 |       | K/W  |
| 在开关状态下温度<br>Temperature under switching conditions | $T_{vj\ op}$ |                                                        | -40   |       | 150   | °C   |

二极管,整流器 / Diode,Rectifier

最大额定值 / Maximum Ratings

| Parameter                                              | Symbol      | Conditions                     | Value | Unit   |
|--------------------------------------------------------|-------------|--------------------------------|-------|--------|
| 反向重复峰值电压<br>Repetitive peak reverse voltage            | $V_{RRM}$   | $T_{vj}=25^{\circ}C$           | 1600  | V      |
| 最大正向均方根电流（每芯片）<br>Maximum RMS forward current per chip | $I_{FRMSM}$ |                                | 150   | A      |
| 正向浪涌电流<br>Surge forward current                        | $I_{FSM}$   | $t_p=10ms, T_{vj}=25^{\circ}C$ | 1080  | A      |
| $I^2t$ -值<br>$I^2t$ -value                             | $I^2t$      | $t_p=10ms, T_{vj}=25^{\circ}C$ | 5830  | $A^2s$ |

特征值 / Characteristic Values

| Parameter                                          | Symbol       | Conditions                                             | Value |       |       | Unit        |
|----------------------------------------------------|--------------|--------------------------------------------------------|-------|-------|-------|-------------|
|                                                    |              |                                                        | Min   | Typ   | Max   |             |
| 正向电压<br>Forward voltage                            | $V_F$        | $I_F=150A, T_{vj}=25^{\circ}C$                         |       | 1.3   | 1.5   | V           |
| 反向电流<br>Reverse current                            | $I_{RM}$     | $V_R=V_{RRM}, T_{vj}=25^{\circ}C$                      |       |       | 50    | $\mu A$     |
| 结-外壳热阻<br>Thermal resistance,junction to case      | $R_{thJC}$   | 每个二极管 / per diode                                      |       |       | 0.275 | K/W         |
| 外壳-散热器热阻<br>Thermal resistance,case to heatsink    | $R_{thCH}$   | 每个二极管 / per diode<br>$\lambda_{grease}=1W/(m \cdot K)$ |       | 0.240 |       | K/W         |
| 在开关状态下温度<br>Temperature under switching conditions | $T_{vj\ op}$ |                                                        | -40   |       | 150   | $^{\circ}C$ |

负温度系数热敏电阻 / NTC-Thermistor

特征值 / Characteristic Values

| Parameter                    | Symbol             | Conditions                                                                              | Value |      |     | Unit |
|------------------------------|--------------------|-----------------------------------------------------------------------------------------|-------|------|-----|------|
|                              |                    |                                                                                         | Min   | Typ  | Max |      |
| 额定电阻值<br>Rated resistance    | R <sub>25</sub>    |                                                                                         |       | 5    |     | kΩ   |
| R100 偏差<br>Deviation of R100 | ΔR/R               | T <sub>c</sub> =100°C, R <sub>100</sub> =493.3Ω                                         | -5    |      | 5   | %    |
| 耗散功率<br>Power dissipation    | P <sub>25</sub>    |                                                                                         |       |      | 20  | mW   |
| B-值<br>B-value               | B <sub>25/50</sub> | R <sub>2</sub> =R <sub>25exp</sub> [B <sub>25/50</sub> (1/T <sub>2</sub> -1/(298.15K))] |       | 3380 |     | K    |

模块 / Module

特征值（除非另有说明，否则 T<sub>c</sub>=25°C）

Characteristic Values (T<sub>c</sub>=25°C unless otherwise specified)

| Parameter                                       | Symbol              | Conditions                                         | Value |       |     | Unit |
|-------------------------------------------------|---------------------|----------------------------------------------------|-------|-------|-----|------|
|                                                 |                     |                                                    | Min   | Typ   | Max |      |
| 绝缘电压<br>Isolation voltage                       | V <sub>isol</sub>   | RMS,t=1min, f=50Hz                                 | 2500  |       |     | V    |
| 最大结温<br>Maximum junction temperature            | T <sub>vj max</sub> |                                                    |       |       | 175 | °C   |
| 在开关状态下温度<br>Operating junction temperature      | T <sub>vj op</sub>  |                                                    | -40   |       | 150 | °C   |
| 储存温度<br>Storage temperature                     | T <sub>stg</sub>    |                                                    | -40   |       | 125 | °C   |
| 杂散电感（模块）<br>Stray inductance module             | L <sub>CE</sub>     |                                                    |       | 40    |     | nH   |
| 外壳-散热器热阻<br>Thermal resistance,case to heatsink | R <sub>thCH</sub>   | 每个模块 / per module<br>λ <sub>grease</sub> =1W/(m·K) |       | 0.009 |     | K/W  |
| 模块安装扭矩<br>Mounting torque for module mounting   | M                   | M5 螺丝（底板到散热器）<br>Screw M5 baseplate to heatsink    | 3.0   |       | 6.0 | N.m  |
| 模块重量 / Weight of module                         | G                   |                                                    |       | 300   |     | g    |

## 电气特性（曲线） / Electrical Characteristics (curves)

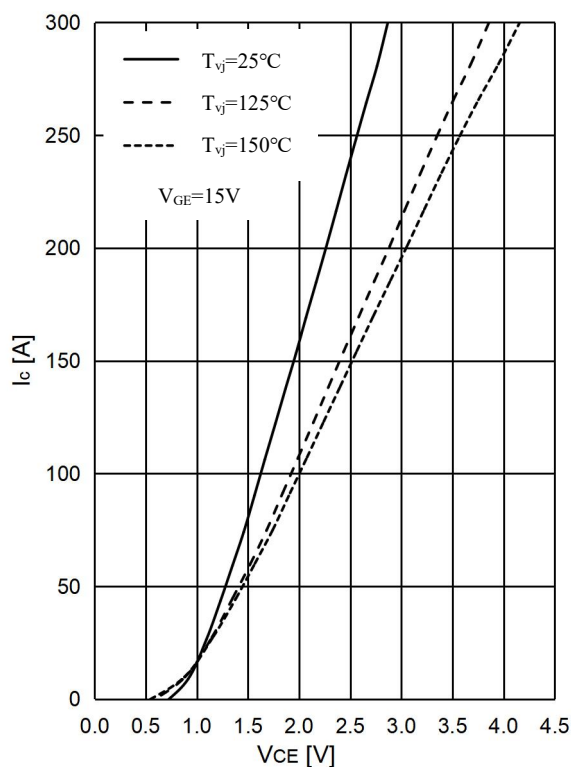


图 1 . IGBT 输出特性,逆变器  
Fig 1. IGBT Output Characteristic, Inverter

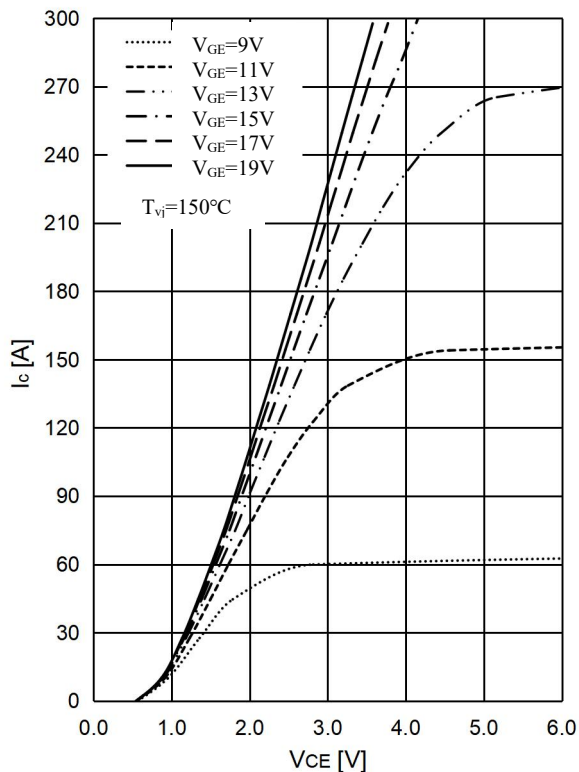


图 2 . IGBT 输出特性,逆变器  
Fig 2. IGBT Output Characteristic, Inverter

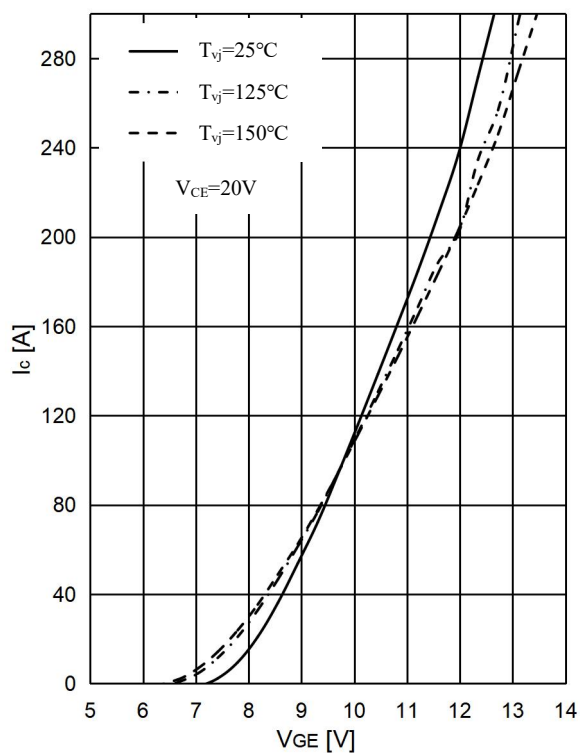


图 3 . IGBT 转移特性,逆变器  
Fig 3. IGBT Transfer Characteristic, Inverter

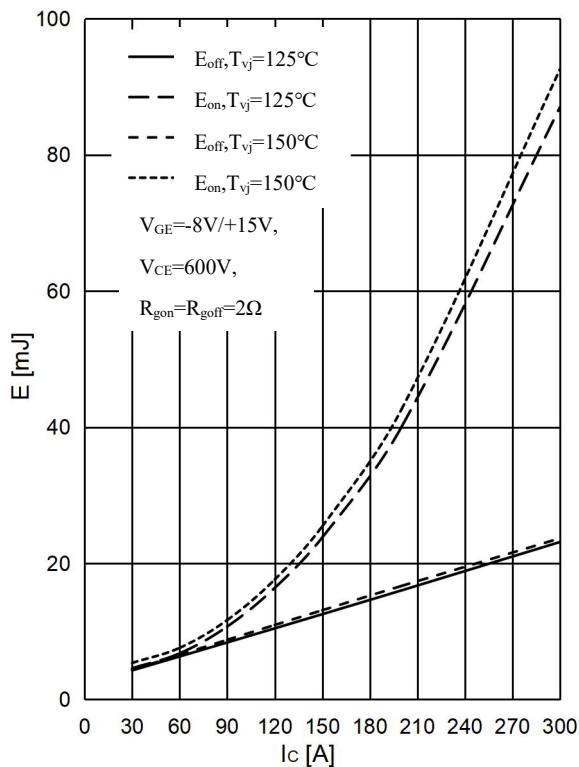


图 4 . IGBT 开关损耗-集电极电流,逆变器  
Fig 4. IGBT Switching Loss  $E_{on}$  &  $E_{off}$  vs.  $I_c$ , Inverter

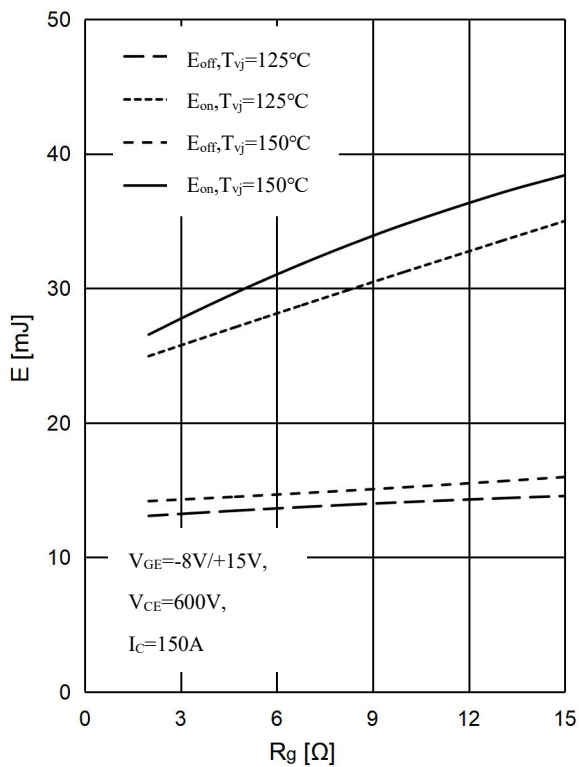


图 5 . IGBT 开关损耗-栅极电阻,逆变器  
Fig 5. IGBT Switching Loss  $E_{on}$  &  $E_{off}$  vs.  $R_G$ ,Inverter

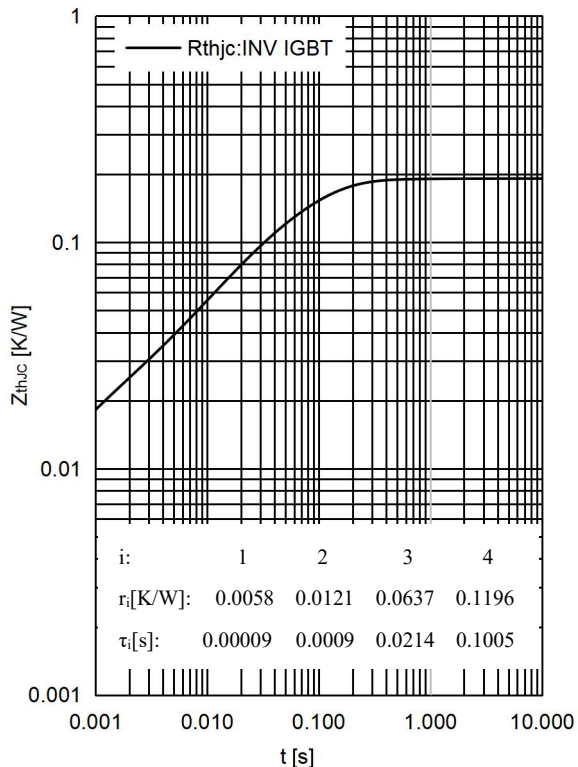


图 6 . IGBT 瞬态热阻抗,逆变器  
Fig 6. IGBT Transient thermal impedance,Inverter

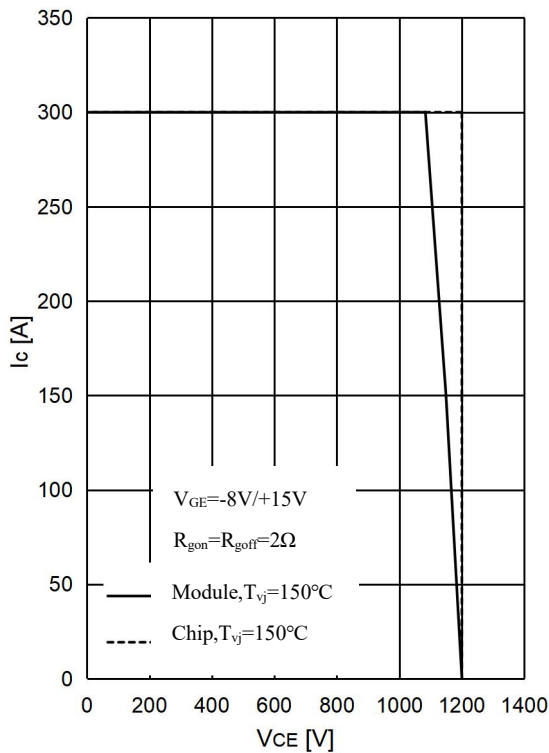


图 7 . IGBT 反偏安全工作区,逆变器  
Fig 7. IGBT RBSOA,Inverter

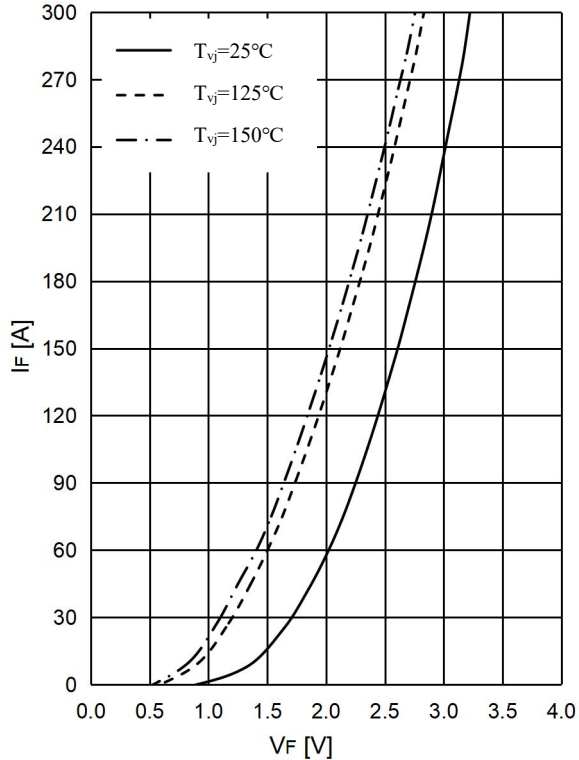


图 8 . 二极管 正向偏压特性,逆变器  
Fig 8. Diode Forward characteristic,Inverter

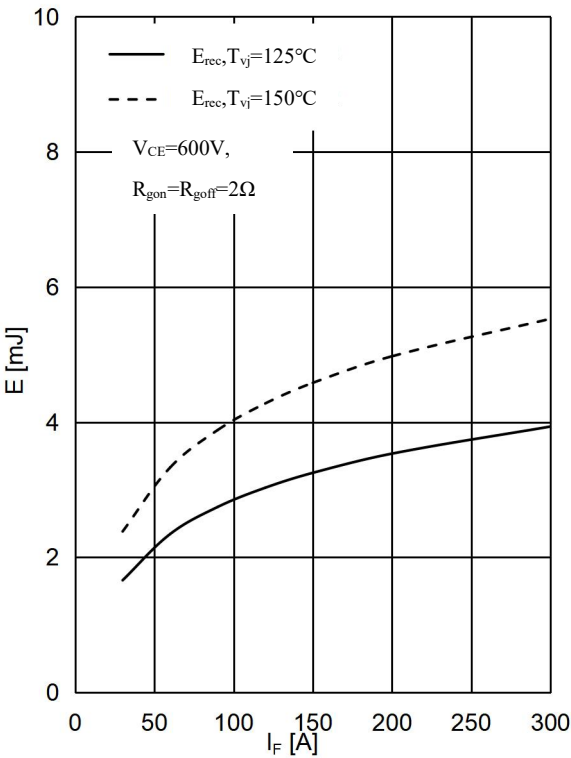


图 9 . 二极管 开关损耗-正向电流,逆变器  
Fig 9. Diode Switching Loss  $E_{rec}$  vs.  $I_F$ , Inverter

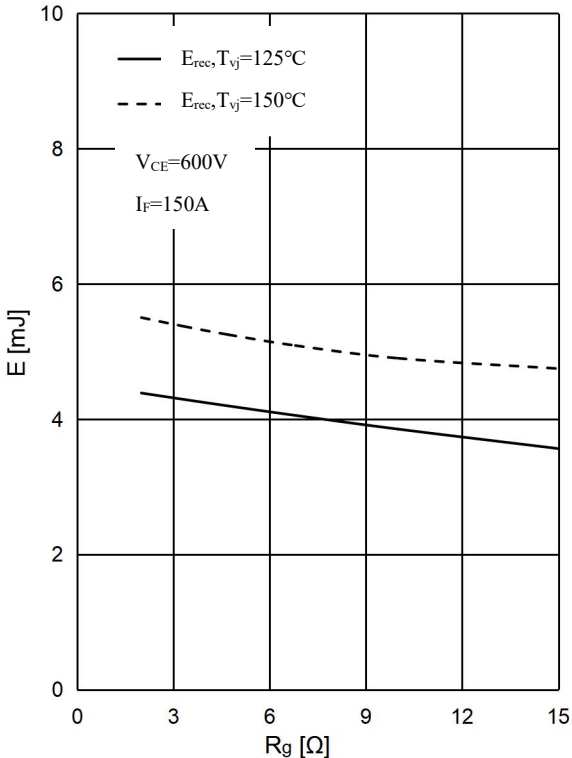


图 10 . 二极管 开关损耗-栅极电阻,逆变器  
Fig 10. Diode Switching Loss  $E_{rec}$  vs.  $R_g$ , Inverter

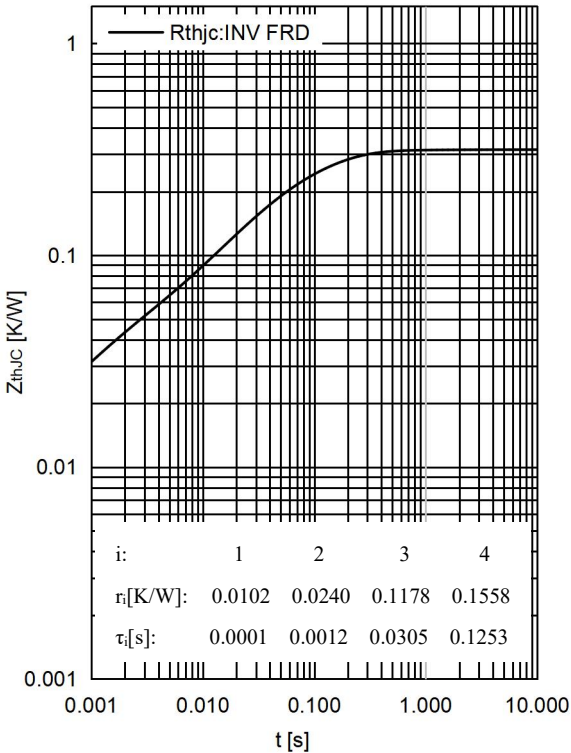


图 11 . 二极管 瞬态热阻抗,逆变器  
Fig 11. Diode Transient thermal impedance, Inverter

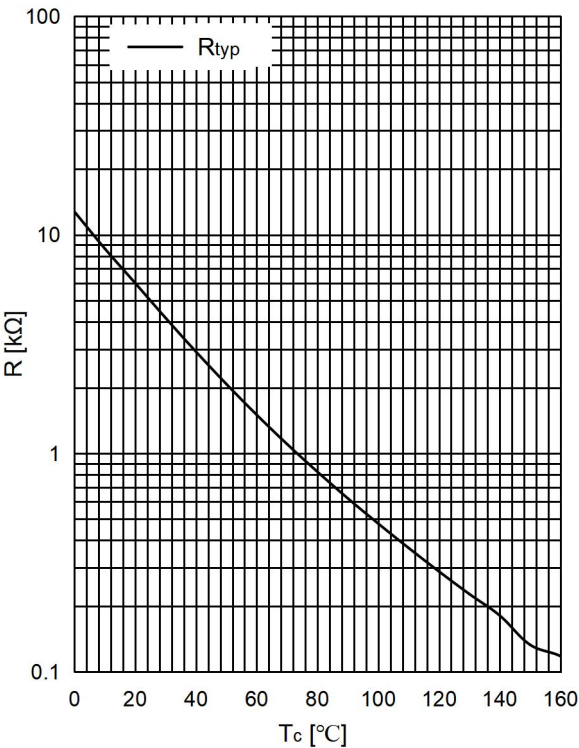
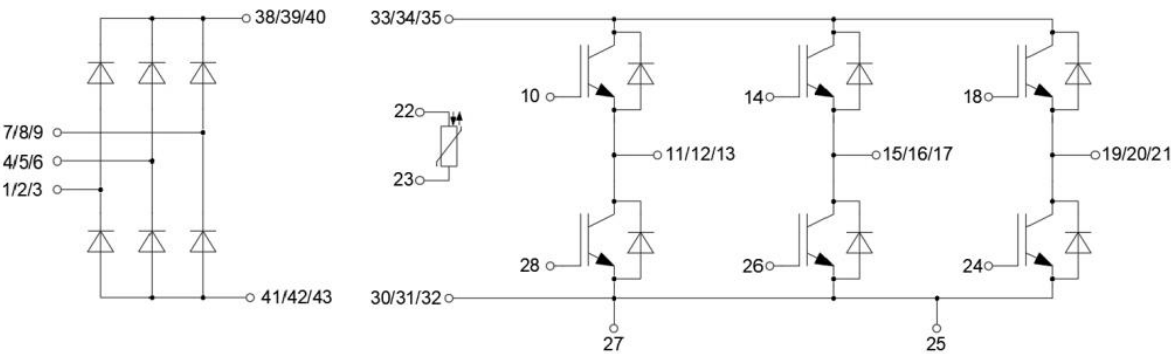
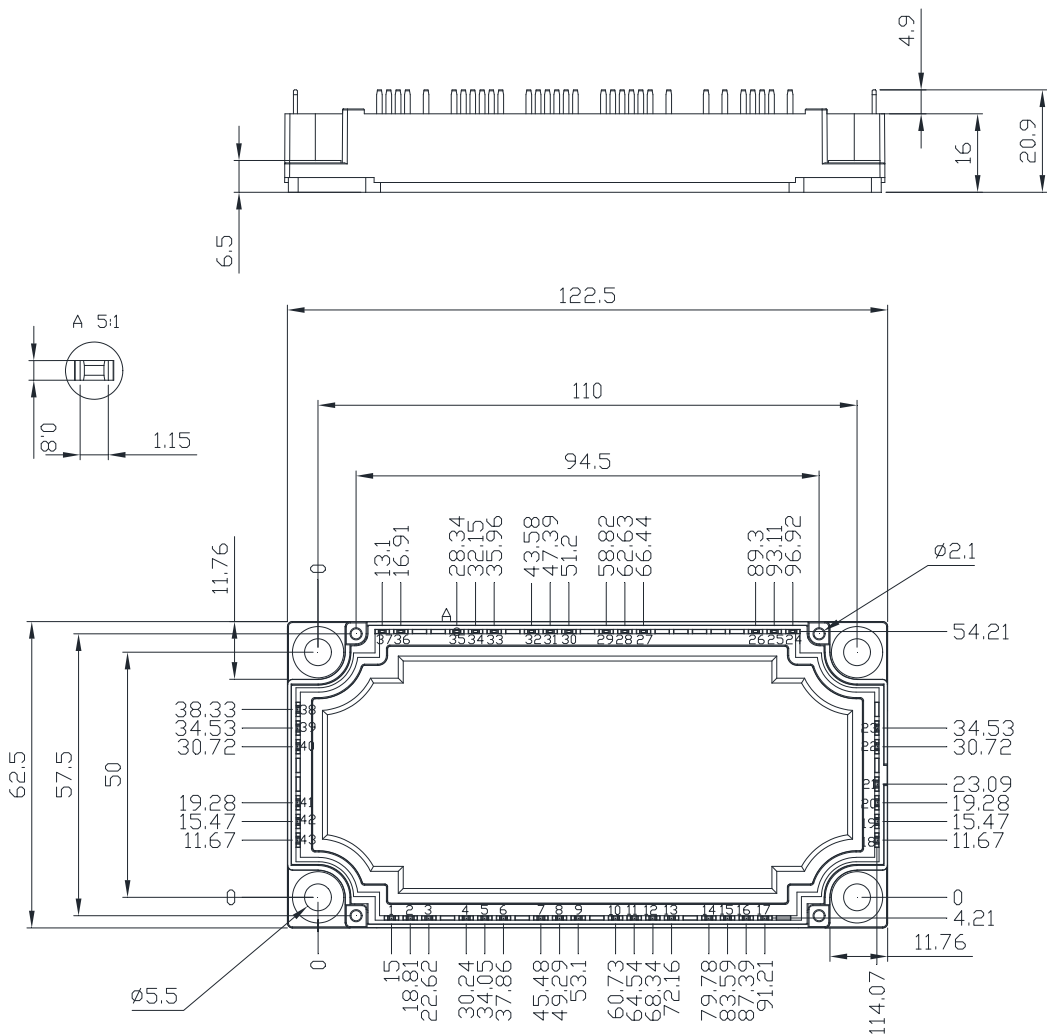


图 12 . 负温度系数热敏电阻 温度特性  
Fig 12. NTC-Thermistor-temperature characteristic

电路图 / Circuit Diagram



封装尺寸 / Package Dimensions



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- to perform joint Risk and Quality Assessments;
- 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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