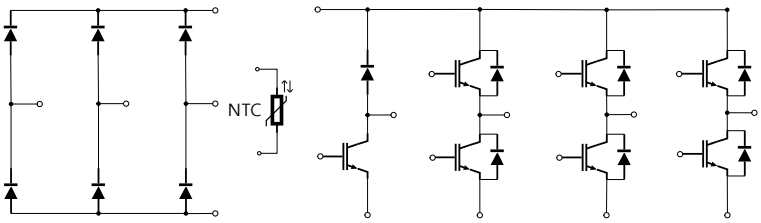
# GCP10GX120PEC1

**等效电路原理图　　Equivalent Circuit Schematic**




10A/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。

## 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.

## 典型应用

- 辅助逆变器
- 医疗应用
- 电机传动
- 伺服驱动器

## Typical Applications

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

## 电气特性

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

## Electrical Features

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

## 机械特性

- 高功率循环和温度循环能力
- 焊接技术
- 标准封装

## Mechanical Features

- High Power and Thermal Cycling Capability
- 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 | $V_{CES}$ | $T_{vj}$=25℃ | 1200 | V |
| 连续集电极直流电流<br>Continuous DC collector current | $I_{C\ nom}$ | $T_C$=100℃, $T_{vj\ max}$=175℃ | 10 | A |
| 集电极重复峰值电流<br>Repetitive peak collector current | $I_{CRM}$ | $t_p$=1ms | 20 | A |
| 总功率损耗<br>Total power dissipation | $P_{tot}$ | $T_C$=25℃, $T_{vj\ max}$=175℃ | 168 | W |
| 栅极-发射极峰值电压<br>Gate-emitter peak voltage | $V_{GES}$ | $T_{vj}$=25℃ | ±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 | $V_{GEth}$ | $V_{GE}$=$V_{CE}$, $I_C$=0.5mA,<br>$T_{vj}$=25℃ | | 5.95 | 6.50 | V |
| 栅极-发射极漏电流<br>Gate-emitter leakage current | $I_{GES}$ | $V_{CE}$=0V, $V_{GE}$=20V,<br>$T_{vj}$=25 ℃ | | | 100 | nA |
| 集电极-发射极截止电流<br>Collector-emitter cut-off current | $I_{CES}$ | $V_{CE}$=1200V, $V_{GE}$=0V,<br>$T_{vj}$=25℃ | | | 1 | mA |
| 集电极-发射极饱和电压<br>Collector-emitter saturation voltage | $V_{CE\ sat}$ | $I_C$=10A, $V_{GE}$=15V,<br>$T_{vj}$=25℃ | | 1.46 | 1.90 | V |
| | | $I_C$=10A, $V_{GE}$=15V,<br>$T_{vj}$=125℃ | | 1.65 | | |
| | | $I_C$=10A, $V_{GE}$=15V,<br>$T_{vj}$=150℃ | | 1.70 | | |
| 内部栅极电阻<br>Internal gate resistance | $R_{gint}$ | $T_{vj}$=25℃ | | 3.0 | | Ω |
| 栅极电荷<br>Gate charge | $Q_G$ | $V_{GE}$=-8V~+15V，$V_{CE}$=600V | | 110 | | nC |
| 输入电容<br>Input capacitance | $C_{ies}$ | $V_{CE}$=25V, $V_{GE}$=0V, f=1MHz,<br>$T_{vj}$=25℃ | | 1.88 | | nF |
| 反向传输电容<br>Reverse transfer capacitance | $C_{res}$ | | | 0.2 | | |

| 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 | $t_{d\,on}$ | $I_c$=10A, $V_{CE}$=600V<br>$R_{gon}$=$R_{goff}$=43Ω<br>$V_{GE}$=-8V/+15V<br>di/$dt_{on}$=460A/us<br>dv/$dt_{off}$=4730V/us<br>$T_{vj}$=25°C | | 54.5 | | ns |
| 上升时间（电感负载）<br>Rise time , inductive load | $t_r$ | | | 19.1 | | |
| 关断延迟时间（电感负载）<br>Turn-off delay time , inductive load | $t_{d\,off}$ | | | 134.6 | | |
| 下降时间（电感负载）<br>Fall time , inductive load | $t_f$ | | | 235.4 | | |
| 开通损耗能量（每脉冲）<br>Turn-on energy loss per pulse | $E_{on}$ | | | 0.8 | | mJ |
| 关断损耗能量（每脉冲）<br>Turn-off energy loss per pulse | $E_{off}$ | | | 0.6 | | |
| 开通延迟时间（电感负载）<br>Turn-on delay time , inductive load | $t_{d\,on}$ | $I_c$=10A, $V_{CE}$=600V<br>$R_{gon}$=$R_{goff}$=43Ω<br>$V_{GE}$=-8V/+15V<br>di/$dt_{on}$=390A/us<br>dv/$dt_{off}$=4670V/us<br>$T_{vj}$=125°C | | 50 | | ns |
| 上升时间（电感负载）<br>Rise time , inductive load | $t_r$ | | | 22.3 | | |
| 关断延迟时间（电感负载）<br>Turn-off delay time , inductive load | $t_{d\,off}$ | | | 157.7 | | |
| 下降时间（电感负载）<br>Fall time , inductive load | $t_f$ | | | 345.2 | | |
| 开通损耗能量（每脉冲）<br>Turn-on energy loss per pulse | $E_{on}$ | | | 1.2 | | mJ |
| 关断损耗能量（每脉冲）<br>Turn-off energy loss per pulse | $E_{off}$ | | | 1.1 | | |
| 开通延迟时间（电感负载）<br>Turn-on delay time , inductive load | $t_{d\,on}$ | $I_c$=10A, $V_{CE}$=600V<br>$R_{gon}$=$R_{goff}$=43Ω<br>$V_{GE}$=-8V/+15V<br>di/$dt_{on}$=400A/us<br>dv/$dt_{off}$=4500V/us<br>$T_{vj}$=150°C | | 45.7 | | ns |
| 上升时间（电感负载）<br>Rise time , inductive load | $t_r$ | | | 24.3 | | |
| 关断延迟时间（电感负载）<br>Turn-off delay time , inductive load | $t_{d\,off}$ | | | 155.6 | | |
| 下降时间（电感负载）<br>Fall time , inductive load | $t_f$ | | | 403.3 | | |
| 开通损耗能量（每脉冲）<br>Turn-on energy loss per pulse | $E_{on}$ | | | 1.3 | | mJ |
| 关断损耗能量（每脉冲）<br>Turn-off energy loss per pulse | $E_{off}$ | | | 1.1 | | |

| Parameter | Symbol | Conditions | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | |
| 短路数据<br>SC data | $I_{SC}$ | $t_p$≤10us, $V_{GE}$=15V,<br>$V_{cc}$=800V, $V_{CEM}$≤1200V,<br>$T_{vj}$=150°C | | 79 | | |
| | | $t_p$≤8us, $V_{GE}$=15V,<br>$V_{cc}$=800V, $V_{CEM}$≤1200V,<br>$T_{vj}$=150°C | | 70 | | A |
| 结-外壳热阻<br>Thermal resistance,junction to case | $R_{thJC}$ | 每个 IGBT / per IGBT | | 0.892 | | K/W |
| 外壳-散热器热阻<br>Thermal resistance,case to heatsink | $R_{thCH}$ | 每个 IGBT / per IGBT<br>$\lambda_{grease}$=1W/(m • K) | | 0.825 | | K/W |
| 在开关状态下温度<br>Temperature under switching conditions | $T_{vj\ op}$ | | -40 | | 150 | ℃ |

# 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 °C | 1200 | V |
| 连续正向直流电流<br>Continuous DC forward current | $I_F$ | | 10 | A |
| 正向重复峰值电流<br>Repetitive peak forward current | $I_{FRM}$ | $t_p$=1ms | 20 | A |

## 特征值 / Characteristic Values

| Parameter | Symbol | Conditions | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | |
| 正向电压<br>Forward voltage | $V_F$ | $I_F$=10A, $V_{GE}$=0V, $T_{vj}$=25°C | | 2.04 | 2.4 | V |
| | | $I_F$=10A, $V_{GE}$=0V, $T_{vj}$=125°C | | 1.78 | | |
| | | $I_F$=10A, $V_{GE}$=0V, $T_{vj}$=150°C | | 1.72 | | |
| 恢复电荷<br>Recovered charge | $Q_{rr}$ | $I_F$=10A, $V_R$=600V<br>-di$_F$/dt=530A/us<br>$T_{vj}$=25°C | | 1.2 | | uC |
| 反向恢复峰值电流<br>Peak reverse recovery current | $I_{RM}$ | | | 14.0 | | A |
| 反向恢复损耗（每脉冲）<br>Reverse recovery energy | $E_{rec}$ | | | 0.4 | | mJ |
| 恢复电荷<br>Recovered charge | $Q_{rr}$ | $I_F$=10A, $V_R$=600V<br>-di$_F$/dt=450A/us<br>$T_{vj}$=125°C | | 2.1 | | uC |
| 反向恢复峰值电流<br>Peak reverse recovery current | $I_{RM}$ | | | 17.6 | | A |
| 反向恢复损耗（每脉冲）<br>Reverse recovery energy | $E_{rec}$ | | | 0.8 | | mJ |
| 恢复电荷<br>Recovered charge | $Q_{rr}$ | $I_F$=10A, $V_R$=600V<br>-di$_F$/dt=430A/us<br>$T_{vj}$=150°C | | 2.2 | | uC |
| 反向恢复峰值电流<br>Peak reverse recovery current | $I_{RM}$ | | | 18.2 | | A |
| 反向恢复损耗（每脉冲）<br>Reverse recovery energy | $E_{rec}$ | | | 0.8 | | 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 | | 1.352 | | 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 • K) | | 0.652 | | K/W |
| 在开关状态下温度<br>Temperature under switching conditions | $T_{vj\ op}$ | | -40 | | 150 | ℃ |

# 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 °C | 1600 | V |
| 最大正向均方根电流（每芯片）<br>Maximum RMS forward current per chip | $I_{FRMSM}$ | | 18 | A |
| 正向浪涌电流<br>Surge forward current | $I_{FSM}$ | $t_P$=10ms, $T_{vj}$=25 °C | 250 | A |
| $I^2t$-值<br>$I^2t$-value | $I^2t$ | $t_P$=10ms, $T_{vj}$=25 °C | 313 | $A^2s$ |

## 特征值 / Characteristic Values

| Parameter | Symbol | Conditions | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | |
| 正向电压<br>Forward voltage | $V_F$ | $I_F$=10A, $T_{vj}$=25°C | | 1.0 | 1.2 | V |
| 反向电流<br>Reverse current | $I_{RM}$ | $V_R$=$V_{RRM}$ ,$T_{vj}$=25°C | | | 50 | uA |
| 结-外壳热阻<br>Thermal resistance,junction to case | $R_{thJC}$ | 每个二极管 / per diode | | 0.895 | | 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 • K) | | 0.355 | | K/W |
| 在开关状态下温度<br>Temperature under switching conditions | $T_{vj\ op}$ | | -40 | | 150 | °C |

# IGBT,制动-斩波器 / IGBT,Brake-Chopper

## 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 | $V_{CES}$ | $T_{vj}$=25℃ | 1200 | V |
| 连续集电极直流电流<br>Continuous DC collector current | $I_{C\ nom}$ | $T_C$=100℃, $T_{vj\ max}$=175℃ | 10 | A |
| 集电极重复峰值电流<br>Repetitive peak collector current | $I_{CRM}$ | $t_p$=1ms | 20 | A |
| 总功率损耗<br>Total power dissipation | $P_{tot}$ | $T_C$=25℃, $T_{vj\ max}$=175℃ | 161 | W |
| 栅极-发射极峰值电压<br>Gate-emitter peak voltage | $V_{GES}$ | $T_{vj}$=25℃ | ±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 | $V_{GEth}$ | $V_{GE}$=$V_{CE}$, $I_C$=0.5mA,<br>$T_{vj}$=25ºC | | 6.0 | 6.50 | V |
| 栅极-发射极漏电流<br>Gate-emitter leakage current | $I_{GES}$ | $V_{CE}$=0V, $V_{GE}$=20V,<br>$T_{vj}$=25 ºC | | | 100 | nA |
| 集电极-发射极截止电流<br>Collector-emitter cut-off current | $I_{CES}$ | $V_{CE}$=1200V, $V_{GE}$=0V,<br>$T_{vj}$=25ºC | | | 1 | mA |
| 集电极-发射极饱和电压<br>Collector-emitter saturation voltage | $V_{CE\ sat}$ | $I_C$=10A, $V_{GE}$=15V,<br>$T_{vj}$=25ºC | | 1.45 | 1.9 | V |
| | | $I_C$=10A, $V_{GE}$=15V,<br>$T_{vj}$=125ºC | | 1.65 | | |
| | | $I_C$=10A, $V_{GE}$=15V,<br>$T_{vj}$=150ºC | | 1.70 | | |
| 内部栅极电阻<br>Internal gate resistance | $R_{gint}$ | $T_{vj}$=25ºC | | 3.5 | | Ω |
| 栅极电荷<br>Gate charge | $Q_G$ | $V_{GE}$=-8V~+15V，$V_{CE}$=600V | | 100 | | nC |
| 输入电容<br>Input capacitance | $C_{ies}$ | $V_{CE}$=25V, $V_{GE}$=0V, f=1MHz,<br>$T_{vj}$=25ºC | | 1.9 | | nF |
| 反向传输电容<br>Reverse transfer capacitance | $C_{res}$ | | | 0.02 | | |

| 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 | $t_{d\,on}$ | $I_c$=10A, $V_{CE}$=600V<br>$R_{gon}$=$R_{goff}$=43Ω<br>$V_{GE}$=-8V/+15V<br>$T_{vj}$=25°C | | 51.6 | | ns |
| 上升时间（电感负载）<br>Rise time , inductive load | $t_r$ | | | 27.1 | | |
| 关断延迟时间（电感负载）<br>Turn-off delay time , inductive load | $t_{d\,off}$ | | | 149.8 | | |
| 下降时间（电感负载）<br>Fall time , inductive load | $t_f$ | | | 242.2 | | |
| 开通损耗能量（每脉冲）<br>Turn-on energy loss per pulse | $E_{on}$ | | | 0.6 | | mJ |
| 关断损耗能量（每脉冲）<br>Turn-off energy loss per pulse | $E_{off}$ | | | 0.7 | | |
| 开通延迟时间（电感负载）<br>Turn-on delay time , inductive load | $t_{d\,on}$ | $I_c$=10A, $V_{CE}$=600V<br>$R_{gon}$=$R_{goff}$=43Ω<br>$V_{GE}$=-8V/+15V<br>$T_{vj}$=125°C | | 49.0 | | ns |
| 上升时间（电感负载）<br>Rise time , inductive load | $t_r$ | | | 28.8 | | |
| 关断延迟时间（电感负载）<br>Turn-off delay time , inductive load | $t_{d\,off}$ | | | 148.0 | | |
| 下降时间（电感负载）<br>Fall time , inductive load | $t_f$ | | | 328.0 | | |
| 开通损耗能量（每脉冲）<br>Turn-on energy loss per pulse | $E_{on}$ | | | 1.0 | | mJ |
| 关断损耗能量（每脉冲）<br>Turn-off energy loss per pulse | $E_{off}$ | | | 0.9 | | |
| 开通延迟时间（电感负载）<br>Turn-on delay time , inductive load | $t_{d\,on}$ | $I_c$=10A, $V_{CE}$=600V<br>$R_{gon}$=$R_{goff}$=43Ω<br>$V_{GE}$=-8V/+15V<br>$T_{vj}$=150°C | | 45.2 | | ns |
| 上升时间（电感负载）<br>Rise time , inductive load | $t_r$ | | | 32.8 | | |
| 关断延迟时间（电感负载）<br>Turn-off delay time , inductive load | $t_{d\,off}$ | | | 132 | | |
| 下降时间（电感负载）<br>Fall time , inductive load | $t_f$ | | | 377 | | |
| 开通损耗能量（每脉冲）<br>Turn-on energy loss per pulse | $E_{on}$ | | | 1.1 | | mJ |
| 关断损耗能量（每脉冲）<br>Turn-off energy loss per pulse | $E_{off}$ | | | 0.9 | | |

| Parameter | Symbol | Conditions | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | |
| 短路数据<br>SC data | $I_{SC}$ | $t_p$≤10us, $V_{GE}$=15V,<br>$V_{cc}$=800V, $V_{CEM}$≤1200V,<br>$T_{vj}$=150°C | | 80 | | A |
| | | $t_p$≤8us, $V_{GE}$=15V,<br>$V_{cc}$=800V, $V_{CEM}$≤1200V,<br>$T_{vj}$=150°C | | 73 | | A |
| 结-外壳热阻<br>Thermal resistance,junction to case | $R_{thJC}$ | 每个 IGBT / per IGBT | | 0.930 | | K/W |
| 外壳-散热器热阻<br>Thermal resistance,case to heatsink | $R_{thCH}$ | 每个 IGBT / per IGBT<br>$\lambda_{grease}$=1W/(m • K) | | 0.725 | | K/W |
| 在开关状态下温度<br>Temperature under switching conditions | $T_{vj\ op}$ | | -40 | | 150 | ℃ |

# 二极管,制动-斩波器 / Diode,Brake-Chopper

## 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 °C | 1200 | V |
| 连续正向直流电流<br>Continuous DC forward current | $I_F$ | | 8 | A |
| 正向重复峰值电流<br>Repetitive peak forward current | $I_{FRM}$ | $t_p$=1ms | 16 | A |

## 特征值 / Characteristic Values

| Parameter | Symbol | Conditions | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | |
| 正向电压<br>Forward voltage | $V_F$ | $I_F$=8A, $V_{GE}$=0V, $T_{vj}$=25°C | | 2.00 | 2.60 | V |
| | | $I_F$=8A, $V_{GE}$=0V, $T_{vj}$=125°C | | 1.73 | | |
| | | $I_F$=8A, $V_{GE}$=0V, $T_{vj}$=150°C | | 1.68 | | |
| 恢复电荷<br>Recovered charge | $Q_{rr}$ | $I_F$=8A, $V_R$=600V<br>-di$_F$/dt=330A/us<br>$T_{vj}$=25°C | | 1.2 | | uC |
| 反向恢复峰值电流<br>Peak reverse recovery current | $I_{RM}$ | | | 9.0 | | A |
| 反向恢复损耗（每脉冲）<br>Reverse recovery energy | $E_{rec}$ | | | 0.4 | | mJ |
| 恢复电荷<br>Recovered charge | $Q_{rr}$ | $I_F$=8A, $V_R$=600V<br>-di$_F$/dt=280A/us<br>$T_{vj}$=125°C | | 2 | | uC |
| 反向恢复峰值电流<br>Peak reverse recovery current | $I_{RM}$ | | | 12.0 | | A |
| 反向恢复损耗（每脉冲）<br>Reverse recovery energy | $E_{rec}$ | | | 0.7 | | mJ |
| 恢复电荷<br>Recovered charge | $Q_{rr}$ | $I_F$=8A, $V_R$=600V<br>-di$_F$/dt=260A/us<br>$T_{vj}$=150°C | | 2.4 | | uC |
| 反向恢复峰值电流<br>Peak reverse recovery current | $I_{RM}$ | | | 12.8 | | A |
| 反向恢复损耗（每脉冲）<br>Reverse recovery energy | $E_{rec}$ | | | 0.8 | | 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 | | 2.588 | | 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 • K) | | 0.910 | | K/W |
| 在开关状态下温度<br>Temperature under switching conditions | $T_{vj\ op}$ | | -40 | | 150 | ℃ |

# 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 | $R_{25}$ | | | 5 | | kΩ |
| R100 偏差<br>Deviation of R100 | ΔR/R | $T_c$=100℃, $R_{100}$=493.3Ω | -5 | | 5 | % |
| 耗散功率<br>Power dissipation | $P_{25}$ | | | | 20 | mW |
| B-值<br>B-value | $B_{25/50}$ | $R_2=R_{25exp}[B_{25/50}(1/T_2-1/(298.15K))]$ | | 3380 | | K |

# 模块 / Module

## 特征值（除非另有说明，否则 $T_c$=25°C）

## Characteristic Values ($T_c$=25°C unless otherwise specified)

| Parameter | Symbol | Conditions | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | |
| 绝缘电压<br>Isolation voltage | $V_{isol}$ | RMS,t=1min, f=50Hz | 2500 | | | V |
| 最大结温<br>Maximum junction temperature | $T_{jmax}$ | | | | 175 | °C |
| 在开关状态下温度<br>Operating junction temperature | $T_{vj\ op}$ | | -40 | | 150 | °C |
| 储存温度<br>Storage temperature | $T_{stg}$ | | -40 | | 125 | °C |
| 杂散电感（模块）<br>Stray inductance module | $L_{CE}$ | | | 30 | | nH |
| 外壳-散热器热阻<br>Thermal resistance,case to heatsink | $R_{thCH}$ | 每个模块 / per module<br>$\lambda_{grease}$=1W/(m·K) | | 0.058 | | 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 | | | 24 | | g |

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

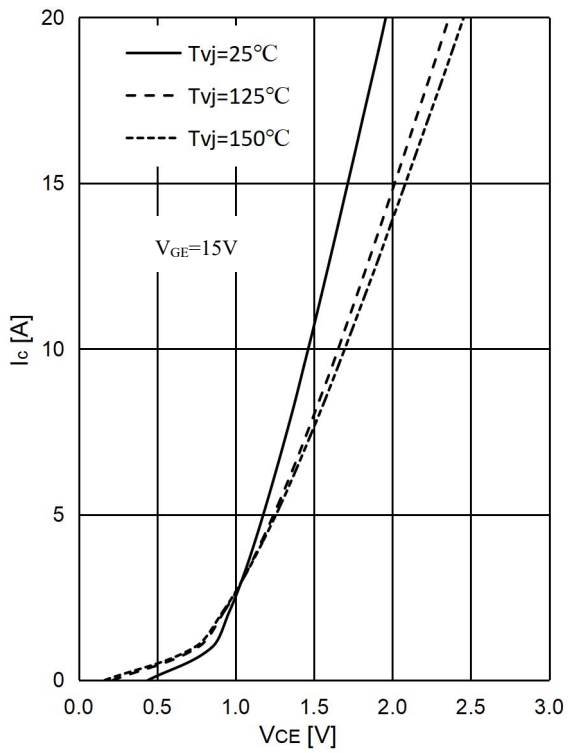



图 1 . IGBT 输出特性,逆变器

Fig 1. IGBT Output Characteristic,Inverter

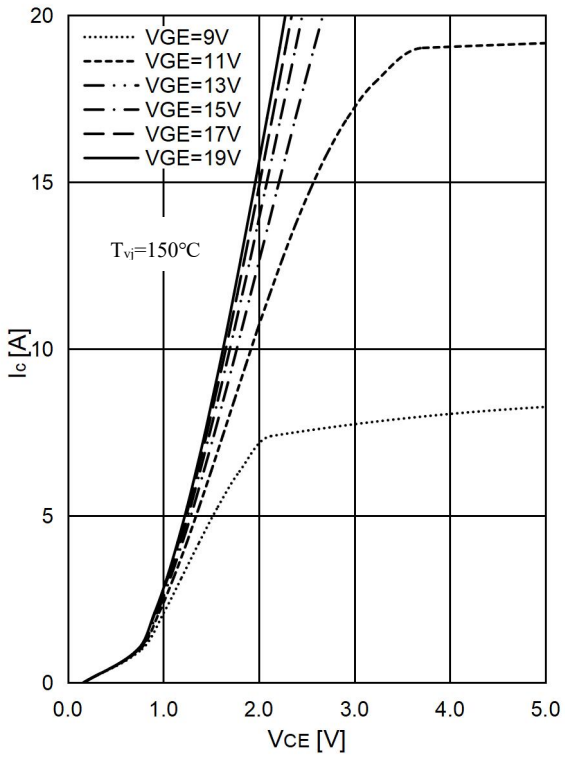



图 2 . IGBT 输出特性,逆变器

Fig 2. IGBT Output Characteristic,Inverter

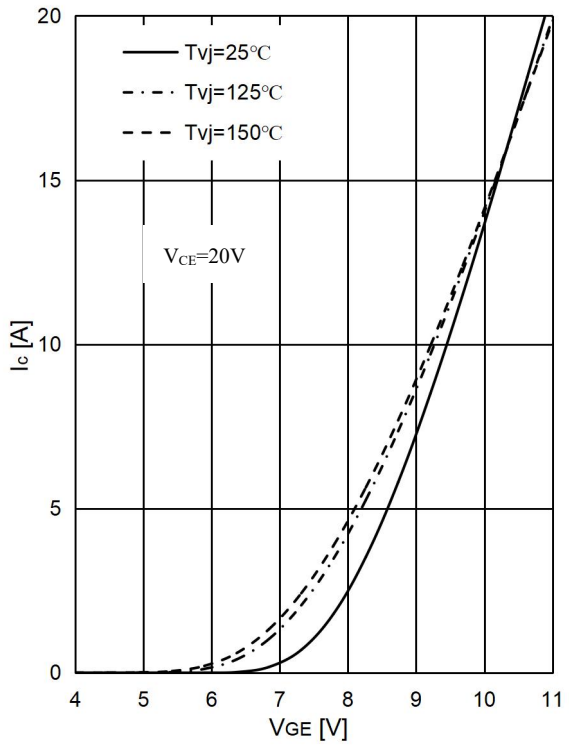



图 3 . IGBT 转移特性,逆变器

Fig 3. IGBT Transfer Characteristic,Inverter

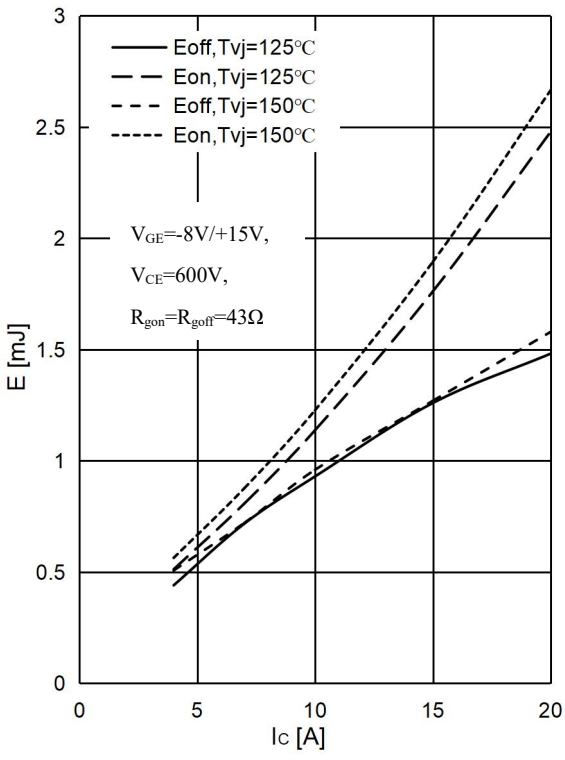



图 4 . IGBT 开关损耗-集电极电流,逆变器

Fig 4. IGBT Switching Loss $E_{on}$ & $E_{off}$ vs. $I_C$,Inverter

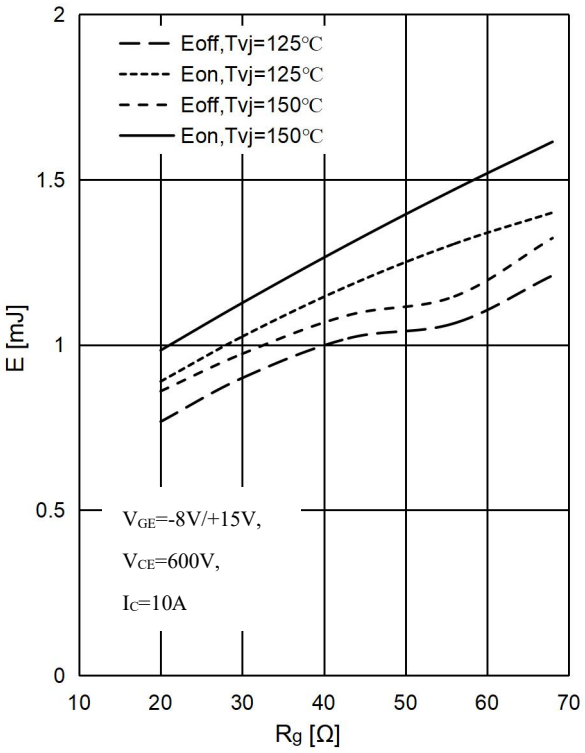



图 5 . IGBT 开关损耗-栅极电阻,逆变器

Fig 5. IGBT Switching Loss $E_{on}$ & $E_{off}$ vs. $R_G$,Inverter

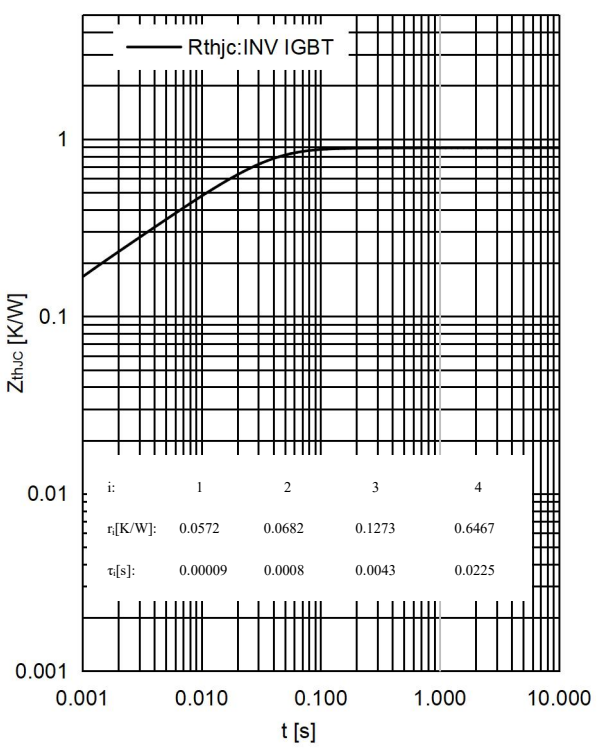



图 6 . IGBT 瞬态热阻抗,逆变器

Fig 6. IGBT Transient thermal impedance,Inverter

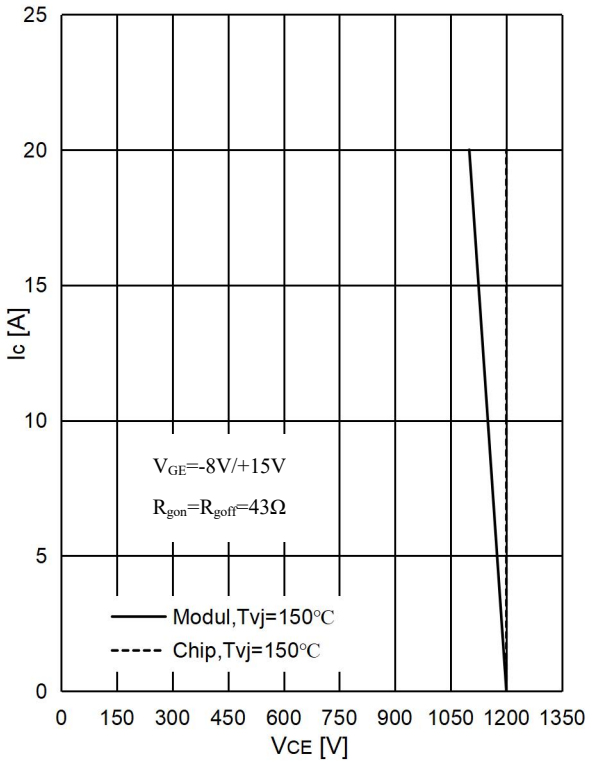



图 7 . IGBT 反偏安全工作区,逆变器

Fig 7. IGBT RBSOA,Inverter

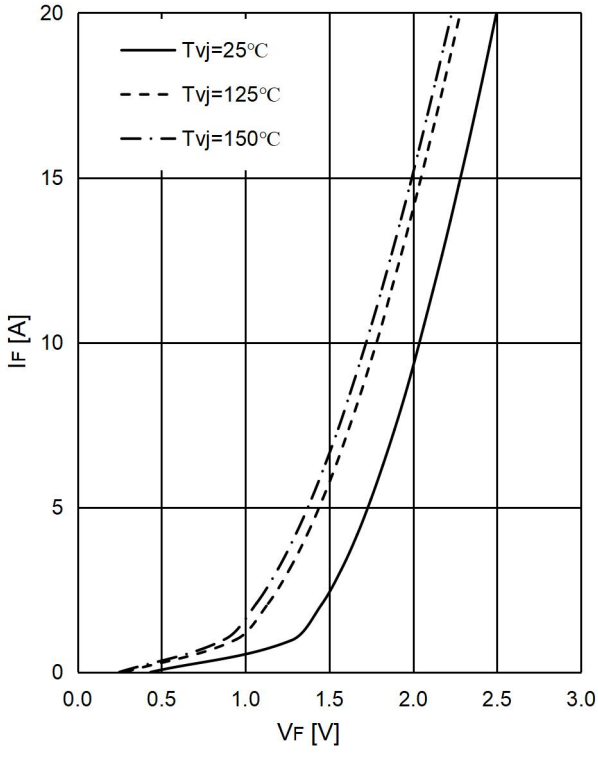



图 8 . 二极管 正向偏压特性,逆变器

Fig 8. Diode Forward characteristic,Inverter

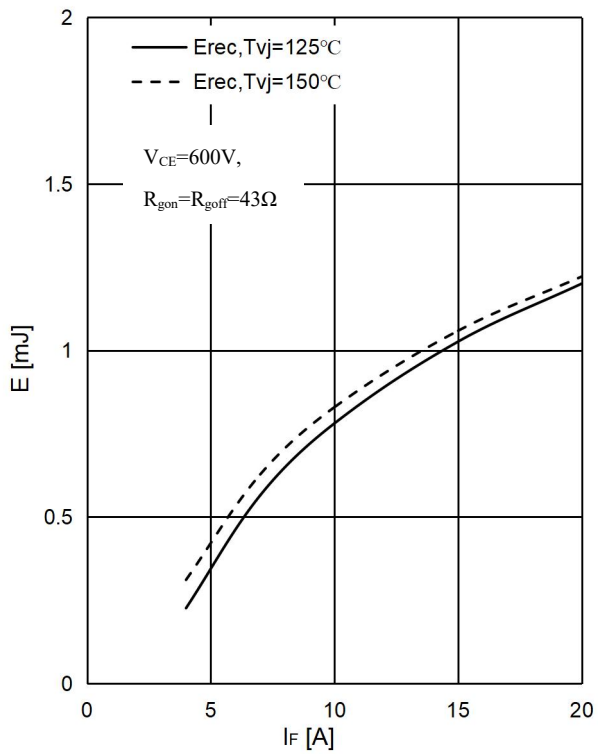



图 9 . 二极管 开关损耗-正向电流,逆变器

Fig 9. Diode Switching Loss $E_{rec}$ vs. $I_F$,Inverter

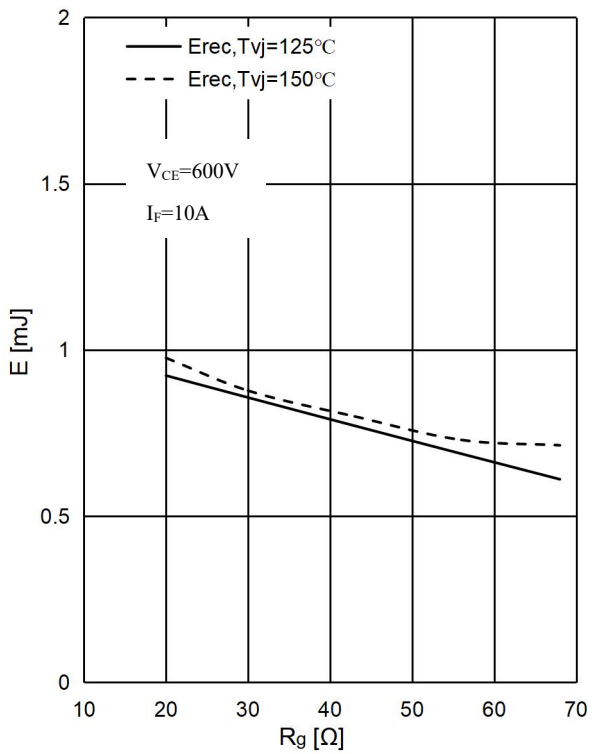



图 10 . 二极管 开关损耗-栅极电阻,逆变器

Fig 10. Diode Switching Loss $E_{rec}$ vs. $R_G$,Inverter

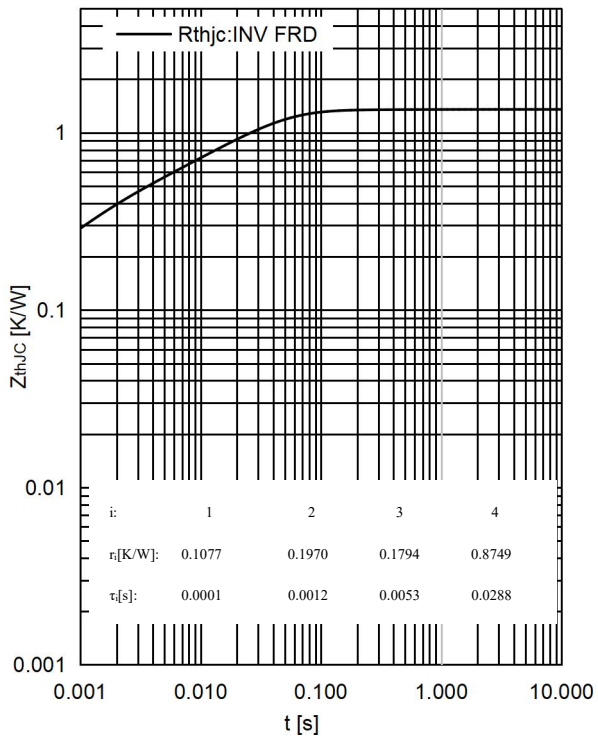



图 11 . 二极管 瞬态热阻抗,逆变器

Fig 11. Diode Transient thermal impedance,Inverter

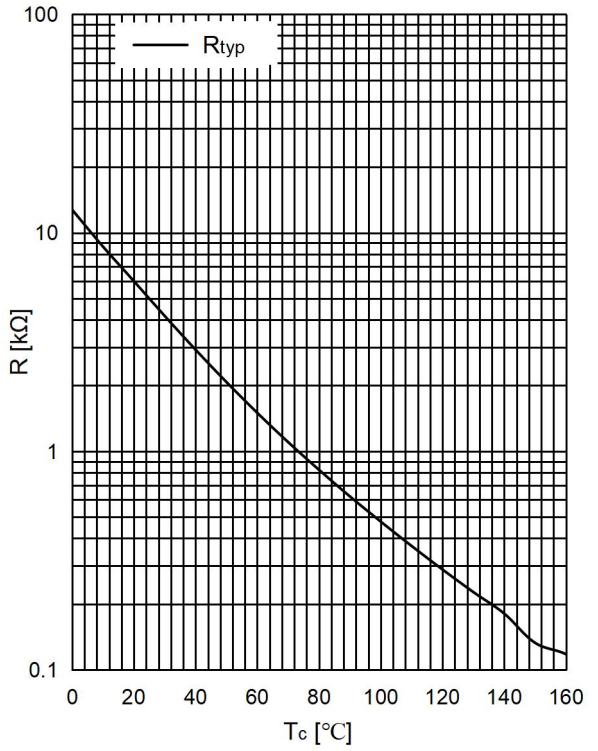
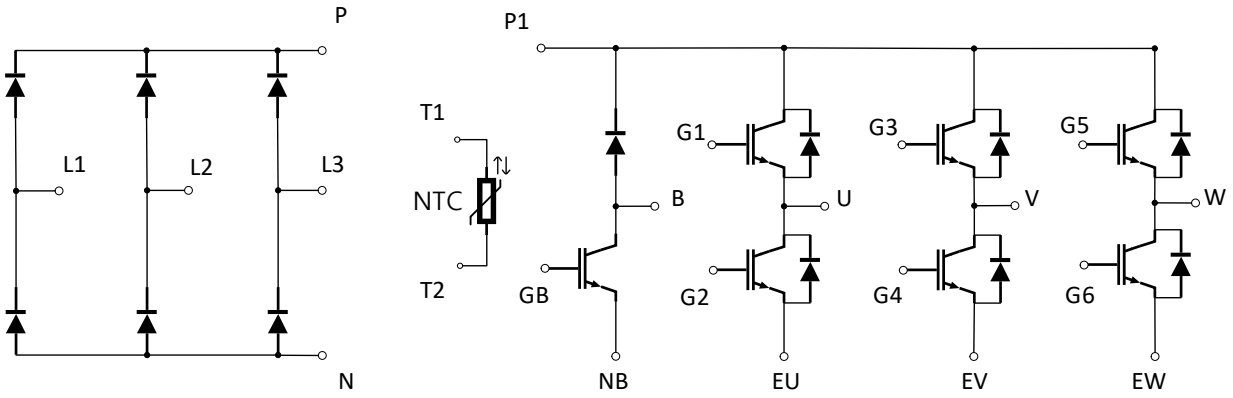


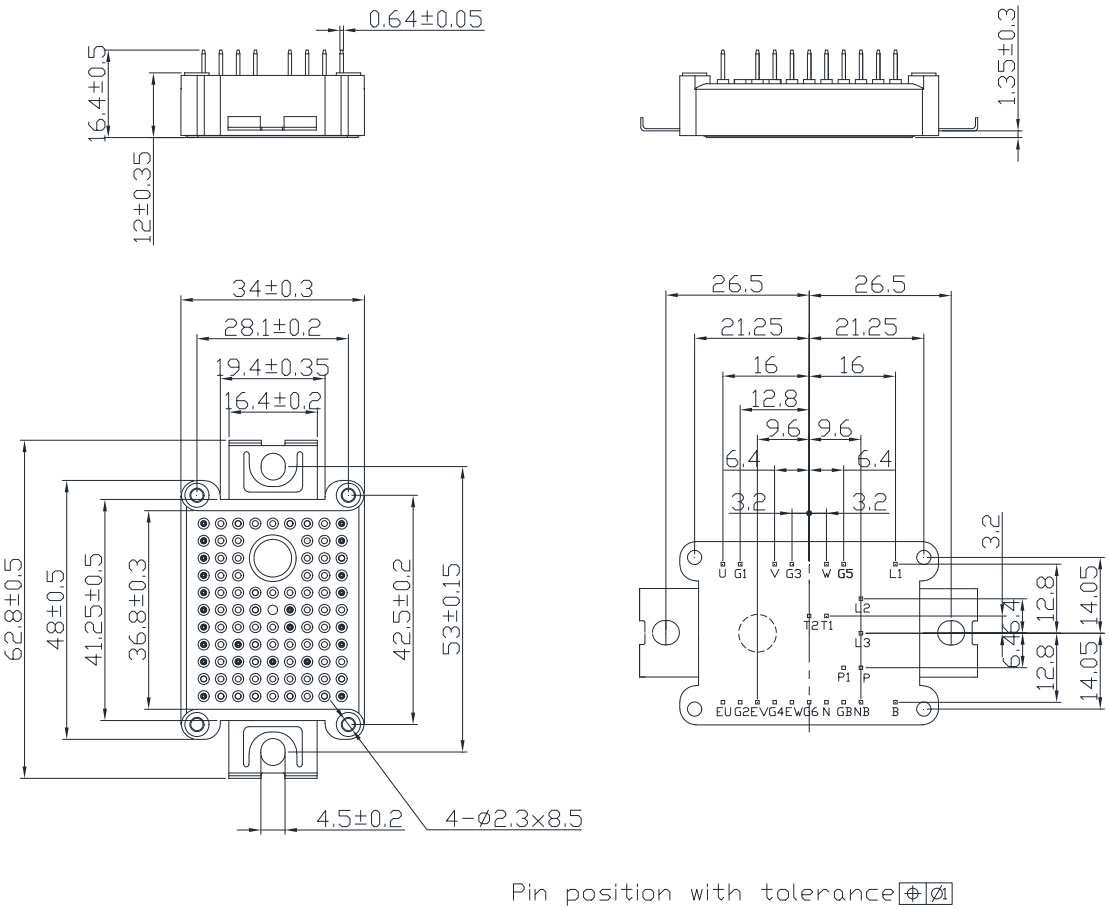

图 12 . 负温度系数热敏电阻 温度特性

Fig 12. NTC-Thermistor-temperature characteristic

## 电路图 / Circuit Diagram




## 封装尺寸 / Package Dimensions




Pin position with tolerance ⌖ ø1

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