

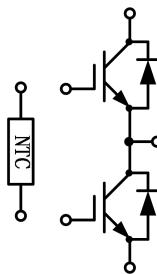
Half Bridge IGBT Module

电气特性:

- 1700V 沟槽栅/场终止工艺
1700V trench gate/field termination process
- 低开关损耗
Low switching losses
- V_{cesat} 正温度系数
 V_{cesat} has a positive temperature coefficient

典型应用:

- 变流器
Power Conversion System
- SVG
Static Var Generator
- 风力发电机
Wind Turbines



$V_{CES} = 1700V$, $I_{C\text{ nom}} = 300A$ / $I_{CRM} = 600A$

IGBT, 逆变器 / IGBT, Inverter

最大额定值 / Maximum Ratings

| Parameter | Conditions | Symbol | Value | Unit |
|--|--|--------------------|----------|------|
| 集电极-发射极电压 Collector-Emitter voltage | $T_{vj}=25^\circ C$ | V_{CES} | 1700 | V |
| 连续集电极直流电流 Continuous DC collector current | $T_C=100^\circ C$, $T_{vj\text{ max}}=175^\circ C$ | $I_{C\text{ nom}}$ | 300 | A |
| 集电极重复峰值电流 Repetitive peak collector current | $t_p=1 \text{ ms}$ | I_{CRM} | 600 | A |
| 总功率损耗 Total power dissipation | $T_C = 25^\circ C$, $T_{vj\text{ max}} = 175^\circ C$ | P_{tot} | 1700 | W |
| 栅极-发射极电压 Gate emitter voltage | | V_{GE} | ± 20 | V |

特征值 / Characteristic Values

| Parameter | Conditions | Symbol | Value | | | Unit |
|---|---|--------------|-------|-------|-------|----------|
| | | | Min. | Typ. | Max. | |
| 集电极-发射极饱和电压 Collector-Emitter saturation voltage | $V_{GE}=15V, I_c=300A$ $T_{vj}=25^\circ C$ $V_{GE}=15V, I_c=300A$ $T_{vj}=125^\circ C$ $V_{GE}=15V, I_c=300A$ $T_{vj}=150^\circ C$ | V_{CESat} | | 1.79 | 2.50 | V |
| 栅极-发射极阈值电压 Gate-Emitter threshold voltage | $I_c=18mA, V_{GE}= V_{CE}$ $T_{vj}=25^\circ C$ | | 4.90 | 5.50 | 6.10 | |
| 栅电荷 Gate charge | $V_{GE}=-15V...+15V$ | | Q_G | 2.99 | | μC |
| 内部栅极电阻 Internal gate resistor | $T_{vj}=25^\circ C$ | R_{Gint} | | 1.95 | | Ω |
| 输入电容 Input capacitance | $f=100KHz, V_{CE}=25 V, V_{GE}=0 V$ $T_{vj}=25^\circ C$ | C_{ies} | | 40.68 | | nF |
| 反向传输电容 Reverse transfer capacitance | | C_{res} | | 1.18 | | |
| 集电极-发射极截止电流 Collector-emitter cut-off current | $V_{CE}=1700V, V_{GE}= 0 V$ $T_{vj}=25^\circ C$ | I_{CES} | | | 2 | mA |
| 栅极-发射极漏电流 Gate-emitter leakage current | $V_{CE}=0 V, V_{GE}= 20 V$ $T_{vj}=25^\circ C$ | I_{GES} | | | 200 | nA |
| 开通延迟时间 Turn-on delay time | $I_c=300A, V_{CE}=900 V$ $V_{GE}=\pm 15 V, R_G=3.3\Omega$ (电感负载) / (inductive load) | $t_{d\ on}$ | | 226 | | ns |
| 上升时间 Rise time | $T_{vj}=25^\circ C$ $T_{vj}=125^\circ C$ $T_{vj}=150^\circ C$ | | | 245 | | |
| | | | | 255 | | |
| 关断延迟时间 Turn-off delay time | $I_c=300A, V_{CE}=900 V$ $V_{GE}=\pm 15 V, R_G=3.3\Omega$ (电感负载) / (inductive load) | $t_{d\ off}$ | | 515 | | ns |
| | $T_{vj}=25^\circ C$ $T_{vj}=125^\circ C$ $T_{vj}=150^\circ C$ | | | 572 | | |
| | | | | 588 | | |
| 下降时间 Fall time | $I_c=300A, V_{CE}=900 V$ $V_{GE}=\pm 15 V, R_G=3.3\Omega$ (电感负载) / (inductive load) | t_f | | 350 | | ns |
| | $T_{vj}=25^\circ C$ $T_{vj}=125^\circ C$ $T_{vj}=150^\circ C$ | | | 363 | | |
| | | | | 404 | | |
| 开通损耗能量 (每脉冲) Turn-on energy loss per pulse | $I_c=300A, V_{CE}=900 V$ $V_{GE}=\pm 15 V, R_G=3.3\Omega$ $di/dt=2300A/\mu s(T_{vj}=150^\circ C)$ (电感负载) / (inductive load) | E_{on} | | 69.2 | | mJ |
| | $T_{vj}=25^\circ C$ $T_{vj}=125^\circ C$ $T_{vj}=150^\circ C$ | | | 90.5 | | |
| | | | | 96.8 | | |
| 关断损耗能量 (每脉冲) Turn-off energy loss per pulse | $I_c=300A, V_{CE}=900 V$ $V_{GE}=\pm 15 V, R_G=3.3\Omega$ $du/dt=4800V/\mu s(T_{vj}=150^\circ C)$ (电感负载) / (inductive load) | E_{off} | | 51.5 | | |
| | $T_{vj}=25^\circ C$ $T_{vj}=125^\circ C$ $T_{vj}=150^\circ C$ | | | 64.7 | | |
| | | | | 69.4 | | |
| 短路数据 SC data | $V_{GE}\leq 15V, V_{ce}=1000V$ $V_{CEmax}=V_{CES}-L_{sCE}\cdot di/dt$ $tp\leq 10\mu s, T_{vj}=150^\circ C$ | I_{sc} | | 1800 | | A |
| 结-外壳热阻 Thermal resistance, junction to case | 每个 IGBT / per IGBT | R_{thJC} | | | 0.088 | 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**最大额定值 / Maximum Ratings**

| Parameter | Conditions | Symbol | Value | | Unit |
|--|--|------------------|-------|--|------------------|
| 反向重复峰值电压 Repetitive peak reverse voltage | T _{vj} =25°C | V _{RRM} | 1700 | | V |
| 连续正向直流电流 Continuous DC forward current | | I _F | 300 | | A |
| 正向重复峰值电流 Repetitive peak forward current | t _p =1ms | I _{FRM} | 600 | | A |
| I ² t 值 I ² t-value | t _p =10ms, sin180°, T _j =125°C | I ² t | 17000 | | A ² s |

特征值 / Characteristic Values

| Parameter | Conditions | Symbol | Value | | | Unit |
|--|---|--------------------|-------|-------|------|------|
| | | | Min. | Typ. | Max. | |
| 正向电压 Forward voltage | I _F =300A, V _{GE} =0V | V _F | | 2.23 | 2.90 | V |
| | I _F =300A, V _{GE} =0V | | | 2.48 | | |
| | I _F =300A, V _{GE} =0V | | | 2.43 | | |
| 反向恢复峰值电流 Peak reverse recovery current | I _F =300A | I _{RM} | | 122 | | A |
| | -dI _F /dt=2300A/μs(T _{vj} =150°C) | | | 147 | | |
| | V _R =900V, V _{GE} =-15V | | | 154 | | |
| 恢复电荷 Recovered charge | I _F =300A | Q _r | | 35.96 | | μC |
| | -dI _F /dt=2300A/μs(T _{vj} =150°C) | | | 60.88 | | |
| | V _R =900V, V _{GE} =-15V | | | 71.56 | | |
| 反向恢复损耗 (每脉冲) Reverse recovered energy | I _F =300A | E _{rec} | | 19.29 | | mJ |
| | -dI _F /dt=2300A/μs(T _{vj} =150°C) | | | 34.06 | | |
| | V _R =900V, V _{GE} =-15V | | | 40.89 | | |
| 结-外壳热阻 Thermal resistance, junction to case | 每个二极管 / per diode | R _{thJC} | | | 0.18 | 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

特征值 / Characteristic Values

| Parameter | Conditions | Symbol | Value | | | Unit |
|----------------------------|---------------------------|--------------------|-------|------|------|------|
| | | | Min. | Typ. | Max. | |
| 额定电阻值 Rated resistances | T _c =25°C, ±5% | R ₂₅ | | 5.0 | | k Ω |
| B-值 B-value | ±2% | B _{25/50} | | 3375 | | K |

模块 / Module

| Parameter | Conditions | Symbol | Value | | | Unit |
|---|---------------------|-------------------|--------------------------------|-----|-----|------|
| 绝缘测试电压 Isolation test voltage | RMS, f=50Hz, t=1min | V _{ISOL} | 4000 | | | V |
| 内部绝缘 Internal isolation | | | Al ₂ O ₃ | | | |
| 储存温度 Storage temperature | | T _{stg} | -40 | | 125 | °C |
| 模块安装的扭矩 Mounting torque for modul mounting | | M | 3.0 | | 6.0 | Nm |
| 端子联接扭距 Terminal connection torque | | M | 3.0 | | 6.0 | Nm |
| 重量 Weight | | W | | 344 | | g |

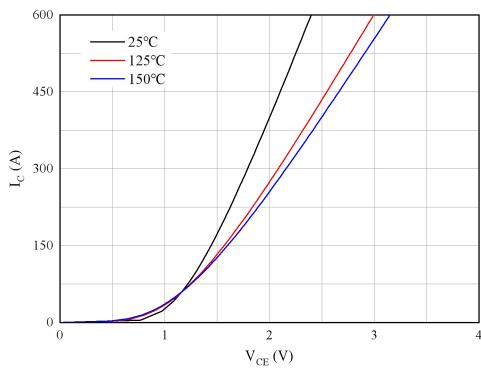
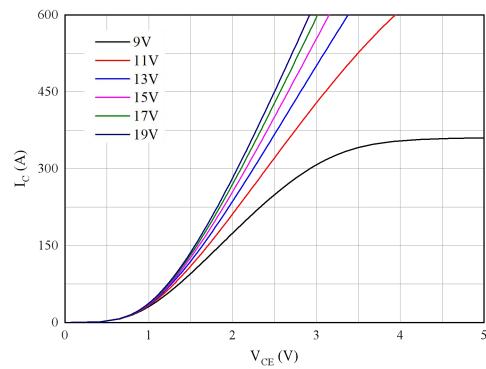
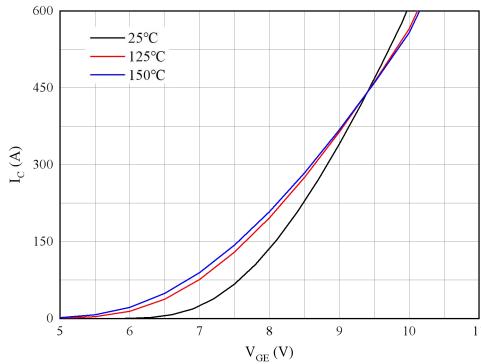
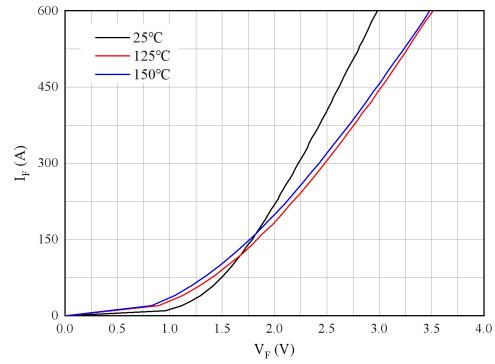
图 1. 典型输出特性 ($V_{GE}=15V$)Figure 1. Typical output characteristics ($V_{GE}=15V$)图 2. 典型输出特性 ($T_{vj}=150^\circ C$)Figure 2. Typical output characteristics ($T_{vj}=150^\circ C$)图 3. 典型传输特性($V_{CE}=20V$)Figure 3. Typical transfer characteristic($V_{CE}=20V$)

图 4. 正向偏压特性 二极管

Figure 4. Forward characteristic of Diode

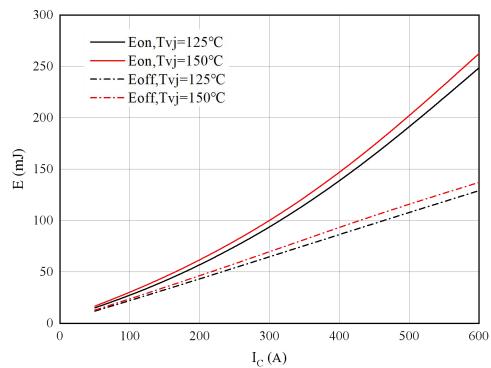


图 5. 开关损耗 逆变器

Figure 5. Switching losses of IGBT

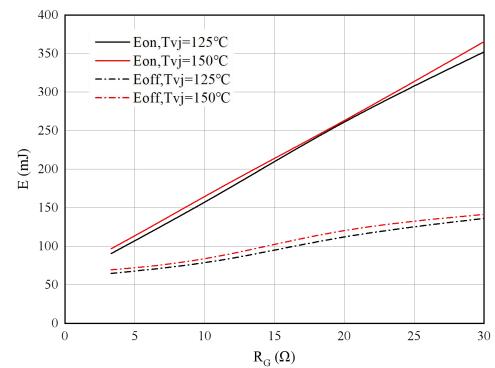
 $V_{GE} = \pm 15V, R_{Gon}=3.3\Omega, R_{Goff}=3.3\Omega, V_{CE}=900V$ 

图 6. 开关损耗 逆变器

Figure 6. Switching losses of IGBT

 $V_{GE} = \pm 15V, I_C=300A, V_{CE}=900V$

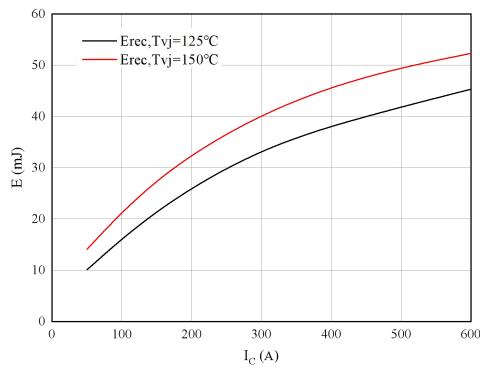


图 7. 开关损耗 二极管

Figure 7. Switching losses of Diode
R_{Gon}=3.3Ω, V_{CE}=900V

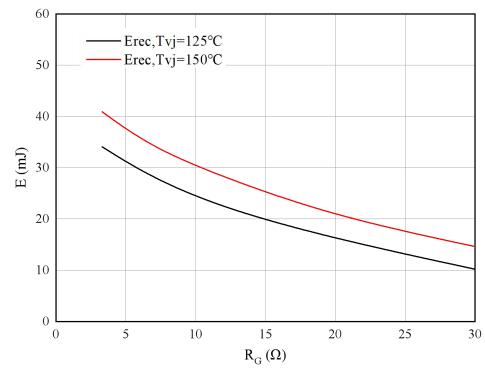


图 8. 开关损耗 二极管

Figure 8. Switching losses of Diode
I_f=300A, V_{CE}=900V

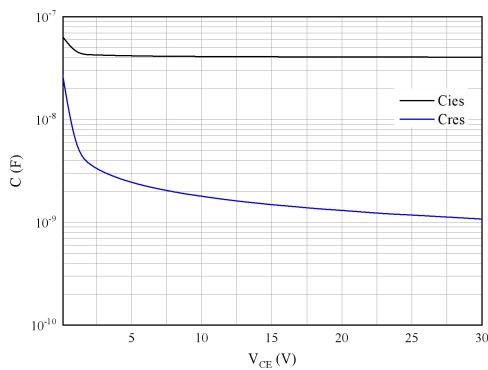


图 9. 电容特性
Figure 9. Capacitance characteristic

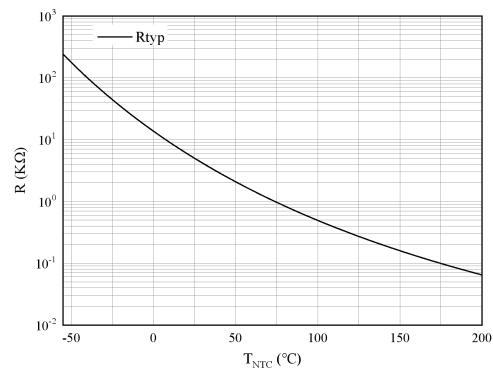


图 10. 负温系数热敏电阻 温度特性
Figure 10. NTC-Themistor-temperature characteristic

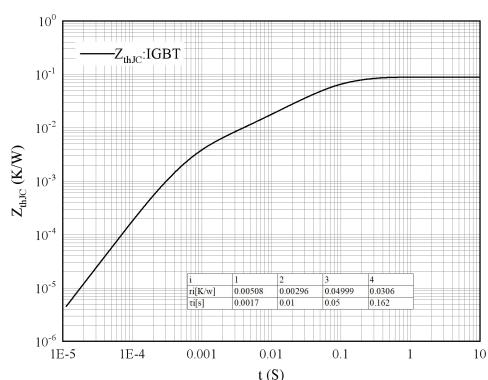


图 11. 瞬态热阻抗 IGBT 逆变器
Figure 11. Transient thermal impedance IGBT,Inverter
 $Z_{thJC}=f(t)$

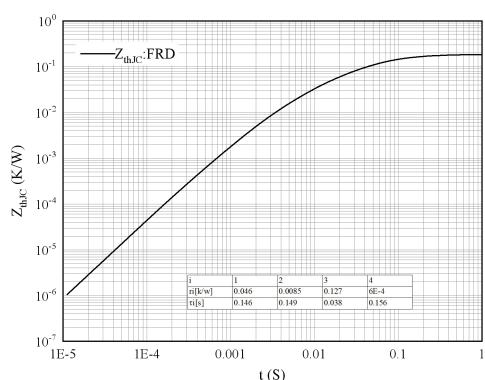
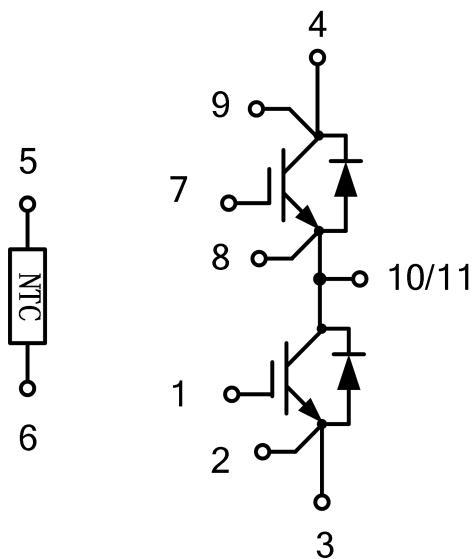


图 12. 瞬态热阻抗 FRD 逆变器
Figure 12. Transient thermal impedance FRD ,Inverter
 $Z_{thJC}=f(t)$

接线图 / Circuit diagram



封装尺寸 / Package outlines

