

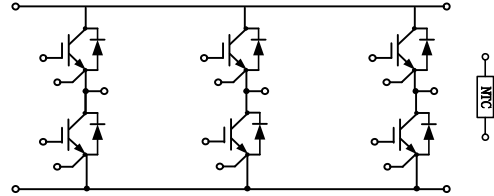
SixPack IGBT Module

电气特性:

- 1200V 沟槽栅/场终止工艺
- 低开关损耗
- 正温度系数

典型应用:

- 变频器
- 伺服
- 逆变器



$V_{CES} = 1200V$, $I_{C\ nom} = 150A$ / $I_{CRM} = 300A$

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} | 1200 | V |
| 连续集电极直流电流 Continuous DC collector current | $T_C=100^{\circ}C$, $T_{vj\ max}=175^{\circ}C$ | $I_{C\ nom}$ | 150 | A |
| 集电极重复峰值电流 Repetitive peak collector current | $t_p=1\ ms$ | I_{CRM} | 300 | A |
| 总功率损耗 Total power dissipation | $T_C = 25^{\circ}C$, $T_{vj\ max} = 175^{\circ}C$ | P_{tot} | 750 | 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 | $V_{GE}=15V$, $I_C=150A$ $V_{GE}=15V$, $I_C=150A$ $V_{GE}=15V$, $I_C=150A$ | $T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$ | V_{CESat} | 2.12 2.53 2.65 | 2.55 | V |
| 栅极-发射极阈值电压 Gate-Emitter threshold voltage | $I_C=5.3mA$, $V_{GE}=V_{CE}$ | $T_{vj}=25^{\circ}C$ | $V_{GE(th)}$ | 5.20 | 5.80 6.40 | |
| 栅电荷 Gate charge | $V_{GE}=-15V...+15V$ | | Q_G | 0.69 | | μC |

| | | | | | | |
|--|--|---|------------|-------|-------|------------------|
| 内部栅极电阻 Internal gate resistor | | R_{Gint} | | 3.50 | | Ω |
| 输入电容 Input capacitance | $f=1\text{MHz}$ $V_{CE}=25\text{V}, V_{GE}=0\text{V}$ | $T_{vj}=25^\circ\text{C}$ | C_{ies} | 11.36 | | nF |
| 反向传输电容 Reverse transfer capacitance | | | C_{res} | 0.41 | | |
| 集电极-发射极截止电流 Collector-emitter cut-off current | $V_{CE}=1200\text{V}, V_{GE}=0\text{V}$ | $T_{vj}=25^\circ\text{C}$ | I_{CES} | | 1 | 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} | | 150 | nA |
| 开通延迟时间 Turn-on delay time | $I_C=150\text{A}, V_{CE}=600\text{V}$ $V_{GE}=\pm 15\text{V}, R_G=2\Omega$ (电感负载)/(inductiveload) | $T_{vj}=25^\circ\text{C}$ $T_{vj}=125^\circ\text{C}$ $T_{vj}=150^\circ\text{C}$ | t_{don} | | 99 | |
| | | | | | 114 | |
| | | | | | 120 | |
| 上升时间 Rise time | $I_C=150\text{A}, V_{CE}=600\text{V}$ $V_{GE}=\pm 15\text{V}, R_G=2\Omega$ (电感负载)/(inductiveload) | $T_{vj}=25^\circ\text{C}$ $T_{vj}=125^\circ\text{C}$ $T_{vj}=150^\circ\text{C}$ | t_r | | 28 | ns |
| | | | | | 32 | |
| | | | | | 33 | |
| 关断延迟时间 Turn-off delay time | $I_C=150\text{A}, V_{CE}=600\text{V}$ $V_{GE}=\pm 15\text{V}, R_G=2\Omega$ (电感负载)/(inductiveload) | $T_{vj}=25^\circ\text{C}$ $T_{vj}=125^\circ\text{C}$ $T_{vj}=150^\circ\text{C}$ | t_{doff} | | 240 | |
| | | | | | 266 | |
| | | | | | 294 | |
| 下降时间 Fall time | $I_C=150\text{A}, V_{CE}=600\text{V}$ $V_{GE}=\pm 15\text{V}, R_G=2\Omega$ (电感负载)/(inductiveload) | $T_{vj}=25^\circ\text{C}$ $T_{vj}=125^\circ\text{C}$ $T_{vj}=150^\circ\text{C}$ | t_f | | 178 | |
| | | | | | 215 | |
| | | | | | 250 | |
| 开通损耗能量 (每脉冲) Turn-on energy loss per pulse | $I_C=150\text{A}, V_{CE}=600\text{V}$ $V_{GE}=\pm 15\text{V}, R_G=2\Omega$ (电感负载)/(inductiveload) | $T_{vj}=25^\circ\text{C}$ $T_{vj}=125^\circ\text{C}$ $T_{vj}=150^\circ\text{C}$ | E_{on} | | 1.32 | mJ |
| | | | | | 2.37 | |
| | | | | | 3.25 | |
| 关断损耗能量 (每脉冲) Turn-off energy loss per pulse | $I_C=150\text{A}, V_{CE}=600\text{V}$ $V_{GE}=\pm 15\text{V}, R_G=2\Omega$ (电感负载)/(inductiveload) | $T_{vj}=25^\circ\text{C}$ $T_{vj}=125^\circ\text{C}$ $T_{vj}=150^\circ\text{C}$ | E_{off} | | 8.75 | |
| | | | | | 10.86 | |
| | | | | | 12.42 | |
| 短路数据 SC data | $V_{GE}\leq 15\text{V}, V_{CC}=800\text{V}$ $V_{CEmax}=V_{CES}-L_{sCE}\cdot di/dt, t_p\leq 10\mu\text{s}$ $T_{vj}=150^\circ\text{C}$ | | I_{SC} | | 563 | A |
| 结-外壳热阻 Thermal resistance, junction to case | 每个 IGBT / per IGBT | | R_{thJC} | | 0.20 | K/W |
| 在开关状态下温度 Temperature under switching conditions | | | T_{vjop} | -40 | 150 | $^\circ\text{C}$ |

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 | $T_{vj}=25^\circ\text{C}$ | V_{RRM} | 1200 | V |
| 连续正向直流电流 Continuous DC forward current | | I_F | 150 | A |
| 正向重复峰值电流 Repetitive peak forward current | $t_p=1\text{ms}$ | I_{FRM} | 300 | A |
| I^2t 值 I^2t -value | $t_p=10\text{ms}, \sin 180^\circ, T_{vj}=125^\circ\text{C}$ | I^2t | 4050 | A^2s |

特征值 / Characteristic Values

| Parameter | Conditions | Symbol | Value | | | Unit |
|--|---|--|-------------|------------------------|-------|-------------|
| | | | Min. | Typ. | Max. | |
| 正向电压 Forward voltage | $I_F=150A, V_{GE}=0V$ $I_F=150A, V_{GE}=0V$ $I_F=150A, V_{GE}=0V$ | $T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$ | V_F | 2.45 1.95 1.85 | 2.90 | V |
| 反向恢复峰值电流 Peak reverse recovery current | $I_F=150A,$ $-di_F/dt=4900A/\mu s(T_{vj}=150^{\circ}C)$ $V_R=600V, V_{GE}=-15V$ | $T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$ | I_{RM} | 155 187 213 | | A |
| 恢复电荷 Recovered charge | $I_F=150A,$ $-di_F/dt=4900A/\mu s(T_{vj}=150^{\circ}C)$ $V_R=600V, V_{GE}=-15V$ | $T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$ | Q_r | 8.00 13.00 20.00 | | μC |
| 反向恢复损耗（每脉冲） Reverse recovered energy | $I_F=150A,$ $-di_F/dt=4900A/\mu s(T_{vj}=150^{\circ}C)$ $V_R=600V, V_{GE}=-15V$ | $T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$ | E_{rec} | 3.00 6.60 8.60 | | mJ |
| 结-外壳热阻 Thermal resistance, junction to case | 每个二极管/ per diode | | R_{thJC} | | 0.375 | K/W |
| 在开关状态下温度 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 | Conditions | Symbol | Value | | | Unit |
|----------------------------|----------------------------|-------------|-------|------|------|------------|
| | | | Min. | Typ. | Max. | |
| 额定电阻值 Rated resistances | $T_c=25^{\circ}C, \pm 5\%$ | R_{25} | | 5.0 | | K Ω |
| B-值 B-value | $\pm 1\%$ | $B_{25/50}$ | | 3380 | | K |

模块 / Module

| Parameter | Conditions | Symbol | Value | | | Unit |
|---|-----------------------|------------|-----------|-----|-----|-------------|
| 绝缘测试电压 Isolation test voltag | RMS, $f=50Hz, t=1min$ | V_{ISOL} | 2500 | | | V |
| 内部绝缘 Internal isolation | | | Al_2O_3 | | | |
| 储存温度 Storage temperature | | T_{stg} | -40 | | 125 | $^{\circ}C$ |
| 模块安装的扭矩 Mounting torque for modul mounting | | M | 3.0 | | 6.0 | Nm |
| 重量 Weight | | W | | 301 | | g |

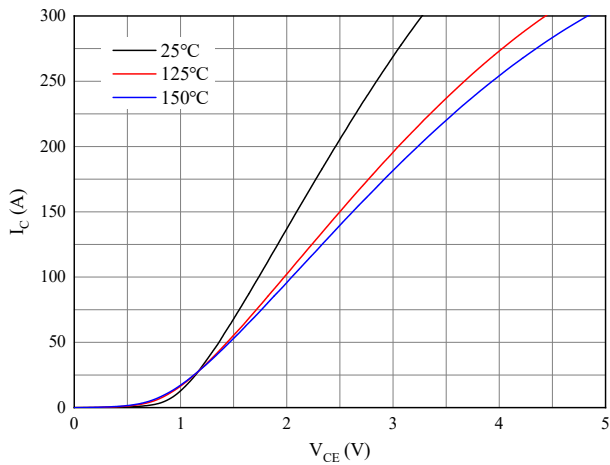


图 1. 输出特性 逆变器 ($V_{GE}=15V$)

Figure 1. Output characteristics IGBT, Inverte

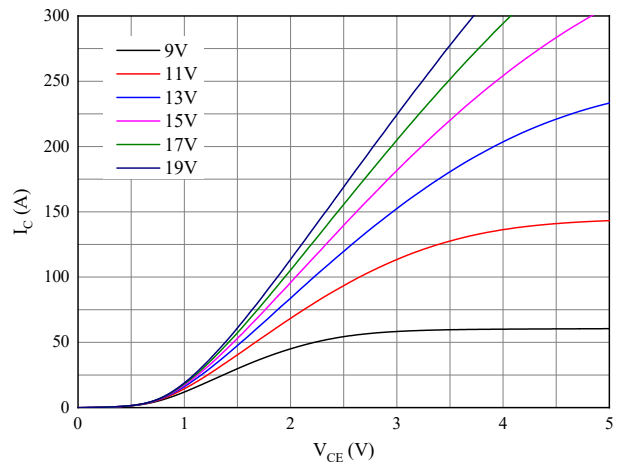


图 2. 输出特性 逆变器 ($T_{vj}=150^{\circ}C$)

Figure 2. Output characteristics IGBT, Inverter

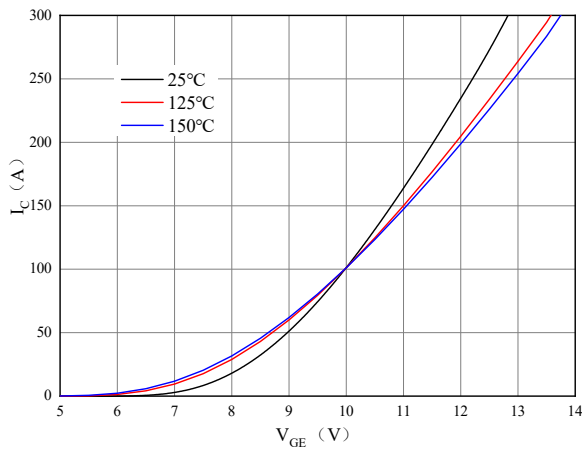


图 3. 传输特性 逆变器 ($V_{GE}=15V$)

Figure 3. Transfer characteristics IGBT, Inverter

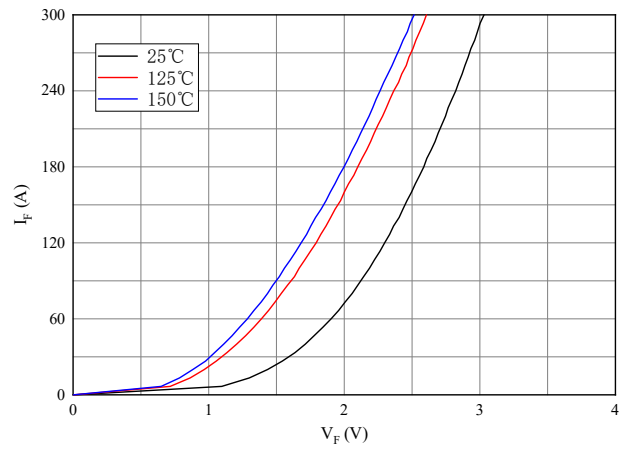


图 4. 正向偏压特性 二极管

Figure 4. Forward characteristic of Diode

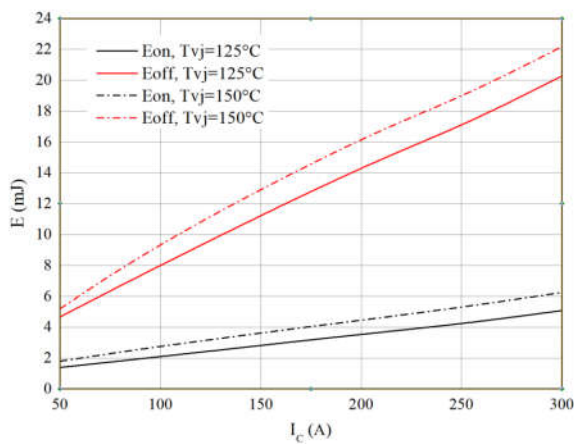


图 5. 开关损耗 逆变器

Figure 5. Switching losses of IGBT

$V_{GE}=\pm 15V, R_{Gon}=2\Omega, R_{Goff}=2\Omega, V_{CE}=600V$

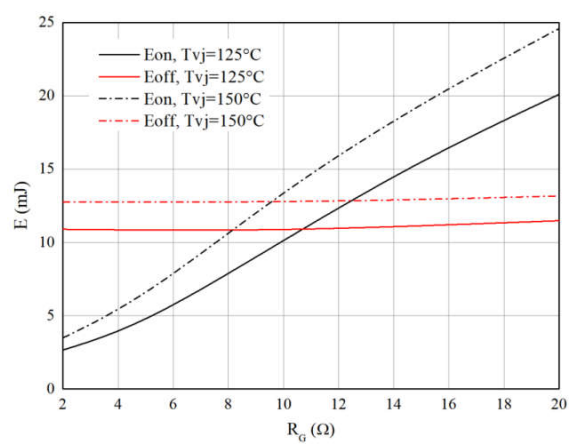


图 6. 开关损耗 逆变器

Figure 6. Switching losses of IGBT

$V_{GE}=\pm 15V, I_C=150A, V_{CE}=600V$

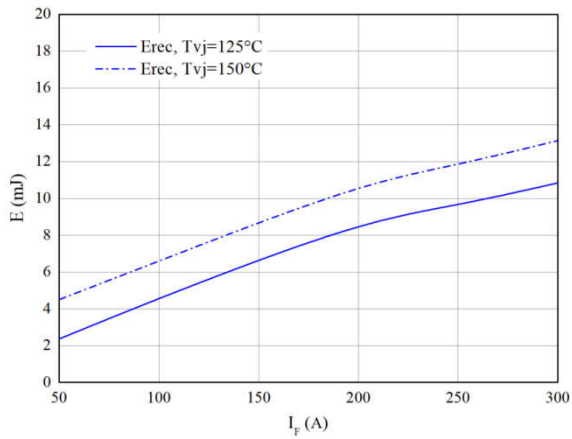


图 7. 开关损耗 二极管

Figure 7. Switching losses of Diode

$R_{Gon}=2\Omega, V_{CE}=600V$

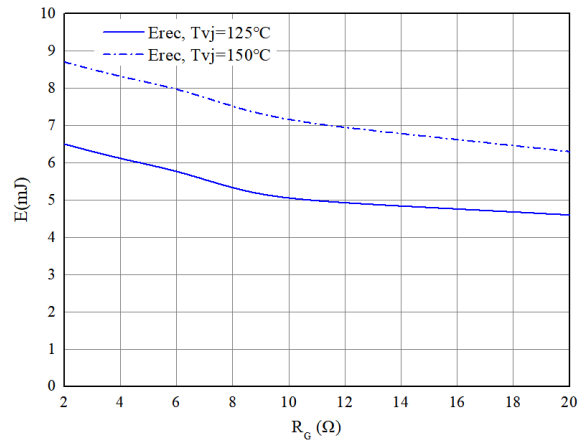


图 8. 开关损耗 二极管

Figure 8. Switching losses of Diode

$I_F=150A, V_{CE}=600V$

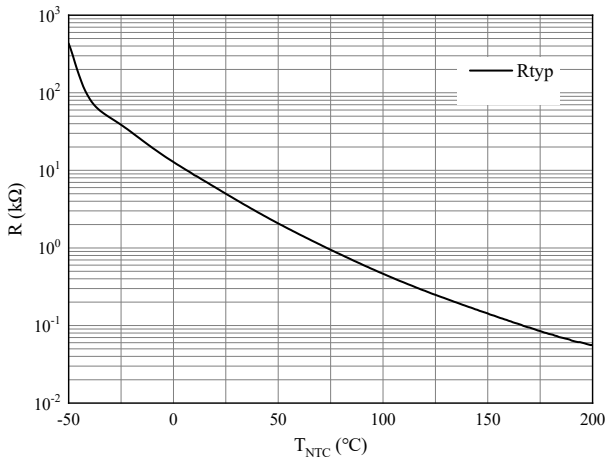


图 9. 负温系数热敏电阻 温度特性

Figure 9. NTC-Themistor-temperature characteristic

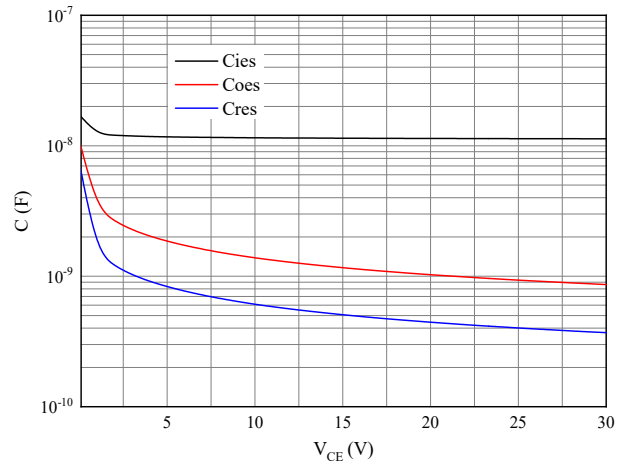
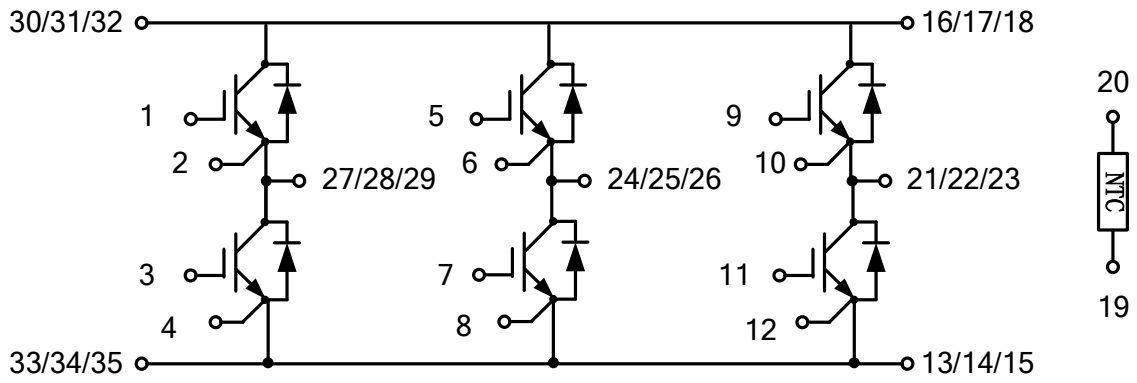


图 10. 电容特性

Figure 10. Capacitance characteristic

接线图 / Circuit diagram



封装尺寸 / Package outlines

