

1. Product Features

1.1 Electrical features

- $V_{CES}=1700V$
- $I_{C\ nom}=100A / I_{CRM}=200A$
- Low switching losses
- Low inductance
- Fast switching and short tail current
- Integrated NTC temperature sensor
- High power and thermal cycling capability

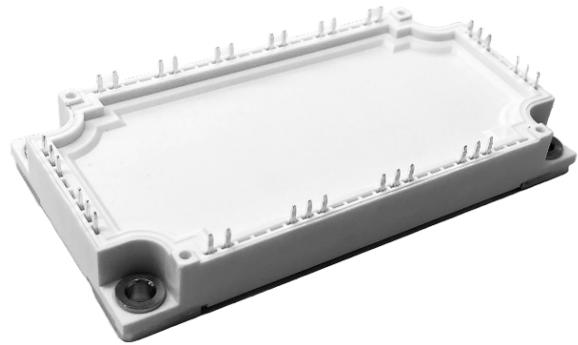


Figure1 IGBT Module

1.2 Mechanical features

- Al_2O_3 substrate with low thermal resistance
- Copper base plate

2. Typical Applications

- Switching mode power supply
- Drive inverters
- Uninterruptible power supply
- AC and DC servo drive amplifier

3. Description

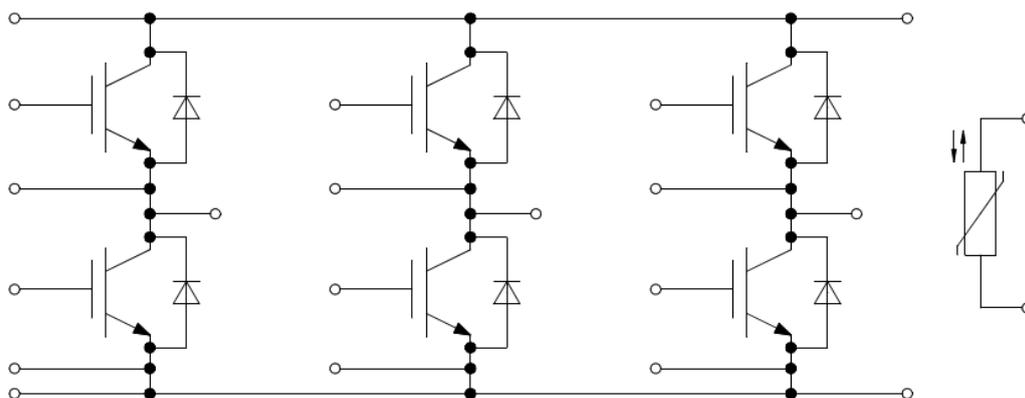


Figure 2 SixPack

4. IGBT, Inverter

4.1 Maximum rated values

| Parameter | Note or test condition | Symbol | Values | Unit |
|--|--|--------------|--------|------|
| Collector-emitter voltage 集电极—发射极间电压 | $T_{vj} = 25^{\circ}\text{C}$ | V_{CES} | 1700 | V |
| Continuous DC collector current 连续集电极电流 | $T_C = 115^{\circ}\text{C}, T_{vj\ max} = 150^{\circ}\text{C}$ | $I_{C\ nom}$ | 100 | A |
| Repetitive peak collector current 集电极峰值电流 | $t_P = 1\ \text{ms}$ | I_{CRM} | 200 | A |
| Total power dissipation 总功率损耗 | $T_C = 25^{\circ}\text{C}, T_{vj\ max} = 175^{\circ}\text{C}$ | P_{tot} | 937 | W |
| Gate-emitter peak voltage 栅极—发射极峰值电压 | | V_{GES} | +/- 20 | V |

4.2 Characteristic value

| Parameter | Note or test condition | Symbol | Values | | | Unit |
|---|---|--------------|--------|--------------------------------|------|---------------|
| | | | Min. | Typ. | Max. | |
| Collector-emitter saturation voltage 集电极—发射极饱和电压 | $I_C = 100\ \text{A}, V_{GE} = 15\ \text{V}$ | $V_{CE,sat}$ | | $T_{vj} = 25^{\circ}\text{C}$ | 1.72 | V |
| | | | | $T_{vj} = 125^{\circ}\text{C}$ | 1.96 | V |
| | | | | $T_{vj} = 150^{\circ}\text{C}$ | 2.03 | V |
| Gate threshold voltage 栅极阈值电压 | $I_C = 6\ \text{mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$ | $V_{GE,th}$ | 5.1 | 5.7 | 6.3 | V |
| Gate charge 栅极电荷 | $V_{GE} = -15\ \text{V} \dots +15\ \text{V}$ | Q_G | | 0.99 | | μC |
| Internal gate resistor 内部栅极电阻 | $T_{vj} = 25^{\circ}\text{C}$ | R_{Gint} | | 5.4 | | Ω |
| Input capacitance 输入电容 | $f=1\ \text{MHz}, T_{vj}=25^{\circ}\text{C}, V_{CE}=25\ \text{V}, V_{GE}=0\ \text{V}$ | C_{ies} | | 13.7 | | nF |
| Reverse transfer capacitance 反向传输电容 | $f=1\ \text{MHz}, T_{vj}=25^{\circ}\text{C}, V_{CE}=25\ \text{V}, V_{GE}=0\ \text{V}$ | C_{res} | | 0.40 | | nF |
| Collector-emitter cut-off current 集电极-发射极截止电流 | $V_{CE} = 1700\ \text{V}, V_{GE} = 0\ \text{V}, T_{vj} = 25^{\circ}\text{C}$ | I_{CES} | | | 1 | mA |
| Gate-emitter leakage current 栅极-发射极漏电流 | $V_{CE} = 0\ \text{V}, V_{GE} = 20\ \text{V}, T_{vj} = 25^{\circ}\text{C}$ | I_{GES} | | | 100 | nA |
| Turn-on delay time, inductive load 开通延迟时间 | $I_C = 100\ \text{A}, V_{CE} = 900\ \text{V}$ $V_{GE} = +15/-15\ \text{V}$ $R_{G,on} = 5\ \Omega$ | $t_{d,on}$ | | $T_{vj} = 25^{\circ}\text{C}$ | 0.23 | μs |
| | | | | $T_{vj} = 125^{\circ}\text{C}$ | 0.24 | μs |
| | | | | $T_{vj} = 150^{\circ}\text{C}$ | 0.25 | μs |
| Rise time, inductive load 上升时间 | $I_C = 100\ \text{A}, V_{CE} = 900\ \text{V}$ $V_{GE} = +15/-15\ \text{V}$ $R_{G,on} = 5\ \Omega$ | t_r | | $T_{vj} = 25^{\circ}\text{C}$ | 0.03 | μs |
| | | | | $T_{vj} = 125^{\circ}\text{C}$ | 0.04 | μs |
| | | | | $T_{vj} = 150^{\circ}\text{C}$ | 0.04 | μs |

(table continues...) 待续

| Parameter | Note or test condition | | Symbol | Values | | | Unit |
|--|---|------------------------|-------------|--------|------|------|------|
| | | | | Min. | Typ. | Max. | |
| Turn-off delay time, inductive load 关断延迟时间 | $I_C = 100A, V_{CE} = 900V$ $V_{GE} = +15/-15V$ $R_{G,off} = 5\Omega$ | $T_{vj} = 25^\circ C$ | $t_{d,off}$ | | 0.39 | | us |
| | | $T_{vj} = 125^\circ C$ | | | 0.49 | | us |
| | | $T_{vj} = 150^\circ C$ | | | 0.51 | | us |
| Fall time, inductive load 下降时间 | $I_C = 100A, V_{CE} = 900V$ $V_{GE} = +15/-15V$ $R_{G,off} = 5\Omega$ | $T_{vj} = 25^\circ C$ | t_f | | 0.35 | | us |
| | | $T_{vj} = 125^\circ C$ | | | 0.51 | | us |
| | | $T_{vj} = 150^\circ C$ | | | 0.53 | | us |
| Turn-on energy loss per pulse 开通损耗能量 | $I_C = 100A, V_{CE} = 900V, L_s = 30nH$ $V_{GE} = +15/-15V, di/dt = 2130A/\mu s$ $R_{G,on} = 5\Omega (T_{vj} = 150^\circ C)$ | $T_{vj} = 25^\circ C$ | E_{on} | | 17.6 | | mJ |
| | | $T_{vj} = 125^\circ C$ | | | 30.8 | | mJ |
| | | $T_{vj} = 150^\circ C$ | | | 34.8 | | mJ |
| Turn-off energy loss per pulse 关断损耗能量 | $I_C = 100A, V_{CE} = 900V, L_s = 30nH$ $V_{GE} = +15/-15V, dv/dt = 3680V/\mu s$ $R_{G,off} = 5\Omega (T_{vj} = 150^\circ C)$ | $T_{vj} = 25^\circ C$ | E_{off} | | 17.5 | | mJ |
| | | $T_{vj} = 125^\circ C$ | | | 25.0 | | mJ |
| | | $T_{vj} = 150^\circ C$ | | | 26.3 | | mJ |
| SC data 短路数据 | $V_{GE} \leq 15V, V_{CC} = 900V, t_P \leq 10\mu s, T_{vj} = 150^\circ C,$ $C_{GE} = 0.0\mu F, V_{CEmax} = V_{CES} - L_{SCE} \cdot di/dt$ | | I_{sc} | | 930 | | A |
| Thermal resistance, junction to case 结-外壳热阻 | Per IGBT | | $R_{th,Jc}$ | | | 0.16 | K/W |

5. Diode

5.1 Maximum rated values

| Parameter | Note or test condition | Symbol | Values | Unit |
|---|------------------------|-----------|--------|------|
| Repetitive peak reverse voltage 反向重复峰值电压 | $T_{vj} = 25^\circ C$ | V_{RRM} | 1700 | V |
| Continuous DC forward current 连续正向直流电流 | | I_F | 100 | A |
| Repetitive peak forward current 正向重复峰值电流 | $t_P = 1\text{ ms}$ | I_{FRM} | 200 | A |

5.2 Characteristic value

| Parameter | Note or test condition | | Symbol | Values | | | Unit |
|-------------------------|---|------------------------|--------|--------|------|------|------|
| | | | | Min. | Typ. | Max. | |
| Forward voltage 正向电压 | $I_F = 100\text{ A}, V_{GE} = 0\text{ V}$ | $T_{vj} = 25^\circ C$ | V_F | | 1.80 | | V |
| | | $T_{vj} = 125^\circ C$ | | | 1.56 | | V |
| | | $T_{vj} = 150^\circ C$ | | | 1.48 | | V |

(table continues...) 待续

| Parameter | Note or test condition | | Symbol | Values | | | Unit |
|--|--|------------------------|-------------|--------|------|------|---------|
| | | | | Min. | Typ. | Max. | |
| Peak reverse recovery current 反向恢复峰值电流 | $I_F = 100A, V_R = 900V$ $V_{GE} = -15V, -di_F/dt = 2980 A/\mu s$ $(T_{vj}=150^\circ C)$ | $T_{vj} = 25^\circ C$ | I_{RM} | | 178 | | A |
| | | $T_{vj} = 125^\circ C$ | | | 202 | | A |
| | | $T_{vj} = 150^\circ C$ | | | 214 | | A |
| Recovered charge 恢复电荷 | $I_F = 100A, V_R = 900V$ $V_{GE} = -15V, -di_F/dt = 2980 A/\mu s$ $(T_{vj}=150^\circ C)$ | $T_{vj} = 25^\circ C$ | Q_r | | 17.3 | | μC |
| | | $T_{vj} = 125^\circ C$ | | | 39.6 | | μC |
| | | $T_{vj} = 150^\circ C$ | | | 42.9 | | μC |
| Reverse recovery energy 反向恢复损耗 (每脉冲) | $I_F = 100A, V_R = 900V$ $V_{GE} = -15V, -di_F/dt = 2980 A/\mu s$ $(T_{vj}=150^\circ C)$ | $T_{vj} = 25^\circ C$ | E_{rec} | | 5.80 | | mJ |
| | | $T_{vj} = 125^\circ C$ | | | 14.7 | | mJ |
| | | $T_{vj} = 150^\circ C$ | | | 17.7 | | mJ |
| Thermal resistance, junction to case 结—外壳热阻 | Per diode | | $R_{th,Jc}$ | | | 0.42 | K/W |

6. NTC-Thermistor

6.1 Characteristic value

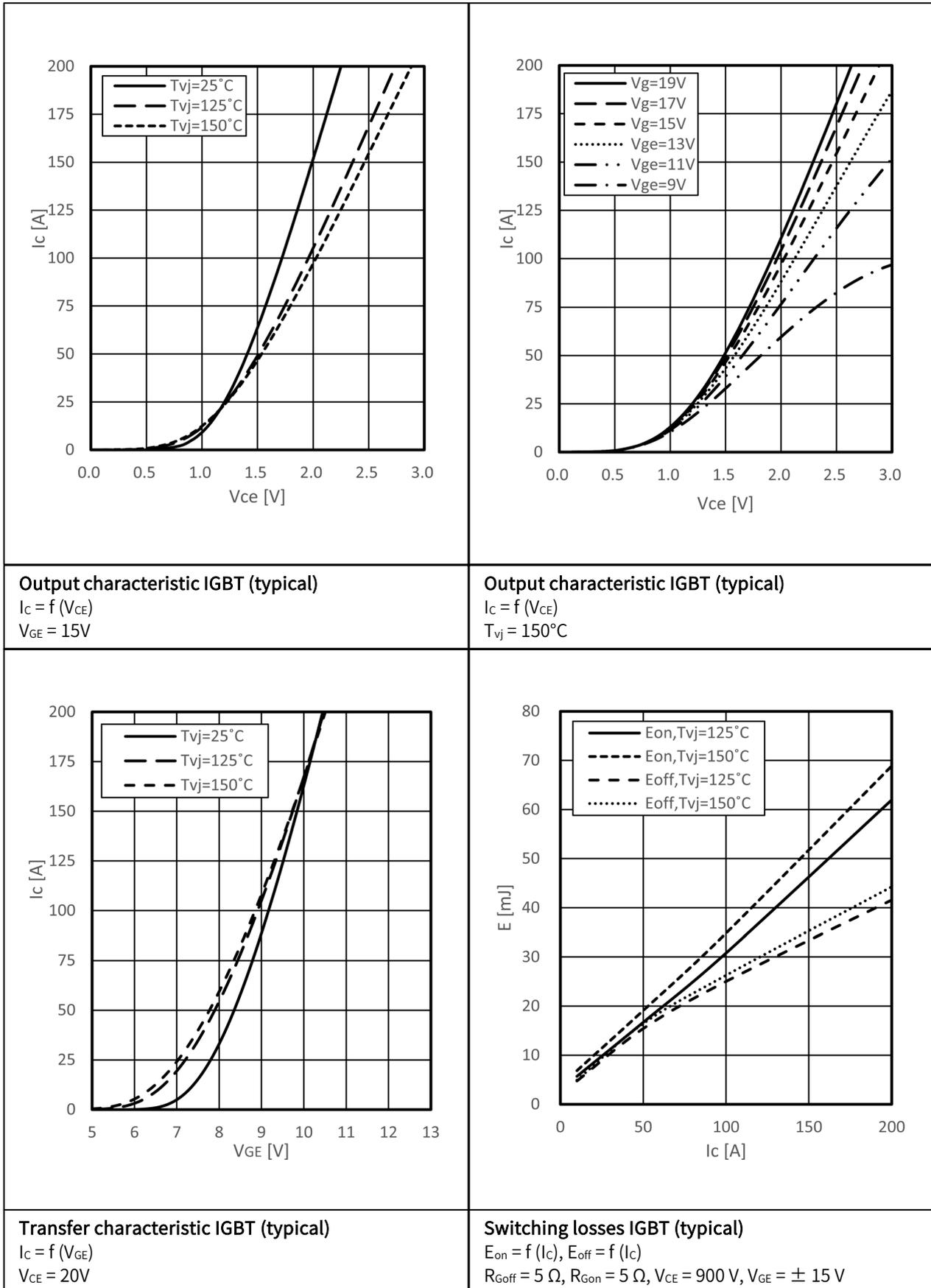
| Parameter | Note or test condition | Symbol | Values | | | Unit |
|---------------------------|--|------------------|--------|------|------|------------|
| | | | Min. | Typ. | Max. | |
| Rated resistance 额定电阻值 | $T_c = 25^\circ C$ | R_{25} | | 5.00 | | K Ω |
| Power dissipation 耗散功耗 | $T_c = 25^\circ C$ | P_{25} | | | 20 | mW |
| B-value B-Z 值 | $R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298, 15K))]$ | B_{25}/B_{50} | | 3375 | | K |
| B-value B-Z 值 | $R_2=R_{25}\exp[B_{25/75}(1/T_2-1/(298, 15K))]$ | B_{25}/B_{75} | | 3408 | | K |
| B-value B-Z 值 | $R_2=R_{25}\exp[B_{25/100}(1/T_2-1/(298, 15K))]$ | B_{25}/B_{100} | | 3436 | | K |

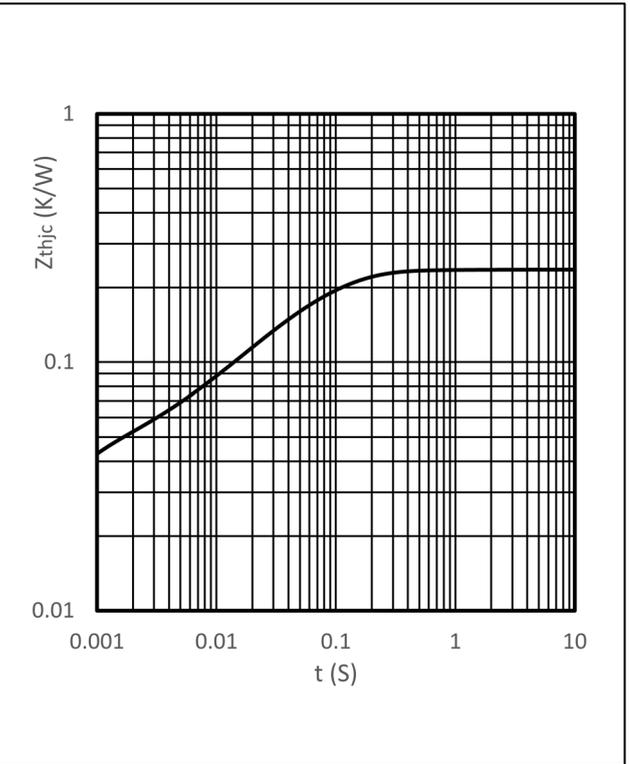
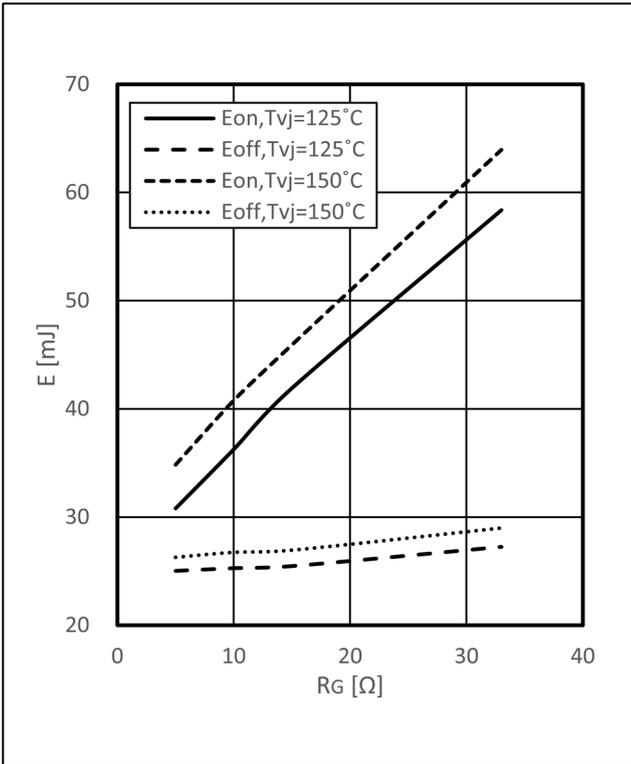
7. Module

7.1 Characteristic value

| Parameter | Note or test condition | Symbol | Values | | | Unit |
|--------------------------------------|------------------------|-------------------|--------|------|------|------|
| | | | Min. | Typ. | Max. | |
| Isolation Voltage 隔离电压 | RMS, f=50HZ,1min | V _{ISOL} | | | 4000 | V |
| Stray inductance module 杂散电感 | | L _{sCE} | | 30 | | nH |
| Operation Junction Temperature 结温 | | T _{jop} | -40 | | 150 | °C |
| Storage Temperature Range 存储温度范围 | | T _{stg} | -40 | | 125 | °C |
| Mounting Torque 安装扭矩 | Screw M5 | M | 3 | | 6 | N.m |
| Weight of Module 重量 | | G | | 300 | | g |

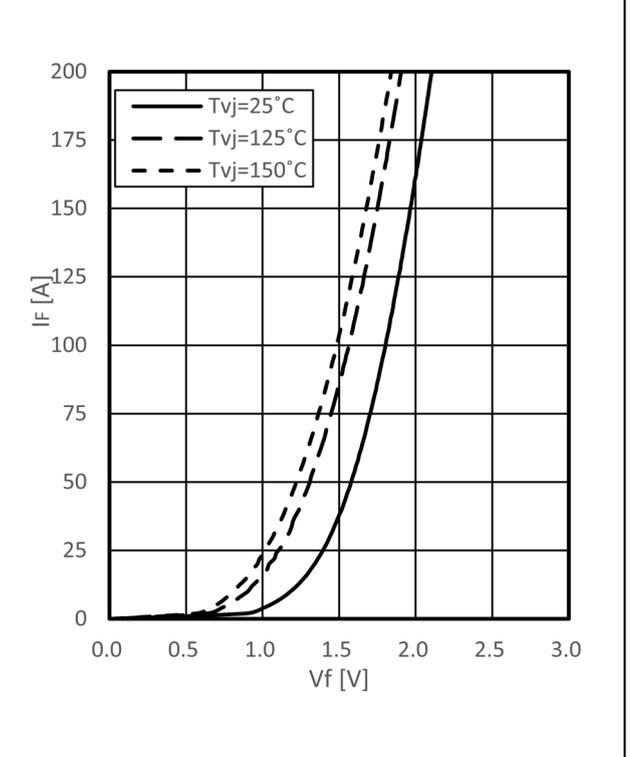
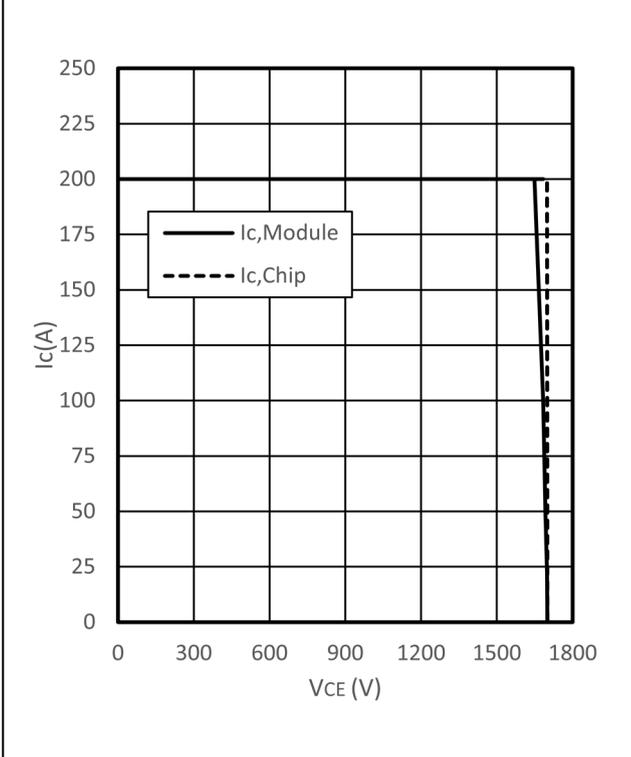
8. Characteristics diagrams





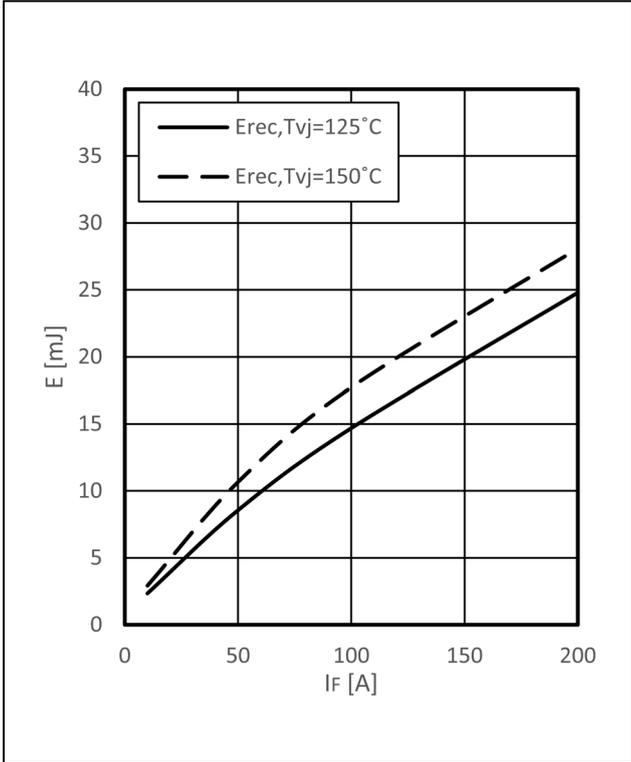
Switching losses IGBT (typical)
 $E_{on} = f(R_G), E_{off} = f(R_G)$
 $I_C = 100\text{ A}, V_{CE} = 900\text{ V}, V_{GE} = \pm 15\text{ V}$

Transient thermal impedance IGBT
 $Z_{thjc} = f(t)$

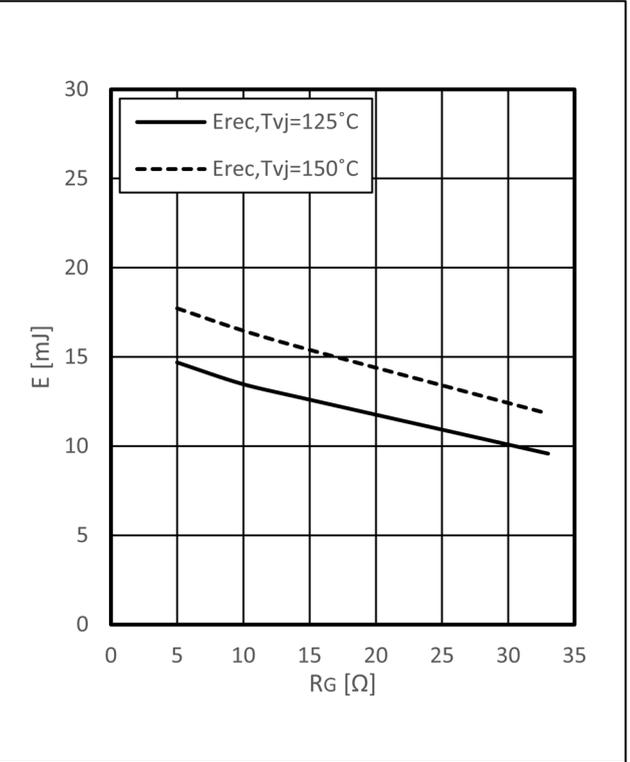


Reverse bias safe operating area IGBT (RBSOA)
 $I_C = f(V_{CE})$
 $V_{GE} = 15\text{ V}, R_{Goff} = 5\ \Omega, T_{vj} = 150\text{ }^\circ\text{C}$

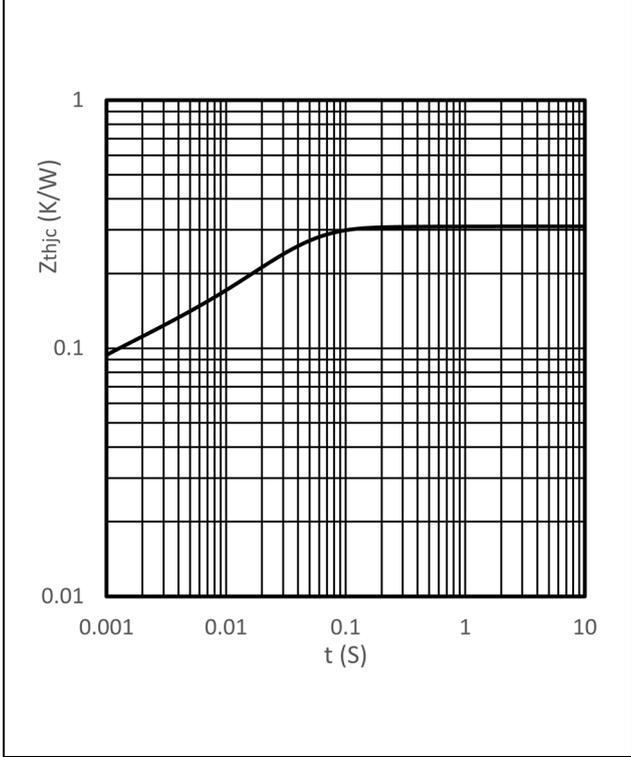
Forward characteristic of Diode (typical)
 $I_F = f(V_F)$



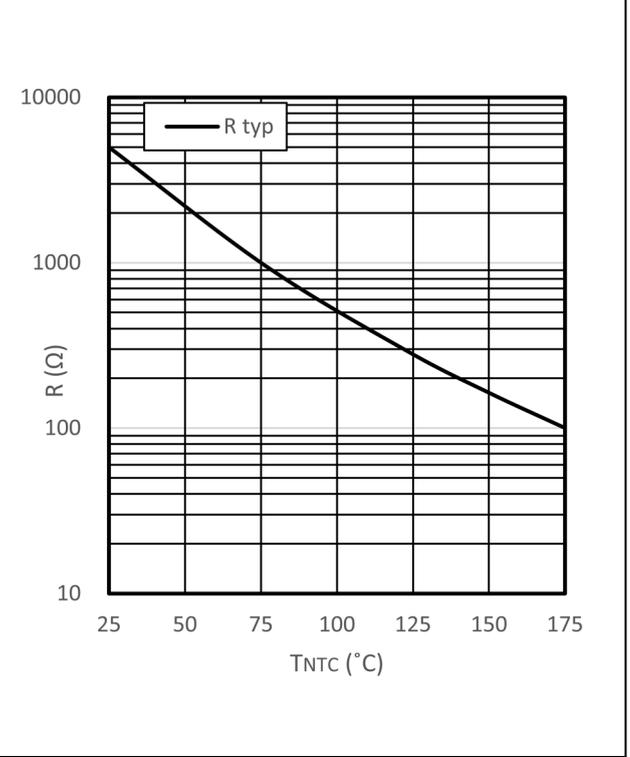
Switching losses Diode (typical)
 $E_{rec} = f(I_F)$
 $R_{Gon} = 5 \Omega, V_{CE} = 900 V$



Switching losses Diode (typical)
 $E_{rec} = f(R_G)$
 $I_F = 100 A, V_{CE} = 900 V$



Transient thermal impedance Diode
 $Z_{thJC} = f(t)$



NTC-Thermistor-temperature characteristic (typical)
 $R = f(T_{NTC})$

9. Circuit Diagram

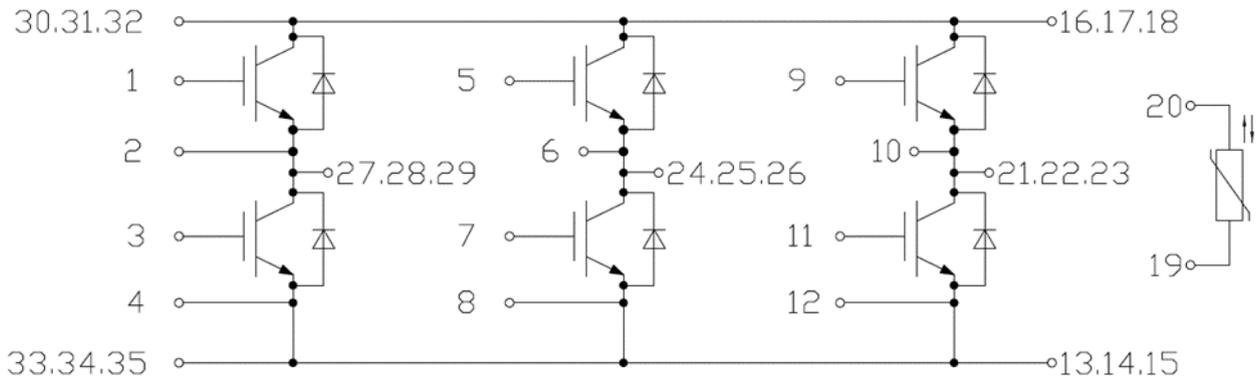


Figure 3

10. Package Outlines

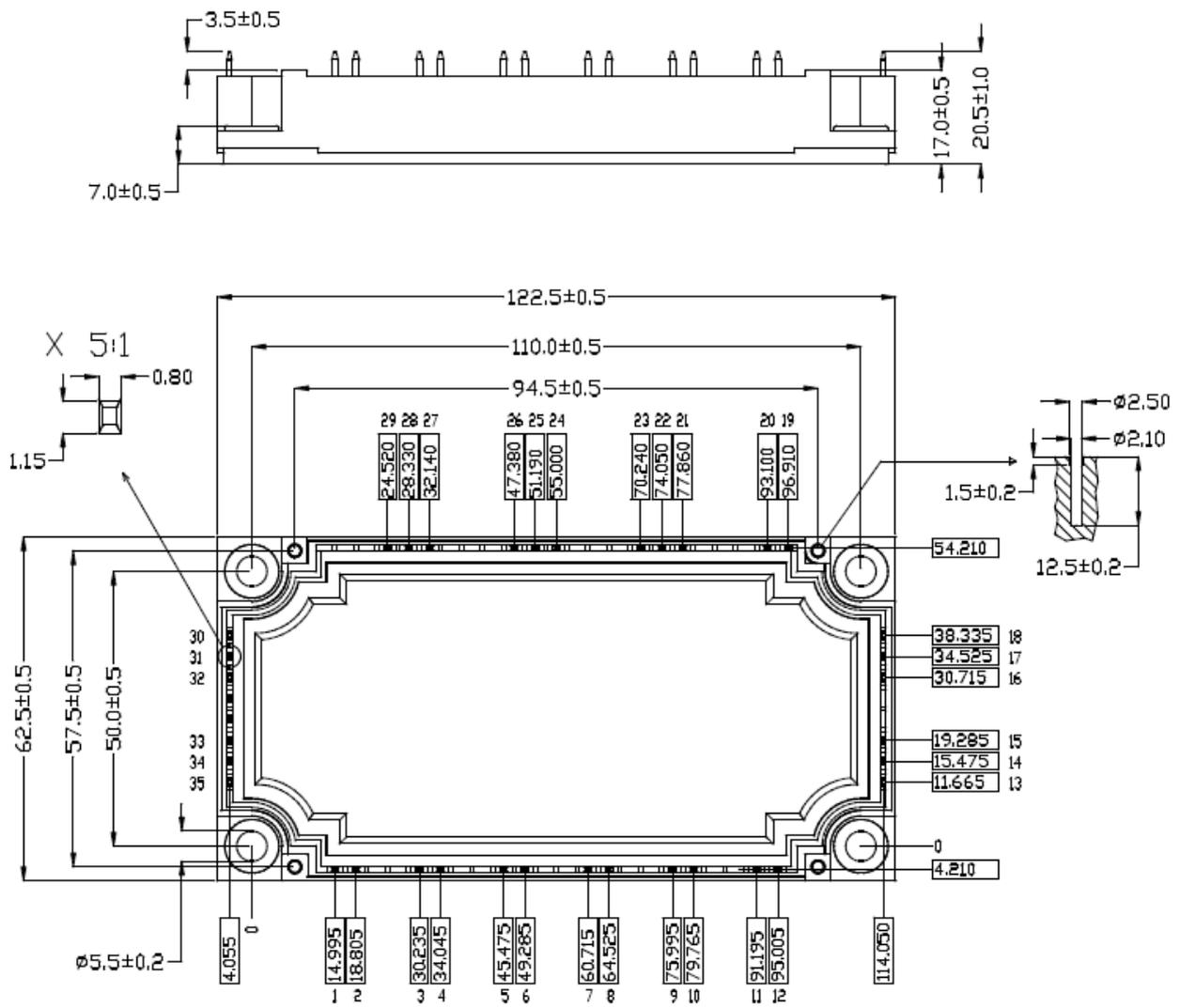


Figure 4