# 1. Product Features

## 1.1 Electrical features

- $V_{CES}$=1700V
- $I_{C\ nom}$=150A / $I_{CRM}$=300A
- Low switching losses
- Low inductance
- Fast switching and short tail current
- High power and thermal cycling capability

Figure1 IGBT Module

## 1.2 Mechanical features

- High power and thermal cycling capability
- $Al_2O_3$ substrate with low thermal resistance
- Copper base plate

# 2. Typical Applications

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

# 3. Description

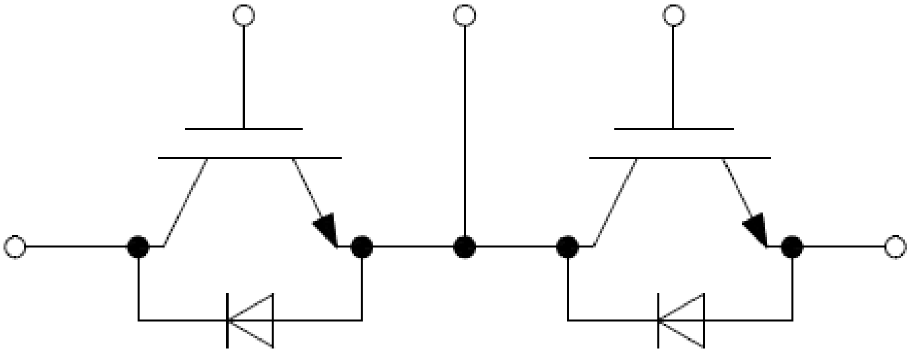


Figure 2 Half Bridge

# 4. IGBT, Inverter

## 4.1 Maximum Rated Values

| Parameter | Note or test condition | Symbol | Values | Unit |
|---|---|---|---|---|
| Collector-emitter voltage<br>集电极—发射极间电压 | $T_{vj} = 25°C$ | $V_{CES}$ | 1700 | V |
| Continuous DC collector current<br>连续集电极电流 | $T_C = 100°C$, $T_{vj,\,max} = 150°C$ | $I_{C\ nom}$ | 150 | A |
| Repetitive peak collector current<br>集电极峰值电流 | $t_P = 1$ ms | $I_{CRM}$ | 300 | A |
| Total power dissipation<br>总功率损耗 | $T_C = 25°C$, $T_{vj,\,max} = 175$ °C | $P_{tot}$ | 1000 | W |
| Gate-emitter peak voltage<br>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<br>集电极－发射极饱和电压 | $I_C = 150$ A, $V_{GE} = 15$ V | $T_{vj} = 25°C$ | $V_{CE,sat}$ |  | 1.58 |  | V |
|  |  | $T_{vj} = 125°C$ |  |  | 1.82 |  | V |
|  |  | $T_{vj} = 150°C$ |  |  | 1.91 |  | V |
| Gate threshold voltage<br>栅极阈值电压 | $I_C = 1mA$, $V_{CE} = V_{GE}$, $T_{vj} = 25°C$ |  | $V_{GE,th}$ | 5.0 | 5.57 | 6.2 | V |
| Gate charge<br>栅极电荷 | $V_{GE} = -15$ V ... +15 V |  | $Q_G$ |  | 1.5 |  | µC |
| Internal gate resistor<br>内部栅极电阻 | $T_{vj} = 25°C$ |  | $R_{Gint}$ |  | 4.7 |  | Ω |
| Input capacitance<br>输入电容 | f=1MHz, $T_{vj}$=25°C, $V_{CE}$=25V, $V_{GE}$=0V |  | $C_{ies}$ |  | 12 |  | nF |
| Reverse transfer capacitance<br>反向传输电容 | f=1MHz, $T_{vj}$=25°C, $V_{CE}$=25V, $V_{GE}$=0V |  | $C_{res}$ |  | 0.41 |  | nF |
| Collector-emitter cut-off current<br>集电极-发射极截止电流 | $V_{CE} = 1700$ V, $V_{GE} = 0$ V, $T_{vj} = 25°C$ |  | $I_{CES}$ |  |  | 1 | mA |
| Gate-emitter leakage current<br>栅极-发射极漏电流 | $V_{CE} = 0$ V, $V_{GE} = 20$ V, $T_{vj} = 25°C$ |  | $I_{GES}$ |  |  | 300 | nA |
| Turn-on delay time, inductive load<br>开通延迟时间 | $I_C = 150A$, $V_{CE} = 900V$ | $T_{vj} = 25°C$ | $T_{d,on}$ |  | 0.219 |  | us |
|  | $V_{GE} = +15/-15V$ | $T_{vj} = 125°C$ |  |  | 0.246 |  | us |
|  | $R_{G,on} = 2.2Ω$ | $T_{vj} = 150°C$ |  |  | 0.265 |  | us |
| Rise time, inductive load<br>上升时间 | $I_C = 150A$, $V_{CE} = 900V$ | $T_{vj} = 25°C$ | $T_r$ |  | 0.038 |  | us |
|  | $V_{GE} = +15/-15V$ | $T_{vj} = 125°C$ |  |  | 0.050 |  | us |
|  | $R_{G,on} = 2.2Ω$ | $T_{vj} = 150°C$ |  |  | 0.055 |  | us |

(table continues...) 待续

| Parameter | Note or test condition | | Symbol | Values | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | Min. | Typ. | Max. | |
| Turn-off delay time, inductive load<br>关断延迟时间 | $I_C$ = 150A, $V_{CE}$ = 900V | $T_{vj}$ = 25°C | $T_{d,off}$ | | 0.41 | | us |
| | $V_{GE}$ = +15/-15V | $T_{vj}$ = 125°C | | | 0.475 | | us |
| | $R_{G,off}$ = 2.2Ω | $T_{vj}$ = 150°C | | | 0.572 | | us |
| Fall time, inductive load<br>下降时间 | $I_C$ = 150A, $V_{CE}$ = 900V | $T_{vj}$ = 25°C | $T_f$ | | 0.17 | | us |
| | $V_{GE}$ = +15/-15V | $T_{vj}$ = 125°C | | | 0.20 | | us |
| | $R_{G,off}$ = 2.2Ω | $T_{vj}$ = 150°C | | | 0.22 | | us |
| Turn-on energy loss per pulse<br>开通损耗能量 | $I_C$ = 150A, $V_{CE}$ = 900V, $L_s$=60nH | $T_{vj}$ = 25°C | $E_{on}$ | | 23.23 | | mJ |
| | $V_{GE}$ = +15/-15V, di/dt =2200A/µs | $T_{vj}$ = 125°C | | | 33.36 | | mJ |
| | $R_{G,on}$ = 2.2Ω ($T_{vj}$ = 150°C) | $T_{vj}$ = 150°C | | | 37.812 | | mJ |
| Turn-off energy loss per pulse<br>关断损耗能量 | $I_C$ = 150A, $V_{CE}$ = 900V, $L_s$=60nH | $T_{vj}$ = 25°C | $E_{off}$ | | 27.21 | | mJ |
| | $V_{GE}$ = +15/-15V, dv/dt =3800V/µs | $T_{vj}$ = 125°C | | | 39.47 | | mJ |
| | $R_{G,off}$ = 2.2Ω ($T_{vj}$ = 150°C) | $T_{vj}$ = 150°C | | | 41.18 | | mJ |
| SC data<br>短路数据 | $V_{GE}$ ≤15V, $V_{CC}$=900 V, $t_P$ ≤ 8 µs, $T_{vj}$ = 150°C ,<br>$C_{GE}$ = 0.0uF , $V_{CEmax}$ = $V_{CES}$ -$L_{sCE}$ · di/dt | | $I_{SC}$ | | 905 | | A |
| Thermal resistance, junction to case<br>结一外壳热阻 | Per IGBT | | $R_{th,JC}$ | | 0.150 | | K/W |

# 5. Diode, Inverter

## 5.1 Maximum Rated Values

| Parameter | Note or test condition | Symbol | Values | Unit |
|---|---|---|---|---|
| Repetitive peak reverse voltage<br>反向重复峰值电压 | $T_{vj}$ = 25°C | $V_{RRM}$ | 1700 | V |
| Continuous DC forward current<br>连续正向直流电流 | | $I_F$ | 150 | A |
| Repetitive peak forward current<br>正向重复峰值电流 | $t_P$ = 1 ms | $I_{FRM}$ | 300 | A |

## 5.2 Characteristic value

| Parameter | Note or test condition | | Symbol | Values | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | Min. | Typ. | Max. | |
| Forward voltage<br>正向电压 | $I_F$ = 150 A, $V_{GE}$ = 0 V | $T_{vj}$ = 25°C | $V_F$ | | 1.92 | | V |
| | | $T_{vj}$ = 125°C | | | 2.11 | | V |
| | | $T_{vj}$ = 150°C | | | 2.16 | | V |

(table continues...) 待续

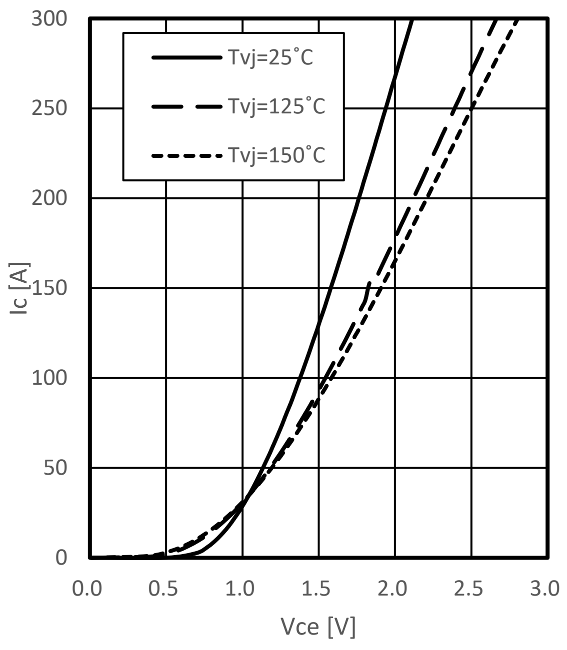
| Parameter | Note or test condition | | Symbol | Values | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | Min. | Typ. | Max. | |
| Peak reverse recovery current<br>反向恢复峰值电流 | $I_F$ = 150A, $V_R$ = 900V | $T_{vj}$ = 25°C | $I_{RM}$ | | 292 | | A |
| | $V_{GE}$ = -15V , - $di_F/dt$ = 2900 A/µs | $T_{vj}$ = 125°C | | | 238 | | A |
| | ($T_{vj}$=150°C) | $T_{vj}$ = 150°C | | | 229 | | A |
| Recovered charge<br>恢复电荷 | $I_F$ = 150A, $V_R$ = 900V | $T_{vj}$ = 25°C | $Q_r$ | | 41 | | µC |
| | $V_{GE}$ = -15V , - $di_F/dt$ = 2900 A/µs | $T_{vj}$ = 125°C | | | 57 | | µC |
| | ($T_{vj}$=150°C) | $T_{vj}$ = 150°C | | | 61 | | µC |
| Reverse recovery energy<br>反向恢复损耗（每脉冲） | $I_F$ = 150A, $V_R$ = 900V | $T_{vj}$ = 25°C | $E_{rec}$ | | 20 | | mJ |
| | $V_{GE}$ = -15V , - $di_F/dt$ = 2900 A/µs | $T_{vj}$ = 125°C | | | 31 | | mJ |
| | ($T_{vj}$=150°C) | $T_{vj}$ = 150°C | | | 34 | | mJ |
| Thermal resistance, junction to case<br>结一外壳热阻 | Per diode | | $R_{th,JC}$ | | | 0.320 | K/W |

# 6. Module

## 6.1 Characteristic value

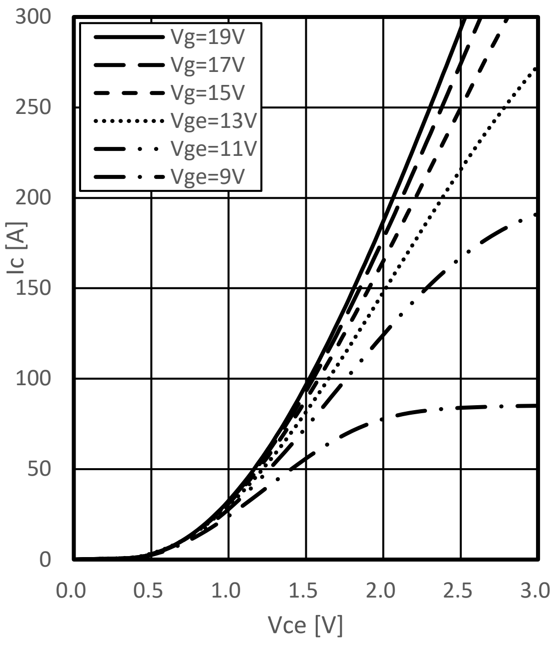
| Parameter | Note or test condition | Symbol | Values | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| Isolation Voltage<br>隔离电压 | RMS, f=50HZ,1min | $V_{ISOL}$ | | | 3400 | V |
| Stray inductance module<br>杂散电感 | | $L_{sCE}$ | | 20 | | nH |
| Operation Junction Temperature<br>结温 | | $T_{jop}$ | -40 | | 150 | ˚C |
| Storage Temperature Range<br>存储温度范围 | | $T_{stg}$ | -40 | | 125 | ˚C |
| Mounting Torque<br>安装扭矩 | Screw M5 | M | 3 | | 6 | N.m |
| Weight of Module<br>重量 | | G | | 340 | | g |

# 7. Characteristics diagrams



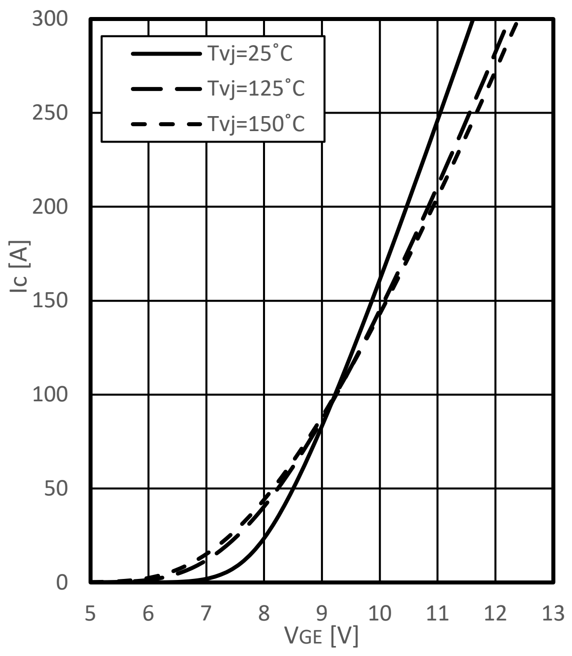
Output characteristic IGBT, Inverter (typical)

$I_C = f\ (V_{CE})$ $V_{GE} = 15V$



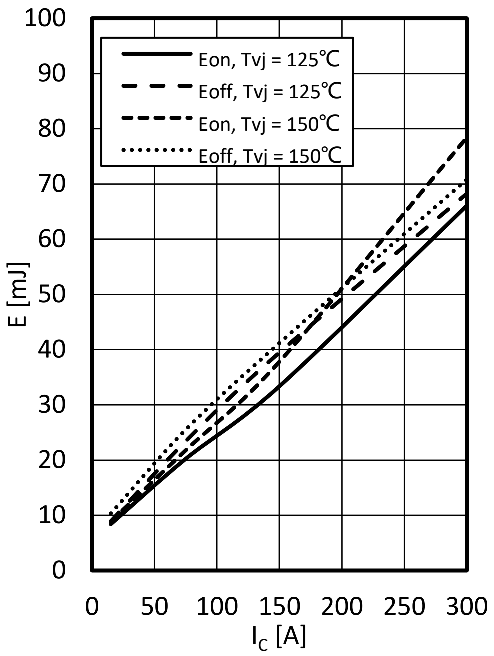
Output characteristic IGBT, Inverter (typical)

$I_C = f\ (V_{CE})$ $T_{vj} = 150°C$



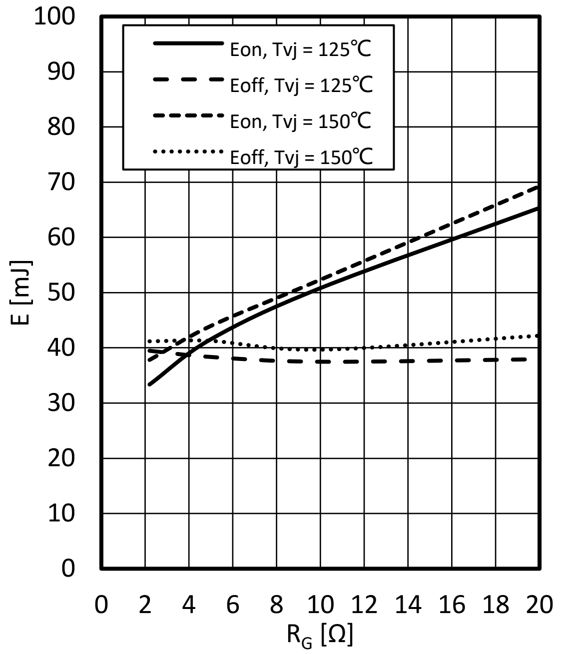
Transfer characteristic IGBT, Inverter (typical)

$I_C = f\ (V_{GE})$ $V_{CE} = 20V$



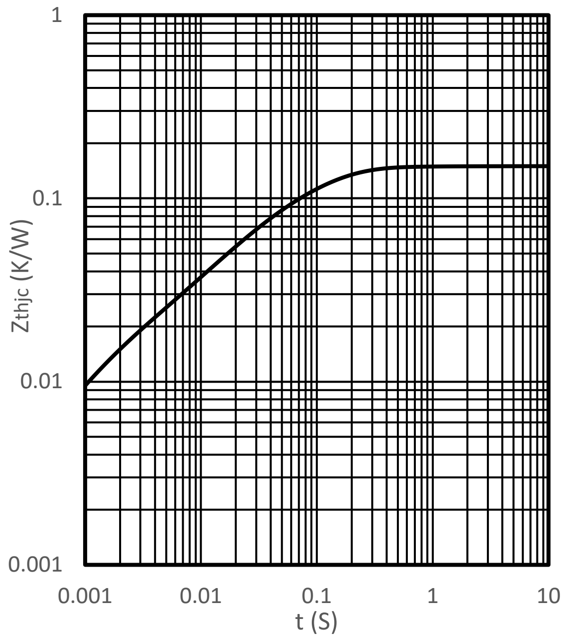
Switching losses IGBT, Inverter (typical)

$E_{on}$=f (IC)，$E_{off}$ = f (IC) $V_{GE}$ = ±15V, $R_{Gon}$ = 2.2 Ω
$R_{Goff}$ = 2.2 Ω, $V_{CE}$ = 900V



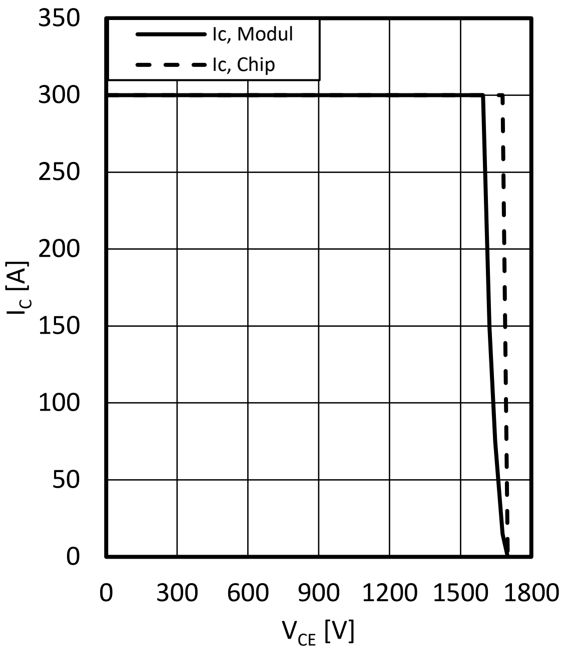
**Switching losses IGBT, Inverter (typical)**

$E_{on}$ = f ($R_G$), $E_{off}$ = f ($R_G$) $V_{GE}$ = ±15V, $I_C$ = 150A,$V_{CE}$ = 900V



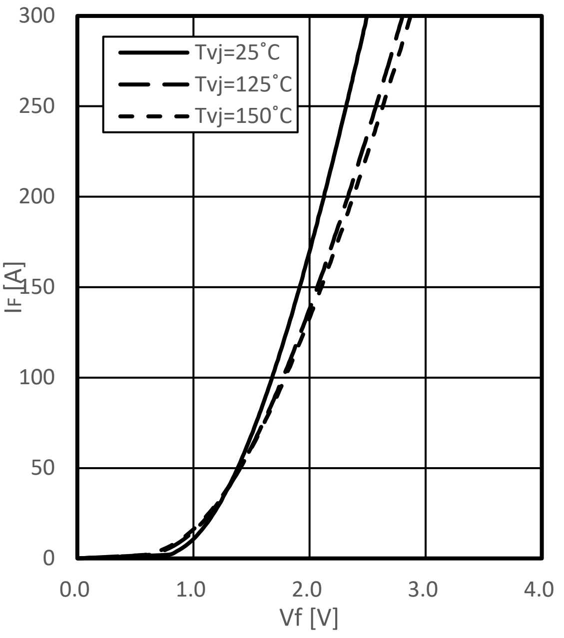
**Transient thermal impedance IGBT, Inverter**

$Z_{thJC}$ = f (t)



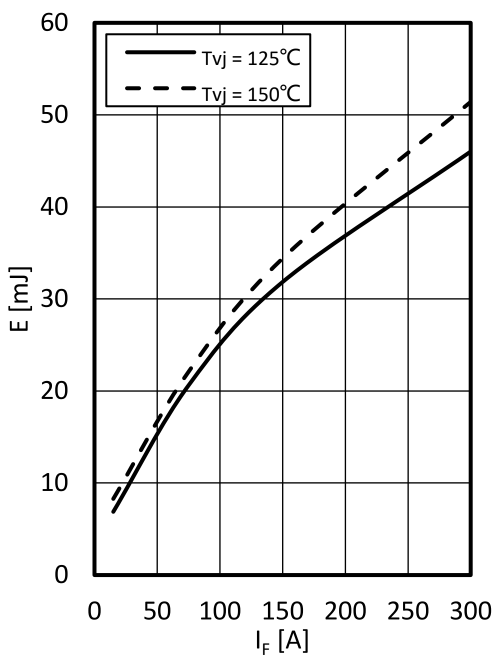
**Reverse bias safe operating area IGBT, Inverter (RBSOA)**

$I_C$ = f ($V_{CE}$) $V_{GE}$ = ±15V $R_{Goff}$ = 15Ω,$T_{vj}$ = 150°C



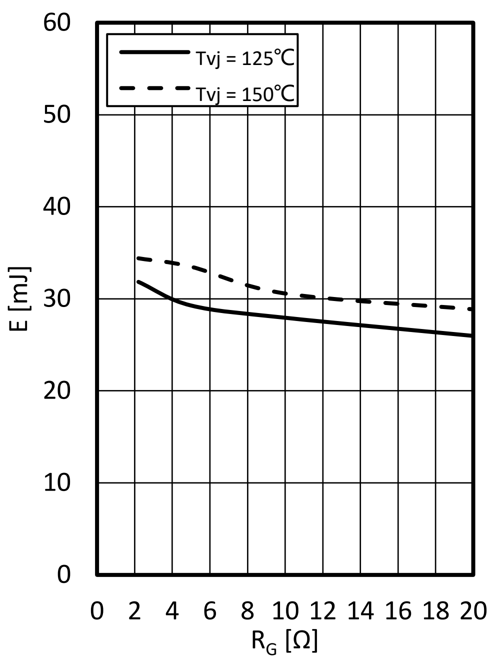
**Forward characteristic of Diode, Inverter (typical)**

$I_F$ = f ($V_F$)



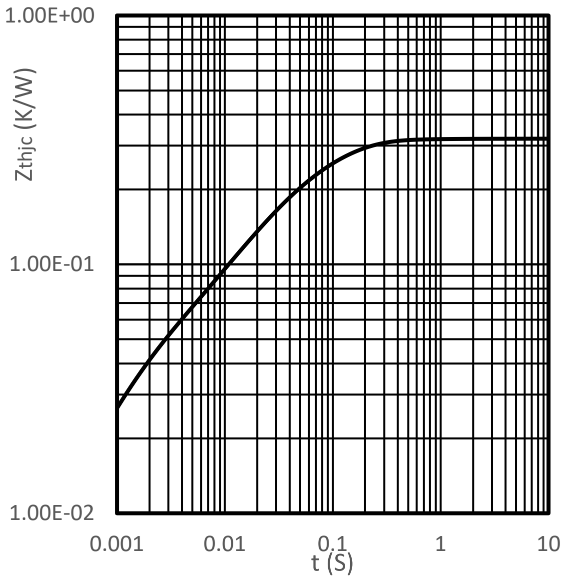
Switching losses Diode, Inverter (typical)

$E_{rec}$ = f ($I_F$) $R_{Gon}$ = 2.2 Ω, $V_{CC}$ = 900V



Switching losses Diode, Inverter (typical)

$E_{rec}$ = f ($R_G$) $I_F$ = 150 A, $V_{CC}$ = 900V



Transient thermal impedance Diode Inverter

$Z_{thJC}$ = f (t)

## 8. Circuit Diagram

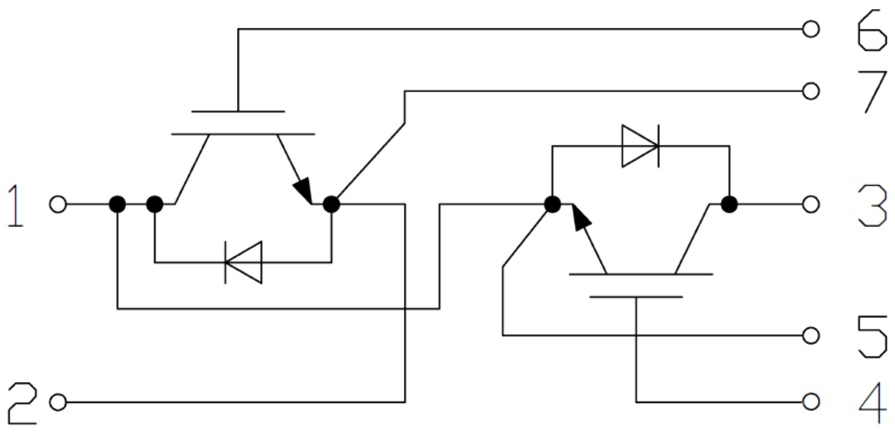


Figure 3

## 9. Package Outlines

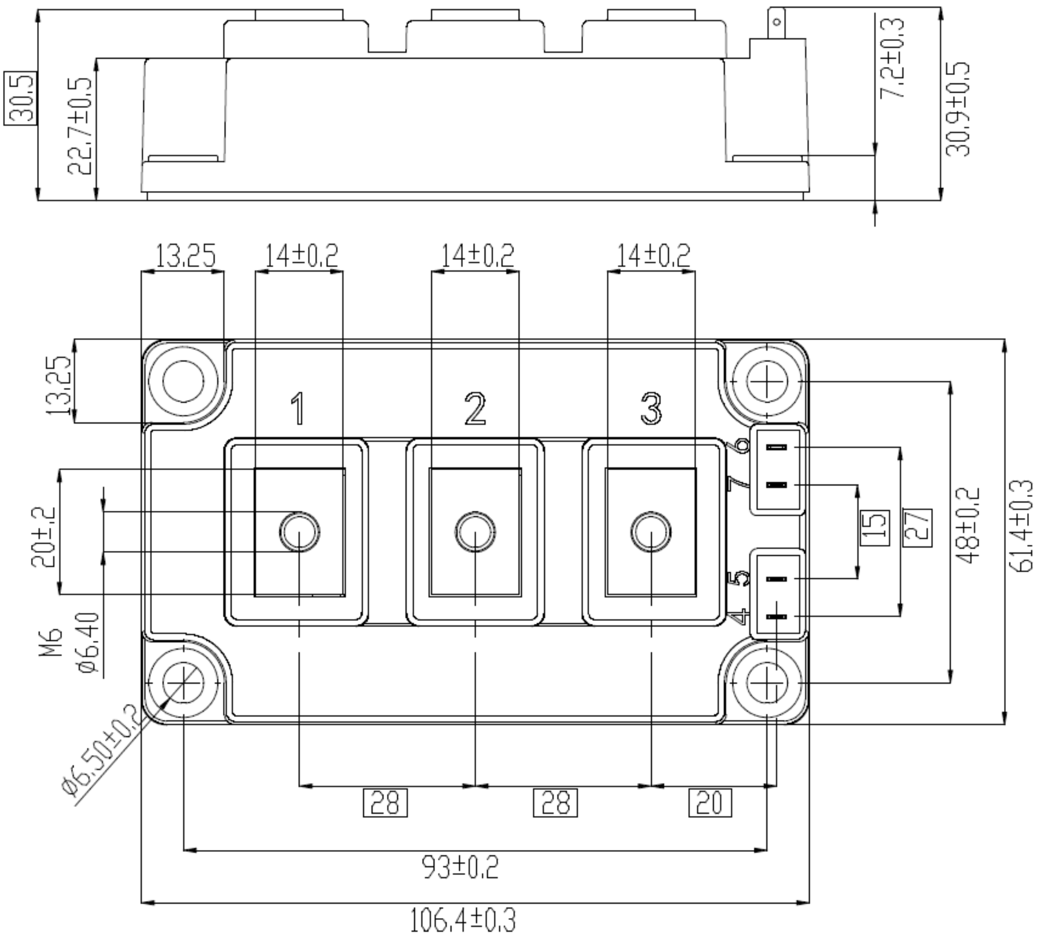


Figure 4