

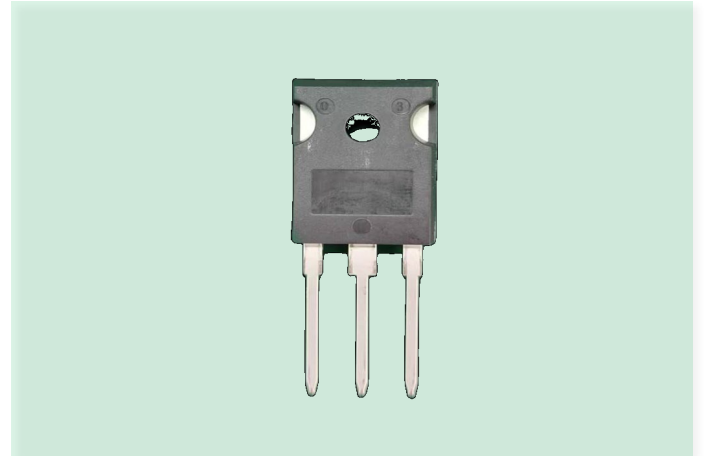
IGBT

Features/特性

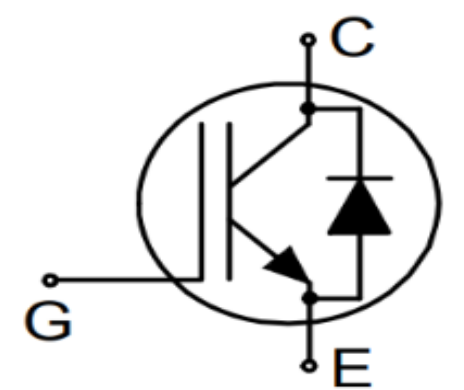
- 1200V, 25A
- $V_{CE(sat)}(typ.)=2.1V @V_{GE}=15V, I_C=25A$
- 具有正温度系数的 $V_{CE(sat)}$
 $V_{CE(sat)}$ with positive temperature coefficient
- 包括快速软恢复反并联前馈
Including fast & soft recovery anti-parallel FWD
- 快开关速度
High speed switching

Applications/应用

- 不间断电源
Uninterruptible power supply
- 电机驱动逆变器
Inverter for motor drive
- 交、直流伺服驱动放大器
AC and DC servo drive amplifier



Equivalent Circuit Schematic/等效电路图



IGBT-Absolute Maximum Ratings (@ $T_C = 25^\circ\text{C}$ unless otherwise specified)

| Symbol | Parameter | Value | Units |
|-----------|---|----------------------------------|------------------|
| V_{CES} | Collector-Emitter Voltage 集电极-发射极电压 | 1200 | V |
| V_{GES} | Gate-Emitter Peak Voltage 栅极-发射极峰值电压 | ± 30 | V |
| I_C | DC collector current, limited by T_{vjmax} 集电极直流电流受最大结温限制 | $T_C = 100^\circ\text{C}$ 25 | A |
| I_{CM} | Pulsed collector current, tp limited by T_{vjmax} 集电极脉冲电流脉宽受最大结温限制 | 75 | A |
| P_{tot} | Maximum Power Dissipation 最大耗散功率 | $T_C = 25^\circ\text{C}$ 277 | W |
| | | $T_C = 100^\circ\text{C}$ 111 | W |
| T_J | Operating Junction Temperature 工作结温 | -40 to 155 | $^\circ\text{C}$ |
| T_{STG} | Storage Temperature Range 储存温度 | -55 to 155 | $^\circ\text{C}$ |

IGBT Characteristics (@ $T_C = 25^\circ\text{C}$ unless otherwise specified)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit | |
|---------------|--|--|------|------|-----------|---------------|----|
| $V_{CE\ sat}$ | Collector to Emitter Saturation Voltage 集电极-发射极饱和电压 | $I_C = 25\text{ A}, V_{GE} = 15\text{ V}$ | | 2.1 | 2.5 | V | |
| $V_{GE\ th}$ | Gate-Emitter Threshold Voltage 栅极阈值电压 | $I_C = 250\ \mu\text{A}, V_{CE} = V_{GE}$ | 4.5 | | 6.5 | V | |
| I_{CES} | Collector-Emitter Cut-off Current 集电极-发射极截止电流 | $V_{CE} = 1200\text{ V}, V_{GE} = 0\text{ V}, T_{vj} = 25^\circ\text{C}$ | | | 100.0 | μA | |
| I_{GES} | Gate-emitter Leakage Current 栅极-发射极漏电流 | $V_{CE} = 0\text{ V}, V_{GE} = \pm 30\text{ V}, T_{vj} = 25^\circ\text{C}$ | | | ± 100 | nA | |
| Q_G | Gate Charge 栅极电荷 | $V_{CC}=600\text{V}, I_C=25\text{A}$ $V_{GE}=15\text{V}$ | | 200 | | nC | |
| Q_{GE} | Gate-Emitter Charge 栅极-发射极电荷 | | | 15 | | nC | |
| Q_{GC} | Gate-Collector Charge 栅极-集电极电荷 | | | 80 | | nC | |
| C_{ies} | Input Capacitance 输入电容 | $V_{CE}=25\text{V}, f=1\text{MHz},$ $V_{GE}=0\text{V}$ | | 3600 | | nF | |
| C_{oies} | Output Capacitance 输出电容 | | | 120 | | nF | |
| C_{res} | Reverse Transfer Capacitance 反向传输电容 | | | 65 | | nF | |
| t_{don} | Turn-on Delay Time 开通延迟时间 | $V_{CE}=600\text{V}, I_C=25\text{A},$ $R_G=15\Omega, V_{GE}=15\text{V}$ | | 47 | | nS | |
| t_r | Rise Time 上升时间 | | | 102 | | nS | |
| t_{doff} | Turn-off Delay Time 关断延迟时间 | | | 116 | | nS | |
| t_f | Fall Time 下降时间 | | | 109 | | nS | |
| E_{on} | Turn-On Switching Loss Per Pulse 开通损耗能量 | | | | 2.10 | | mJ |
| E_{off} | Turn-off Energy Loss Per Pulse 关断损耗能量 | | | | 0.90 | | mJ |

Diode-Absolute Maximum Ratings (@ $T_C = 25^\circ\text{C}$ unless otherwise specified)

| Symbol | Parameter | Value | Units |
|-----------|--|---------------------------------|-------|
| V_{RRM} | Repetitive Peak Reverse Voltage 反向重复峰值电压 | 1200 | V |
| I_F | Diode Continuous Forward Current 连续正向直流电流 | $T_C = 100^\circ\text{C}$ 25 | A |
| I_{FM} | Diode maximum current, tp limited by T_{vjmax} 二极管最大电流, 脉宽受最大结温限制 | 75 | A |

Diode Characteristics (@ $T_C = 25^\circ\text{C}$ unless otherwise specified)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|----------|---|---|------|------|------|------|
| V_F | Diode Forward Voltage 正向电压 | $I_F = 25\text{ A}$ | | 2.1 | 2.8 | V |
| Q_{rr} | Recovered Charge 恢复电荷 | $I_F = 25\text{ A}, V_{CE} = 600\text{ V},$ $R_G = 15\ \Omega$ | | 1120 | | nC |
| I_{rr} | Peak Reverse Recovery Current 反向恢复峰值电流 | | | 14 | | A |
| t_{rr} | Reverse Recovery Time 反向恢复时间 | | | 252 | | nS |

Thermal Characteristics

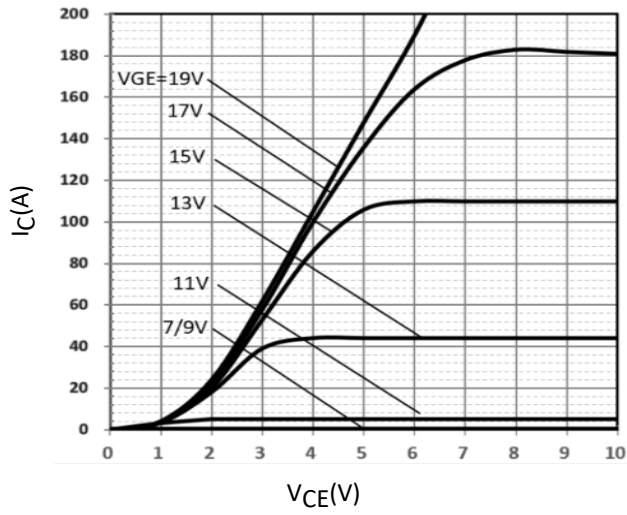
| Symbol | Parameter | Min. | Typ. | Max. | Unit |
|------------|--|------|------|------|---------------------------|
| R_{thJC} | Thermal resistance, junction to case for IGBT IGBT 结-外壳热阻 | | | 0.5 | $^\circ\text{C}/\text{W}$ |
| R_{thJC} | Thermal resistance, junction to case for Diode 二极管 结-外壳热阻 | | | 1.5 | $^\circ\text{C}/\text{W}$ |
| R_{thJA} | Thermal resistance, junction to Ambient 结-环境热阻 | | | 40 | $^\circ\text{C}/\text{W}$ |

输出特性IGBT

Typical output characteristic IGBT

$$I_C = f(V_{CE})$$

$T_{vj} = 25^\circ\text{C}$

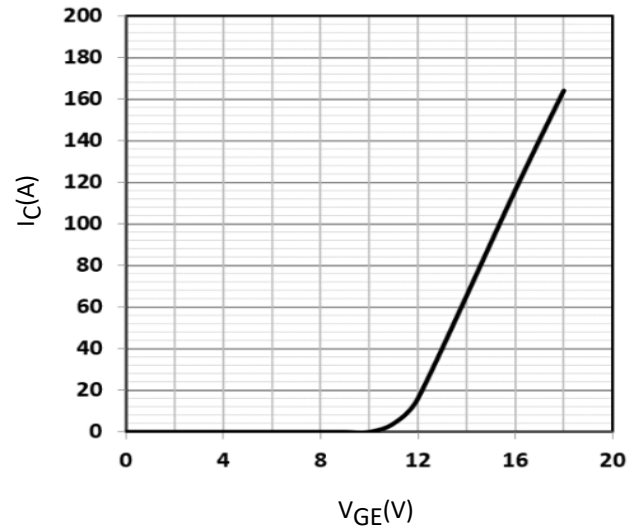


传输特性IGBT

Typical transfer characteristic IGBT

$$I_C = f(V_{GE})$$

$T_{vj} = 25^\circ\text{C}$

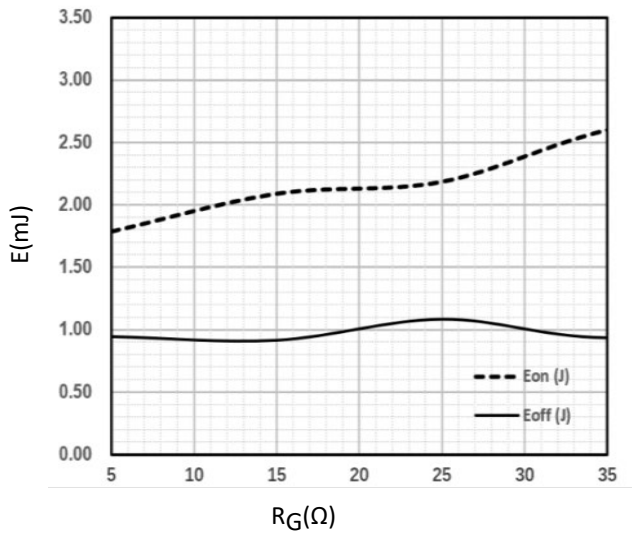


开关损耗IGBT

output characteristic IGBT

$$E_{on} = f(R_G), E_{off} = f(R_G)$$

$V_{GE}=15V, I_C=25A, V_{CE}=600V$



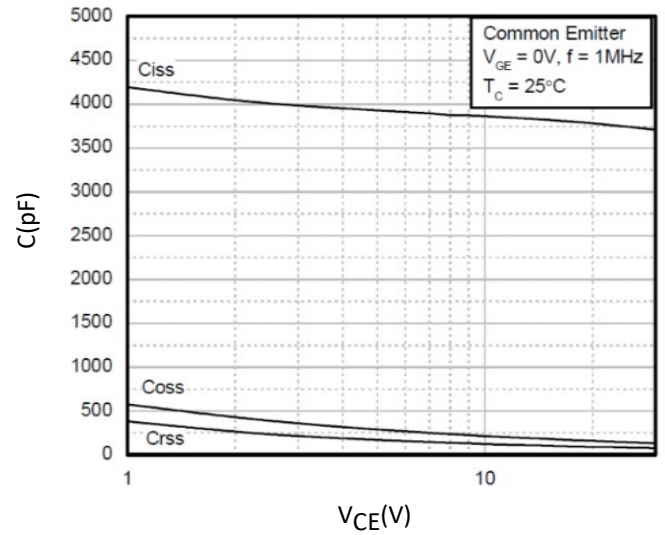
电容

capacitance as a function of collector-emitter voltage IGBT

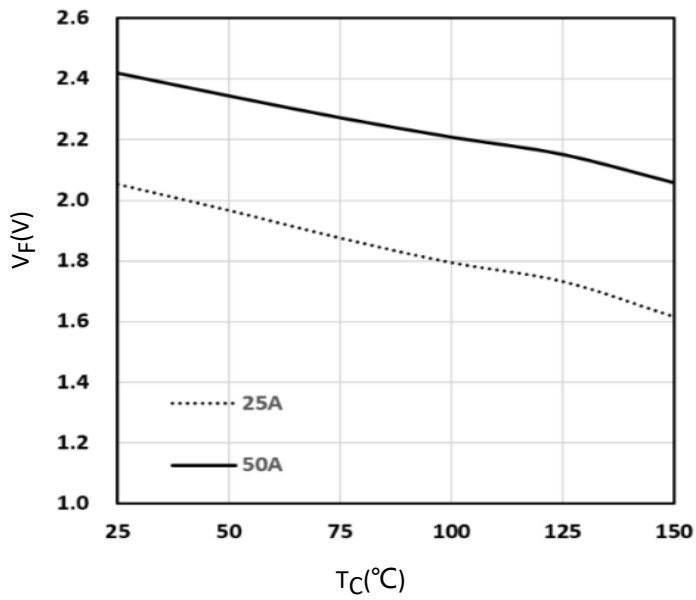
Common Emitter

$$C = f(V_{CE}), f = 1\text{MHz}, V_{GE} = 0\text{V}$$

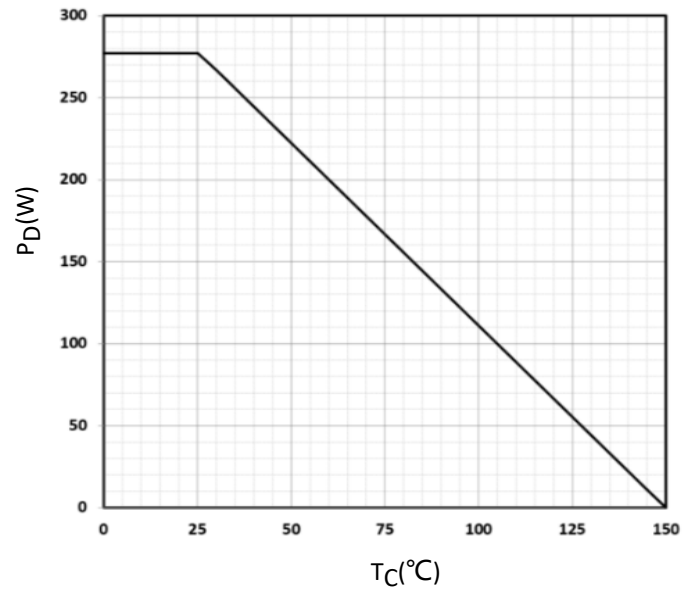
$T_{vj} = 25^\circ\text{C}$



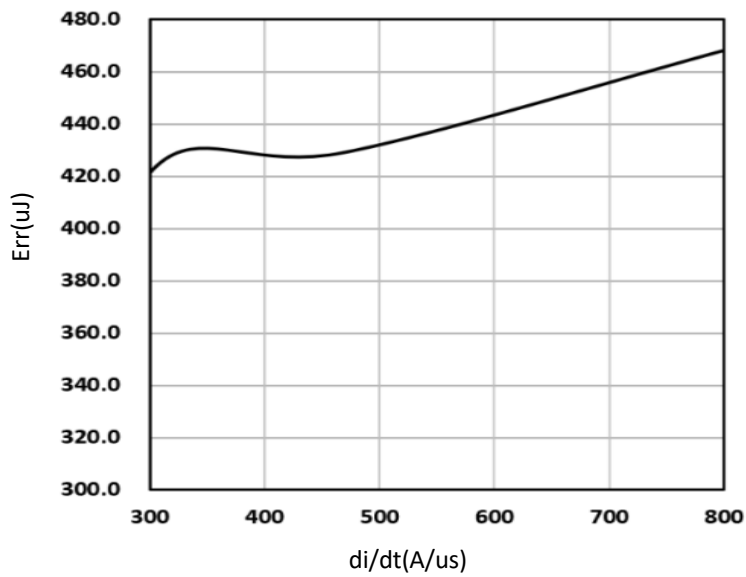
正向偏压二极管
Diode forward voltage as a function of junction temperature



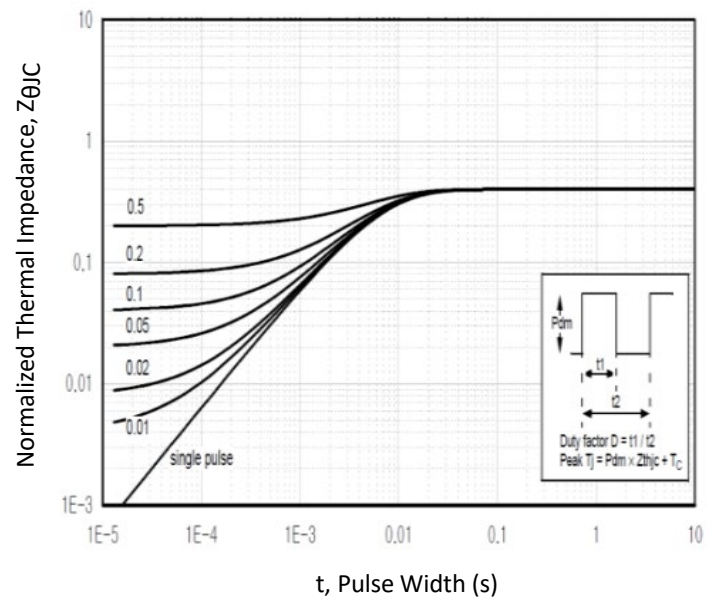
功耗
Power dissipation as a function of case temperature
 $P_D=f(T_C)$



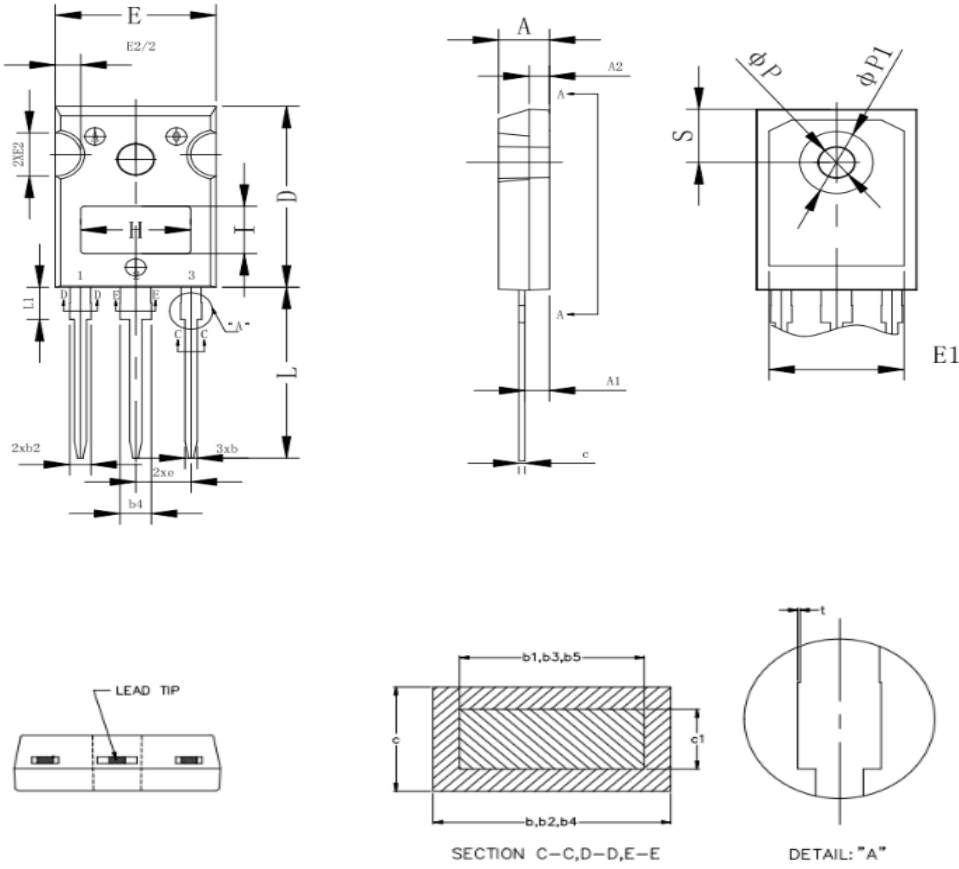
开关损耗二极管
Switching losses Diode
 $Err = f(di/dt)$
 $V_{GE}=15V, I_C=25A, V_{CE}=600V$



瞬态热阻抗
normalized transient thermal impedance, junction to case
 $Z_{thJC}=f(t)$



封装尺寸/package outlines



| SYMBOLS | DIMENSIONS | | | |
|---------|------------|-------|----------|-------|
| | mm | | inch | |
| | Min. | Max. | Min. | Max. |
| A | 4.9 | 5.1 | 0.193 | 0.201 |
| A1 | 2.31 | 2.51 | 0.091 | 0.099 |
| A2 | 1.90 | 2.10 | 0.075 | 0.083 |
| b | 1.16 | 1.26 | 0.046 | 0.050 |
| b1 | 1.15 | 1.22 | 0.045 | 0.048 |
| b2 | 1.96 | 2.06 | 0.077 | 0.081 |
| b3 | 1.95 | 2.02 | 0.077 | 0.080 |
| b4 | 2.96 | 3.06 | 0.117 | 0.120 |
| b5 | 2.95 | 3.02 | 0.116 | 0.119 |
| c | 0.59 | 0.66 | 0.023 | 0.026 |
| c1 | 0.58 | 0.62 | 0.023 | 0.024 |
| D | 20.90 | 21.10 | 0.823 | 0.831 |
| D1 | 16.25 | 16.85 | 0.640 | 0.663 |
| D2 | 1.05 | 1.35 | 0.041 | 0.053 |
| E | 15.75 | 15.90 | 0.620 | 0.626 |
| E1 | 13.26 | - | 0.552 | - |
| E2 | 4.90 | 5.10 | 0.193 | 0.201 |
| e | 5.44BSC | | 0.214BSC | |
| L | 19.80 | 20.10 | 0.780 | 0.791 |
| L1 | - | 4.30 | - | 0.169 |
| φP | 3.5 | 3.7 | 0.138 | 0.146 |
| φP1 | - | 7.40 | - | 0.291 |
| S | 6.05 | 6.25 | 0.238 | 0.246 |
| t | 0.00 | 0.15 | 0.000 | 0.006 |
| H | 10.6 | 11.2 | 0.417 | 0.441 |
| I | 5.3 | 5.7 | 0.209 | 0.224 |