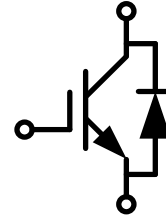


IGBT Discrete with Anti-Parallel Diode

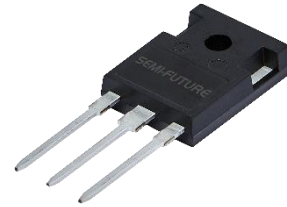
电气特性/ Features and Benefits:

- 650V 沟槽栅/场终止工艺
650V Trench with Field Stop Technology
- 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/ Applications:

- 充电桩
Charging pile
- 不间断电源
Uninterruptible power supplies
- 光伏逆变器
Solar converters



$V_{CES} = 650V$, $I_{C\ nom} = 75A$ / $I_{CRM} = 300A$

关键性能和程序参数 / Key Performance and Package Parameters

| Type | V_{CE} | I_C | V_{CESat} , $T_{vj}=25^\circ C$ | T_{vjmax} | Package |
|-------------|----------|-------|-----------------------------------|-------------|-----------|
| SD75R07A6UB | 650V | 75A | 1.56V | 175°C | TO-247-3L |

双极晶体管/IGBT

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} | 650 | V |
| 连续集电极直流电流 Continuous DC collector current | $T_C=100^\circ C$, $T_{vj\ max}=175^\circ C$ | $I_{C\ nom}$ | 75 | A |
| 集电极重复峰值电流 Repetitive peak collector current | $t_p=1\ ms$ | I_{CRM} | 300 | A |
| 栅极-发射极电压 Gate emitter voltage | $t_p \leq 10\ \mu s$, $D < 0.010$ | V_{GE} | ± 20 ± 30 | V |
| 总功率损耗 Power dissipation | $T_C=25^\circ C$ $T_C=100^\circ C$ | P_{tot} | 520 260 | W |

Changes of this product data sheet are reserved.
Edited by Semi-Future Technologies, Edition 1.0

| | | | | |
|--|--|--------------|------------|----|
| 在开关状态下温度 Temperature under switching conditions | | $T_{vj\ op}$ | -40...+175 | °C |
| 储存温度 Storage temperature | | T_{stg} | -40...+150 | °C |
| 焊接温度 Soldering temperature | | | 260 | °C |
| 安装扭矩 Mounting torque | | M | 0.6 | Nm |

热特性 / Thermal Characteristics

| Parameter | Conditions | Symbol | Value | Unit |
|--|------------|---------------|-------|------|
| IGBT 热阻, 结-壳 IGBT thermal resistance, junction - case | | $R_{th(j-C)}$ | 0.29 | K/W |
| 二极管热阻, 结-壳 Diode thermal resistance, junction - case | | $R_{th(j-C)}$ | 0.27 | K/W |

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 | $V_{GE}=15V, I_C=75A$ $V_{GE}=15V, I_C=75A$ $V_{GE}=15V, I_C=75A$ | $T_{vj}=25^\circ C$ $T_{vj}=150^\circ C$ $T_{vj}=175^\circ C$ | V_{CEsat} | 1.56 1.86 1.90 | 2.00 | V | |
| 栅极-发射极阈值电压 Gate-Emitter threshold voltage | $I_C=0.75mA, V_{GE}=V_{CE}$ | $T_{vj}=25^\circ C$ | $V_{GE(th)}$ | 3.8 | 4.4 | 5.0 | V |
| 跨导 Transconductance | $V_{CE}=20V, I_C=75A$ | | G_{fs} | 58 | | S | |
| 输入电容 Input capacitance | | | C_{ies} | 4472 | | pF | |
| 输出电容 Output capacitance | $f=100kHz, V_{CE}=25V, V_{GE}=0V$ | $T_{vj}=25^\circ C$ | C_{oes} | 280 | | pF | |
| 反向传输电容 Reverse transfer capacitance | | | C_{res} | 20 | | pF | |
| 门极电荷 Gate charge | $I_C=75A, V_{GE}=15V,$ $V_{CE}=520V$ | $T_{vj}=25^\circ C$ | Q_G | 273 | | nC | |
| 集电极-发射极截止电流 Collector-emitter cut-off current | $V_{CE}=650V, V_{GE}=0V$ | $T_{vj}=25^\circ C$ | I_{CES} | | 1 | mA | |
| 栅极-发射极漏电流 Gate-emitter leakage current | $V_{CE}=0V, V_{GE}=20V$ | $T_{vj}=25^\circ C$ | I_{GES} | | 200 | nA | |
| 开通延迟时间 Turn-on delay time | $I_C=75A, V_{CE}=300V$ $V_{GE}=\pm 15V, R_G=8\Omega$ (电感负载) / (inductive load) | $T_{vj}=25^\circ C$ $T_{vj}=175^\circ C$ | t_{don} | 38 34 | | ns | |
| 上升时间 Rise time | $I_C=75A, V_{CE}=300V$ $V_{GE}=\pm 15V, R_G=8\Omega$ (电感负载) / (inductive load) | $T_{vj}=25^\circ C$ $T_{vj}=175^\circ C$ | t_r | 122 123 | | ns | |

| | | | | | | | |
|--|---|---|------------|--|--------------|--|----|
| 关断延迟时间 Turn-off delay time | $I_C=75A, V_{CE}=300V$ $V_{GE}=\pm 15V, R_G=8\Omega$ (电感负载) / (inductive load) | $T_{vj}=25^\circ C$ $T_{vj}=175^\circ C$ | t_{doff} | | 99 121 | | ns |
| 下降时间 Fall time | $I_C=75A, V_{CE}=300V$ $V_{GE}=\pm 15V, R_G=8\Omega$ (电感负载) / (inductive load) | $T_{vj}=25^\circ C$ $T_{vj}=175^\circ C$ | t_f | | 63 112 | | ns |
| 开通损耗能量 (每脉冲) Turn-on energy loss per pulse | $I_C=75A, V_{CE}=300V$ $V_{GE}=\pm 15V, R_G=8\Omega$ $di/dt=500A/\mu s(T_{vj}=175^\circ C)$ (电感负载) / (inductive load) | $T_{vj}=25^\circ C$ $T_{vj}=175^\circ C$ | E_{on} | | 2.49 4.70 | | mJ |
| 关断损耗能量 (每脉冲) Turn-off energy loss per pulse | $I_C=75A, V_{CE}=300V$ $V_{GE}=\pm 15V, R_G=8\Omega$ $dv/dt=7300V/\mu s(T_{vj}=175^\circ C)$ (电感负载) / (inductive load) | $T_{vj}=25^\circ C$ $T_{vj}=175^\circ C$ | E_{off} | | 1.00 1.52 | | mJ |

二极管/Diode

最大额定值 / Maximum Ratings

| Parameter | Conditions | Symbol | Value | Unit |
|---|--|-----------|-------|------|
| 反向重复峰值电压 Repetitive peak reverse voltage | $T_{vj}=25^\circ C$ | V_{RRM} | 650 | V |
| 连续正向直流电流 Continuous DC forward current | $T_C=100^\circ C, T_{vj\ max}=175^\circ C$ | I_F | 75 | A |
| 正向重复峰值电流 Repetitive peak forward current | $t_p=1ms$ | I_{FRM} | 300 | A |

特征值 / Characteristic Values

| Parameter | Conditions | Symbol | Value | | | Unit | |
|---|--|---|-----------|------|----------------------|------|---------|
| | | | Min. | Typ. | Max. | | |
| 正向电压 Forward voltage | $I_F=75A, V_{GE}=0V$ $I_F=75A, V_{GE}=0V$ $I_F=75A, V_{GE}=0V$ | $T_{vj}=25^\circ C$ $T_{vj}=150^\circ C$ $T_{vj}=175^\circ C$ | V_F | | 1.38 1.18 1.14 | 1.8 | V |
| 反向恢复峰值电流 Peak reverse recovery current | $I_F=75A,$ $-di_F/dt=500A/\mu s(T_{vj}=175^\circ C)$ $V_R=300V, V_{GE}=-15V$ | $T_{vj}=25^\circ C$ $T_{vj}=175^\circ C$ | I_{RM} | | 18 43 | | A |
| 反向恢复电荷 Reverse Recovered charge | $I_F=75A,$ $-di_F/dt=500A/\mu s(T_{vj}=175^\circ C)$ $V_R=300V, V_{GE}=-15V$ | $T_{vj}=25^\circ C$ $T_{vj}=175^\circ C$ | Q_{rr} | | 1.37 7.20 | | μC |
| 反向恢复时间 Reverse Recovery Time | $I_F=75A,$ $-di_F/dt=500A/\mu s(T_{vj}=175^\circ C)$ $V_R=300V, V_{GE}=-15V$ | $T_{vj}=25^\circ C$ $T_{vj}=175^\circ C$ | t_{rr} | | 136 248 | | ns |
| 反向恢复损耗 (每脉冲) Reverse recovered energy | $I_F=75A,$ $-di_F/dt=500A/\mu s(T_{vj}=175^\circ C)$ $V_R=300V, V_{GE}=-15V$ | $T_{vj}=25^\circ C$ $T_{vj}=175^\circ C$ | E_{rec} | | 0.20 0.92 | | mJ |

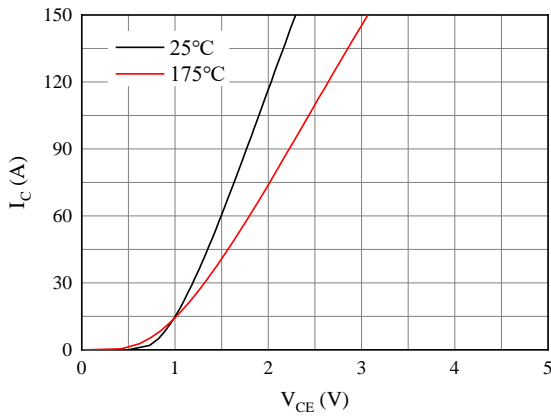


图 1. 典型输出特性 ($V_{GE}=15V$)

Figure 1. Typical output characteristics ($V_{GE}=15V$)

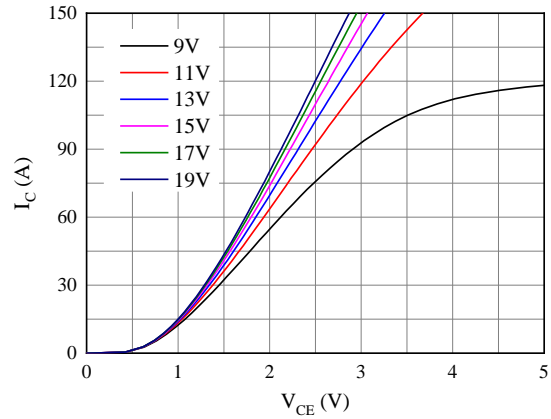


图 2. 典型输出特性 ($T_{vj}=175^{\circ}C$)

Figure 2. Typical output characteristics ($T_{vj}=175^{\circ}C$)

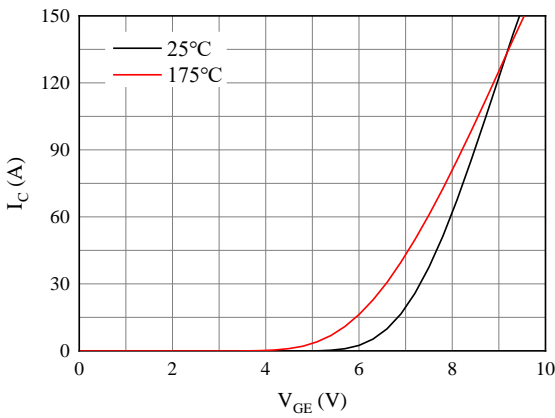


图 3. 典型传输特性 ($V_{CE}=20V$)

Figure 3. Typical transfer characteristic ($V_{CE}=20V$)

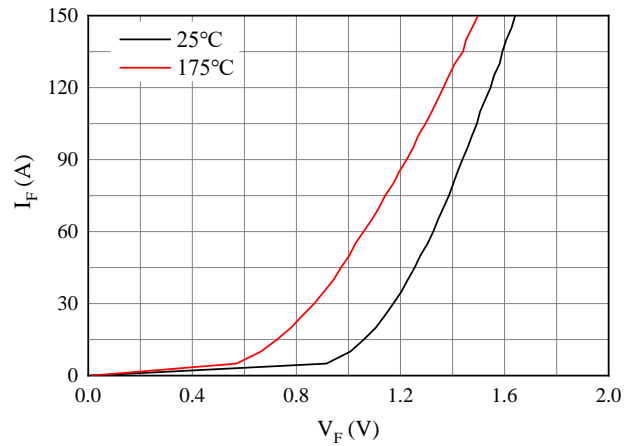


图 4. 正向偏压特性 二极管

Figure 4. Forward characteristic of Diode

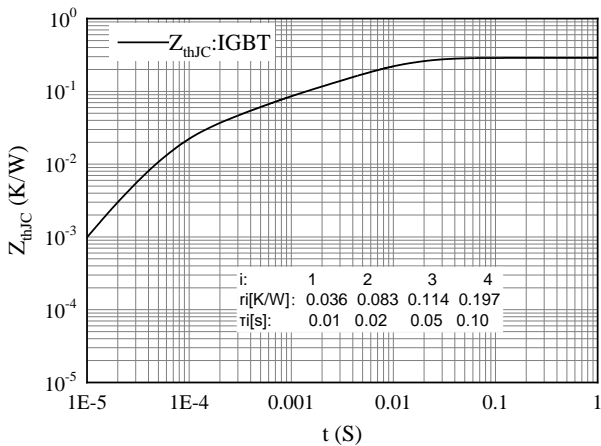


图 5. 瞬态热阻抗 IGBT

Figure 5. Transient thermal impedance IGBT,
 $Z_{thJC}=f(t)$

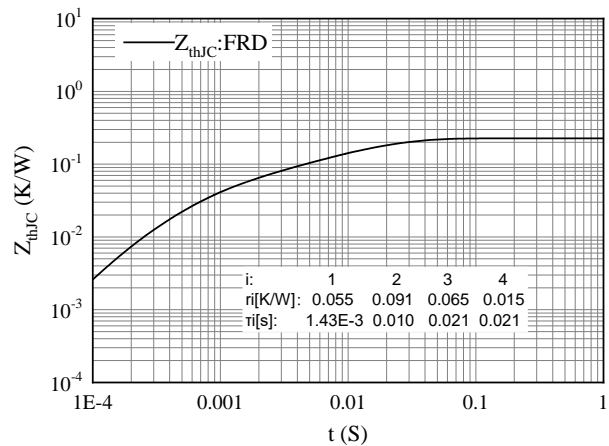


图 6. 瞬态热阻抗 FRD

Figure 6. Transient thermal impedance FRD,
 $Z_{thJC}=f(t)$

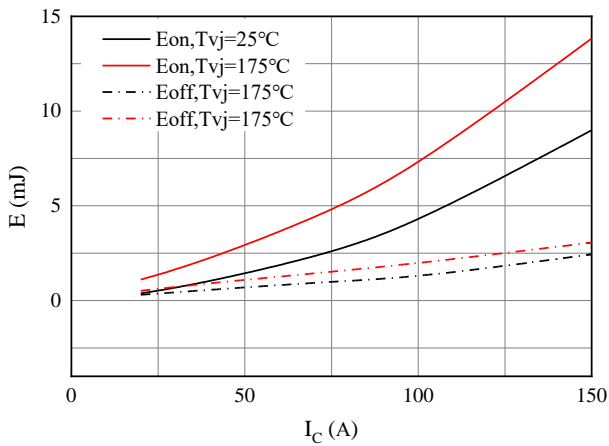


图 7. 开关损耗

Figure 7. Switching losses of IGBT
 $V_{GE} = \pm 15V, R_{gon} = 8\Omega, R_{goff} = 8\Omega, V_{CE} = 300V$

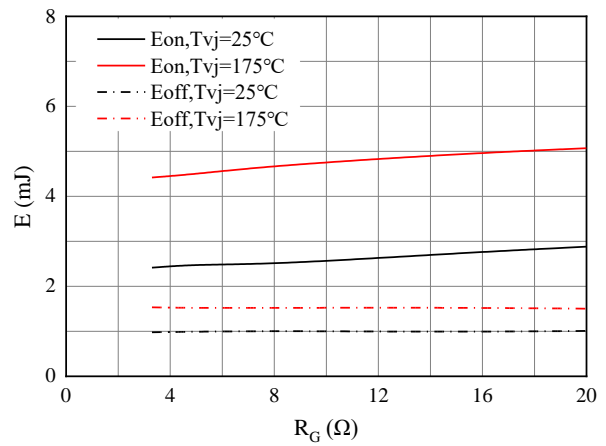


图 8. 开关损耗

Figure 8. Switching losses of IGBT
 $V_{GE} = \pm 15V, I_C = 75A, V_{CE} = 300V$

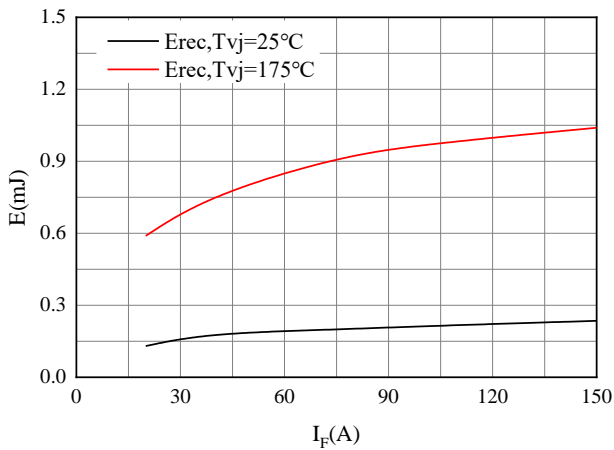


图 9. 开关损耗 二极管

Figure 9. Switching losses of Diode
 $R_{gon} = 8\Omega, V_{CE} = 300V$

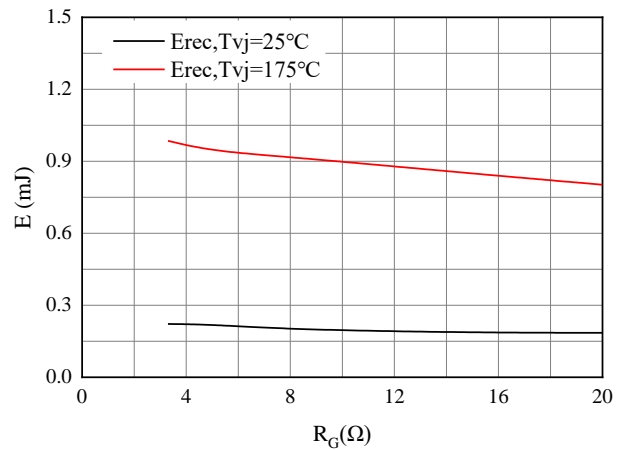


图 10. 开关损耗 二极管

Figure 10. Switching losses of Diode
 $I_F = 75A, V_{CE} = 300V$

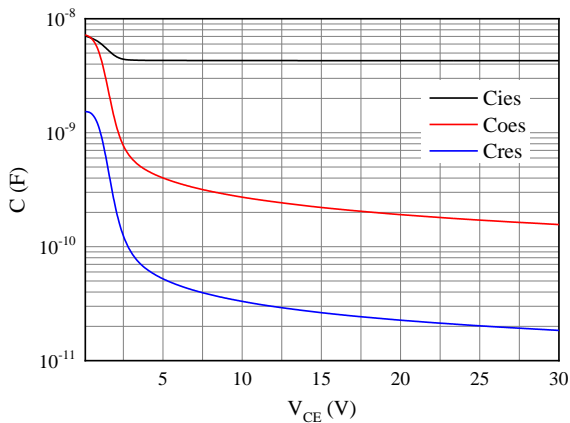
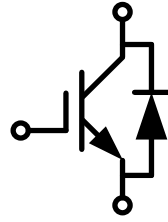


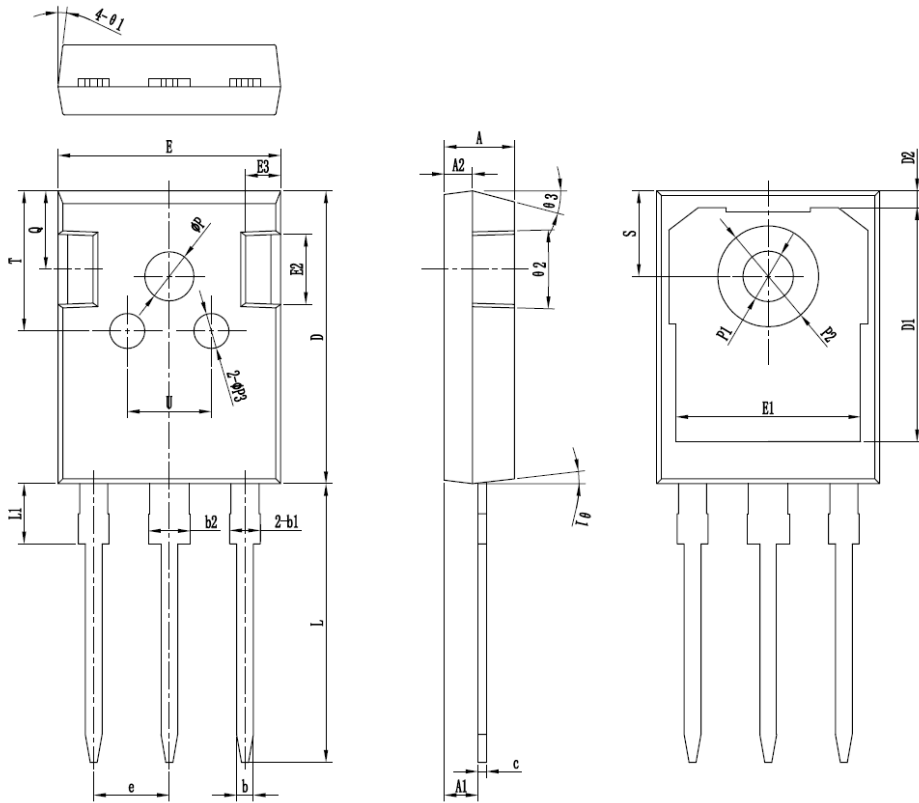
图 11. 电容特性

Figure 11. Capacitance characteristic

接线图 / Circuit diagram



封装尺寸 / Package outlines



| 符号 | 单位:mm | | |
|------|-------|-------|-------|
| | MIN | NOM | MAX |
| *H | 4.90 | 5.00 | 5.10 |
| *H1 | 2.31 | 2.41 | 2.51 |
| A2 | 1.90 | 2.00 | 2.10 |
| *h | 1.15 | 1.20 | 1.25 |
| *h1 | 1.95 | 2.10 | 2.25 |
| *h2 | 2.95 | 3.10 | 3.25 |
| *c | 0.55 | 0.60 | 0.65 |
| *d | 20.90 | 21.00 | 21.10 |
| D1 | 16.35 | 16.55 | 16.75 |
| D2 | 1.05 | 1.20 | 1.35 |
| *e | 15.70 | 15.80 | 15.90 |
| E1 | 13.10 | 13.25 | 13.40 |
| E2 | 4.90 | 5.00 | 5.10 |
| E3 | 2.40 | 2.50 | 2.60 |
| *e | 5.40 | 5.44 | 5.48 |
| *L | 19.80 | 19.92 | 20.10 |
| *L1 | - | - | 4.30 |
| *PP | 3.70 | 3.80 | 3.90 |
| *PP1 | 3.50 | 3.60 | 3.70 |
| *PP2 | 7.00 | 7.20 | 7.40 |
| *PP3 | 2.40 | 2.50 | 2.60 |
| Q | 5.60 | 5.80 | 6.00 |
| *S | 6.05 | 6.15 | 6.25 |
| T | 9.80 | 10.00 | 10.20 |
| U | 6.00 | 6.20 | 6.40 |
| θ1 | 5° | 7° | 9° |
| θ2 | 1° | 3° | 5° |
| θ3 | 13° | 15° | 17° |

*为关键管控尺寸