

# 25GU120N

## 主要参数 Main Characteristics

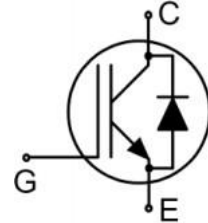
|            |        |
|------------|--------|
| IC         | 25A    |
| Vces       | 1200 V |
| Vcesat-typ | 2.2V   |

## 用途

- 光伏逆变器
- UPS 电源
- 电焊机
- 中高频率逆变器

## Applications

- Solar Converters
- Uninterrupted Power Supply
- Welding Converters
- Mid to High Range Switching  
Frequency Converters



TO-247

## 产品特性

- 1200V, 25A
- $V_{CE(sat)(typ.)} = 2.2V @ V_{GE} = 15V, I_C = 25A$
- Maximum Junction Temperature 150°C
- Pb-free Lead Plating; RoHS Compliant



## 产品中有毒有害物质或元素的名称及含量

| 部件名称<br>含量要求 | 有害物质或元素                                                                                                                                |        |        |                 |               |                 |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------|--------|--------|-----------------|---------------|-----------------|
|              | 铅 (Pb)                                                                                                                                 | 汞 (Hg) | 镉 (Cd) | 六价铬<br>(Cr(VI)) | 多溴联苯<br>(PBB) | 多溴二苯醚<br>(PBDE) |
|              | ≤0.1%                                                                                                                                  | ≤0.1%  | ≤0.01% | ≤0.1%           | ≤0.1%         | ≤0.1%           |
| 引线框          | ○                                                                                                                                      | ○      | ○      | ○               | ○             | ○               |
| 塑封树脂         | ○                                                                                                                                      | ○      | ○      | ○               | ○             | ○               |
| 管 芯          | ○                                                                                                                                      | ○      | ○      | ○               | ○             | ○               |
| 内引线          | ○                                                                                                                                      | ○      | ○      | ○               | ○             | ○               |
| 焊 料          | ×                                                                                                                                      | ○      | ○      | ○               | ○             | ○               |
| 说 明          | <p>○：表示该元素的含量在 SJ/T11363-2006 标准的限量要求以下。</p> <p>×：表示该元素的含量超出 SJ/T11363-2006 标准的限量要求。</p> <p>目前产品的焊料中含有铅 (Pb) 成分，但属于欧盟 RoHS 指令豁免范围。</p> |        |        |                 |               |                 |

绝对最大额定值 **Absolute Ratings** ( $T_c=25^{\circ}\text{C}$ )

| 项 目<br>Parameter                                                        | 符 号<br>Symbol                       | 数 值<br>Value    | 单位<br>Unit         |
|-------------------------------------------------------------------------|-------------------------------------|-----------------|--------------------|
| 最高集电极—发射极直流电压<br>Collector-Emmitter Voltage                             | $V_{ces}$                           | 1200            | V                  |
| 最高栅极发射极电压<br>Gate-Emmitter Voltage                                      | $V_{GES}$                           | $\pm 30$        | V                  |
| 连续集电极电流<br>Collector Current-continuous                                 | $I_C \quad T_C=25^{\circ}\text{C}$  | 45              | A                  |
|                                                                         | $I_C \quad T_C=100^{\circ}\text{C}$ | 25              | A                  |
| 最大脉冲集电极极电流（注 1）<br>Collector Current – pulse （note 1）                   | $I_{CM}$                            | 75              | A                  |
| 二极管正向电流<br>Diode Continuous Forward Current                             | $I_F \quad T_C=100^{\circ}\text{C}$ | 25              | A                  |
| 二极管最大正向电流<br>Diode Maximum Forward Current (Note 1)                     | $I_{FM}$                            | 60              | A                  |
| 短路时间<br>Short Circuit Withstand Time ( $T_J \leq 150^{\circ}\text{C}$ ) | $t_{sc}$                            | 10              | us                 |
| 耗散功率<br>Power Dissipation                                               | $P_D \quad T_C=25^{\circ}\text{C}$  | 220             | W                  |
|                                                                         | $P_D \quad T_C=100^{\circ}\text{C}$ | 100             | W                  |
| 最高结温<br>Operating Junction Temperature                                  | $T_J$                               | $-55 \sim +150$ | $^{\circ}\text{C}$ |
| 存储温度<br>Storage Temperature Range                                       | $T_{STG}$                           | $-55 \sim +150$ | $^{\circ}\text{C}$ |

热特性 **Electrical Characteristics**

| 项 目<br>Parameter                                                | 符 号<br>Symbol | 数 值<br>Value | 单位<br>Unit                  |
|-----------------------------------------------------------------|---------------|--------------|-----------------------------|
| IGBT结到管壳的热阻<br>Thermal Resistance, Junction to case<br>for IGBT | $R_{th\ j-c}$ | 0.45         | $^{\circ}\text{C}/\text{W}$ |
| FRD结到管壳的热阻<br>Thermal Resistance, Junction to case<br>for Diode | $R_{th\ j-c}$ | 0.85         | $^{\circ}\text{C}/\text{W}$ |
| 结到环境的热阻<br>Thermal Resistance, Junction to<br>Ambient           | $R_{th\ j-a}$ | 40           | $^{\circ}\text{C}/\text{W}$ |

**IGBT电特性 Electrical Characteristics of IGBT( $T_c=25^\circ\text{C}$  unless otherwise noted )**

| 项 目<br>Parameter                                   | 符 号<br>Symbol | 测试条件<br>Tests conditions                                                                                 | 最小<br>Min | 典型<br>Typ | 最大<br>Max | 单位<br>Units |
|----------------------------------------------------|---------------|----------------------------------------------------------------------------------------------------------|-----------|-----------|-----------|-------------|
| 集电极-发射极击穿电压<br>Collector-Emitter Breakdown Voltage | $BV_{CES}$    | $V_{GE}=0V, I_C=250\mu A$                                                                                | 1200      | -         | -         | V           |
| 零栅压下集电极漏电流<br>Collector-Emitter Leakage Current    | $I_{CES}$     | $V_{CE}=1200V, V_{GE}=0V$                                                                                | -         | -         | 250       | $\mu A$     |
| 正向栅极体漏电流<br>Gate Leakage Current                   | $I_{GES}$     | $V_{GE}=\pm 30V, V_{CE}=0V$                                                                              | -         | -         | $\pm 100$ | nA          |
| 阈值电压<br>Gate Threshold Voltage                     | $V_{GE(th)}$  | $V_{GE}=V_{CE}, I_C=250\mu A$                                                                            | 4.5       | 5.0       | 5.5       | V           |
| 饱和压降<br>Collector-Emmitter saturation Voltage      | $V_{CE(sat)}$ | $V_{GE}=15V, I_C=25A$                                                                                    | -         | 2.2       | 2.7       | V           |
| 栅极电荷总量 Total Gate Charge                           | $Q_g$         | $V_{CC}=960V$<br>$V_{GE}=15V$<br>$I_C=25A$                                                               | -         | 125       | -         | nC          |
| 栅极-反射极 Gate to emitter charge                      | $Q_{ge}$      |                                                                                                          | -         | 29        | -         | nC          |
| 栅极-集电极 Gate to collector charge                    | $Q_{gc}$      |                                                                                                          | -         | 67        | -         | nC          |
| 开启延迟时间 Turn-On delay time                          | $t_{d(on)}$   | $V_{CC}=600V$<br>$V_{GE}=15V$<br>$I_C=25A$<br>$R_G=15\Omega$<br>Inductive Load<br>$T_c=25^\circ\text{C}$ | -         | 21        | -         | ns          |
| 上升时间 Turn-On rise time                             | $t_r$         |                                                                                                          | -         | 46        | -         | ns          |
| 关断延迟时间 Turn-Off delay time                         | $t_{d(off)}$  |                                                                                                          | -         | 253       | -         | ns          |
| 下降时间 Turn-Off Fall time                            | $t_f$         |                                                                                                          | -         | 38        | -         | ns          |
| 开通损耗 Turn-On energy                                | $E_{on}$      |                                                                                                          | -         | 1.5       | -         | mJ          |
| 关断损耗 Turn-off energy                               | $E_{off}$     |                                                                                                          | -         | 0.8       | -         | mJ          |
| 总开关损耗 Total switching energy                       | $E_{tot}$     |                                                                                                          | -         | 2.3       | -         | mJ          |
| 输入电容<br>Input capacitance                          | $C_{ies}$     | $V_{CE}=25V$<br>$V_{GE}=0V$<br>$f=1\text{MHz}$                                                           | -         | 1130      | -         | pF          |
| 输出电容<br>Output capacitance                         | $C_{oes}$     |                                                                                                          | -         | 162       | -         | pF          |
| 反向传输电容<br>Reverse transfer capacitance             | $C_{res}$     |                                                                                                          | -         | 89        | -         | pF          |
| 栅极电阻<br>Integrated gate resistor                   | $R_{Gint}$    |                                                                                                          |           | 3.8       |           | $\Omega$    |

**二极管电特性 Electrical Characteristics of Diode ( $T_c=25^\circ\text{C}$  unless otherwise noted )**

|                                               |          |                                              |   |      |      |    |
|-----------------------------------------------|----------|----------------------------------------------|---|------|------|----|
| 正向压降<br>Diode Forward Voltage                 | $V_F$    | $I_F=25A$                                    | - | 2.0  | 2.65 | V  |
| 反向恢复时间<br>Diode Reverse Recovery Time         | $t_{rr}$ | $V_{CE}=600V$<br>$I_F=25A$<br>$R_g=15\Omega$ | - | 240  |      | ns |
| 反向恢复电流<br>Diode peak Reverse Recovery Current | $I_{rr}$ |                                              | - | 20   |      | A  |
| 反向恢复电荷<br>Diode Reverse Recovery Charge       | $Q_{rr}$ |                                              | - | 1672 |      | nC |

Note1: Repetitive rating, pulse width limited by maximum junction temperature

特征曲线 ELECTRICAL CHARACTERISTICS (curves)

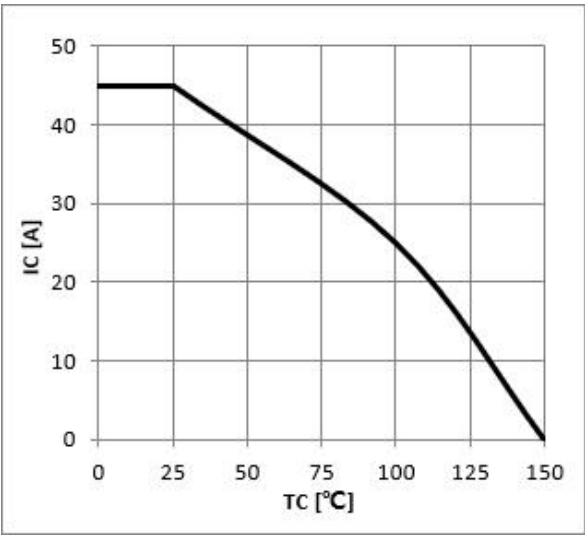


Figure 1: Maximum DC Collector Current  
VS. case temperature

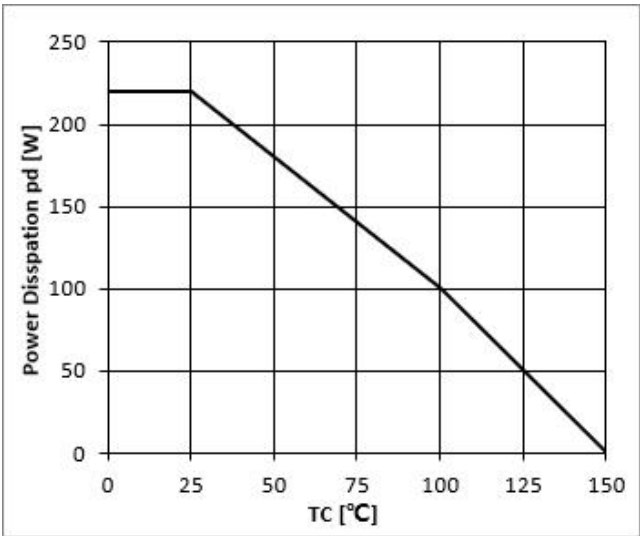


Figure 2: Power Dissipation VS. Case Temperature

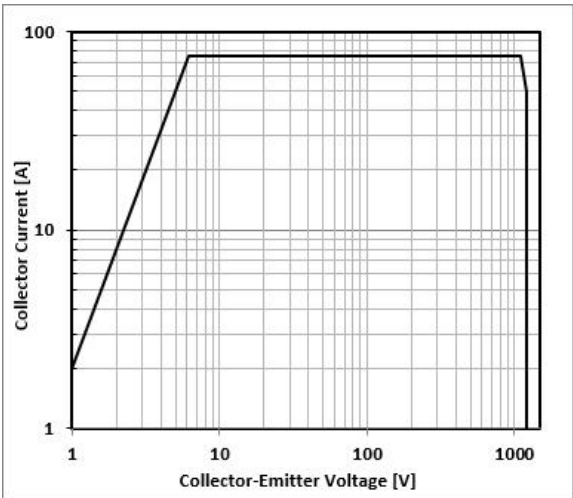


Figure 3: Reverse Bias SOA,  $T_J=125^{\circ}\text{C}$ ,  $V_{GE}=15\text{V}$

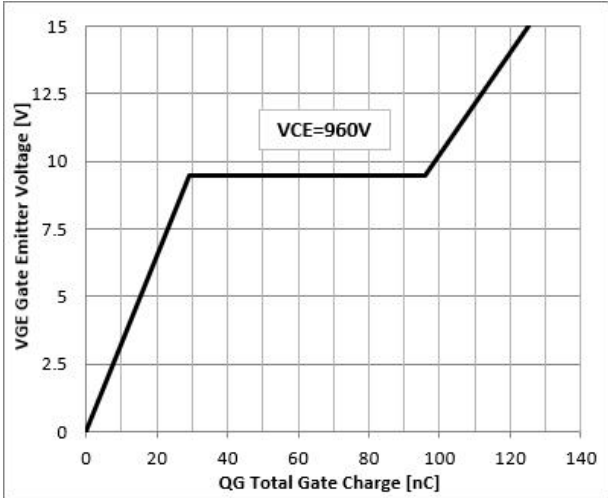


Figure 4: Typical Gate charge VS.  $V_{GE}$ ,  $I_C=25\text{A}$

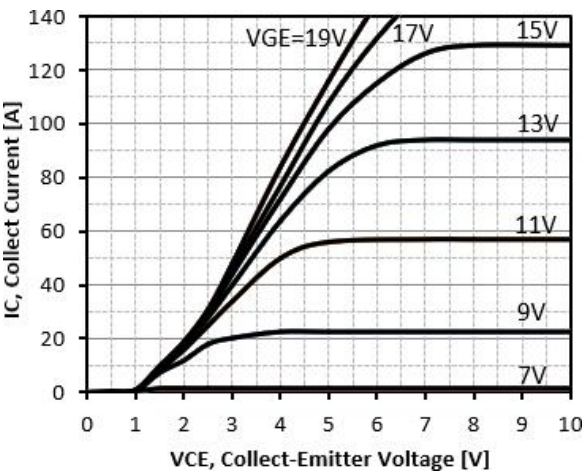


Figure 5: Typical IGBT Output characteristics,  
 $T_C = 25^\circ\text{C}; t_p = 300\mu\text{s}$

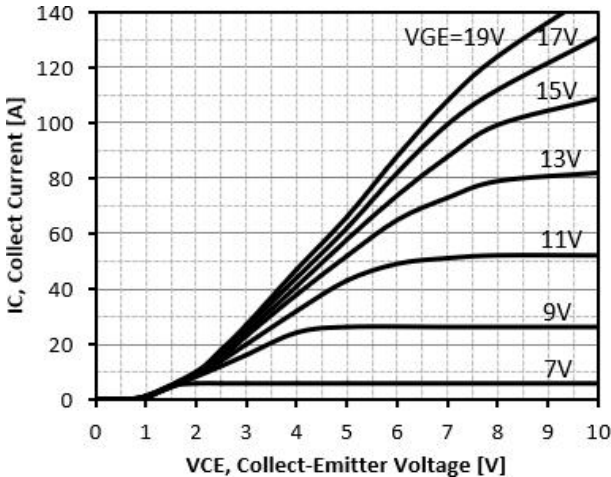


Figure 6: Typical IGBT Output characteristics,  
 $T_C = 150^\circ\text{C}; t_p = 300\mu\text{s}$

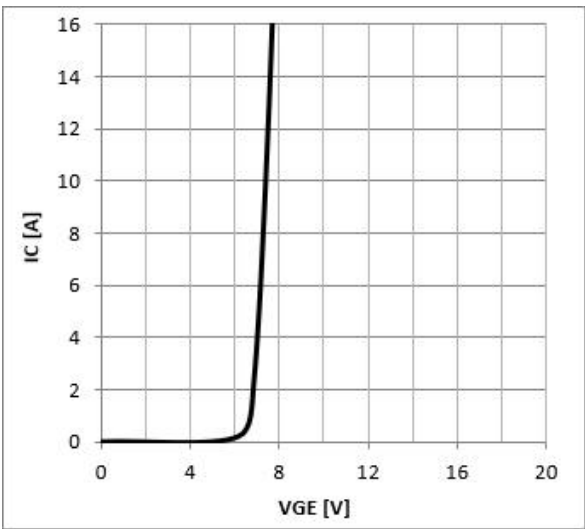


Figure 7: Typical Gate Threshold Voltage

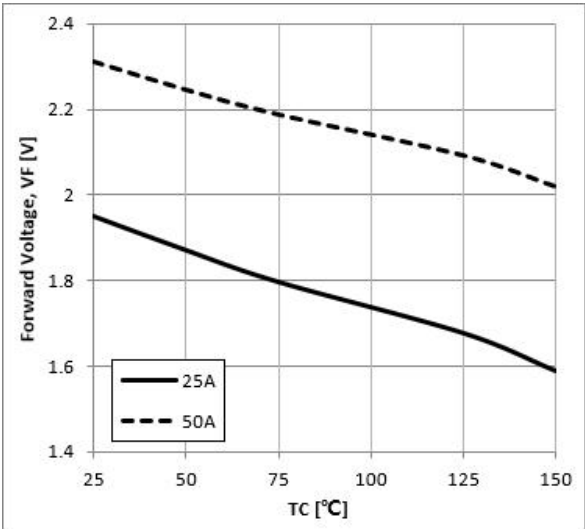


Figure 8: Typical Forward Voltage vs  $I_F$

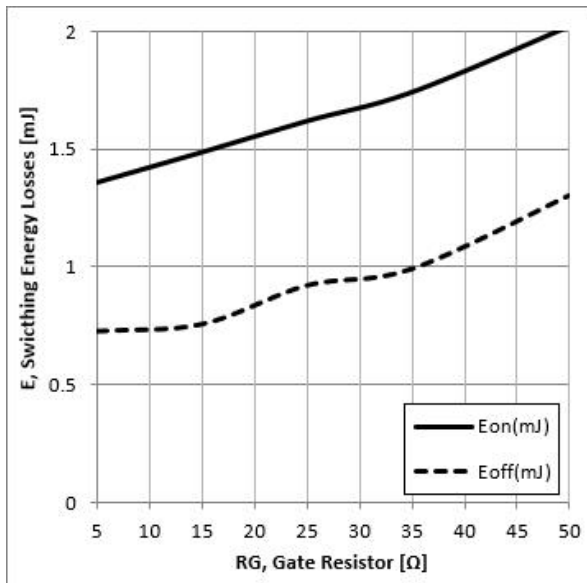


Figure 9: Typical Energy Loss VS. RG, TC=25°C,  
L=100uH, VCE=600V, VGE=15V, IC=25A

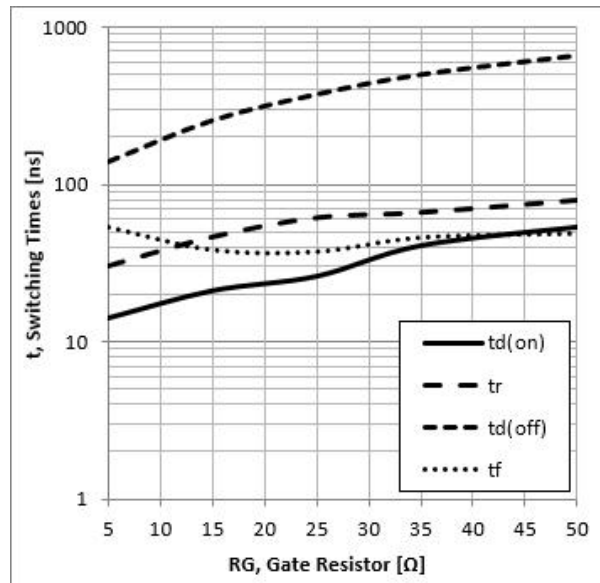


Figure 10: Typical Switching Time VS. RG, TC=25°C,  
L=100uH, VCE=600V, VGE=15V, IC=25A

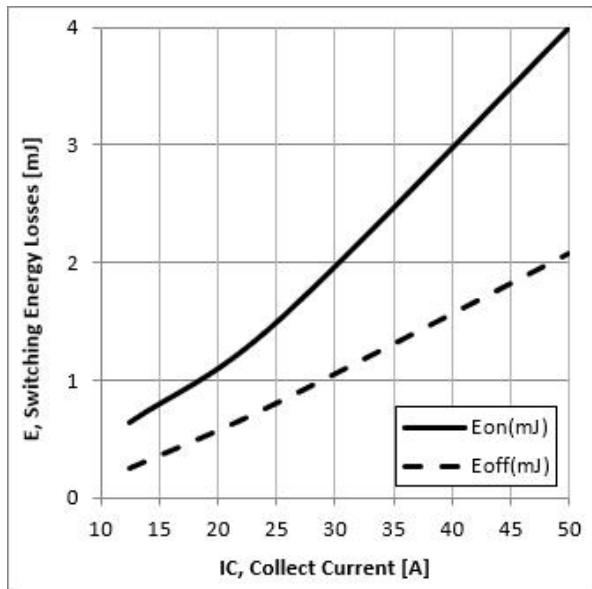


Figure 11: Typical Energy Loss VS. IC, TC=25°C,  
L=100uH, VCE=600V, VGE=15V, RG=15Ω

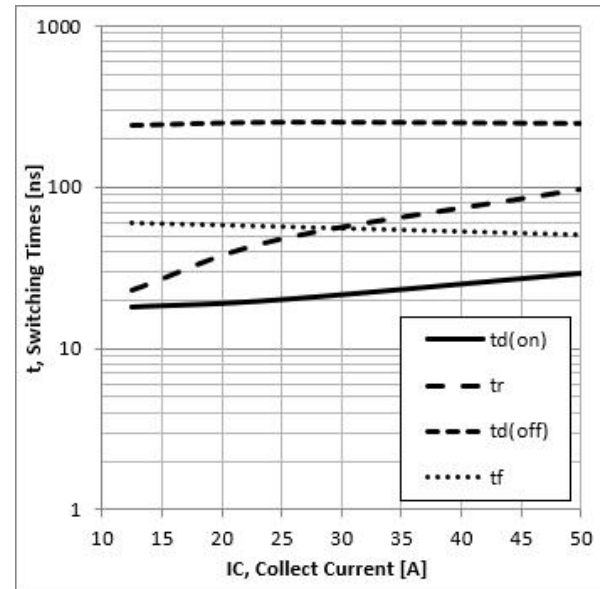


Figure 12: Typical Switching Time VS. IC, TC=25°C,  
L=100uH, VCE=600V, VGE=15V, RG=15Ω

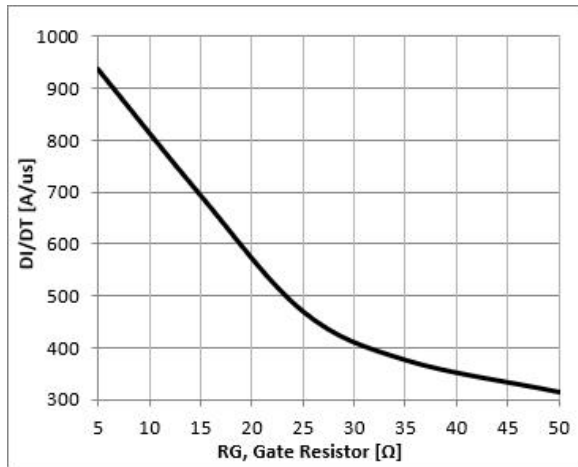


Figure 13: Typical Diode DI/DT VS. RG, TC=25°C  
VCC=600V, VGE=15V, IF=25A

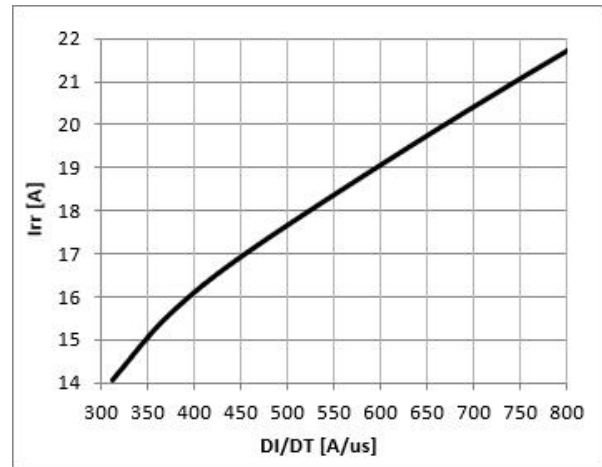


Figure 14: Typical Diode IRR VS. DI/DT, TC=25°C  
VCC=600V, VGE=15V, IF=25A

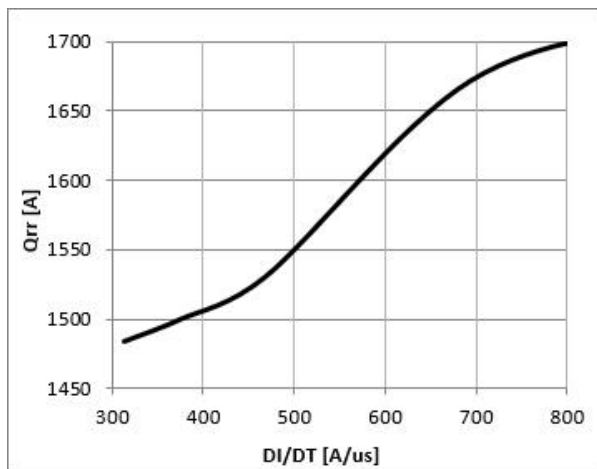


Figure 15: Typical Diode Qrr VS. DI/DT, TC=25°C  
VCC=600V, VGE=15V, IF=25A

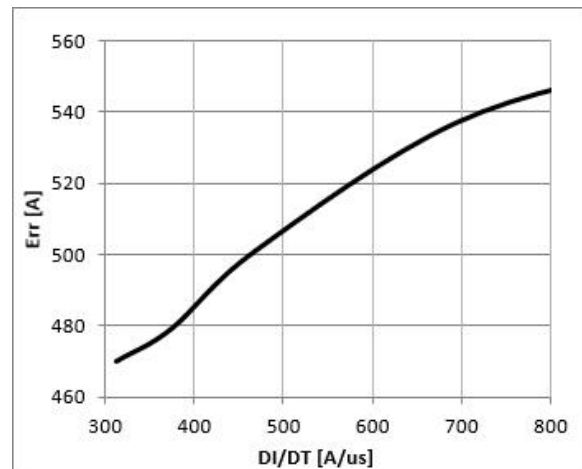


Figure 16: Typical Diode Err VS. DI/DT, TC=25°C  
VCC=600V, VGE=15V, IF=25A

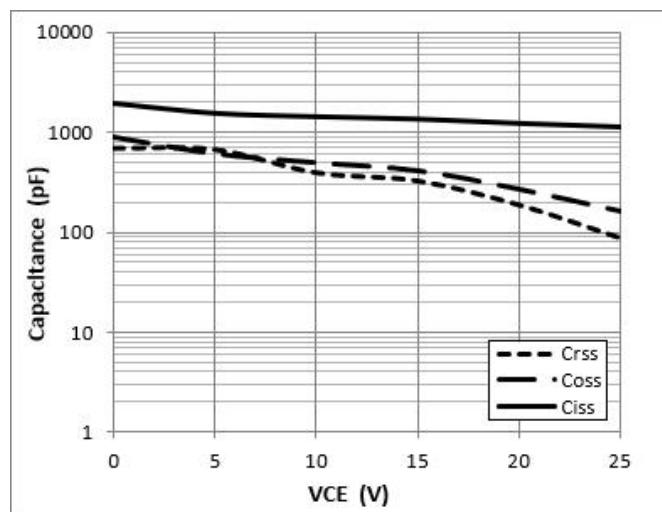


Figure 17: Typical Capacitance VS. VCE,  
VGE=0V, f=100kHz

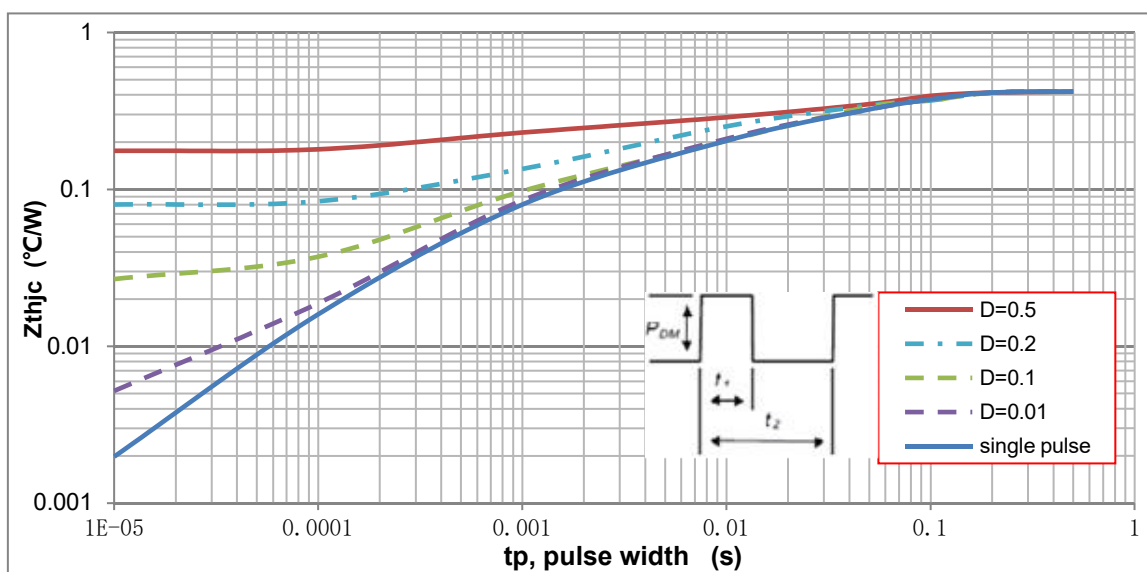


Figure 18: Normalized transient thermal impedance, junction-to-case Note1. Duty factor  $D=t_1/t_2$ ; Note2: peak  $T_J=P_{DM} \times Z_{thjc}+T$

外形尺寸 PACKAGE MECHANICAL DATA

TO-247

