

# RJH1CM7DPQ-E0

1200V - 25A - 绝缘栅双极晶体管

应用：逆变器

R07DS0522CJ0400

修订版本 4.00

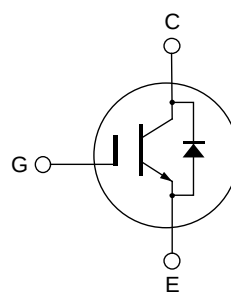
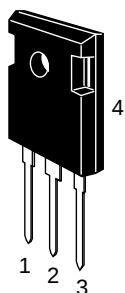
Oct 09, 2012

## 特点

- 短路承受时间 (10  $\mu$ s 典型值)
- 低集电极/发射极饱和电压  
 $V_{CE(sat)} = 2.1$  V 典型值 ( $I_C = 25$  A,  $V_{GE} = 15$  V,  $T_a = 25^\circ\text{C}$ )
- 内置快速恢复二极管 ( $t_{rr} = 170$  ns 典型值) 于一封装
- 沟槽栅与薄晶圆技术
- 快速开关时间  
 $t_f = 105$  ns 典型值 ( $V_{CC} = 600$  V,  $V_{GE} = 15$  V,  $I_C = 25$  A,  $R_g = 5$   $\Omega$ ,  $T_a = 25^\circ\text{C}$ , 感性负载)

## 封装形式

RENESAS 封装代码: PRSS0003ZE-A  
(封装名称: TO-247)



1. 栅极
2. 集电极
3. 发射极
4. 集电极

## 绝对最大额定值

( $T_a = 25^\circ\text{C}$ )

| 参数                  |                           | 符号                            | 额定值         | 单位                        |
|---------------------|---------------------------|-------------------------------|-------------|---------------------------|
| 集电极/发射极电压 或 二极管反向电压 |                           | $V_{CES} / V_R$               | 1200        | V                         |
| 栅极/发射极电压            |                           | $V_{GES}$                     | $\pm 30$    | V                         |
| 集电极电流               | $T_c = 25^\circ\text{C}$  | $I_C$                         | 50          | A                         |
|                     | $T_c = 100^\circ\text{C}$ | $I_C$                         | 25          | A                         |
| 集电极脉冲电流             |                           | $i_{c(peak)}$ <sup>注1</sup>   | 100         | A                         |
| 集电极/发射极二极管正向电流      |                           | $I_{DF}$                      | 25          | A                         |
| 集电极/发射极二极管正向脉冲电流    |                           | $i_{DF(peak)}$ <sup>注1</sup>  | 100         | A                         |
| 集电极最大容许功率损耗         |                           | $P_C$ <sup>注2</sup>           | 328.9       | W                         |
| 结壳热阻 (绝缘栅双极晶体管)     |                           | $\theta_{j-c}$ <sup>注2</sup>  | 0.39        | $^\circ\text{C}/\text{W}$ |
| 结壳热阻 (二极管)          |                           | $\theta_{j-cd}$ <sup>注2</sup> | 0.69        | $^\circ\text{C}/\text{W}$ |
| 结温                  |                           | $T_j$                         | 150         | $^\circ\text{C}$          |
| 储存温度                |                           | $T_{stg}$                     | -55 to +150 | $^\circ\text{C}$          |

注: 1. 在  $PW \leq 10$   $\mu$ s, 工作周期  $\leq 1\%$  的容许值  
 2. 在  $T_c = 25^\circ\text{C}$  的容许值

## 电特性

(Ta = 25°C)

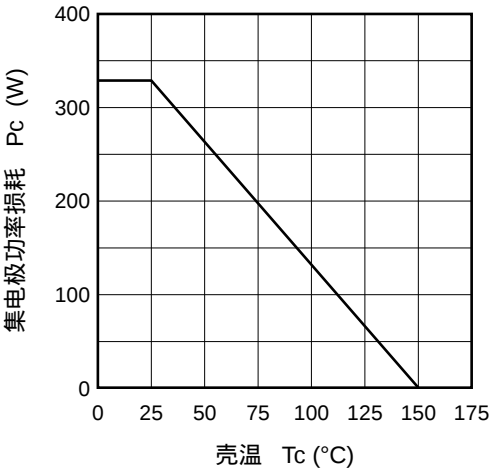
| 参数                       | 符号              | 最小值  | 典型值  | 最大值     | 单位      | 测定条件                                                         |
|--------------------------|-----------------|------|------|---------|---------|--------------------------------------------------------------|
| 集电极/发射极破坏电压              | $V_{(BR)CES}$   | 1200 | —    | —       | V       | $I_C = 10 \mu A, V_{GE} = 0$                                 |
| 集电极/发射极短路电流 或<br>二极管反向电流 | $I_{CES} / I_R$ | —    | —    | 5       | $\mu A$ | $V_{CE} = 1200 V, V_{GE} = 0$                                |
| 栅极/发射极漏泄电流               | $I_{GES}$       | —    | —    | $\pm 1$ | $\mu A$ | $V_{GE} = \pm 30 V, V_{CE} = 0$                              |
| 栅极/发射极截止电压               | $V_{GE(off)}$   | 4.5  | —    | 6.5     | V       | $V_{CE} = 10 V, I_C = 1 mA$                                  |
| 集电极/发射极饱和电压              | $V_{CE(sat)}$   | —    | 2.1  | —       | V       | $I_C = 25 A, V_{GE} = 15 V$ 注3                               |
|                          | $V_{CE(sat)}$   | —    | 2.6  | —       | V       | $I_C = 50 A, V_{GE} = 15 V$ 注3                               |
| 输入电容                     | $C_{ies}$       | —    | 2000 | —       | pF      | $V_{CE} = 25 V$                                              |
| 输出电容                     | $C_{oes}$       | —    | 100  | —       | pF      | $V_{GE} = 0$                                                 |
| 反向传输电容                   | $C_{res}$       | —    | 55   | —       | pF      | $f = 1 MHz$                                                  |
| 栅极充电电荷量                  | $Q_g$           | —    | 140  | —       | nC      | $V_{GE} = 15 V$                                              |
| 栅极/发射极充电电荷量              | $Q_{ge}$        | —    | 18   | —       | nC      | $V_{CE} = 300 V$                                             |
| 栅极/集电极充电电荷量              | $Q_{gc}$        | —    | 75   | —       | nC      | $I_C = 25 A$                                                 |
| 接通延迟时间                   | $t_{d(on)}$     | —    | 50   | —       | ns      | $V_{CC} = 600 V$                                             |
| 上升时间                     | $t_r$           | —    | 28   | —       | ns      | $V_{GE} = 15 V$                                              |
| 关断延迟时间                   | $t_{d(off)}$    | —    | 165  | —       | ns      | $I_C = 25 A$                                                 |
| 下降时间                     | $t_f$           | —    | 105  | —       | ns      | $R_g = 5 \Omega$                                             |
| 接通能量                     | $E_{on}$        | —    | 2.3  | —       | mJ      | 感性负载                                                         |
| 关断能量                     | $E_{off}$       | —    | 1.3  | —       | mJ      |                                                              |
| 总开关能量                    | $E_{total}$     | —    | 3.6  | —       | mJ      |                                                              |
| 短路承受时间                   | $t_{sc}$        | —    | 10   | —       | $\mu s$ | $V_{CC} \leq 720 V, V_{GE} = 15 V$<br>$T_C \leq 125^\circ C$ |

|                 |          |   |      |   |         |                         |
|-----------------|----------|---|------|---|---------|-------------------------|
| 快速恢复二极管正向电压     | $V_F$    | — | 1.8  | — | V       | $I_F = 25 A$ 注3         |
| 快速恢复二极管反向恢复时间   | $t_{rr}$ | — | 170  | — | ns      | $I_F = 25 A$            |
| 快速恢复二极管反向恢复电荷   | $Q_{rr}$ | — | 0.62 | — | $\mu C$ | $di_F/dt = 100 A/\mu s$ |
| 快速恢复二极管反向恢复脉冲电流 | $I_{rr}$ | — | 8.5  | — | A       |                         |

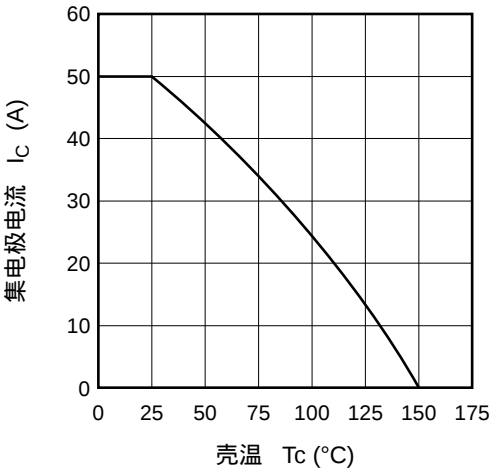
注: 3. 脉冲测试

主要特性

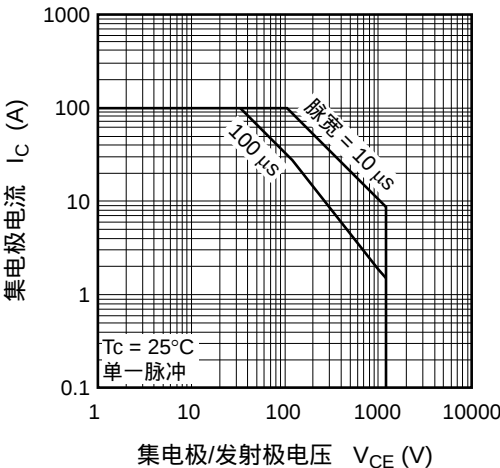
集电极功率损耗-壳温



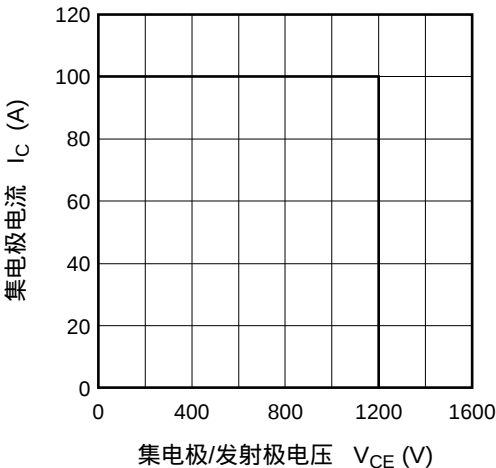
集电极最大直流电流-壳温



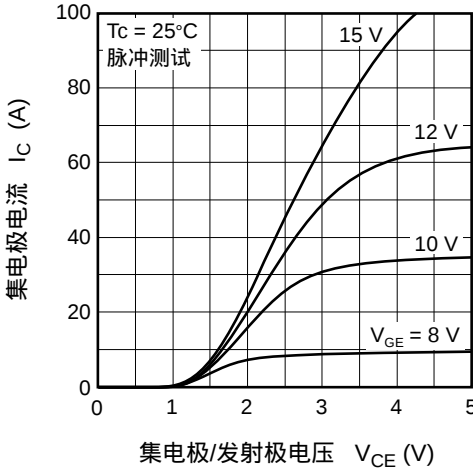
最大安全工作区域



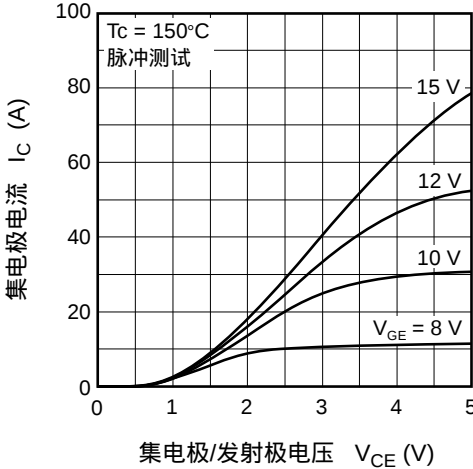
关断安全工作区域



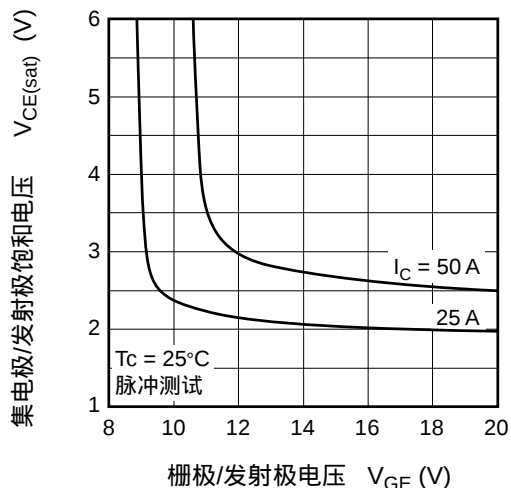
典型输出特性



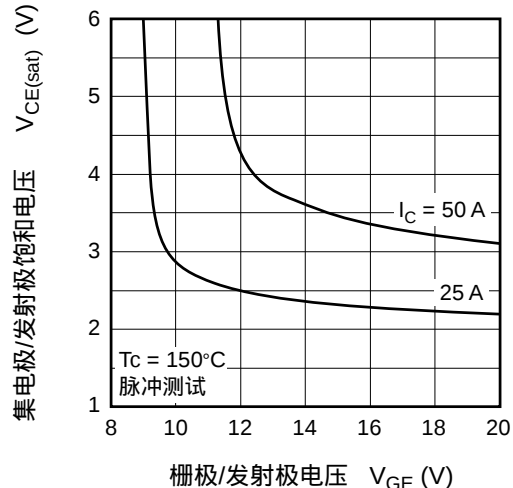
典型输出特性



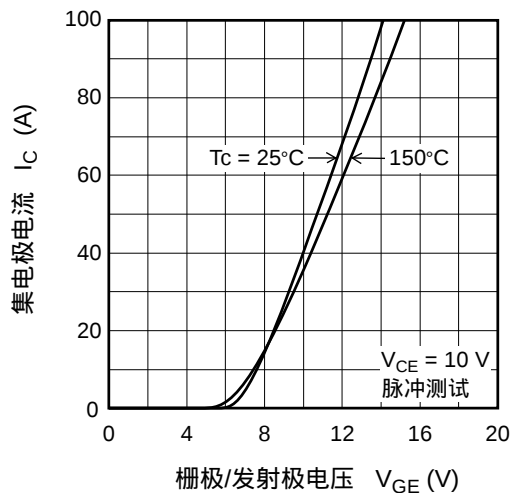
集电极/发射极饱和电压-  
栅极/发射极电压 (典型)



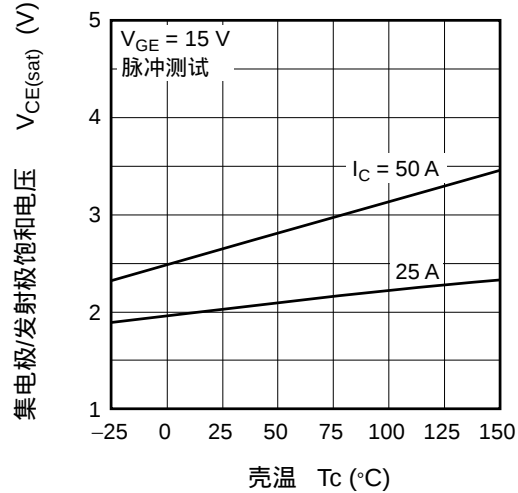
集电极/发射极饱和电压-  
栅极/发射极电压 (典型)



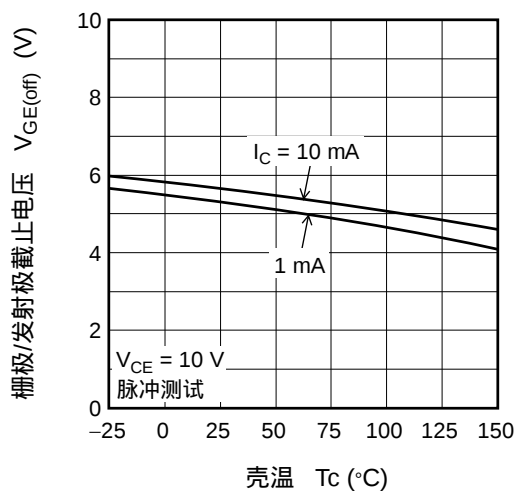
典型传输特性



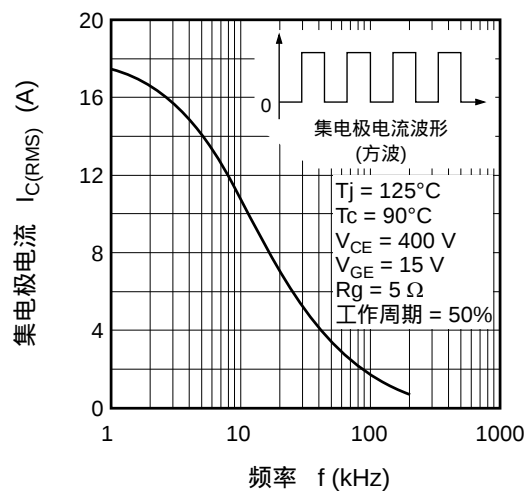
集电极/发射极饱和电压-壳温 (典型)



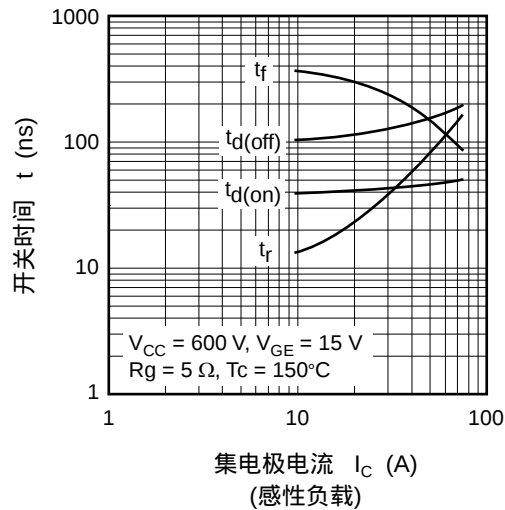
栅极/发射极截止电压-壳温 (典型)



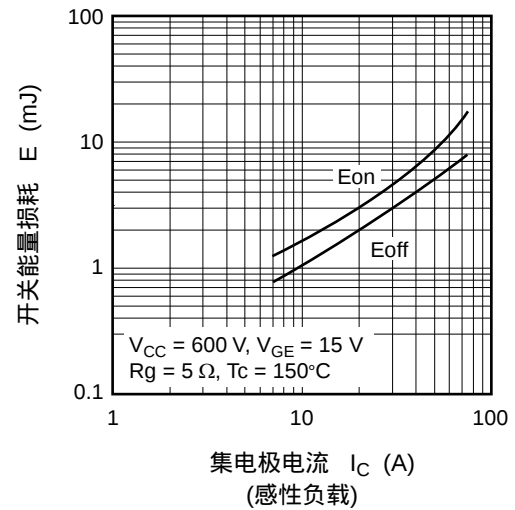
频率特性 (典型)



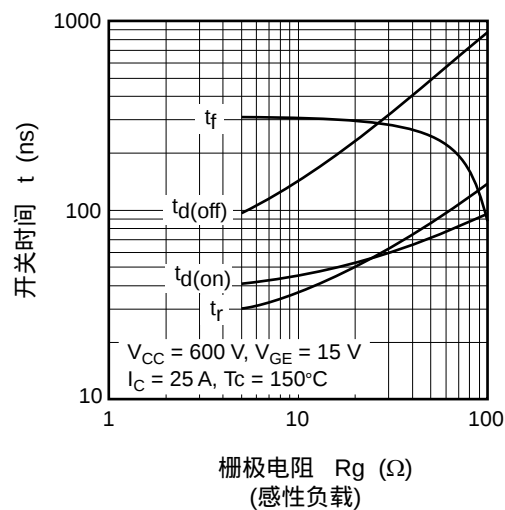
开关特性 (典型) (1)



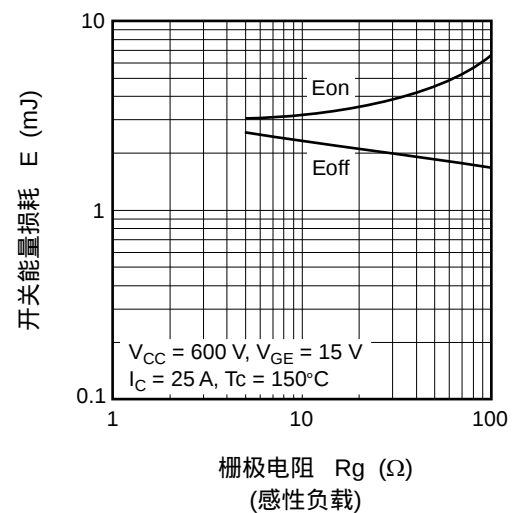
开关特性 (典型) (2)



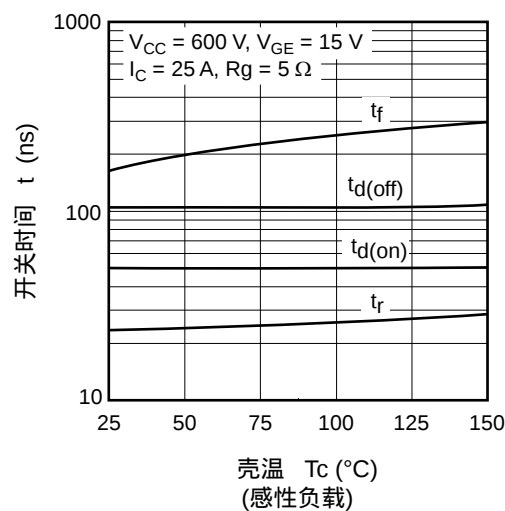
开关特性 (典型) (3)



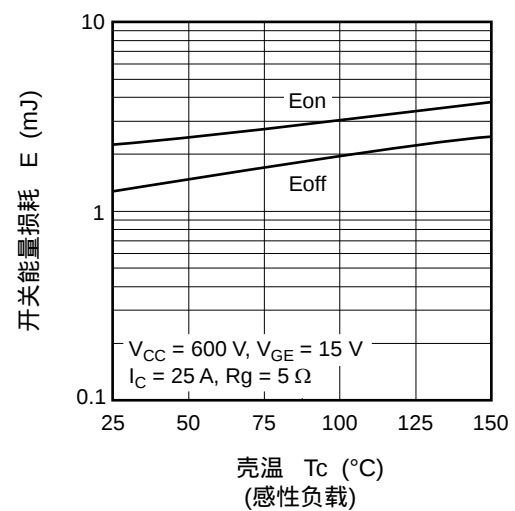
开关特性 (典型) (4)



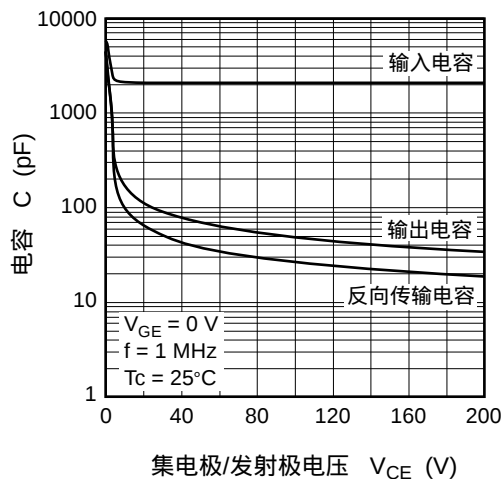
开关特性 (典型) (5)



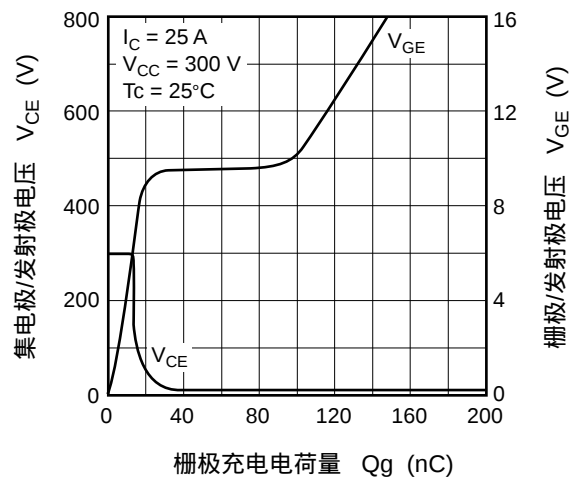
开关特性 (典型) (6)



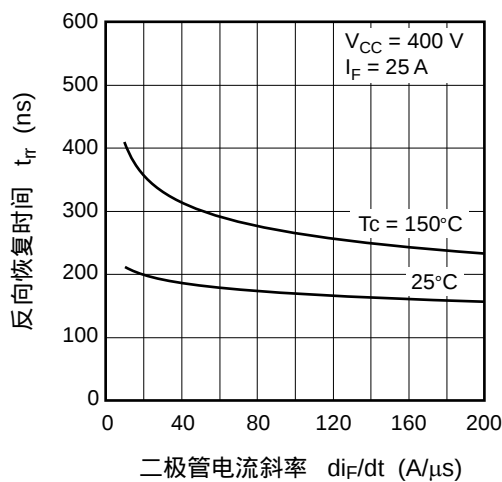
典型电容-集电极/发射极电压



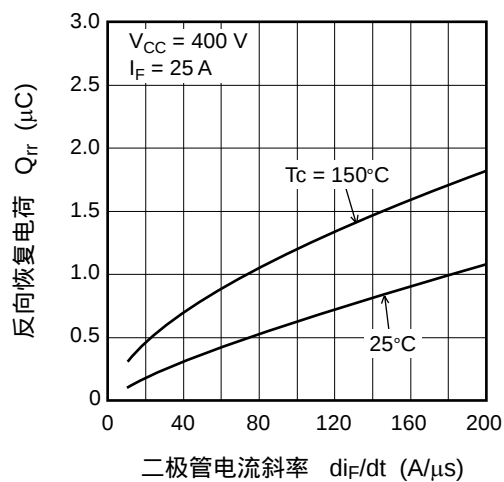
输入时序特性 (典型)



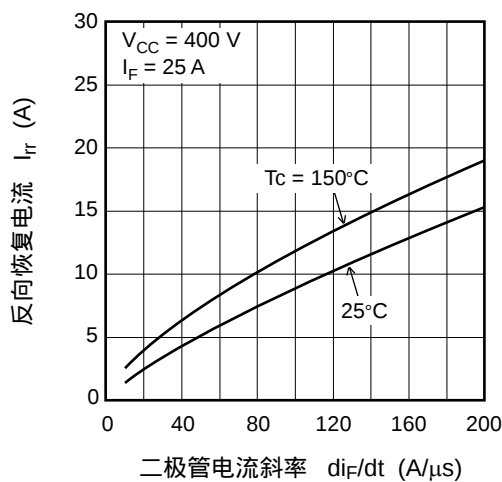
反向恢复时间-二极管电流斜率 (典型)



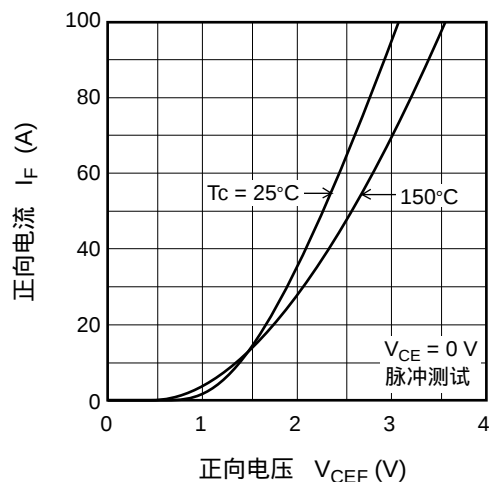
反向恢复电荷-二极管电流斜率 (典型)



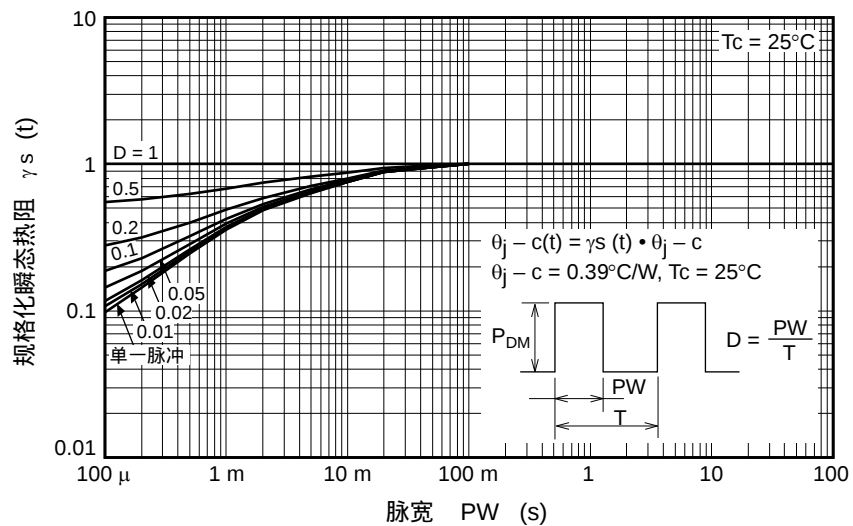
反向恢复电流-二极管电流斜率 (典型)



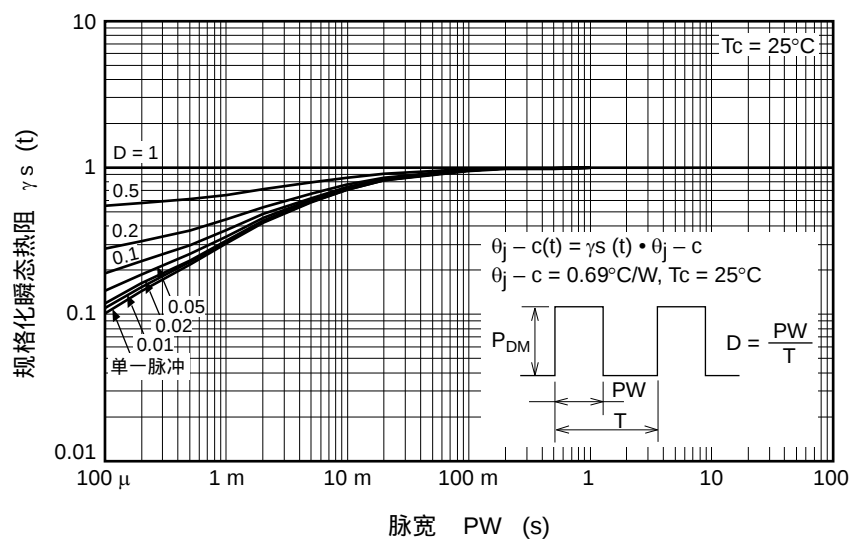
正向电流-正向电压 (典型)



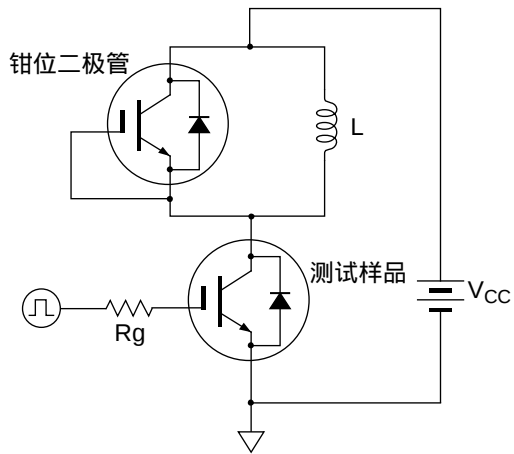
瞬态热阻特性规格化 (绝缘栅双极晶体管)



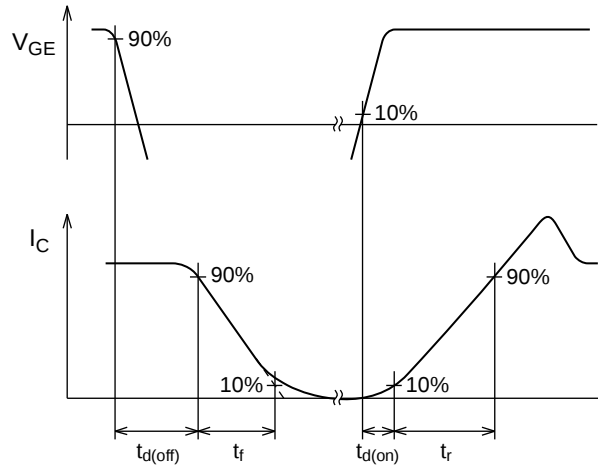
瞬态热阻特性规格化 (二极管)



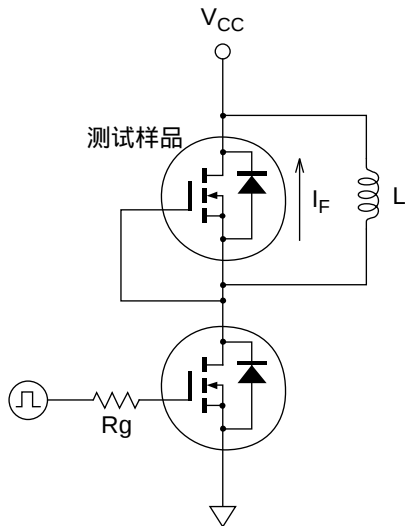
开关时间测定电路



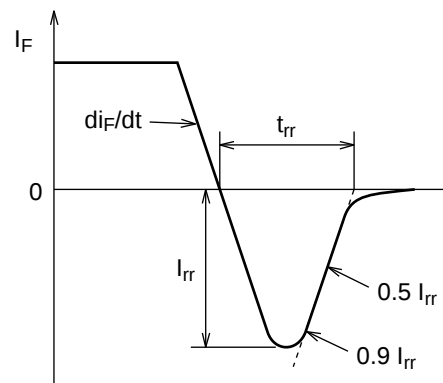
波形



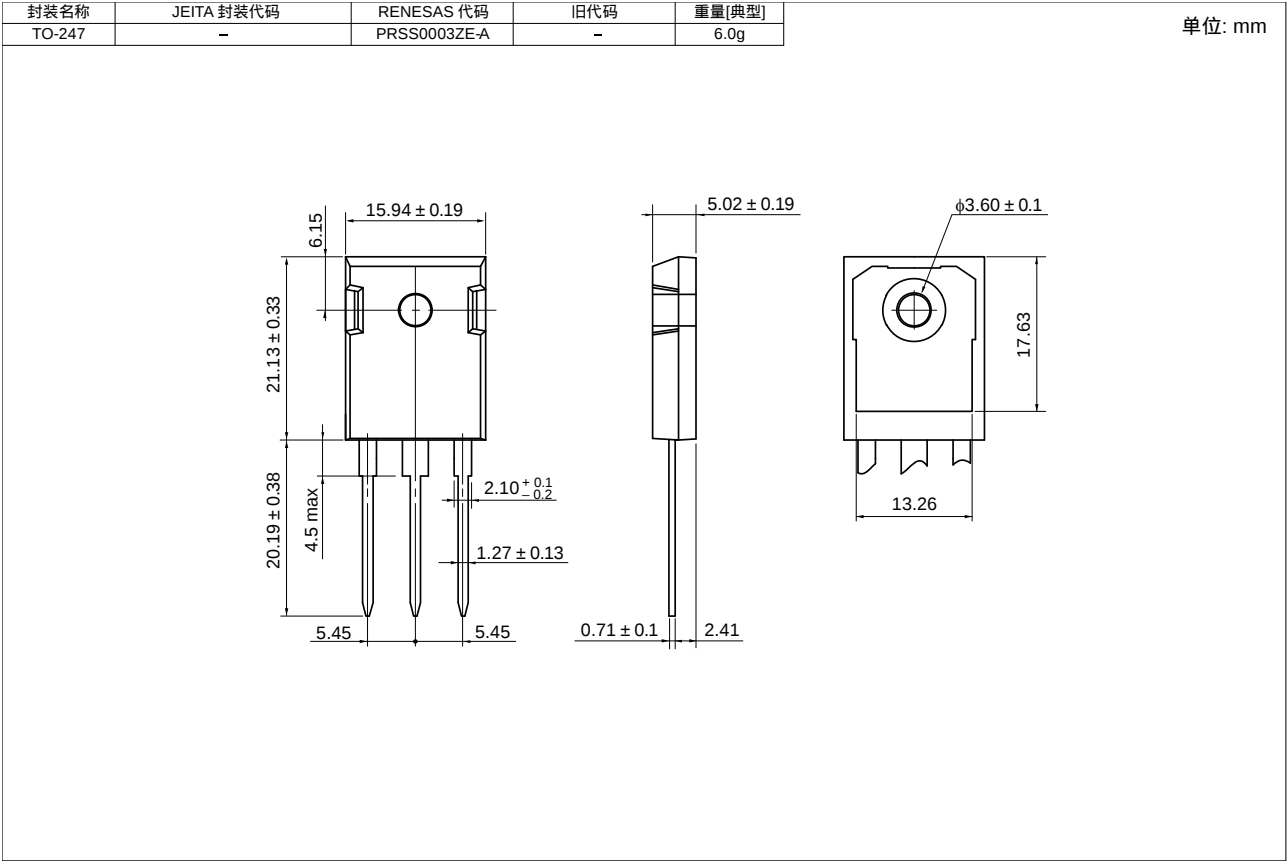
二极管反向恢复时间测定电路



波形



封装尺寸



订购信息

| 订购型号             | 数量    | 运输包装        |
|------------------|-------|-------------|
| RJH1CM7DPQ-E0#T2 | 450 枚 | 纸盒包装 (管状容器) |

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  5. 瑞萨电子产品根据其质量等级分为两个等级：“标准等级”和“高质量等级”。每种瑞萨电子产品的推荐用途均取决于产品的质量等级，如下所示：  
标准等级：计算机、办公设备、通讯设备、测试和测量设备、视听设备、家用电器、机械工具、个人电子设备以及工业机器人等。  
高质量等级：运输设备（汽车、火车、轮船等）、交通控制系统、防灾系统、预防犯罪系统以及安全设备等。  
瑞萨电子产品无意用于且未被授权用于可能对人类生命造成直接威胁的产品或系统及可能造成人身伤害的产品或系统（人工生命维持装置或系统、植埋于体内的装置等）中，或者可能造成重大财产损失的产品或系统（核反应堆控制系统、军用设备等）中。在将每种瑞萨电子产品用于某种特定应用之前，用户应先确认其质量等级。不得将瑞萨电子产品用于超出其设计用途之外的任何应用。对于用户或第三方因将瑞萨电子产品用于其设计用途之外而遭受的任何损害或损失，瑞萨电子不承担任何责任。
  6. 使用本文件中记载的瑞萨电子产品时，应在瑞萨电子指定的范围内，特别是在最大额定值、电源工作电压范围、移动电源电压范围、热辐射特性、安装条件以及其他产品特性的范围内使用。对于在上述指定范围之外使用瑞萨电子产品而产生的故障或损失，瑞萨电子不承担任何责任。
  7. 虽然瑞萨电子一直致力于提高瑞萨电子产品的质量和可靠性，但是，半导体产品有其自身的具体特性，如一定的故障发生率以及在某些使用条件下会发生故障等。此外，瑞萨电子产品均未进行防辐射设计。所以请采取安全保护措施，以避免当瑞萨电子产品在发生故障而造成火灾时导致人身事故、伤害或损害的事故。例如进行软硬件安全设计（包括但不限于冗余设计、防火控制以及故障预防等）、适当的老化处理或其他适当的措施等。由于难于对微机软件单独进行评估，所以请用户自行对最终产品或系统进行安全评估。
  8. 关于环境保护方面的详细内容，例如每种瑞萨电子产品的环境兼容性等，请与瑞萨电子的营业部门联系。使用瑞萨电子产品时，请遵守对管制物质的使用或含量进行管理的所有相关法律法规（包括但不限于《欧盟RoHS指令》）。对于因用户未遵守相关法律法规而导致的损害或损失，瑞萨电子不承担任何责任。
  9. 不可将瑞萨电子产品和技术用于或者嵌入日本国内或海外相应的法律法规所禁止生产、使用及销售的任何产品或系统中。也不可将本文件中记载的瑞萨电子产品或技术用于与军事应用或者军事用途有关的目目的（如大规模杀伤性武器的开发等）。在将本文件中记载的瑞萨电子产品或技术进行出口时，应当遵守相应的出口管制法律法规，并按照上述法律法规所规定的程序进行。
  10. 向第三方分销或处分产品或者以其他方式将产品置于第三方控制之下的瑞萨电子产品买方或分销商，有责任事先向上述第三方通知本文件规定的内容和条件；对于用户或第三方因非法使用瑞萨电子产品而遭受的任何损失，瑞萨电子不承担任何责任。
  11. 在事先未得到瑞萨电子书面认可的情况下，不得以任何形式部分或全部转载或复制本文件。
  12. 如果对本文件所记载的信息或瑞萨电子产品有任何疑问，或者用户有任何其他疑问，请向瑞萨电子的营业部门咨询。
- (注1) 瑞萨电子：在本文件中指瑞萨电子株式会社及其控股子公司。  
(注2) 瑞萨电子产品：指瑞萨电子开发或生产的任何产品。



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