

**描述 / Descriptions**

TO-220 塑封封装 NPN 半导体三极管。Silicon NPN transistor in a TO-220 Plastic Package.

**特征 / Features**

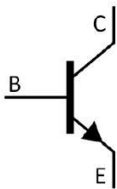
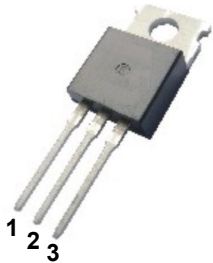
耐压高,开关速度快。

High voltage capability, high speed switching.

**用途 / Applications**

用于高频电子照明电路、开关及开关电源。

High frequency electronic lighting, switching power supply applications .

**内部等效电路 / Equivalent Circuit****引脚排列 / Pinning**

PIN1 : Base      PIN 2 : Collector      PIN 3 : Emitter

**放大及印章代码 /  $h_{FE}$  Classifications & Marking**

见印章说明。See Marking Instructions.


**极限参数 / Absolute Maximum Ratings(Ta=25°C)**

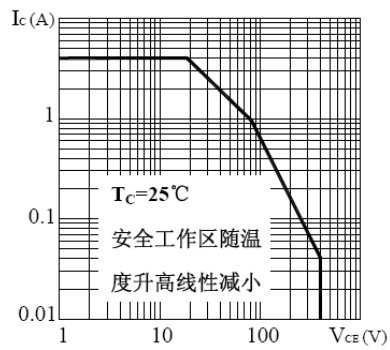
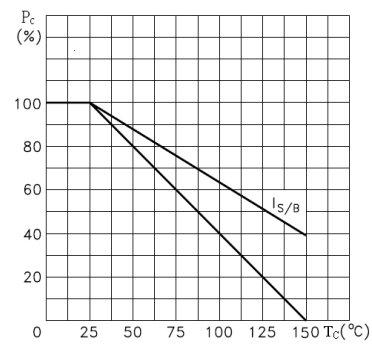
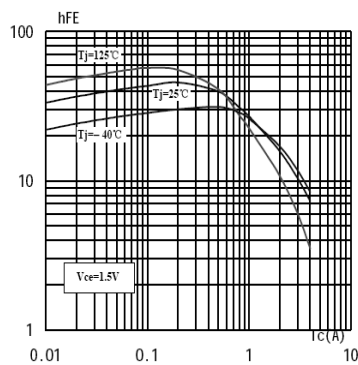
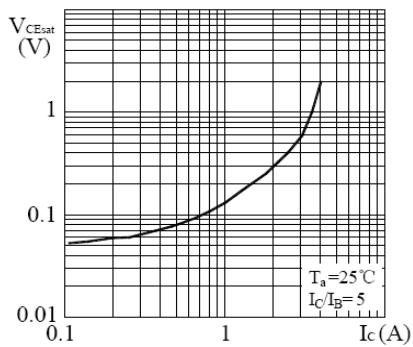
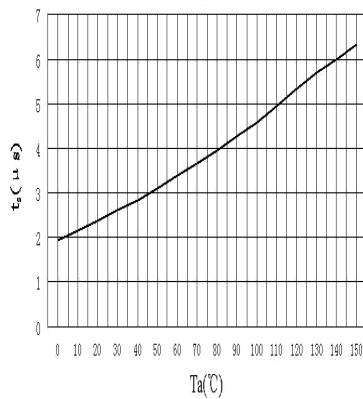
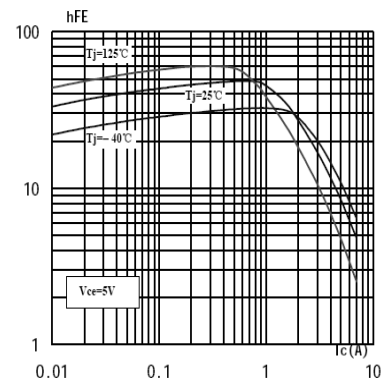
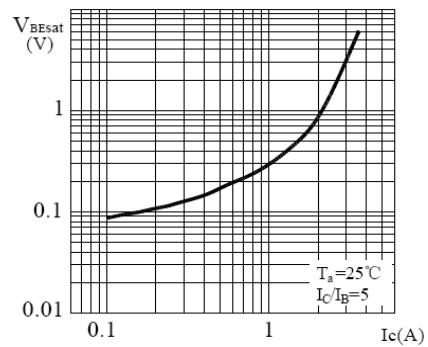
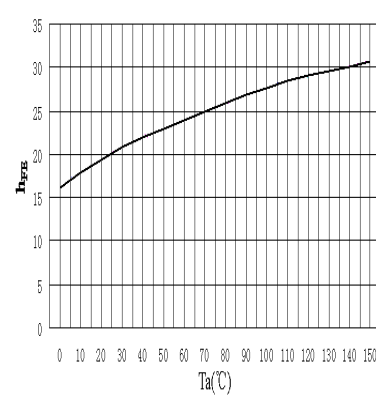
| 参数<br>Parameter                | 符号<br>Symbol            | 数值<br>Rating | 单位<br>Unit |
|--------------------------------|-------------------------|--------------|------------|
| Collector to Base Voltage      | $V_{CBO}$               | 700          | V          |
| Collector to Emitter Voltage   | $V_{CEO}$               | 400          | V          |
| Emitter to Base Voltage        | $V_{EBO}$               | 9.0          | V          |
| Collector Current - Continuous | $I_C$                   | 4.0          | A          |
| Base Current - Continuous      | $I_B$                   | 2.0          | A          |
| Collector Power Dissipation    | $P_C$                   | 2.0          | W          |
| Collector Power Dissipation    | $P_{C(Tc=25^{\circ}C)}$ | 75           | W          |
| Junction Temperature           | $T_j$                   | 150          | °C         |
| Storage Temperature Range      | $T_{stg}$               | -55~150      | °C         |

**电性能参数 / Electrical Characteristics(Ta=25°C)**

| 参数<br>Parameter                         | 符号<br>Symbol     | 测试条件<br>Test Conditions          | 最小值<br>Min | 典型值<br>Typ | 最大值<br>Max | 单位<br>Unit |
|-----------------------------------------|------------------|----------------------------------|------------|------------|------------|------------|
| Collector to Base Breakdown Voltage     | $V_{CBO}$        | $I_C=1mA$ $I_E=0$                | 700        |            |            | V          |
| Collector to Emitter Breakdown Voltage  | $V_{CEO}$        | $I_C=10mA$ $I_B=0$               | 400        |            |            | V          |
| Emitter to Base Breakdown Voltage       | $V_{EBO}$        | $I_E=1mA$ $I_C=0$                | 9.0        |            |            | V          |
| Collector Cut-Off Current               | $I_{CBO}$        | $V_{CB}=700V$ $I_E=0$            |            |            | 0.1        | mA         |
| Collector cut-off current               | $I_{CEO}$        | $V_{CE}=400V$ $I_B=0$            |            |            | 0.1        | mA         |
| Emitter Base Cut-Off Current            | $I_{EBO}$        | $V_{EB}=9.0V$ $I_C=0$            |            |            | 0.1        | mA         |
| DC Current Gain                         | $h_{FE(1)}$      | $V_{CE}=5.0V$ $I_C=1.0A$         | 10         | 20         | 50         |            |
|                                         | $h_{FE(2)}$      | $V_{CE}=5.0V$ $I_C=2.0A$         | 8.0        | 17         | 40         |            |
| Collector to Emitter Saturation Voltage | $V_{CE(sat)(1)}$ | $I_C=2.0A$ $I_B=0.5A$            |            | 0.2        | 0.6        | V          |
|                                         | $V_{CE(sat)(2)}$ | $I_C=1.0A$ $I_B=0.2A$            |            | 0.1        | 0.5        | V          |
|                                         | $V_{CE(sat)(3)}$ | $I_C=4.0A$ $I_B=1.0A$            |            | 0.3        | 1.0        | V          |
| Base to Emitter Saturation Voltage      | $V_{BE(sat)(1)}$ | $I_C=2.0A$ $I_B=0.5A$            |            | 0.92       | 1.2        | V          |
|                                         | $V_{BE(sat)(2)}$ | $I_C=1.0A$ $I_B=0.2A$            |            | 0.85       | 1.2        | V          |
| Output Capacitance                      | $C_{ob}$         | $V_{CB}=10V$ $f=1MHz$            |            | 65         |            | pF         |
| Transition Frequency                    | $f_T$            | $V_{CE}=10V$ $I_C=0.5A$ $f=1MHz$ | 7.0        |            |            | MHz        |
| Fall time                               | $t_f$            | $V_{CE}=5V$ $I_C=0.5A$ (UI9600)  |            |            | 0.8        | μs         |
| Storage time                            | $t_s$            |                                  |            |            | 4.0        | μs         |


**电参数曲线图 / Electrical Characteristic Curve**

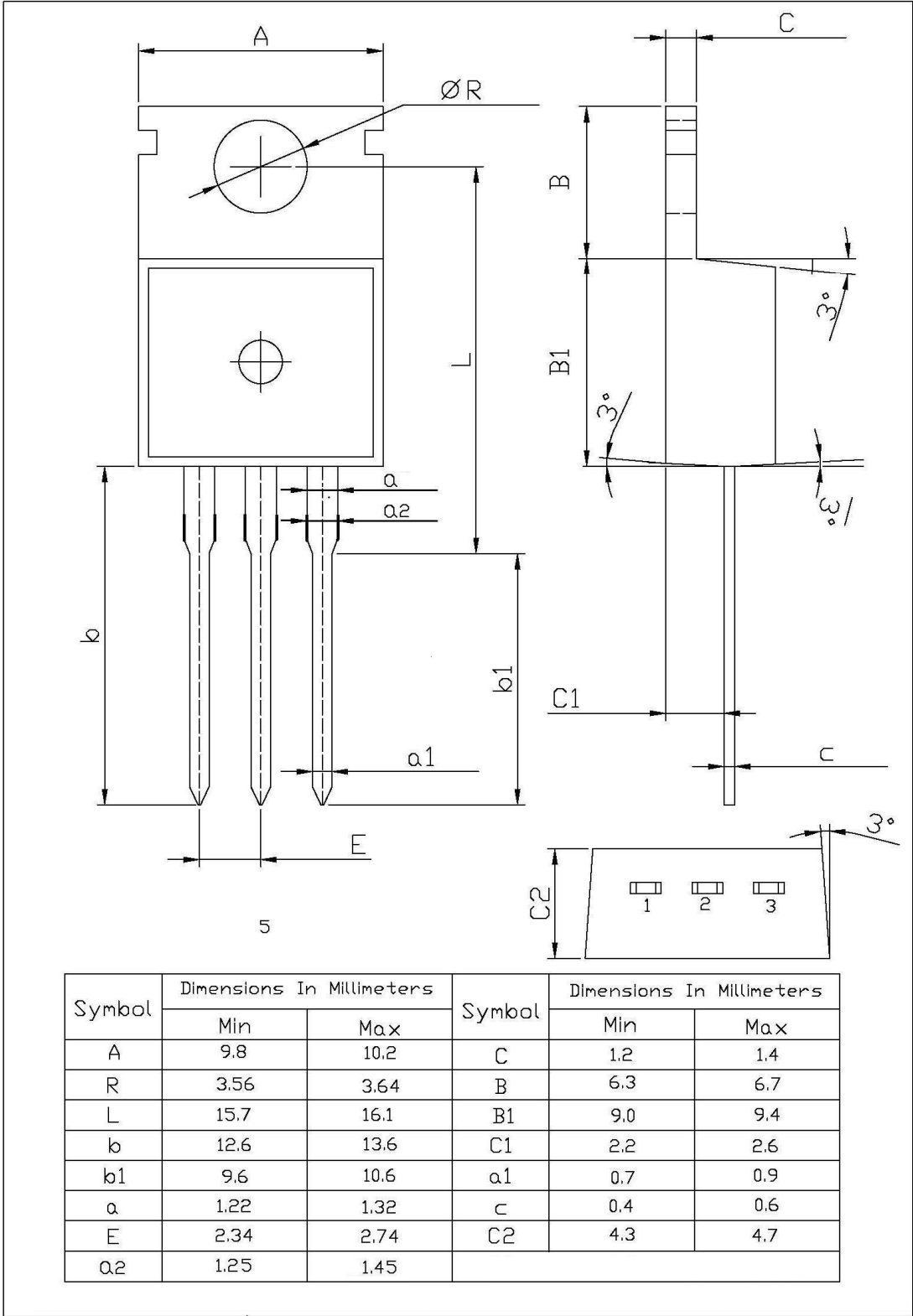
SOA(DC)

 $P_C$ - $T_C$  $h_{FE}$ - $I_C$  $V_{CES}$ - $I_C$  $t_s$ - $T_a$  $h_{FE}$ - $I_C$  $V_{BES}$ - $I_C$  $h_{FE}$ - $T_a$ 

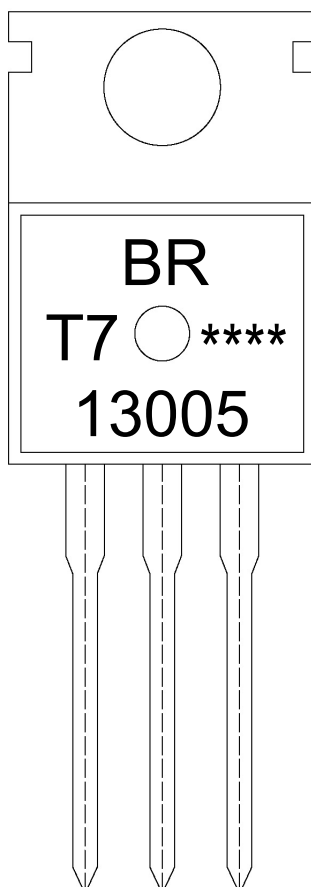
外形尺寸图 / Package Dimensions

T□-220

单位: mm



印章说明 / Marking Instructions



说明：

BR： 为公司代码

13005： 为型号代码

T7： 为规格代码

\*\*\*\*： 为生产批号代码，随生产批号变化。

Note:

BR: Company Code

13005: Product Type Code.

T7: Specification Code

\*\*\*\*: Lot No. Code, code change with Lot No.

## 波峰焊温度曲线图(无铅) / Temperature Profile for Dip Soldering(Pb-Free)



说明：

- 1、预热温度 25 ~ 150°C，时间 60 ~ 90sec;
- 2、峰值温度 255±5°C，时间持续为 5±0.5sec;
- 3、焊接制程冷却速度为 2 ~ 10°C/sec.

Note:

- 1.Preheating:25~150°C, Time:60~90sec.
- 2.Peak Temp.:255±5°C, Duration:5±0.5sec.
3. Cooling Speed: 2~10°C/sec.

## 耐焊接热试验条件 / Resistance to Soldering Heat Test Conditions

温度：270±5°C

时间：10±1 sec.

Temp.:270±5°C

Time:10±1 sec

## 包装规格 / Packaging SPEC.

散件包装 / BULK

| Package Type<br>封装形式 | Units 包装数量       |                       |                        |                              |                        | Dimension 包装尺寸 (unit: mm <sup>3</sup> ) |             |             |
|----------------------|------------------|-----------------------|------------------------|------------------------------|------------------------|-----------------------------------------|-------------|-------------|
|                      | Units/Bag<br>只/袋 | Bags/Inner Box<br>袋/盒 | Units/Inner Box<br>只/盒 | Inner Boxes/Outer Box<br>盒/箱 | Units/Outer Box<br>只/箱 | Bag 袋                                   | Inner Box 盒 | Outer Box 箱 |
| TO-220/F             | 200              | 10                    | 2,000                  | 5                            | 10,000                 | 135×190                                 | 237×172×102 | 560×245×195 |

套管包装 / TUBE

| Package Type<br>封装形式 | Units 包装数量         |                         |                        |                              |                        | Dimension 包装尺寸 (unit: mm <sup>3</sup> ) |             |             |
|----------------------|--------------------|-------------------------|------------------------|------------------------------|------------------------|-----------------------------------------|-------------|-------------|
|                      | Units/Tube<br>只/套管 | Tubes/Inner Box<br>套管/盒 | Units/Inner Box<br>只/盒 | Inner Boxes/Outer Box<br>盒/箱 | Units/Outer Box<br>只/箱 | Tube 套管                                 | Inner Box 盒 | Outer Box 箱 |
| TO-220/F             | 50                 | 20                      | 1,000                  | 5                            | 5,000                  | 532×31.4×5.5                            | 555×164×50  | 575×290×180 |

## 使用说明 / Notices