

**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**

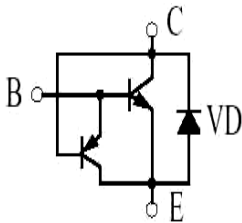
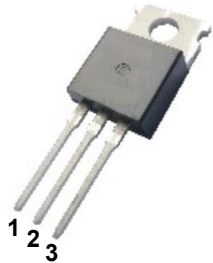
耐压高,开关速度快。

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                  |
| Collector Power Dissipation    | $P_C$                         | 2.0          | W                  |
|                                | $P_C(T_c=25^{\circ}\text{C})$ | 75           | W                  |
| Junction Temperature           | $T_J$                         | 150          | $^{\circ}\text{C}$ |
| Storage Temperature Range      | $T_{stg}$                     | -55~150      | $^{\circ}\text{C}$ |

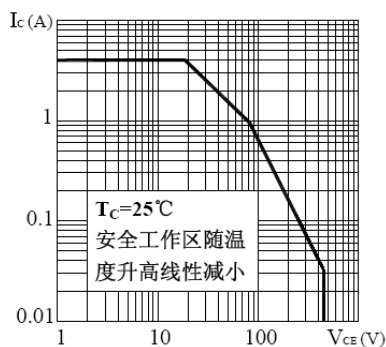
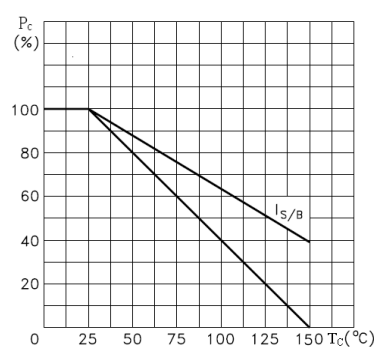
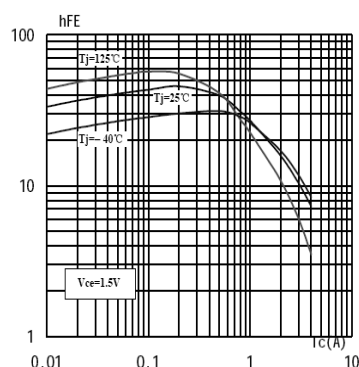
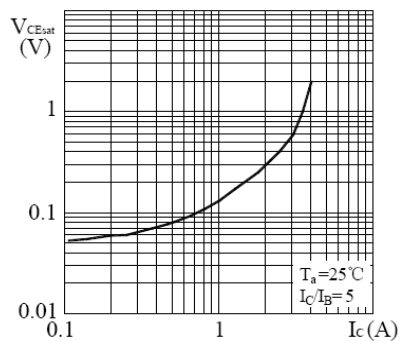
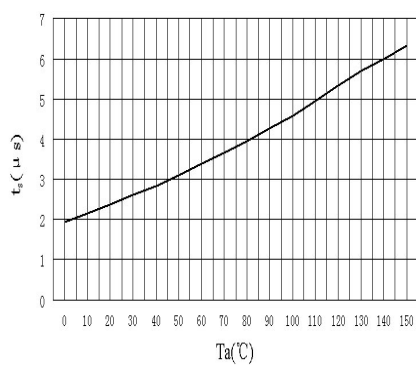
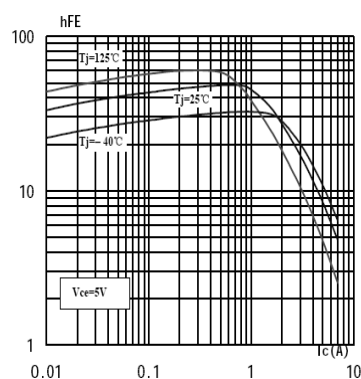
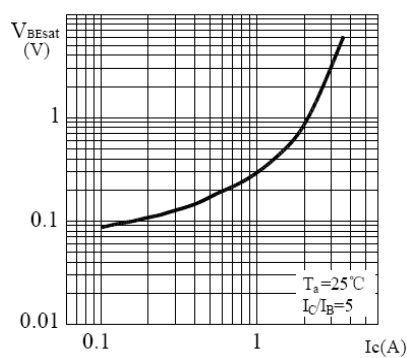
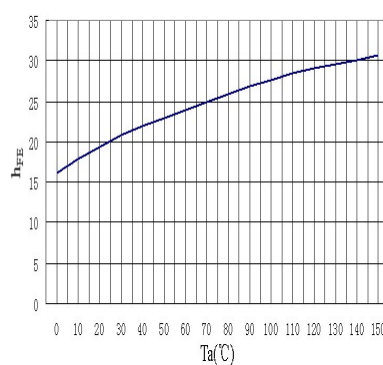
**电性能参数 / Electrical Characteristics(Ta=25°C)**

| 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     | $V_{CBO}$     | $I_C=1\text{mA}$ $I_E=0$                                   | 700        |            |            | V             |
| Collector to Emitter Breakdown Voltage  | $V_{CEO}$     | $I_C=10\text{mA}$ $I_B=0$                                  | 400        |            |            | V             |
| Emitter to Base Breakdown Voltage       | $V_{EBO}$     | $I_E=1\text{mA}$ $I_C=0$                                   | 9.0        |            |            | V             |
| Emitter Base Cut-Off Current            | $I_{CBO}$     | $V_{CB}=700\text{V}$ $I_E=0$                               |            |            | 0.1        | mA            |
| Collector Cut-Off Current               | $I_{CEO}$     | $V_{CE}=400\text{V}$ $I_B=0$                               |            |            | 0.1        | mA            |
| Collector cut-off current               | $I_{EBO}$     | $V_{EB}=9.0\text{V}$ $I_C=0$                               |            |            | 0.1        | mA            |
| DC Current Gain                         | $h_{FE}$      | $V_{CE}=5.0\text{V}$ $I_C=1.0\text{A}$                     | 10         |            | 40         |               |
| Collector to Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C=2.0\text{A}$ $I_B=0.5\text{A}$                        |            |            | 0.8        | V             |
| Base to Emitter Saturation Voltage      | $V_{BE(sat)}$ | $I_C=2.0\text{A}$ $I_B=0.5\text{A}$                        |            |            | 1.2        | V             |
| Transition Frequency                    | $f_T$         | $V_{CE}=10\text{V}$ $I_C=0.5\text{A}$<br>$f=1.0\text{MHz}$ | 7.0        |            |            | MHz           |
| Fall time                               | $t_f$         | $V_{CE}=5\text{V}$ $I_C=0.5\text{A}$<br>(UI9600)           |            |            | 0.8        | $\mu\text{s}$ |
| Storage time                            | $t_s$         |                                                            |            |            | 4.0        | $\mu\text{s}$ |



## 电参数曲线图 / Electrical Characteristic Curve

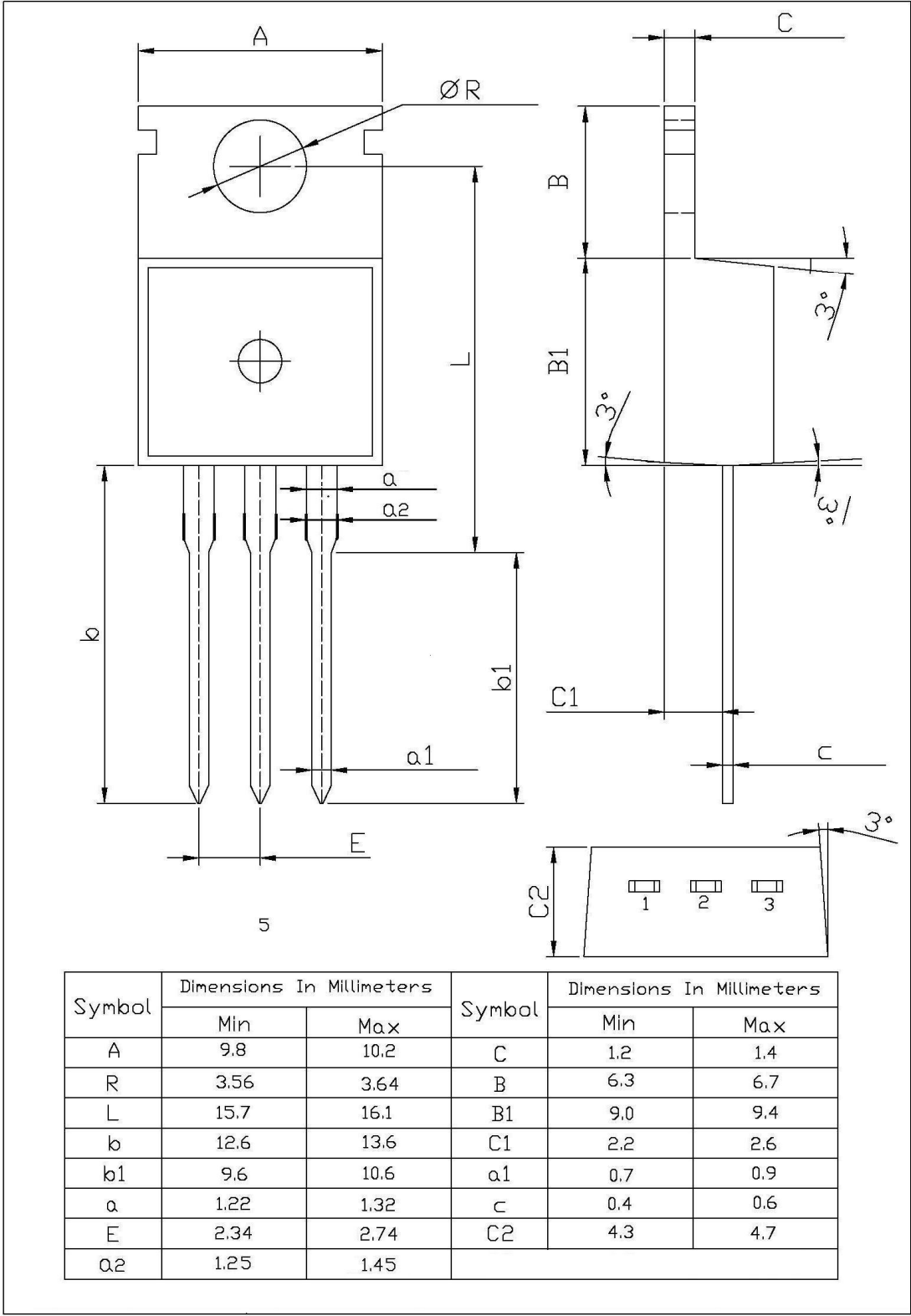
SOA(DC)

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

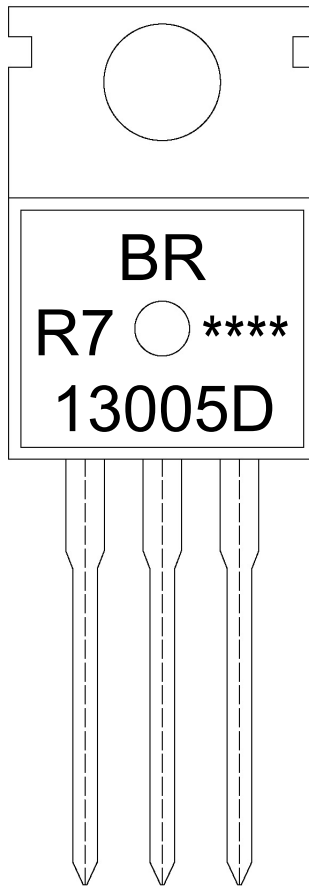
外形尺寸图 / Package Dimensions

T□-220

单位: mm



印章说明 / Marking Instructions



说明：

BR： 为公司代码

13005D： 为型号代码

R7： 为规格代码

\*\*\*\*： 为生产批号代码，随生产批号变化。

Note:

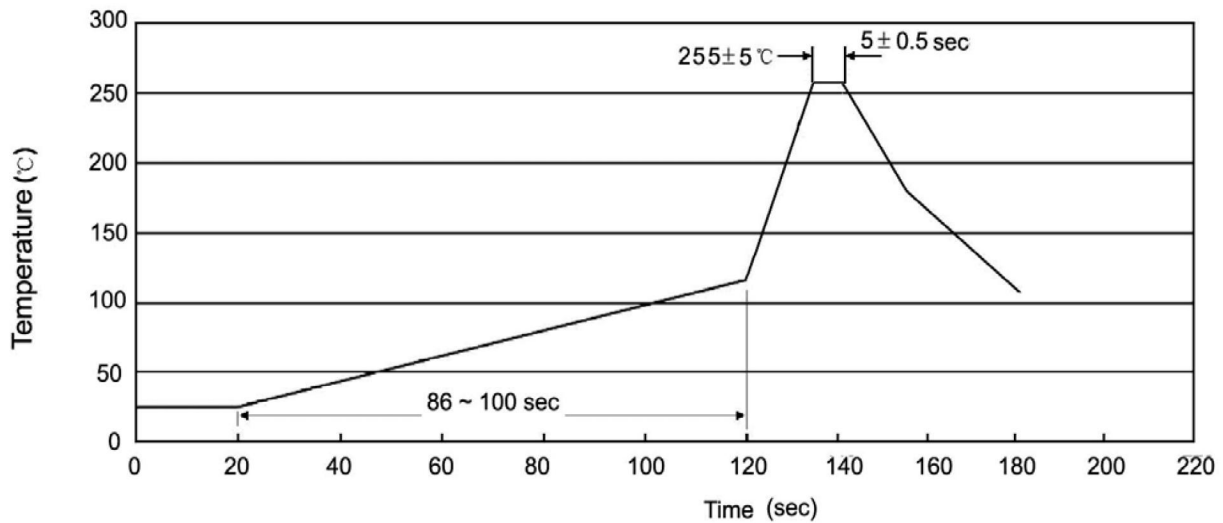
BR: Company Code

13005D: Product Type.

R7: 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