

**描述 / Descriptions**

TO-92 塑封封装 NPN 半导体三极管。Silicon NPN transistor in a TO-92 Plastic Package.

**特征 / Features**

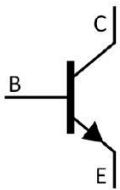
低电流，低电压。

Low current, Low voltage.

**用途 / Applications**

用于一般放大。

General purpose amplifier.

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

PIN1 : Collector      PIN 2 : Base      PIN 3 : Emitter

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

见印章说明。See Marking Instructions.

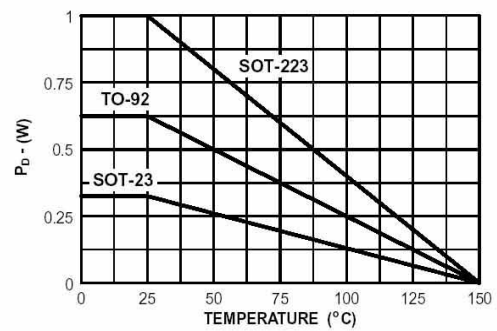
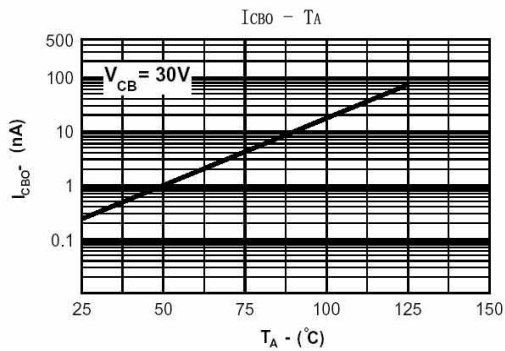
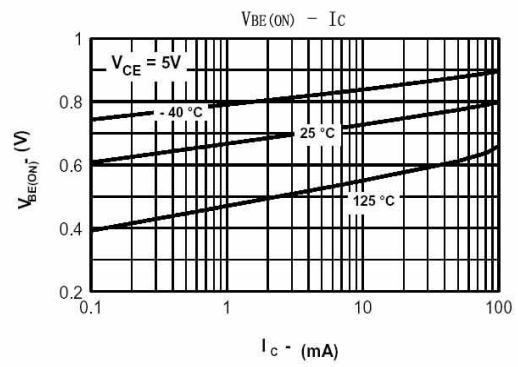
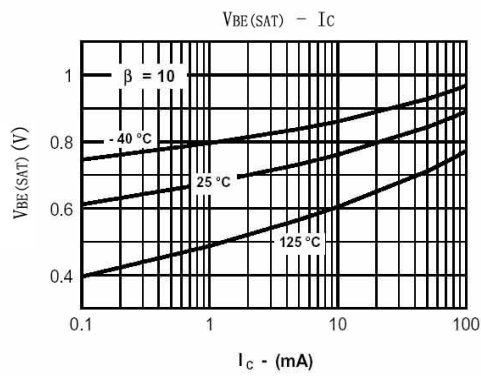
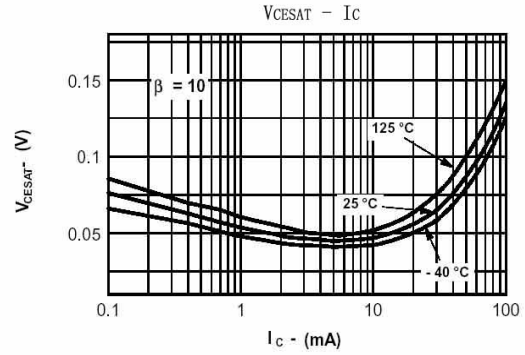
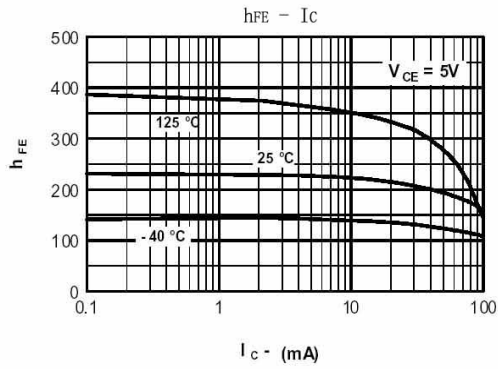
**极限参数 / Absolute Maximum Ratings(Ta=25°C)**

| 参数<br>Parameter                | 符号<br>Symbol | 数值<br>Rating | 单位<br>Unit |
|--------------------------------|--------------|--------------|------------|
| Collector to Base Voltage      | $V_{CBO}$    | 60           | V          |
| Collector to Emitter Voltage   | $V_{CEO}$    | 40           | V          |
| Emitter to Base Voltage        | $V_{EBO}$    | 6.0          | V          |
| Collector Current - Continuous | $I_C$        | 200          | mA         |
| Collector Power Dissipation    | $P_C$        | 625          | mW         |
| 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     | $V_{CBO}$     | $I_C=10\mu A$ $I_E=0$                                    | 60         |            |            | V          |
| Collector to Emitter Breakdown Voltage  | $V_{CEO}$     | $I_C=1.0mA$ $I_B=0$                                      | 40         |            |            | V          |
| Emitter to Base Breakdown Voltage       | $V_{EBO}$     | $I_E=10\mu A$ $I_C=0$                                    | 6.0        |            |            | V          |
| Collector Cut-Off Current               | $I_{CBO}$     | $V_{CB}=50V$ $I_E=0$                                     |            |            | 0.05       | $\mu A$    |
| Emitter Cut-Off Current                 | $I_{EBO}$     | $V_{EB}=5.0V$ $I_C=0$                                    |            |            | 0.05       | $\mu A$    |
| DC Current Gain                         | $h_{FE(1)}$   | $V_{CE}=1.0V$ $I_C=10mA$                                 | 100        |            | 300        |            |
|                                         | $h_{FE(2)}$   | $V_{CE}=1.0V$ $I_C=100mA$                                | 30         |            |            |            |
| Collector to Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C=50mA$ $I_B=5.0mA$                                   |            |            | 0.3        | V          |
| Base to Emitter Saturation Voltage      | $V_{BE(sat)}$ | $I_C=50mA$ $I_B=5.0mA$                                   |            |            | 0.95       | V          |
| Current Gain Bandwidth Product          | $f_T$         | $I_C=10mA$ $V_{CE}=20V$<br>$f=100MHz$                    | 300        |            |            | MHz        |
| Output Capacitance                      | $C_{ob}$      | $V_{CB}=5.0V$ $I_E=0$<br>$f=1.0MHz$                      |            |            | 4.0        | pF         |
| Turn On Time                            | $T_{on}$      | $V_{CC}=3.0V$ $V_{BE}=0.5V$<br>$I_C=10mA$ $I_{B1}=1.0mA$ |            |            | 0.07       | $\mu s$    |
| Turn Off Time                           | $T_{off}$     | $V_{CC}=3.0V$ $I_C=10mA$<br>$I_{B1}=-I_{B2}=1.0mA$       |            |            | 0.25       | $\mu s$    |

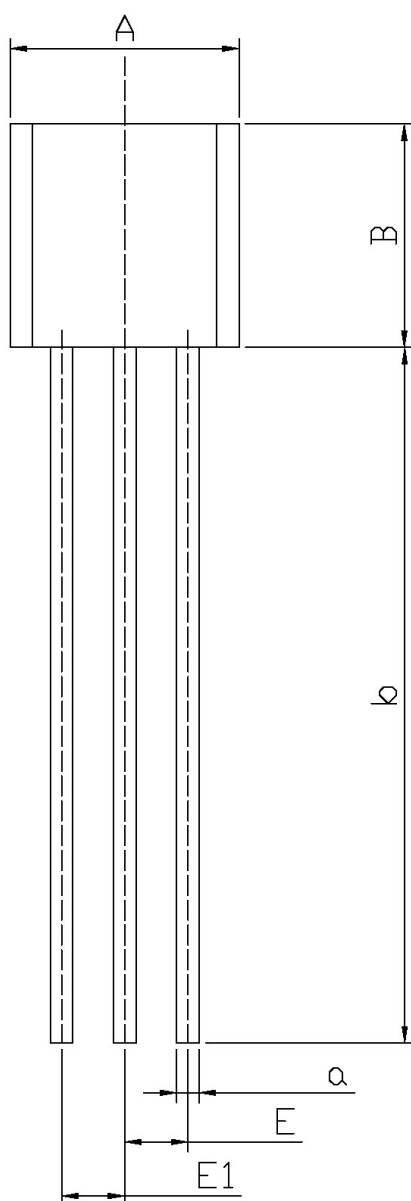
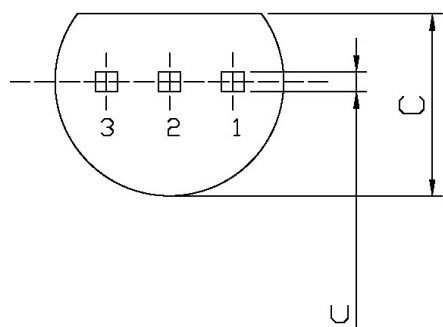
**电参数曲线图 / Electrical Characteristic Curve**



**外形尺寸图 / Package Dimensions**

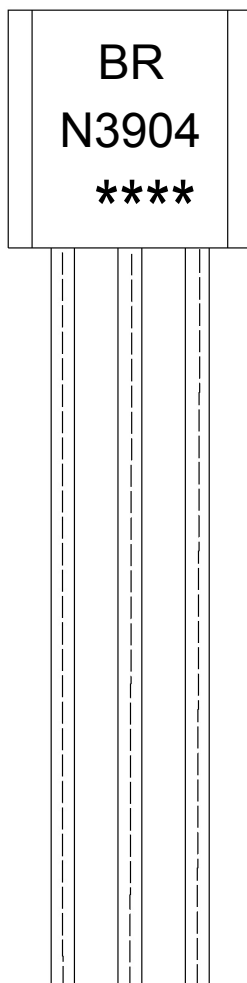
TO-92

Unit: mm



| Symbol | Dimensions In Millimeters |      |
|--------|---------------------------|------|
|        | Min                       | Max  |
| A      | 4.4                       | 4.8  |
| B      | 4.3                       | 4.7  |
| b      | 13                        | 15   |
| a      | 0.40                      | 0.60 |
| E      | 1.22                      | 1.32 |
| E1     | 1.22                      | 1.32 |
| C      | 3.4                       | 3.8  |
| c      | 0.30                      | 0.50 |

**印章说明 / Marking Instructions**



说明：

BR： 为公司代码

N3904： 为型号代码

\*\*\*\*： 为生产批号代码，随生产批号变化。

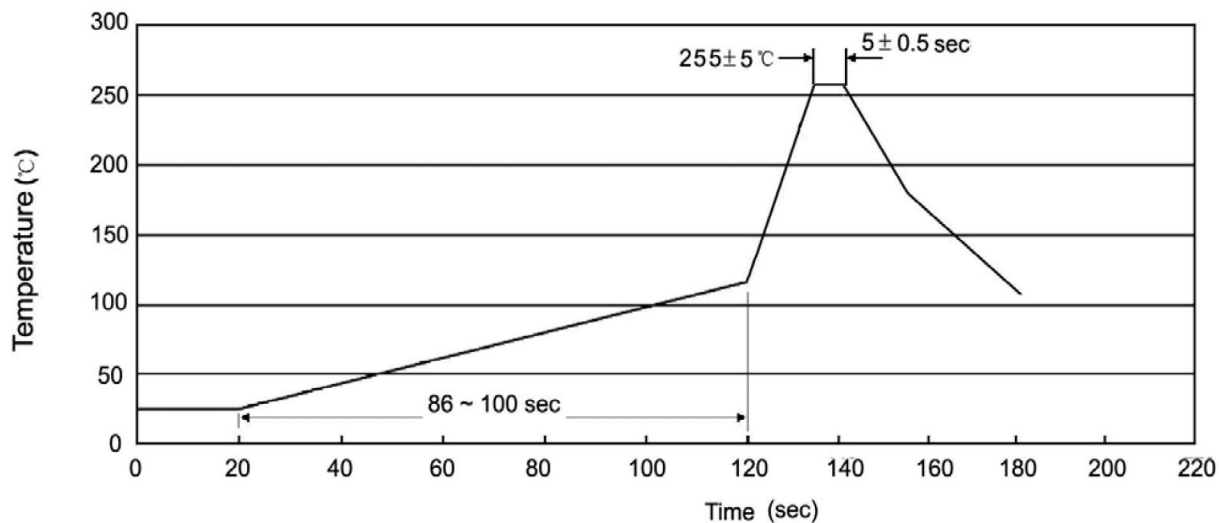
Note:

BR: Company Code.

N3904: Product Type.

\*\*\*\*: 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: mm3) |             |             |
|----------------------|------------------|-----------------------|------------------------|------------------------------|------------------------|----------------------------|-------------|-------------|
|                      | 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-92                | 1,000            | 10                    | 10,000                 | 5                            | 50,000                 | 135×190                    | 237×172×102 | 560×245×195 |
|                      | 1,000            | 10                    | 10,000                 | 10                           | 100,000                | 135×190                    | 237×172×102 | 560×245×375 |

编带包装 / AMMO

| Package Type<br>封装形式 | Units 包装数量         |                        |                         |                              |                        | Dimension 包装尺寸 (unit: mm3) |                                   |
|----------------------|--------------------|------------------------|-------------------------|------------------------------|------------------------|----------------------------|-----------------------------------|
|                      | Units/tape<br>只/纸带 | Tape/Inner Box<br>纸带/盒 | Rows/Inner Box<br>纸带层/盒 | Inner Boxes/Outer Box<br>盒/箱 | Units/Outer Box<br>只/箱 | Inner Box 盒                | Outer Box 箱                       |
| TO-92                | 3,000              | 1                      | 120                     | 10                           | 30,000                 | 328×230×42                 | 小箱 480×346×235,<br>大箱 547×407×268 |

### 使用说明 / Notices