

### 描述 / Descriptions

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

### 特征 / Features

低饱和压降，电流放大线性好，开关速度快。

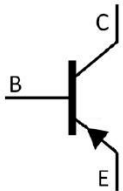
Low saturation voltage, excellent dependence of  $h_{FE}$  on current, fast switching time.

### 用途 / Applications

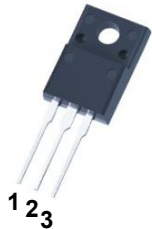
用于灯驱动，功率放大，高速开关。

Lamp drivers, power amplifiers, high-speed switching.

### 内部等效电路 / Equivalent Circuit



### 引脚排列 / Pinning



PIN 1 : Base      PIN 2 : Collector      PIN 3 : Emitter

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

|                                    |        |         |         |
|------------------------------------|--------|---------|---------|
| $h_{FE}$ Classifications<br>Symbol | Q      | R       | S       |
| $h_{FE}$ Range                     | 70~140 | 100~200 | 140~280 |

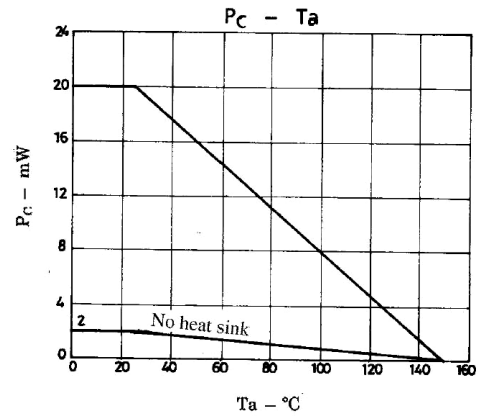
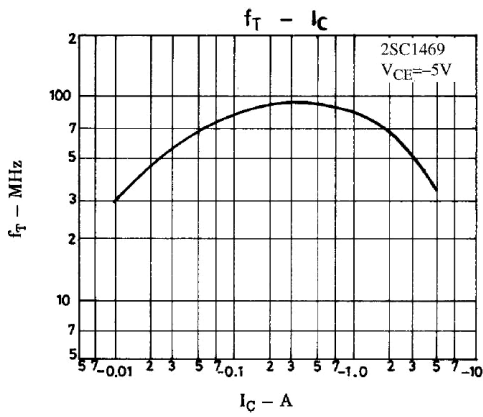
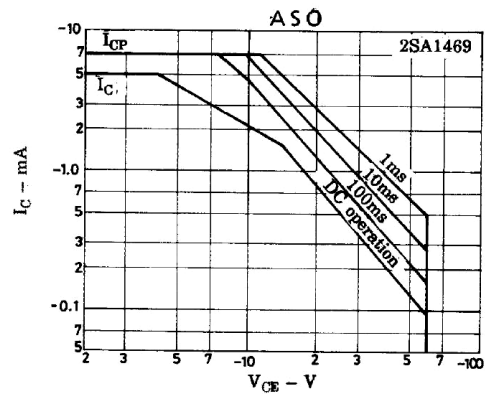
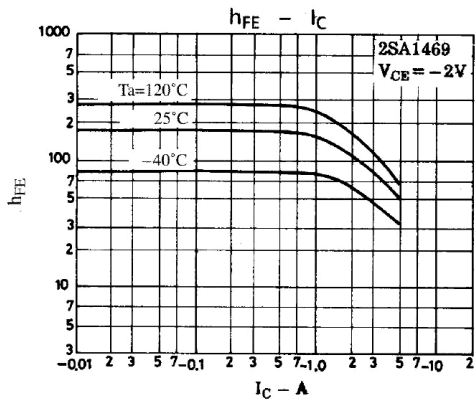
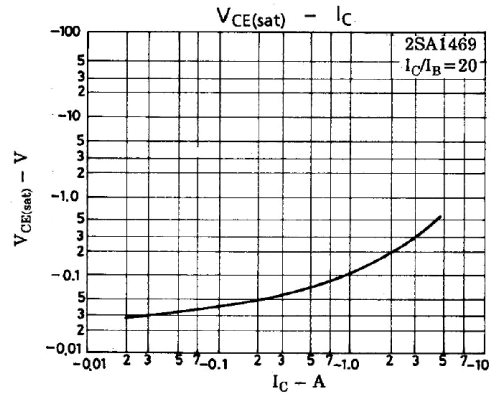
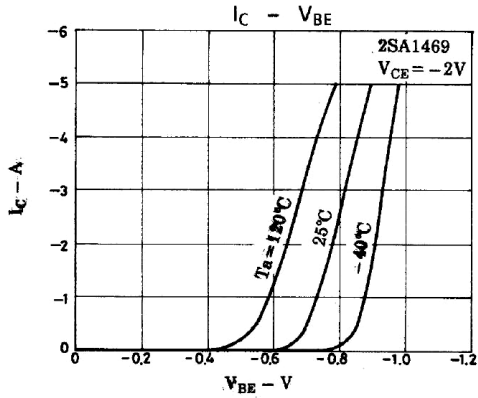
**极限参数 / Absolute Maximum Ratings(Ta=25°C)**

| 参数<br>Parameter                       | 符号<br>Symbol          | 数值<br>Rating | 单位<br>Unit |
|---------------------------------------|-----------------------|--------------|------------|
| Collector to Base Voltage             | $V_{CBO}$             | -80          | V          |
| Collector to Emitter Voltage          | $V_{CEO}$             | -60          | V          |
| Emitter to Base Voltage               | $V_{EBO}$             | -5.0         | V          |
| Collector Current - Continuous        | $I_C$                 | -5.0         | A          |
| Collector Current – Continuous(Pulse) | $I_{CP}$              | -7.0         | A          |
| Collector Power Dissipation           | $P_C$                 | 2.0          | W          |
| Collector Power Dissipation           | $P_C(T_c=25^\circ C)$ | 20           | 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     | $V_{CBO}$     | $I_C=-1.0mA$ $I_E=0$        | -80        |            |            | V          |
| Collector to Base Breakdown Voltage     | $V_{CEO}$     | $I_C=-1.0mA$ $I_B=0$        | -60        |            |            | V          |
| Emitter to Base Breakdown Voltage       | $V_{EBO}$     | $I_E=-1.0mA$ $I_C=0$        | -5.0       |            |            | V          |
| Collector Cut-Off Current               | $I_{CBO}$     | $V_{CB}=-40V$ $I_E=0$       |            |            | -0.1       | mA         |
| Emitter Cut-Off Current                 | $I_{EBO}$     | $V_{EB}=-4.0V$ $I_C=0$      |            |            | -0.1       | mA         |
| DC Current Gain                         | $h_{FE}$      | $V_{CE}=-2.0V$ $I_C=-1.0A$  | 70         |            | 280        |            |
| Collector to Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C=-2.5A$ $I_B=-0.125A$   |            |            | -0.4       | V          |
| Transition Frequency                    | $f_T$         | $V_{CE}=-5.0V$ $I_C=-1.0A$  |            | 100        |            | MHz        |
| Turn-On Time                            | $t_{on}$      | $20I_{B1}=-20I_{B2}=I_C=2A$ |            | 0.1        |            | μs         |
| Storage Time                            | $t_{stg}$     |                             |            | 0.5        |            |            |
| Fall Time                               | $t_f$         |                             |            | 0.1        |            |            |

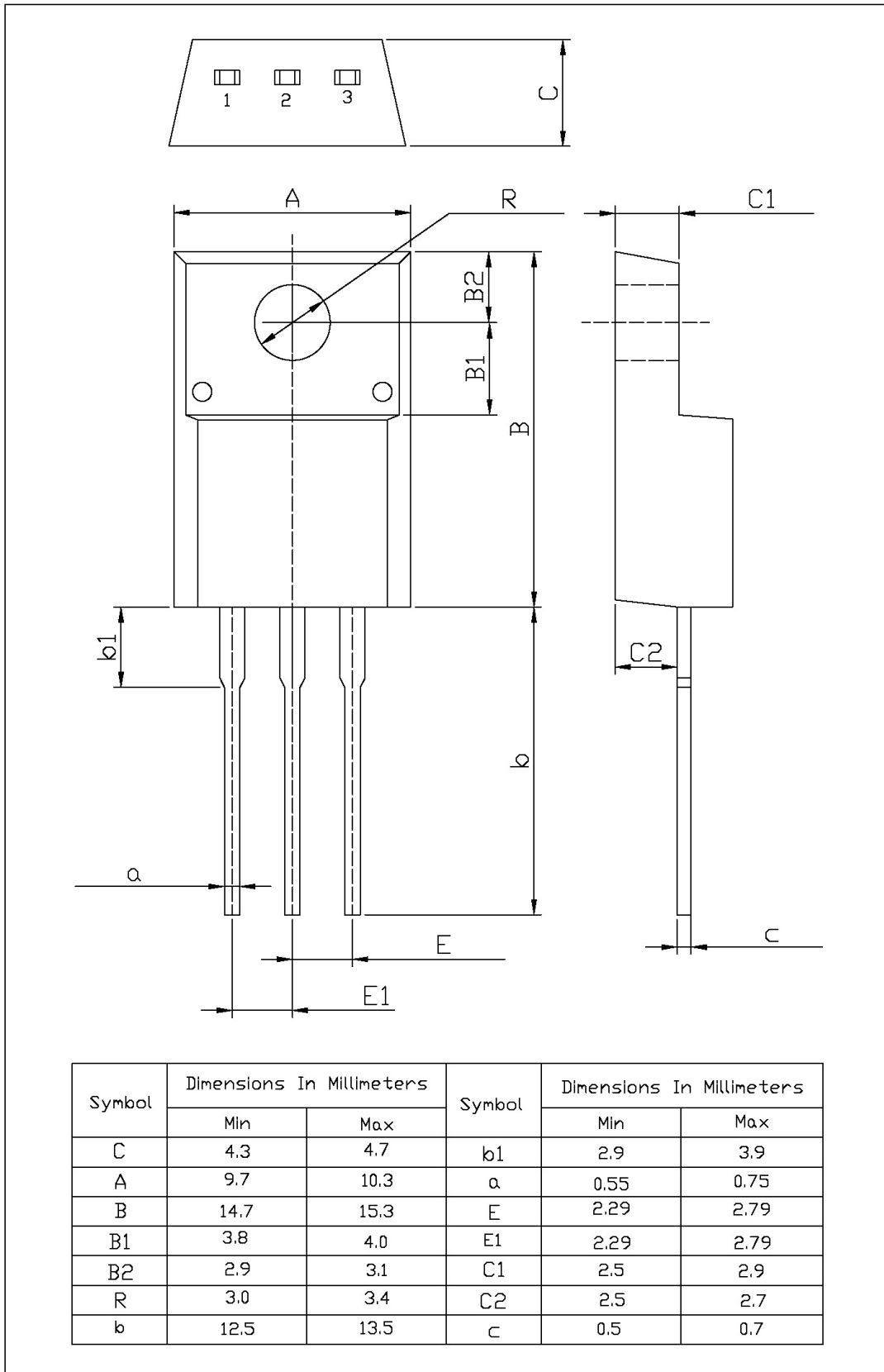
电参数曲线图 / Electrical Characteristic Curve



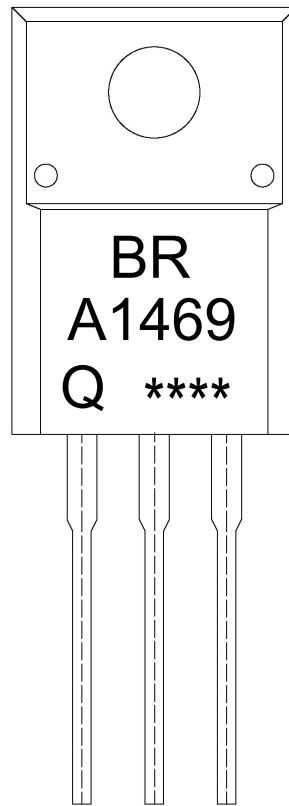
外形尺寸图 / Package Dimensions

T0-220F

单位: mm



印章说明 / Marking Instructions



说明：

BR： 为公司代码

A1469： 为型号代码

Q： 为  $h_{FE}$  分档代码

\*\*\*\*： 为生产批号代码，随生产批号变化。

Note:

BR: Company Code.

A1469: Product Type.

Q:  $h_{FE}$  Classifications Symbol

\*\*\*\*: 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**