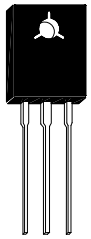
# HSD669AT

NPN Epitaxial Planar Transistor



TO-126

## Description

Low frequency power amplifier complementary pair with HSB649A

## Absolute Maximum Ratings ($T_A$=25°C)

- Maximum Temperatures
  - Storage Temperature ..... -55 ~ +150 °C
  - Junction Temperature ..... +150 °C Maximum
- Maximum Power Dissipation
  - Total Power Dissipation ($T_A$=25°C) ..... 1 W
  - Total Power Dissipation ($T_C$=25°C) ..... 20 W
- Maximum Voltages and Currents
  - $BV_{CBO}$ Collector to Base Voltage ..... 180 V
  - $BV_{CEO}$ Collector to Emitter Voltage ..... 160 V
  - $BV_{EBO}$ Emitter to Base Voltage ..... 5 V
  - $I_C$ Collector Current (DC) ..... 1.5 A
  - $I_C$ Collector Current (Pulse) ..... 3 A

## Electrical Characteristics ($T_A$=25°C)

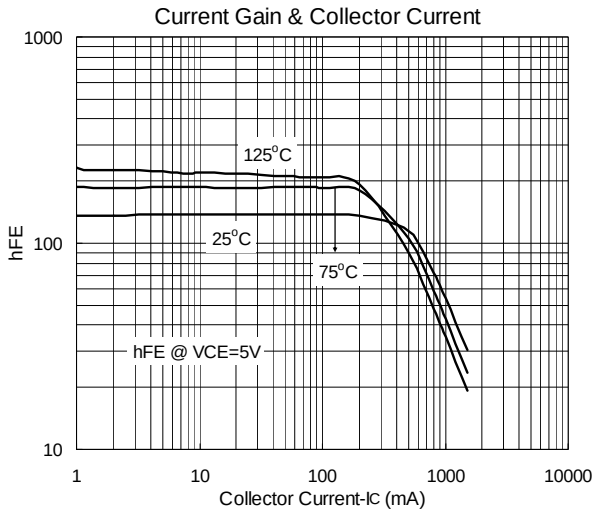
| Symbol | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|
| $BV_{CBO}$ | 180 | - | - | V | $I_C$=1mA, $I_E$=0 |
| $BV_{CEO}$ | 160 | - | - | V | $I_C$=10mA, $I_B$=0 |
| $BV_{EBO}$ | 5 | - | - | V | $I_E$=1mA, $I_C$=0 |
| $I_{CBO}$ | - | - | 10 | uA | $V_{CB}$=160V, $I_E$=0 |
| *$V_{CE(sat)}$ | - | - | 1 | V | $I_C$=500mA, $I_B$=50mA |
| $V_{BE(on)}$ | - | - | 1.5 | V | $I_C$=150mA, $V_{CE}$=5V |
| *$h_{FE1}$ | 100 | - | 200 | | $I_C$=150mA, $V_{CE}$=5V |
| *$h_{FE2}$ | 30 | - | - | | $I_C$=500mA, $V_{CE}$=5V |
| $f_T$ | - | 140 | - | MHz | $I_C$=150mA , $V_{CE}$=5V |
| Cob | - | 14 | - | pF | $V_{CB}$=10V, f=1MHz, $I_E$=0 |

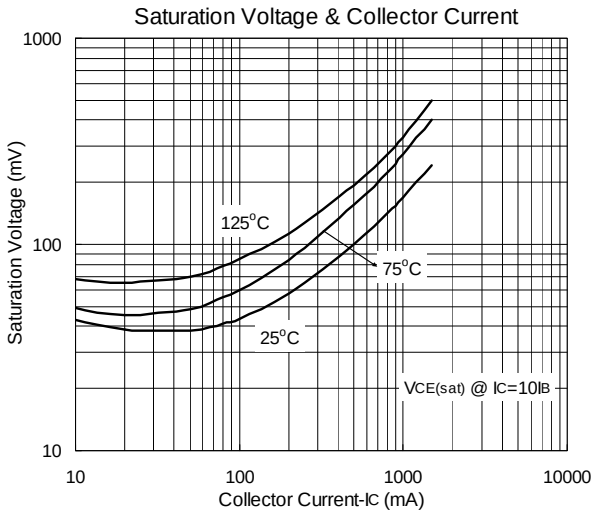
*Pulse Test: Pulse Width ≤380us, Duty Cycle≤2%

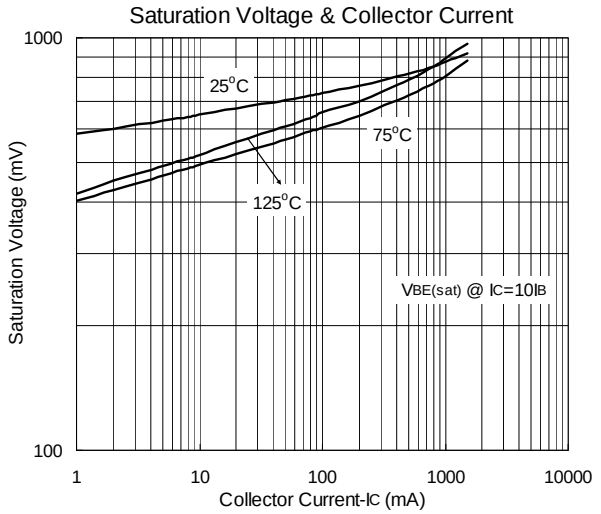
## Classification Of $h_{FE1}$

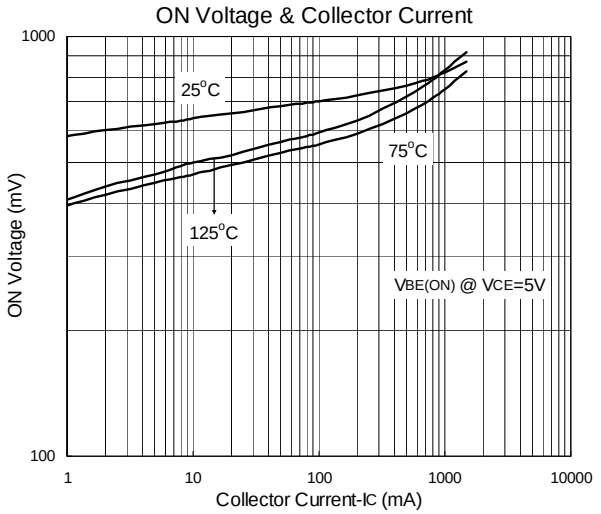
| Rank | C |
|---|---|
| Range | 100-200 |

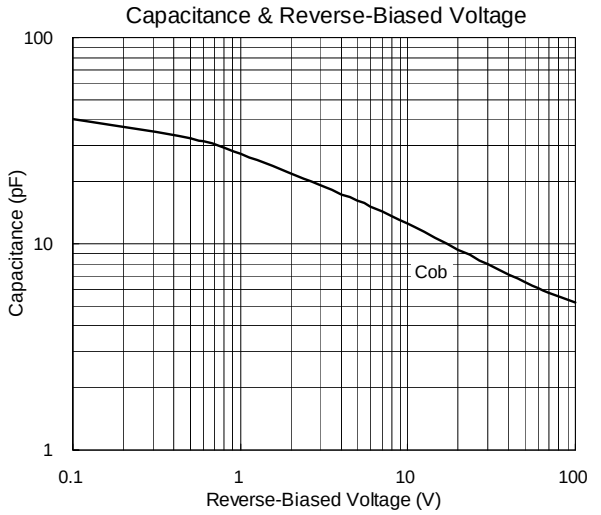
## Characteristics Curve

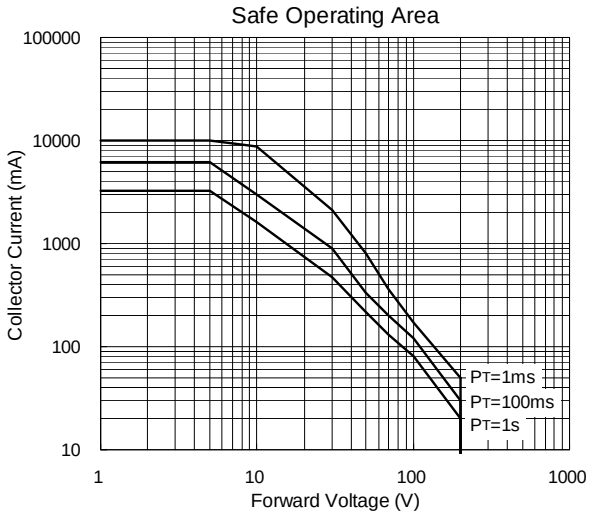


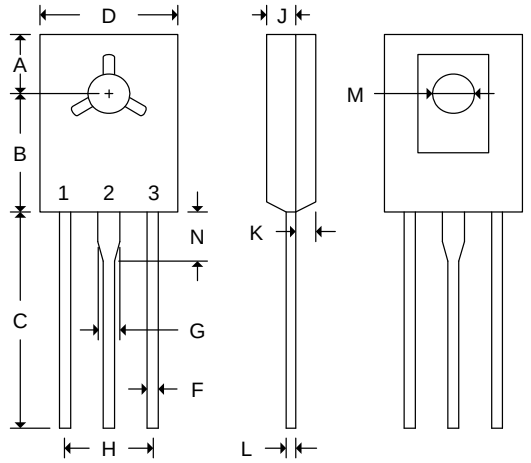



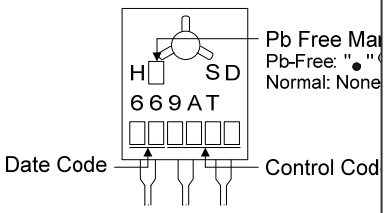



## TO-126 Dimension




3-Lead TO-126
Plastic Package
HSMC Package Code: T

Marking:




Note: Green label is used for pb-free packing

Pin Style: 1.Emitter 2.Collector 3.Base

Material:
- Lead solder plating: Sn60/Pb40 (Normal), Sn/3.0Ag/0.5Cu or Pure-Tin (Pb-free)

| DIM | Min. | Max. |
|---|---|---|
| A | 3.60 | 4.40 |
| B | 6.90 | 7.60 |
| C | 13.00 | 16.50 |
| D | 7.20 | 8.50 |
| F | 0.65 | 0.88 |
| G | 1.00 | 1.42 |
| H | 4.52 | 4.62 |
| J | 1.14 | 1.50 |
| K | 0.90 | 1.50 |
| L | 0.45 | 0.60 |
| M | 2.92 | 3.40 |
| N | 2.00 | 2.70 |

*: Typical, Unit: mm

### *Important Notice:*

- All rights are reserved. Reproduction in whole or in part is prohibited without the prior written approval of HSMC.
- HSMC reserves the right to make changes to its products without notice.
- ***HSMC semiconductor products are not warranted to be suitable for use in Life-Support Applications, or systems.***
- HSMC assumes no liability for any consequence of customer product design, infringement of patents, or application assistance.

### *Head Office And Factory:*

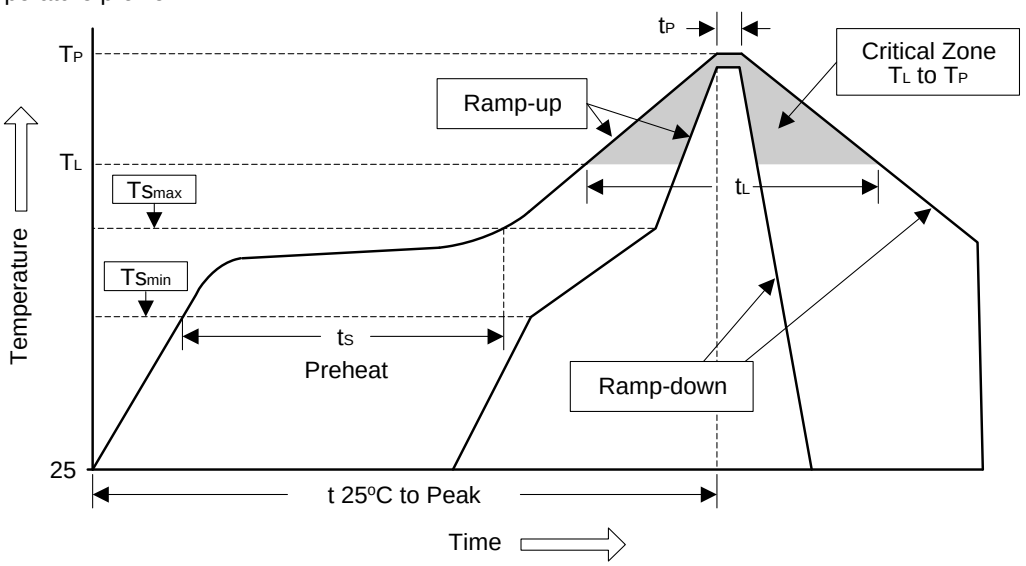
- **Head Office** (Hi-Sincerity Microelectronics Corp.): 10F.,No. 61, Sec. 2, Chung-Shan N. Rd. Taipei Taiwan R.O.C.
  Tel: 886-2-25212056 Fax: 886-2-25632712, 25368454

## Soldering Methods for HSMC's Products

1. Storage environment: Temperature=10°C~35°C Humidity=65%±15%

2. Reflow soldering of surface-mount devices

Figure 1: Temperature profile




| Profile Feature | Sn-Pb Eutectic Assembly | Pb-Free Assembly |
|---|---|---|
| Average ramp-up rate ($T_L$ to $T_P$) | <3°C/sec | <3°C/sec |
| Preheat<br>- Temperature Min ($Ts_{min}$)<br>- Temperature Max ($Ts_{max}$)<br>- Time (min to max) (ts) | <br>100°C<br>150°C<br>60~120 sec | <br>150°C<br>200°C<br>60~180 sec |
| Tsmax to $T_L$<br>- Ramp-up Rate | <br><3°C/sec | <br><3°C/sec |
| Time maintained above:<br>- Temperature ($T_L$)<br>- Time ($t_L$) | <br>183°C<br>60~150 sec | <br>217°C<br>60~150 sec |
| Peak Temperature ($T_P$) | 240°C +0/-5°C | 260°C +0/-5°C |
| Time within 5°C of actual Peak Temperature ($t_P$) | 10~30 sec | 20~40 sec |
| Ramp-down Rate | <6°C/sec | <6°C/sec |
| Time 25°C to Peak Temperature | <6 minutes | <8 minutes |

3. Flow (wave) soldering (solder dipping)

| Products | Peak temperature | Dipping time |
|---|---|---|
| Pb devices. | 245°C ±5°C | 10sec ±1sec |
| Pb-Free devices. | 260°C ±5°C | 10sec ±1sec |