

## High power PNP epitaxial planar bipolar transistor

### Features

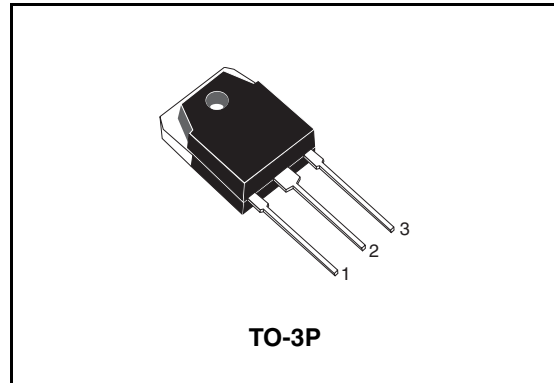
- High breakdown voltage  $V_{CE0} = -140\text{ V}$
- Complementary to 2STC4468
- Typical  $f_t = 20\text{ MHz}$
- Fully characterized at  $125\text{ }^\circ\text{C}$

### Applications

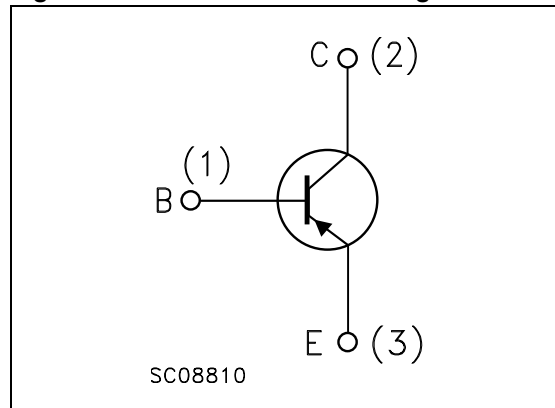
- Audio power amplifier

### Description

The device is a PNP transistor manufactured using new BiT-LA (Bipolar transistor for linear amplifier) technology. The resulting transistor shows good gain linearity behaviour. Recommended for 70 W to 100 W high fidelity audio frequency amplifier output stage.



**Figure 1. Internal schematic diagram**



**Table 1. Device summary**

| Order code | Marking  | Package | Packaging |
|------------|----------|---------|-----------|
| 2STA1695   | 2STA1695 | TO-3P   | Tube      |

# 1 Electrical ratings

**Table 2. Absolute maximum rating**

| Symbol    | Parameter                               | Value      | Unit |
|-----------|---|------------|------|
| $V_{CBO}$ | Collector-base voltage ( $I_E = 0$ )    | -140       | V    |
| $V_{CEO}$ | Collector-emitter voltage ( $I_B = 0$ ) | -140       | V    |
| $V_{EBO}$ | Emitter-base voltage ( $I_C = 0$ )      | -6         | V    |
| $I_C$     | Collector current                       | -10        | A    |
| $I_{CM}$  | Collector peak current ( $t_P < 5$ ms)  | -20        | A    |
| $P_{tot}$ | Total dissipation at $T_C = 25$ °C      | 100        | W    |
| $T_{stg}$ | Storage temperature                     | -65 to 150 | °C   |
| $T_J$     | Max. operating junction temperature     | 150        | °C   |

**Table 3. Thermal data**

| Symbol         | Parameter                            | Value | Unit |
|----------------|--------------------------------------|-------|------|
| $R_{thj-case}$ | Thermal resistance junction-case max | 1.25  | °C/W |

## 2 Electrical characteristics

( $T_{\text{case}} = 25\text{ }^{\circ}\text{C}$ ; unless otherwise specified)

**Table 4. Electrical characteristics**

| Symbol  | Parameter   | Test conditions   | Min. | Typ. | Max. | Unit          |
|---|---|---|------|------|------|---------------|
| $I_{\text{CBO}}$                                      | Collector cut-off current<br>( $I_{\text{E}} = 0$ )           | $V_{\text{CB}} = -140\text{ V}$                               |      |      | -0.1 | $\mu\text{A}$ |
| $I_{\text{EBO}}$                                      | Emitter cut-off current<br>( $I_{\text{C}} = 0$ )             | $V_{\text{EB}} = -6\text{ V}$                                 |      |      | -0.1 | $\mu\text{A}$ |
| $V_{(\text{BR})\text{CEO}}$                           | Collector-emitter breakdown<br>voltage ( $I_{\text{B}} = 0$ ) | $I_{\text{C}} = -50\text{ mA}$                                | -140 |      |      | V             |
| $V_{(\text{BR})\text{CBO}}$                           | Collector-base breakdown<br>voltage ( $I_{\text{E}} = 0$ )    | $I_{\text{C}} = -100\text{ }\mu\text{A}$                      | -140 |      |      | V             |
| $V_{(\text{BR})\text{EBO}}^{(1)}$                     | Emitter-base breakdown<br>voltage ( $I_{\text{C}} = 0$ )      | $I_{\text{E}} = -1\text{ mA}$                                 | -6   |      |      | V             |
| $V_{\text{CE}(\text{sat})}^{(1)}$                     | Collector-emitter saturation<br>voltage                       | $I_{\text{C}} = -5\text{ A}$ $I_{\text{B}} = -500\text{ mA}$  |      |      | -0.5 | V             |
|   |   | $I_{\text{C}} = -7\text{ A}$ $I_{\text{B}} = -700\text{ mA}$  |      |      | -0.7 | V             |
| $V_{\text{BE}}^{(1)}$                                 | Base-emitter voltage  | $V_{\text{CE}} = -5\text{ V}$ $I_{\text{C}} = -5\text{ A}$    |      |      | -1.3 | V             |
| $h_{\text{FE}}$                                       | DC current gain   | $I_{\text{C}} = -3\text{ A}$ $V_{\text{CE}} = -4\text{ V}$    | 70   |      | 140  |               |
|   |   | $I_{\text{C}} = -5\text{ A}$ $V_{\text{CE}} = -4\text{ V}$    | 50   |      |      |               |
| $f_{\text{T}}$  | Transition frequency  | $I_{\text{C}} = -0.5\text{ A}$ $V_{\text{CE}} = -12\text{ V}$ |      | 20   |      | MHz           |
| $C_{\text{CBO}}$                                      | Collector-base capacitance<br>( $I_{\text{E}} = 0$ )          | $V_{\text{CB}} = -10\text{ V}$ $f = 1\text{ MHz}$             |      | 225  |      | pF            |
| $t_{\text{on}}$<br>$t_{\text{stg}}$<br>$t_{\text{f}}$ | Resistive load  |   |      |      |      |               |
|   | Turn-on time  | $I_{\text{C}} = -5\text{ A}$ $V_{\text{CC}} = -60\text{ V}$   |      | 0.24 |      | $\mu\text{s}$ |
|   | Storage time  | $I_{\text{B1}} = -I_{\text{B2}} = -0.5\text{ A}$              |      | 1.2  |      | $\mu\text{s}$ |
|   | Fall time   |   |      | 0.24 |      | $\mu\text{s}$ |

1. Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle  $\leq 1.5\%$

## 2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

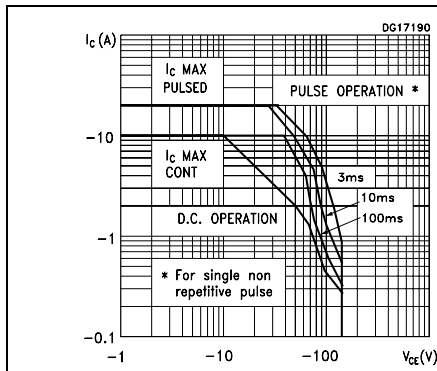


Figure 4. DC current gain

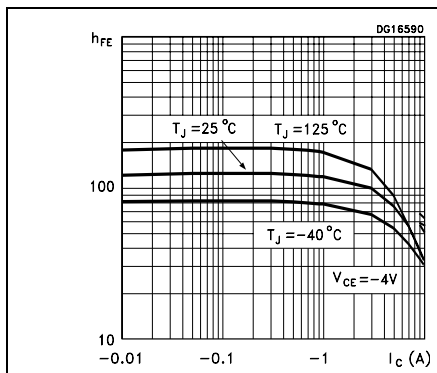


Figure 6. Base-emitter voltage

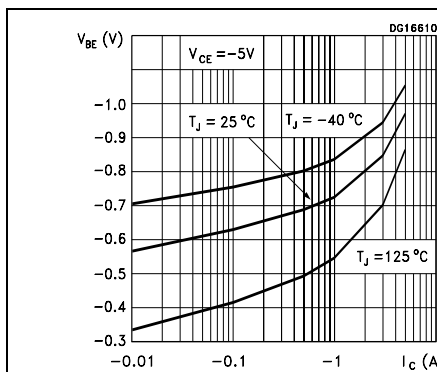


Figure 3. Output characteristics

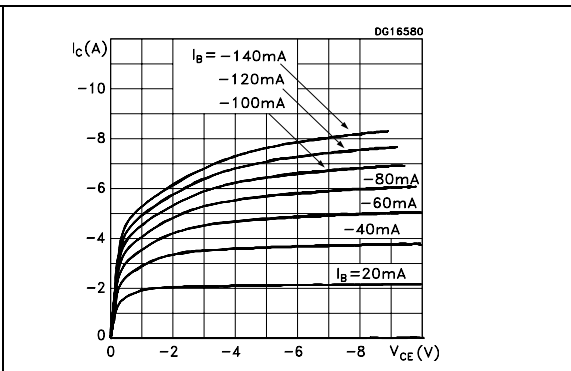


Figure 5. Collector-emitter saturation voltage

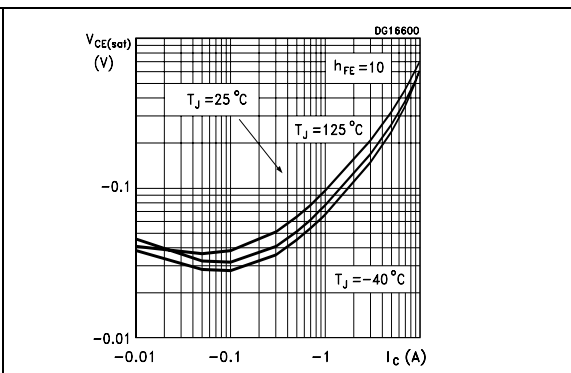
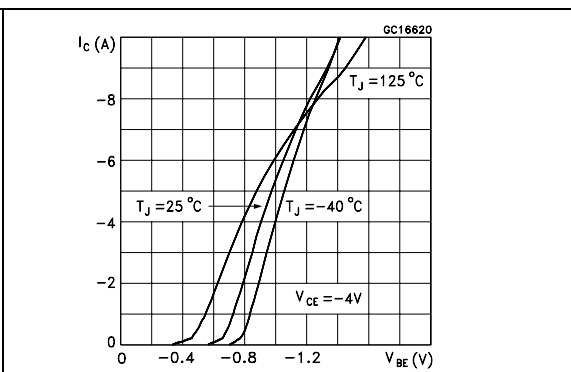
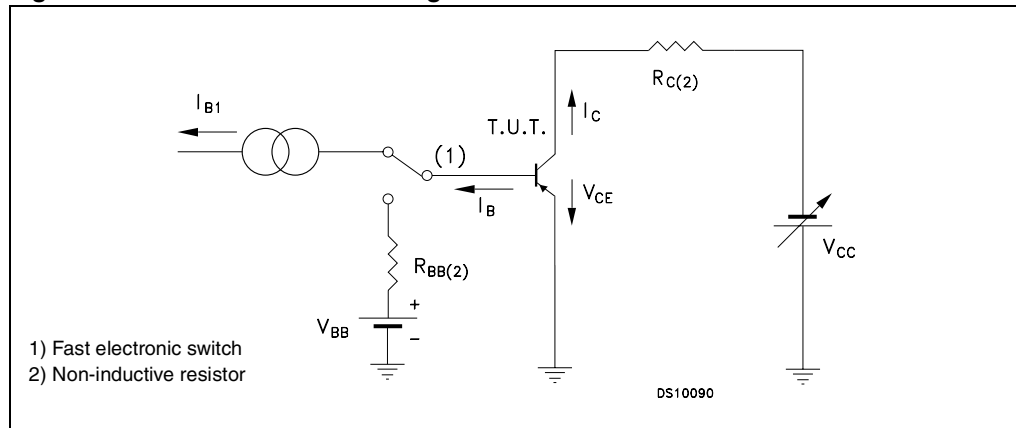


Figure 7. Base-emitter voltage



## 2.2 Test circuit

Figure 8. Resistive load switching test circuit

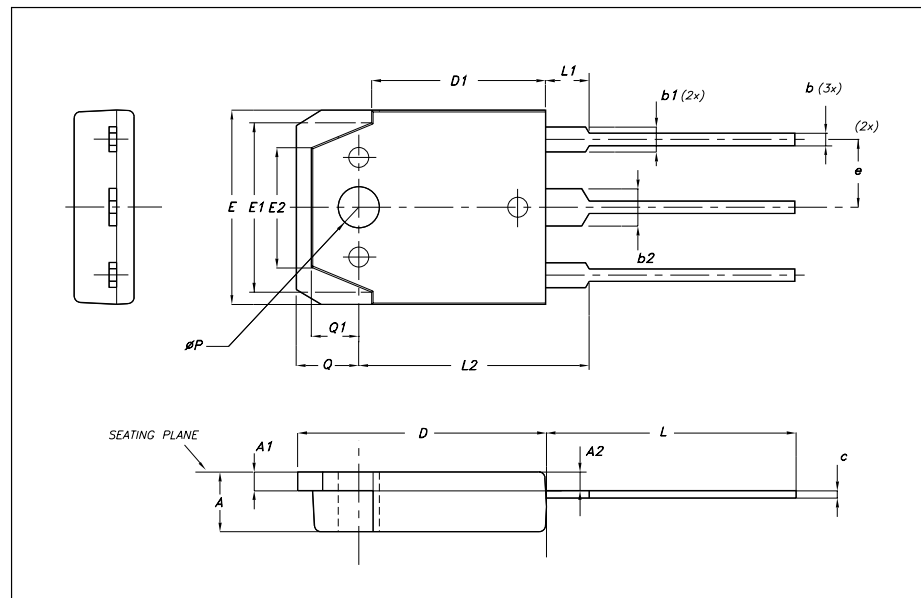


### 3 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect . The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: [www.st.com](http://www.st.com)

## TO-3P Mechanical data

| DIM. | mm.   |       |       |
|------|-------|-------|-------|
|      | MIN.  | TYP   | MAX.  |
| A    | 4.6   |       | 5     |
| A1   | 1.45  | 1.50  | 1.65  |
| A2   | 1.20  | 1.40  | 1.60  |
| b    | 0.80  | 1     | 1.20  |
| b1   | 1.80  |       | 2.20  |
| b2   | 2.80  |       | 3.20  |
| c    | 0.55  | 0.60  | 0.75  |
| D    | 19.70 | 19.90 | 20.10 |
| D1   |       | 13.90 |       |
| E    | 15.40 |       | 15.80 |
| E1   |       | 13.60 |       |
| E2   |       | 9.60  |       |
| e    | 5.15  | 5.45  | 5.75  |
| L    | 19.50 | 20    | 20.50 |
| L1   |       | 3.50  |       |
| L2   | 18.20 | 18.40 | 18.60 |
| P    | 3.10  |       | 3.30  |
| Q    |       | 5     |       |
| Q1   |       | 3.80  |       |



## 4 Revision history

**Table 5. Document revision history**

| Date        | Revision | Changes  |
|-------------|----------|--|
| 18-May-2007 | 1        | Initial release  |
| 06-Nov-2008 | 2        | Document status promoted from preliminary data to datasheet. |



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