

High power PNP epitaxial planar bipolar transistor

Features

- High breakdown voltage $V_{CEO} = -140\text{ V}$
- Complementary to 2STW4468
- 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.

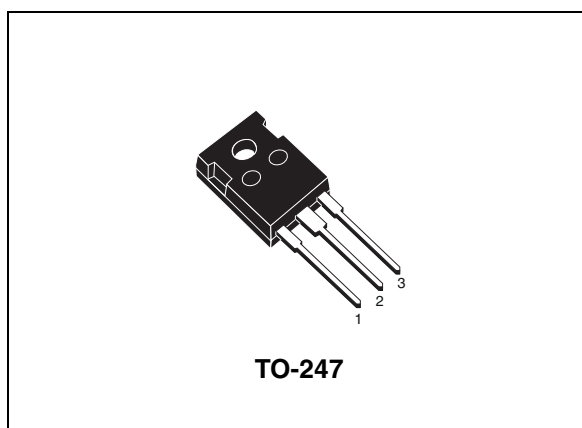


Figure 1. Internal schematic diagram

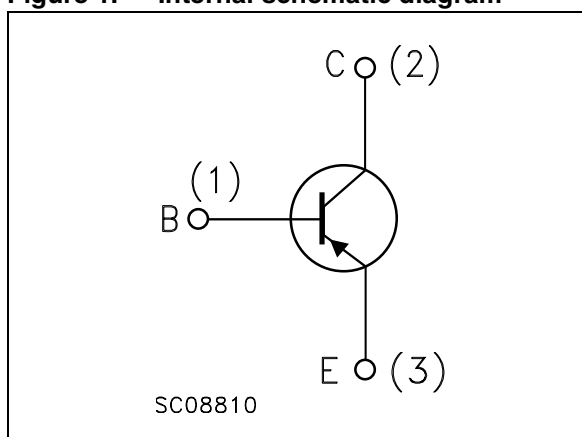


Table 1. Device summary

| Order code | Marking | Package | Packaging |
|------------|----------|---------|-----------|
| 2STW1695 | 2STW1695 | TO-247 | 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

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

Table 4. Electrical characteristics

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

1. Pulsed: Pulse duration = 300 μs , duty cycle $\leq 1.5\%$

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

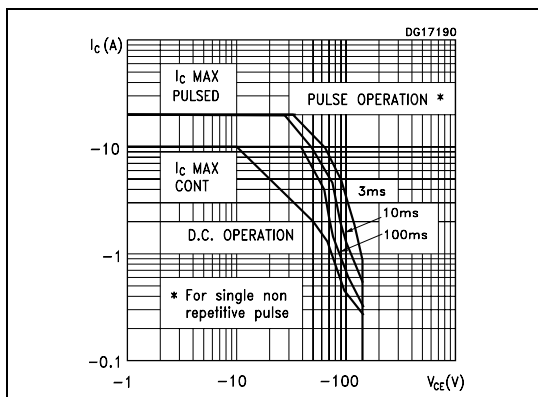


Figure 3. Output characteristics

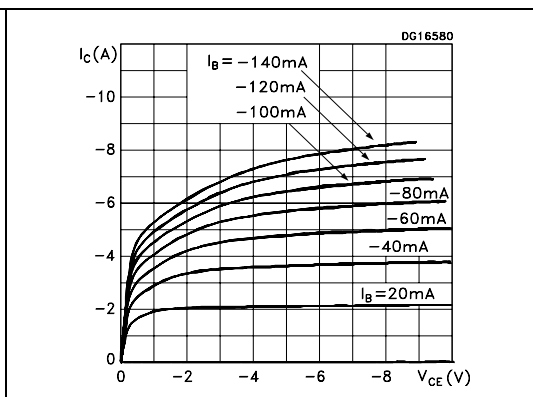


Figure 4. DC current gain

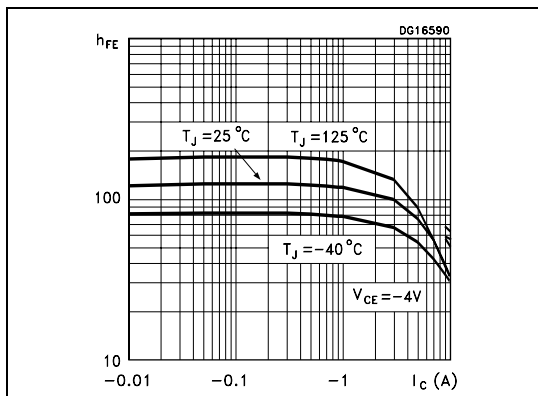


Figure 5. Collector-emitter saturation voltage

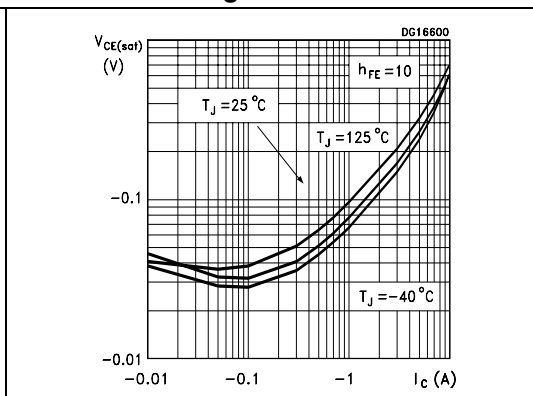


Figure 6. Base-emitter voltage

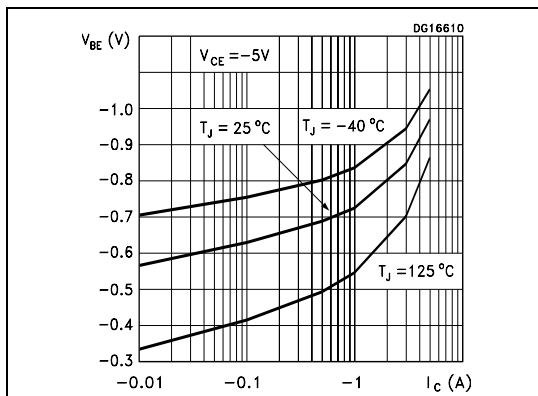
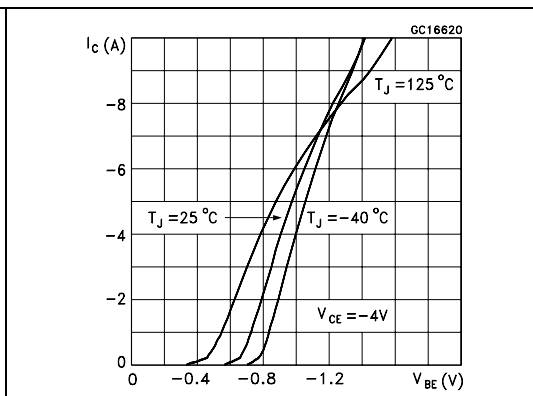
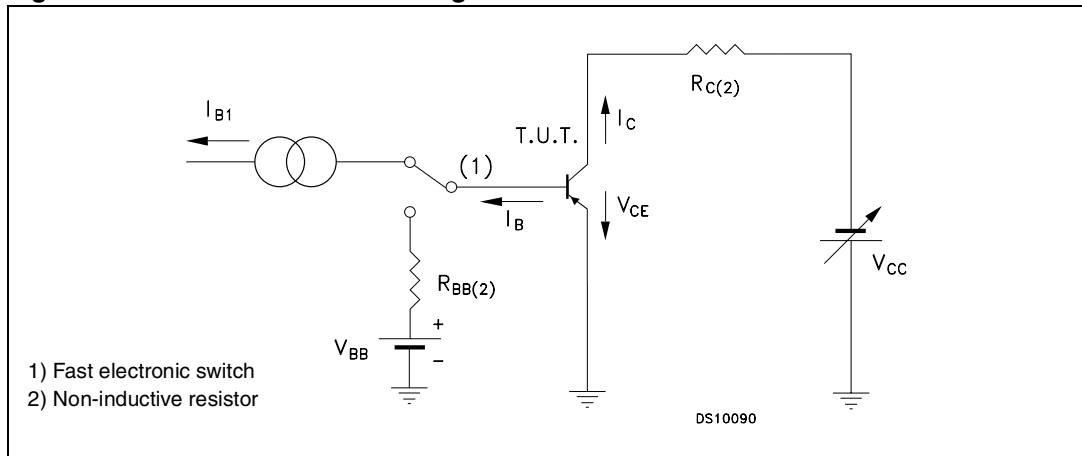


Figure 7. Base-emitter voltage



2.2 Test circuit

Figure 8. Resistive load switching test circuit

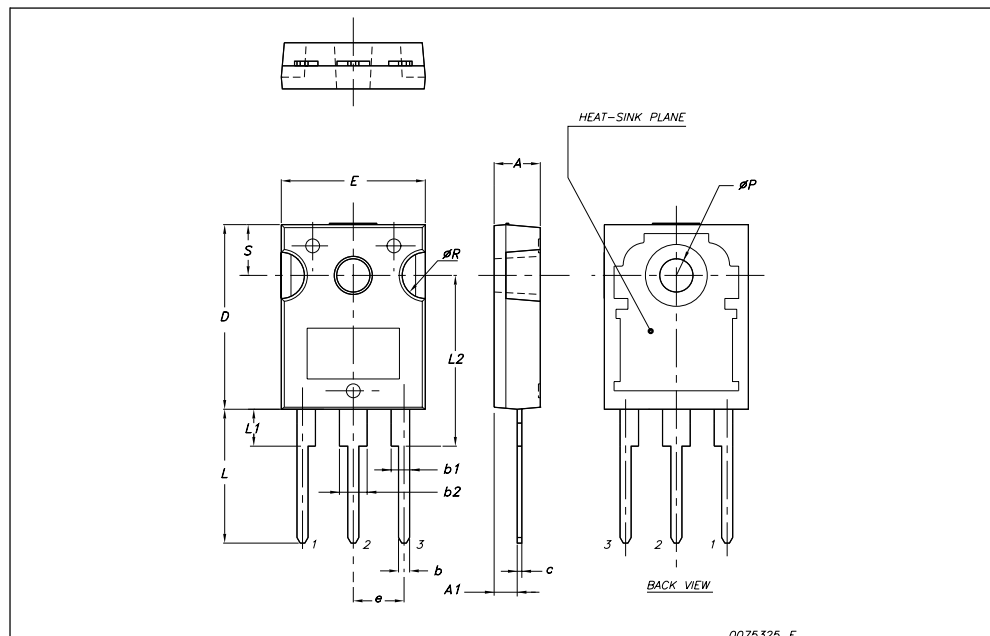


3 Package mechanical data

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

TO-247 Mechanical data

| Dim. | mm. | | |
|-----------------|-------|-------|-------|
| | Min. | Typ | Max. |
| A | 4.85 | | 5.15 |
| A1 | 2.20 | | 2.60 |
| b | 1.0 | | 1.40 |
| b1 | 2.0 | | 2.40 |
| b2 | 3.0 | | 3.40 |
| c | 0.40 | | 0.80 |
| D | 19.85 | | 20.15 |
| E | 15.45 | | 15.75 |
| e | | 5.45 | |
| L | 14.20 | | 14.80 |
| L1 | 3.70 | | 4.30 |
| L2 | | 18.50 | |
| $\varnothing P$ | 3.55 | | 3.65 |
| $\varnothing R$ | 4.50 | | 5.50 |
| S | | 5.50 | |



4 Revision history

Table 5. Document revision history

| Date | Revision | Changes |
|-------------|----------|---|
| 23-Oct-2006 | 1 | Initial release |
| 23-Sep-2007 | 2 | Added figures 2 , 3 , 4 , 5 , 6 , 7 . |
| 20-Feb-2007 | 3 | Document status promoted from preliminary data to datasheet. |
| 06-Oct-2008 | 4 | Content reworked to improve readability, no technical changes. |

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