

High voltage fast-switching NPN power transistor

Features

- High voltage capability
- Low spread of dynamic parameters
- Minimum lot-to-lot spread for reliable operation
- Very high switching speed

Applications

- Compact fluorescent lamps (CFLs)
- SMPS for battery charger

Description

The device is manufactured using high voltage multi epitaxial planar technology for high switching speeds and high voltage capability. It uses a cellular emitter structure with planar edge termination to enhance switching speeds while maintaining the wide RBSOA. The STBV45G and STBV45G-AP are supplied using halogen-free molding compound.

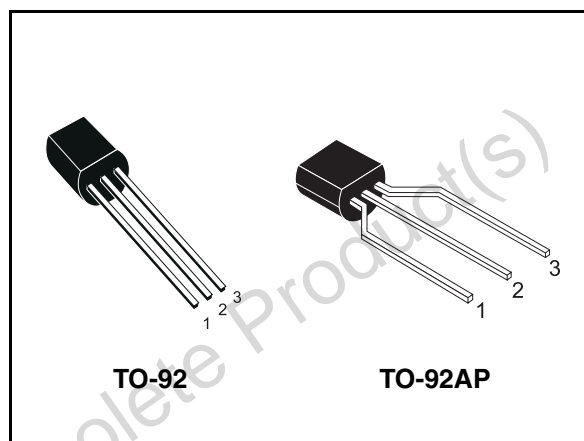


Figure 1. Internal schematic diagram

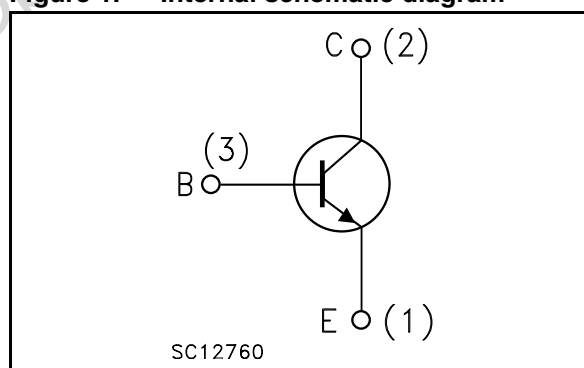


Table 1. Device summary

| Order codes | Marking | Package | Packaging |
|-------------|---------|---------|-----------|
| STBV45 | BV45 | TO-92 | Bulk |
| STBV45G | BV45G | TO-92 | Bulk |
| STBV45-AP | BV45 | TO-92AP | Ammopack |
| STBV45G-AP | BV45G | TO-92AP | Ammopack |

1 Electrical ratings

Table 2. Absolute maximum rating

| Symbol | Parameter | Value | Unit |
|-----------|--|------------|------|
| V_{CES} | Collector-emitter voltage ($V_{BE} = 0$) | 700 | V |
| V_{CEO} | Collector-emitter voltage ($I_B = 0$) | 400 | V |
| V_{EBO} | Emitter-base voltage ($I_C = 0$) | 9 | V |
| I_C | Collector current | 0.75 | A |
| I_{CM} | Collector peak current ($t_P < 5$ ms) | 1.5 | A |
| I_B | Base current | 0.4 | A |
| I_{BM} | Base peak current ($t_P < 5$ ms) | 0.75 | A |
| P_{TOT} | Total dissipation at $T_C = 25$ °C | 0.95 | W |
| T_{stg} | Storage temperature | -65 to 150 | °C |
| T_J | Max. operating junction temperature | 150 | |

Table 3. Thermal data

| Symbol | Parameter | Value | Unit |
|----------------|--------------------------------------|-------|------|
| $R_{thj-case}$ | Thermal resistance junction-case max | 131.6 | °C/W |

2 Electrical characteristics

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

Table 4. Electrical characteristics

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|----------------------|--|--|------|------|------|---------------|
| I_{CES} | Collector cut-off current ($V_{BE} = 0$) | $V_{CE} = 700\text{ V}$ | | | 250 | μA |
| I_{EBO} | Emitter cut-off current ($I_C = 0$) | $V_{EB} = 9\text{ V}$ | | | 1 | mA |
| $V_{CEQ(sus)}^{(1)}$ | Collector-emitter sustaining voltage ($I_B = 0$) | $I_C = 1\text{ mA}$ | 400 | | | V |
| $V_{CE(sat)}^{(1)}$ | Collector-emitter saturation voltage | $I_C = 0.2\text{ A}$ $I_B = 40\text{ mA}$ | | 0.2 | 0.5 | V |
| | | $I_C = 0.3\text{ A}$ $I_B = 75\text{ mA}$ | | 0.3 | 1 | V |
| | | $I_C = 0.4\text{ A}$ $I_B = 135\text{ mA}$ | | 0.4 | 1.5 | V |
| $V_{BE(sat)}^{(1)}$ | Base-emitter saturation voltage | $I_C = 0.2\text{ A}$ $I_B = 40\text{ mA}$ | | | 1 | V |
| | | $I_C = 0.3\text{ A}$ $I_B = 75\text{ mA}$ | | | 1.2 | V |
| h_{FE} | DC current gain | $I_C = 0.5\text{ mA}$ $V_{CE} = 2\text{ V}$ | 12 | | | |
| | | $I_C = 0.2\text{ A}$ $V_{CE} = 5\text{ V}$ | 10 | | 30 | |
| | | $I_C = 0.4\text{ A}$ $V_{CE} = 5\text{ V}$ | 5 | | 20 | |
| t_f | Inductive load Fall time | $I_C = 0.2\text{ A}$ $V_{clamp} = 300\text{ V}$ $I_{B1} = -I_{B2} = 40\text{ mA}$ $L = 3\text{ mH}$ <i>Figure 8.</i> | | 0.3 | | μs |

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

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

Figure 3. Derating curve

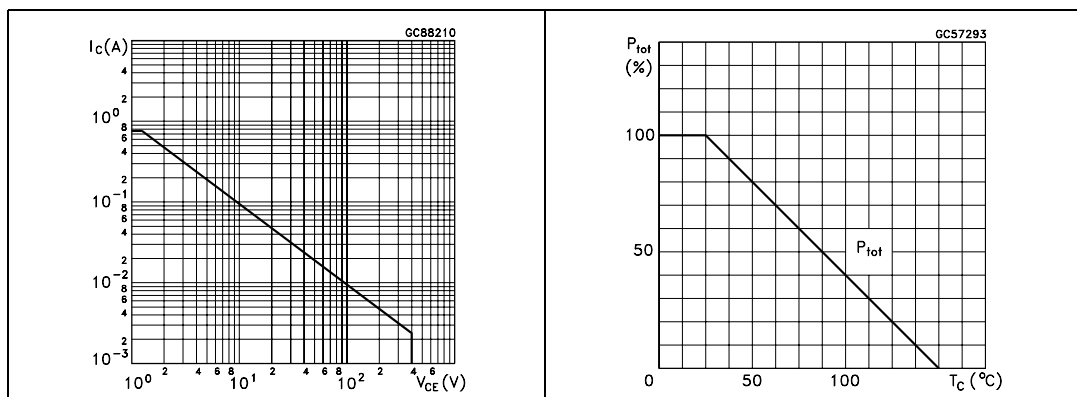


Figure 4. DC current gain

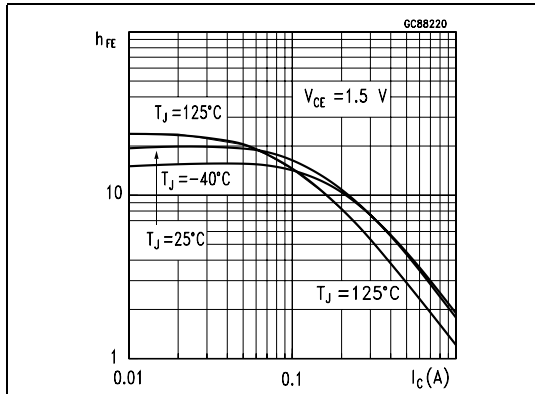


Figure 5. DC current gain

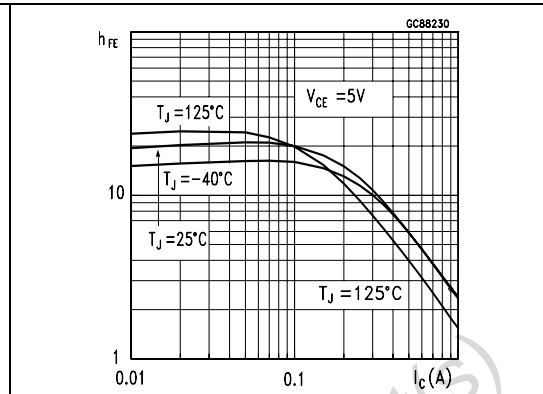


Figure 6. Collector-emitter saturation voltage

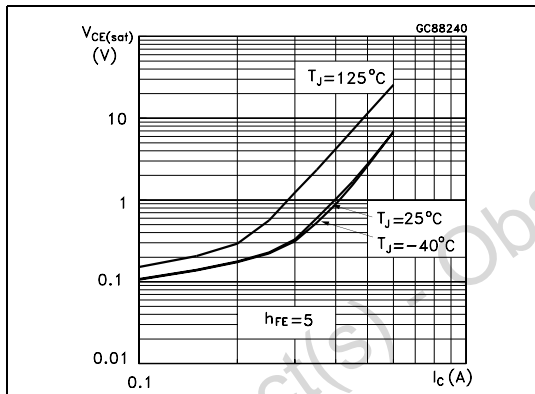
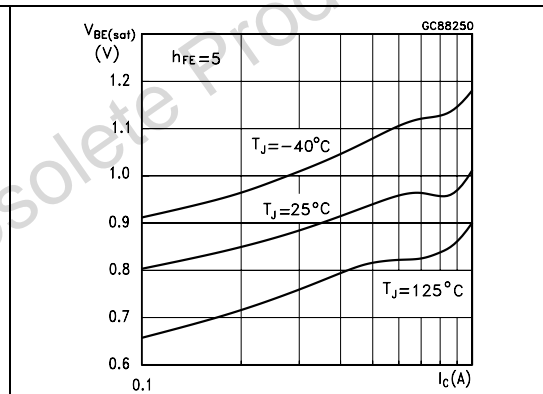
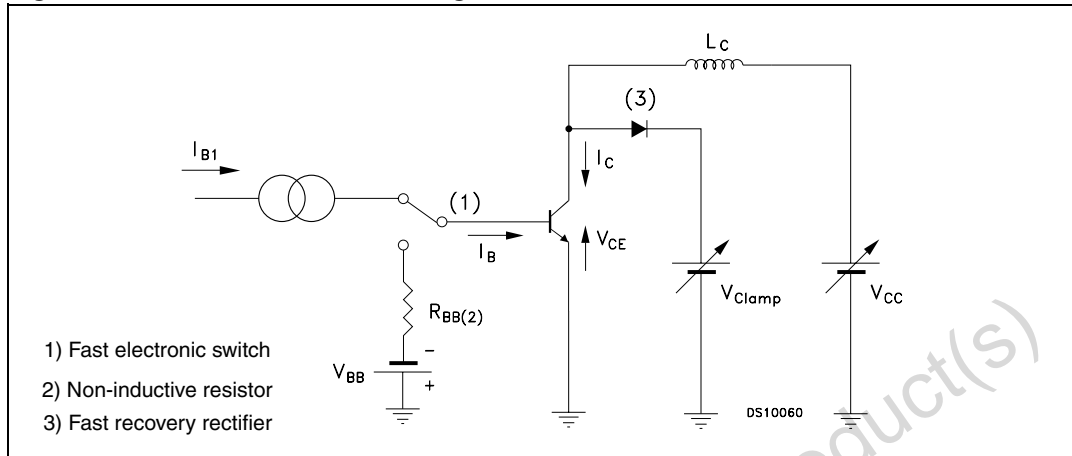


Figure 7. Base-emitter saturation voltage



2.2 Test circuit

Figure 8. Inductive load switching test circuit



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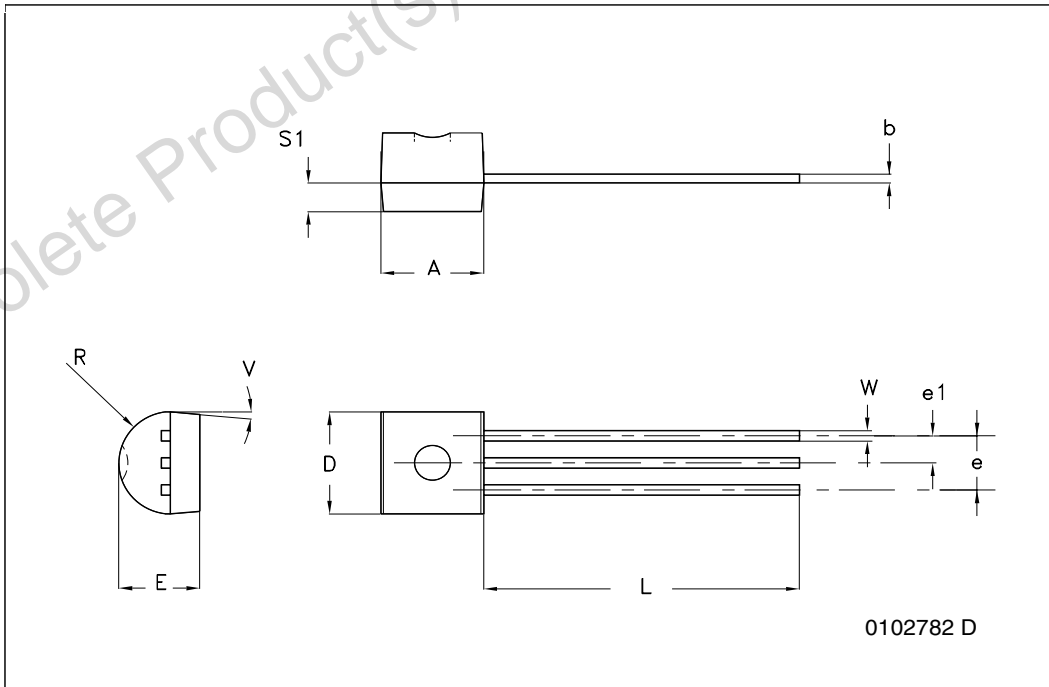
3 Package mechanical data

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

Obsolete Product(s) - Obsolete Product(s)

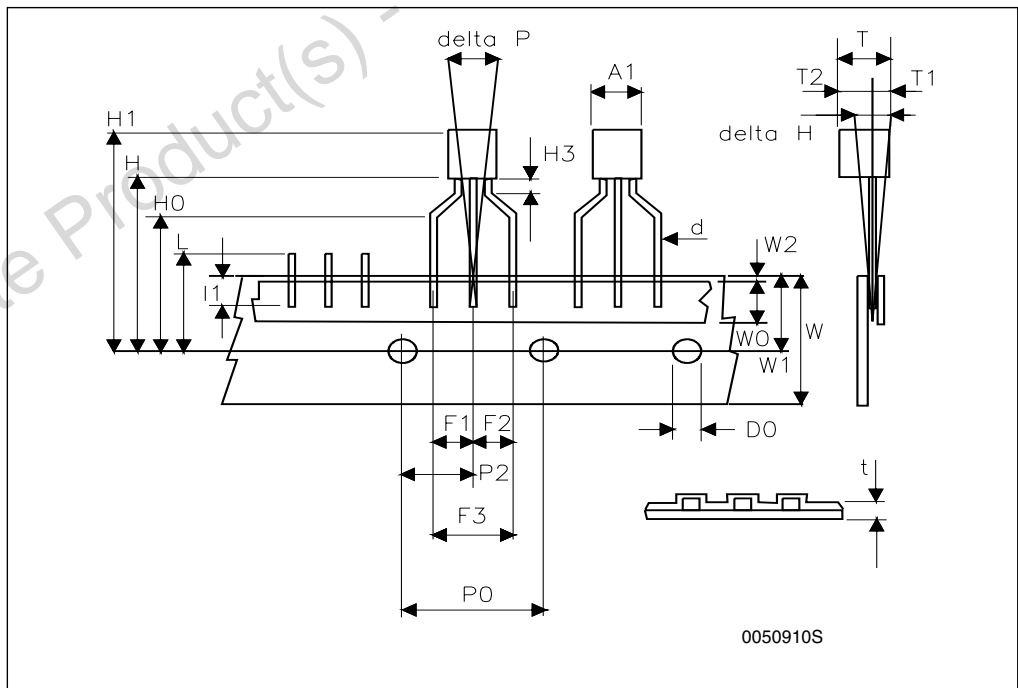
TO-92 bulk shipment mechanical data

| DIM. | mm. | | |
|------|-------|-----|-------|
| | MIN. | TYP | MAX. |
| A | 4.32 | | 4.95 |
| b | 0.36 | | 0.51 |
| D | 4.45 | | 4.95 |
| E | 3.30 | | 3.94 |
| e | 2.41 | | 2.67 |
| e1 | 1.14 | | 1.40 |
| L | 12.70 | | 15.49 |
| R | 2.16 | | 2.41 |
| S1 | 0.92 | | 1.52 |
| W | 0.41 | | 0.56 |
| V | | 5° | |



TO-92 ammpack shipment (suffix"-AP") mechanical data

| Dim. | mm | | |
|---------|-------|-------|-------|
| | Min | Typ | Max |
| A1 | | | 4.80 |
| T | | | 3.80 |
| T1 | | | 1.60 |
| T2 | | | 2.30 |
| d | | | 0.48 |
| P0 | 12.50 | 12.70 | 12.90 |
| P2 | 5.65 | 6.35 | 7.05 |
| F1,F2 | 2.44 | 2.54 | 2.94 |
| F3 | 4.98 | 5.08 | 5.48 |
| delta H | -2.00 | | 2.00 |
| W | 17.50 | 18.00 | 19.00 |
| W0 | 5.70 | 6.00 | 6.30 |
| W1 | 8.50 | 9.00 | 9.25 |
| W2 | | | 0.50 |
| H | 18.50 | | 20.50 |
| H3 | 0.5 | 1 | 1.5 |
| H0 | 15.50 | 16.00 | 16.50 |
| H1 | | | 25.00 |
| D0 | 3.80 | 4.00 | 4.20 |
| t | | | 0.90 |
| L | | | 11.00 |
| l1 | 3.00 | | |
| delta P | -1.00 | | 1.00 |



4 Revision history

Table 5. Document revision history

| Date | Revision | Changes |
|-------------|----------|---|
| 13-Jul-2004 | 4 | |
| 03-Jul-2008 | 5 | Added halogen-free molding compound package. |
| 22-Oct-2008 | 6 | Updated Table 2 on page 2 and Table 4 on page 3 |

Obsolete Product(s) - Obsolete Product(s)

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