



STC03DE220HV

Hybrid emitter switched bipolar transistor

ESBT® 2200 V - 3 A - 0.33 Ω

Features

Table 1. Features

| $V_{CS(ON)}$ | I_C | $R_{CS(ON)}$ |
|--------------|-------|--------------|
| 1V | 3A | 0.33Ω |

- Low equivalent on resistance
- Very fast-switch, up to 150 kHz
- Very low C_{ISS} driven by $R_G = 4.7 \Omega$

Applications

- Aux SMPS for three phase mains

Description

The STC03DE220HV is manufactured in a hybrid structure, using dedicated high voltage Bipolar and low voltage MOSFET technologies, aimed to providing the best performance in ESBT topology. The STC03DE220HV is designed for use in aux flyback smps for any three phase application.

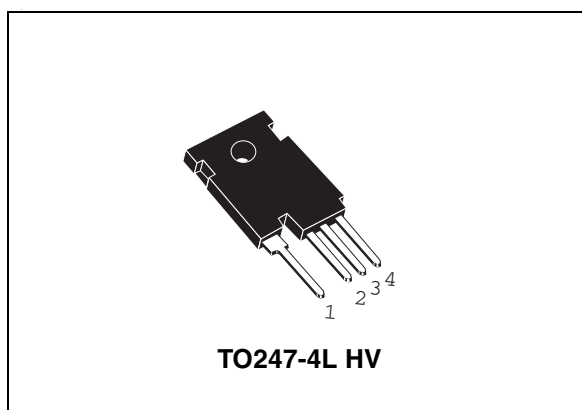


Figure 1. Internal schematic diagrams

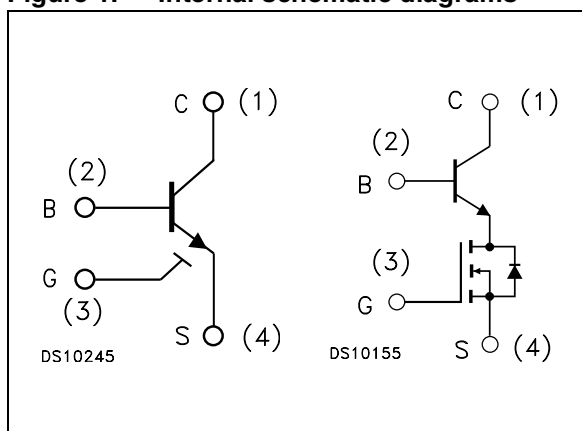


Table 2. Device summary

| Order code | Marking | Package | Packaging |
|--------------|------------|-------------|-----------|
| STC03DE220HV | C03DE220HV | TO247-4L HV | Tube |

1 Electrical ratings

Table 3. Absolute maximum ratings

| Symbol | Parameter | Value | Unit |
|--------------|--|------------|------|
| $V_{CS(SS)}$ | Collector-source voltage ($V_{BS} = V_{GS} = 0$) | 2200 | V |
| $V_{BS(OS)}$ | Base-source voltage ($I_C = 0, V_{GS} = 0$) | 30 | V |
| $V_{SB(OS)}$ | Source-base voltage ($I_C = 0, V_{GS} = 0$) | 9 | V |
| V_{GS} | Gate-source voltage | ± 20 | V |
| I_C | Collector current | 3 | A |
| I_{CM} | Collector peak current ($t_P < 5$ ms) | 6 | A |
| I_B | Base current | 3 | A |
| I_{BM} | Base peak current ($t_P < 1$ ms) | 6 | A |
| P_{tot} | Total dissipation at $T_C \leq 25$ °C | 166 | W |
| T_{stg} | Storage temperature | -40 to 150 | °C |
| T_J | Max. operating junction temperature | 125 | °C |

Table 4. Thermal data

| Symbol | Parameter | Value | Unit |
|----------------|---|-------|------|
| $R_{thj-case}$ | Thermal resistance junction-case max | 0.6 | °C/W |

2 Electrical characteristics

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

Table 5. Electrical characteristics

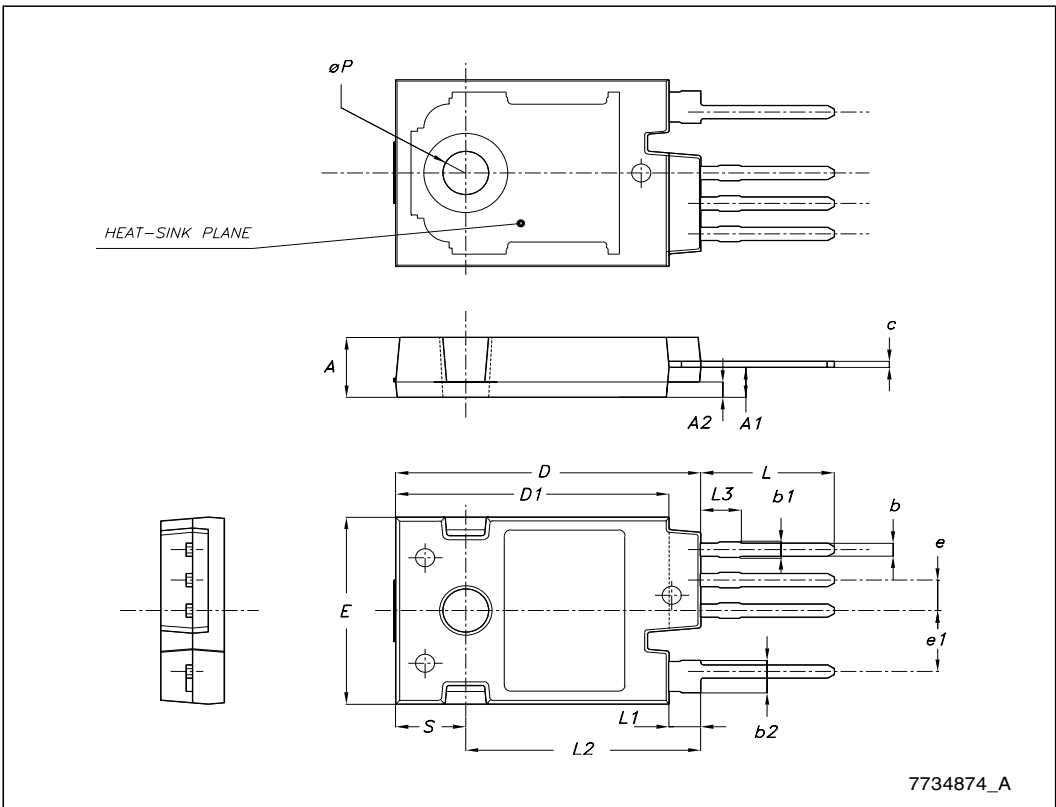
| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|----------------------------------|--|---|------|-------------|------|---------------|
| $I_{\text{CS(SS)}}$ | Collector-source current ($V_{\text{BS}} = V_{\text{GS}} = 0$) | $V_{\text{CS(SS)}} = 2200\text{ V}$ | | | 100 | μA |
| $I_{\text{BS(OS)}}$ | Base-source current ($I_{\text{C}} = 0, V_{\text{GS}} = 0$) | $V_{\text{BS(OS)}} = 30\text{ V}$ | | | 10 | μA |
| $I_{\text{SB(OS)}}$ | Source-base current ($I_{\text{C}} = 0, V_{\text{GS}} = 0$) | $V_{\text{SB(OS)}} = 9\text{ V}$ | | | 100 | μA |
| $I_{\text{GS(OS)}}$ | Gate-source leakage ($V_{\text{BS}} = 0$) | $V_{\text{GS}} = \pm 20\text{ V}$ | | | 500 | nA |
| $V_{\text{CS(ON)}}$ | Collector-source ON voltage | $V_{\text{GS}} = 10\text{ V } I_{\text{C}} = 1.5\text{ A } I_{\text{B}} = 0.15\text{ A}$ $V_{\text{GS}} = 10\text{ V } I_{\text{C}} = 3\text{ A } I_{\text{B}} = 0.6\text{ A}$ | | 0.2 0.25 | | V V |
| h_{FE} | DC current gain | $V_{\text{CS}} = 1\text{ V } V_{\text{GS}} = 10\text{ V } I_{\text{C}} = 1.5\text{ A}$ $V_{\text{CS}} = 1\text{ V } V_{\text{GS}} = 10\text{ V } I_{\text{C}} = 3\text{ A}$ | | 15 10 | | |
| $V_{\text{BS(ON)}}$ | Base-source ON voltage | $V_{\text{GS}} = 10\text{ V } I_{\text{C}} = 1.5\text{ A } I_{\text{B}} = 0.15\text{ A}$ $V_{\text{GS}} = 10\text{ V } I_{\text{C}} = 3\text{ A } I_{\text{B}} = 0.6\text{ A}$ | | 0.82 1 | | V V |
| $V_{\text{GS(th)}}$ | Gate threshold voltage | $V_{\text{BS}} = V_{\text{GS}} \quad I_{\text{B}} = 250\text{ }\mu\text{A}$ | 1.5 | 2.2 | 3 | V |
| C_{iss} | Input capacitance ($V_{\text{GS}} = V_{\text{CB}} = 0$) | $V_{\text{CS}} = 25\text{ V } f = 1\text{ MHz}$ | | 750 | | pF |
| $Q_{\text{GS(tot)}}$ | Gate-source Charge ($V_{\text{CB}} = 0$) | $V_{\text{CS}} = 15\text{ V } V_{\text{GS}} = 10\text{ V}$ $I_{\text{C}} = 1.8\text{ A}$ | | 12.5 | | nC |
| t_{s} t_{f} | INDUCTIVE LOAD Storage time Fall time | $V_{\text{GS}} = 10\text{ V } R_{\text{G}} = 47\text{ }\Omega$ $V_{\text{Clamp}} = 1760\text{ V } t_{\text{p}} = 4\text{ }\mu\text{s}$ $I_{\text{C}} = 1.5\text{ A } I_{\text{B}} = 0.3\text{ A}$ | | 1040 20 | | ns ns |
| $V_{\text{CS(dyn)}}$ | Collector-source dynamic voltage (500 ns) | $V_{\text{CC}} = V_{\text{Clamp}} = 400\text{ V}$ $V_{\text{GS}} = 10\text{ V } I_{\text{C}} = 1.5\text{ A}$ $I_{\text{B}} = 0.3\text{ A } R_{\text{G}} = 47\text{ }\Omega$ $t_{\text{peak}} = 500\text{ ns } I_{\text{Bpeak}} = 3\text{ A}$ | | 7.6 | | V |
| $V_{\text{CS(dyn)}}$ | Collector-source dynamic voltage (1 μs) | $V_{\text{CC}} = V_{\text{Clamp}} = 400\text{ V}$ $V_{\text{GS}} = 10\text{ V } I_{\text{C}} = 1.5\text{ A}$ $I_{\text{B}} = 0.3\text{ A } R_{\text{G}} = 47\text{ }\Omega$ $t_{\text{peak}} = 500\text{ ns } I_{\text{Bpeak}} = 3\text{ A}$ | | 5.8 | | V |
| V_{CSW} | Maximum collector-source voltage switched without snubber | $R_{\text{G}} = 47\text{ }\Omega \quad h_{\text{FE}} = 5 \quad I_{\text{C}} = 3\text{ A}$ | 2200 | | | V |

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

TO247-4L HV mechanical data

| DIM. | mm. | | |
|------|-------|-------|-------|
| | MIN. | TYP | MAX. |
| A | 4.85 | | 5.15 |
| A1 | 2.20 | 2.50 | 2.60 |
| A2 | | 1.27 | |
| b | 0.95 | 1.10 | 1.30 |
| b1 | 1.10 | | 1.50 |
| b2 | 2.50 | | 2.90 |
| c | 0.40 | | 0.80 |
| D | 23.85 | 24 | 24.15 |
| D1 | | 21.50 | |
| E | 15.45 | 15.60 | 15.75 |
| e | | 2.54 | |
| e1 | | 5.08 | |
| L | 10.20 | | 10.80 |
| L1 | 2.20 | 2.50 | 2.80 |
| L2 | | 18.50 | |
| L3 | | 3 | |
| øP | 3.55 | | 3.65 |
| S | | 5.50 | |



4 Revision history

Table 6. Document revision history

| Date | Revision | Changes |
|-------------|----------|--|
| 27-Nov-2006 | 1 | First release. |
| 19-May-2008 | 2 | Document status promoted from preliminary data to datasheet. |

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