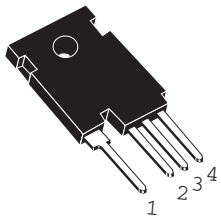
# STC08IE150HV

Emitter switched bipolar transistor
ESBT® 1500V - 8A - 0.08 Ω

## Features

| $V_{CS(ON)}$ | $I_C$ | $R_{CS(ON)}$ |
|---|---|---|
| 0.65 V | 8 A | 0.08 Ω |

- High voltage / high current cascode configuration
- Low equivalent on resistance
- Very fast-switch, up to 150 kHz
- Squared RBSOA, up to 1500 V
- Very low $C_{ISS}$ driven by $R_G$ = 4.7 Ω
- Very low turn-off cross over time




**TO247-4L HV**

## Application

- Aux SMPS for three phase mains
- PFC

## Description

The STC08IE150HV is manufactured in monolithic ESBT technology, aimed to provide best performance in high frequency / high voltage applications. it is designed for use in gate driven based topologies.

**Figure 1. Internal schematic diagrams**

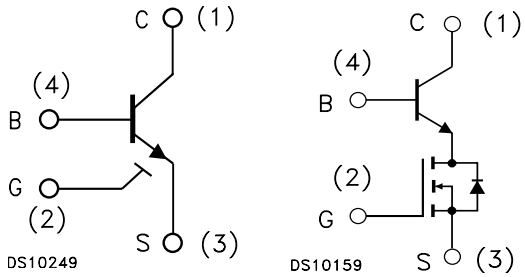



**Table 1. Device summary**

| Part number | Marking | Package | Packaging |
|---|---|---|---|
| STC08IE150HV | C08IE150HV | TO247-4L HV | Tube |

# Contents

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# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{CS(SS)}$ | Collector-source voltage ($V_{BS}$ =$V_{GS}$ =0) | 1500 | 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) | 17 | V |
| $V_{GS}$ | Gate-source voltage | ± 17 | V |
| $I_C$ | Collector current | 8 | A |
| $I_{CM}$ | Collector peak current ($t_P$ < 1 ms) | 24 | A |
| $I_B$ | Base current | 8 | A |
| $I_{BM}$ | Base peak current ($t_P$ < 1 ms) | 12 | A |
| $P_{tot}$ | Total dissipation at $T_c$ ≤25°C | 208 | W |
| $T_{stg}$ | Storage temperature | -40 to 150 | °C |
| $T_J$ | Max. operating junction temperature | 125 | °C |

**Table 3. Thermal data**

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

# 2 Electrical characteristics

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

**Table 4. Electrical characteristics**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_{CS(SS)}$ | Collector-source cut-off current ($V_{BS}$ =$V_{GS}$ =0) | $V_{CS}$ =1500 V | | | 100 | µA |
| $I_{BS(OS)}$ | Base-source cut-off current ($I_C$ =0, $V_{GS}$ =0) | $V_{BS}$ =30 V | | | 10 | µA |
| $I_{SB(OS)}$ | Source-base cut-off current ($I_C$ =0, $V_{GS}$ =0) | $V_{SB}$ =17 V | | | 100 | µA |
| $I_{GS(OS)}$ | Gate-source cut-off current ($I_C$=0; $V_{BS}$ =0) | $V_{GS}$ = ± 17 V | | | 100 | nA |
| $V_{CS(ON)}$ | Collector-source on voltage | $V_{GS}$ =10 V $I_C$ =3 A $I_B$ =0.3 A<br>$V_{GS}$ =10 V $I_C$ =8 A $I_B$ =1.6 A | | 0.3<br>0.65 | 1.2<br>1.5 | V<br>V |
| $h_{FE}$ | DC current gain | $V_{GS}$ =10 V $V_{CS}$ =1 V $I_C$ =3 A<br>$V_{GS}$ =10 V $V_{CS}$ =1 V $I_C$ =8 A | 9<br>4.5 | 14<br>6.8 | | |
| $V_{BS(ON)}$ | Base-source on voltage | $V_{GS}$ =10 V $I_C$ =3 A $I_B$ =0.3 A<br>$V_{GS}$ =10 V $I_C$ =8 A $I_B$ =1.6 A | | 1<br>1.7 | 1.5<br>2 | V<br>V |
| $V_{GS(th)}$ | Gate threshold voltage | $V_{BS}$ =$V_{GS}$ $I_B$ =250 µA | 2 | 3 | 4 | V |
| $C_{iss}$ | Input capacitance | $V_{CS}$ =25 V f =1 MHz<br>$V_{GS}$=$V_{CB}$=0 | | 810 | | pF |
| $Q_{GS(tot)}$ | Gate-source charge | $V_{CS}$=25 V $V_{GS}$=10 V<br>$V_{CB}$=0 $I_C$ =4 A | | 45 | | nC |
| $t_s$<br>$t_f$ | Inductive load<br>Storage time<br>Fall time | $V_{GS}$ =10 V $R_G$ =4.7 Ω<br>$V_{clamp}$ =1200V $t_p$ =4 µs<br>$I_C$ =4 A $I_B$ =0.8 A | | <br>690<br>10 | | <br>ns<br>ns |
| $t_s$<br>$t_f$ | Inductive load<br>Storage time<br>Fall time | $V_{GS}$ =10 V $R_G$ =4.7 Ω<br>$V_{clamp}$ =1200 V $t_p$ =4 µs<br>$I_C$ =4 A $I_B$ =0.4 A | | <br>340<br>10 | | <br>ns<br>ns |
| $V_{CS(dyn)}$ | Collector-source dynamic voltage (500 ns) | $V_{CC}$ =$V_{clamp}$ =600 V<br>$V_{GS}$ =10 V $I_C$ =2 A<br>$I_B$ = 0.4 A $R_G$ =4.7 Ω<br>$t_{(peak)}$ =500 ns $I_{B(peak)}$ =4 A | | 2.8 | | V |

**Table 4. Electrical characteristics (continued)**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_{CS(dyn)}$ | Collector-source dynamic voltage (1 µs) | $V_{CC}$ =$V_{clamp}$ =600 V<br>$V_{GS}$ =10 V $I_C$ =2 A<br>$I_B$ = 0.4 A $R_G$ =4.7 Ω<br>$t_{(peak)}$ =500 ns $I_{B(peak)}$ =4 A | | 1.7 | | V |
| $V_{CSW}$ | Maximum collector-source voltage switched without snubber | $R_G$ =4.7 Ω $h_{FE}$ = 5 $I_C$ = 8 A | 1500 | | | V |

## 2.1 Electrical characteristics (curves)

**Figure 2. Output characteristics**

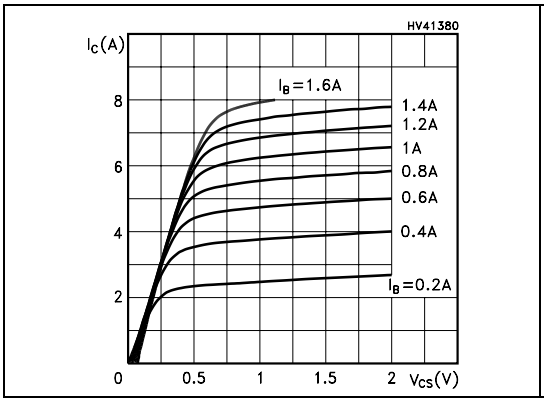



**Figure 3. Gate threshold voltage vs temperature**

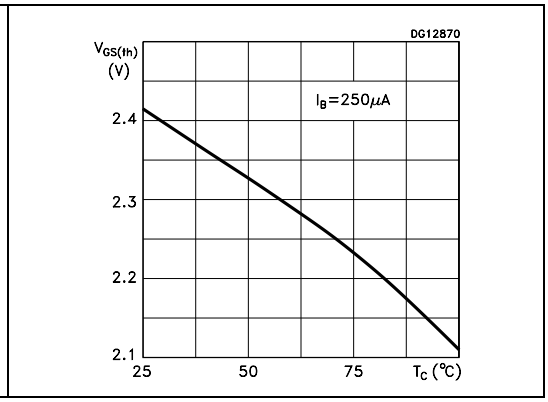



**Figure 4. Reverse biased safe operating area**

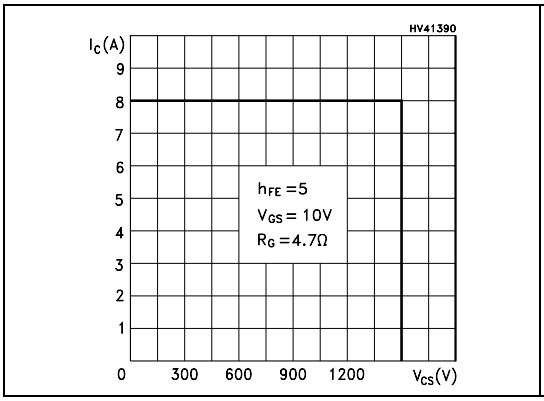



**Figure 5. DC current gain**

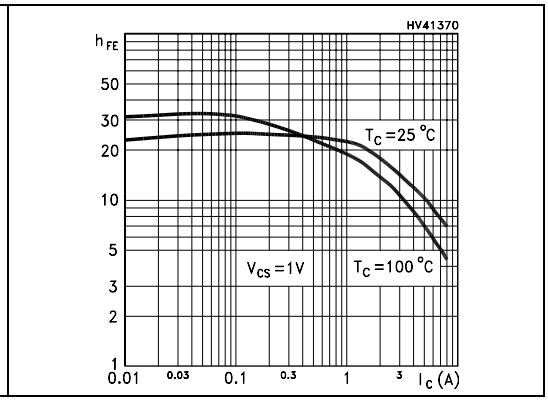



**Figure 6. Collector-source voltage @$h_{FE}$= 5**

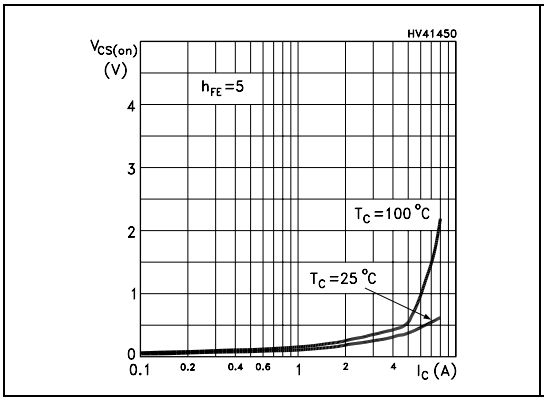



**Figure 7. Collector-source voltage @$h_{FE}$= 10**

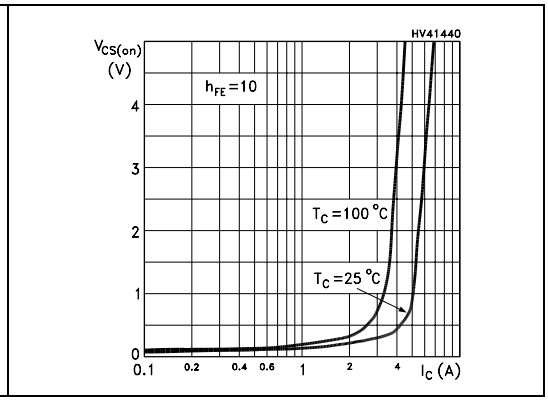


**Figure 8. Base-source voltage @$h_{FE}$= 5**

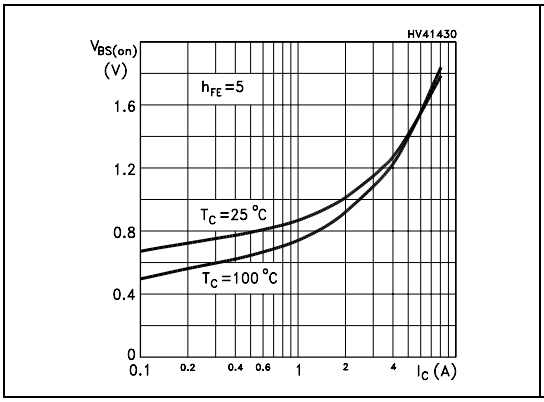



**Figure 9. Base-source voltage @$h_{FE}$= 10**

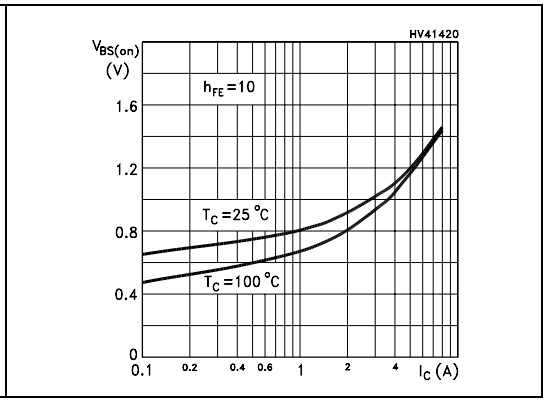



**Figure 10. Inductive load switching time @$h_{FE}$= 5**

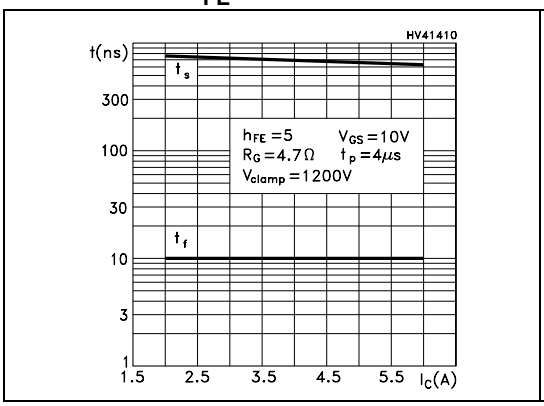



**Figure 11. Inductive load switching time @$h_{FE}$= 10**

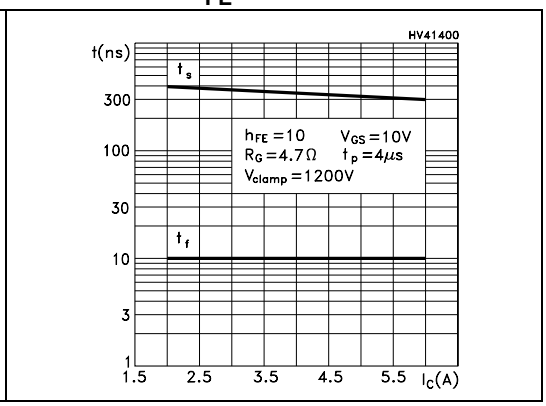
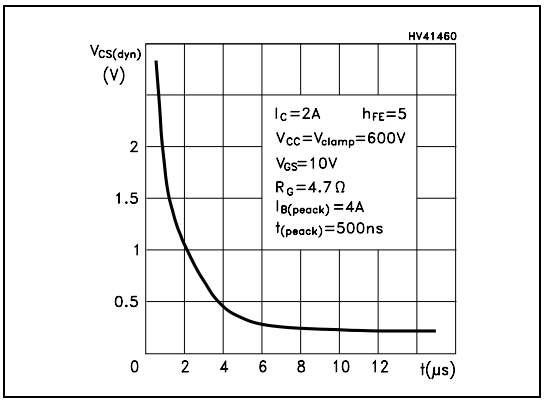



**Figure 12. Dynamic collector-source voltage**

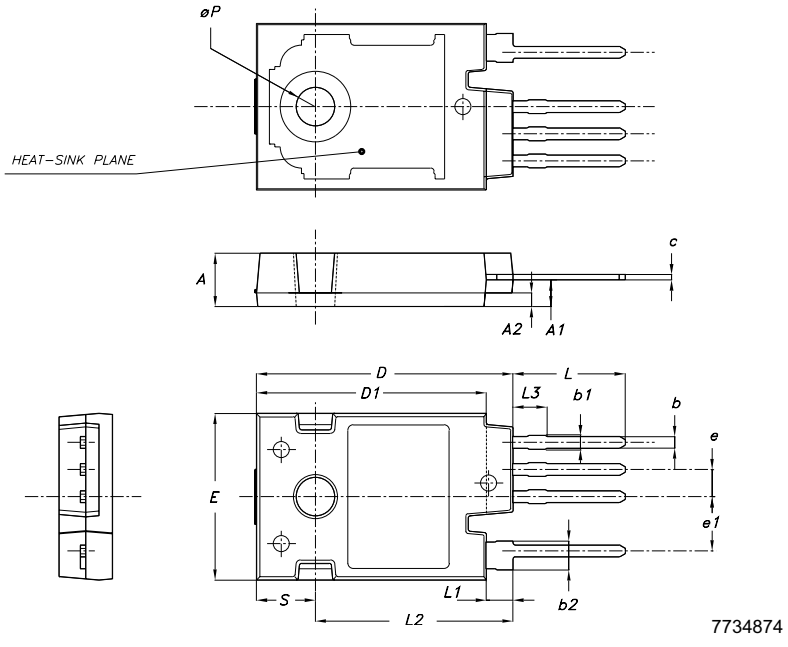


# 3 Package mechanical data

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 |
| 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 | |
| ∅P | 3.55 | | 3.65 |
| S | | 5.50 | |



# 4 Revision history

Table 5. Document revision history

| Date | Revision | Changes |
|---|---|---|
| 30-Jan-2006 | 1 | First release |
| 01-Dec-2006 | 2 | The document has been reformatted, no content change |
| 22-Nov-2007 | 3 | Document status promoted from preliminary data to datasheet.<br>Added *Section 2.1: Electrical characteristics (curves)* |

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