



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 $R_G = 4.7 \Omega$
- Very low turn-off cross over time

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.

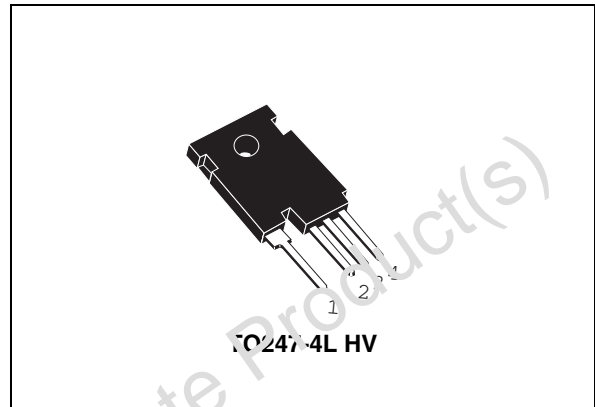


Figure 1. Internal schematic diagrams

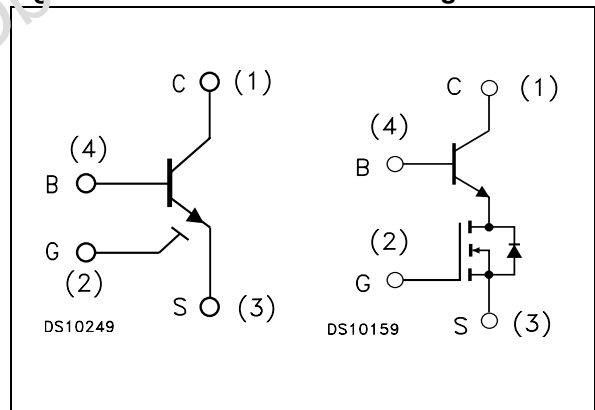


Table 1. Device summary

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

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Obsolete Product(s) - Obsolete Product(s)

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 $T_C \leq 25^\circ\text{C}$	208	W
T_{stg}	Storage temperature	-40 to 150	$^\circ\text{C}$
T_J	Max. operating junction temperature	125	$^\circ\text{C}$

Table 3. Thermal data

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

2 Electrical characteristics

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

Table 4. Electrical characteristics

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

Table 4. Electrical characteristics (continued)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{CS(dyn)}$	Collector-source dynamic voltage (1 μ s)	$V_{CC} = V_{clamp} = 600$ V $V_{GS} = 10$ V $I_B = 0.4$ A $t_{(peak)} = 500$ ns $I_C = 2$ A $R_G = 4.7$ Ω $I_{B(peak)} = 4$ 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

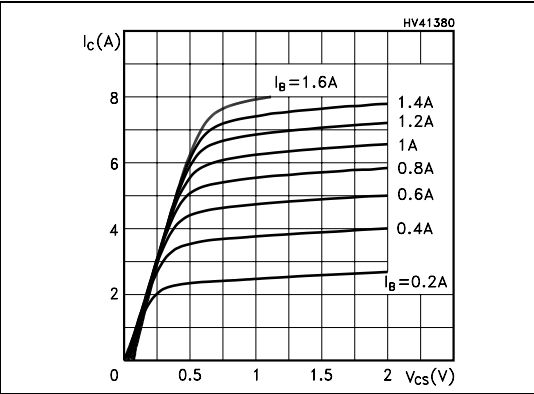


Figure 3. Gate threshold voltage vs temperature

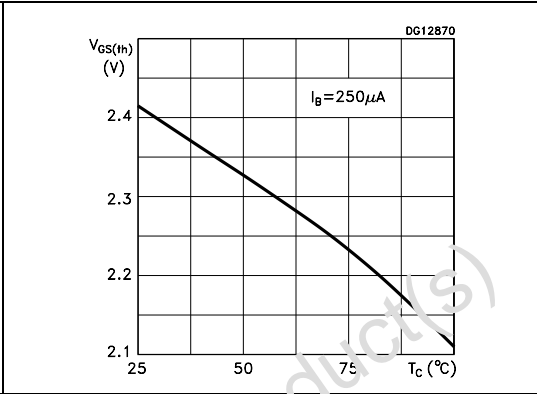


Figure 4. Reverse biased safe operating area

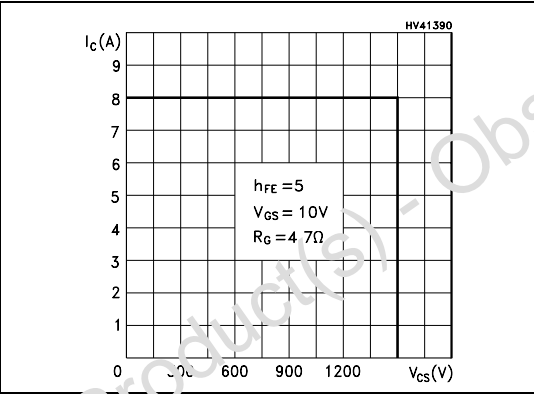


Figure 5. DC current gain

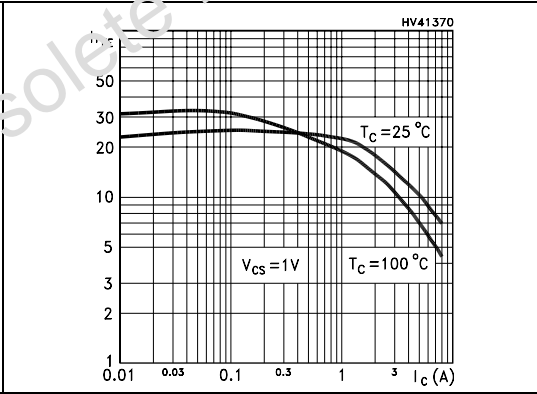


Figure 6. Collector-source voltage @ $h_{FE} = 5$

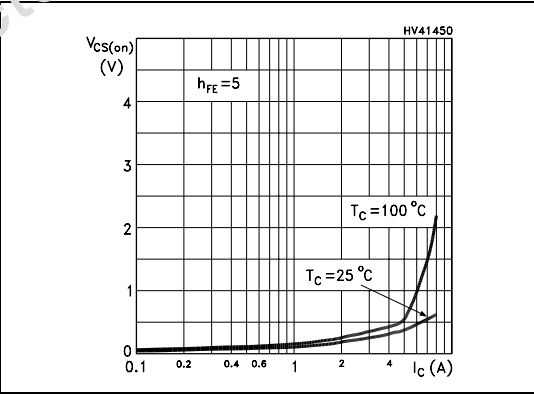


Figure 7. Collector-source voltage @ $h_{FE} = 10$

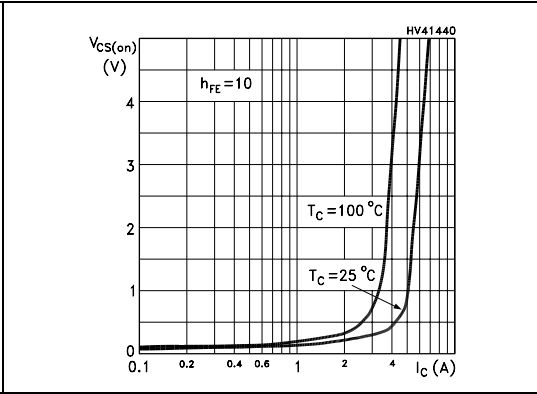


Figure 8. Base-source voltage
@ $h_{FE}=5$

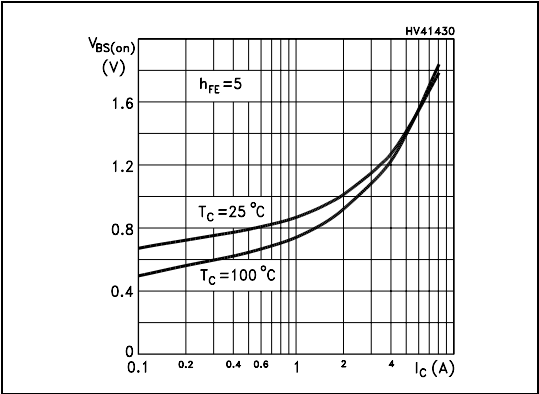


Figure 9. Base-source voltage
@ $h_{FE}=10$

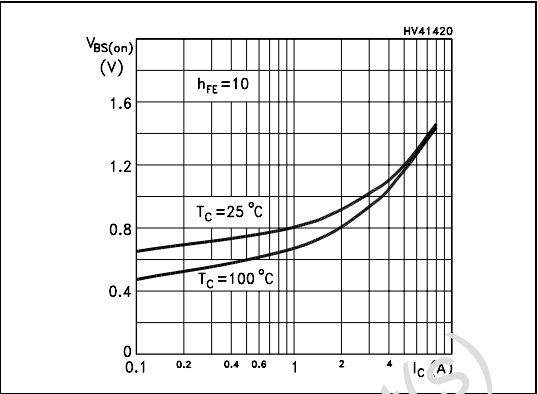


Figure 10. Inductive load switching time
@ $h_{FE}=5$

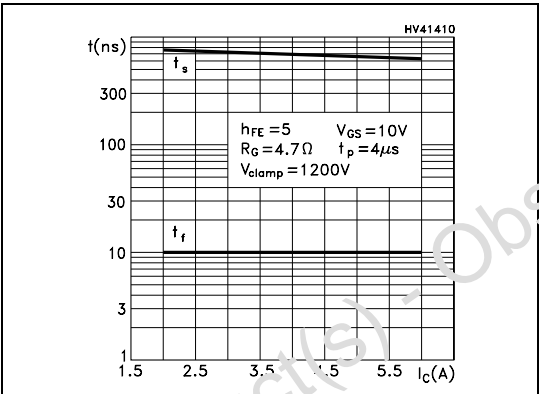


Figure 11. Inductive load switching time
@ $h_{FE}=10$

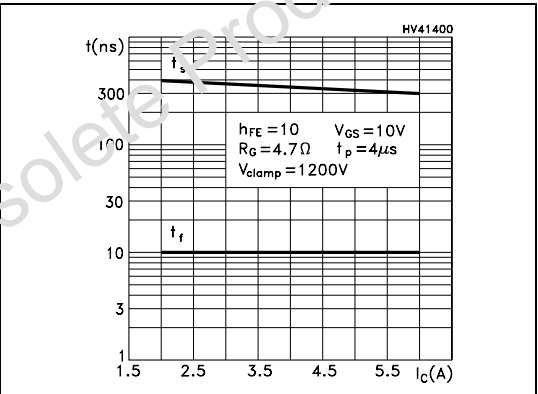
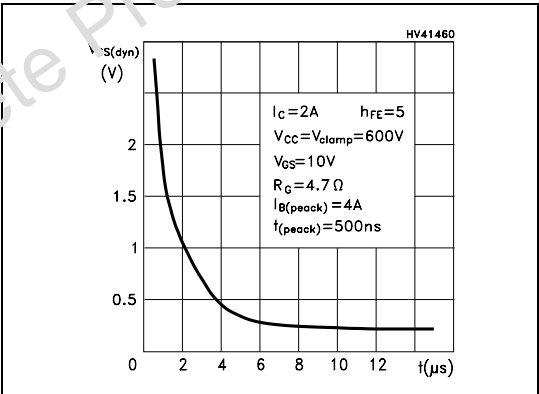


Figure 12. Dynamic collector-source
voltage



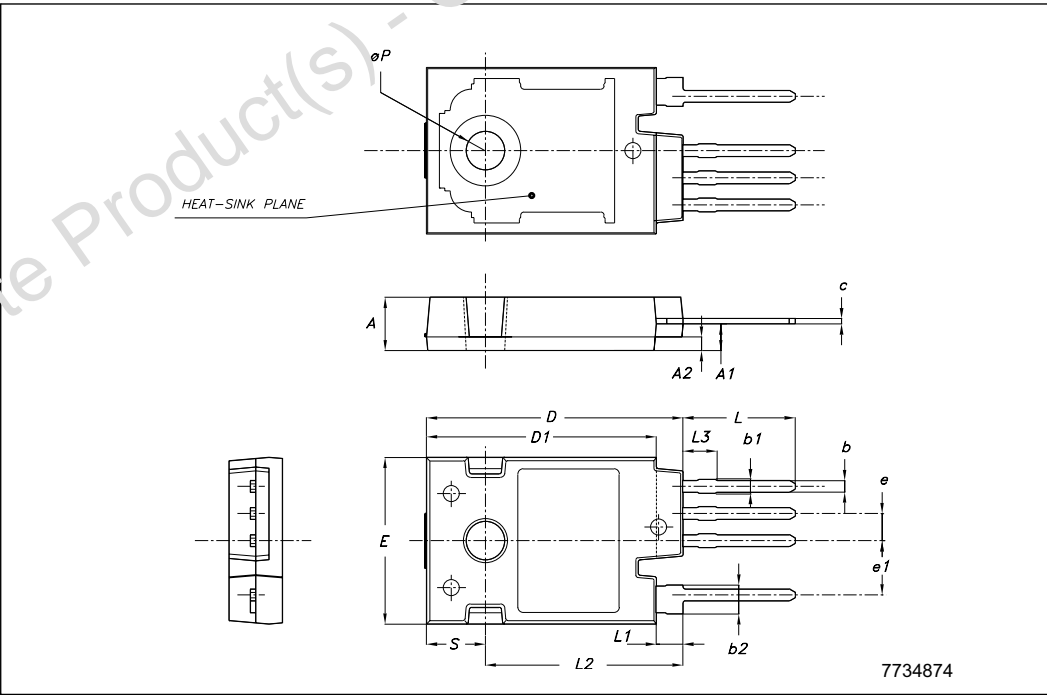
3 Package mechanical data

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

Obsolete Product(s) - Obsolete Product(s)

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	
ØP	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. Added Section 2.1: Electrical characteristics (curves)

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