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STC08DE150HV

Hybrid emitter switched bipolar transistor
ESBT® 1500 V - 8 A - 0.075 Ω

Features

$V_{CS(ON)}$	I_C	$R_{CS(ON)}$
0.6 V	8 A	0.075 Ω

- Low equivalent ON resistance
- Very fast-switch: up to 150 kHz
- Squared RBSOA: up to 1500 V
- Very low C_{ISS} driven by $R_G = 47 \Omega$

Application

- Single switch SMPS based on three-phase mains

Description

The STC08DE150HV is manufactured in a hybrid structure, using dedicated high voltage bipolar and low voltage MOSFET technologies, aimed at providing the best performance in an ESBT topology.

The STC08DE150HV is designed for use in auxiliary flyback SMPS for any three-phase application.

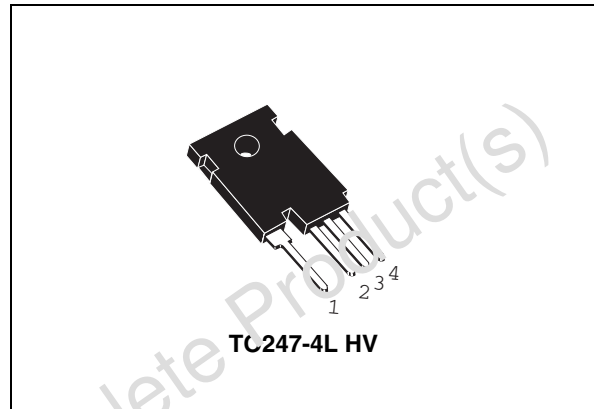


Figure 1. Internal schematic diagrams

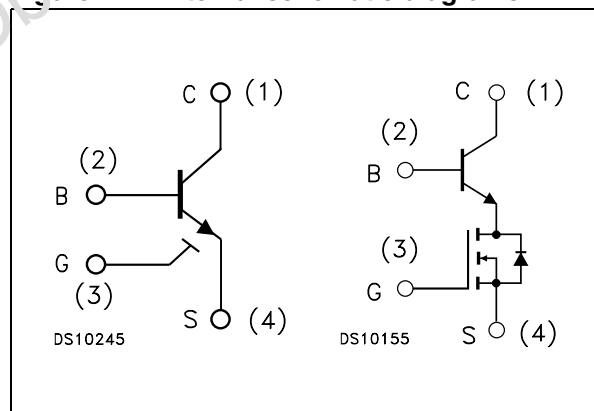


Table 1. Device summary

Order code	Marking	Package	Packing
STC08DE150HV	C08DE150HV	TO247-4L HV	Tube

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 ($I_C = 0, V_{GS} = 0$)	9	V
V_{GS}	Gate-source voltage	± 20	V
I_C	Collector current	8	A
I_{CM}	Collector peak current ($t_P < 5$ ms)	15	A
I_B	Base current	8	A
I_{BM}	Base peak current ($t_P < 1$ ms)	15	A
P_{tot}	Total dissipation at $T_C \leq 25$ °C	156	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_{thJC}	Thermal resistance junction-case	0.64	°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 cut-off current ($V_{\text{BS}} = V_{\text{GS}} = 0$)	$V_{\text{CS}} = 1500 \text{ V}$			100	μA
$I_{\text{BS(OS)}}$	Base cut-off current ($I_{\text{C}} = 0, V_{\text{GS}} = 0$)	$V_{\text{BS}} = 30 \text{ V}$			10	μA
$I_{\text{SB(OS)}}$	Source cut-off current ($I_{\text{C}} = 0, V_{\text{GS}} = 0$)	$V_{\text{SB}} = 9 \text{ V}$			100	μA
$I_{\text{GS(OS)}}$	Gate-source leakage current ($V_{\text{BS}} = 0$)	$V_{\text{GS}} = \pm 20 \text{ V}$			500	nA
$V_{\text{CS(ON)}}$	Collector-source ON voltage	$V_{\text{GS}} = 10 \text{ V } I_{\text{C}} = 8 \text{ A } I_{\text{B}} = 1.6 \text{ A}$ $V_{\text{GS}} = 10 \text{ V } I_{\text{C}} = 5 \text{ A } I_{\text{B}} = 0.5 \text{ A}$		0.6 0.6	1.4	V V
$h_{\text{FE}}^{(1)}$	DC current gain	$I_{\text{C}} = 8 \text{ A } V_{\text{CS}} = 1 \text{ V } V_{\text{GS}} = 10 \text{ V}$ $I_{\text{C}} = 5 \text{ A } V_{\text{CS}} = 1 \text{ V } V_{\text{GS}} = 10 \text{ V}$	4.5 8	7.5 10		
$V_{\text{BS(ON)}}$	Base-source ON voltage	$V_{\text{GS}} = 10 \text{ V } I_{\text{C}} = 8 \text{ A } I_{\text{B}} = 1.6 \text{ A}$ $V_{\text{GS}} = 10 \text{ V } I_{\text{C}} = 5 \text{ A } I_{\text{B}} = 0.5 \text{ A}$		1.5 1	2	V V
$V_{\text{GS(th)}}$	Gate threshold voltage	$V_{\text{BS}} = V_{\text{GS}} I_{\text{B}} = 250 \mu\text{A}$	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 ($V_{\text{CS}} = 0$)	$V_{\text{GS}} = 10 \text{ V } I_{\text{C}} = 8 \text{ A } V_{\text{CS}} = 25 \text{ V}$		12.5		nC
t_{r}	Inductive load Storage time	$V_{\text{GS}} = 10 \text{ V } R_{\text{G}} = 47 \Omega$ $V_{\text{Clamp}} = 1200 \text{ V } t_{\text{p}} = 4 \mu\text{s}$		526		ns
t_{f}	Fall time	$I_{\text{C}} = 5 \text{ A } I_{\text{B}} = 0.5 \text{ A}$		8.5		ns
t_{s}	Inductive load Storage time	$V_{\text{GS}} = 10 \text{ V } R_{\text{G}} = 47 \Omega$ $V_{\text{Clamp}} = 1200 \text{ V } t_{\text{p}} = 4 \mu\text{s}$		884		ns
t_{f}	Fall time	$I_{\text{C}} = 5 \text{ A } I_{\text{B}} = 1 \text{ A}$		16		ns
V_{CSW}	Maximum collector-source voltage at turn-off without snubber	$R_{\text{G}} = 47 \Omega h_{\text{FE}} = 5 I_{\text{C}} = 8 \text{ A}$	1500			V
$V_{\text{CS(dyn)}}$	Collector-source dynamic voltage (0.5 μs)	$V_{\text{CC}} = V_{\text{Clamp}} = 300 \text{ V}$ $V_{\text{GS}} = 10 \text{ V } I_{\text{C}} = 4 \text{ A}$ $I_{\text{B}} = 0.8 \text{ A } t_{\text{peak}} = 500 \text{ ns}$ $R_{\text{G}} = 47 \Omega I_{\text{Bpeak}} = 8 \text{ A } (2I_{\text{C}})$		6		V
$V_{\text{CS(dyn)}}$	Collector-source dynamic voltage (1 μs)	$V_{\text{CC}} = V_{\text{Clamp}} = 300 \text{ V}$ $V_{\text{GS}} = 10 \text{ V } I_{\text{C}} = 4 \text{ A}$ $I_{\text{B}} = 0.8 \text{ A } t_{\text{peak}} = 500 \text{ ns}$ $R_{\text{G}} = 47 \Omega I_{\text{Bpeak}} = 8 \text{ A } (2I_{\text{C}})$		2.2		V

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

2.1 Electrical characteristics (curves)

Figure 2. Output characteristics

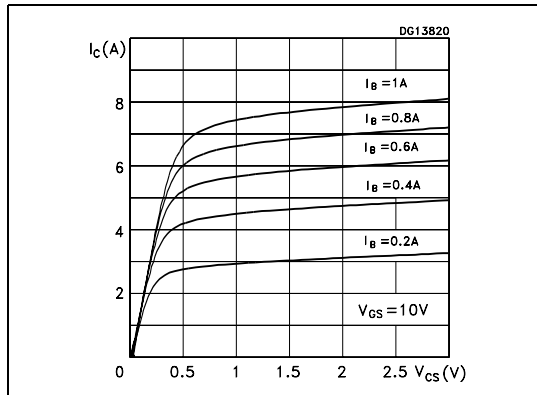


Figure 3. Collector-source dynamic voltage

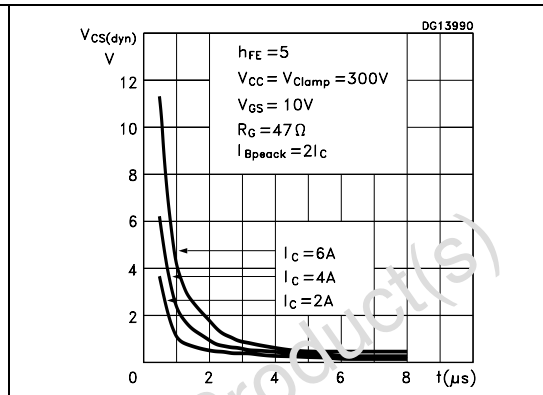


Figure 4. DC current gain

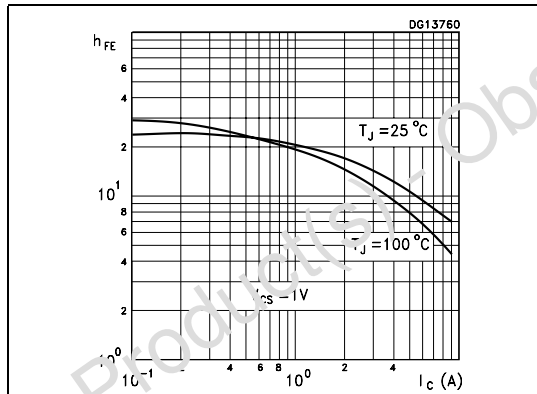


Figure 5. Gate threshold voltage vs. temperature

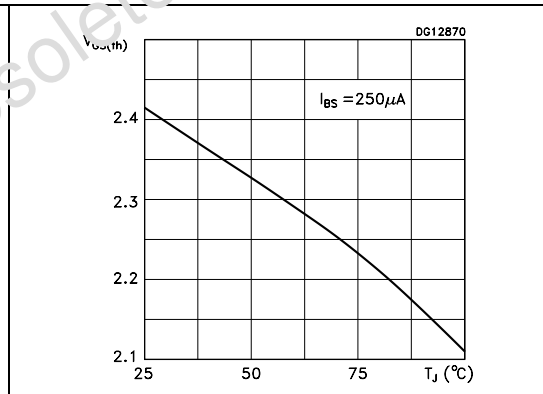


Figure 6. Collector-source ON voltage ($h_{FE} = 5$)

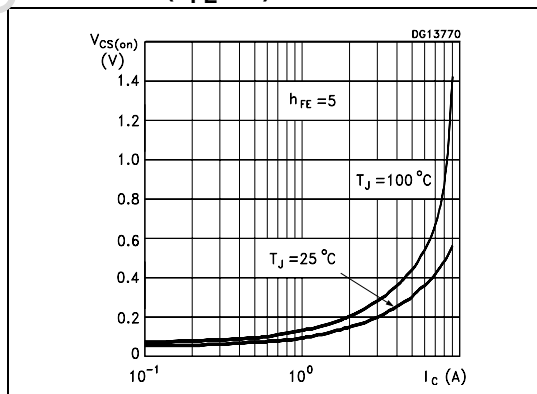


Figure 7. Collector-source ON voltage ($h_{FE} = 10$)

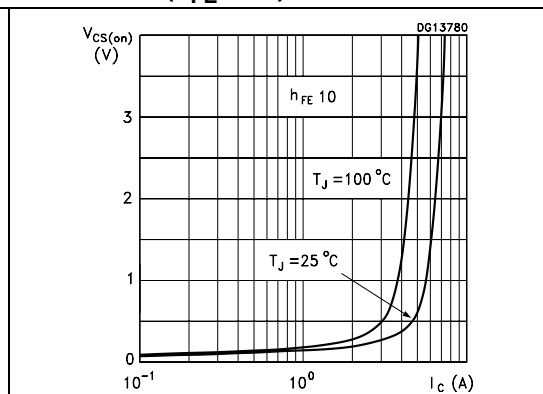


Figure 8. Base-source ON voltage ($h_{FE} = 5$)

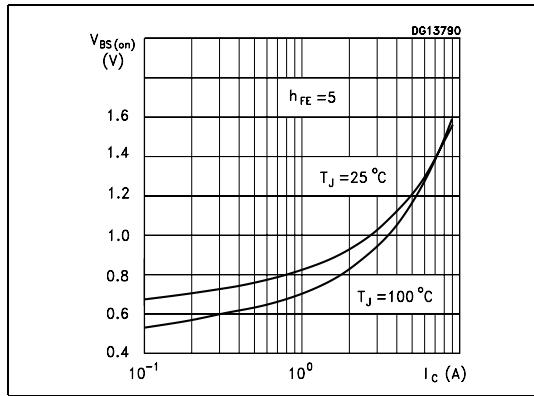


Figure 9. Base-source ON voltage ($h_{FE} = 10$)

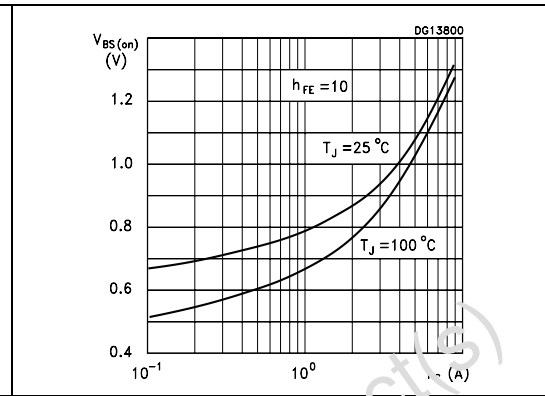


Figure 10. Inductive load switching time ($h_{FE} = 5$)

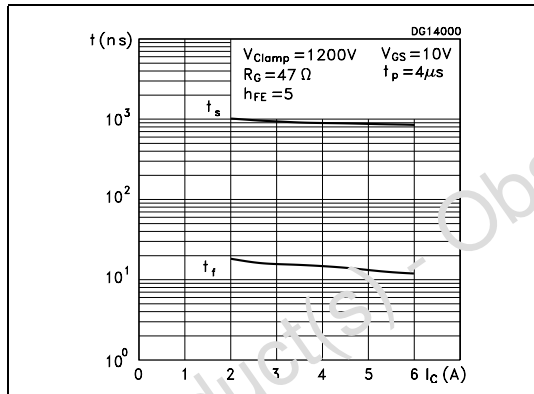


Figure 11. Inductive load switching time ($h_{FE} = 10$)

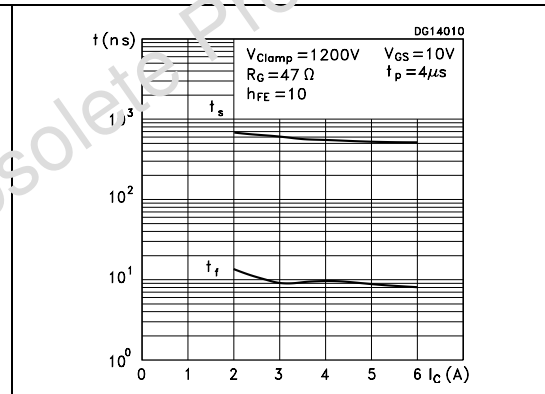
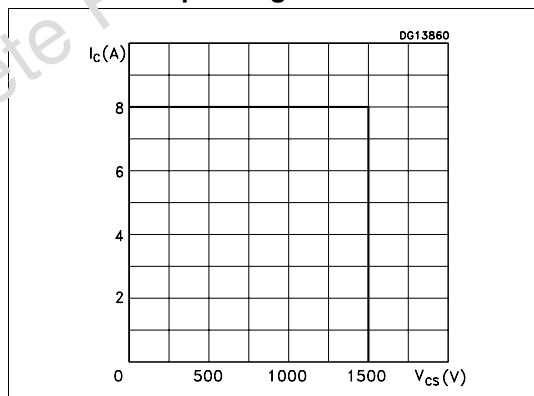


Figure 12. Reverse biased safe operating area



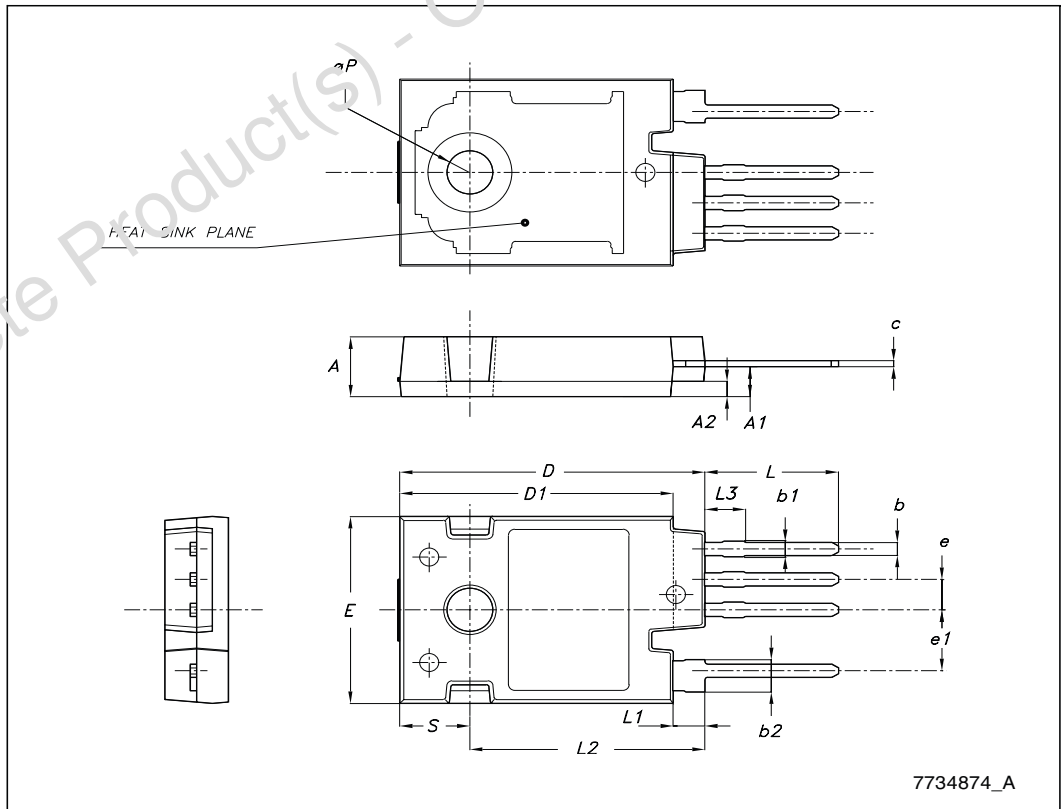
3 Package mechanical data

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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
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		5	
øP	3.55		3.65
S		5.50	



4 Revision history

Table 5. Document revision history

Date	Revision	Changes
25-Oct-2006	1	First release.
17-Jun-2009	2	Document status promoted from preliminary data to datasheet.

Obsolete Product(s) - Obsolete Product(s)

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