



# STC08DE150HP

Hybrid emitter switched bipolar transistor  
 ESBT<sup>®</sup> 1500 V - 8 A - 0.075  $\Omega$

## Features

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

- Low equivalent ON resistance
- Very fast-switching: 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 STC08DE150HP 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 STC08DE150HP is designed for use in auxiliary flyback SMPS for any three-phase application.

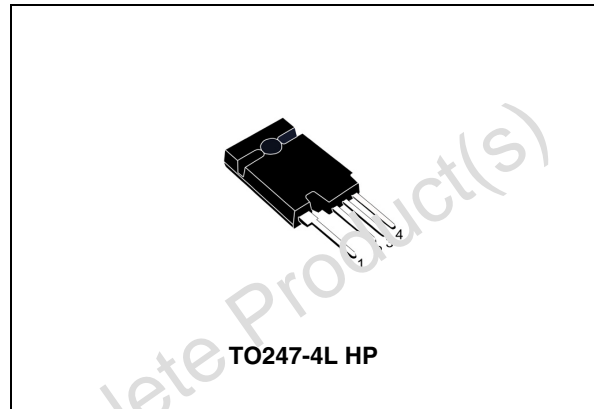


Figure 1. Internal schematic diagrams

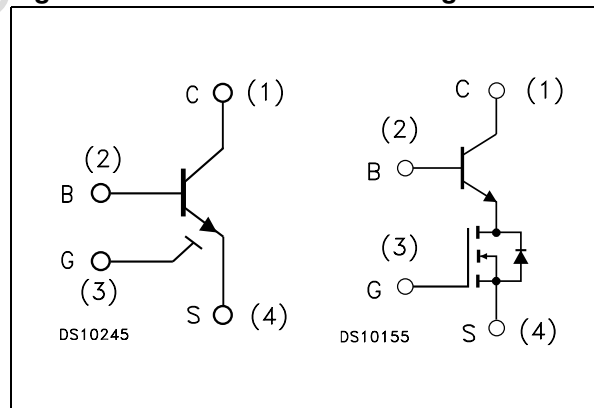


Table 1. Device summary

Order code	Marking	Package	Packing
STC08DE150HP	C08DE150HP	TO247-4L HP	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	$\pm 20$	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	42	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	2.4	°C/W

## 2 Electrical characteristics

( $T_{\text{case}} = 25\text{ }^{\circ}\text{C}$  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	$\mu\text{A}$
$I_{\text{BS(OS)}}$	Base cut-off current ( $I_{\text{C}} = 0, V_{\text{GS}} = 0$ )	$V_{\text{BS}} = 30\text{ V}$			10	$\mu\text{A}$
$I_{\text{SB(OS)}}$	Source cut-off current ( $I_{\text{C}} = 0, V_{\text{GS}} = 0$ )	$V_{\text{SB}} = 9\text{ V}$			100	$\mu\text{A}$
$I_{\text{GS(OS)}}$	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	$V_{\text{GS}} = 10\text{ V } I_{\text{C}} = 8\text{ A } I_{\text{P}} = 1.6\text{ A}$ $V_{\text{GS}} = 10\text{ V } I_{\text{C}} = 5\text{ A } I_{\text{B}} = 0.5\text{ A}$		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	$V_{\text{BS}} = V_{\text{GS}} I_{\text{B}} = 250\text{ }\mu\text{A}$	1.5	2.2	3	V
$C_{\text{iss}}$	Input capacitance ( $V_{\text{GS}} = V_{\text{CS}} = 0$ )	$V_{\text{CS}} = 25\text{ V } f = 1\text{ MHz}$		750		pF
$Q_{\text{GS(tot)}}$	Gate-source charge ( $V_{\text{CE}} = 0$ )	$V_{\text{GS}} = 10\text{ V } I_{\text{C}} = 8\text{ A } V_{\text{CS}} = 25\text{ V}$		12.5		nC
$t_{\text{s}}$ $t_{\text{f}}$	Inductive load Storage time Fall time	$V_{\text{GS}} = 10\text{ V } R_{\text{G}} = 47\text{ }\Omega$ $V_{\text{Clamp}} = 1200\text{ V } t_{\text{p}} = 4\text{ }\mu\text{s}$ $I_{\text{C}} = 5\text{ A } I_{\text{B}} = 0.5\text{ A}$		526 8.5		ns ns
$t_{\text{s}}$ $t_{\text{f}}$	Inductive load Storage time Fall time	$V_{\text{GS}} = 10\text{ V } R_{\text{G}} = 47\text{ }\Omega$ $V_{\text{Clamp}} = 1200\text{ V } t_{\text{p}} = 4\text{ }\mu\text{s}$ $I_{\text{C}} = 5\text{ A } I_{\text{B}} = 1\text{ A}$		884 16		ns ns
$V_{\text{CSW}}$	Maximum collector-source voltage at turn-off without snubber	$R_{\text{G}} = 47\text{ }\Omega h_{\text{FE}} = 5 I_{\text{C}} = 8\text{ A}$	1500			V
$V_{\text{CS(dyn)}}$	Collector-source dynamic voltage (0.5 $\mu\text{s}$ )	$V_{\text{CC}} = V_{\text{Clamp}} = 300\text{ V}$ $V_{\text{GS}} = 10\text{ V } I_{\text{C}} = 4\text{ A}$ $I_{\text{B}} = 0.8\text{ A } t_{\text{peak}} = 500\text{ ns}$ $R_{\text{G}} = 47\text{ }\Omega I_{\text{Bpeak}} = 8\text{ A } (2I_{\text{C}})$		6		V
$V_{\text{CS(dyn)}}$	Collector-source dynamic voltage (1 $\mu\text{s}$ )	$V_{\text{CC}} = V_{\text{Clamp}} = 300\text{ V}$ $V_{\text{GS}} = 10\text{ V } I_{\text{C}} = 4\text{ A}$ $I_{\text{B}} = 0.8\text{ A } t_{\text{peak}} = 500\text{ ns}$ $R_{\text{G}} = 47\text{ }\Omega I_{\text{Bpeak}} = 8\text{ A } (2I_{\text{C}})$		2.2		V

1. Pulsed duration = 300  $\mu\text{s}$ , duty cycle  $\leq 1.5\%$ .

## 2.1 Electrical characteristics (curves)

Figure 2. Output characteristics

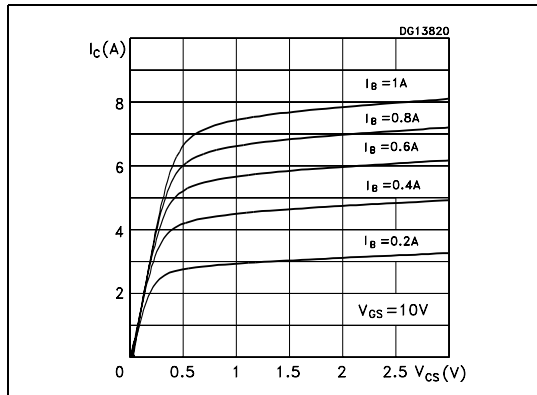


Figure 3. Collector-source dynamic voltage

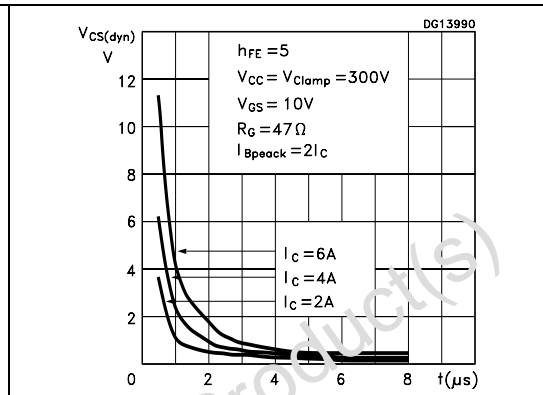


Figure 4. DC current gain

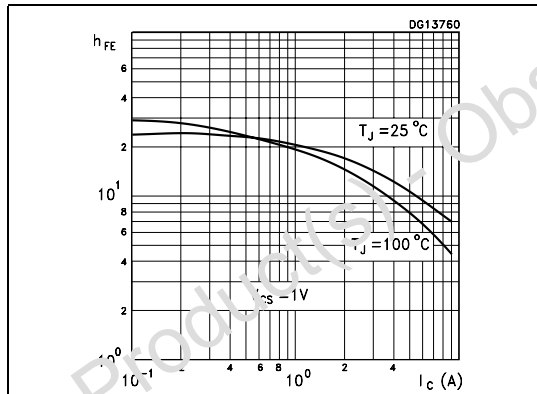


Figure 5. Gate threshold voltage vs. temperature

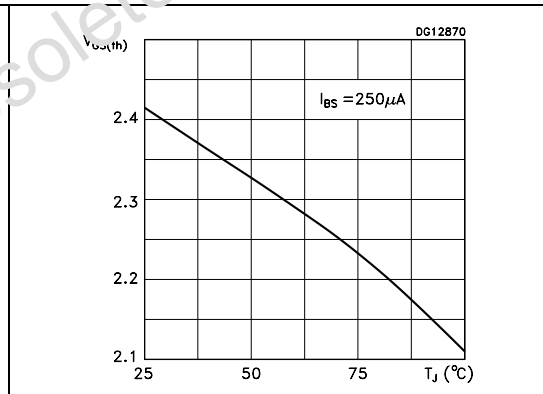


Figure 6. Collector-source ON voltage ( $h_{FE} = 5$ )

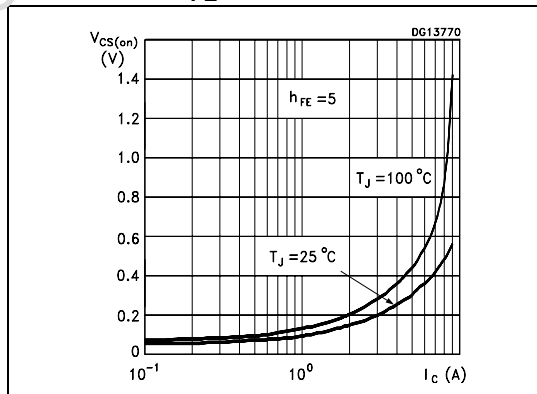
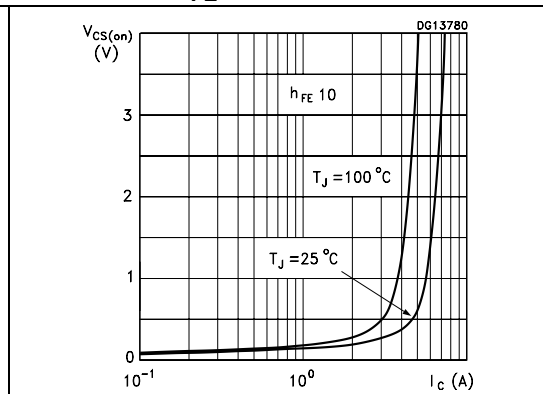
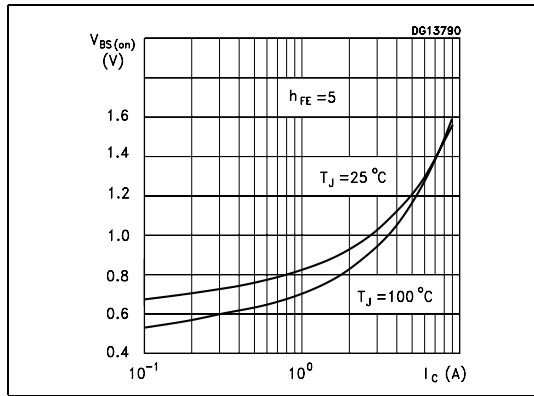


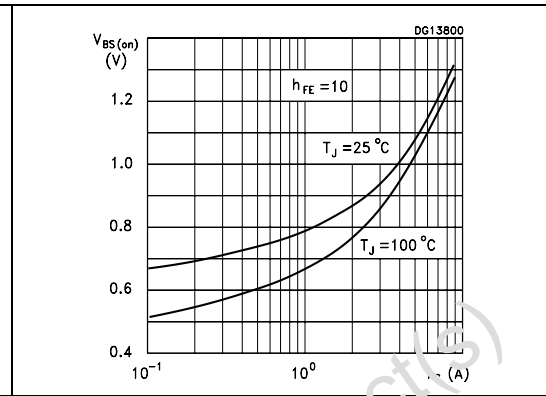
Figure 7. Collector-source ON voltage ( $h_{FE} = 10$ )



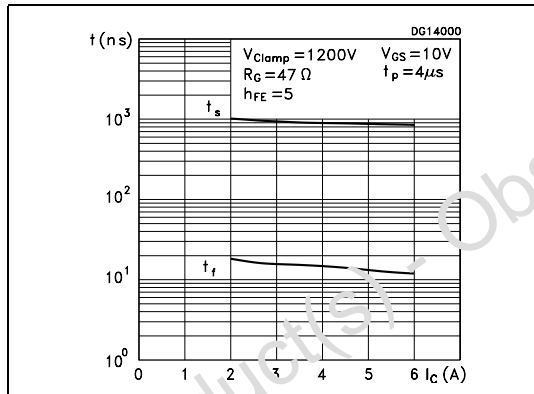
**Figure 8. Base-source ON voltage ( $h_{FE} = 5$ )**



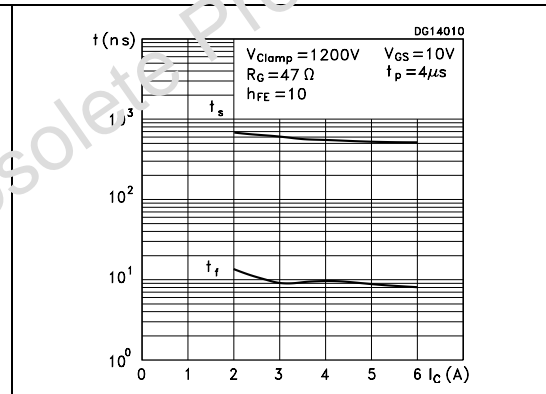
**Figure 9. Base-source ON voltage ( $h_{FE} = 10$ )**



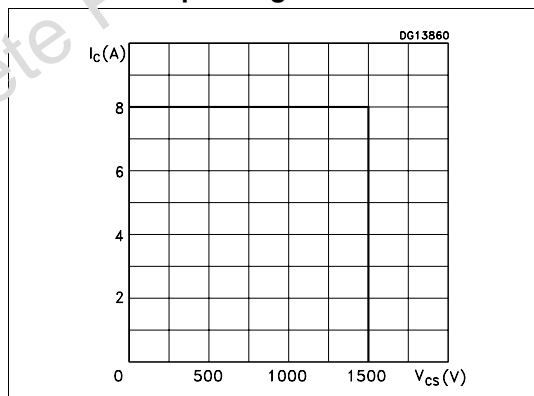
**Figure 10. Inductive load switching time ( $h_{FE} = 5$ )**



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



**Figure 12. Reverse biased safe operating area**



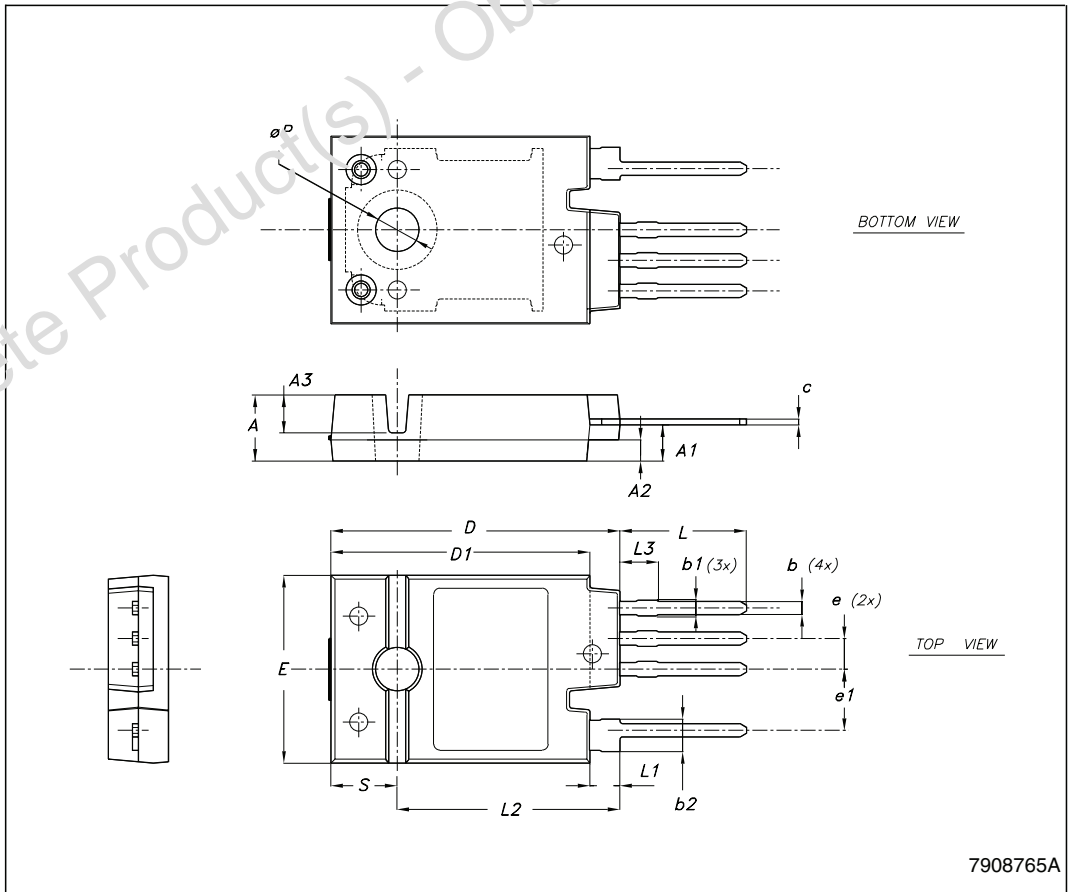
### 3 Package mechanical data

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Obsolete Product(s) - Obsolete Product(s)

**TO247-4L HP mechanical data**

DIM.	mm.		
	MIN.	TYP	MAX.
A	5.50	5.65	5.80
A1	2.85	3.15	3.25
A2		1.92	
A3		3.18	
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		?	
øP	3.55		3.65
S		5.50	



## 4 Revision history

**Table 5. Document revision history**

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

Obsolete Product(s) - Obsolete Product(s)



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