

# STC03DE170HP

Preliminary Data

### **General features**

#### Table 1.General features

V <sub>CS(ON)</sub>	۱ <sub>C</sub>	R <sub>CS(ON)</sub>
1V	1.8A	0.55Ω

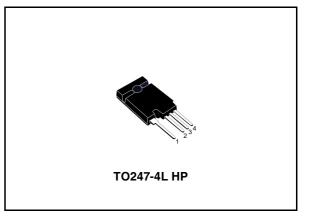
- Low equivalent on resistance
- Very fast-switch, up to 150 kHz
- Squared RBSOA, up to 1700 V
- Very low  $C_{ISS}$  driven by  $R_G = 47 \Omega$
- In compliance with the 2002/93/EC European Directive

### Description

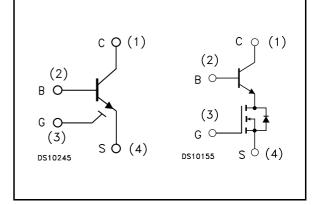
The STC03DE170HP is manufactured in a hybrid structure, using dedicated high voltage Bipolar and low voltage MOSFET technologies, aimed to providing the best performance in ESBT topology. The STC03DE170HP is designed for use in aux flyback smps for any three phase application.

## Applications

Aux SMPS for three phase mains



### Internal schematic diagrams



#### **Order codes**

Part Number	Marking	Package	Packing
STC03DE170HP	C03DE170HP	TO247-4L HP	Tube

September 2006

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## 1 Electrical ratings

Table 2.Absolute maximum	ratings
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Symbol	Parameter	Value	Unit
V <sub>CS(SS)</sub>	Collector-source voltage (V <sub>BS</sub> =V <sub>GS</sub> =0V)	1700	V
V <sub>BS(OS)</sub>	Base-source voltage (I <sub>C</sub> =0, V <sub>GS</sub> =0V)	30	V
V <sub>SB(OS)</sub>	Source-base voltage (I <sub>C</sub> =0, V <sub>GS</sub> =0V)	9	V
$V_{GS}$	Gate-source voltage	±20	V
۱ <sub>C</sub>	Collector current	3	А
I <sub>CM</sub>	Collector peak current (t <sub>P</sub> < 5ms)	6	А
Ι <sub>Β</sub>	Base current	2	Α
I <sub>BM</sub>	Base peak current (t <sub>P</sub> < 1ms)4		А
P <sub>tot</sub>	Total dissipation at $T_c \le 25^{\circ}C$	35.7	W
T <sub>stg</sub>	Storage temperature -40 to 150		°C
Τ <sub>J</sub>	Max. operating junction temperature	125	°C

#### Table 3. Thermal data

Symbol	Parameter	Value	Unit
R <sub>thj-case</sub>	Thermal resistance junction-case max	2.8	°C/W

## 2 Electrical characteristics

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

Table 4.	Electrical	characteristics

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
I <sub>CS(SS)</sub>	Collector-source current $(V_{BS} = V_{GS} = 0V)$	V <sub>CS(SS)</sub> =1700V			100	μA
I <sub>BS(OS)</sub>	Base-source current (I <sub>C</sub> =0, V <sub>GS</sub> =0V)	V <sub>BS(OS)</sub> =30V			10	μA
I <sub>SB(OS)</sub>	Source-base current (I <sub>C</sub> =0, V <sub>GS</sub> =0V)	V <sub>SB(OS)</sub> =9V			100	μA
I <sub>GS(OS)</sub>	Gate-source leakage (V <sub>BS</sub> =0V)	$V_{GS} = \pm 20V$			500	nA
V <sub>CS(ON)</sub>	Collector-source ON voltage	$V_{GS} = 10V I_{C} = 1.8A I_{B} = 0.36A$ $V_{GS} = 10V I_{C} = 0.7A I_{B} = 70mA$		1 1	1.5 1.3	V V
h <sub>FE</sub>	DC current gain	$V_{CS} = 1V$ $V_{GS} = 10V$ $I_{C} = 1.8A$ $V_{CS} = 1V$ $V_{GS} = 10V$ $I_{C} = 0.7A$	3.5 6	5 10		
V <sub>BS(ON)</sub>	Base-source ON voltage	$V_{GS} = 10V I_{C} = 1.8A I_{B} = 0.36A$ $V_{GS} = 10V I_{C} = 0.7A I_{B} = 70mA$		1 0.8	1.2 1	V V
V <sub>GS(th)</sub>	Gate threshold voltage	V <sub>BS</sub> =V <sub>GS</sub> I <sub>B</sub> =250μA	1.5	2.2	3	V
C <sub>iss</sub>	Input capacitance	V <sub>CS</sub> =25V f =1MHz V <sub>GS</sub> =0V		750		pF
Q <sub>GS(tot)</sub>	Gate-source Charge	V <sub>CS</sub> =15V V <sub>GS</sub> =10V V <sub>CB</sub> =0V I <sub>C</sub> =1.8A		12.5		nC
t <sub>s</sub> t <sub>f</sub>	INDUCTIVE LOAD Storage time Fall time	$V_{GS} = 10V$ $R_G = 47\Omega$ $V_{Clamp} = 1200V$ $t_p = 4\mu s$ $I_C = 1.8A$ $I_B = 0.36A$		760 14		ns ns
t <sub>s</sub> t <sub>f</sub>	INDUCTIVE LOAD Storage time Fall time	$V_{GS} = 10V$ $R_G = 47\Omega$ $V_{Clamp} = 1200V$ $t_p = 4\mu s$ $I_C = 0.7A$ $I_B = 70mA$		690 32		ns ns
V <sub>CS(dyn)</sub>	Collector-source dynamic voltage (500ns)	$\label{eq:V_CC} \begin{split} & V_{CC} = V_{Clamp} = \!$		3.9		V



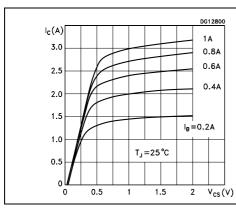
Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
V <sub>CS(dyn)</sub>	Collector-source dynamic voltage (1µs)	$\label{eq:V_CC} \begin{split} &V_{CC} = V_{Clamp} = 400V \\ &V_{GS} = 10V & I_{C} = 0. \\ &I_{B} = 0.1A & R_{G} = 400 \\ &I_{c} = 0.14 & I_{c} = 0.14 \\ &I_{c} = 0.14 & $	17Ω	2.2		v
V <sub>CSW</sub>	Maximum collector- source voltage switched without snubber	$R_{G} = 47\Omega$ $h_{FE} = 5$ $I_{C}$	= 3A 1700			V

Table 4. Electrical characteristics

Note (1) Pulsed duration = 300  $\mu$ s, duty cycle  $\leq$ 1.5%

### 2.1 Electrical characteristics (curves)

Figure 1.



Output characteristics Figure 2.

2. Dynamic collector-source saturation voltage

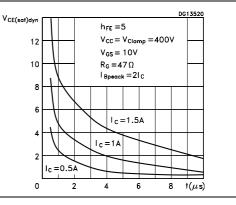
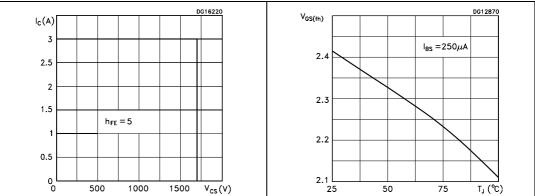


 Figure 3.
 Reverse biased safe operating area
 Figure 4.
 Gate threshold voltage vs temperature



#### Figure 5. DC current gain

Figure 6. DC current gain

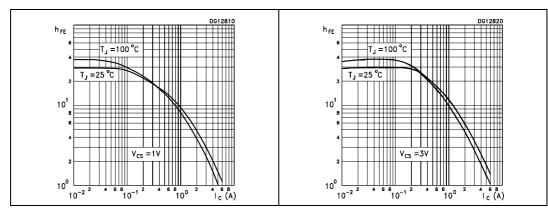
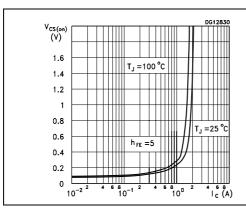


Figure 7. Collector-source On voltage Figure 8. Collector-source On voltage



V<sub>CS (on)</sub> (V) 1.6 T<sub>J</sub> =100 °C 1.4 1.2 1 0.8 T<sub>J</sub> =25 °C 0.6  $h_{FE} = 10$ 0.4 0.2 0 10<sup>-2</sup> 10<sup>-1</sup> l° Å) 10°

Figure 9. Base-source On voltage

Figure 10. Base-source On voltage

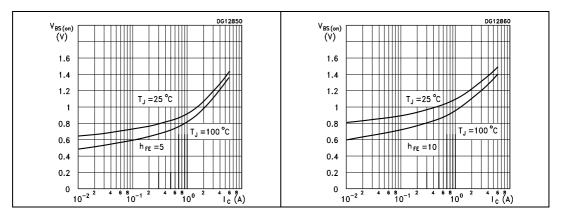




Figure 11.	Inductive load switching time	Figure 12. Inductive load switching time
t(ns) 4 2 $10^{3}_{8}$ 4 2 $10^{2}_{9}$ 0	$\begin{array}{c c} & & & & & & \\ \hline & & & & & \\ V_{Clomp} = 1280V & V_{GS} = 10V \\ R_G = 47 \Omega & t_p = 4\mu s \\ h_{FE} = 5 & & & \\ \hline & & & & & \\ & & & & & \\ \hline & & & &$	$\begin{array}{c c} & & & & & & & & & & & & & & & & & & &$



## 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

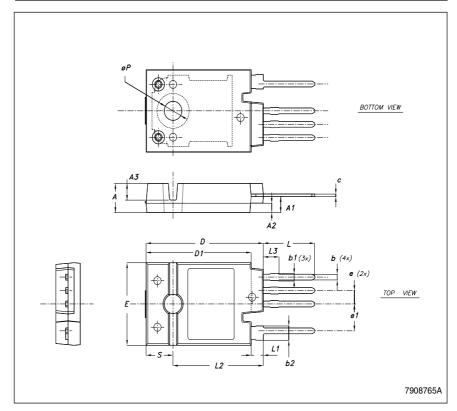


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STC03DE170HP

ЫΜ.		mm.	
	MIN.	ТҮР	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
с	0.40		0.80
D	23.85	24	24.15
D1		21.50	
E	15.45	15.60	15.75
е	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	

TO247-4LHP MECHANICAL DATA





## 4 Revision history

Table 5. Revision	history	
Table 5. Revision	matory	

Date	Revision	Changes
26-Sep-2006	1	First release.



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