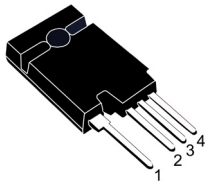
STC03DE170HP

Hybrid emitter switched bipolar transistor
ESBT® 1700V - 3A - 0.33 Ω

Features

$V_{CS(ON)}$	I_C	$R_{CS(ON)}$
1 V	3 A	0.33 Ω

- Low equivalent on resistance
- Very fast-switch, up to 150 kHz
- Squared RBSOA, up to 1700V
- Very low C_{ISS} driven by R_G = 47 Ω



TO247-4L HP

Applications

- Aux SMPS for three phase mains

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

Figure 1. Internal schematic diagrams

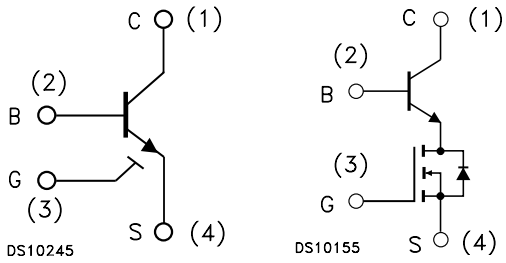


Table 1. Device summary

Order code	Marking	Package	Packaging
STC03DE170HP	C03DE170HP	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} =0V)	1700	V
$V_{BS(OS)}$	Base-source voltage (I_C =0, V_{GS} =0V)	30	V
$V_{SB(OS)}$	Source-base voltage (I_C =0, V_{GS} =0V)	9	V
V_{GS}	Gate-source voltage	± 20	V
I_C	Collector current	3	A
I_{CM}	Collector peak current (t_P < 5ms)	6	A
I_B	Base current	1	A
I_{BM}	Base peak current (t_P < 1ms)	3	A
P_{tot}	Total dissipation at $T_c \leq 25°C$	35.7	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	2.8	°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 current (V_{BS} =V_{GS} =0V)	$V_{CS(SS)}$ =1700V			100	µA
$I_{BS(OS)}$	Base-source current (I_C =0, V_{GS} =0V)	$V_{BS(OS)}$ =30V			10	µA
$I_{SB(OS)}$	Source-base current (I_C =0, V_{GS} =0V)	$V_{SB(OS)}$ =9V			100	µA
$I_{GS(OS)}$	Gate-source leakage (V_{BS} =0V)	V_{GS} = ± 20V			500	nA
$V_{CS(ON)}$	Collector-source ON voltage	V_{GS} =10V I_C =3A I_B =0.6A V_{GS} =10V I_C =1A I_B =100mA		1 0.3	1.2 0.6	V V
h_{FE}	DC current gain	V_{GS} =10V V_{CS} =1V I_C =3A V_{GS} =10V V_{CS} =1V I_C =1A	 10	5 14		
$V_{BS(ON)}$	Base-source ON voltage	V_{GS} =10V I_C =3A I_B =0.6A V_{GS} =10V I_C =1A I_B =100mA		1 1	1.2	V V
$V_{GS(th)}$	Gate threshold voltage	V_{BS} =V_{GS} I_B =250µA	1.5		3	V
C_{iss}	Input capacitance	V_{CS} =25V f =1MHz V_{GS}=0V		750		pF
$Q_{GS(tot)}$	Gate-source Charge	V_{CS}=15V V_{GS}=10V V_{CB}=0V I_C =4A		12.5		nC
 t_s t_f	INDUCTIVE LOAD Storage time Fall time	V_{GS} =10V R_G =47Ω V_{Clamp} =1360V t_p =4µs I_C =3A I_B =0.6A		 1000 15		 ns ns
 t_s t_f	INDUCTIVE LOAD Storage time Fall time	V_{GS} =10V R_G =47Ω V_{Clamp} =1360V t_p =4µs I_C =3A I_B =0.3A		 590 15		 ns ns
$V_{CS(dyn)}$	Collector-source dynamic voltage (500ns)	V_{CC} =V_{Clamp} =400V V_{GS} =10V I_C =1.5A I_B = 0.1A R_G =47Ω t_{peak} =500ns I_{Bpeak} =3A		9.5		V

Table 4. Electrical characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{CS(dyn)}$	Collector-source dynamic voltage (1µs)	V_{CC} =V_{Clamp} =400V V_{GS} =10V I_C =1.5A I_B = 0.1A R_G =47Ω t_{peak} =500ns I_{Bpeak} =3A		9.5		V
V_{CSW}	Maximum collector-source voltage switched without snubber	R_G =47Ω h_{FE} =5 I_C = 4A	1700			V

Note (1) Pulsed duration = 300 µs, duty cycle ≤1.5%

2.1 Electrical characteristics (curves)

Figure 2. Output characteristics

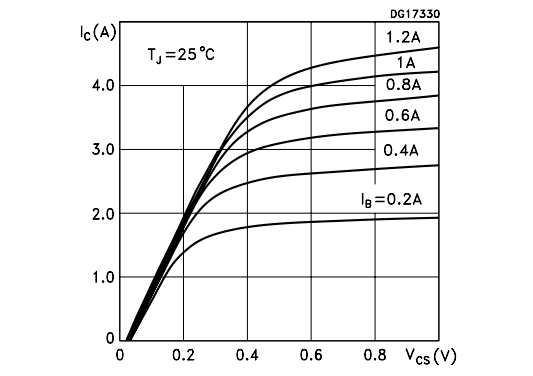


Figure 3. Dynamic collector-source saturation voltage

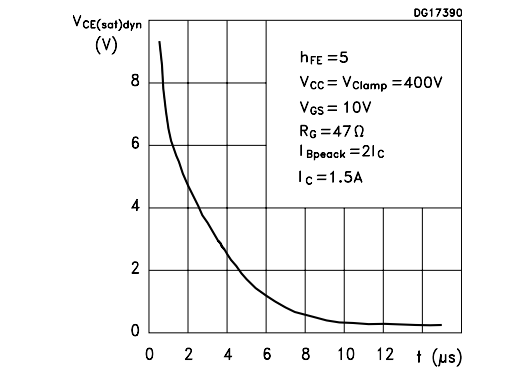


Figure 4. Reverse biased safe operating area

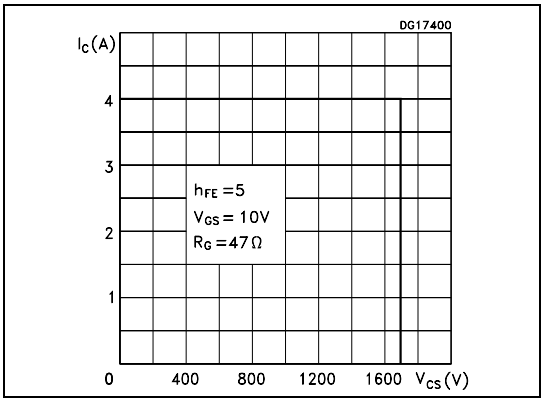


Figure 5. Gate threshold voltage vs temperature

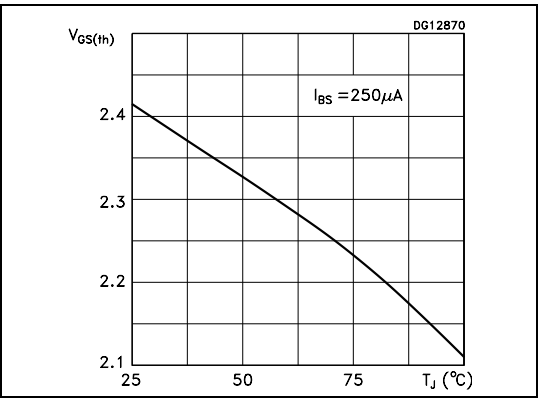


Figure 6. DC current gain

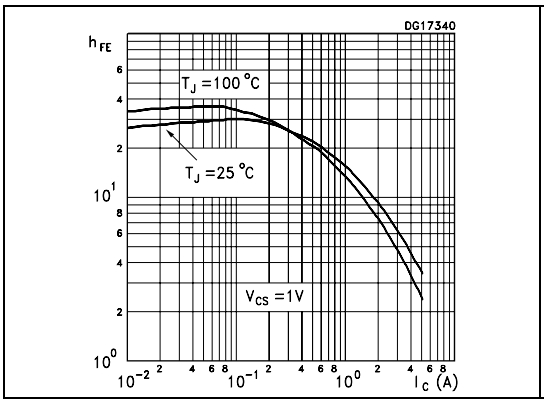


Figure 7. Collector-source On voltage

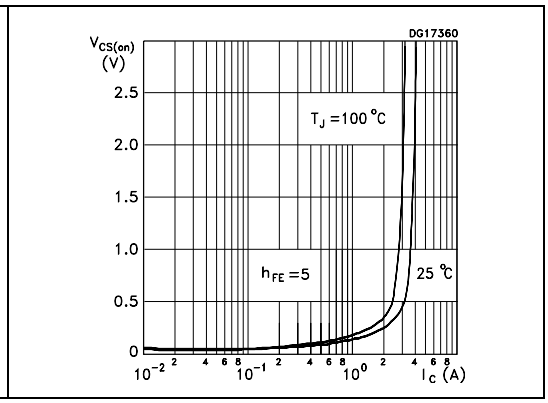


Figure 8. Collector-source On voltage

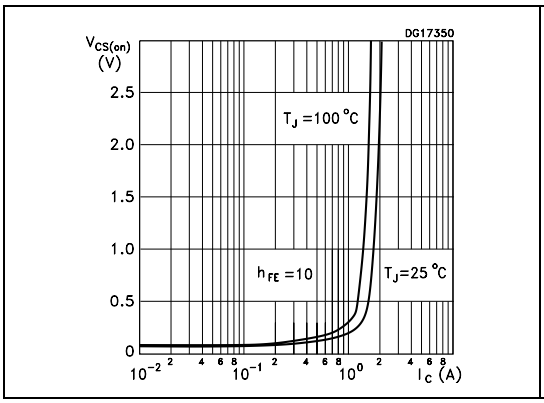


Figure 9. Base-source On voltage

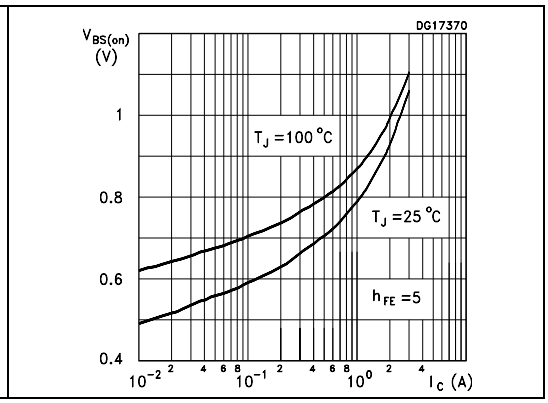


Figure 10. Inductive load switching time

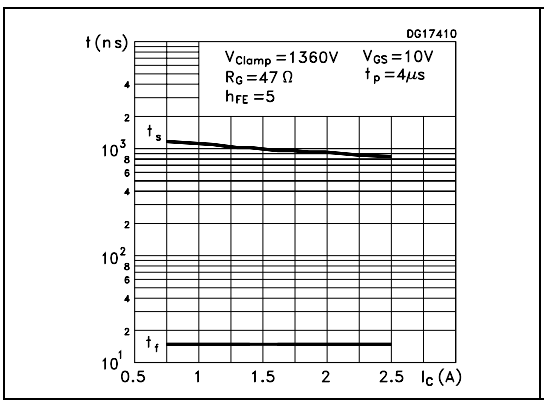
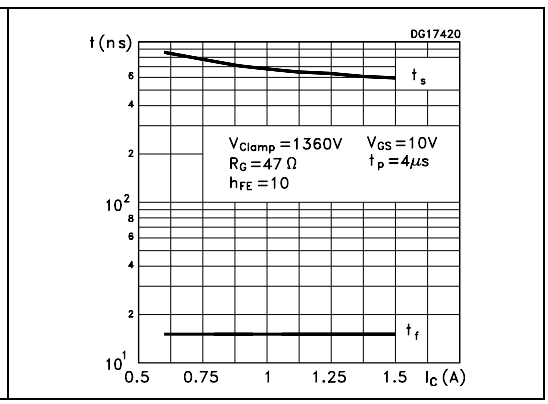


Figure 11. Inductive load switching time

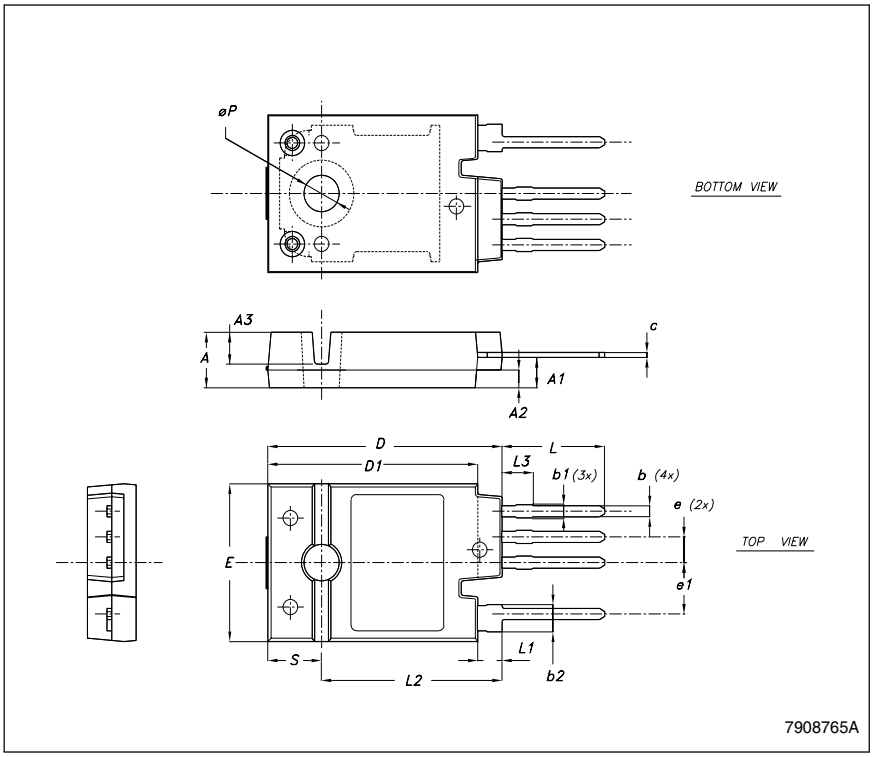


3 Package mechanical data

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

TO247-4LHP 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		3	
øP	3.55		3.65
S		5.50	



4 Revision history

Table 5. Revision history

Date	Revision	Changes
26-Sep-2006	1	First release.
16-Jul-2007	2	Improved electrical specification. Updated figures: 2,3,4,6,7,8,9,10 and 11.

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