STC03DE220HP

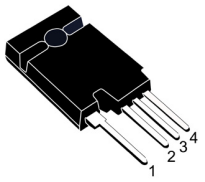
Hybrid emitter switched bipolar transistor
ESBT® 2200 V - 3 A - 0.33 Ω

Features

Table 1. Features

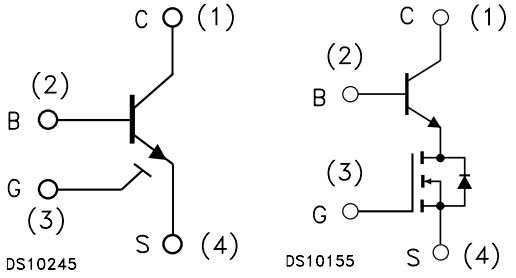
$V_{CS(ON)}$	I_C	$R_{CS(ON)}$
1 V	3 A	0.33 Ω

- Low equivalent on resistance
- Very fast-switch, up to 150 kHz
- Very low C_{ISS} driven by R_G = 4.7 Ω



TO247-4L HP

Figure 1. Internal schematic diagrams



Applications

- Aux SMPS for three phase mains

Description

The STC03DE220HP 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 STC03DE220HP is designed for use in aux flyback SMPS for any three phase application.

Table 2. Device summary

Order code	Marking	Package	Packaging
STC03DE220HP	C03DE220HP	TO247-4L HP	Tube

1 Electrical ratings

Table 3. Absolute maximum ratings

Symbol	Parameter	Value	Unit
$V_{CS(SS)}$	Collector-source voltage (V_{BS} = V_{GS} =0)	2200	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	3	A
I_{CM}	Collector peak current (t_P < 5 ms)	6	A
I_B	Base current	3	A
I_{BM}	Base peak current (t_P < 1 ms)	6	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 4. Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Thermal resistance junction-case	2.4	°C/W

2 Electrical characteristics

(T_{case} = 25 °C; unless otherwise specified)

Table 5. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{CS(SS)}$	Collector cut-off current (V_{BS} = V_{GS} = 0)	V_{CS} = 2200 V			100	µA
$I_{BS(OS)}$	Base cut-off current (I_C =0, V_{GS} = 0)	V_{BS} = 30 V			10	µA
$I_{SB(OS)}$	Source cut-off current (I_C =0, V_{GS} = 0)	V_{SB} = 9 V			100	µA
$I_{GS(OS)}$	Gate-source leakage current (V_{BS} = 0)	V_{GS} = ± 20 V			500	nA
$V_{CS(ON)}$	Collector-source ON voltage	V_{GS} = 10 V I_C = 1.5 A I_B = 0.15 A V_{GS} = 10 V I_C = 3 A I_B = 0.6 A		0.2 0.25		V V
h_{FE}	DC current gain	V_{CS} = 1 V V_{GS} =10 V I_C =1.5 A V_{CS} = 1 V V_{GS} =10 V I_C =3 A		15 10		
$V_{BS(ON)}$	Base-source ON voltage	V_{GS} = 10 V I_C = 1.5 A I_B = 0.15 A V_{GS} =10 V I_C = 3 A I_B = 0.6 A		0.82 1		V V
$V_{GS(th)}$	Gate threshold voltage	V_{BS} = V_{GS} I_B = 250 µA	1.5	2.2	3	V
C_{iss}	Input capacitance (V_{GS} = V_{CB} = 0)	V_{CS} = 25 V f = 1 MHz		750		pF
$Q_{GS(tot)}$	Gate-source Charge (V_{CB} = 0)	V_{CS} =15 V V_{GS} = 10 V I_C = 1.8 A		12.5		nC
t_s t_f	INDUCTIVE LOAD Storage time Fall time	V_{GS} = 10 V R_G = 47 Ω V_{Clamp} = 1760 V t_p = 4 µs I_C = 1.5 A I_B = 0.3 A		1040 20		ns ns
$V_{CS(dyn)}$	Collector-source dynamic voltage (0.5 µs)	V_{CC} = V_{Clamp} = 400 V V_{GS} = 10 V I_C = 1.5 A I_B = 0.3 A R_G = 47 Ω t_{peak} = 500 ns I_{Bpeak} = 3 A		7.6		V
$V_{CS(dyn)}$	Collector-source dynamic voltage (1 µs)	V_{CC} = V_{Clamp} = 400 V V_{GS} = 10 V I_C = 1.5 A I_B = 0.3 A R_G = 47 Ω t_{peak} = 500 ns I_{Bpeak} = 3 A		5.8		V
V_{CSW}	Maximum collector-source voltage at turn-off without snubber	R_G = 47 Ω h_{FE} = 5 I_C = 3 A	2200			V

2.1 Electrical characteristics (curves)

Figure 2. DC current gain

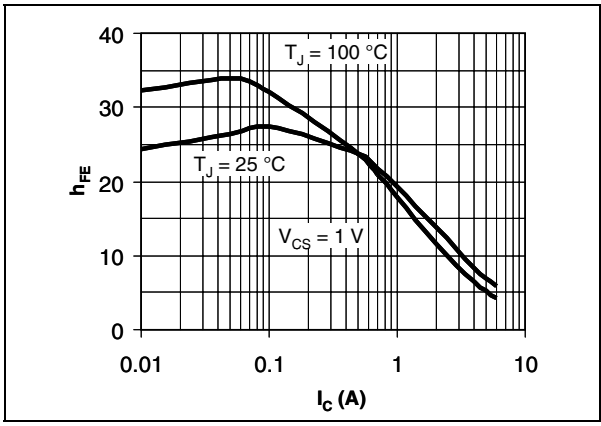


Figure 3. Base-source ON voltage

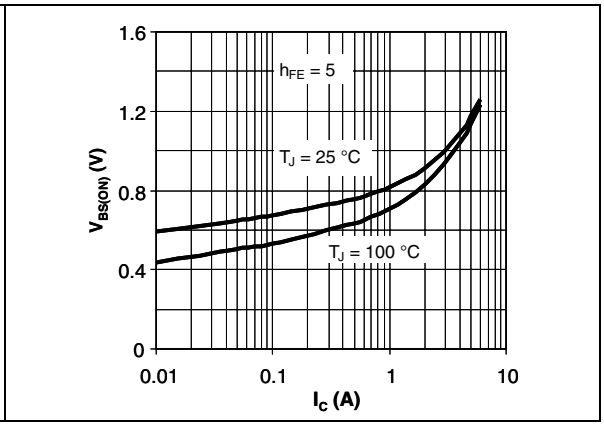


Figure 4. Collector-source ON voltage

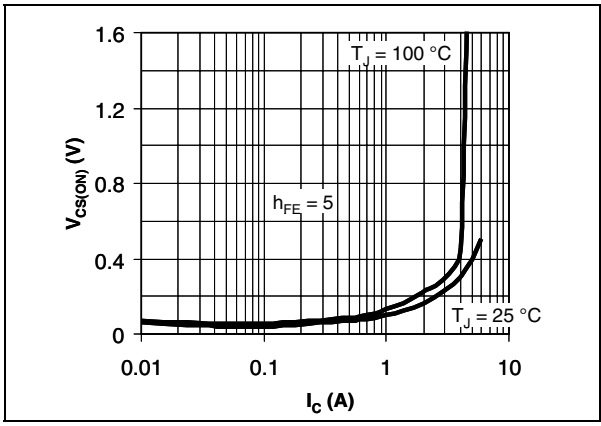


Figure 5. Collector-source dynamic voltage

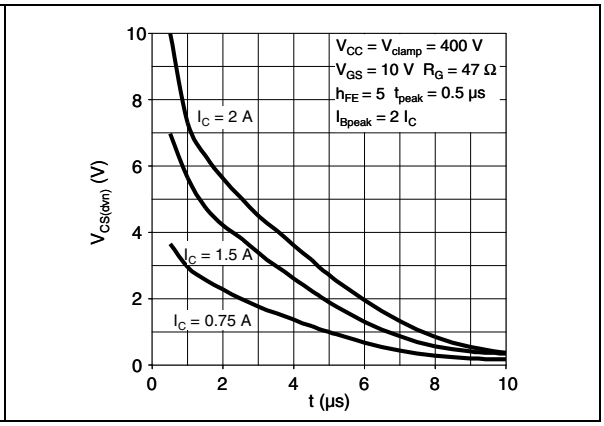


Figure 6. Inductive load switching off (T_C = 25°C)

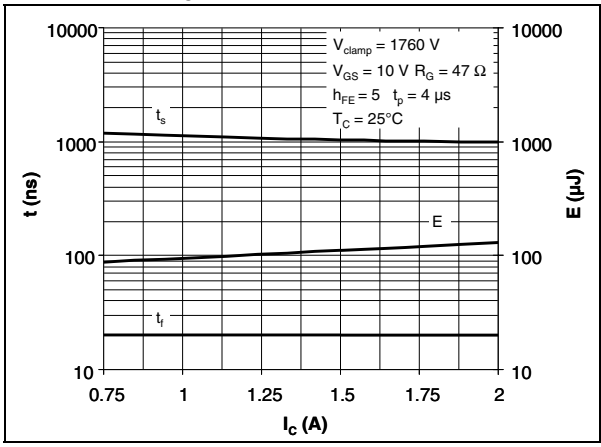


Figure 7. Inductive load switching off (T_C = 100°C)

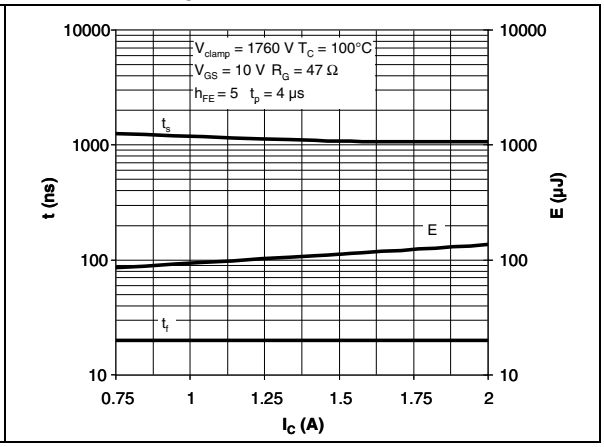
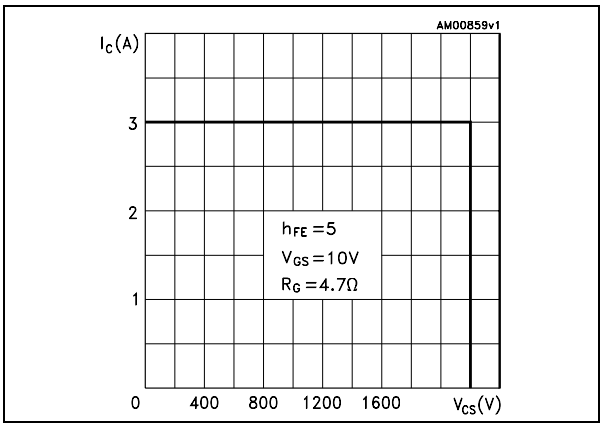


Figure 8. Reverse biased safe operating area

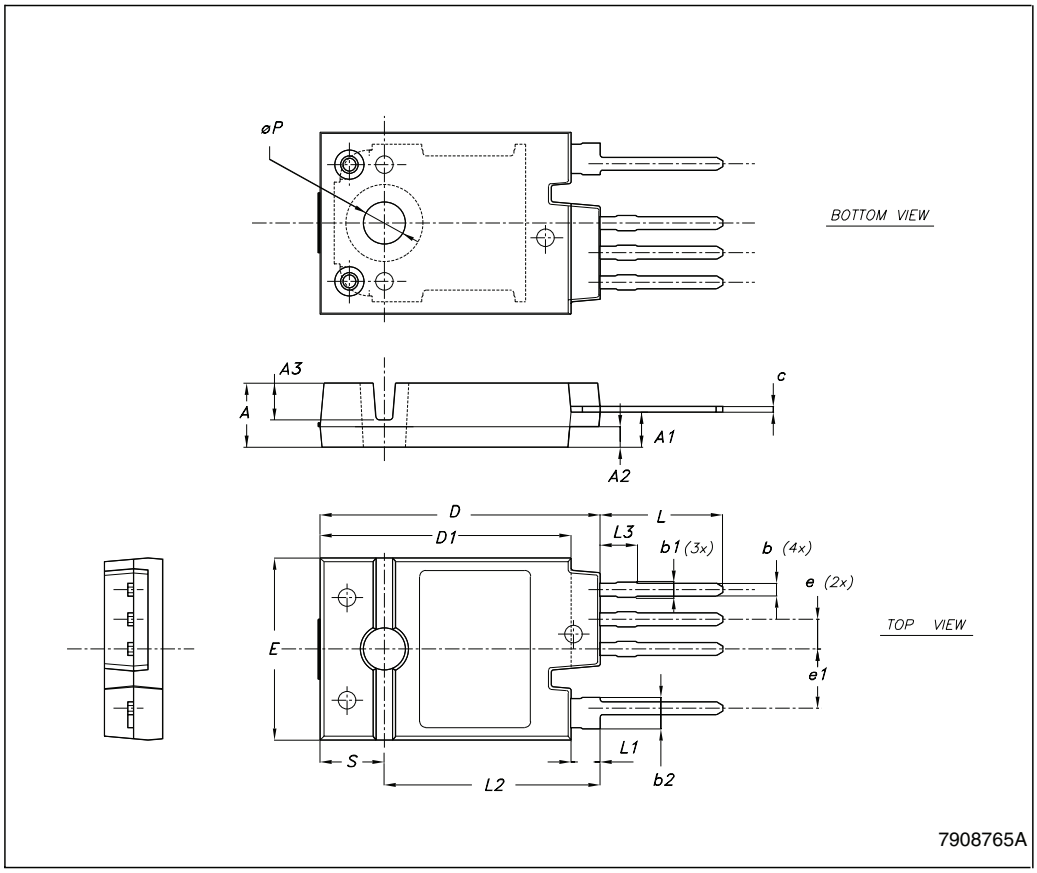


3 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com*. ECOPACK® is an ST trademark.

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		3	
øP	3.55		3.65
S		5.50	



4 Revision history

Table 6. Document revision history

Date	Revision	Changes
19-May-2008	1	First release.
05-Jun-2009	2	Added *Section 2.1: Electrical characteristics (curves) on page 4*.

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