



STC03DE220HV

Hybrid emitter switched bipolar transistor
ESBT® 2200 V - 3 A - 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 switching, up to 150 kHz
- Very low C_{ISS} driven by $R_G = 4.7 \Omega$

Application

- Aux SMPS for 3-phase mains

Description

The STC03DE220HV is manufactured using a hybrid structure, with dedicated high voltage bipolar and low voltage MOSFET technology, aimed at providing the best performance in an ESBT topology.

The STC03DE220HV is designed for use in an aux. flyback SMPS for any 3-phase application.

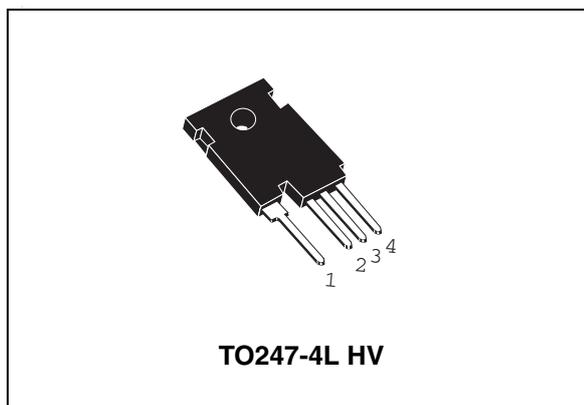


Figure 1. Internal schematic diagrams

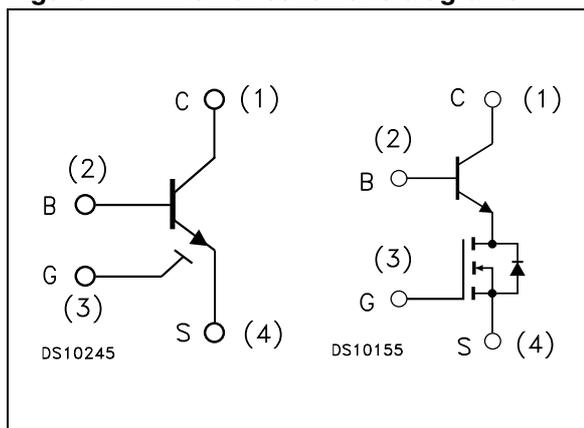


Table 1. Device summary

Order code	Marking	Package	Packaging
STC03DE220HV	C03DE220HV	TO247-4L HV	Tube

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
$V_{CS(SS)}$	Collector-source voltage ($V_{BS} = V_{GS} = 0$)	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	166	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	0.6	°C/W

2 Electrical characteristics

($T_{\text{case}} = 25\text{ °C}$; unless otherwise specified.)

Table 4. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{\text{CS(SS)}}$	Collector cut-off current ($V_{\text{BS}} = V_{\text{GS}} = 0$)	$V_{\text{CS}} = 2200\text{ V}$			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	$V_{\text{GS}} = 10\text{ V } I_{\text{C}} = 1.5\text{ A } I_{\text{B}} = 0.15\text{ A}$ $V_{\text{GS}} = 10\text{ V } I_{\text{C}} = 3\text{ A } I_{\text{B}} = 0.6\text{ A}$		0.2 0.25		V V
h_{FE}	DC current gain	$V_{\text{CS}} = 1\text{ V } V_{\text{GS}} = 10\text{ V } I_{\text{C}} = 1.5\text{ A}$ $V_{\text{CS}} = 1\text{ V } V_{\text{GS}} = 10\text{ V } I_{\text{C}} = 3\text{ A}$		15 10		
$V_{\text{BS(ON)}}$	Base-source ON voltage	$V_{\text{GS}} = 10\text{ V } I_{\text{C}} = 1.5\text{ A } I_{\text{B}} = 0.15\text{ A}$ $V_{\text{GS}} = 10\text{ V } I_{\text{C}} = 3\text{ A } I_{\text{B}} = 0.6\text{ A}$		0.82 1		V V
$V_{\text{GS(th)}}$	Gate threshold voltage	$V_{\text{BS}} = V_{\text{GS}} \quad I_{\text{B}} = 250\text{ }\mu\text{A}$	1.5	2.2	3	V
C_{iss}	Input capacitance ($V_{\text{GS}} = V_{\text{CB}} = 0$)	$V_{\text{CS}} = 25\text{ V} \quad f = 1\text{ MHz}$		750		pF
$Q_{\text{GS(tot)}}$	Gate-source charge ($V_{\text{CB}} = 0$)	$V_{\text{CS}} = 15\text{ V} \quad V_{\text{GS}} = 10\text{ V}$ $I_{\text{C}} = 1.8\text{ A}$		12.5		nC
t_{s} t_{f}	Inductive load Storage time Fall time	$V_{\text{GS}} = 10\text{ V} \quad R_{\text{G}} = 47\text{ }\Omega$ $V_{\text{Clamp}} = 1760\text{ V} \quad t_{\text{p}} = 4\text{ }\mu\text{s}$ $I_{\text{C}} = 1.5\text{ A} \quad I_{\text{B}} = 0.3\text{ A}$		1040 20		ns ns
$V_{\text{CS(dyn)}}$	Collector-source dynamic voltage (0.5 μs)	$V_{\text{CC}} = V_{\text{Clamp}} = 400\text{ V}$ $V_{\text{GS}} = 10\text{ V} \quad I_{\text{C}} = 1.5\text{ A}$ $I_{\text{B}} = 0.3\text{ A} \quad R_{\text{G}} = 47\text{ }\Omega$ $t_{\text{peak}} = 500\text{ ns} \quad I_{\text{Bpeak}} = 3\text{ A}$		7.6		V
$V_{\text{CS(dyn)}}$	Collector-source dynamic voltage (1 μs)	$V_{\text{CC}} = V_{\text{Clamp}} = 400\text{ V}$ $V_{\text{GS}} = 10\text{ V} \quad I_{\text{C}} = 1.5\text{ A}$ $I_{\text{B}} = 0.3\text{ A} \quad R_{\text{G}} = 47\text{ }\Omega$ $t_{\text{peak}} = 500\text{ ns} \quad I_{\text{Bpeak}} = 3\text{ A}$		5.8		V
V_{CSW}	Maximum collector-source voltage at turn-off without snubber	$R_{\text{G}} = 47\text{ }\Omega \quad h_{\text{FE}} = 5 \quad I_{\text{C}} = 3\text{ A}$	2200			V

2.1 Electrical characteristics (curves)

Figure 2. DC current gain

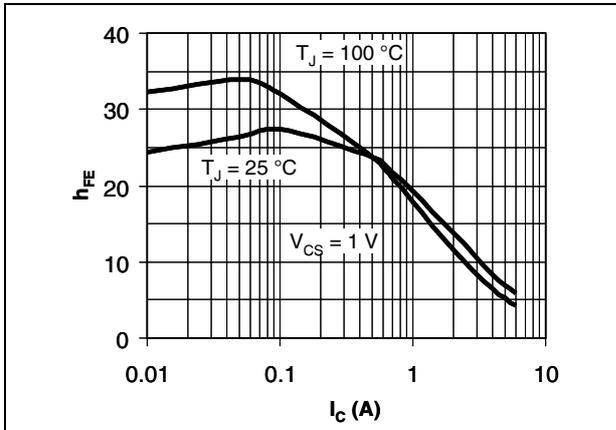


Figure 3. Base-source ON voltage

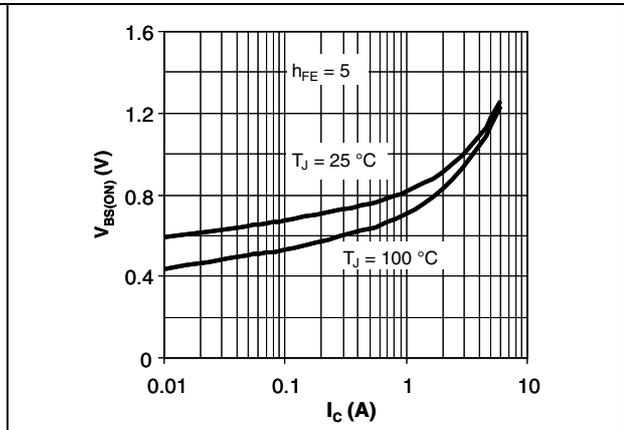


Figure 4. Collector-source ON voltage

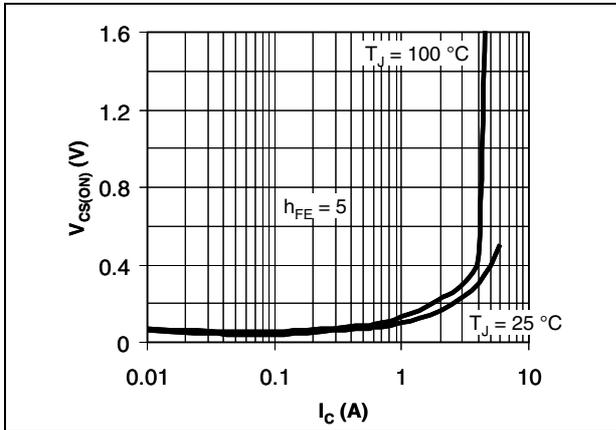


Figure 5. Collector-source dynamic voltage

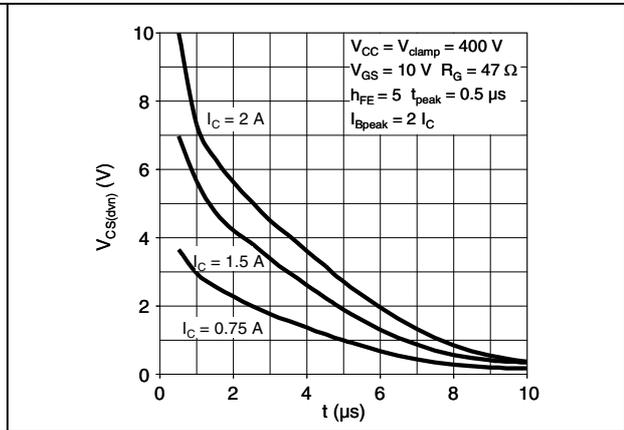


Figure 6. Inductive load switching off ($T_C = 25^\circ\text{C}$)

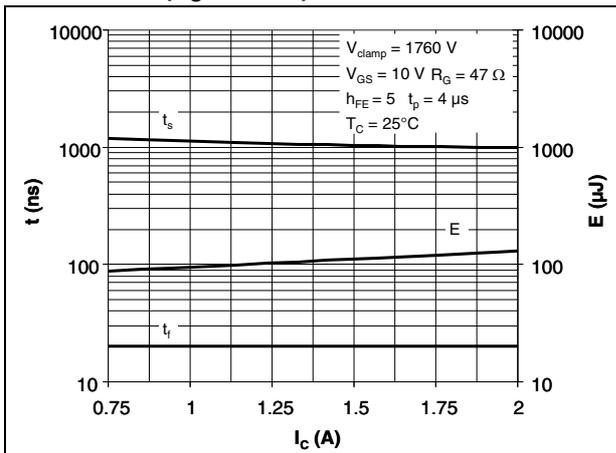


Figure 7. Inductive load switching off ($T_C = 100^\circ\text{C}$)

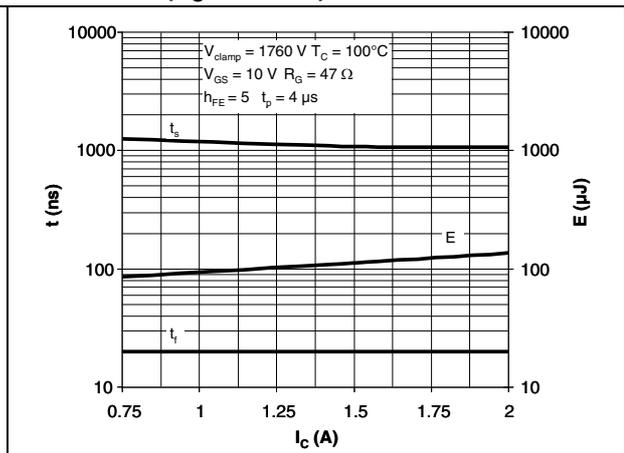
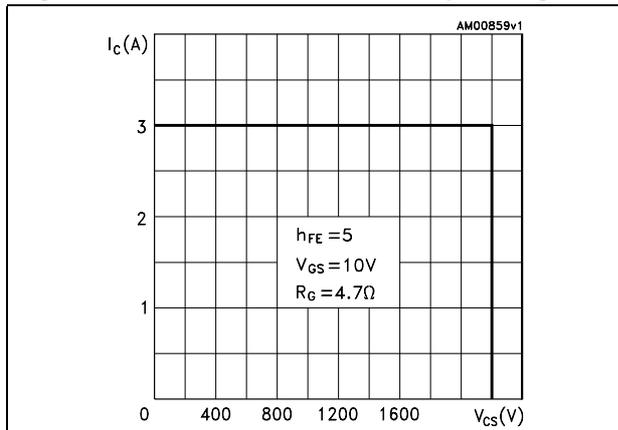


Figure 8. Reverse biased safe operating area



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.

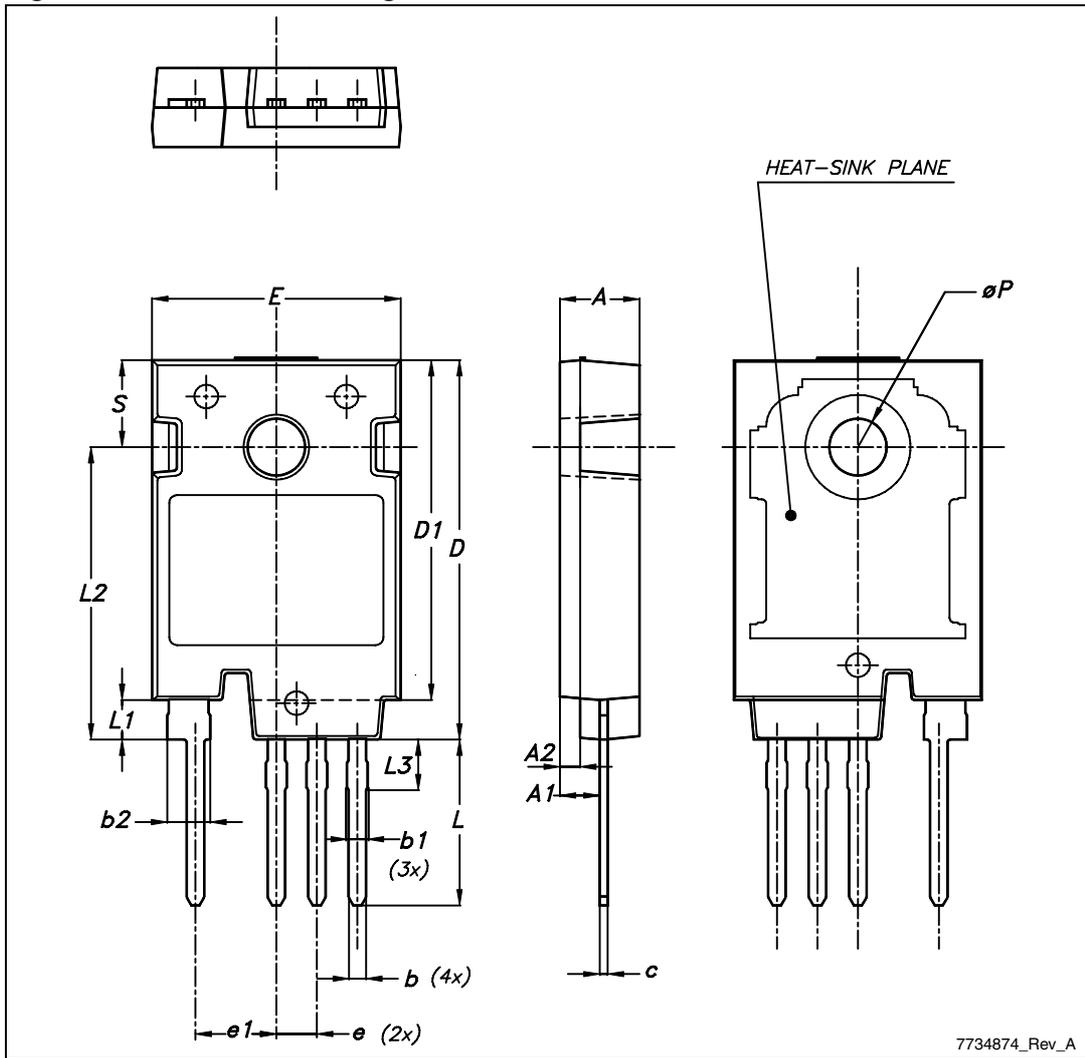
Table 5. TO-247-4L mechanical data

Dim.	mm.			Notes
	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	5
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	4
S		5.50		

General package performance

1. The lead size is comprehensive of the thickness of the leads finishing material.
2. The leads must be covered with soldered alloy up to 1,3 mm from the plastic package.
3. Package outline exclusive of any mold flash dimensions and metal burrs.
4. Resin thickness around the mounting hole must not be less than 0,9 mm.
5. "D" dimension plus gate protrusion, must not exceed 24,5 mm.
6. Package backside planarity: the level of the resin surrounding the heatsink must not be higher than 30 microns versus the heatsink plan.
7. Torque force (through hole package): recommended: 0,55 Nm // maximum: 1 Nm.
8. The maximum bent leads allowed, in any direction, is: # 2° if the devices are packed in tube.
9. Package weight: 4,78 g / unit (typ.).

Figure 9. TO-247-4L drawing



4 Revision history

Table 6. Document revision history

Date	Revision	Changes
27-Nov-2006	1	First release.
19-May-2008	2	Document status promoted from preliminary data to datasheet.
10-Jun-2009	3	Added Section 2.1: Electrical characteristics (curves) on page 4.
25-Jan-2012	4	Mechanical data updated

Please Read Carefully:

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

UNLESS EXPRESSLY APPROVED IN WRITING BY TWO AUTHORIZED ST REPRESENTATIVES, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER'S OWN RISK.

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2012 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com

AMEYA360

Components Supply Platform

Authorized Distribution Brand :



Website :

Welcome to visit www.ameya360.com

Contact Us :

➤ Address :

401 Building No.5, JiuGe Business Center, Lane 2301, Yishan Rd
Minhang District, Shanghai , China

➤ Sales :

Direct +86 (21) 6401-6692

Email amall@ameya360.com

QQ 800077892

Skype [ameyasales1](#) [ameyasales2](#)

➤ Customer Service :

Email service@ameya360.com

➤ Partnership :

Tel +86 (21) 64016692-8333

Email mkt@ameya360.com