STX1F10

High voltage fast-switching NPN power transistor

Features

- High voltage capability
- Low spread of dynamic parameters
- Minimum lot-to-lot spread for reliable operation
- Very high switching speed

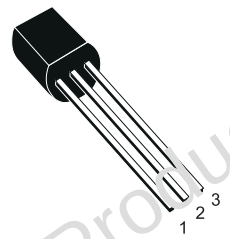
Application

- Battery charger

Description

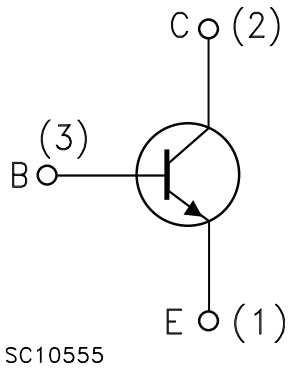
The device is manufactured using high voltage multi-epitaxial planar technology for high switching speeds and high voltage capability.

Thanks to an increased intermediate layer, it has an intrinsic ruggedness which enables the transistor to withstand a high collector current level during breakdown condition, without using the transil protection usually necessary in typical converters for lamp ballast.



TO-92

Figure 1. Internal schematic diagram



Obsolete Product(s) - Obsolete Product(s)

Table 1. Device summary

Order code	Marking	Package	Packaging
STX1F10	X1F10	TO-92	Box

1 Electrical ratings

Table 2. Absolute maximum rating

Symbol	Parameter	Value	Unit
V_{CES}	Collector-emitter voltage (V_{BE} = 0)	980	V
V_{CEO}	Collector-emitter voltage (I_B = 0)	400	V
V_{EBO}	Emitter-base voltage (I_C = 0)	15	V
I_C	Collector current	1.5	A
I_{CM}	Collector peak current (t_P < 5 ms)	3	A
I_B	Base current	0.5	A
I_{BM}	Base peak current (t_P < 5 ms)	1	A
P_{tot}	Total dissipation at T_c = 25 °C	2.8	W
T_{stg}	Storage temperature	-65 to 150	°C
T_J	Max. operating junction temperature	150	°C

Table 3. Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Thermal resistance junction-case max	44.6	°C/W

Obsolete Product(s) - Obsolete Product(s)

2 Electrical characteristics

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

Table 4. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CES}	Collector cut-off current (V_{BE} =0)	V_{CE} = 980 V V_{CE} = 980 V; T_C =125 °C			50 0.5	µA mA
I_{CEO}	Collector cut-off current (I_B =0)	V_{CE} = 400 V			250	uA
$V_{(BR)EBO}$	Emitter-base breakdown voltage (I_C = 0)	I_E = 1 mA	15			V
$V_{CEO(sus)}$ (1)	Collector-emitter sustaining voltage (I_B = 0)	I_C = 10 mA	400			V
$V_{CE(sat)}$ (1)	Collector-emitter saturation voltage	I_C = 0.3 A I_B = 60 mA I_C = 1 A I_B = 0.2 A		0.15 0.3	0.5 1	V V
$V_{BE(sat)}$ (1)	Base-emitter saturation voltage	I_C = 1 A I_B = 0.2 A		1.1	1.5	V
h_{FE}	DC current gain	I_C = 500 µA V_{CE} = 2 V I_C = 0.45 A V_{CE} = 5 V I_C = 1 A V_{CE} = 5 V	15 30 14	 40 20	 61 28	
t_s t_f	Resistive load Storage time Fall time	V_{CC} = 125 V I_C = 1 A $I_{B(on)}$ = -$I_{B(off)}$ = 200 mA t_p = 300 µs $V_{BE(off)}$ = - 5 V		 2.5 350		 µs ns

1. Pulsed duration = 300 µs, duty cycle ≤ 1.5%.

2.1 Typical characteristic

Figure 2. Safe operating area

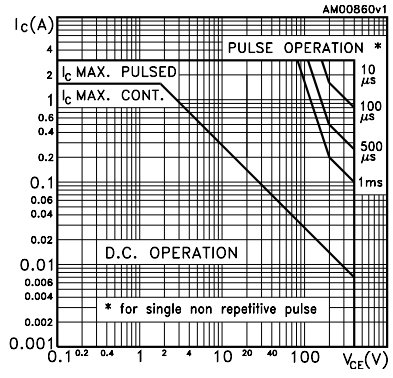
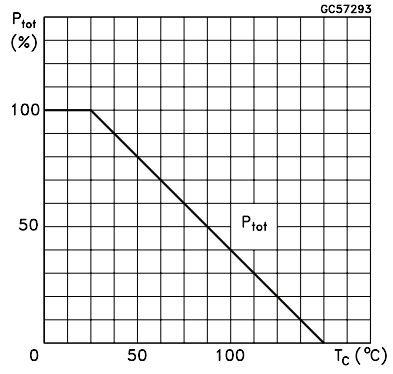


Figure 3. Derating curve



Obsolete Product(s) - Obsolete Product(s)

Figure 4. Output characteristics

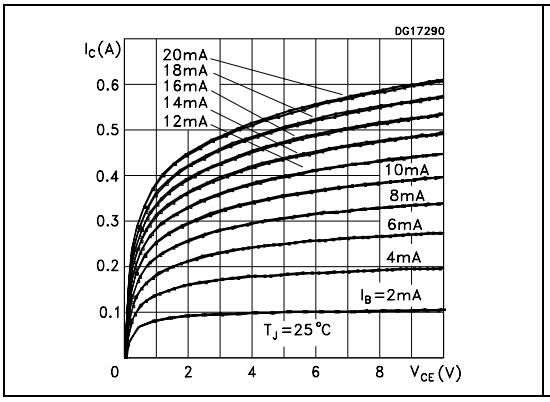


Figure 5. Reverse biased safe operating area

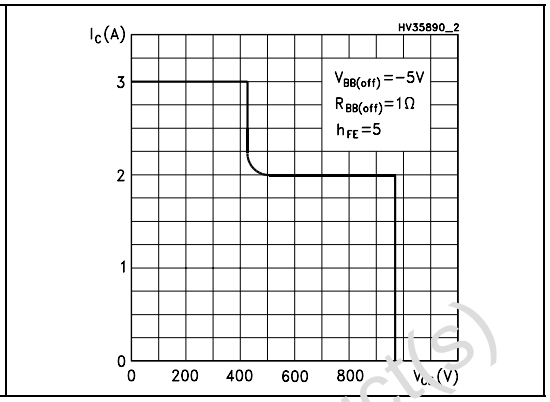


Figure 6. DC current gain (V_{CE} = 3 V)

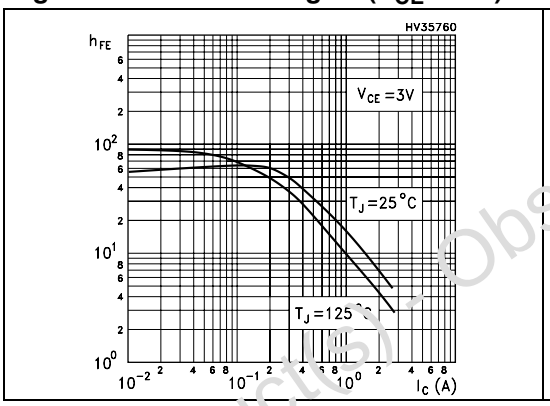


Figure 7. DC current gain (V_{CE} = 5 V)

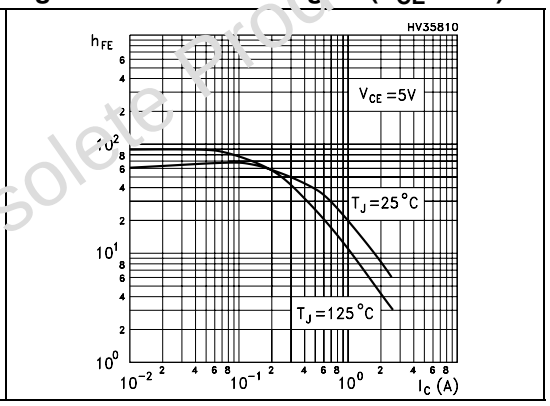


Figure 8. Base-emitter saturation voltage

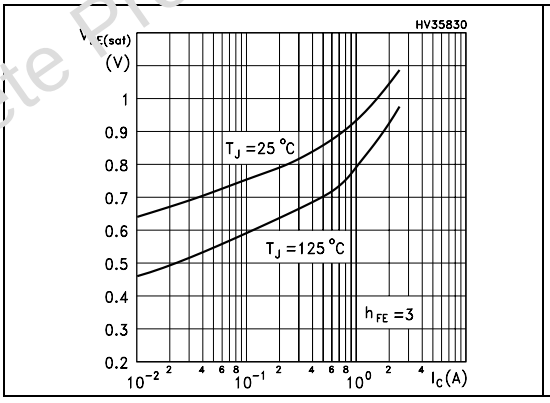
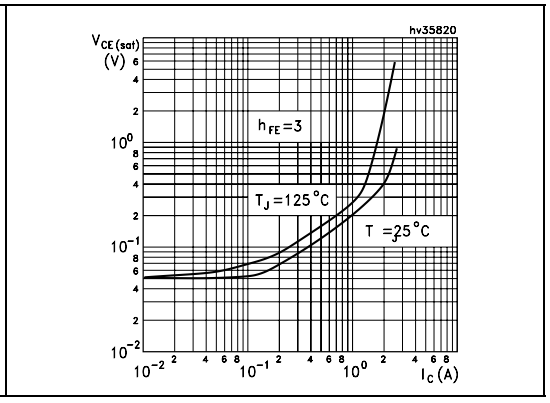


Figure 9. Collector-emitter saturation voltage



Obsolete Product(s) - Obsolete Product(s)

Figure 10. Resistive load switching time (turn-on, h_{FE} = 5)

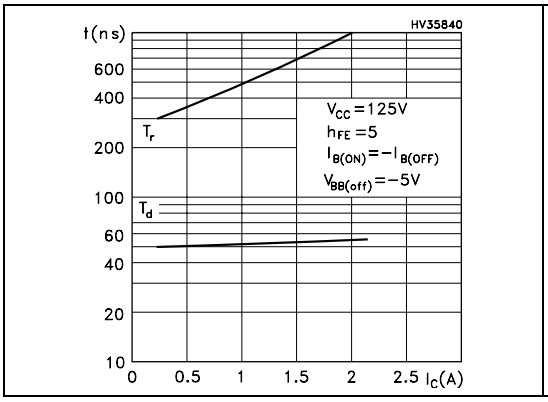


Figure 11. Resistive load switching time (turn-on, h_{FE} = 10)

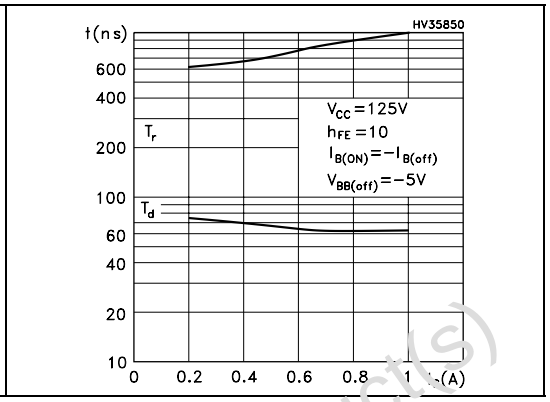


Figure 12. Resistive load switching time (turn-off, h_{FE} = 5)

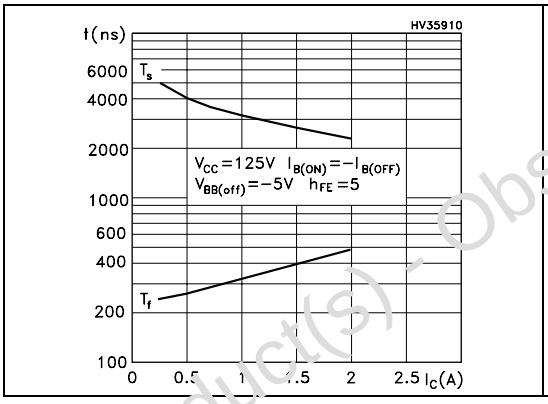
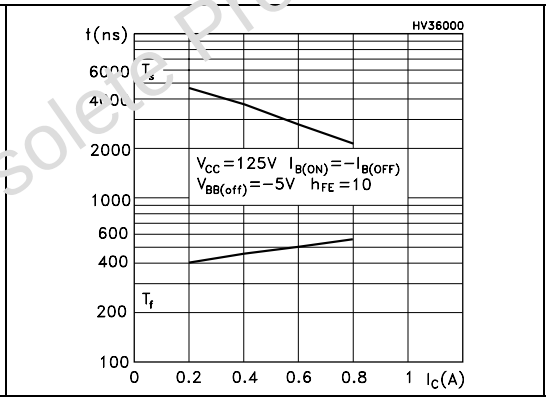
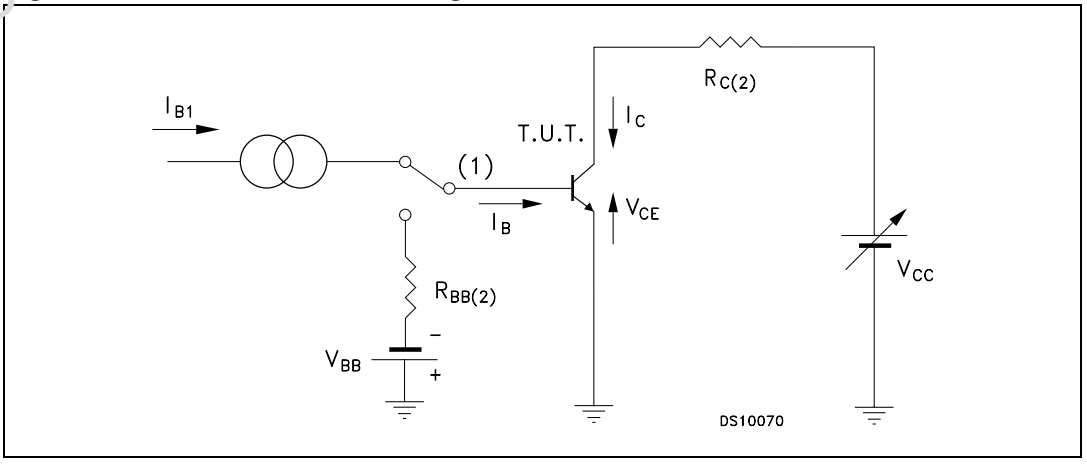


Figure 13. Resistive load switching time (turn-off, h_{FE} = 10)



2.2 Test circuits

Figure 14. Resistive load switching test circuit



1. Fast electronic switch
2. Non-inductive resistor

Obsolete Product(s) - Obsolete Product(s)

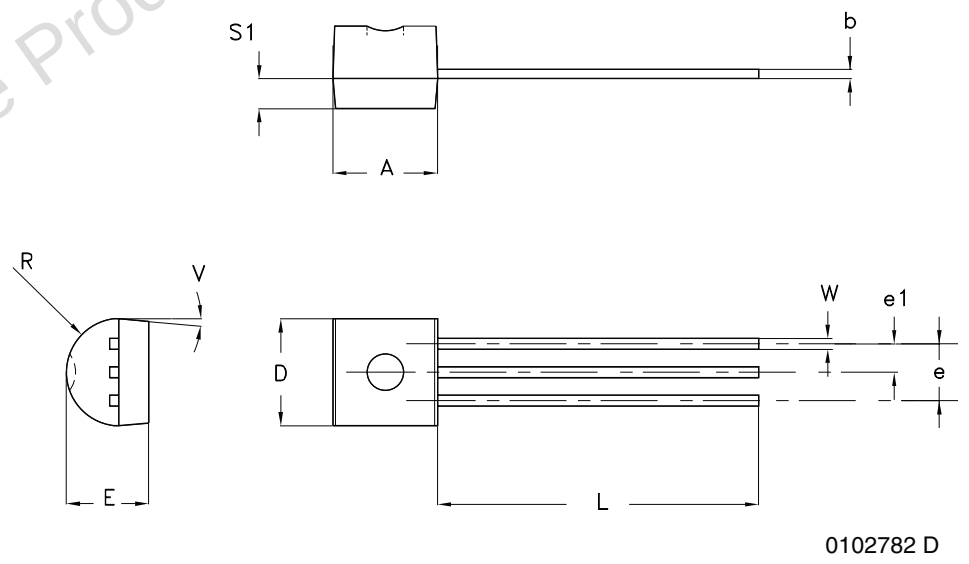
3 Package mechanical data

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.

Obsolete Product(s) - Obsolete Product(s)

TO-92 bulk shipment mechanical data

DIM.	mm.		
	MIN.	TYP	MAX.
A	4.32		4.95
b	0.36		0.51
D	4.45		4.95
E	3.30		3.94
e	2.41		2.67
e1	1.14		1.40
L	12.70		15.49
R	2.16		2.41
S1	0.92		1.52
W	0.41		0.56
V		5°	



Obsolete Product(s) - Obsolete Product(s)

4 Revision history

Table 5. Document revision history

Date	Revision	Changes
18-Jun-2009	1	Initial release.

Obsolete Product(s) - Obsolete Product(s)

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 AN AUTHORIZED ST REPRESENTATIVE, 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.

© 2009 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

Obsolete Product(s) - Obsolete Product(s)