

Low voltage high performance NPN power transistor

Features

- Very low collector-emitter saturation voltage
- High current gain characteristic
- Fast switching speed
- Miniature SOT-23 plastic package ECOPACK[®]2 grade for surface mounting circuits

Applications

- Strobe and LED drives
- Motor and relay drives
- DC-DC converters

Description

This device is an NPN transistor manufactured using low voltage planar technology with a double-metal process.

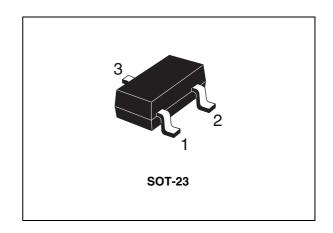


Figure 1. Internal schematic diagram

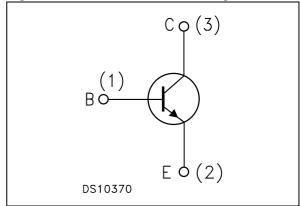


Table 1. Device summary

Order code	Marking	Package	Packing
3STR1630	1630	SOT-23	Tape and reel

Electrical ratings 3STR1630

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V _{CES}	Collector-emitter voltage (V _{BE} = 0)	30	V
V _{CEO}	Collector-emitter voltage (I _B = 0)	30	V
V _{EBO}	Emitter-base voltage ($I_C = 0$)	5	V
I _C	Collector current	6	Α
I _{CM}	Collector peak current (t _P < 5 ms)	12	Α
P _{TOT}	Total dissipation at T _{amb} = 25 °C	0.5	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
Ī	R _{thJA} ⁽¹⁾	Thermal resistance junction-ambient max	250	°C/W

^{1.} Device mounted on PCB area of 1 cm².

2 Electrical characteristics

 T_{case} = 25 °C unless otherwise specified.

Table 4. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
I _{CBO}	Collector cut-off current (I _E = 0)	V _{CB} = 30 V			0.1	μΑ
I _{EBO}	Emitter cut-off current (I _C = 0)	V _{EB} = 4 V			0.1	μА
V _{(BR)CBO}	Collector-base breakdown voltage (I _E = 0)	I _C = 100 μA	30			V
V _{(BR)CEO} (1)	Collector-emitter breakdown voltage (I _B = 0)	I _C = 10 mA	30			V
V _{(BR)EBO}	Emitter-base breakdown voltage ($I_C = 0$)	Ι _Ε = 100 μΑ	5			V
V _{CE(sat)} (1)	Collector-emitter saturation voltage	$\begin{split} I_{C} &= 1 \text{ A} & I_{B} = 100 \text{ m} \\ I_{C} &= 2 \text{ A} & I_{B} = 40 \text{ mA} \\ I_{C} &= 5 \text{ A} & I_{B} = 500 \text{ m} \end{split}$		60 140 240	90 190 300	mV mV mV
V _{BE(sat)} (1)	Base-emitter saturation voltage	$I_C = 2 \text{ A}$ $I_B = 40 \text{ m/}$ $I_C = 5 \text{ A}$ $I_B = 500 \text{ m}$		830 1000	1100	mV mV
h _{FE} ⁽¹⁾	DC current gain	$\begin{split} & I_{C} = 50 \text{ mA} & V_{CE} = 2 \text{ V} \\ & I_{C} = 0.5 \text{ A} & V_{CE} = 2 \text{ V} \\ & I_{C} = 2 \text{ A} & V_{CE} = 2 \text{ V} \\ & I_{C} = 5 \text{ A} & V_{CE} = 2 \text{ V} \end{split}$	180 170	260 90	560	
f _t	Transition frequency	I _C = 0.1 A V _{CE} = 10	V	100		MHz
C _{CBO}	Collector-base capacitance (I _E = 0)	V _{CB} = 40 V, f = 1 MHz		15		pF
t _{on} t _{off}	Resistive load Turn-on time Turn-off time	$I_C = 2.5 \text{ A}$ $V_{CC} = 12$ $I_{B1} = -I_{B2} = 125 \text{ mA}$ $V_{BE(off)} = -5 \text{ V}$	V	90 450		ns ns

^{1.} Pulse test: pulse duration ≤300 µs, duty cycle ≤2%

Electrical characteristics 3STR1630

2.1 Electrical characteristics (curves)

Figure 2. DC current gain (V_{CE} =1 V) Figure 3. DC current gain (V_{CE} =2 V)

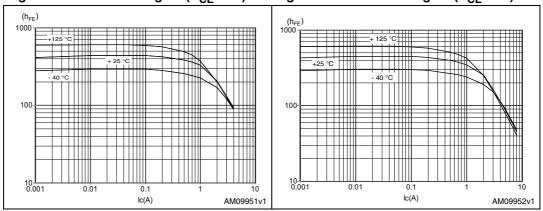


Figure 4. Collector-emitter saturation Fi voltage (V_{CEsat} @ h_{FE} =10)

Figure 5. Collector-emitter saturation voltage (V_{CEsat} @ h_{FE}=50)

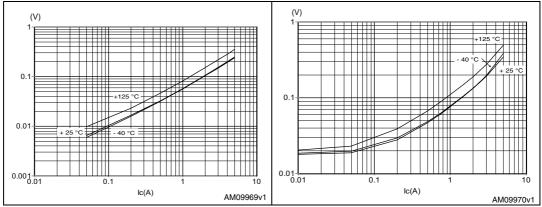
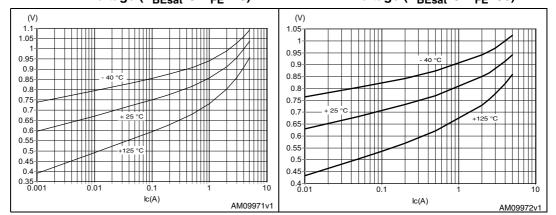


Figure 6. Base-emitter saturation voltage (V_{BEsat} @ h_{FE}=10)

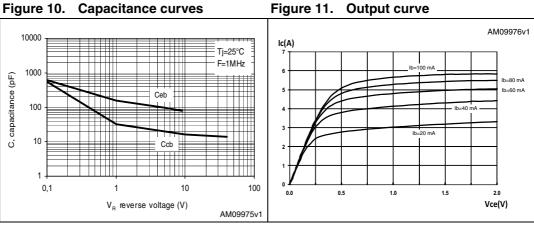
Figure 7. Base-emitter saturation voltage (V_{BEsat} @ h_{FE}=50)



(OFF) AM09973v1 AM09974v1 t(ns) t(ns) 10000 10000 1000 1000 Storage time (ns) 100 100 10 Delay time (ns) 10 500 1000 1500 2000 2500 3000 3500 0 0 500 1000 1500 2000 2500 3000 3500 I_C(A) $I_{C}(A)$

Figure 8. Resistive load switching time Figure 9. Resistive load switching time

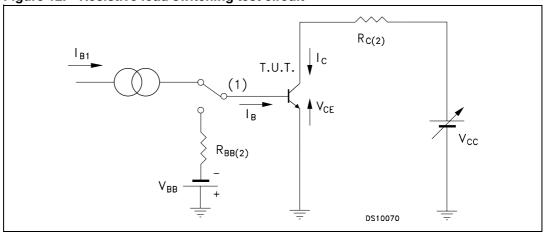
Figure 10. **Capacitance curves**



Electrical characteristics 3STR1630

2.2 Test circuits

Figure 12. Resistive load switching test circuit



- 1. Fast electronic switch
- 2. Non-inductive resistor

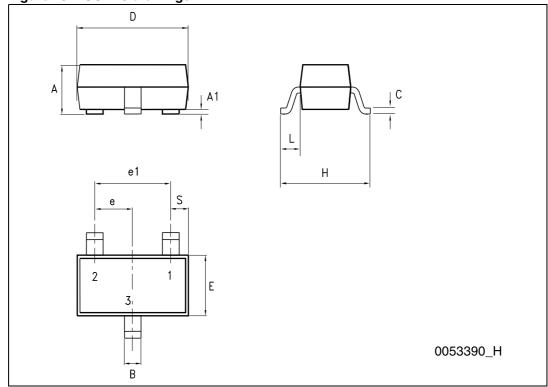
3 Package mechanical data

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. SOT-23 mechanical data

Dim.	mm.			
	Min.	Тур.	Max.	
Α	0.89		1.4	
A1	0		0.1	
В	0.3		0.51	
С	0.085		0.18	
D	2.75		3.04	
е	0.85		1.05	
e1	1.7		2.1	
E	1.2		1.6	
Н	2.1		2.75	
L		0.6		
S	0.35		0.65	

Figure 13. SOT-23 drawings



3STR1630 Revision history

4 Revision history

Table 6. Document revision history

Date	Revision	Changes
02-Nov-2009	1	Initial release
17-Jan-2011	2	Removed "Preliminary data" text from coverpage header.
15-Jun-2011	3	Curves inserted Modified: <i>Table 4</i>

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.

© 2011 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

10/10 Doc ID 16600 Rev 3

