

## NPN medium power transistors

### Features

- Surface mounting devices in medium power SOT-223 and SOT-89 packages
- Available in tape and reel packaging

### Applications

- Voltage regulation
- Relay driver
- Generic switch

### Description

The STF724 and STN724 are NPN transistors manufactured using Planar technology resulting in rugged high performance devices.

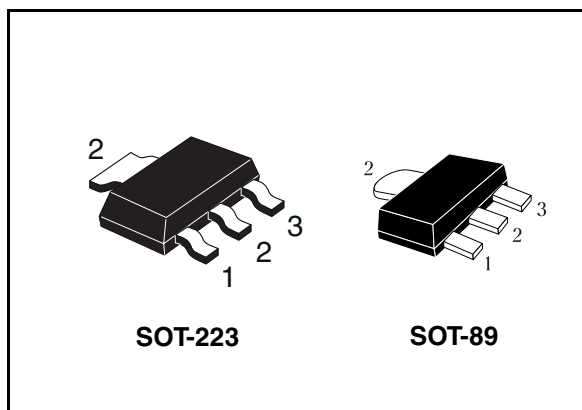


Figure 1. Internal schematic diagram

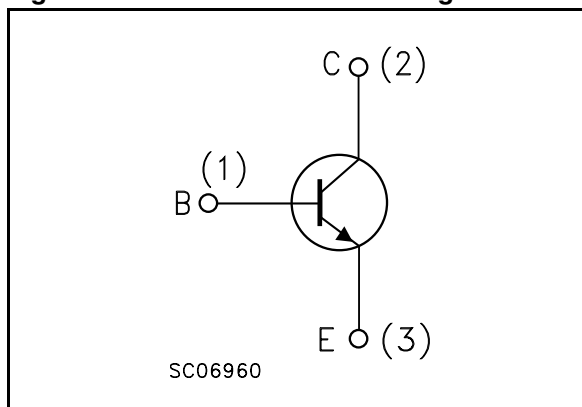


Table 1. Device summary

Order code	Marking	Package	Packaging
STF724	724	SOT-89	Tape & reel
STN724	N724	SOT-223	

# Contents

<b>1</b>	<b>Electrical ratings</b> .....	<b>3</b>
<b>2</b>	<b>Electrical characteristics</b> .....	<b>4</b>
	2.1 Electrical characteristics (curves) .....	5
<b>3</b>	<b>Package mechanical data</b> .....	<b>7</b>
<b>4</b>	<b>Revision history</b> .....	<b>10</b>

# 1 Electrical ratings

**Table 2. Absolute maximum rating**

Symbol	Parameter	Value		Unit
		STF724	STN724	
$V_{CBO}$	Collector-base voltage ( $I_E = 0$ )	60		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	3		A
$I_{CM}$	Collector peak current ( $t_P < 5\text{ms}$ )	6		A
$I_B$	Base current	1		A
$I_{BM}$	Base peak current ( $t_P < 5\text{ms}$ )	2		A
$P_{tot}$	Total dissipation at $T_{amb} = 25^\circ\text{C}$	1.4	1.6	W
$T_{stg}$	Storage temperature	-65 to 150		$^\circ\text{C}$
$T_J$	Max. operating junction temperature	150		$^\circ\text{C}$

**Table 3. Thermal data**

Symbol	Parameter	Value		Unit
		SOT-89	SOT-223	
$R_{thj-amb}$	Thermal resistance junction-ambient <sup>(1)</sup> max	89	78	$^\circ\text{C}/\text{W}$

1. Device mounted on PCB area of 1 cm<sup>2</sup>.

## 2 Electrical characteristics

( $T_{\text{case}} = 25^{\circ}\text{C}$  unless otherwise specified)

**Table 4. Electrical characteristics**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{\text{CES}}$	Collector cut-off current ( $V_{\text{BE}} = 0$ )	$V_{\text{CE}} = 60 \text{ V}$			10	$\mu\text{A}$
$I_{\text{CEO}}$	Collector cut-off current ( $I_{\text{B}} = 0$ )	$V_{\text{CE}} = 30 \text{ V}$			100	$\mu\text{A}$
$I_{\text{EBO}}$	Emitter cut-off current ( $I_{\text{C}} = 0$ )	$V_{\text{EB}} = 5 \text{ V}$			10	$\mu\text{A}$
$V_{(\text{BR})\text{CBO}}$	Collector-base breakdown voltage ( $I_{\text{E}} = 0$ )	$I_{\text{C}} = 100 \mu\text{A}$	60			V
$V_{(\text{BR})\text{CEO}}^{(1)}$	Collector-emitter breakdown voltage ( $I_{\text{B}} = 0$ )	$I_{\text{C}} = 10 \text{ mA}$	30			V
$V_{(\text{BR})\text{EBO}}$	Emitter-base breakdown voltage ( $I_{\text{C}} = 0$ )	$I_{\text{E}} = 100 \mu\text{A}$	5			V
$V_{\text{CE}(\text{sat})}^{(1)}$	Collector-emitter saturation voltage	$I_{\text{C}} = 1 \text{ A}$ $I_{\text{B}} = 50 \text{ mA}$ $I_{\text{C}} = 2 \text{ A}$ $I_{\text{B}} = 100 \text{ mA}$ $I_{\text{C}} = 3 \text{ A}$ $I_{\text{B}} = 150 \text{ mA}$			0.4 0.7 1.1	V V V
$V_{\text{BE}(\text{sat})}^{(1)}$	Base-emitter saturation voltage	$I_{\text{C}} = 2 \text{ A}$ $I_{\text{B}} = 100 \text{ mA}$			1.2	V
$h_{\text{FE}}$	DC current gain	$I_{\text{C}} = 100 \text{ mA}$ $V_{\text{CE}} = 2 \text{ V}$ $I_{\text{C}} = 1 \text{ A}$ $V_{\text{CE}} = 2 \text{ V}$ $I_{\text{C}} = 3 \text{ A}$ $V_{\text{CE}} = 2 \text{ V}$	100 80 30		300	
$f_{\text{T}}$	Transition frequency	$V_{\text{CE}} = 10 \text{ V}$ $I_{\text{C}} = 0.1 \text{ A}$		100		MHz

1. Pulsed duration = 300  $\mu\text{s}$ , duty cycle  $\leq 1.5 \%$

## 2.1 Electrical characteristics (curves)

Figure 2. DC Current Gain

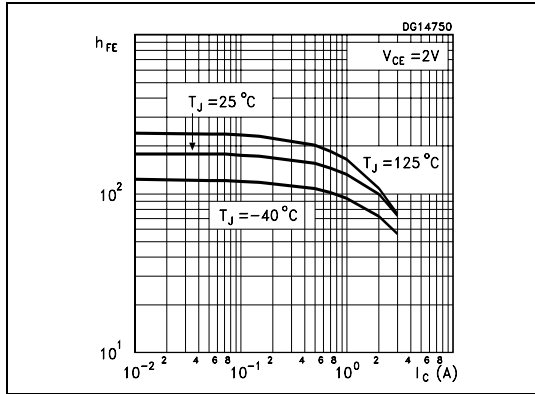


Figure 3. DC Current Gain

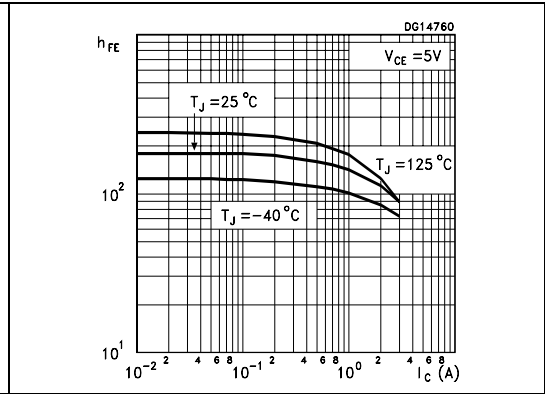


Figure 4. Collector-emitter saturation voltage

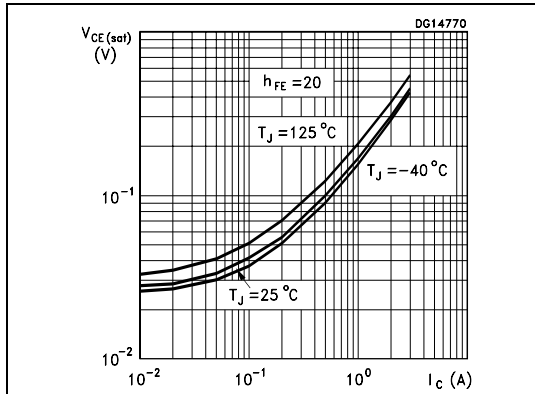


Figure 5. Base-emitter saturation voltage

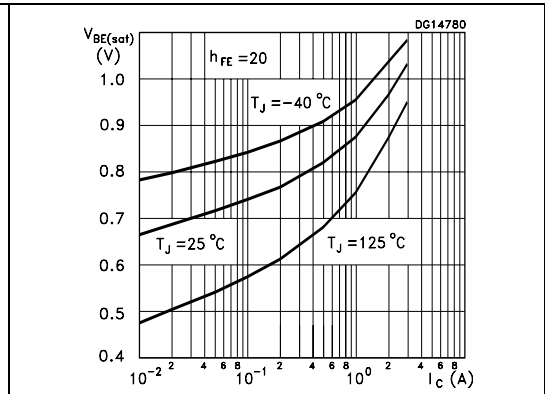


Figure 6. Switching times on resistive load

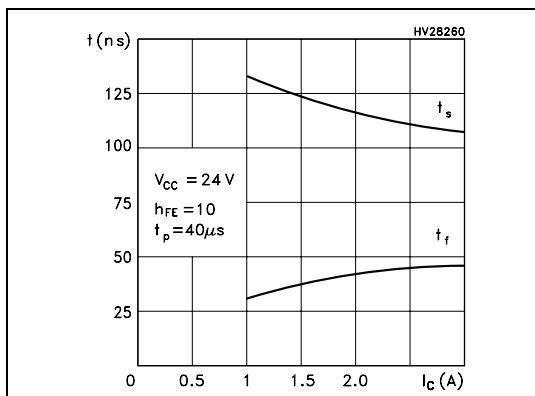
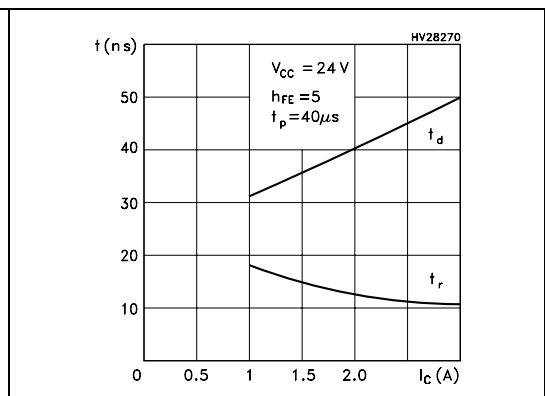
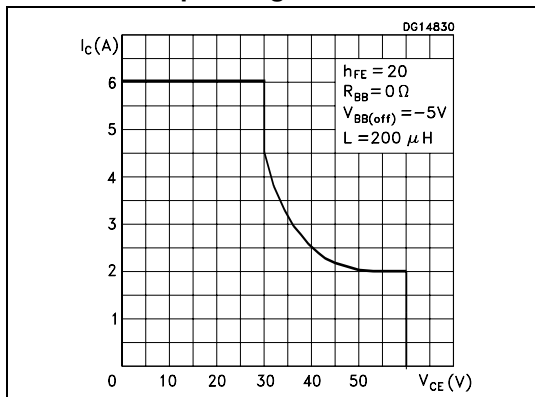


Figure 7. Switching times on resistive load



**Figure 8. Reverse biased safe operating area**

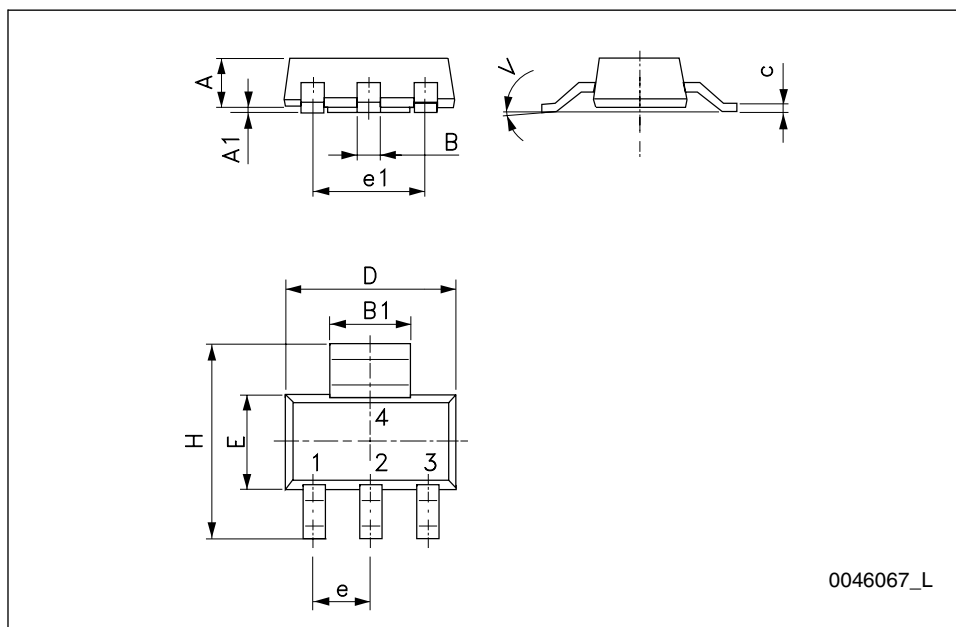


### 3 Package mechanical data

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](http://www.st.com)

**SOT-223 mechanical data**

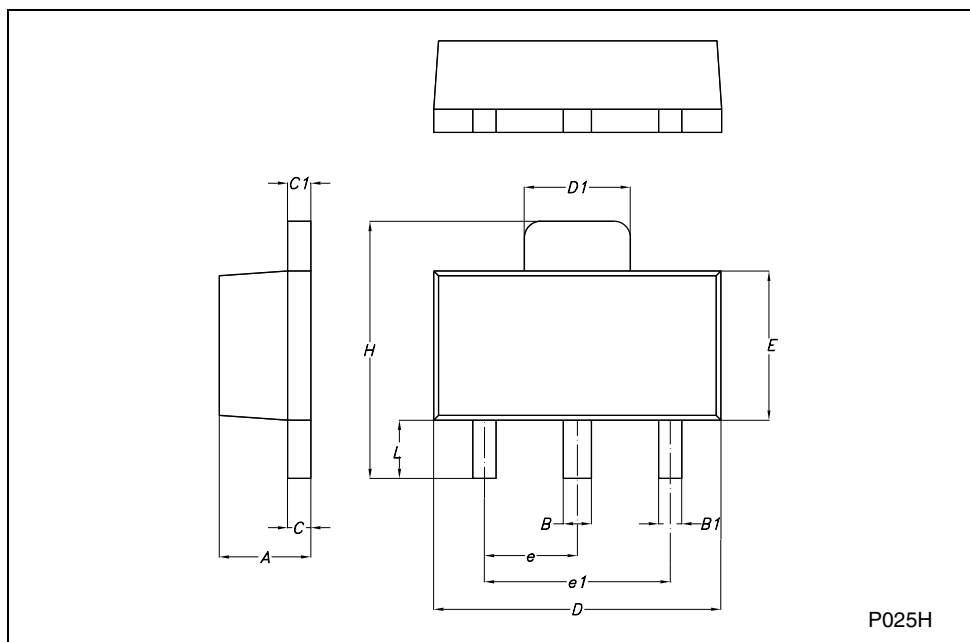
DIM.	mm.		
	min.	typ	max.
A			1.80
A1	0.02		0.1
B	0.60	0.70	0.85
B1	2.90	3.00	3.15
c	0.24	0.26	0.35
D	6.30	6.50	6.70
e		2.30	
e1		4.60	
E	3.30	3.50	3.70
H	6.70	7.00	7.30
V			10°





SOT-89 MECHANICAL DATA

DIM.	mm			mils		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	1.4		1.6	55.1		63.0
B	0.44		0.56	17.3		22.0
B1	0.36		0.48	14.2		18.9
C	0.35		0.44	13.8		17.3
C1	0.35		0.44	13.8		17.3
D	4.4		4.6	173.2		181.1
D1	1.62		1.83	63.8		72.0
E	2.29		2.6	90.2		102.4
e	1.42		1.57	55.9		61.8
e1	2.92		3.07	115.0		120.9
H	3.94		4.25	155.1		167.3
L	0.89		1.2	35.0		47.2



## 4 Revision history

**Table 5. Document revision history**

<b>Date</b>	<b>Revision</b>	<b>Changes</b>
29-Mar-2005	1	Initial release.
12-Oct-2005	2	Added new graphics
17-Jul-2006	3	New template
04-Apr-2008	4	SOT-223 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 AN AUTHORIZED REPRESENTATIVE OF ST, 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.

© 2008 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 - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

[www.st.com](http://www.st.com)

