

## 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.

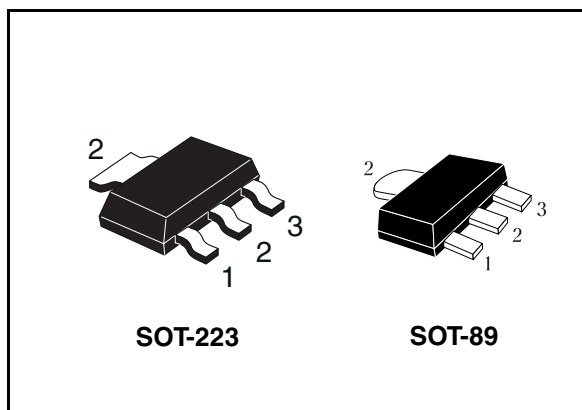


Figure 1. Internal schematic diagram

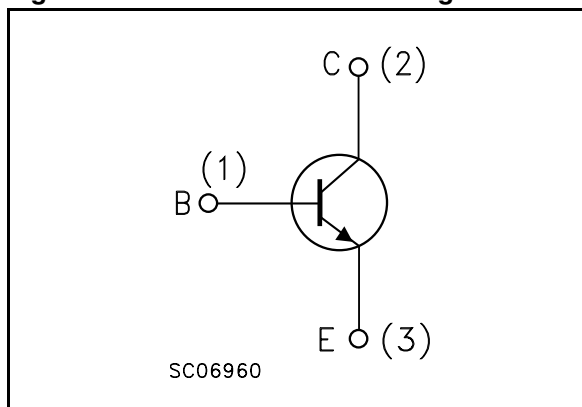


Table 1. Device summary

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  $1\text{ cm}^2$ .

## 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

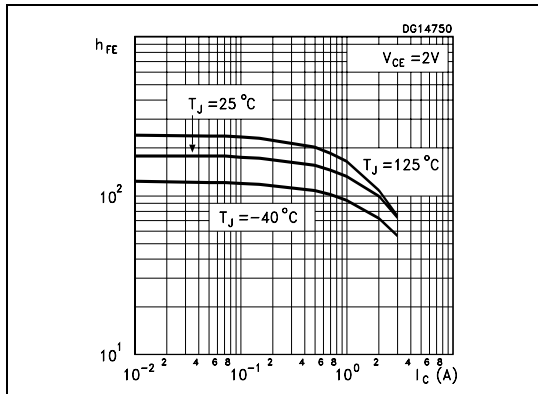


Figure 3. DC Current Gain

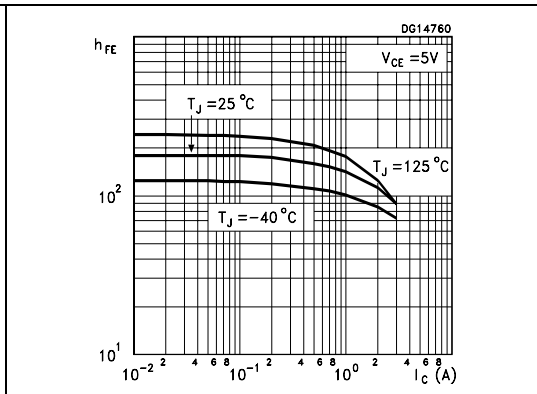


Figure 4. Collector-emitter saturation voltage

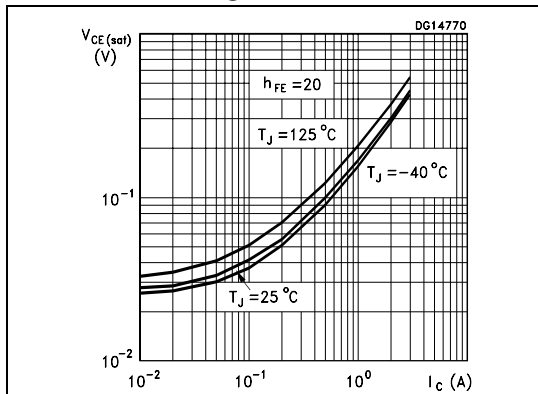


Figure 5. Base-emitter saturation voltage

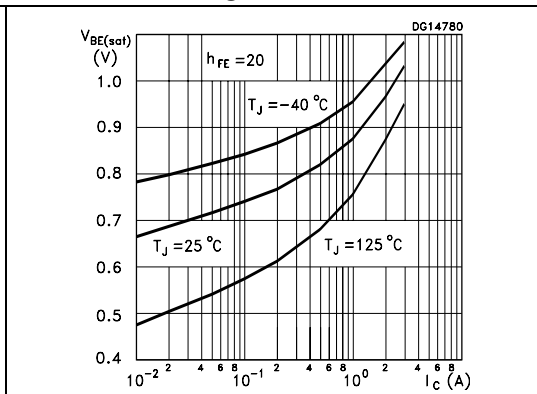


Figure 6. Switching times on resistive load

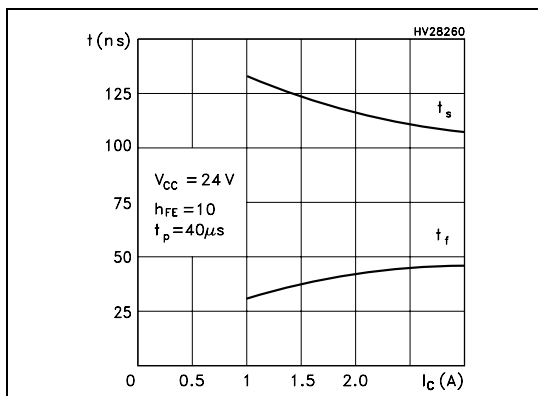
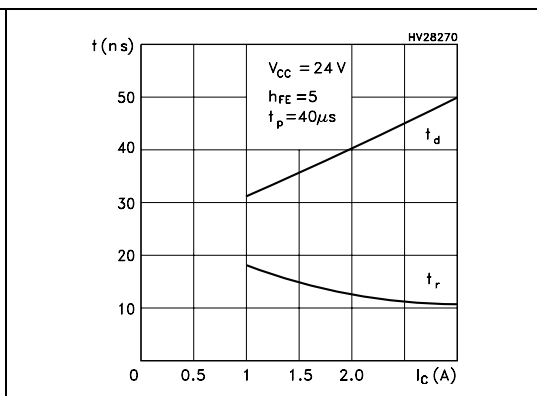
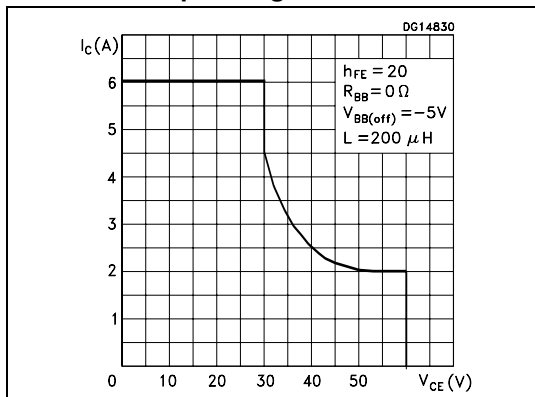


Figure 7. Switching times on resistive load



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

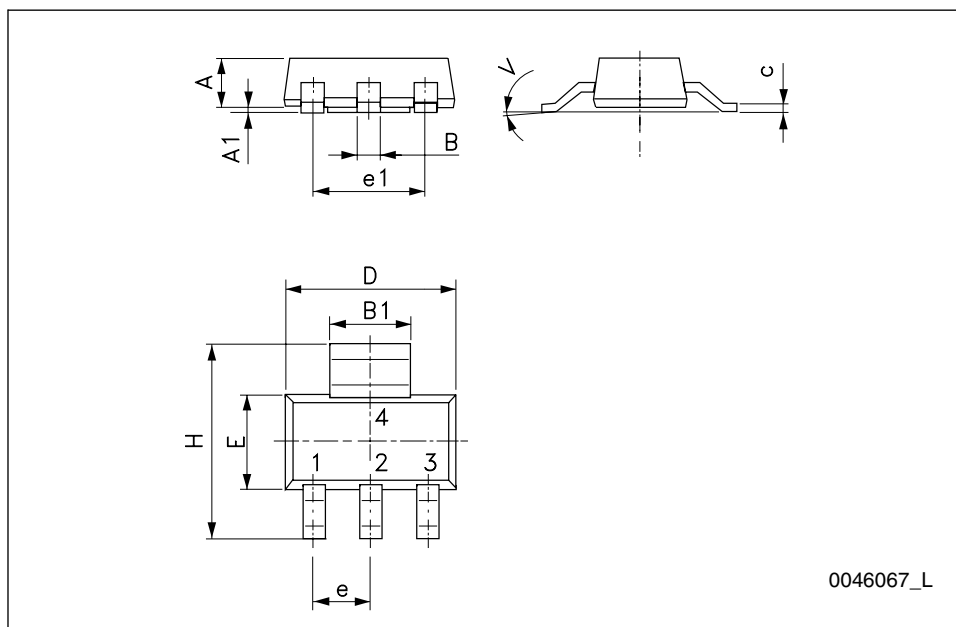


### 3 Package mechanical data

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**

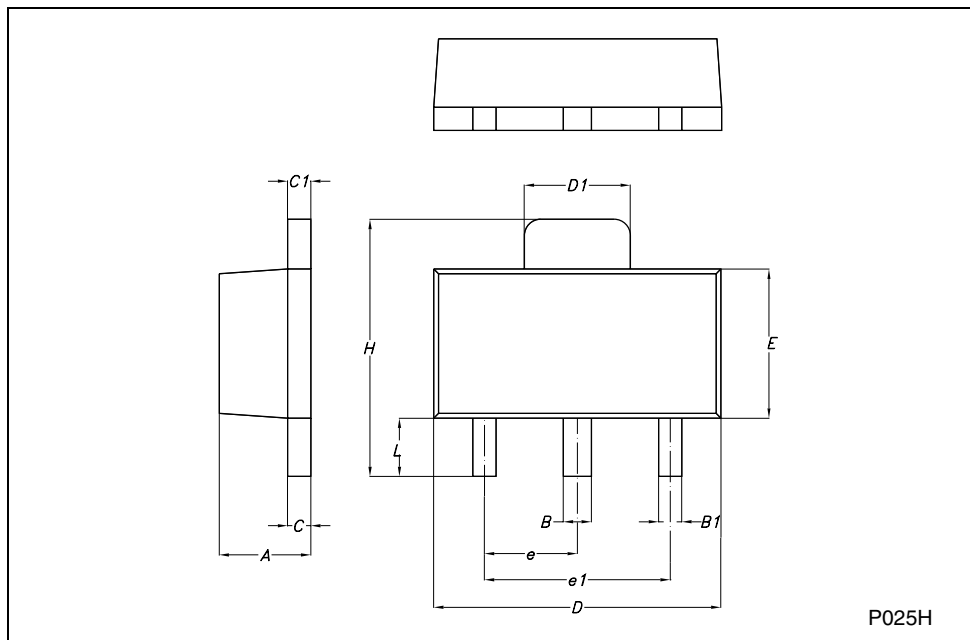
DIM.	mm.		
	min.	typ	max.
A			1.80
A1	0.02		0.1
B	0.60	0.70	0.85
B1	2.90	3.00	3.15
c	0.24	0.26	0.35
D	6.30	6.50	6.70
e		2.30	
e1		4.60	
E	3.30	3.50	3.70
H	6.70	7.00	7.30
V			10°





**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.

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