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Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



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.

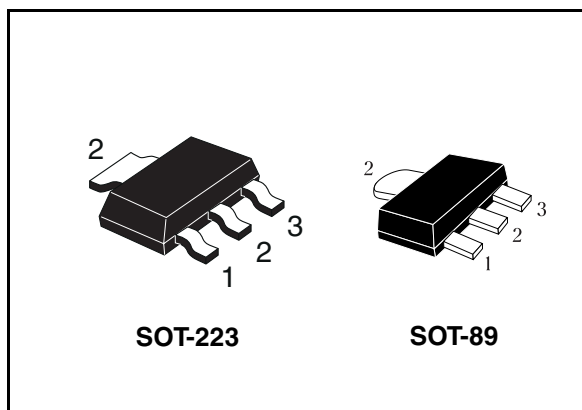


Figure 1. Internal schematic diagram

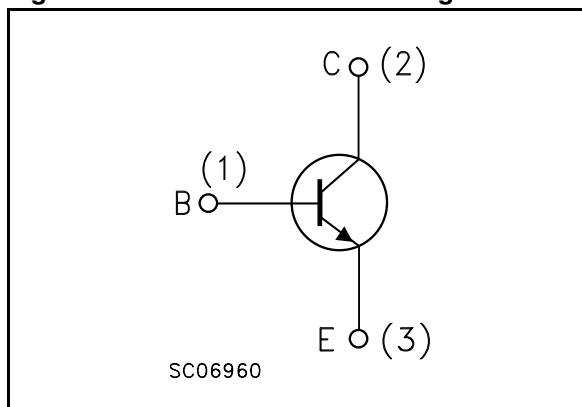


Table 1. Device summary

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

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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 ⁽¹⁾ max	89	78	$^\circ\text{C}/\text{W}$

1. Device mounted on PCB area of 1 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_{CES}	Collector cut-off current ($V_{\text{BE}} = 0$)	$V_{\text{CE}} = 60 \text{ V}$			10	μA
I_{CEO}	Collector cut-off current ($I_{\text{B}} = 0$)	$V_{\text{CE}} = 30 \text{ V}$			100	μA
I_{EBO}	Emitter cut-off current ($I_{\text{C}} = 0$)	$V_{\text{EB}} = 5 \text{ V}$			10	μA
$V_{(\text{BR})\text{CBO}}$	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_{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_{T}	Transition frequency	$V_{\text{CE}} = 10 \text{ V}$ $I_{\text{C}} = 0.1 \text{ A}$		100		MHz

1. Pulsed duration = 300 μs , duty cycle $\leq 1.5 \%$

2.1 Electrical characteristics (curves)

Figure 2. DC Current Gain

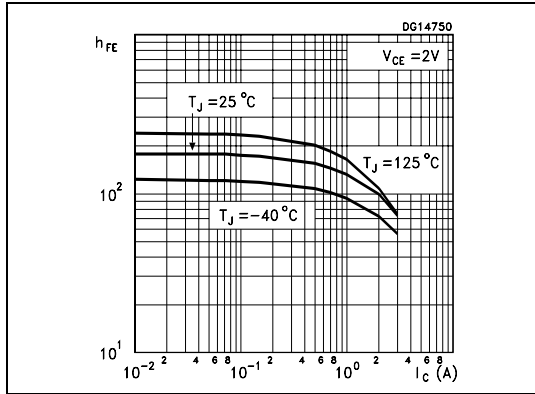


Figure 3. DC Current Gain

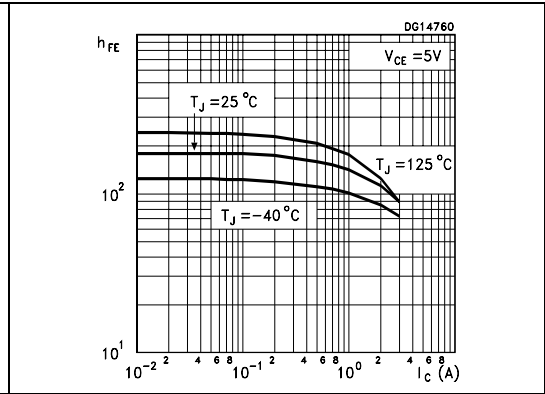


Figure 4. Collector-emitter saturation voltage

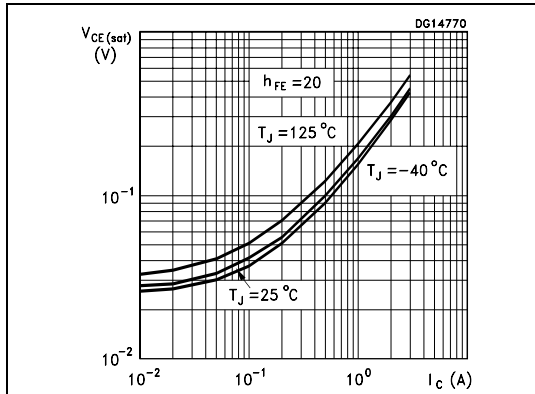


Figure 5. Base-emitter saturation voltage

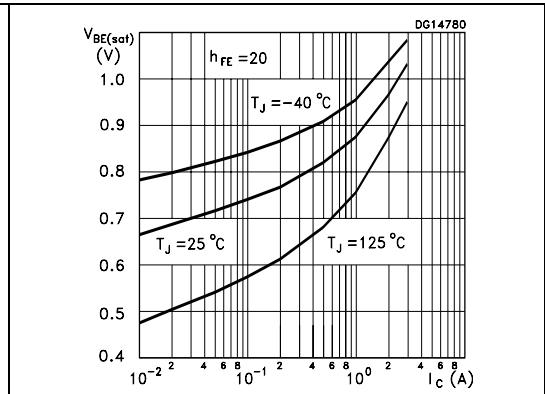


Figure 6. Switching times on resistive load

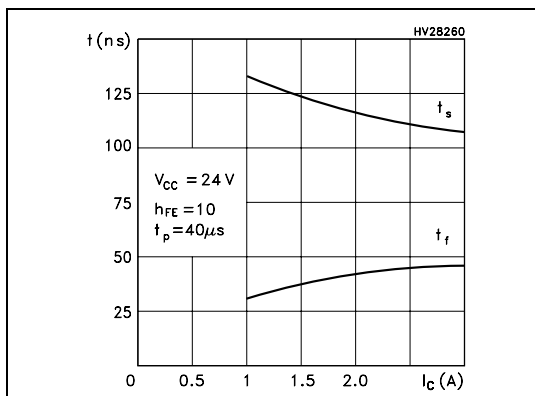


Figure 7. Switching times on resistive load

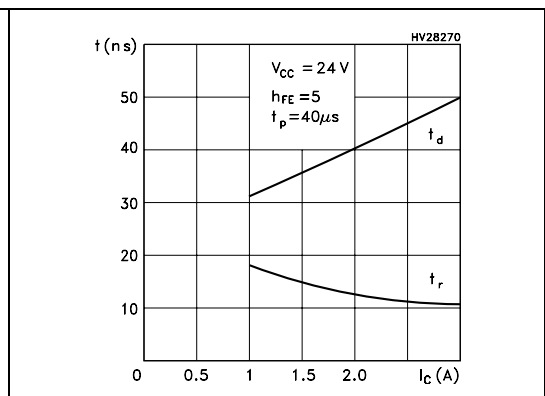
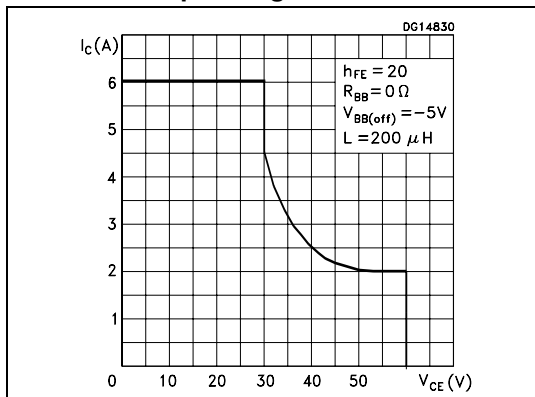


Figure 8. Reverse biased safe operating area

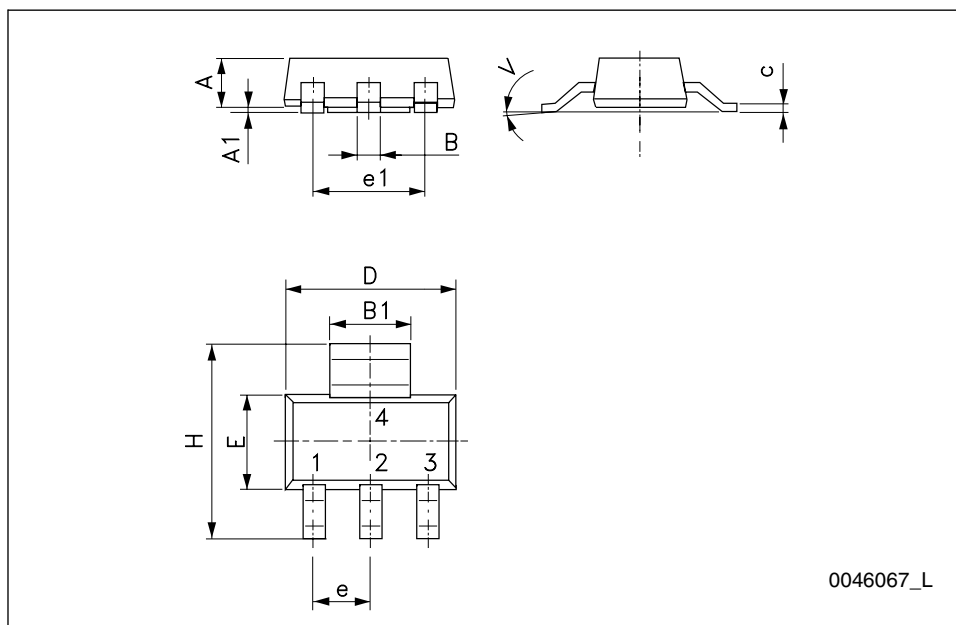


3 Package mechanical data

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

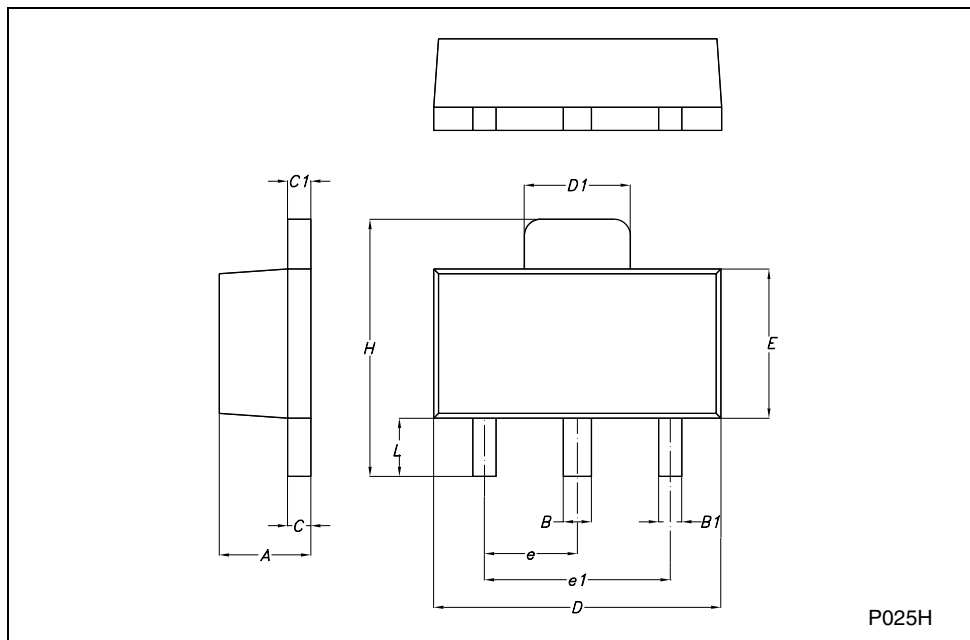
SOT-223 mechanical data

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

Date	Revision	Changes
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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