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## Low voltage high performance NPN power transistors

Preliminary Data

### Features

- Very low collector-emitter saturation voltage
- High current gain characteristic
- Fast switching speed
- Surface mounting devices in medium power SOT-89 and SOT-223 packages

### Applications

- Emergency lighting
- LED
- Motherboard and hard disk drive
- Mobile equipment
- Battery charger
- Voltage regulation

### Description

The 2STF1550 and 2STN1550 are NPN transistors manufactured using new "PB-HCD" (Power bipolar high current density) technology. The resulting transistor shows exceptional high gain performances coupled with very low saturation voltage.

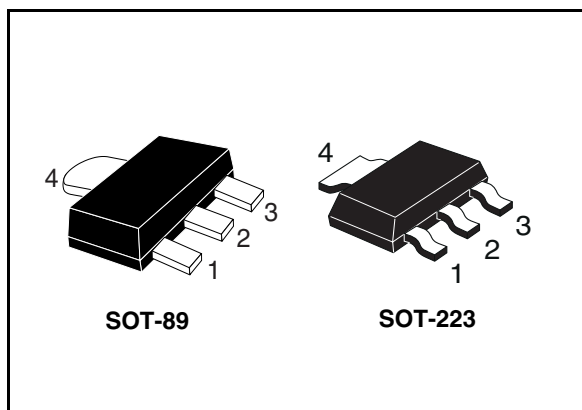


Figure 1. Internal schematic diagram

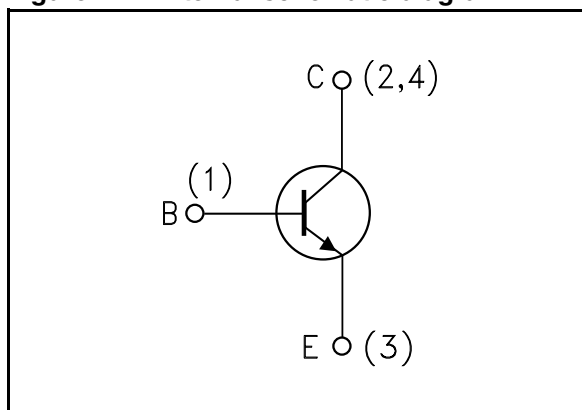


Table 1. Device summary

Order codes	Marking	Package	Packaging
2STF1550	1550	SOT-89	Tape and reel
2STN1550	N1550	SOT-223	

# 1 Electrical ratings

**Table 2. Absolute maximum rating**

Symbol	Parameter	Value		Unit
		2STF1550	2STN1550	
		SOT-89	SOT-223	
$V_{CES}$	Collector-emitter voltage ( $V_{CE} = 0$ )	50		V
$V_{CEO}$	Collector-emitter voltage ( $I_B = 0$ )	50		V
$V_{EBO}$	Emitter-base voltage ( $I_C = 0$ )	5		V
$I_C$	Collector current	5		A
$I_{CM}$	Collector peak current ( $t_P < 5$ ms)	10		A
$I_B$	Base current	1		A
$P_{TOT}$	Total dissipation at $T_{amb} = 25$ °C	1.4	1.6	W
$T_{stg}$	Storage temperature	-65 to 150		°C
$T_J$	Max. operating junction temperature	150		°C

**Table 3. Thermal data**

Symbol	Parameter	SOT-89	SOT-223	Unit
$R_{thj-amb}^{(1)}$	Thermal resistance junction-amb max	89	78	°C/W

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

## 2 Electrical characteristics

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

**Table 4. Electrical characteristics**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{\text{CBO}}$	Collector cut-off current ( $I_{\text{E}} = 0$ )	$V_{\text{CB}} = 50\text{ V}$			0.1	$\mu\text{A}$
$I_{\text{EBO}}$	Emitter cut-off current ( $I_{\text{C}} = 0$ )	$V_{\text{EB}} = 4\text{ V}$			0.1	$\mu\text{A}$
$V_{(\text{BR})\text{CBO}}$	Collector-base breakdown voltage ( $I_{\text{E}} = 0$ )	$I_{\text{C}} = 100\ \mu\text{A}$	50			V
$V_{(\text{BR})\text{CEO}}^{(1)}$	Collector-emitter breakdown voltage ( $I_{\text{B}} = 0$ )	$I_{\text{C}} = 10\text{ mA}$	50			V
$V_{(\text{BR})\text{EBO}}$	Emitter-base breakdown voltage ( $I_{\text{C}} = 0$ )	$I_{\text{E}} = 100\ \mu\text{A}$	5			V
$h_{\text{FE}}^{(1)}$	DC current gain	$I_{\text{C}} = 0.5\text{ A}$ $V_{\text{CE}} = 2\text{ V}$ $I_{\text{C}} = 2\text{ A}$ $V_{\text{CE}} = 2\text{ V}$ $I_{\text{C}} = 3\text{ A}$ $V_{\text{CE}} = 2\text{ V}$ $I_{\text{C}} = 5\text{ A}$ $V_{\text{CE}} = 5\text{ V}$	135 100	250 95	400	
$V_{\text{CE}(\text{sat})}^{(1)}$	Collector-emitter saturation voltage	$I_{\text{C}} = 3\text{ A}$ $I_{\text{B}} = 300\text{ mA}$		0.26	0.45	V
$V_{\text{BE}(\text{sat})}^{(1)}$	Base-emitter saturation voltage	$I_{\text{C}} = 3\text{ A}$ $I_{\text{B}} = 300\text{ mA}$		1	1.2	V
$C_{\text{CBO}}$	Collector-base capacitance ( $I_{\text{E}} = 0$ )	$V_{\text{CB}} = 10\text{ V}$ , $f = 1\text{ MHz}$		20		pF
$t_{\text{on}}$ $t_{\text{off}}$	Resistive load Turn-on time Turn-off time	$I_{\text{C}} = 1.5\text{ A}$ $V_{\text{CC}} = 10\text{ V}$ $I_{\text{B}1} = -I_{\text{B}2} = 150\text{ mA}$		90 700		ns ns

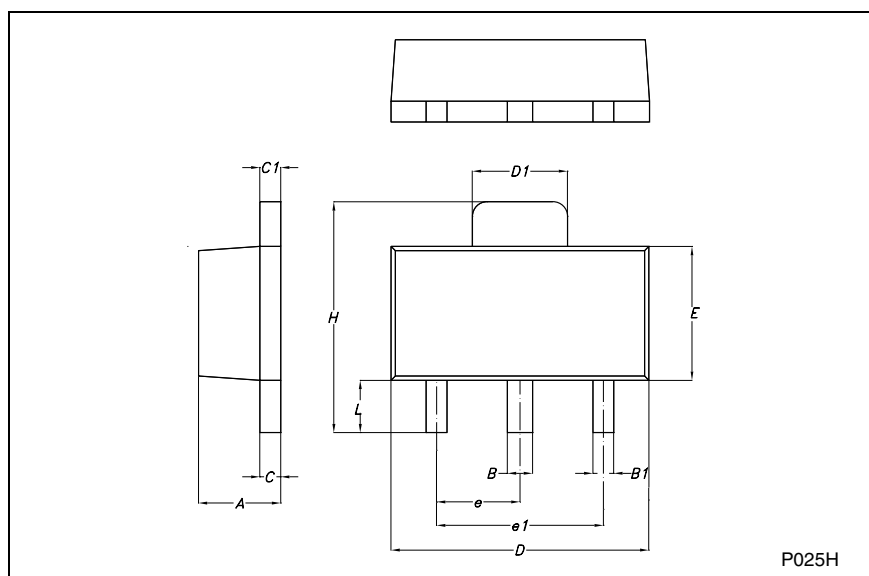
1. Pulsed duration = 300  $\mu\text{s}$ , duty cycle  $\leq 1.5\%$

### 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)

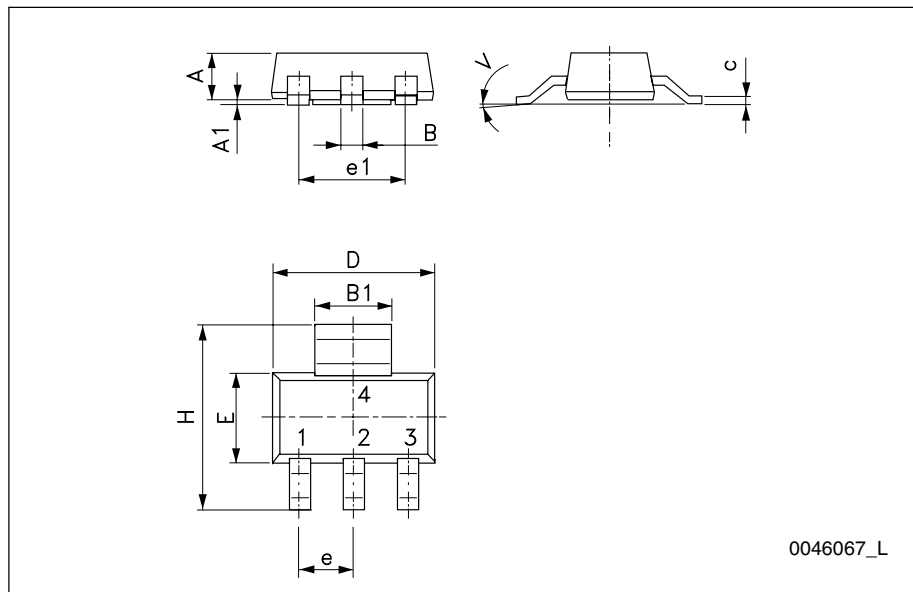
**SOT-89 MECHANICAL DATA**

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



**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 °



## 4 Revision history

**Table 5. Document revision history**

Date	Revision	Changes
08-May-2007	1	Initial release
12-Nov-2008	2	Updated SOT-223 mechanical data



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