

## High voltage fast-switching NPN power transistor

Datasheet - production data

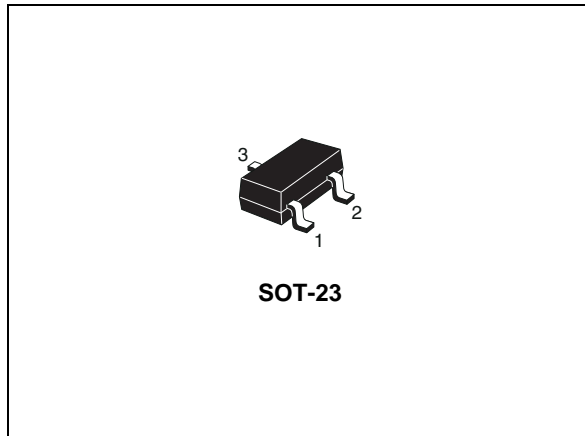
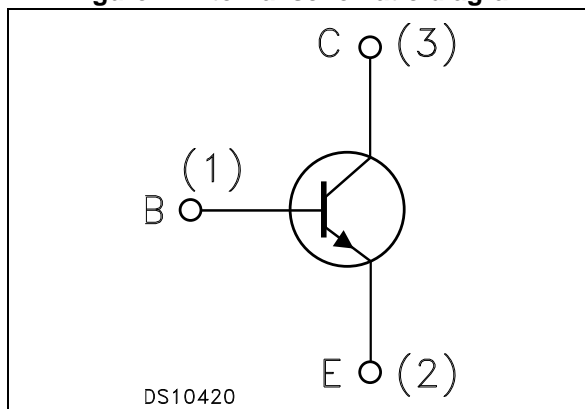


Figure 1. Internal schematic diagram



### Features

- Excellent  $h_{FE}$  linearity up to 50 mA
- Miniature SOT-23 plastic package for surface mounting circuits
- Tape and reel packaging
- The PNP complementary type is STR2550

### Applications

- LED driving

### Description

This device is a high voltage fast-switching NPN power transistor, manufactured using diffused collector planar technology for high switching speeds.

It employs a base island structure with planar edge termination to enhance switching speeds, while maintaining a wide RBSOA.

Table 1. Device summary

Order code	Marking	Package	Packing
STR1550	1550	SOT-23	Tape and reel

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# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{CBO}$	Collector-base voltage ( $I_E = 0$ )	500	V
$V_{CEO}$	Collector-emitter voltage ( $I_B = 0$ )	500	V
$V_{EBO}$	Emitter-base voltage ( $I_C = 0$ )	9	V
$I_C$	Collector current	0.5	A
$I_{CM}$	Collector peak current ( $t_p < 5$ ms)	1	A
$P_{TOT}$	Total dissipation at $T_{amb} = 25$ °C	500	mW
$T_{STG}$	Storage temperature	-65 to 150	°C
$T_J$	Max. operating junction temperature	150	°C

**Table 3. Thermal data**

Symbol	Parameter	Value	Unit
$R_{thJA}^{(1)}$	Thermal resistance junction-ambient max	250	°C/W

1. Device mounted on PCB area of 1 cm².

## 2 Electrical characteristics

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

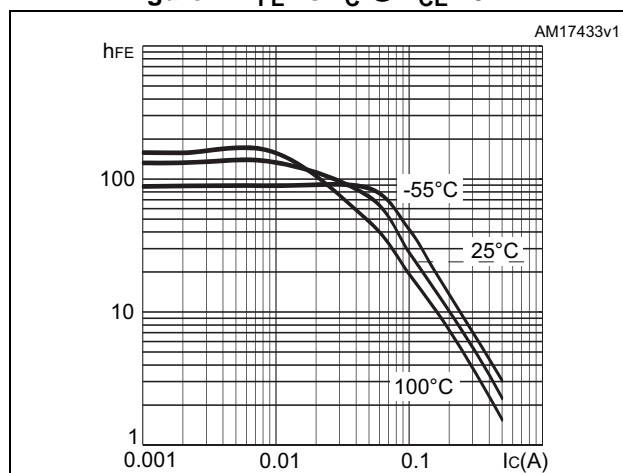
**Table 4. Electrical characteristics**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{\text{CBO}}$	Collector cut-off current ( $I_{\text{E}} = 0$ )	$V_{\text{CB}} = 500\text{ V}$			10	$\mu\text{A}$
$V_{(\text{BR})\text{CBO}}$	Collector-base breakdown voltage ( $I_{\text{E}} = 0$ )	$I_{\text{C}} = 100\text{ }\mu\text{A}$	500			V
$V_{(\text{BR})\text{CEO}}^{(1)}$	Collector-emitter breakdown voltage ( $I_{\text{B}} = 0$ )	$I_{\text{C}} = 1\text{ mA}$	500			V
$V_{(\text{BR})\text{EBO}}$	Emitter-base breakdown voltage ( $I_{\text{C}} = 0$ )	$I_{\text{E}} = 100\text{ }\mu\text{A}$	12			V
$V_{\text{CE(sat)}}^{(1)}$	Collector-emitter saturation voltage	$I_{\text{C}} = 20\text{ mA}$ , $I_{\text{B}} = 2\text{ mA}$			0.2	V
		$I_{\text{C}} = 50\text{ mA}$ , $I_{\text{B}} = 6\text{ mA}$			0.3	V
$V_{\text{BE(sat)}}^{(1)}$	Base-emitter saturation voltage	$I_{\text{C}} = 50\text{ mA}$ , $I_{\text{B}} = 5\text{ mA}$			0.9	V
$V_{\text{BE(on)}}$	Base-emitter on voltage	$I_{\text{C}} = 50\text{ mA}$ , $V_{\text{CE}} = 10\text{ V}$			0.9	V
$h_{\text{FE}}^{(1)}$	DC current gain	$I_{\text{C}} = 1\text{ mA}$ , $V_{\text{CE}} = 10\text{ V}$	100			
		$I_{\text{C}} = 50\text{ mA}$ , $V_{\text{CE}} = 10\text{ V}$	100		300	
		$I_{\text{C}} = 100\text{ mA}$ , $V_{\text{CE}} = 10\text{ V}$	10			

1. Pulse test: pulse duration  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$

### 2.1 Electrical characteristics (curves)

**Figure 2.  $h_{\text{FE}}$  vs.  $I_{\text{C}}$  @  $V_{\text{CE}} = 5\text{ V}$**



**Figure 3.  $h_{\text{FE}}$  vs.  $I_{\text{C}}$  @  $V_{\text{CE}} = 10\text{ V}$**

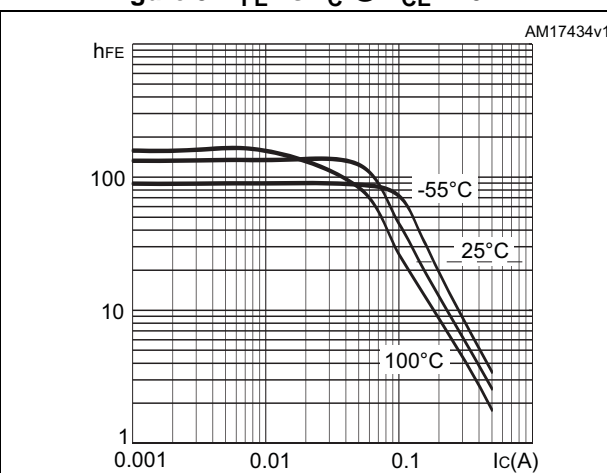


Figure 4.  $V_{CE(sat)}$  vs.  $I_C$  @  $h_{FE}=5$

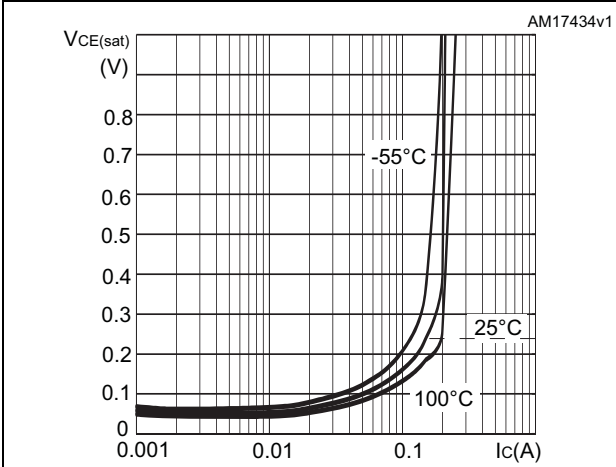


Figure 5.  $V_{CE(sat)}$  vs.  $I_C$  @  $h_{FE}=10$

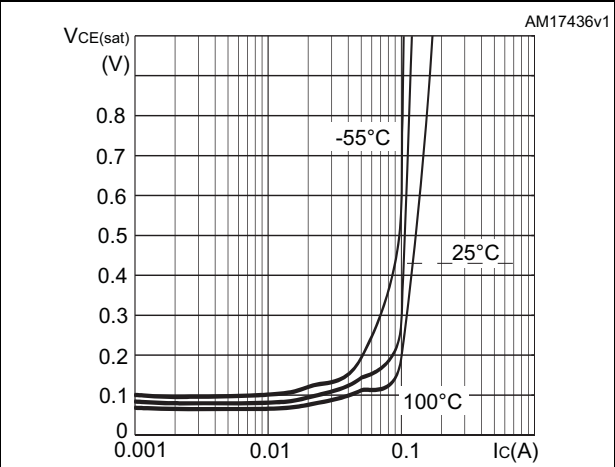


Figure 6.  $V_{BE(sat)}$  vs.  $I_C$  @  $h_{FE}=5$

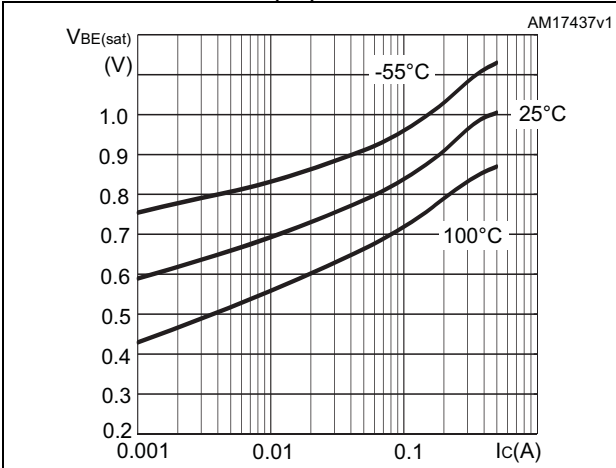


Figure 7.  $V_{BE(sat)}$  vs.  $I_C$  @  $h_{FE}=10$

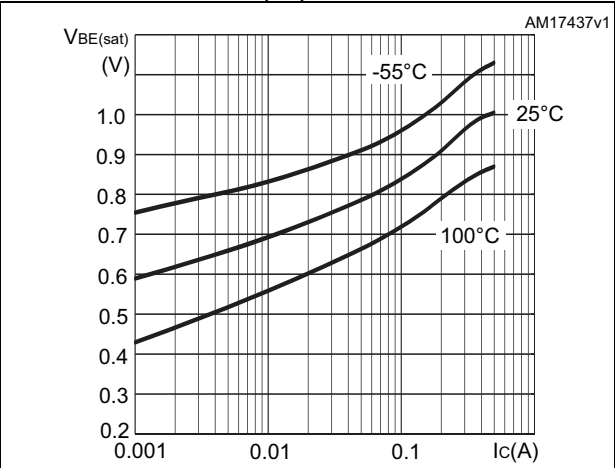
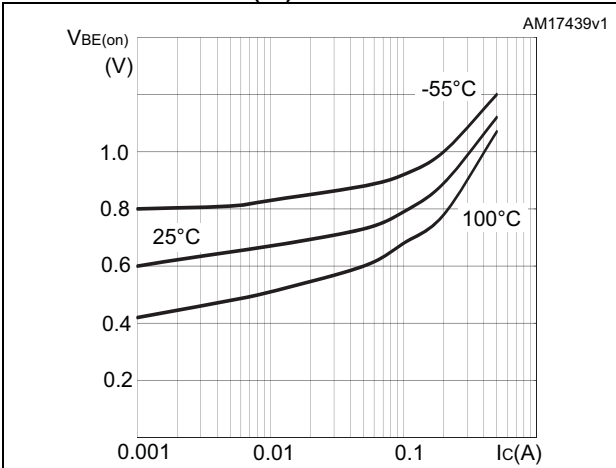


Figure 8.  $V_{BE(on)}$  vs.  $I_C$  @  $V_{CE}=10\text{ V}$



### 3 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK<sup>®</sup> is an ST trademark.

Figure 9. SOT-23 drawings

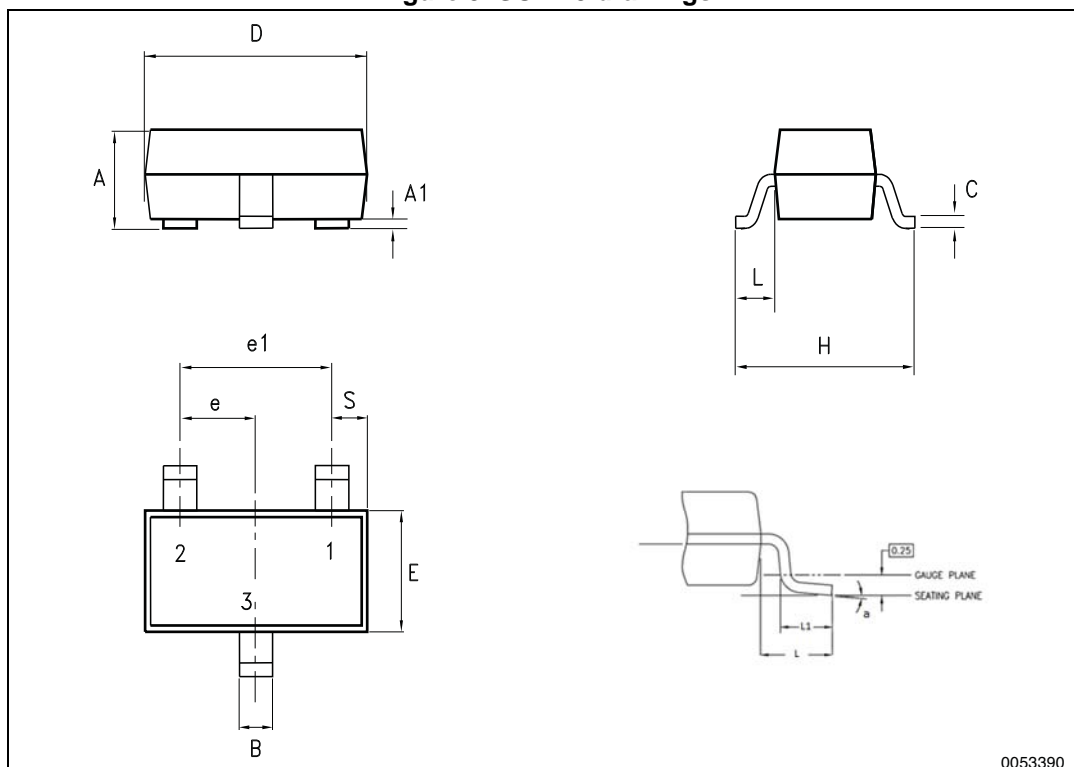
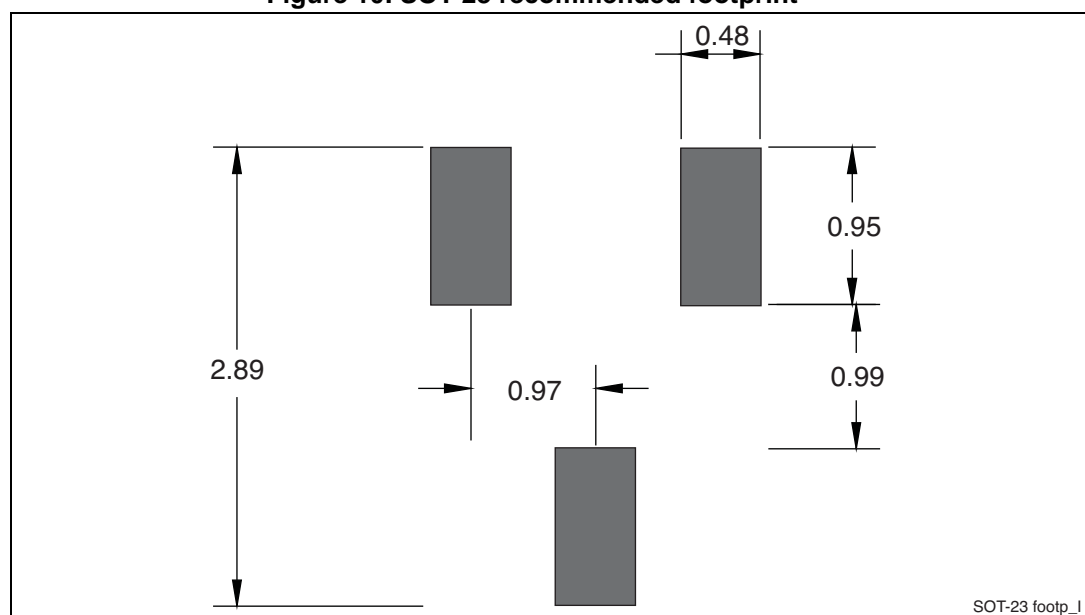


Table 5. SOT-23 mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	0.89		1.40
A1	0		0.10
B	0.30		0.51
C	0.085		0.18
D	2.75		3.04
e	0.85		1.05
e1	1.70		2.10
E	1.20		1.75
H	2.10		3.00
L		0.60	
S	0.35		0.65
L1	0.25		0.55
a	0°		8°

Figure 10. SOT-23 recommended footprint (a)



a. Dimensions are in mm.

## 4 Revision history

**Table 6. Document revision history**

Date	Revision	Changes
17-Oct-2011	1	Initial release
05-Jun-2012	2	Modified: features, <a href="#">Table 4</a> ( $V_{CE(sat)}$ values, $h_{FE}$ test conditions and values)
21-May-2013	3	<ul style="list-style-type: none"><li>– Modified: <a href="#">Table 4</a> (<math>V_{BE(sat)}</math> values, <math>h_{FE}</math> max. value and <math>V_{(BR)EBO}</math> min. value</li><li>– Inserted: <math>V_{BE(on)}</math></li><li>– Modified: <a href="#">Table 4</a> (<math>h_{FE}</math> max. value)</li><li>– Added new section: <a href="#">Electrical characteristics (curves)</a></li></ul>
27-May-2013	4	– Document status promoted from preliminary to production data
09-May-2014	5	– Updated <a href="#">Table 1: Device summary</a> and <a href="#">Section 3: Package mechanical data</a>



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