

## Low voltage fast-switching NPN power transistor

Datasheet - production data

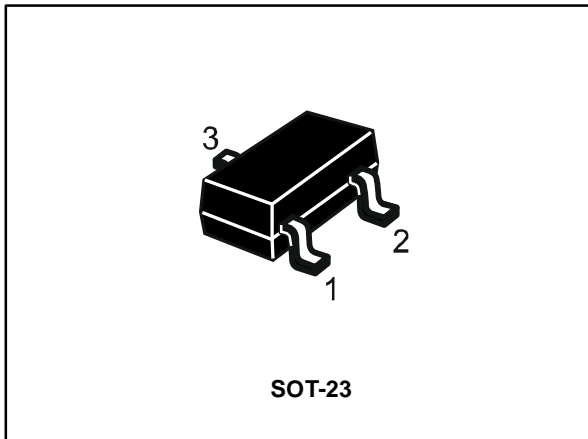
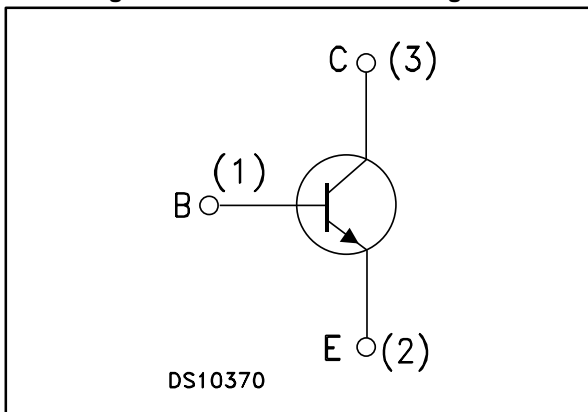


Figure 1: Internal schematic diagram



### Features

- Very low collector-emitter saturation voltage
- High current gain characteristic
- Fast switching speed
- Miniature SOT-23 plastic package for surface mounting circuits

### Description

The device is an NPN transistor 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.

The complementary PNP is the 2STR2160.

### Applications

- LED
- Battery charger
- Motor and relay driver
- Voltage regulation

Table 1: Device summary

Order code	Marking	Package	Packing
2STR1160	1160	SOT-23	Tape and reel

# 1 Electrical ratings

**Table 2: Absolute maximum rating**

Symbol	Parameter	Value	Unit
V <sub>CB0</sub>	Collector-base voltage (I <sub>E</sub> = 0)	60	V
V <sub>CE0</sub>	Collector-emitter voltage (I <sub>B</sub> = 0)	60	V
V <sub>EB0</sub>	Emitter-base voltage (I <sub>C</sub> = 0)	5	V
I <sub>C</sub>	Collector current	1	A
I <sub>CM</sub>	Collector peak current (t <sub>P</sub> < 5ms)	2	A
P <sub>tot</sub>	Total dissipation at T <sub>amb</sub> = 25°C	0.5	W
T <sub>stg</sub>	Storage temperature	-65 to 150	°C
T <sub>J</sub>	Max. operating junction temperature	150	°C

**Table 3: Thermal data**

Symbol	Parameter	Value	Unit
R <sub>thj-amb</sub> <sup>(1)</sup>	Thermal resistance junction-amb max	250	°C/ W

**Notes:**

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

## 2 Electrical characteristics

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

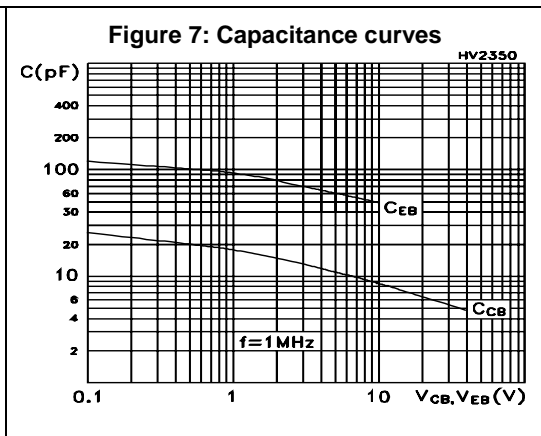
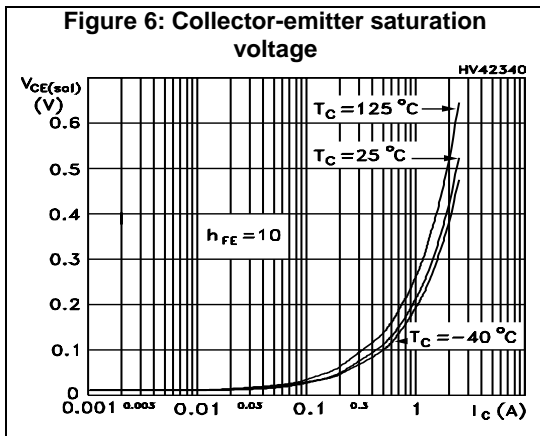
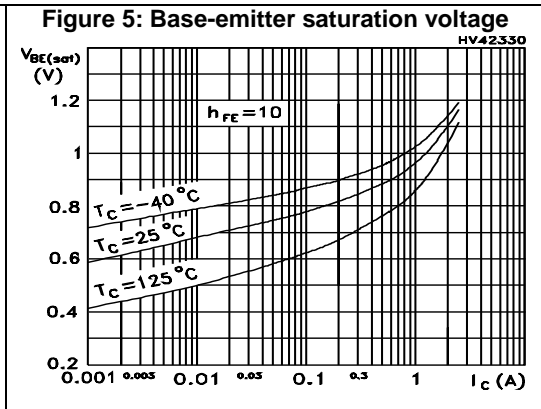
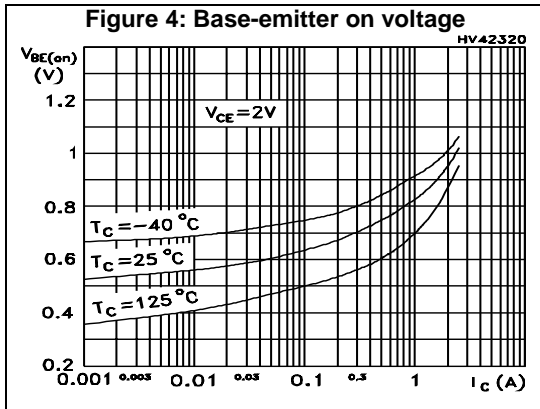
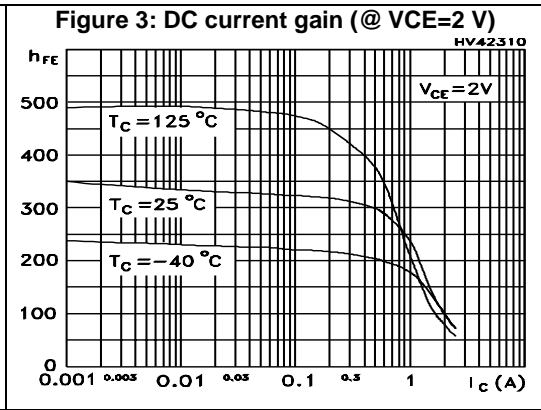
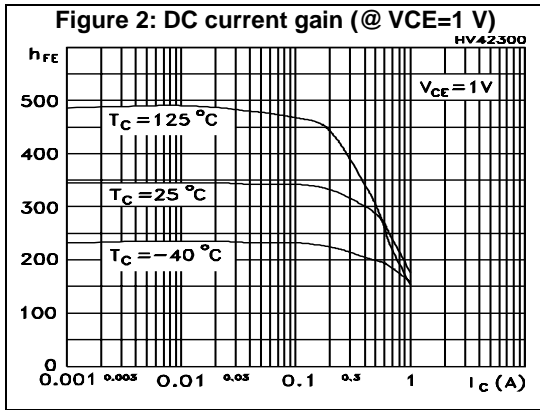
**Table 4: Electrical characteristics**

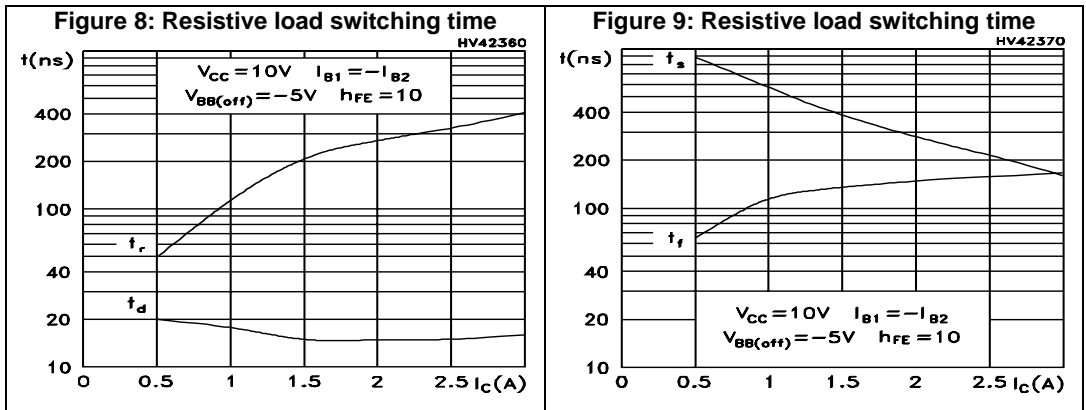
Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{\text{CBO}}$	Collector cut-off current ( $I_{\text{E}} = 0$ )	$V_{\text{CB}} = 60 \text{ V}$			0.1	$\mu\text{A}$
$I_{\text{EBO}}$	Emitter cut-off current ( $I_{\text{C}} = 0$ )	$V_{\text{EB}} = 5 \text{ V}$			0.1	$\mu\text{A}$
$V_{(\text{BR})\text{CBO}}$	Collector-base breakdown voltage ( $I_{\text{E}} = 0$ )	$I_{\text{C}} = 100 \mu\text{A}$	60			V
$V_{(\text{BR})\text{CEO}}^{(1)}$	Collector-emitter breakdown voltage ( $I_{\text{B}} = 0$ )	$I_{\text{C}} = 10 \text{ mA}$	60			V
$V_{(\text{BR})\text{EBO}}$	Emitter-base breakdown voltage ( $I_{\text{C}} = 0$ )	$I_{\text{E}} = 100 \mu\text{A}$	5			V
$V_{\text{CE(sat)}}$	Collector-emitter saturation voltage	$I_{\text{C}} = 0.5 \text{ A } I_{\text{B}} = 50 \text{ mA}$		130	210	mV
		$I_{\text{C}} = 1 \text{ A } I_{\text{B}} = 100 \text{ mA}$		210	430	mV
$V_{\text{BE(sat)}}$	Base-emitter saturation voltage	$I_{\text{C}} = 1 \text{ A } I_{\text{B}} = 100 \text{ mA}$		0.9	1.25	V
$h_{\text{FE}}$	DC current gain	$I_{\text{C}} = 0.5 \text{ A } V_{\text{CE}} = 2\text{V}$	180	250	560	
		$I_{\text{C}} = 1 \text{ A } V_{\text{CE}} = 2\text{V}$	85	130		
		$I_{\text{C}} = 2 \text{ A } V_{\text{CE}} = 2\text{V}$		30		
	Resistive load					
$t_{\text{on}}$	Turn-on time	$I_{\text{C}} = 1.5 \text{ A } V_{\text{CC}} = 10 \text{ V}$		220		ns
$t_{\text{off}}$	Turn-off time	$I_{\text{B1}} = -I_{\text{B2}} = 150 \text{ mA}$ $V_{\text{BB(off)}} = -5 \text{ V}$		500		ns

**Notes:**

<sup>(1)</sup>Pulse test: pulse duration = 300  $\mu\text{s}$ , duty cycle  $\leq 1.5\%$

## 2.1 Typical characteristic (curves)





### 3 Package mechanical data

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

#### 3.1 SOT-23 mechanical data

Figure 10: SOT-23 mechanical drawing

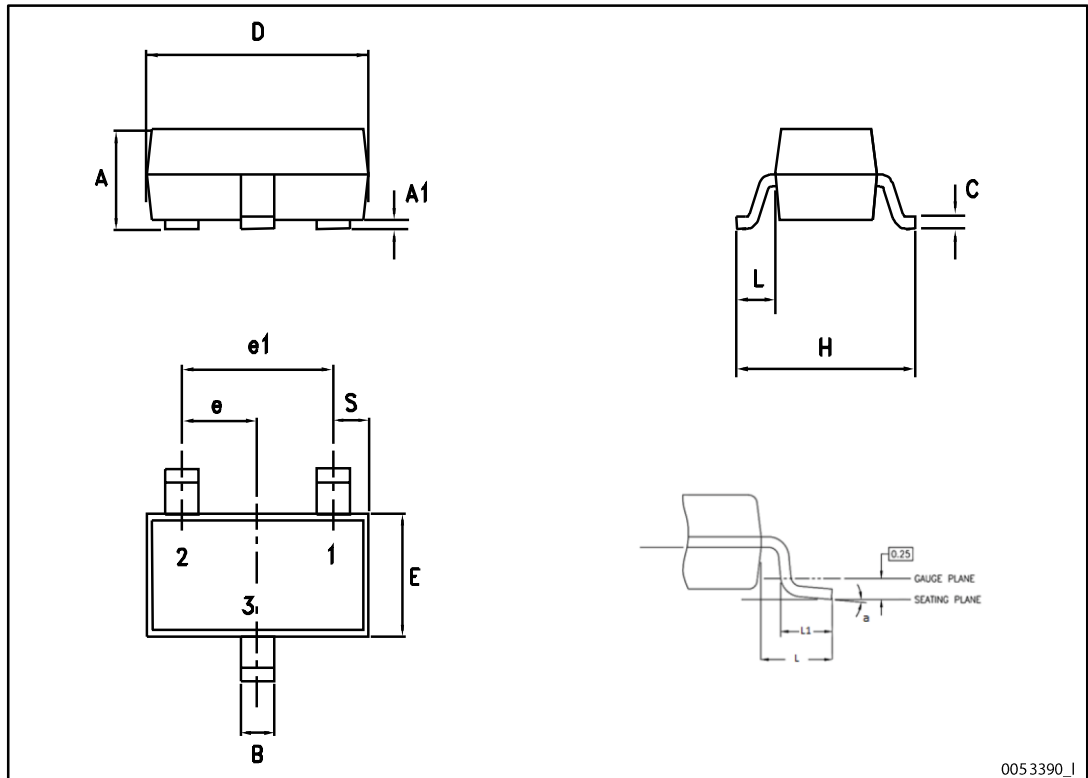
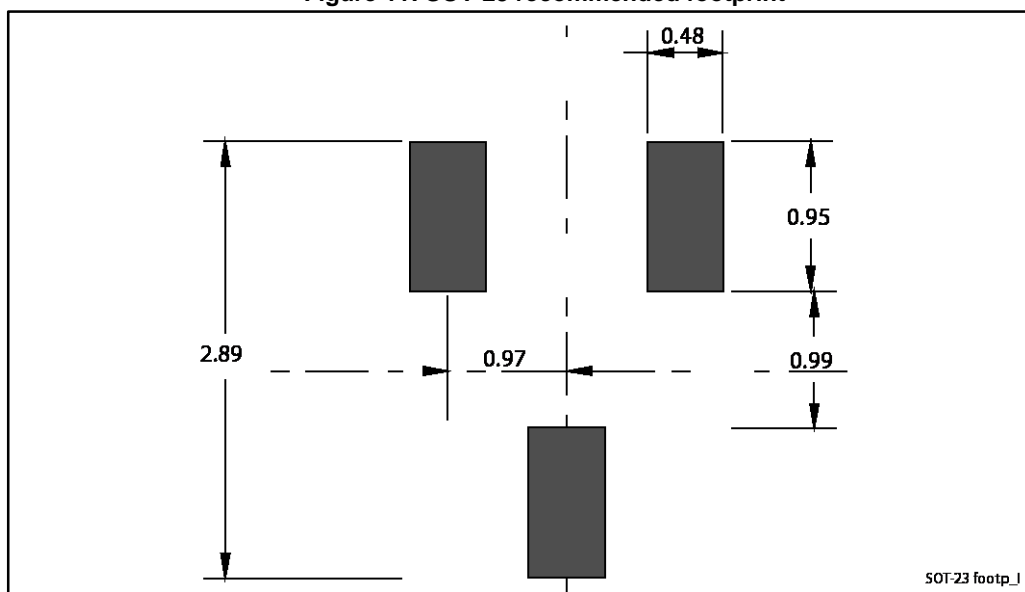


Table 5: SOT-23 mechanical data

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 11: SOT-23 recommended footprint



Dimensions are in mm.

## 4 Revision history

**Table 6: Document revision history**

Date	Revision	Changes
12-Feb-2008	1	Initial release
08-May-2014	2	Updated <a href="#">Section 3: "Package mechanical data"</a> .
01-Apr-2015	3	Updated marking in <a href="#">Table 1: "Device summary"</a>



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