

## Low voltage fast-switching PNP power transistor

Datasheet - production data

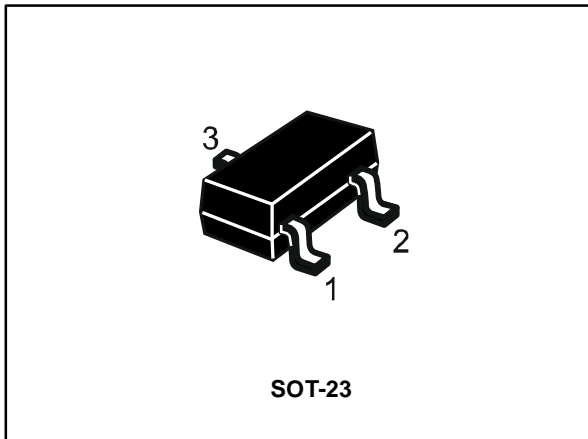
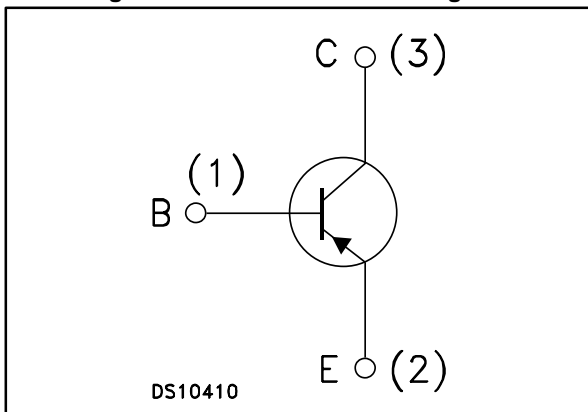


Figure 1: Internal schematic diagram



### Features

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

### Applications

- LED
- Motherboard & hard disk drive
- Mobile equipment
- Battery charger
- Voltage regulation

### Description

The device is a PNP 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.

Table 1: Device summary

Order code	Marking	Package	Packing
2STR2230	2230	SOT-23	Tape and reel

---

## 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 information .....</b>	<b>6</b>
	3.1 SOT-23 package information .....	6
<b>4</b>	<b>Revision history .....</b>	<b>9</b>

# 1 Electrical ratings

**Table 2: Absolute maximum rating**

Symbol	Parameter	Value	Unit
$V_{CES}$	Collector-emitter voltage ( $V_{CE} = 0$ )	-30	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	-1.5	A
$I_{CM}$	Collector peak current ( $t_P < 5ms$ )	-3	A
$P_{tot}$	Total dissipation at $T_{amb} = 25^\circ C$	0.5	W
$T_{stg}$	Storage temperature range	-65 to 150	$^\circ C$
$T_J$	Operating junction temperature range		

**Table 3: Thermal data**

Symbol	Parameter	Value	Unit
$R_{thj-amb}^{(1)}$	Thermal resistance junction-amb max	250	$^\circ C/W$

**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 ( $I_{\text{E}} = 0$ )	$V_{\text{CB}} = -30 \text{ V}$			-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 ( $I_{\text{E}} = 0$ )	$I_{\text{C}} = -100 \mu\text{A}$	-30			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
$V^{(1)}$	Collector-emitter saturation voltage	$I_{\text{C}} = -0.1 \text{ A}, I_{\text{B}} = -1 \text{ mA}$			-0.17	mV
		$I_{\text{C}} = -1 \text{ A}, I_{\text{B}} = -100 \text{ mA}$		-0.25	-0.45	
		$I_{\text{C}} = -2 \text{ A}, I_{\text{B}} = -200 \text{ mA}$		-0.42	-0.8	
$V_{\text{BE}(\text{sat})}^{(1)}$	Base-emitter saturation voltage	$I_{\text{C}} = -1 \text{ A}, I_{\text{B}} = -100 \text{ mA}$		-0.9	-1.25	V
$h_{\text{FE}}^{(1)}$	DC current gain	$I_{\text{C}} = -50 \text{ mA}, V_{\text{CE}} = -2 \text{ V}$	210			
		$I_{\text{C}} = -0.5 \text{ A}, V_{\text{CE}} = -2 \text{ V}$	170	280	560	
		$I_{\text{C}} = -1 \text{ A}, V_{\text{CE}} = -2 \text{ V}$	100			
		$I_{\text{C}} = -1.5 \text{ A}, V_{\text{CE}} = -2 \text{ V}$	70			
$f_{\text{t}}$	Transition frequency	$I_{\text{C}} = -0.1 \text{ A}, V_{\text{CE}} = -5 \text{ V}$ $f = 100 \text{ MHz}$	100			MHz
$C_{\text{CBO}}$	Collector-base capacitance	$I_{\text{E}} = 0, V_{\text{CB}} = -10 \text{ V}$ $f = 1 \text{ MHz}$		10		pF
$t_{\text{on}}$	Turn-on time	Resistive load		74		ns
$t_{\text{off}}$	Turn-off time	$I_{\text{C}} = -1.5 \text{ A}, V_{\text{CC}} = -10 \text{ V}$ $I_{\text{B}1} = -I_{\text{B}2} = -150 \text{ mA}$		200		ns

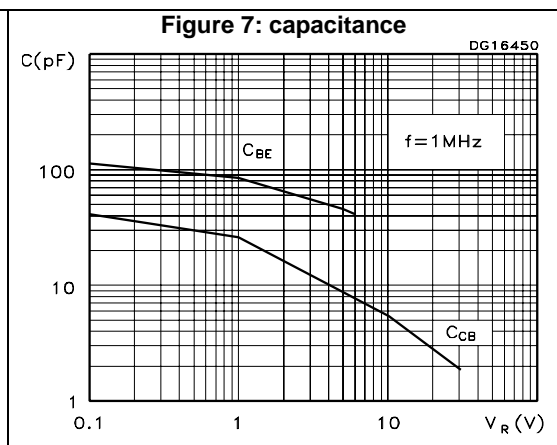
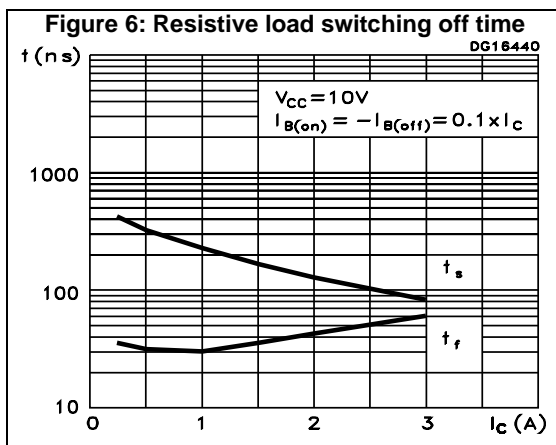
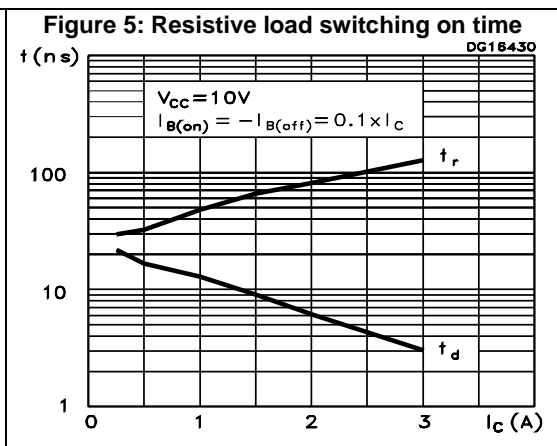
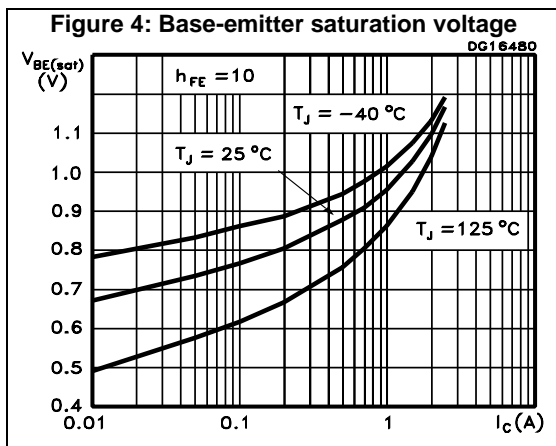
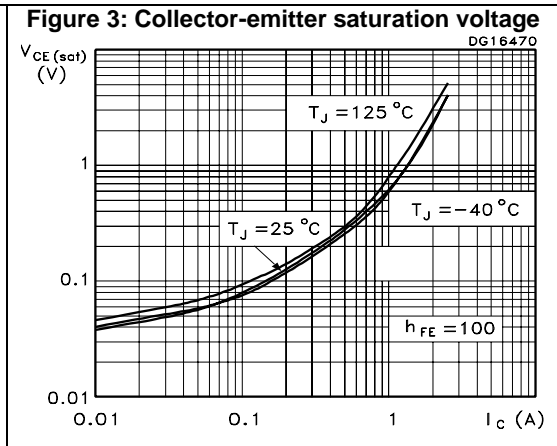
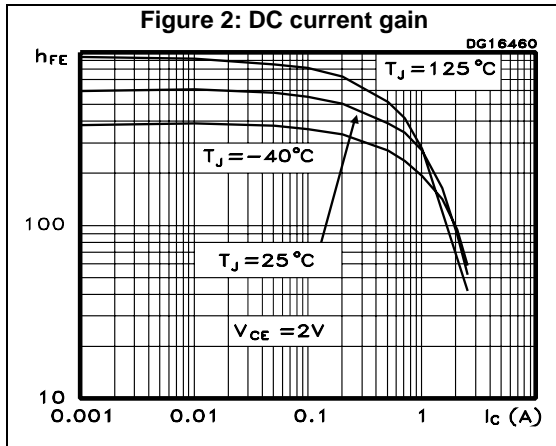
**Notes:**

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

## 2.1 Electrical characteristics (curves)



For the PNP transistors, current and voltage polarities are reversed.



### 3 Package information

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 package information

Figure 8: SOT-23 package outline

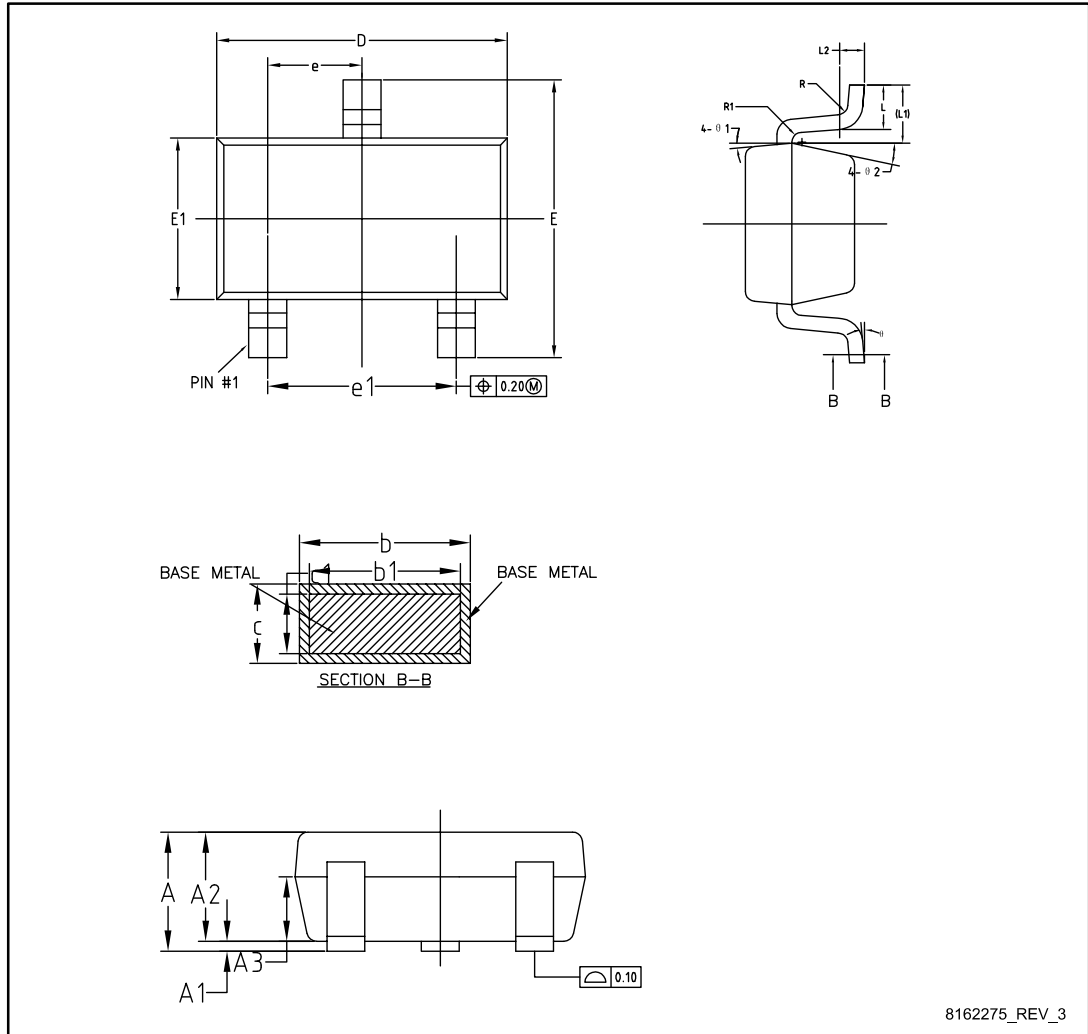
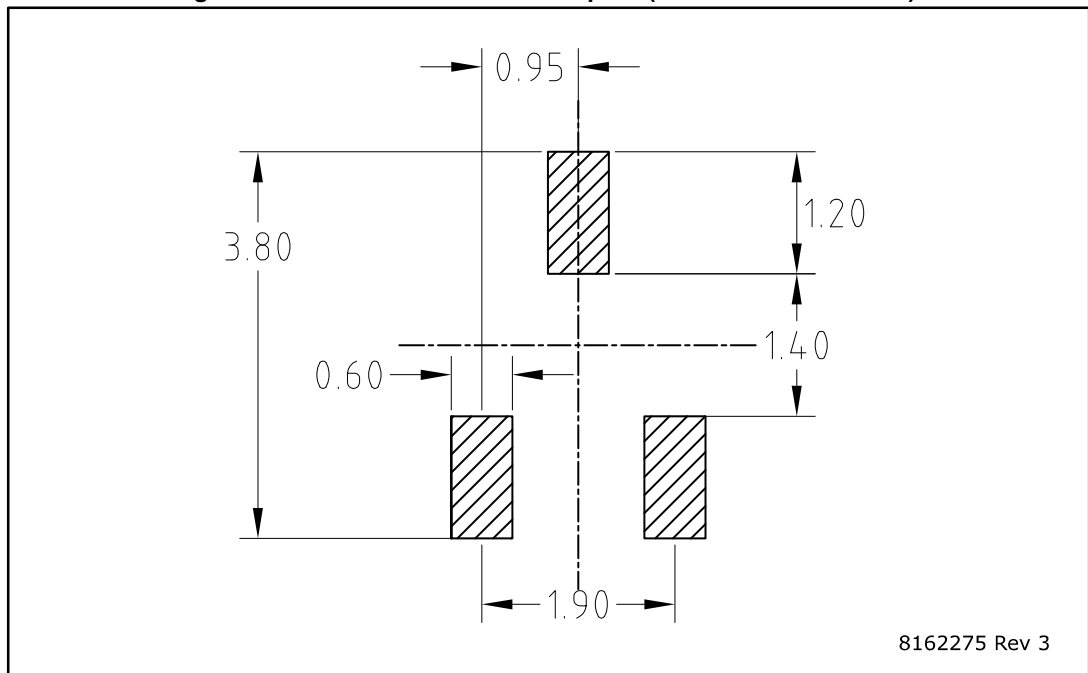


Table 5: SOT-23 package mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A			1.25
A1	0		0.15
A2	1	1.10	1.20
A3	0.60	0.65	0.70
b	0.36		0.50
b1	0.36	0.38	0.45
c	0.14		0.20
c1	0.14	0.15	0.16
D	2.826	2.926	3.026
E	2.60	2.80	3.00
E1	1.526	1.626	1.726
e	0.90	0.95	1.00
e1	1.80	1.90	2.00
L	0.35	0.45	0.60
L1		0.59 REF	
L2		0.25 BSC	
R	0.05		
R1	0.05		
$\theta$	0°		8°
$\theta_1$	3°	5°	7°
$\theta_2$	6°		5°

Figure 9: SOT-23 recommended footprint (dimensions are in mm)





## 4 Revision history

Table 6: Document revision history

Date	Revision	Changes
18-Jul-2006	1	Initial release
31-Oct-2006	2	New graphics
07-Nov-2006	3	Maturity changed from preliminary to full.
09-Jun-2016	4	Updated features and description in cover page. Updated <a href="#">Table 1: "Device summary"</a> . Updated <a href="#">Section 3.1: "SOT-23 package information"</a> . Minor text changes.

**IMPORTANT NOTICE – PLEASE READ CAREFULLY**

STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers' products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2016 STMicroelectronics – All rights reserved