

## Low voltage fast-switching PNP power transistor

### General features

- Very low collector-emitter saturation voltage
- High current gain characteristic
- Fast switching speed
- Miniature SOT-23 plastic package for surface mounting circuits
- In compliance with the 2002/93/EC European Directive

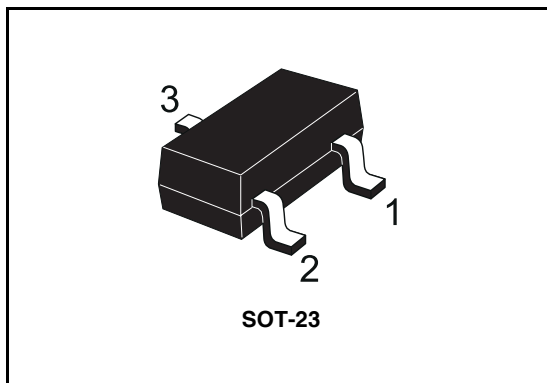
### Description

The 2STR2230 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.

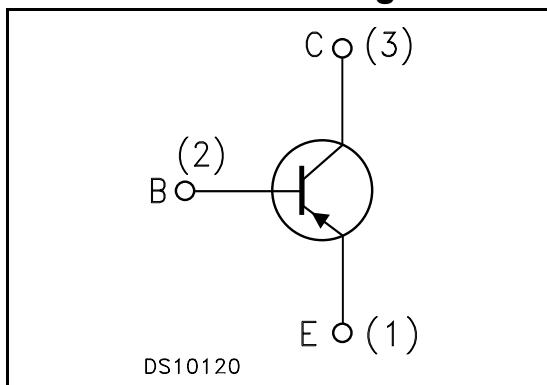
The complementary NPN is the 2STR1230.

### Applications

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



### Internal schematic diagram



### Order codes

Part Number	Marking	Package	Packing
2STR2230	230	SOT-23	Tape & reel

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# 1 Electrical ratings

**Table 1. 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 ( $t_P < 5\text{ms}$ )	-3	A
$P_{tot}$	Total dissipation at $T_{amb} = 25^\circ\text{C}$	0.5	W
$T_{stg}$	Storage temperature	-65 to 150	$^\circ\text{C}$
$T_J$	Max. operating junction temperature	150	$^\circ\text{C}$

**Table 2. Thermal data**

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

(1) Device mounted on PCB area of  $1\text{cm}^2$

## 2 Electrical characteristics

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

**Table 3. 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
$V_{(\text{BR})\text{CEO}}^{(2)}$	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
$V_{\text{CE}(\text{sat})}^{(2)}$	Collector-emitter saturation voltage	$I_{\text{C}} = -0.1\text{A}$ $I_{\text{B}} = -1\text{mA}$ $I_{\text{C}} = -1\text{A}$ $I_{\text{B}} = -100\text{mA}$ $I_{\text{C}} = -2\text{A}$ $I_{\text{B}} = -200\text{mA}$		-0.25 -0.42	-0.17 -0.45 -0.8	V V V
$V_{\text{BE}(\text{sat})}^{(2)}$	Base-emitter saturation voltage	$I_{\text{C}} = -1\text{A}$ $I_{\text{B}} = -100\text{mA}$		-0.9	-1.25	V
$h_{\text{FE}}^{(2)}$	DC current gain	$I_{\text{C}} = -50\text{mA}$ $V_{\text{CE}} = -2\text{V}$ $I_{\text{C}} = -0.5\text{A}$ $V_{\text{CE}} = -2\text{V}$ $I_{\text{C}} = -1\text{A}$ $V_{\text{CE}} = -2\text{V}$ $I_{\text{C}} = -1.5\text{A}$ $V_{\text{CE}} = -2\text{V}$	210 170 100 70	280	560	
$f_{\text{T}}$	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
$t_{\text{on}}$ $t_{\text{off}}$	Resistive load Turn-on time Turn-off time	$I_{\text{C}} = -1.5\text{A}$ $V_{\text{CC}} = -10\text{V}$ $I_{\text{B1}} = -I_{\text{B2}} = -150\text{mA}$		74 200		ns ns

Note (2) Pulsed duration = 300  $\mu\text{s}$ , duty cycle  $\leq 1.5\%$

## 2.1 Electrical characteristics (curves)

Figure 1. DC current gain

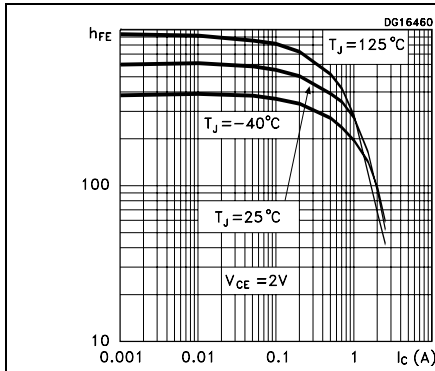


Figure 2. Collector-emitter saturation voltage

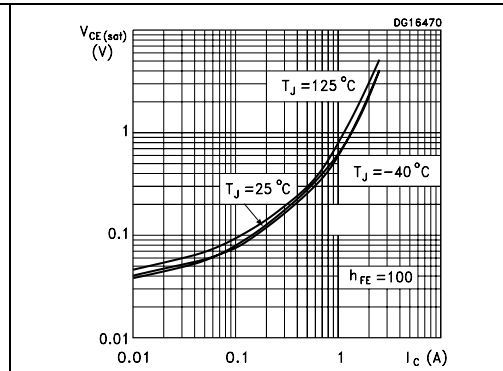


Figure 3. Base-emitter saturation voltage

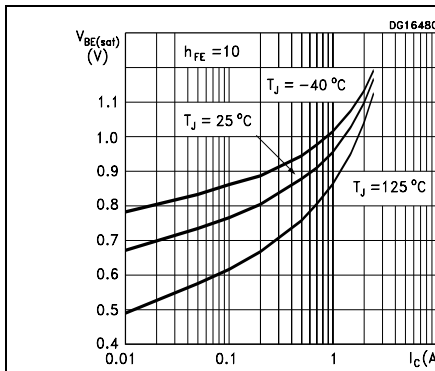


Figure 4. Resistive load switching time

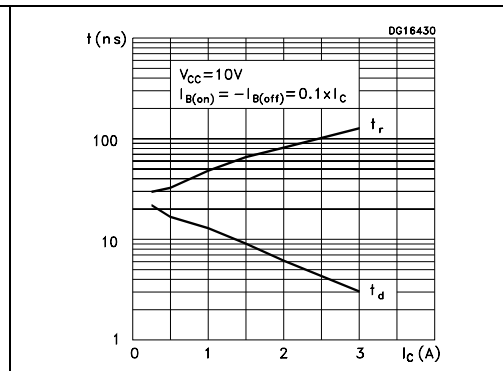


Figure 5. Resistive load switching time

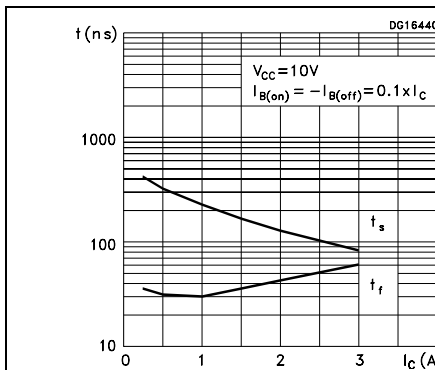
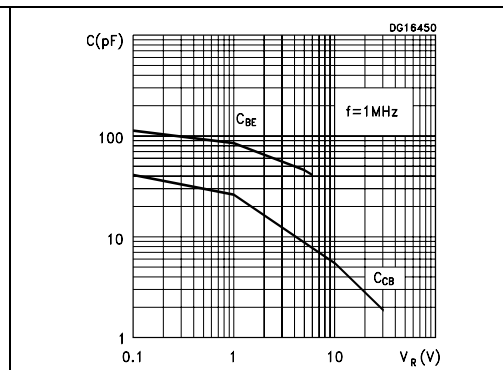


Figure 6. Capacitance

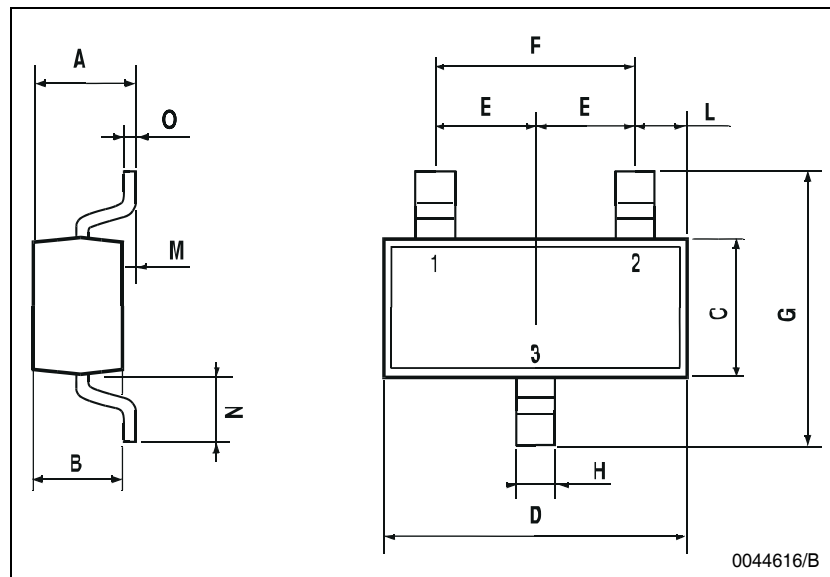


### 3 Package mechanical data

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-23 MECHANICAL DATA

DIM.	mm			mils		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	0.85		1.1	33.4		43.3
B	0.65		0.95	25.6		37.4
C	1.20		1.4	47.2		55.1
D	2.80		3	110.2		118
E	0.95		1.05	37.4		41.3
F	1.9		2.05	74.8		80.7
G	2.1		2.5	82.6		98.4
H	0.38		0.48	14.9		18.8
L	0.3		0.6	11.8		23.6
M	0		0.1	0		3.9
N	0.3		0.65	11.8		25.6
O	0.09		0.17	3.5		6.7



## 4 Revision history

**Table 4. Revision history**

<b>Date</b>	<b>Revision</b>	<b>Changes</b>
18-Jul-2006	1	Initial release
31-Oct-2006	2	New graphics
07-Nov-2006	3	Maturity changed from preliminary to full.



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