

## 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

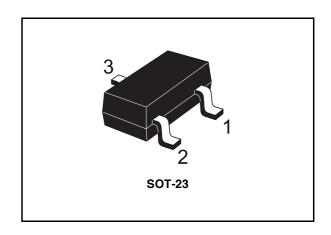
### **Description**

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.

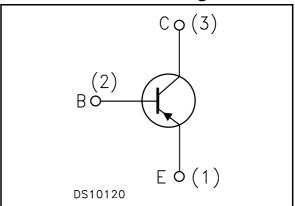
The complementary NPN is the 2STR1230.

### **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

## **Contents**

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2STR2230 Electrical ratings

# 1 Electrical ratings

Table 1. Absolute maximum rating

Symbol	Parameter	Value	Unit
V <sub>CES</sub>	Collector-emitter voltage (V <sub>CE</sub> = 0)	-30	V
V <sub>CEO</sub>	Collector-emitter voltage (I <sub>B</sub> = 0)	-30	V
V <sub>EBO</sub>	Emitter-base voltage (I <sub>C</sub> = 0)	-5	V
I <sub>C</sub>	Collector current	-1.5	Α
I <sub>CM</sub>	Collector peak current (t <sub>P</sub> < 5ms)	-3	Α
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 2. Thermal data

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

<sup>(1)</sup> Device mounted on PCB area of  $1\,\mathrm{cm}^2$ 

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Electrical characteristics 2STR2230

# 2 Electrical characteristics

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

Table 3. Electrical characteristics

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
I <sub>CBO</sub>	Collector cut-off current (I <sub>E</sub> =0)	V <sub>CB</sub> = -30V			-0.1	μА
I <sub>EBO</sub>	Emitter cut-off current (I <sub>C</sub> =0)	V <sub>EB</sub> = -4V			-0.1	μА
V <sub>(BR)CBO</sub>	Collector-base breakdown voltage (I <sub>E</sub> = 0)	I <sub>C</sub> = -100μA	-30			V
V <sub>(BR)CEO</sub> (2)	Collector-emitter breakdown voltage (I <sub>B</sub> = 0)	I <sub>C</sub> = -10mA	-30			V
V <sub>(BR)EBO</sub>	Emitter-base breakdown voltage (I <sub>C</sub> = 0)	I <sub>E</sub> = -100μA	-5			V
V (2)	0 11	$I_C = -0.1A$ $I_B = -1 mA$			-0.17	V
V <sub>CE(sat)</sub> (2)	Collector-emitter saturation voltage	$I_C = -1A$ $I_B = -100mA$		-0.25	-0.45	V
		$I_C = -2A$ $I_B = -200mA$		-0.42	-0.8	V
V <sub>BE(sat)</sub> (2)	Base-emitter saturation voltage	I <sub>C</sub> = -1A		-0.9	-1.25	V
		$I_C = -50 \text{mA}$ $V_{CE} = -2 \text{V}$	210			
h <sub>FF</sub> <sup>(2)</sup>	DC current gain	$I_C = -0.5A$ $V_{CE} = -2V$	170	280	560	
''FE`'		$I_C = -1A$ $V_{CE} = -2V$	100			
		$I_C = -1.5A$ $V_{CE} = -2V$	70			
f <sub>T</sub>	Transition frequency	I <sub>C</sub> = -0.1A V <sub>CE</sub> = -5V f = 100MHz	100			MHz
C <sub>CBO</sub>	Collector-base capacitance	$I_E = 0$ $V_{CB} = -10V$ $f = 1MHz$		10		pF
	Resistive load	I <sub>C</sub> = -1.5A V <sub>CC</sub> = -10V				
t <sub>on</sub>	Turn-on time	$I_{B1} = -I_{B2} = -150 \text{mA}$		74		ns
t <sub>off</sub>	Turn-off time	.p1 .B2 _ 1991		200		ns

Note (2) Pulsed duration = 300 μs, duty cycle ≤1.5%

## 2.1 Electrical characteristics (curves)

Figure 1. DC current gain

100

T<sub>J</sub>=-40°C

T<sub>J</sub>=125°C

V<sub>CE</sub>=2V

10

0.001 0.01 0.1 1 I<sub>C</sub> (A)

Figure 2. Collector-emitter saturation voltage

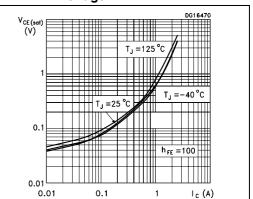
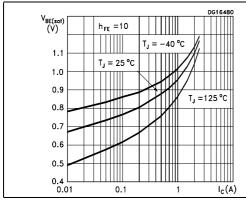


Figure 3. Base-emitter saturation voltage

Figure 4. Resistive load switching time



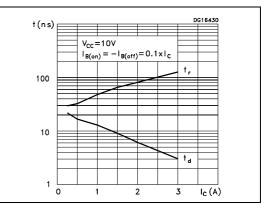
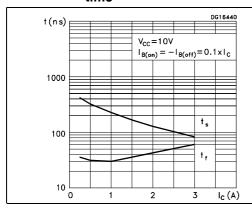
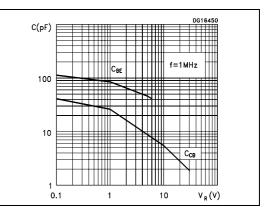


Figure 5. Resistive load switching time

Figure 6. Capacitance





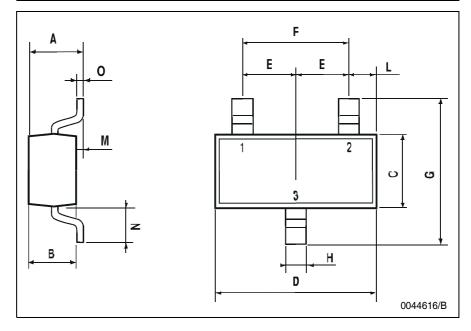
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# 3 Package mechanical data

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

#### **SOT-23 MECHANICAL DATA**

DIM.	mm			mils			
Diwi.	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
Α	0.85		1.1	33.4		43.3	
В	0.65		0.95	25.6		37.4	
С	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	
Н	0.38		0.48	14.9		18.8	
L	0.3		0.6	11.8		23.6	
М	0		0.1	0		3.9	
N	0.3		0.65	11.8		25.6	
0	0.09		0.17	3.5		6.7	



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Revision history 2STR2230

# 4 Revision history

Table 4. 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.	

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