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## 2STR1230

### Low voltage fast-switching NPN power transistor

#### 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
- DC-DC converter
- Voltage regulation

#### Description

The device is a 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 2STR2230.

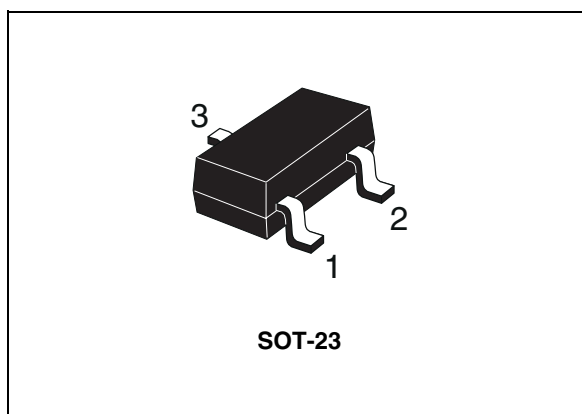


Figure 1. Internal schematic diagram

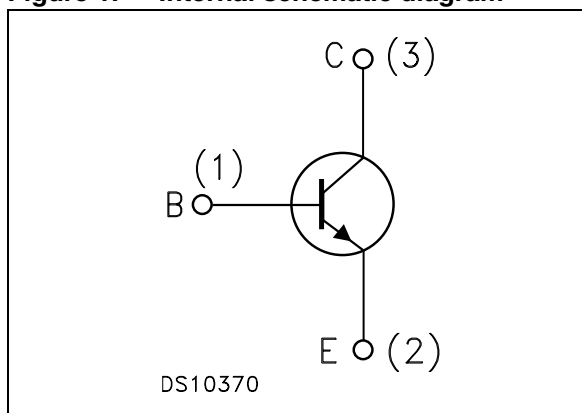


Table 1. Device summary

Order code <sup>(1)</sup>	Marking	Package	Packing
2STR1230	130	SOT-23	Tape and reel
2STR1230G	130G	SOT-23	Tape and reel

1. The letter "G" in the order code suffix identifies the product as ECOPACK®2 grade. Please see [Section 3](#) for details.

Electrical ratings

2STR1230

# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{CES}$	Collector-emitter voltage ( $V_{BE} = 0$ )	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 ( $t_P < 5$ ms)	3	A
$P_{tot}$	Total dissipation at $T_{amb} = 25$ °C	0.5	W
$T_{stg}$	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 cm<sup>2</sup>.

## 2 Electrical characteristics

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

**Table 4. Electrical characteristics**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{CBO}$	Collector cut-off current ( $I_E = 0$ )	$V_{CB} = 30\text{ V}$			0.1	$\mu\text{A}$
$I_{EBO}$	Emitter cut-off current ( $I_C = 0$ )	$V_{EB} = 4\text{ V}$			0.1	$\mu\text{A}$
$V_{(BR)CBO}$	Collector-base breakdown voltage ( $I_E = 0$ )	$I_C = 100\text{ }\mu\text{A}$	30			V
$V_{(BR)CEO}^{(1)}$	Collector-emitter breakdown voltage ( $I_B = 0$ )	$I_C = 10\text{ mA}$	30			V
$V_{(BR)EBO}$	Emitter-base breakdown voltage ( $I_C = 0$ )	$I_E = 100\text{ }\mu\text{A}$	5			V
$V_{CE(sat)}^{(1)}$	Collector-emitter saturation voltage	$I_C = 0.1\text{ A}$ $I_B = 1\text{ mA}$ $I_C = 1\text{ A}$ $I_B = 100\text{ mA}$ $I_C = 2\text{ A}$ $I_B = 200\text{ mA}$		0.2 0.4	0.15 0.5 0.85	V V V
$V_{BE(sat)}^{(1)}$	Base-emitter saturation voltage	$I_C = 1\text{ A}$ $I_B = 100\text{ mA}$			1.25	V
$h_{FE}^{(1)}$	DC current gain	$I_C = 50\text{ mA}$ $V_{CE} = 2\text{ V}$ $I_C = 0.5\text{ A}$ $V_{CE} = 2\text{ V}$ $I_C = 1\text{ A}$ $V_{CE} = 2\text{ V}$ $I_C = 2\text{ A}$ $V_{CE} = 2\text{ V}$	210 180 130 80	330	560	
$C_{CBO}$	Collector-base capacitance ( $I_E = 0$ )	$V_{CB} = 10\text{ V}$ , $f = 1\text{ MHz}$		5		pF
$t_{on}$ $t_{off}$	Resistive load Turn-on time Turn-off time	$I_C = 1.5\text{ A}$ $V_{CC} = 10\text{ V}$ $I_{B1} = - I_{B2} = 150\text{ mA}$		70 380		ns ns

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

Electrical characteristics

2STR1230

2.1 Electrical characteristics (curves)

Figure 2. DC current gain

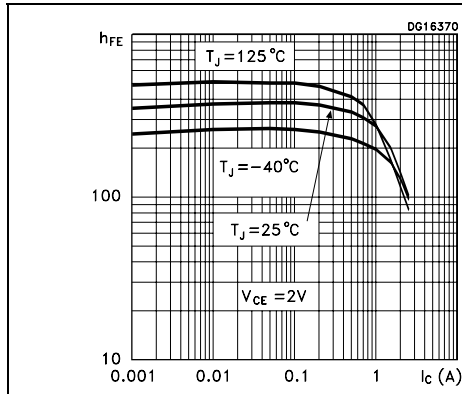


Figure 3. Collector-emitter saturation voltage

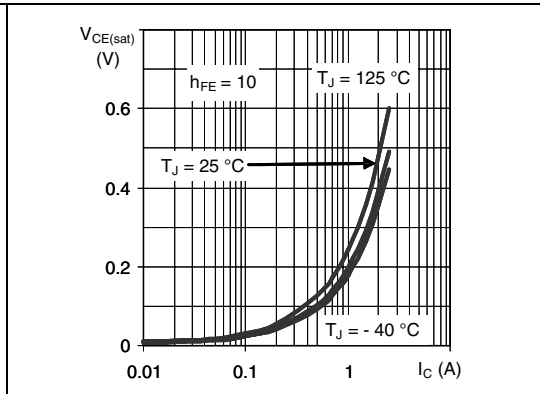


Figure 4. Base-emitter saturation voltage

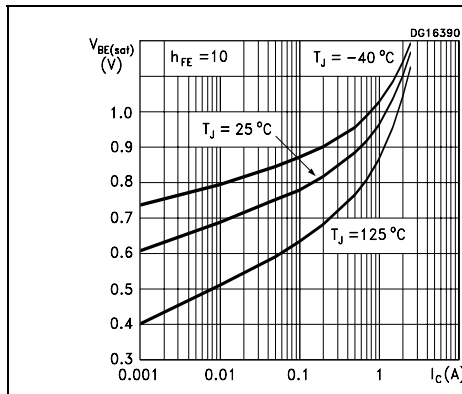


Figure 5. Resistive load switching on

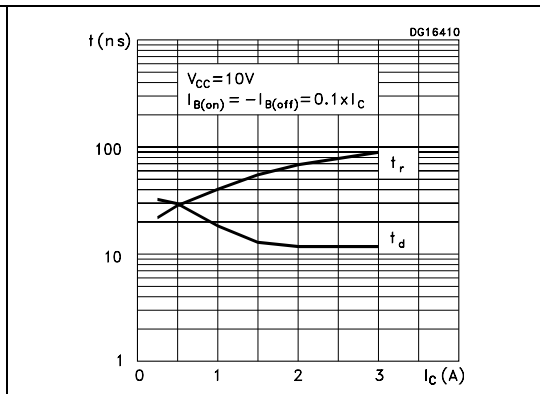


Figure 6. Resistive load switching off

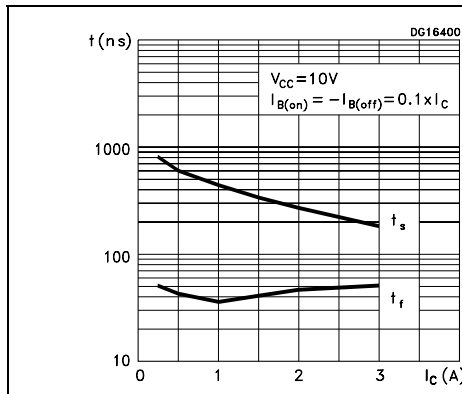
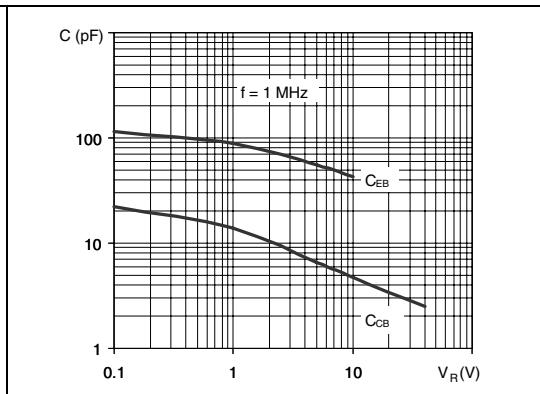
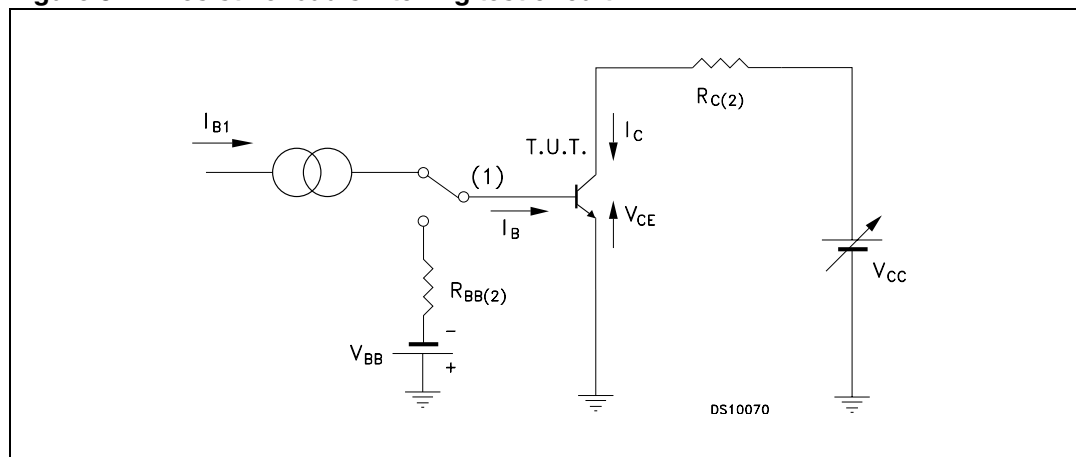


Figure 7. Capacitance



## 2.2 Test circuits

Figure 8. Resistive load switching test circuit



1. Fast electronic switch
2. Non-inductive resistor

### 3 Package mechanical data

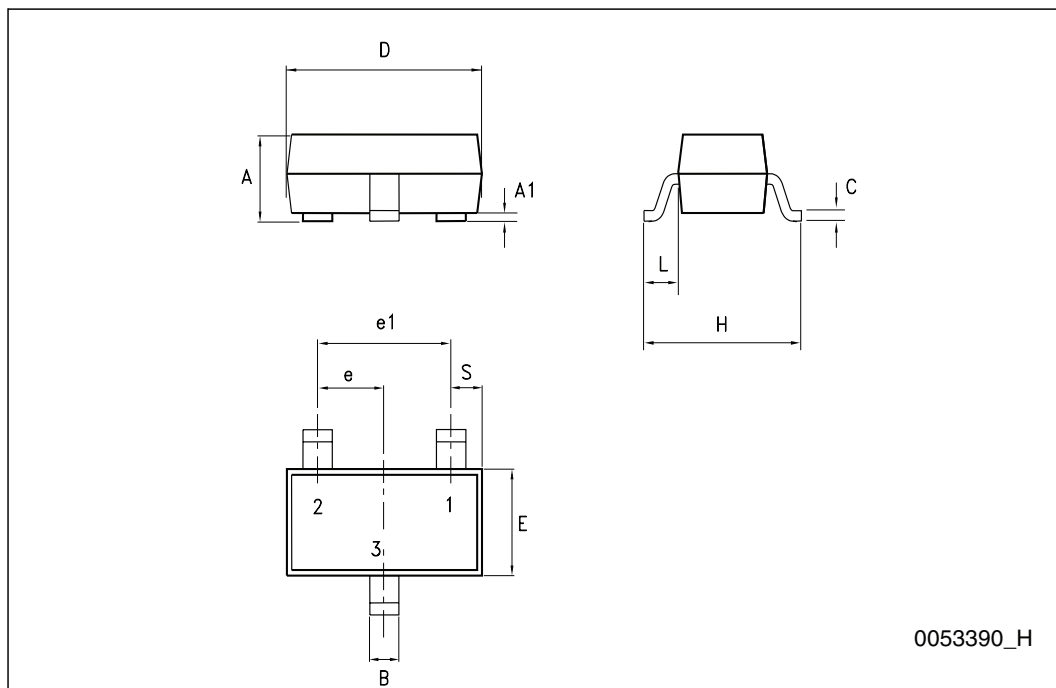
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK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

**2STR1230**

**Package mechanical data**

**SOT-23 mechanical data**

DIM.	mm.		
	min.	typ	max.
A	0.89		1.4
A1	0		0.1
B	0.3		0.51
C	0.085		0.18
D	2.75		3.04
e	0.85		1.05
e1	1.7		2.1
E	1.2		1.6
H	2.1		2.75
L		0.6	
S	0.35		0.65





## 4 Revision history

Table 5. Document revision history

Date	Revision	Changes
18-Jul-2006	1	Initial release
24-Oct-2006	2	New graphics
09-Oct-2009	3	Updated: <a href="#">Figure 3</a> , <a href="#">Figure 7</a> and package mechanical data.

## 2STR1230

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