

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

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 2STR2160.

Applications

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

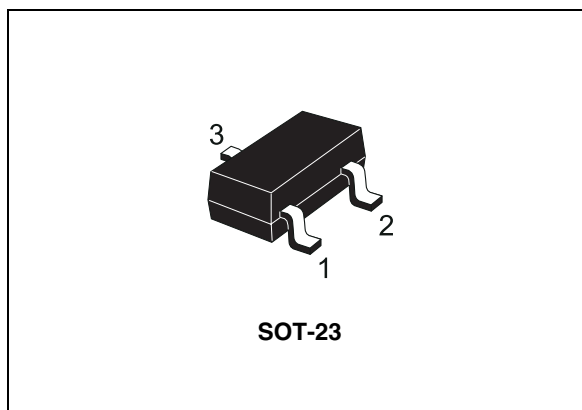


Figure 1. Internal schematic diagram

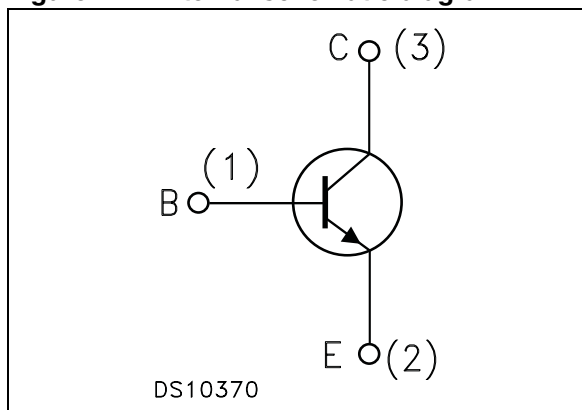


Table 1. Device summary

Order code	Marking	Package	Packing
2STR1160	160	SOT-23	Tape and reel

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1 Electrical ratings

Table 2. Absolute maximum rating

Symbol	Parameter	Value	Unit
V_{CBO}	Collector-base voltage ($I_E = 0$)	60	V
V_{CEO}	Collector-emitter voltage ($I_B = 0$)	60	V
V_{EBO}	Emitter-base voltage ($I_C = 0$)	5	V
I_C	Collector current	1	A
I_{CM}	Collector peak current ($t_P < 5\text{ms}$)	2	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 3. Thermal data

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

1. Device mounted on PCB area of 1 cm^2

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_{CBO}	Collector cut-off current ($I_{\text{E}} = 0$)	$V_{\text{CB}} = 60 \text{ V}$			0.1	μA
I_{EBO}	Emitter cut-off current ($I_{\text{C}} = 0$)	$V_{\text{EB}} = 5 \text{ V}$			0.1	μA
$V_{(\text{BR})\text{CBO}}$	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
$V_{\text{CE(sat)}}^{(1)}$	Collector-emitter saturation voltage	$I_{\text{C}} = 0.5 \text{ A}$ $I_{\text{B}} = 50 \text{ mA}$ $I_{\text{C}} = 1 \text{ A}$ $I_{\text{B}} = 100 \text{ mA}$		130 210	210 430	mV mV
$V_{\text{BE(sat)}}^{(1)}$	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	$I_{\text{C}} = 0.5 \text{ A}$ $V_{\text{CE}} = 2 \text{ V}$ $I_{\text{C}} = 1 \text{ A}$ $V_{\text{CE}} = 2 \text{ V}$ $I_{\text{C}} = 2 \text{ A}$ $V_{\text{CE}} = 2 \text{ V}$	180 85	250 130 30	560	
t_{on} t_{off}	Resistive load Turn-on time Turn-off time	$I_{\text{C}} = 1.5 \text{ A}$ $V_{\text{CC}} = 10 \text{ V}$ $I_{\text{B1}} = -I_{\text{B2}} = 150 \text{ mA}$ $V_{\text{BB(off)}} = -5 \text{ V}$		220 500		ns ns

1. Pulsed duration = 300 μs , duty cycle $\leq 5\%$

2.1 Typical characteristic (curves)

Figure 2. DC current gain (@ $V_{CE}=1\text{ V}$) Figure 3. DC current gain (@ $V_{CE}=2\text{ V}$)

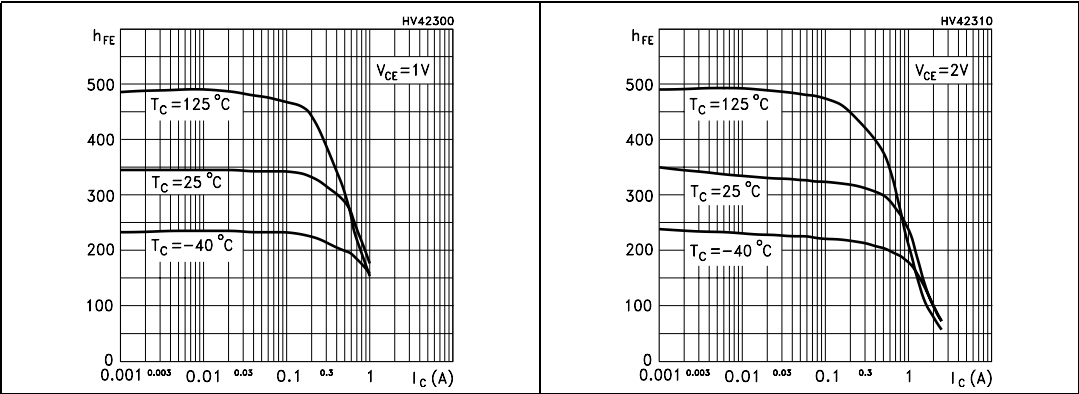


Figure 4. Base-emitter on voltage Figure 5. Base-emitter saturation voltage

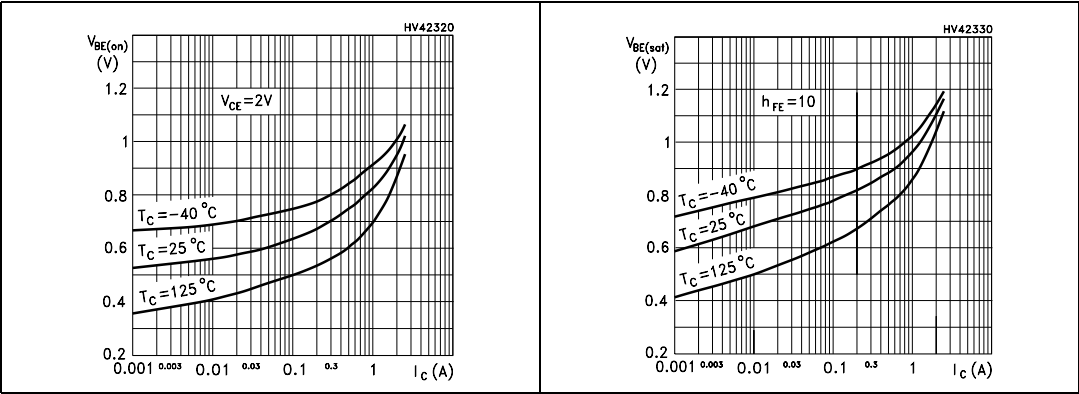


Figure 6. Collector-emitter saturation voltage Figure 7. Capacitance curves

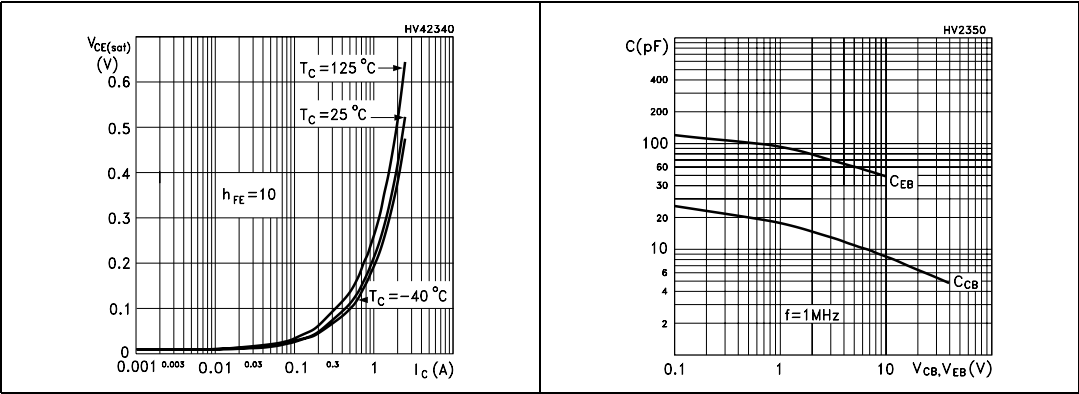
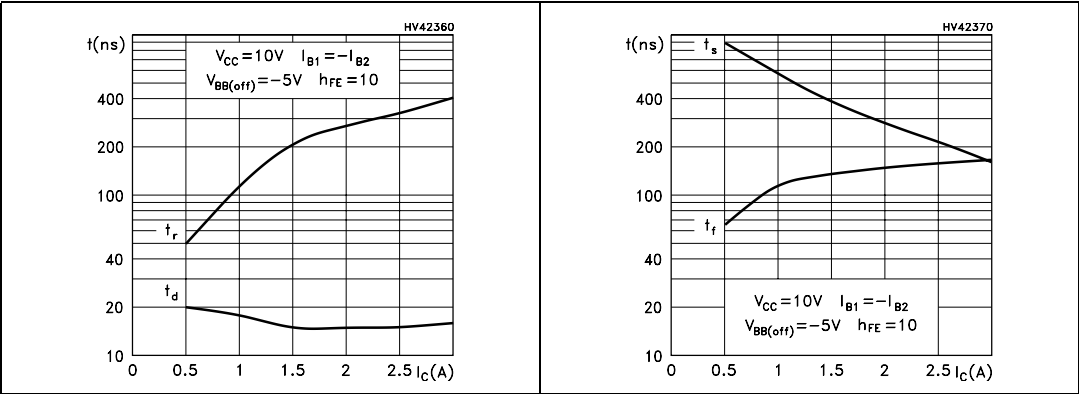


Figure 8. Resistive load switching time Figure 9. Resistive load switching time



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.		
	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

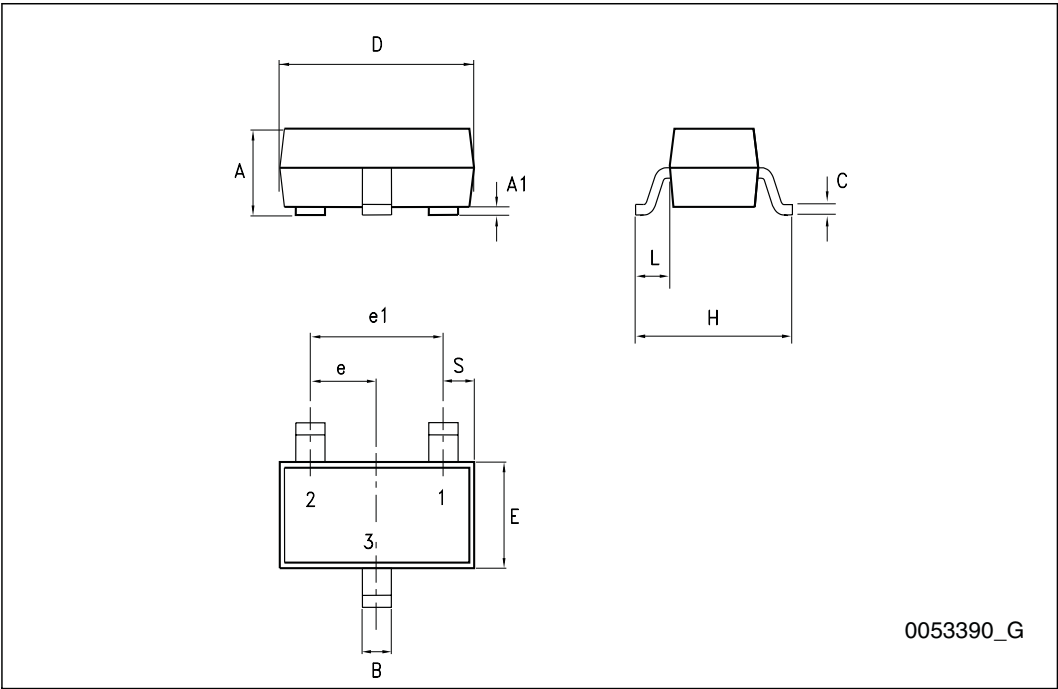
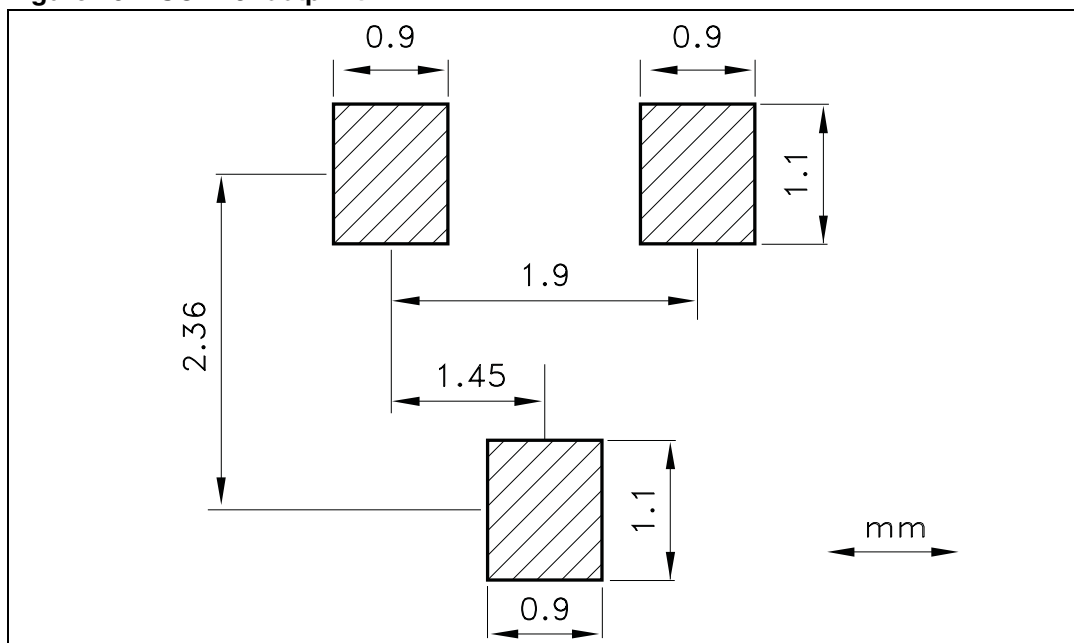


Figure 10. SOT-23 footprint



4 Revision history

Table 5. Document revision history

Date	Revision	Changes
12-Feb-2008	1	Initial release

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