

Low voltage fast-switching NPN power transistor

Datasheet - production data

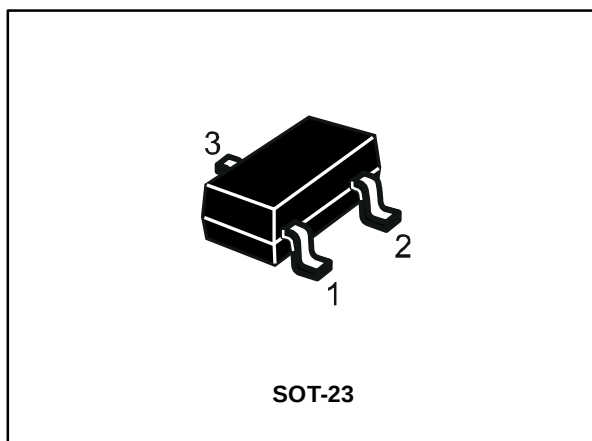
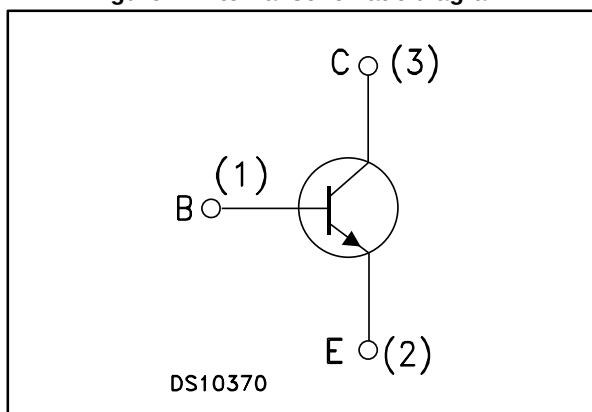


Figure 1: Internal schematic diagram



Features

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

Description

The device is an 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

Table 1: Device summary

Order code	Marking	Package	Packing
2STR1160	1160	SOT-23	Tape and reel

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°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 _{thj-amb} ⁽¹⁾	Thermal resistance junction-amb max	250	°C/ W

Notes:⁽¹⁾Device mounted on PCB area of 1 cm²

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
$V_{\text{CE(sat)}}$	Collector-emitter saturation voltage	$I_{\text{C}} = 0.5 \text{ A } I_{\text{B}} = 50 \text{ mA}$		130	210	mV
		$I_{\text{C}} = 1 \text{ A } I_{\text{B}} = 100 \text{ mA}$		210	430	mV
$V_{\text{BE(sat)}}$	Base-emitter saturation voltage	$I_{\text{C}} = 1 \text{ A } I_{\text{B}} = 100 \text{ mA}$		0.9	1.25	V
h_{FE}	DC current gain	$I_{\text{C}} = 0.5 \text{ A } V_{\text{CE}} = 2 \text{ V}$	180	250	560	
		$I_{\text{C}} = 1 \text{ A } V_{\text{CE}} = 2 \text{ V}$	85	130		
		$I_{\text{C}} = 2 \text{ A } V_{\text{CE}} = 2 \text{ V}$		30		
	Resistive load					
t_{on}	Turn-on time	$I_{\text{C}} = 1.5 \text{ A } V_{\text{CC}} = 10 \text{ V}$		220		ns
t_{off}	Turn-off time	$I_{\text{B1}} = -I_{\text{B2}} = 150 \text{ mA}$ $V_{\text{BB(off)}} = -5 \text{ V}$		500		ns

Notes:

⁽¹⁾Pulse test: pulse duration = 300 μs , duty cycle $\leq 1.5 \%$

2.1 Typical characteristic (curves)

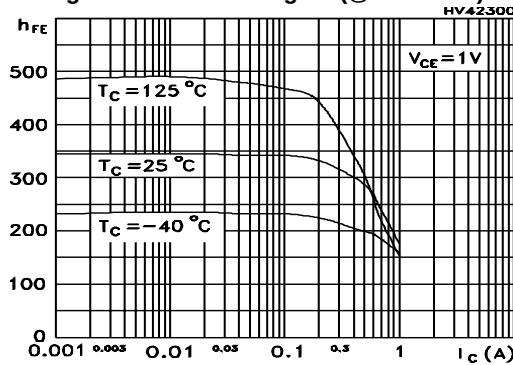
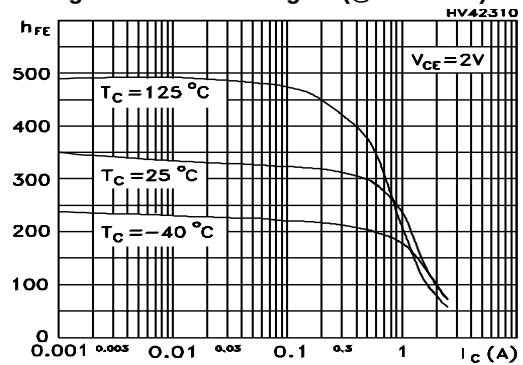
Figure 2: DC current gain (@ $V_{CE}=1\text{ V}$)Figure 3: DC current gain (@ $V_{CE}=2\text{ V}$)

Figure 4: Base-emitter on voltage

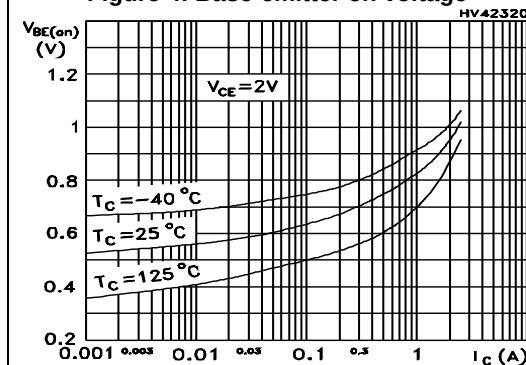


Figure 5: Base-emitter saturation voltage

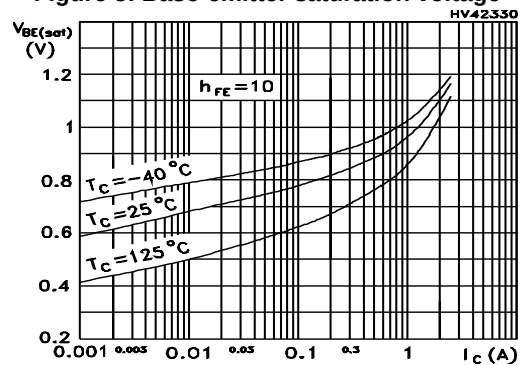


Figure 6: Collector-emitter saturation voltage

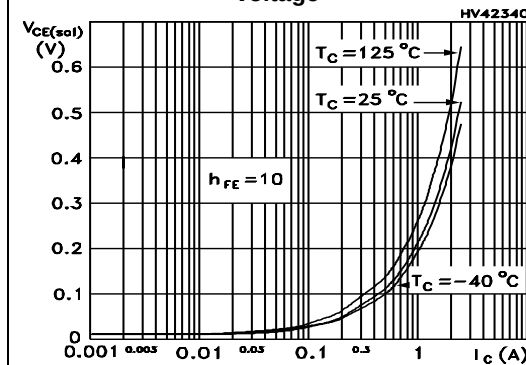
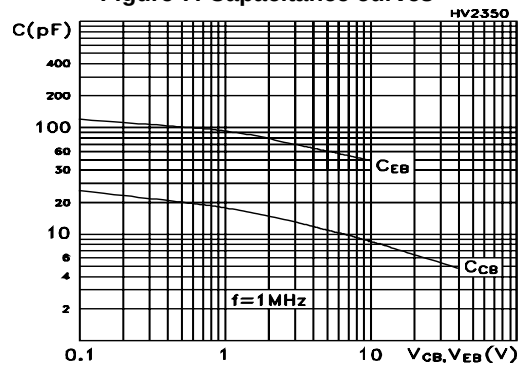
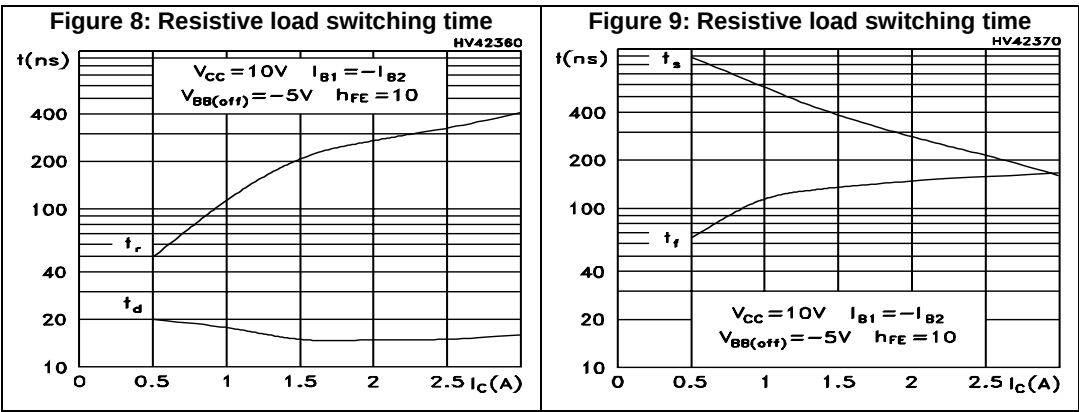


Figure 7: Capacitance curves





3 Package mechanical data

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3.1 SOT-23 mechanical data

Figure 10: SOT-23 mechanical drawing

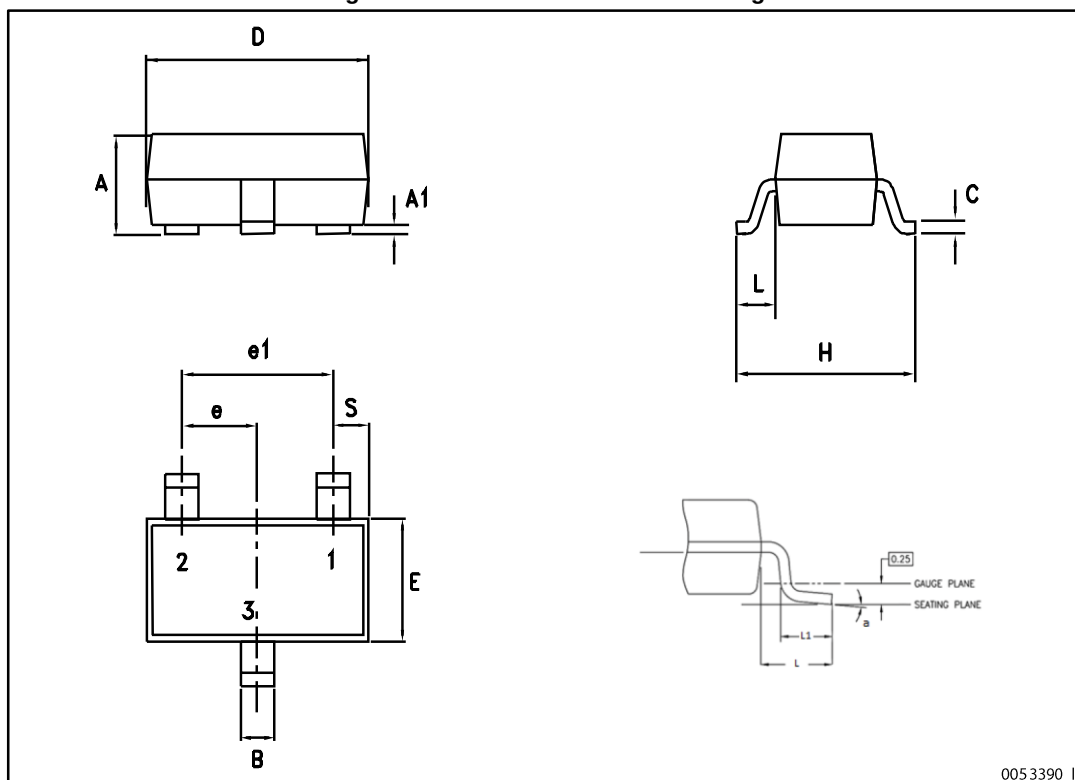
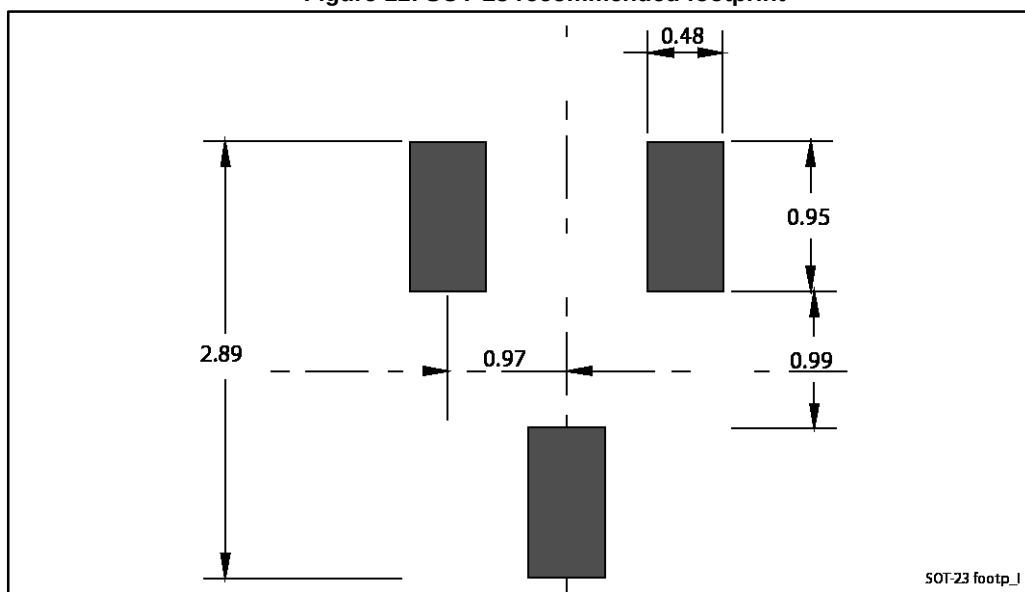


Table 5: SOT-23 mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	0.89		1.40
A1	0		0.10
B	0.30		0.51
C	0.085		0.18
D	2.75		3.04
e	0.85		1.05
e1	1.70		2.10
E	1.20		1.75
H	2.10		3.00
L		0.60	
S	0.35		0.65
L1	0.25		0.55
a	0°		8°

Figure 11: SOT-23 recommended footprint



Dimensions are in mm.

4 Revision history

Table 6: Document revision history

Date	Revision	Changes
12-Feb-2008	1	Initial release
08-May-2014	2	Updated Section 3: "Package mechanical data" .
01-Apr-2015	3	Updated marking in Table 1: "Device summary"

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