

Low voltage fast-switching NPN power transistor

Datasheet - production data

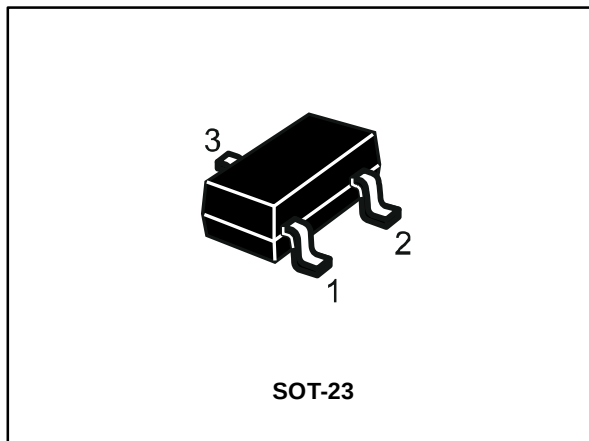
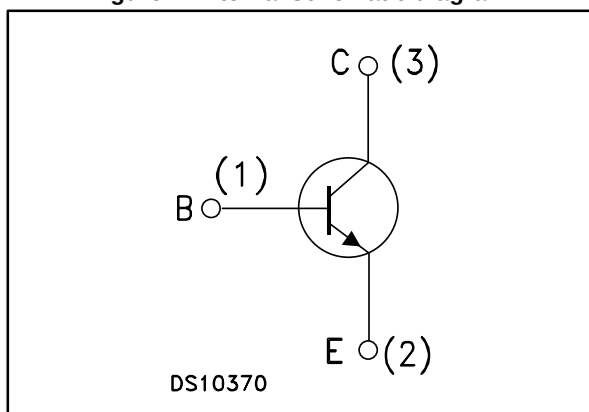


Figure 1: Internal schematic diagram



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_{case} = 25°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} = 60 V			0.1	μA
I _{EBO}	Emitter cut-off current (I _C = 0)	V _{EB} = 5 V			0.1	μA
V _{(BR)CBO}	Collector-base breakdown voltage (I _E = 0)	I _C = 100 μA	60			V
V _{(BR)CEO} ⁽¹⁾	Collector-emitter breakdown voltage (I _B = 0)	I _C = 10 mA	60			V
V _{(BR)EBO}	Emitter-base breakdown voltage (I _C = 0)	I _E = 100 μA	5			V
V _{CE(sat)}	Collector-emitter saturation voltage	I _C = 0.5 A I _B = 50 mA		130	210	mV
		I _C = 1 A I _B = 100 mA		210	430	mV
V _{BE(sat)}	Base-emitter saturation voltage	I _C = 1 A I _B = 100 mA		0.9	1.25	V
h _{FE}	DC current gain	I _C = 0.5 A V _{CE} = 2V	180	250	560	
		I _C = 1 A V _{CE} = 2V	85	130		
		I _C = 2 A V _{CE} = 2V		30		
	Resistive load					
t _{on}	Turn-on time	I _C = 1.5 A V _{CC} = 10 V		220		ns
t _{off}	Turn-off time	I _{B1} = -I _{B2} = 150 mA V _{BB(off)} = -5 V		500		ns

Notes:

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

2.1 Typical characteristic (curves)

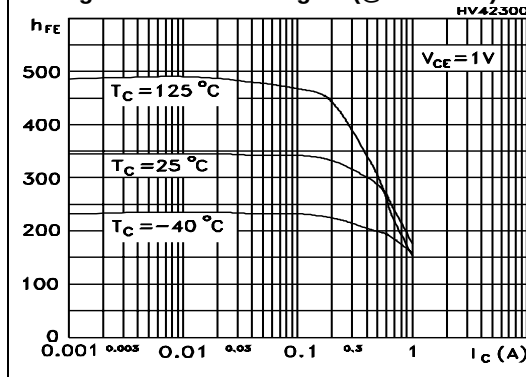
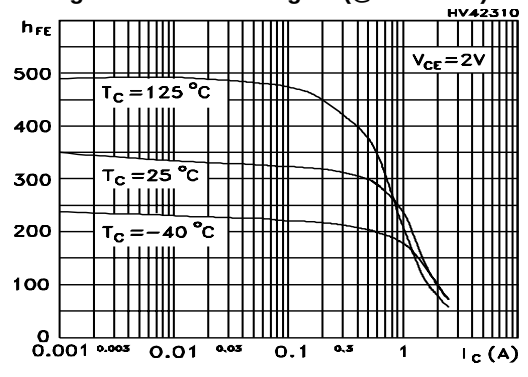
Figure 2: DC current gain (@ $V_{CE}=1\text{ V}$)Figure 3: DC current gain (@ $V_{CE}=2\text{ V}$)

Figure 4: Base-emitter on voltage

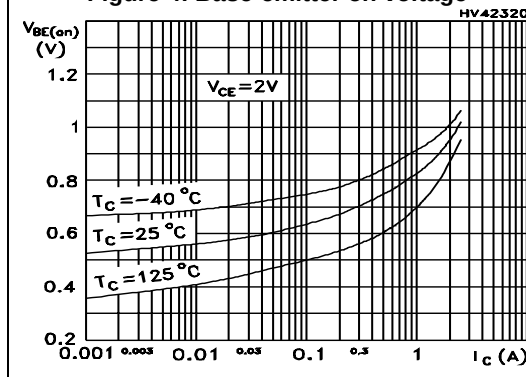


Figure 5: Base-emitter saturation voltage

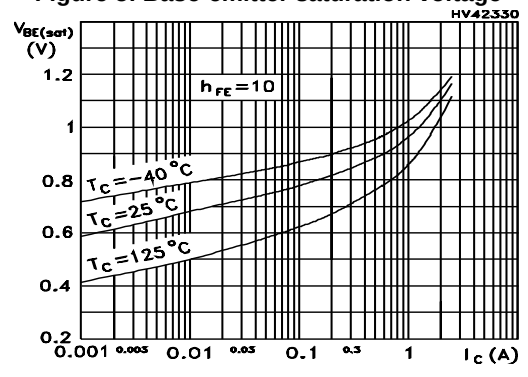


Figure 6: Collector-emitter saturation voltage

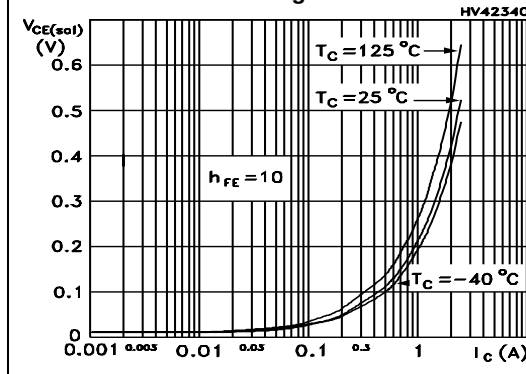
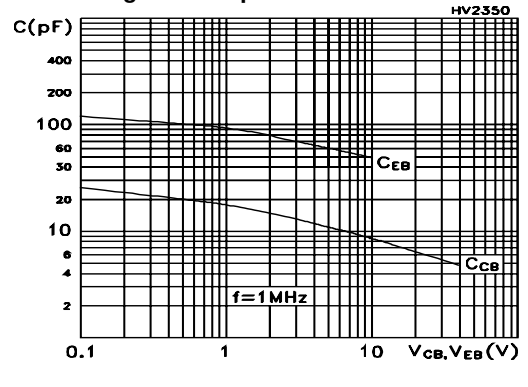
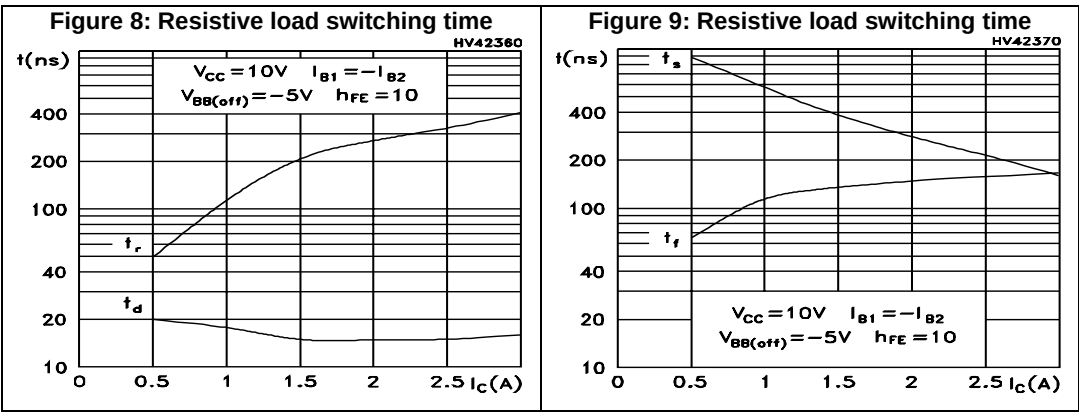


Figure 7: Capacitance curves





3 Package mechanical data

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3.1 SOT-23 mechanical data

Figure 10: SOT-23 mechanical drawing

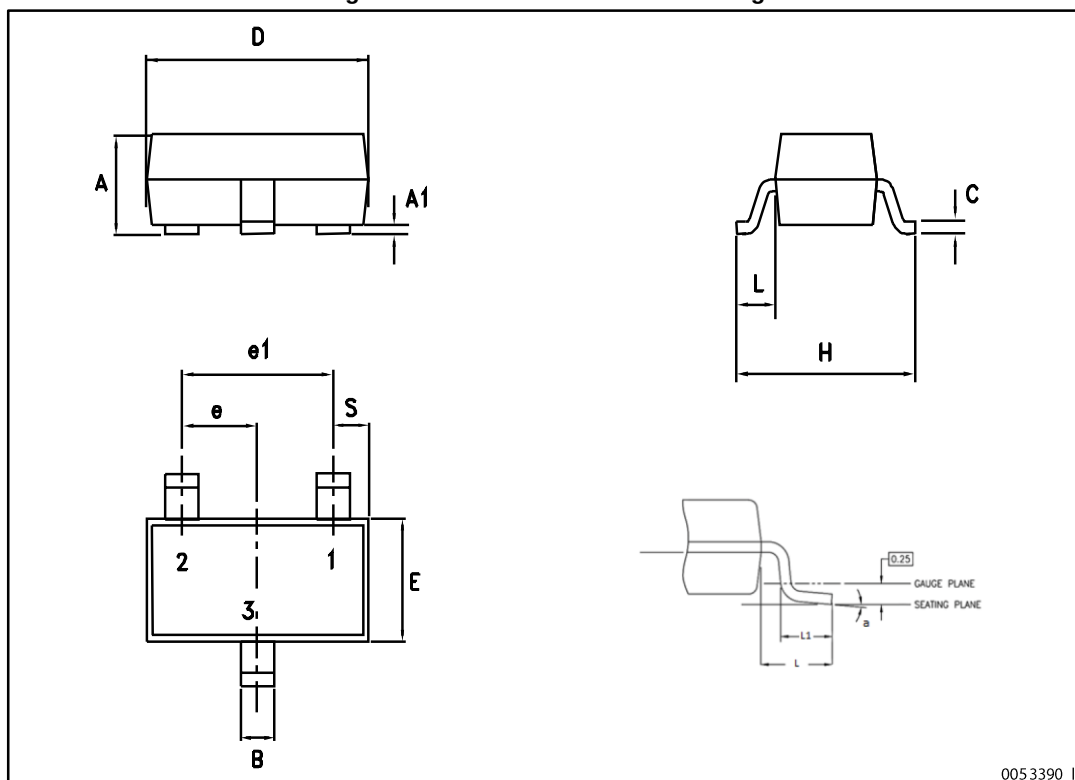
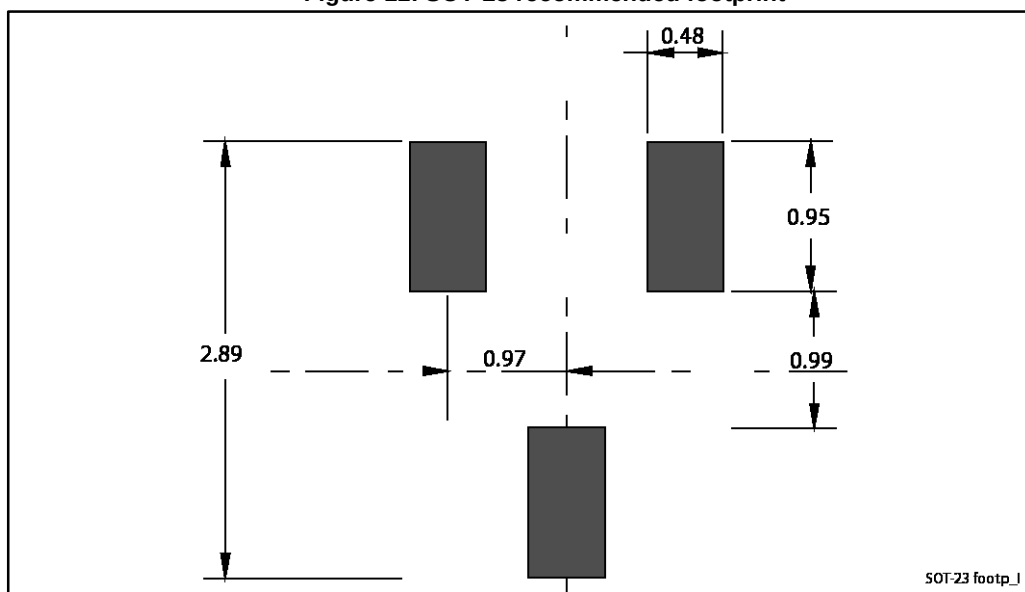


Table 5: SOT-23 mechanical data

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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