2STR1160

Low voltage fast-switching NPN power transistor

Datasheet - production data

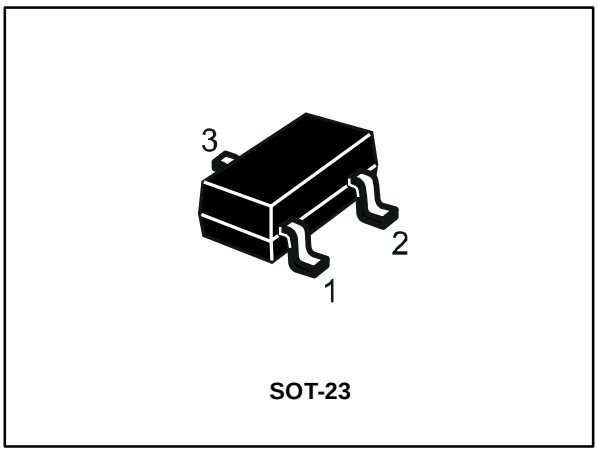
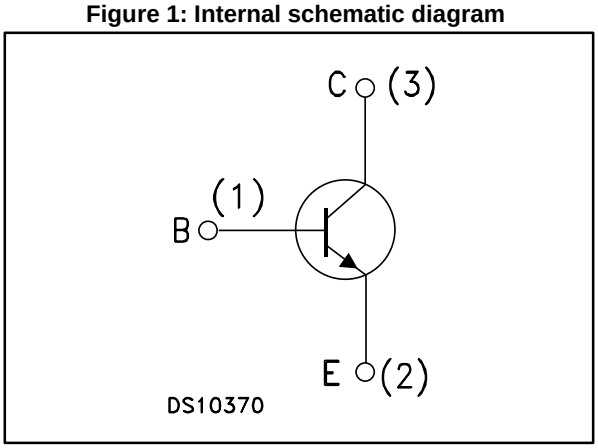


Figure 1: Internal schematic diagram



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 in 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

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 < 5ms)	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
$R_{thj\text{-}amb}$ (1)	Thermal resistance junction-amb max	250	°C/W

Notes:

(1)Device mounted on PCB area of 1 cm^2

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 I_{B1} = -I_{B2} = 150 mA $V_{BB(off)}$= -5 V		220		ns
t_{off}	Turn-off time			500		ns

Notes:

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

2.1 Typical characteristic (curves)

Figure 2: DC current gain (@ VCE=1 V)

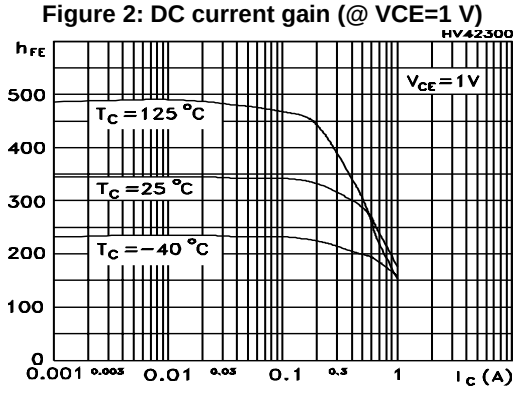


Figure 3: DC current gain (@ VCE=2 V)

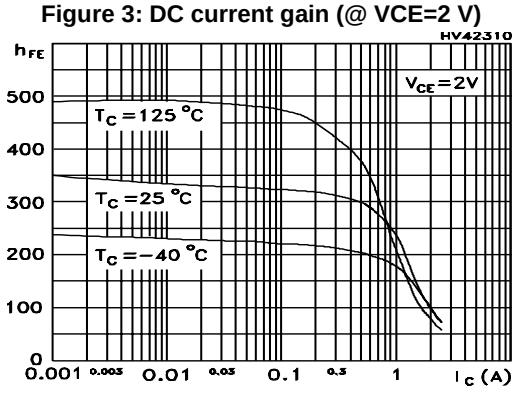


Figure 4: Base-emitter on voltage

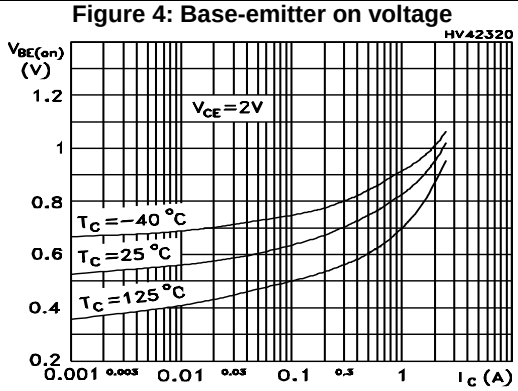


Figure 5: Base-emitter saturation voltage

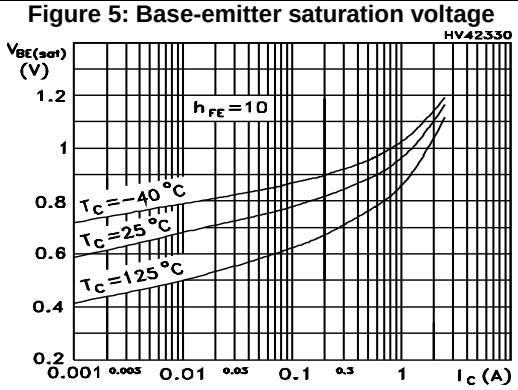


Figure 6: Collector-emitter saturation voltage

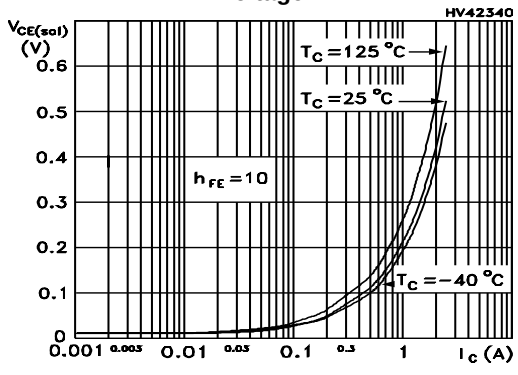


Figure 7: Capacitance curves

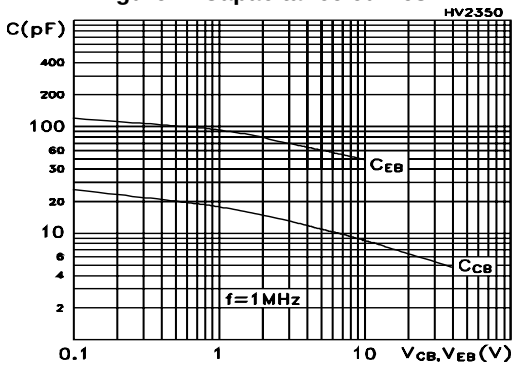


Figure 8: Resistive load switching time

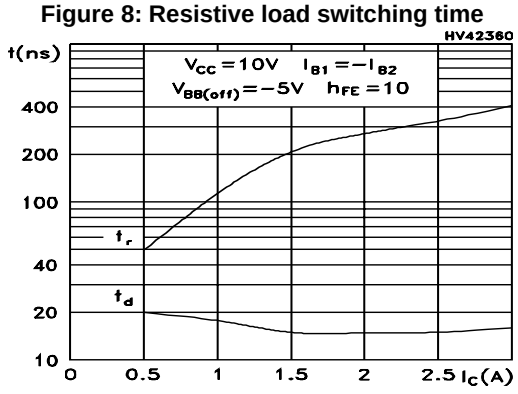
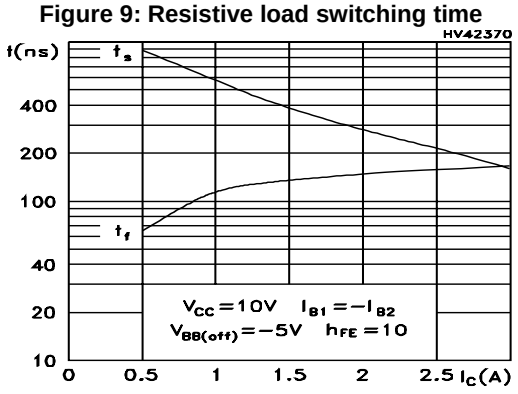


Figure 9: Resistive load switching time



3 Package mechanical data

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

3.1 SOT-23 mechanical data

Figure 10: SOT-23 mechanical drawing

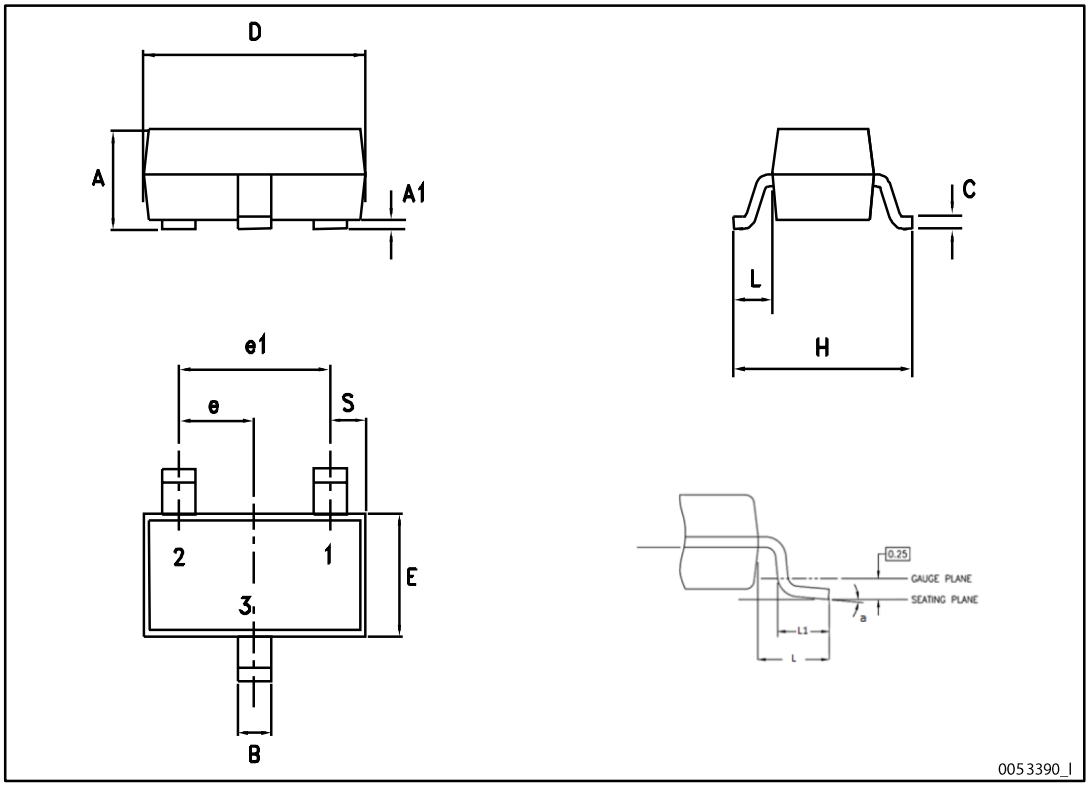
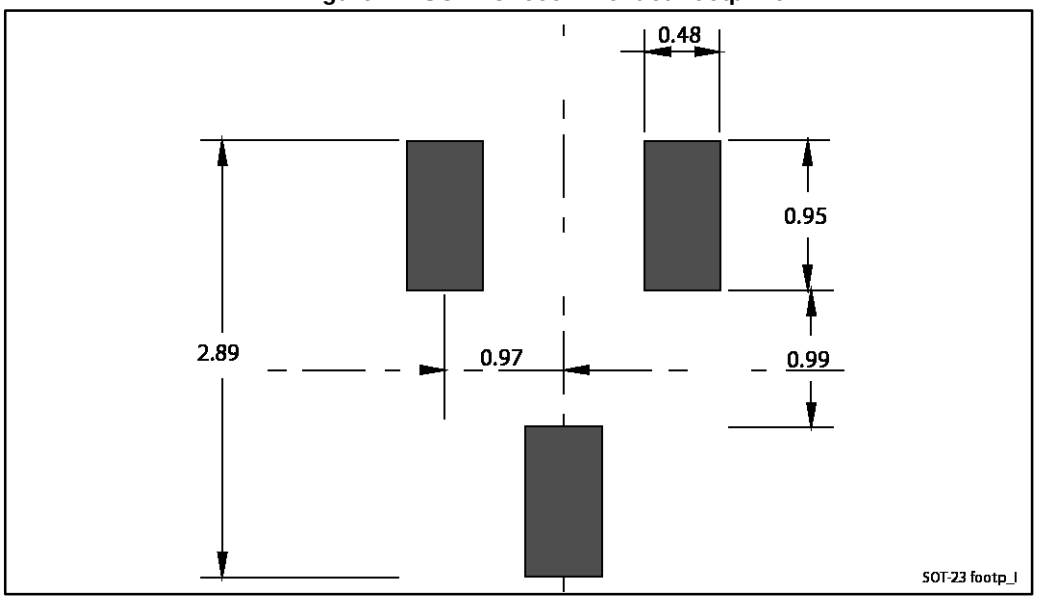


Table 5: SOT-23 mechanical data

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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