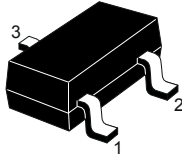
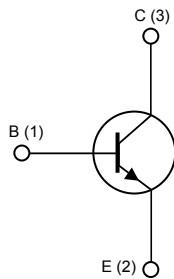


Low voltage fast-switching NPN power transistor


SOT-23


NPNB1C3E2

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
- Battery charger
- Motor and relay driver
- Voltage regulation

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.



Product status link

[2STR1160](#)

Product summary

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

1 Electrical ratings

Table 1. Absolute maximum rating

Symbol	Parameter	Value	Unit
V_{EBO}	Emitter-base voltage ($I_C = 0$ A)	5	V
V_{CBO}	Collector-base voltage ($I_E = 0$ A)	60	V
V_{CEO}	Collector-emitter voltage ($I_B = 0$ A)	60	V
I_C	Collector current	1	A
I_{CM}	Collector peak current ($t_p < 5$ ms)	2	A
P_{TOT}	Total power dissipation at $T_A = 25$ °C	500	mW
T_{stg}	Storage temperature range	-65 to 150	°C
T_J	Maximum operating junction temperature	150	°C

Table 2. Thermal data

Symbol	Parameter	Value	Unit
$R_{thJA}^{(1)}$	Thermal resistance, junction-to-ambient	250	°C/W

1. Device mounted on a PCB area of 1 cm².

2 Electrical characteristics

$T_C = 25\text{ °C}$ unless otherwise specified.

Table 3. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CBO}	Collector cut-off current	$V_{CB} = 60\text{ V}$, $I_E = 0\text{ A}$			0.1	μA
I_{EBO}	Emitter cut-off current	$V_{EB} = 5\text{ V}$, $I_C = 0\text{ A}$			0.1	μA
$V_{(BR)CBO}$	Collector-base breakdown voltage	$I_C = 100\text{ }\mu\text{A}$, $I_E = 0\text{ A}$	60			V
$V_{(BR)CEO}^{(1)}$	Collector-emitter breakdown voltage	$I_B = 0\text{ A}$, $I_C = 10\text{ mA}$	60			V
$V_{(BR)EBO}$	Emitter-base breakdown voltage	$I_C = 0\text{ A}$, $I_E = 100\text{ }\mu\text{A}$	5			V
$V_{CE(sat)}$	Collector-emitter saturation voltage	$I_C = 0.5\text{ A}$, $I_B = 50\text{ mA}$		130	120	mV
		$I_C = 1\text{ A}$, $I_B = 100\text{ mA}$		210	430	
$V_{BE(sat)}$	Base-emitter saturation voltage	$I_C = 1\text{ A}$, $I_B = 100\text{ mA}$		0.9	1.25	V
h_{FE}	DC current gain	$I_C = 0.5\text{ A}$, $V_{CE} = 2\text{ V}$	180	250	560	
		$I_C = 1\text{ A}$, $V_{CE} = 2\text{ V}$	85	130		
		$I_C = 2\text{ A}$, $V_{CE} = 2\text{ V}$		30		
	Resistive load					
t_{on}	Turn-on time	$I_C = 1.5\text{ A}$, $V_{CC} = 10\text{ V}$,		220		ns
t_{off}	Turn-off time	$I_{B1} = -I_{B2} = 150\text{ mA}$, $V_{BB(off)} = -5\text{ V}$		500		ns

1. Pulsed: Pulse duration = 300 μs , duty cycle $\leq 2\%$.

2.1 Electrical characteristics (curves)

Figure 1. DC current gain at $V_{CE} = 1\text{ V}$

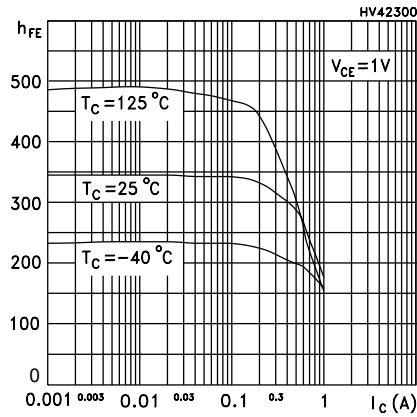


Figure 2. DC current gain at $V_{CE} = 2\text{ V}$

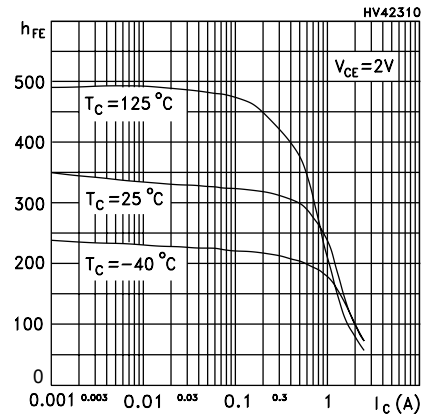


Figure 3. Collector-emitter saturation voltage at $h_{FE} = 10$

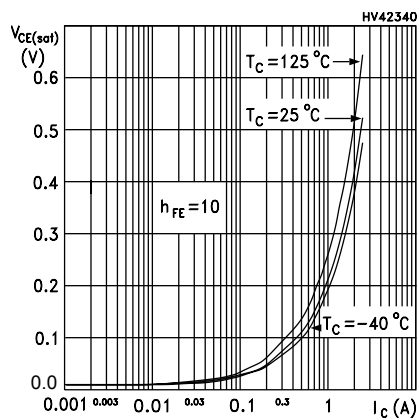


Figure 4. Typical capacitance characteristics

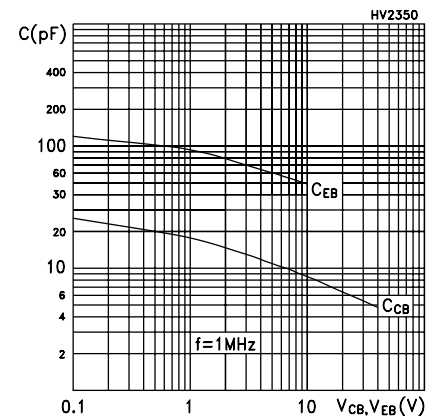


Figure 5. Base-emitter on voltage at $V_{CE} = 2\text{ V}$

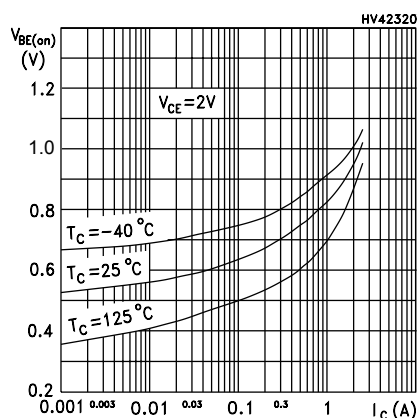


Figure 6. Base-emitter saturation voltage at $h_{FE} = 10$

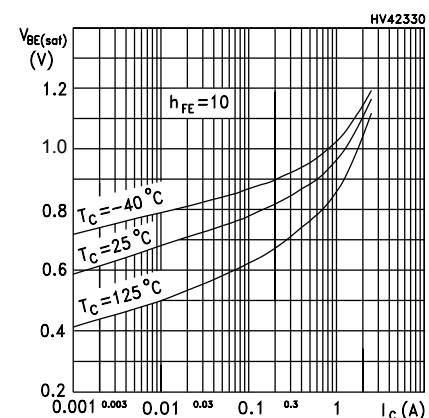


Figure 7. Resistive load switching on time

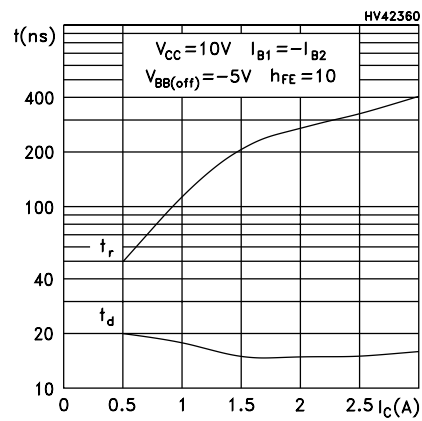
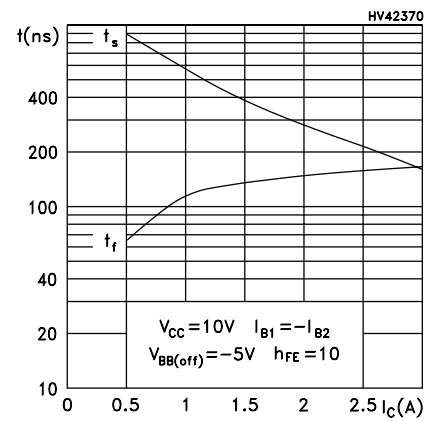


Figure 8. Resistive load switching off time

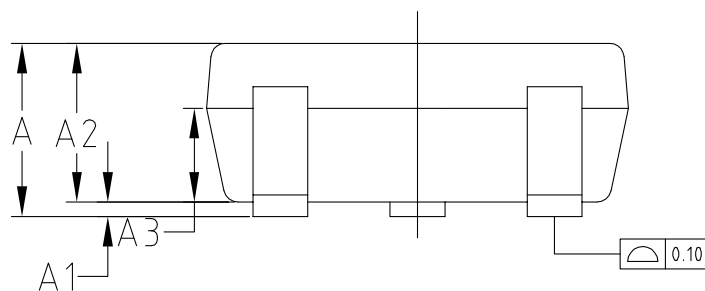
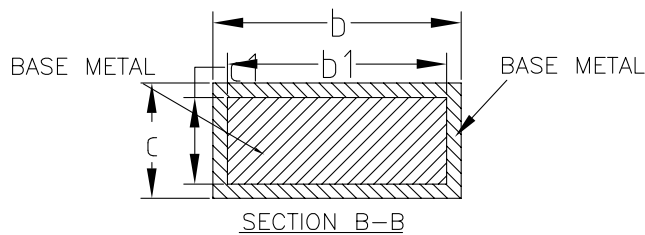
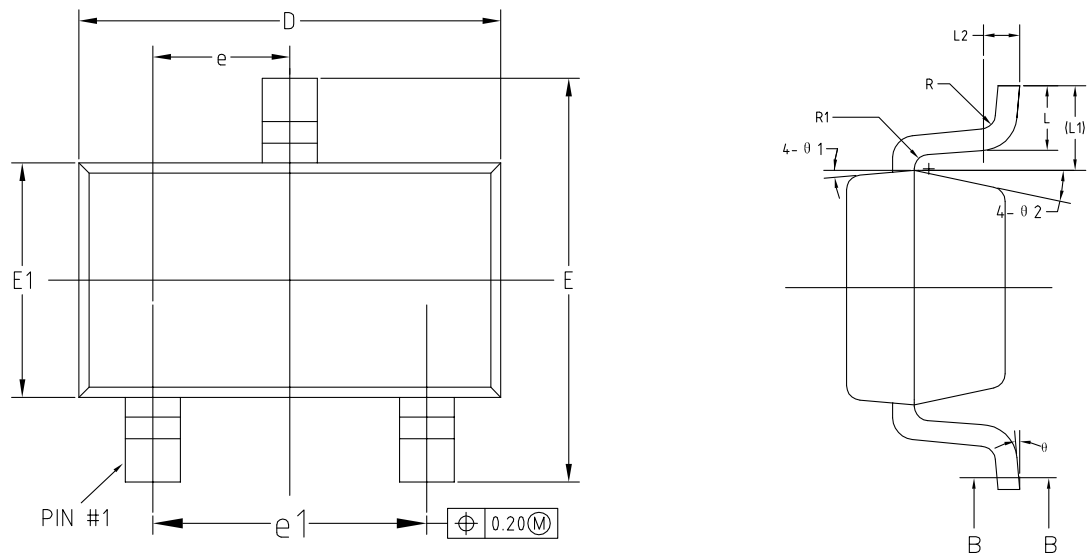


3 Package information

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 package information

Figure 9. SOT-23 package outline (dimensions are in mm)

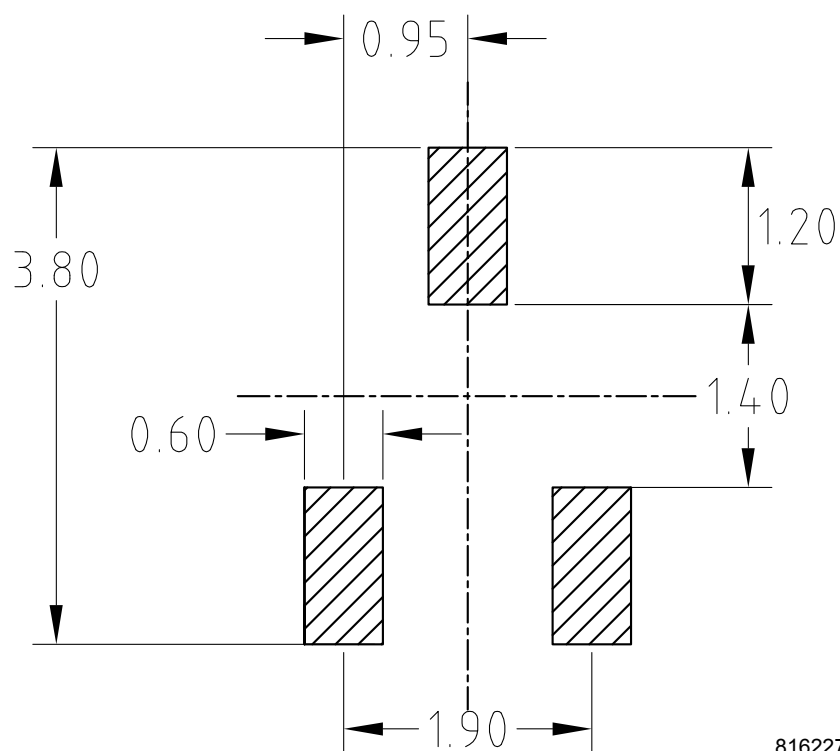


8162275_REV3

Table 4. SOT-23 package mechanical data

Ref.	mm		
	Min.	Typ.	Max.
A			1.25
A1	0		0.15
A2	1	1.10	1.20
A3	0.60	0.65	0.70
b	0.36		0.50
b1	0.36	0.38	0.45
c	0.14		0.20
c1	0.14	0.15	0.16
D	2.826	2.926	3.026
E	2.60	2.80	3.00
E1	1.526	1.626	1.726
e	0.90	0.95	1.00
e1	1.80	1.90	2.00
L	0.35	0.45	0.60
L1	0.59 REF		
L2	0.25 BSC		
R	0.05		
R1	0.05		
θ	0°		8°
θ1	3°	5°	7°
θ2	6°		14°

Figure 10. SOT-23 recommended footprint (dimensions in mm)



8162275_footprint_REV3

Revision history

Table 5. Document revision history

Date	Revision	Changes
12-Feb-2008	1	Initial release.
08-May-2014	2	Updated <i>Section 3: "Package mechanical data"</i> .
01-Apr-2015	3	Updated marking in <i>Table 1: "Device summary"</i>
19-Feb-2025	4	Updated Section 3.1: SOT-23 package information . Minor text changes.

Contents

1	Electrical ratings	2
2	Electrical characteristics	3
2.1	Electrical characteristics (curves)	4
3	Package information	6
3.1	SOT-23 package information	6
	Revision history	9

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