

Low voltage high performance NPN power transistor

Features

- Very low collector-emitter saturation voltage
- High current gain characteristic
- Fast switching speed
- Miniature SOT-23 plastic package
ECOPACK[®]2 grade for surface mounting circuits

Applications

- Strobe and LED drives
- Motor and relay drives
- DC-DC converters

Description

This device is an NPN transistor manufactured using low voltage planar technology with a double-metal process.

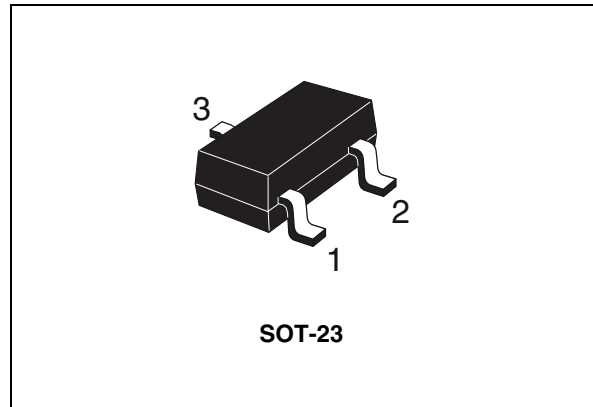


Figure 1. Internal schematic diagram

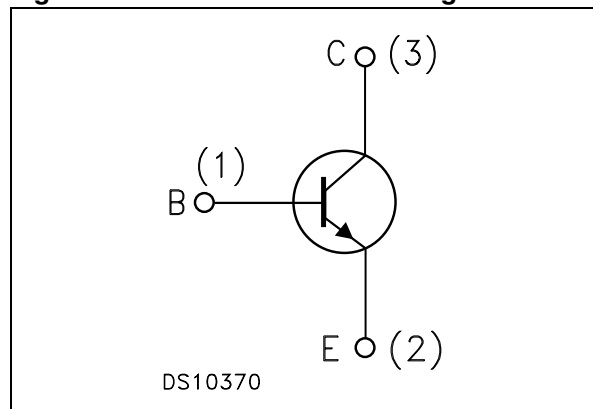


Table 1. Device summary

Order code	Marking	Package	Packing
3STR1630	1630	SOT-23	Tape and reel

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CES}	Collector-emitter voltage ($V_{BE} = 0$)	30	V
V_{CEO}	Collector-emitter voltage ($I_B = 0$)	30	V
V_{EBO}	Emitter-base voltage ($I_C = 0$)	5	V
I_C	Collector current	6	A
I_{CM}	Collector peak current ($t_p < 5$ ms)	12	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
$R_{thJA}^{(1)}$	Thermal resistance junction-ambient max	250	°C/W

1. Device mounted on PCB area of 1 cm².

2 Electrical characteristics

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

Table 4. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CBO}	Collector cut-off current ($I_{\text{E}} = 0$)	$V_{\text{CB}} = 30\text{ V}$			0.1	μA
I_{EBO}	Emitter cut-off current ($I_{\text{C}} = 0$)	$V_{\text{EB}} = 4\text{ V}$			0.1	μA
$V_{(\text{BR})\text{CBO}}$	Collector-base breakdown voltage ($I_{\text{E}} = 0$)	$I_{\text{C}} = 100\ \mu\text{A}$	30			V
$V_{(\text{BR})\text{CEO}}^{(1)}$	Collector-emitter breakdown voltage ($I_{\text{B}} = 0$)	$I_{\text{C}} = 10\text{ mA}$	30			V
$V_{(\text{BR})\text{EBO}}$	Emitter-base breakdown voltage ($I_{\text{C}} = 0$)	$I_{\text{E}} = 100\ \mu\text{A}$	5			V
$V_{\text{CE}(\text{sat})}^{(1)}$	Collector-emitter saturation voltage	$I_{\text{C}} = 1\text{ A}$ $I_{\text{B}} = 100\text{ mA}$ $I_{\text{C}} = 2\text{ A}$ $I_{\text{B}} = 40\text{ mA}$ $I_{\text{C}} = 5\text{ A}$ $I_{\text{B}} = 500\text{ mA}$		60 140 240	90 190 300	mV mV mV
$V_{\text{BE}(\text{sat})}^{(1)}$	Base-emitter saturation voltage	$I_{\text{C}} = 2\text{ A}$ $I_{\text{B}} = 40\text{ mA}$ $I_{\text{C}} = 5\text{ A}$ $I_{\text{B}} = 500\text{ mA}$		830 1000	1100	mV mV
$h_{\text{FE}}^{(1)}$	DC current gain	$I_{\text{C}} = 50\text{ mA}$ $V_{\text{CE}} = 2\text{ V}$ $I_{\text{C}} = 0.5\text{ A}$ $V_{\text{CE}} = 2\text{ V}$ $I_{\text{C}} = 2\text{ A}$ $V_{\text{CE}} = 2\text{ V}$ $I_{\text{C}} = 5\text{ A}$ $V_{\text{CE}} = 2\text{ V}$	210 180 170	260 90	560	
f_{t}	Transition frequency	$I_{\text{C}} = 0.1\text{ A}$ $V_{\text{CE}} = 10\text{ V}$		100		MHz
C_{CBO}	Collector-base capacitance ($I_{\text{E}} = 0$)	$V_{\text{CB}} = 40\text{ V}$, $f = 1\text{ MHz}$		15		pF
t_{on} t_{off}	Resistive load Turn-on time Turn-off time	$I_{\text{C}} = 2.5\text{ A}$ $V_{\text{CC}} = 12\text{ V}$ $I_{\text{B}1} = - I_{\text{B}2} = 125\text{ mA}$ $V_{\text{BE}(\text{off})} = -5\text{ V}$		90 450		ns ns

1. Pulse test: pulse duration $\leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$

2.1 Electrical characteristics (curves)

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

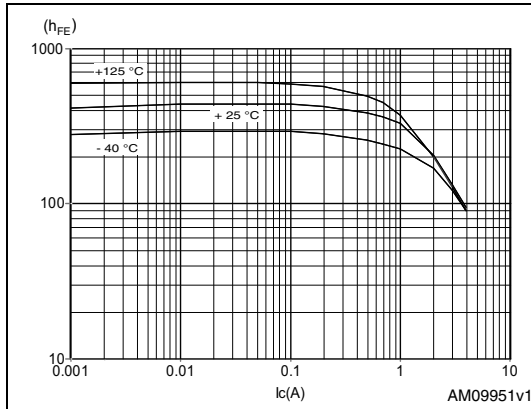


Figure 3. DC current gain ($V_{CE}=2\text{ V}$)

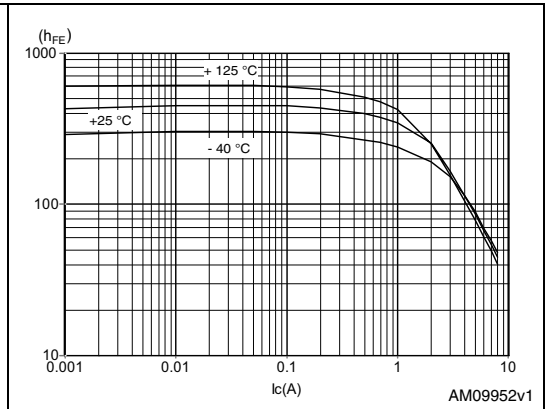


Figure 4. Collector-emitter saturation voltage (V_{CEsat} @ $h_{FE}=10$)

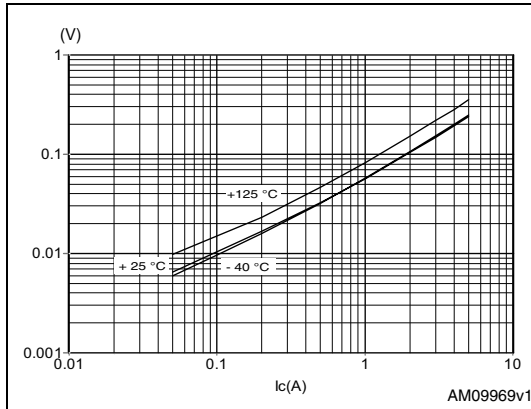


Figure 5. Collector-emitter saturation voltage (V_{CEsat} @ $h_{FE}=50$)

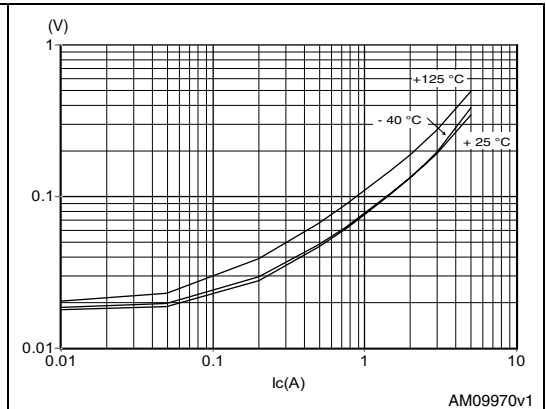


Figure 6. Base-emitter saturation voltage (V_{BEsat} @ $h_{FE}=10$)

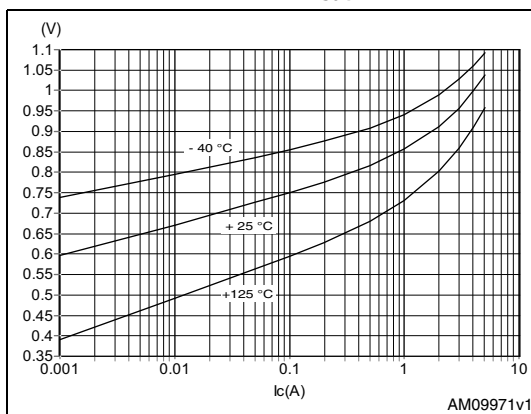


Figure 7. Base-emitter saturation voltage (V_{BEsat} @ $h_{FE}=50$)

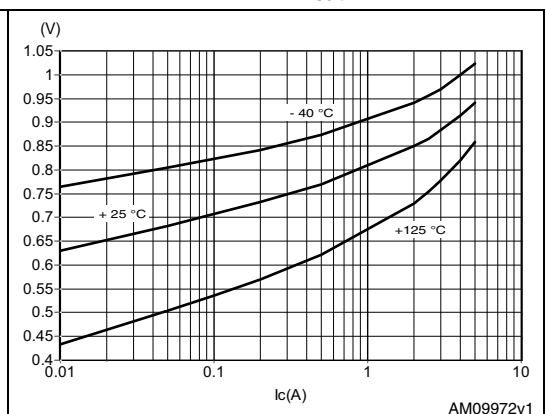


Figure 8. Resistive load switching time (ON) **Figure 9. Resistive load switching time (OFF)**

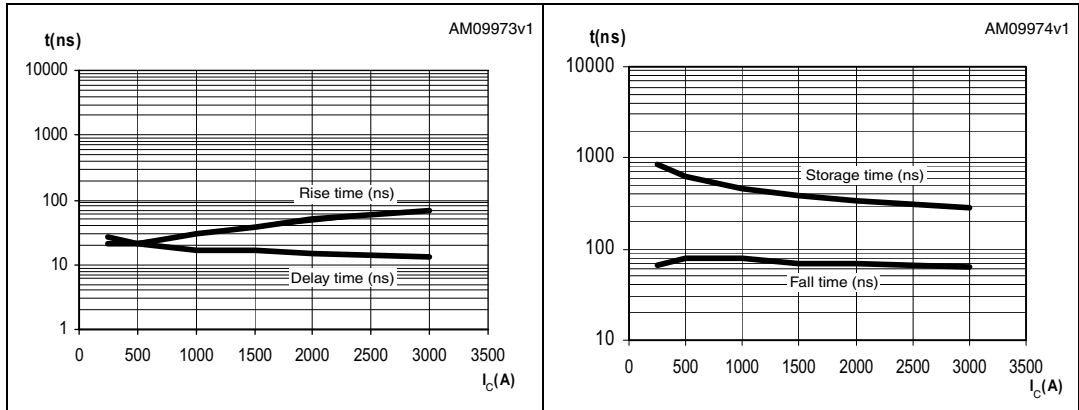
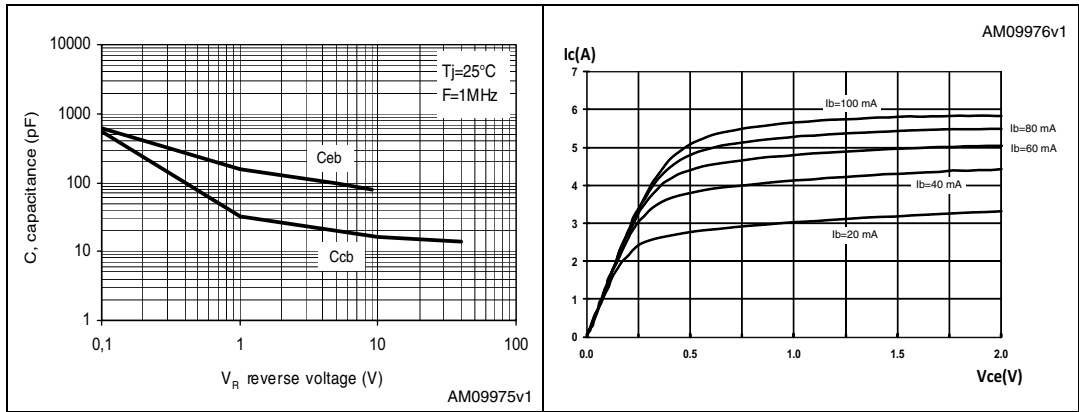
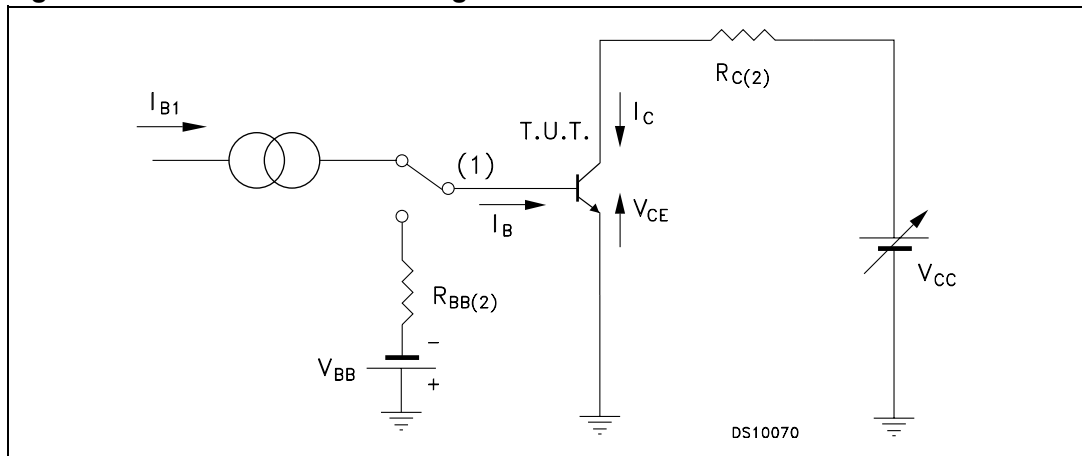


Figure 10. Capacitance curves **Figure 11. Output curve**



2.2 Test circuits

Figure 12. Resistive load switching test circuit



1. Fast electronic switch
2. Non-inductive resistor

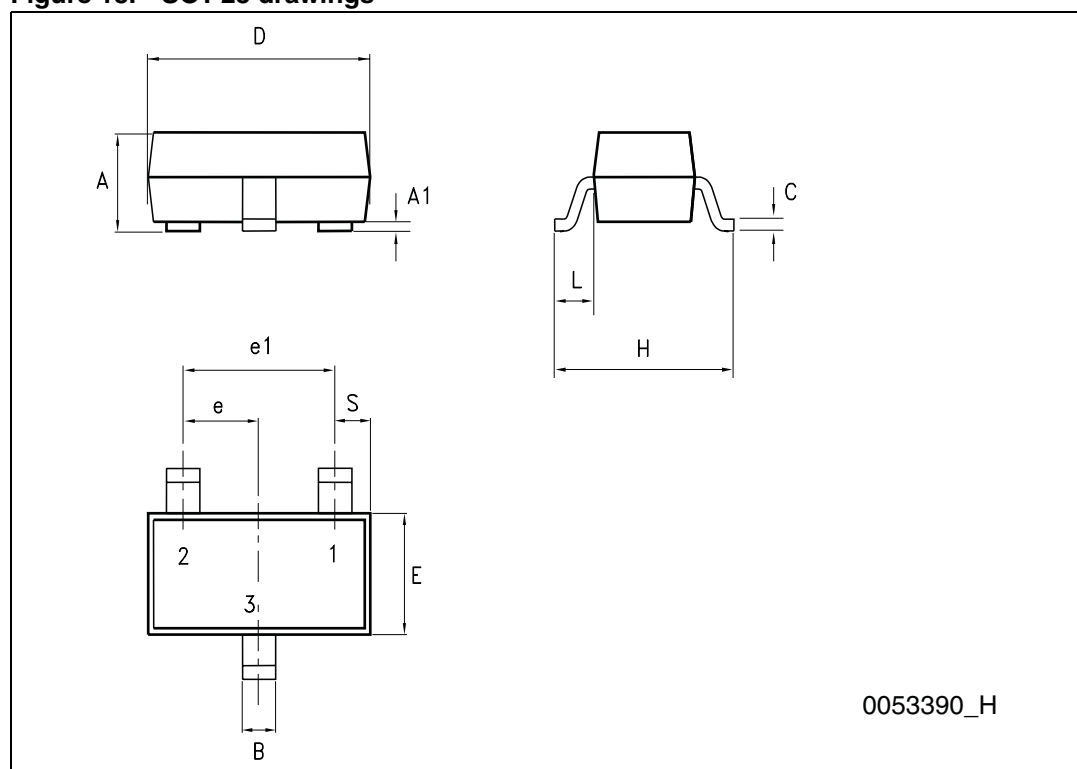
3 Package mechanical data

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.

Table 5. 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 13. SOT-23 drawings



4 Revision history

Table 6. Document revision history

Date	Revision	Changes
02-Nov-2009	1	Initial release
17-Jan-2011	2	Removed "Preliminary data" text from coverpage header.
15-Jun-2011	3	Curves inserted Modified: Table 4

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