3STR1630

Low voltage high performance NPN power transistor

Features

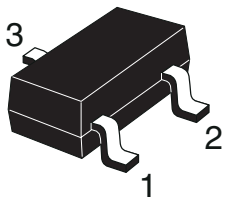
- Very low collector-emitter saturation voltage
- High current gain characteristic
- Fast switching speed
- Miniature SOT-23 plastic package ECOPACK®2 grade for surface mounting circuits

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.



SOT-23

Figure 1. Internal schematic diagram

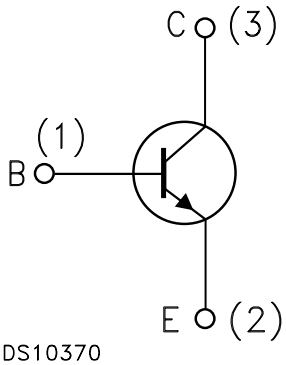


Table 1. Device summary

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_{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} = 30 V			0.1	µA
I_{EBO}	Emitter cut-off current (I_C = 0)	V_{EB} = 4 V			0.1	µA
$V_{(BR)CBO}$	Collector-base breakdown voltage (I_E = 0)	I_C = 100 µA	30			V
$V_{(BR)CEO}$ (1)	Collector-emitter breakdown voltage (I_B = 0)	I_C = 10 mA	30			V
$V_{(BR)EBO}$	Emitter-base breakdown voltage (I_C = 0)	I_E = 100 µA	5			V
$V_{CE(sat)}$ (1)	Collector-emitter saturation voltage	I_C = 1 A I_B = 100 mA I_C = 2 A I_B = 40 mA I_C = 5 A I_B = 500 mA		60 140 240	90 190 300	mV mV mV
$V_{BE(sat)}$ (1)	Base-emitter saturation voltage	I_C = 2 A I_B = 40 mA I_C = 5 A I_B = 500 mA		830 1000	1100	mV mV
h_{FE} (1)	DC current gain	I_C = 50 mA V_{CE} = 2 V I_C = 0.5 A V_{CE} = 2 V I_C = 2 A V_{CE} = 2 V I_C = 5 A V_{CE} = 2 V	210 180 170	 260 90	 560	
f_t	Transition frequency	I_C = 0.1 A V_{CE} = 10 V		100		MHz
C_{CBO}	Collector-base capacitance (I_E = 0)	V_{CB} = 40 V, f = 1 MHz		15		pF
t_{on} t_{off}	Resistive load Turn-on time Turn-off time	I_C = 2.5 A V_{CC} = 12 V I_{B1} = - I_{B2} = 125 mA $V_{BE(off)}$ = - 5 V		 90 450		 ns ns

1. Pulse test: pulse duration ≤300 µs, duty cycle ≤2%

2.1 Electrical characteristics (curves)

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

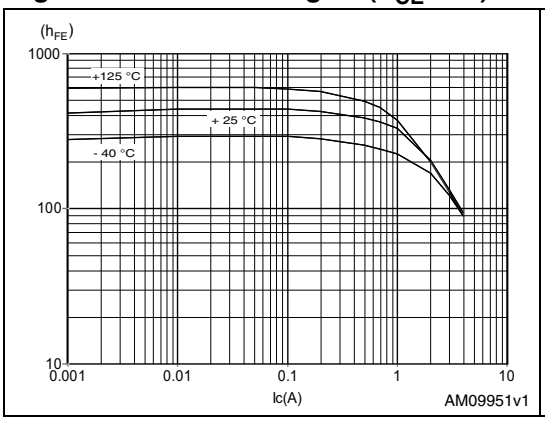


Figure 3. DC current gain (V_{CE}=2 V)

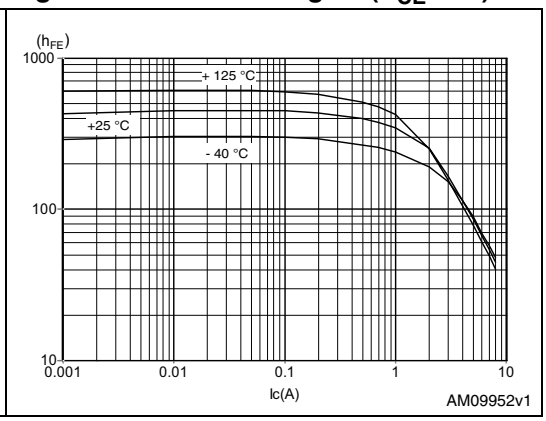


Figure 4. Collector-emitter saturation voltage (V_{CEsat} @ h_{FE}=10)

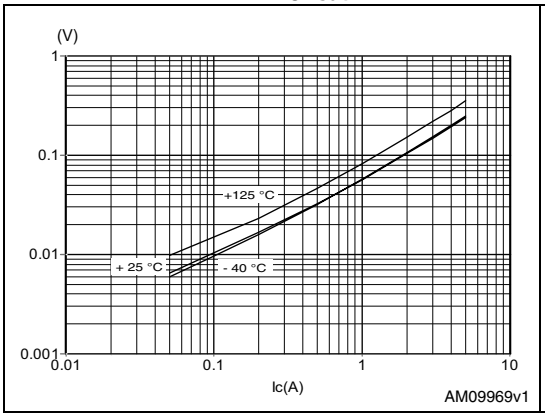


Figure 5. Collector-emitter saturation voltage (V_{CEsat} @ h_{FE}=50)

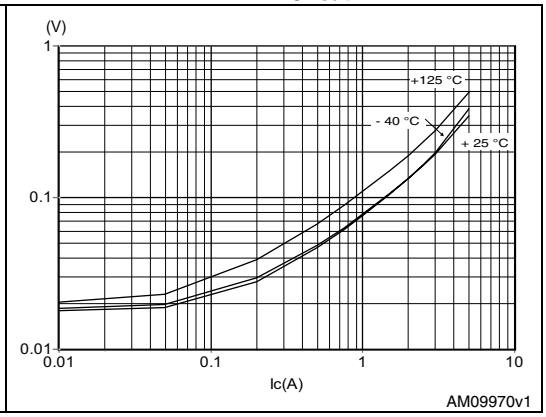


Figure 6. Base-emitter saturation voltage (V_{BEsat} @ h_{FE}=10)

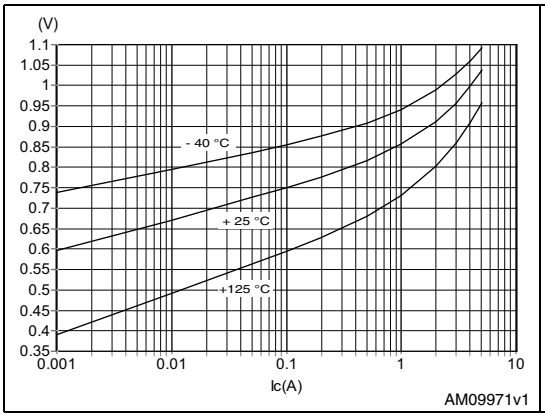


Figure 7. Base-emitter saturation voltage (V_{BEsat} @ h_{FE}=50)

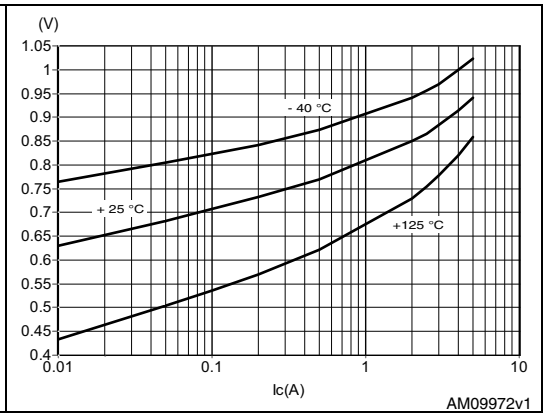


Figure 8. Resistive load switching time (ON)

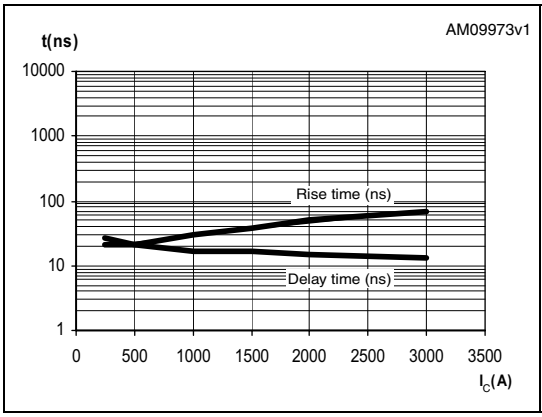


Figure 9. Resistive load switching time (OFF)

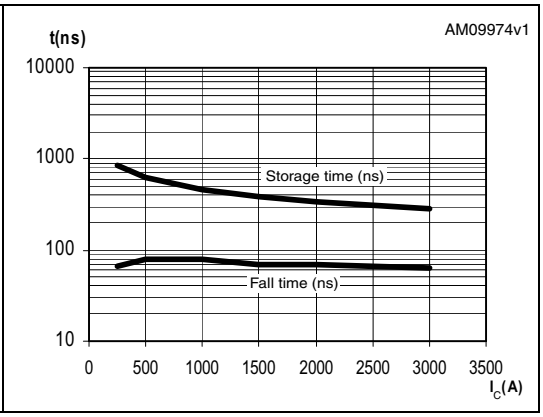


Figure 10. Capacitance curves

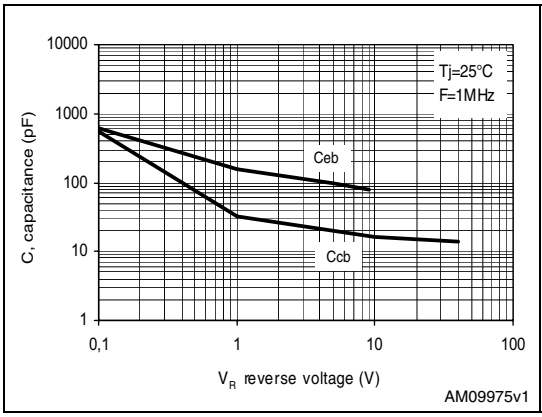
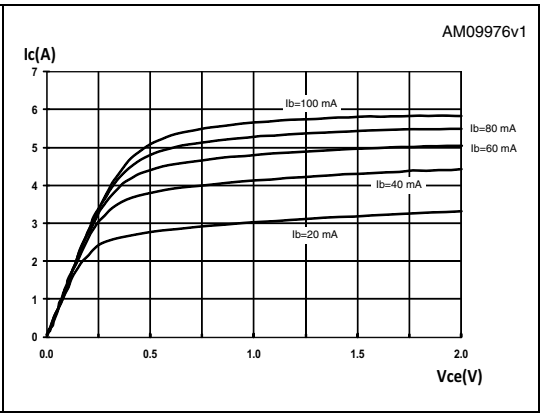
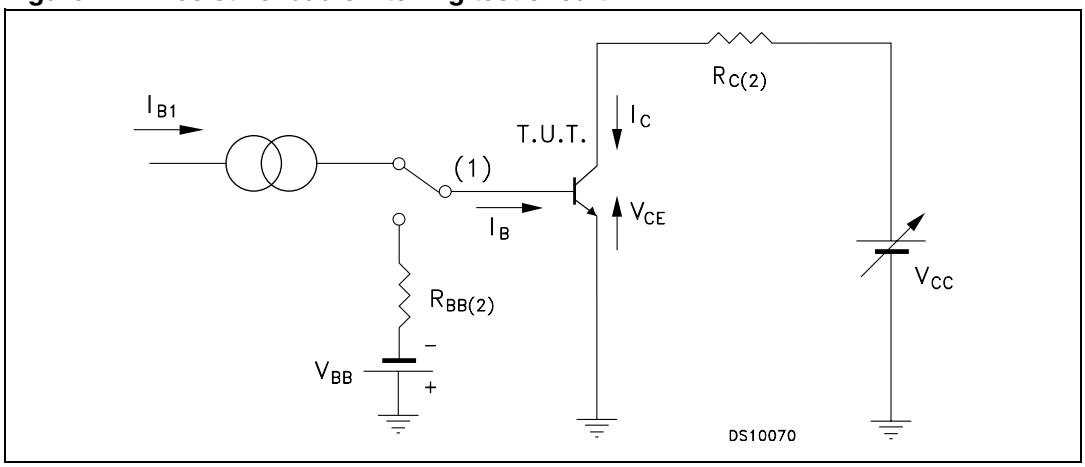


Figure 11. Output curve



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*.
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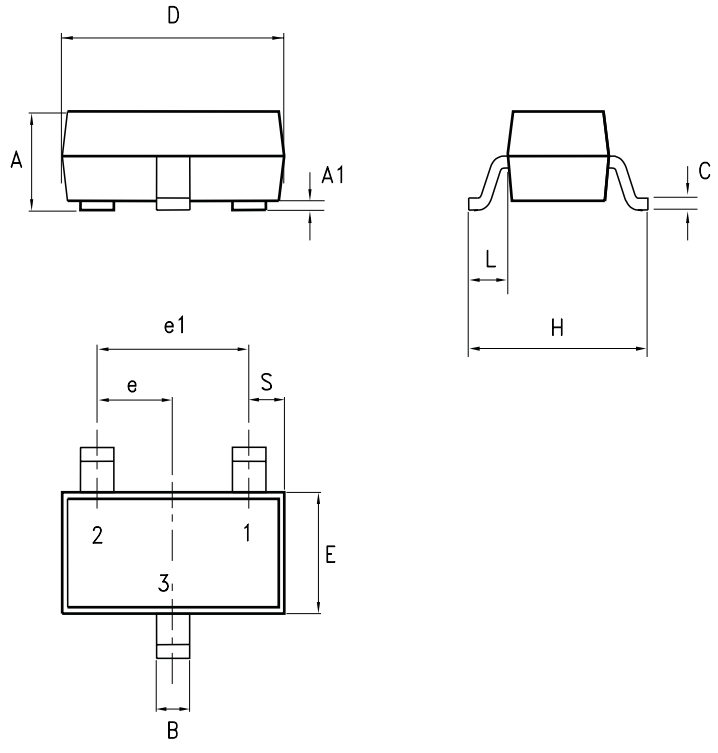
Table 5. SOT-23 mechanical data

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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