

## Low voltage high performance NPN power transistor

### Features

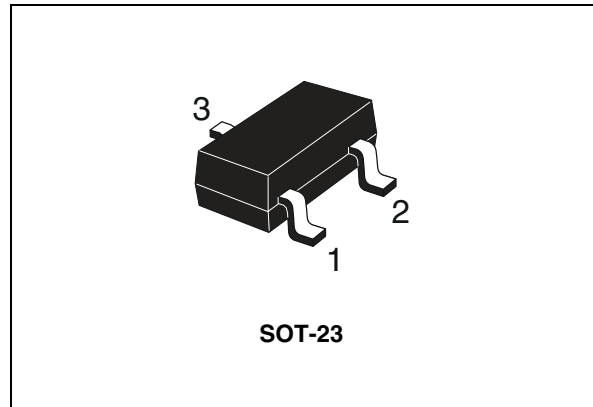
- Very low collector-emitter saturation voltage
- High current gain characteristic
- Fast switching speed
- Miniature SOT-23 plastic package  
ECOPACK<sup>®</sup>2 grade for surface mounting circuits

### Applications

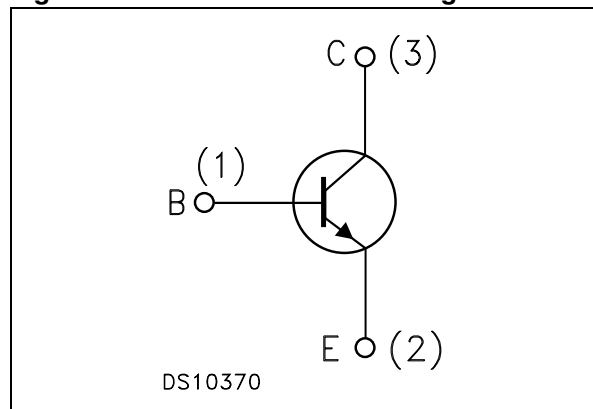
- Strobe and LED drives
- Motor and relay drives
- DC-DC converters

### 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 cm<sup>2</sup>.

## 2 Electrical characteristics

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

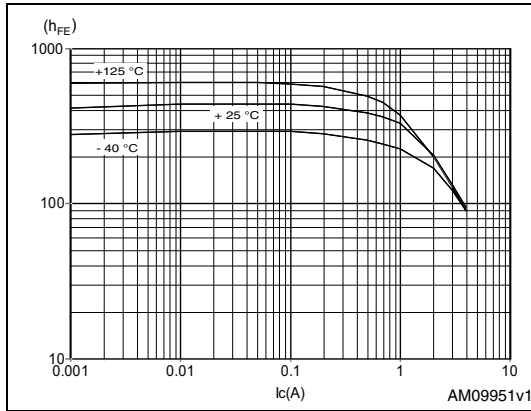
**Table 4. Electrical characteristics**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{\text{CBO}}$	Collector cut-off current ( $I_{\text{E}} = 0$ )	$V_{\text{CB}} = 30\text{ V}$			0.1	$\mu\text{A}$
$I_{\text{EBO}}$	Emitter cut-off current ( $I_{\text{C}} = 0$ )	$V_{\text{EB}} = 4\text{ V}$			0.1	$\mu\text{A}$
$V_{(\text{BR})\text{CBO}}$	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	
$f_{\text{t}}$	Transition frequency	$I_{\text{C}} = 0.1\text{ A}$ $V_{\text{CE}} = 10\text{ V}$		100		MHz
$C_{\text{CBO}}$	Collector-base capacitance ( $I_{\text{E}} = 0$ )	$V_{\text{CB}} = 40\text{ V}$ , $f = 1\text{ MHz}$		15		pF
$t_{\text{on}}$ $t_{\text{off}}$	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

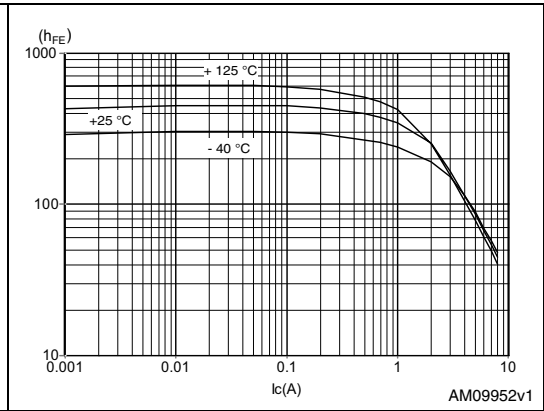
1. Pulse test: pulse duration  $\leq 300\ \mu\text{s}$ , duty cycle  $\leq 2\%$

## 2.1 Electrical characteristics (curves)

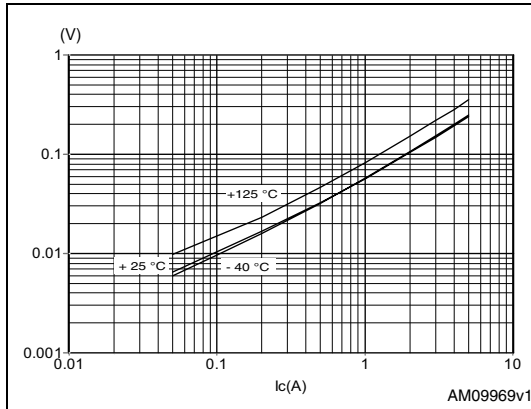
**Figure 2. DC current gain ( $V_{CE}=1\text{ V}$ )**



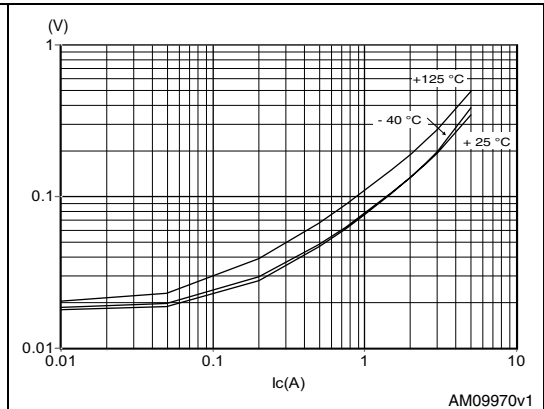
**Figure 3. DC current gain ( $V_{CE}=2\text{ V}$ )**



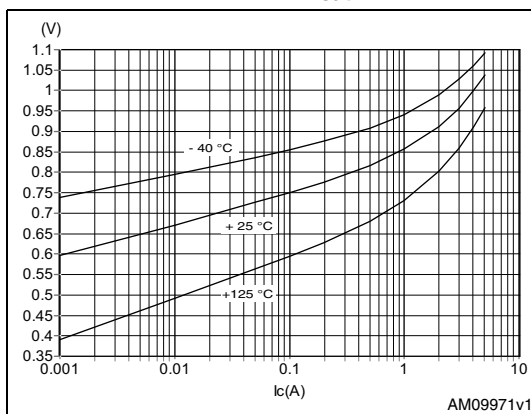
**Figure 4. Collector-emitter saturation voltage ( $V_{CEsat}$  @  $h_{FE}=10$ )**



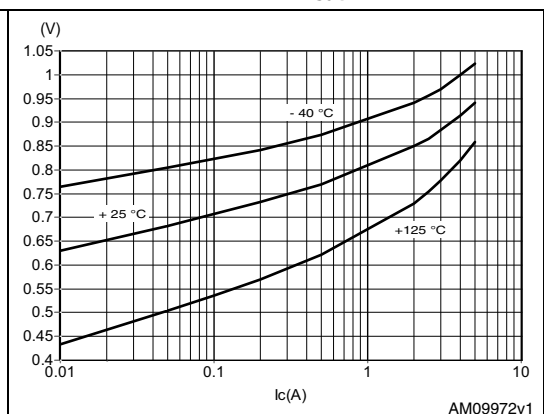
**Figure 5. Collector-emitter saturation voltage ( $V_{CEsat}$  @  $h_{FE}=50$ )**



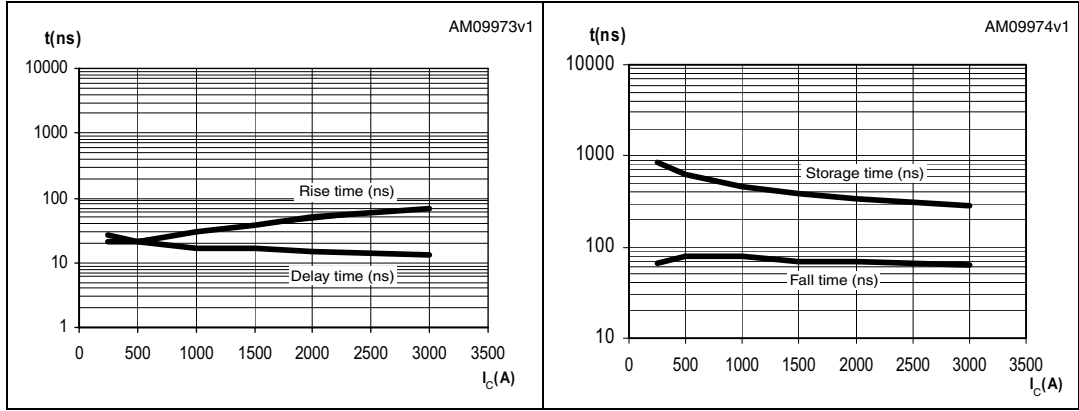
**Figure 6. Base-emitter saturation voltage ( $V_{BEsat}$  @  $h_{FE}=10$ )**



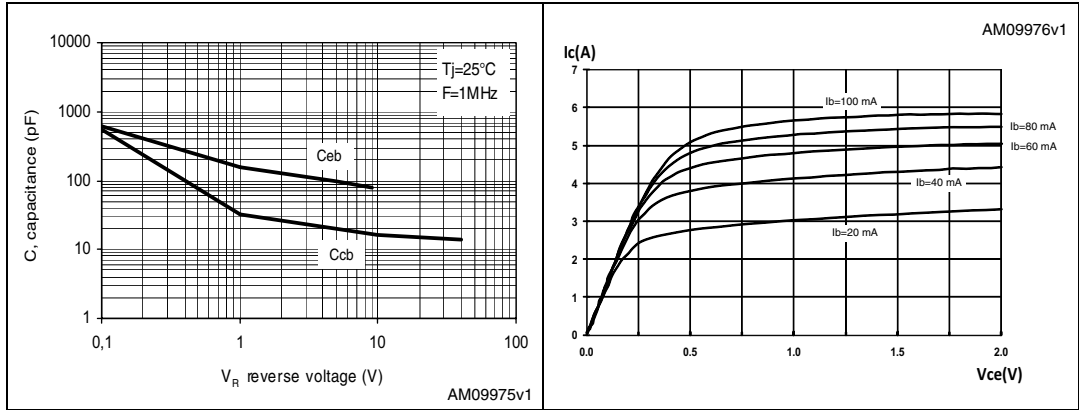
**Figure 7. Base-emitter saturation voltage ( $V_{BEsat}$  @  $h_{FE}=50$ )**



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

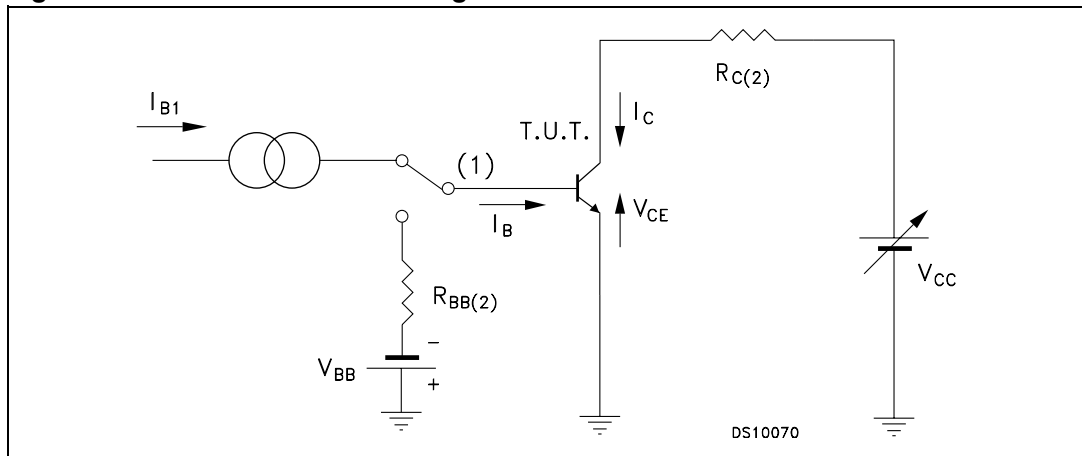


**Figure 10. Capacitance curves**      **Figure 11. Output curve**



## 2.2 Test circuits

Figure 12. Resistive load switching test circuit



1. Fast electronic switch
2. Non-inductive resistor

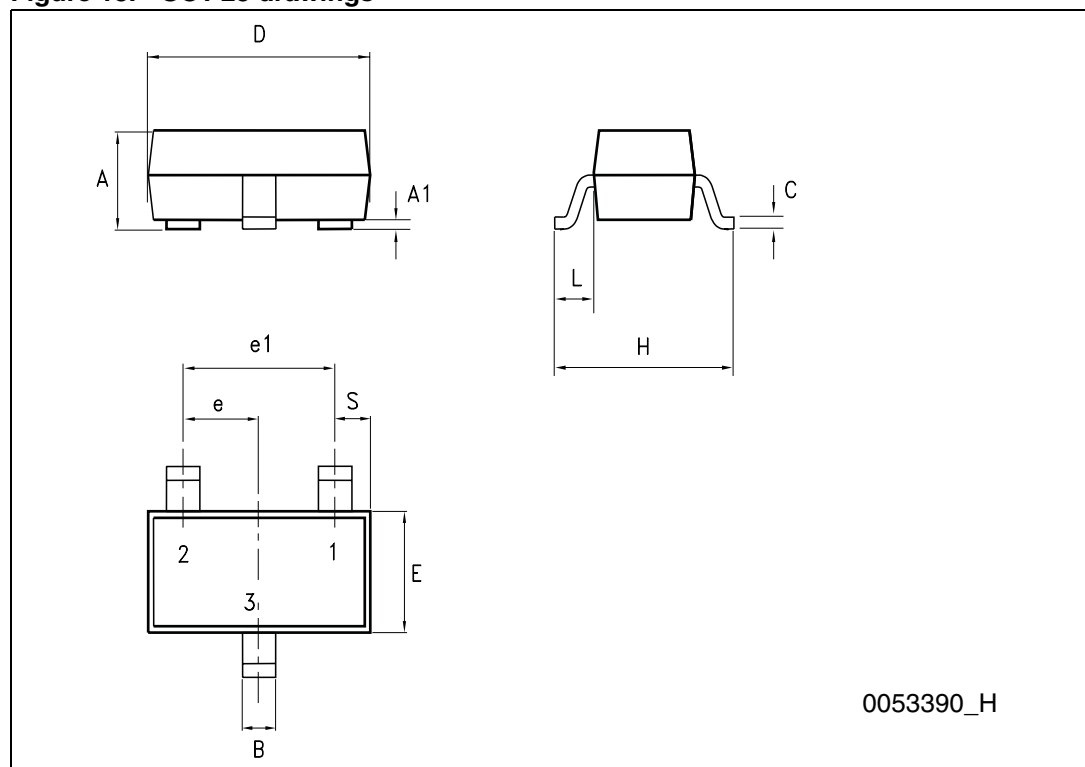
### 3 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK<sup>®</sup> 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



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## 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: <a href="#">Table 4</a>

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