

Low voltage fast-switching NPN power transistor

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
- Voltage and relay driver
- Voltage regulation

Description

The 2STR1215 is 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 2STR2215.

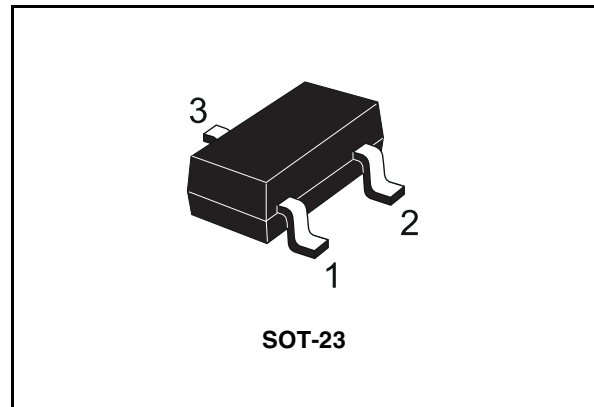


Figure 1. Internal schematic diagram

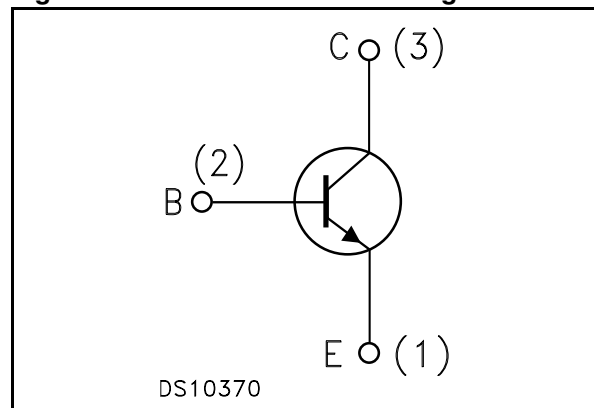


Table 1. Device summary

Order code	Marking	Package	Packaging
2STR1215	115	SOT-23	Tape and reel

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1 Electrical ratings

Table 2. Absolute maximum rating

Symbol	Parameter	Value	Unit
V_{CBO}	Collector-base voltage ($I_E = 0$)	15	V
V_{CEO}	Collector-emitter voltage ($I_B = 0$)	15	V
V_{EBO}	Emitter-base voltage ($I_C = 0$)	5	V
I_C	Collector current	1.5	A
I_{CM}	Collector peak current ($t_P < 5$ ms)	3	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
$R_{thj-amb}^{(1)}$	Thermal resistance junction-amb max	250	°C/W

(1) Device mounted on PCB area of 1cm²

2 Electrical characteristics

($T_{\text{case}} = 25^{\circ}\text{C}$ unless otherwise specified)

Table 4. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CBO}	Collector cut-off current ($I_{\text{E}} = 0$)	$V_{\text{CB}} = 15 \text{ V}$			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 ($I_{\text{E}} = 0$)	$I_{\text{C}} = 100 \mu\text{A}$	15			V
$V_{(\text{BR})\text{CEO}}^{(1)}$	Collector-emitter breakdown voltage ($I_{\text{B}} = 0$)	$I_{\text{C}} = 10 \text{ mA}$	15			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	$I_{\text{C}} = 0.1 \text{ A}$ $I_{\text{B}} = 1 \text{ mA}$ $I_{\text{C}} = 1 \text{ A}$ $I_{\text{B}} = 100 \text{ mA}$ $I_{\text{C}} = 2 \text{ A}$ $I_{\text{B}} = 200 \text{ mA}$		0.25 0.4	0.15 0.5 0.85	V V V
$V_{\text{BE}(\text{sat})}^{(1)}$	Base-emitter saturation voltage	$I_{\text{C}} = 1 \text{ A}$ $I_{\text{B}} = 100 \text{ mA}$		0.9	1.25	V
$h_{\text{FE}}^{(1)}$	DC current gain	$I_{\text{C}} = 50 \text{ mA}$ $V_{\text{CE}} = 2 \text{ V}$ $I_{\text{C}} = 0.5 \text{ A}$ $V_{\text{CE}} = 2 \text{ V}$ $I_{\text{C}} = 1 \text{ A}$ $V_{\text{CE}} = 2 \text{ V}$ $I_{\text{C}} = 2 \text{ A}$ $V_{\text{CE}} = 2 \text{ V}$	200 200 130 80	280	560	
C_{CBO}	Collector-base capacitance ($I_{\text{E}} = 0$)	$V_{\text{CB}} = 10 \text{ V}$ $f = 1 \text{ MHz}$		16		pF
t_{on} t_{off}	Resistive load Turn-on time Turn-off time	$I_{\text{C}} = 1.5 \text{ A}$ $V_{\text{CC}} = 10 \text{ V}$ $I_{\text{B}1} = -I_{\text{B}2} = 150 \text{ mA}$		60 310		ns ns

1. Pulsed duration = 300 μs , duty cycle $\leq 1.5\%$

2.1 Electrical characteristics (curves)

Figure 2. DC current gain

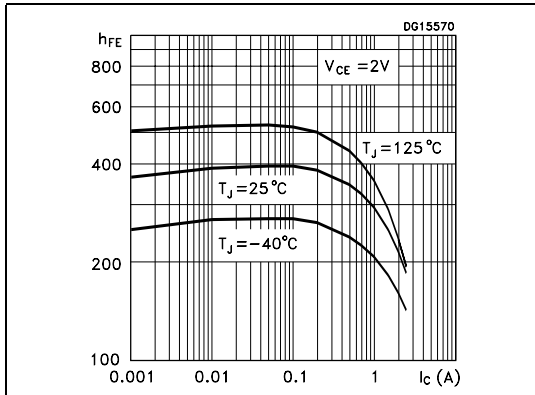


Figure 3. Collector-emitter saturation voltage

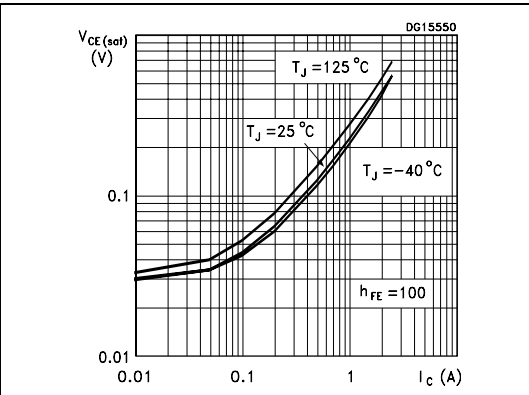


Figure 4. Base-emitter saturation voltage

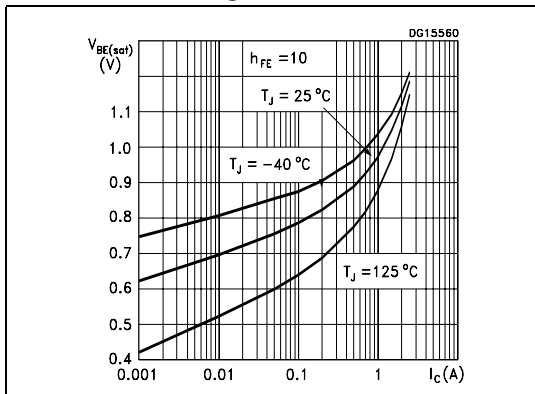


Figure 5. Resistive load switching time

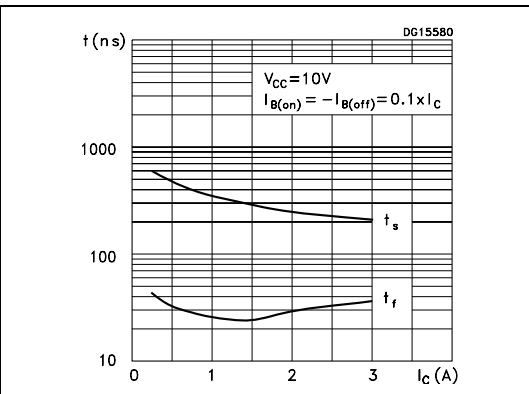


Figure 6. Resistive load switching time

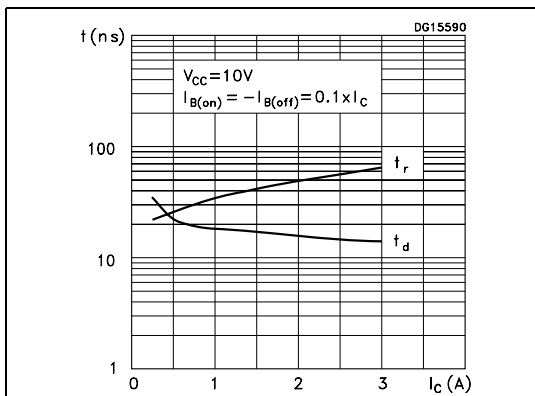
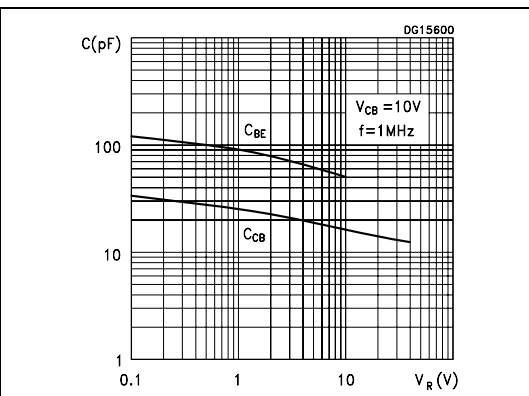
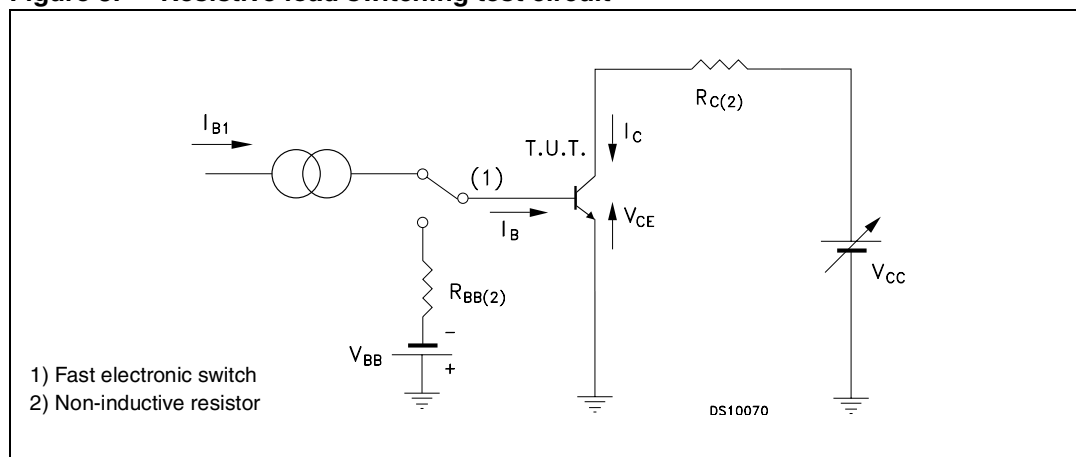


Figure 7. Capacitance



2.2 Test circuits

Figure 8. Resistive load switching test circuit

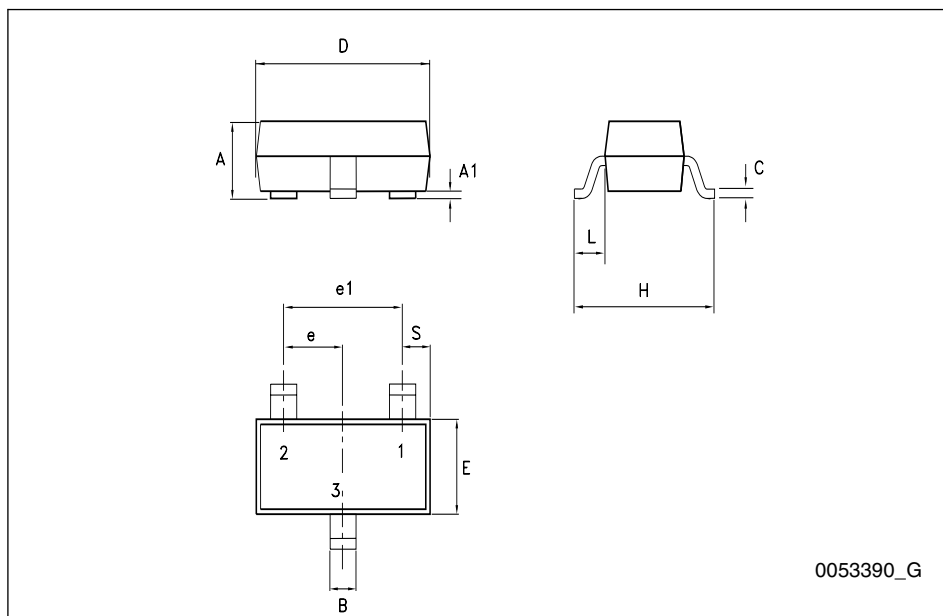


3 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com

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



4 Revision history

Table 5. Document revision history

Date	Revision	Changes
09-Feb-2006	1	Initial release
18-Jul-2006	2	New template
08-Sep-2008	3	Updated the SOT-23 mechanical data.

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