

## Low voltage fast-switching PNP power transistor

### Features

- Very low collector-emitter saturation voltage
- High current gain characteristic
- Fast switching speed
- SOT-89 plastic package for surface mounting circuits

### Applications

- LED
- Motherboard & hard disk drive
- Mobile equipment
- Battery charger
- Voltage regulation

### Description

The device is a PNP transistor manufactured using new "PB-HDC" (Power Bipolar High Density Current) technology. The resulting transistor shows exceptional high gain performances coupled with very low saturation voltage. The complementary NPN is the 2STF1340.

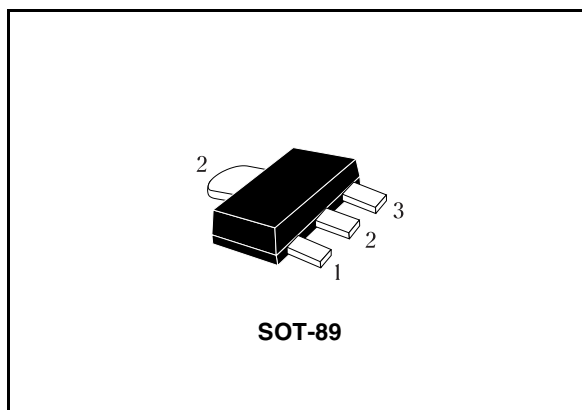


Figure 1. Internal schematic diagram

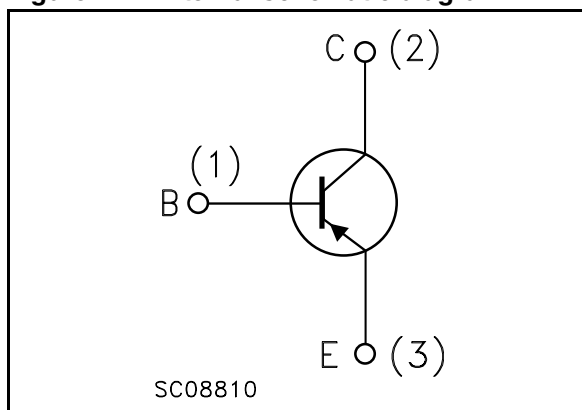


Table 1. Device summary

Order code	Marking	Package	Packaging
2STF2340	2340	SOT-89	Tape and reel

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# 1 Electrical ratings

**Table 2. Absolute maximum rating**

Symbol	Parameter	Value	Unit
$V_{CES}$	Collector-emitter voltage ( $V_{CE} = 0$ )	-40	V
$V_{CEO}$	Collector-emitter voltage ( $I_B = 0$ )	-40	V
$V_{EBO}$	Emitter-base voltage ( $I_C = 0$ )	-5	V
$I_C$	Collector current	-3	A
$I_{CM}$	Collector peak current ( $t_P < 5\text{ms}$ )	-6	A
$P_{tot}$	Total dissipation at $T_{amb} = 25^\circ\text{C}$	1.4	W
$T_{stg}$	Storage temperature	-65 to 150	$^\circ\text{C}$
$T_J$	Max. operating junction temperature	150	$^\circ\text{C}$

**Table 3. Thermal data**

Symbol	Parameter	Value	Unit
$R_{thj-amb}^{(1)}$	Thermal resistance junction-amb max	89.3	$^\circ\text{C}/\text{W}$

1. Device mounted on PCB area of  $1\text{cm}^2$

## 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
$I_{\text{CBO}}$	Collector cut-off current ( $I_{\text{E}} = 0$ )	$V_{\text{CB}} = -40 \text{ V}$			-0.1	$\mu\text{A}$
$I_{\text{EBO}}$	Emitter cut-off current ( $I_{\text{C}} = 0$ )	$V_{\text{EB}} = -5 \text{ V}$			-0.1	$\mu\text{A}$
$V_{(\text{BR})\text{CBO}}^{(1)}$	Collector-base breakdown voltage ( $I_{\text{E}} = 0$ )	$I_{\text{C}} = -100 \mu\text{A}$	-40			V
$V_{(\text{BR})\text{CEO}}^{(1)}$	Collector-emitter breakdown voltage ( $I_{\text{B}} = 0$ )	$I_{\text{C}} = -10 \text{ mA}$	-40			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	$I_{\text{C}} = -2 \text{ A}$ $I_{\text{B}} = -100 \text{ mA}$ $I_{\text{C}} = -3 \text{ A}$ $I_{\text{B}} = -150 \text{ mA}$		-0.2 -0.3		V V
$V_{\text{BE}(\text{sat})}^{(1)}$	Base-emitter saturation voltage	$I_{\text{C}} = -2 \text{ A}$ $I_{\text{B}} = -100 \text{ mA}$		-0.9	-1.25	V
$h_{\text{FE}}^{(1)}$	DC current gain	$I_{\text{C}} = -0.1 \text{ A}$ $V_{\text{CE}} = -2 \text{ V}$ $I_{\text{C}} = -1 \text{ A}$ $V_{\text{CE}} = -2 \text{ V}$ $I_{\text{C}} = -3 \text{ A}$ $V_{\text{CE}} = -2 \text{ V}$		280 250 200		
$f_{\text{t}}$	Transition frequency	$I_{\text{C}} = -0.1 \text{ A}$ $V_{\text{CE}} = -5 \text{ V}$ $f = 100 \text{ MHz}$	100			MHz
$C_{\text{CBO}}$	Collector-base capacitance ( $I_{\text{E}} = 0$ )	$V_{\text{CB}} = -10 \text{ V}$ $f = 1 \text{ MHz}$		50		pF
$t_{\text{on}}$ $t_{\text{off}}$	Resistive load Turn-on time Turn-off time	$I_{\text{C}} = -1.5 \text{ A}$ $V_{\text{CC}} = -10 \text{ V}$ $I_{\text{B1}} = -I_{\text{B2}} = -150 \text{ mA}$		80 450		ns ns

1. Pulsed duration = 300  $\mu\text{s}$ , duty cycle  $\leq 1.5\%$

## 2.1 Electrical characteristics (curves)

Figure 2. Output characteristics

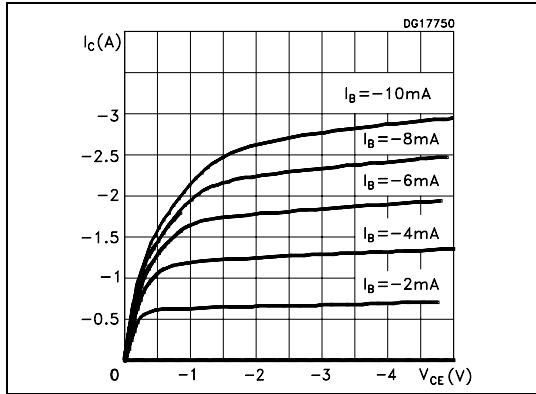


Figure 3. Derating curve

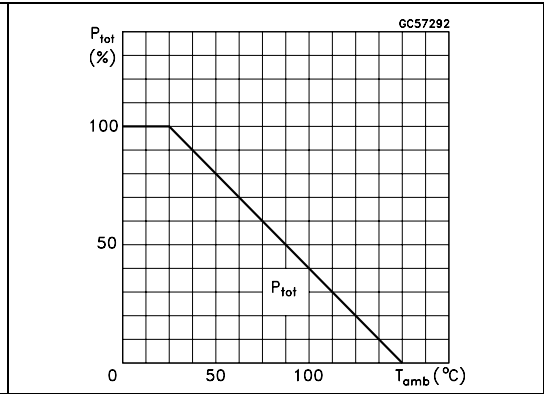


Figure 4. DC current gain

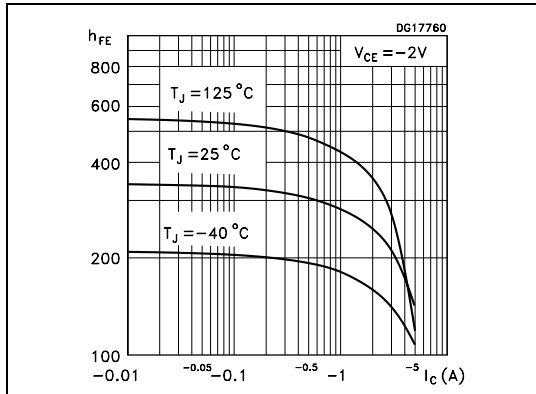


Figure 5. DC current gain

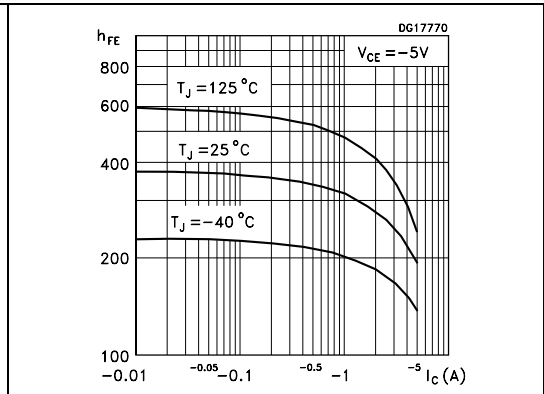


Figure 6. Collector-emitter saturation voltage

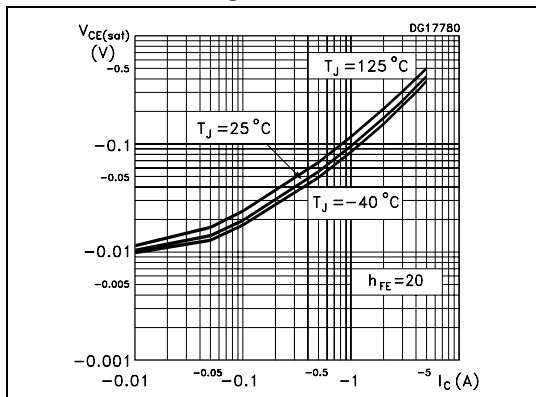


Figure 7. Base-emitter saturation voltage

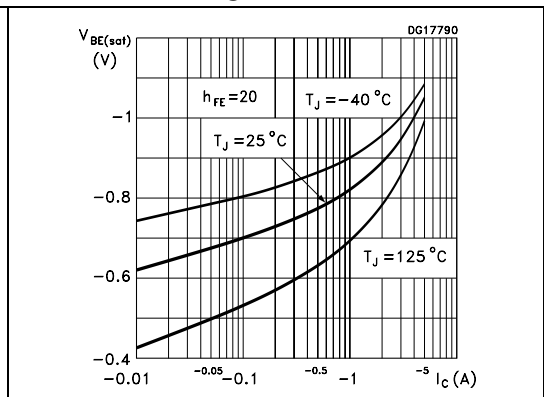


Figure 8. Resistive load switching time Figure 9. Resistive load switching time

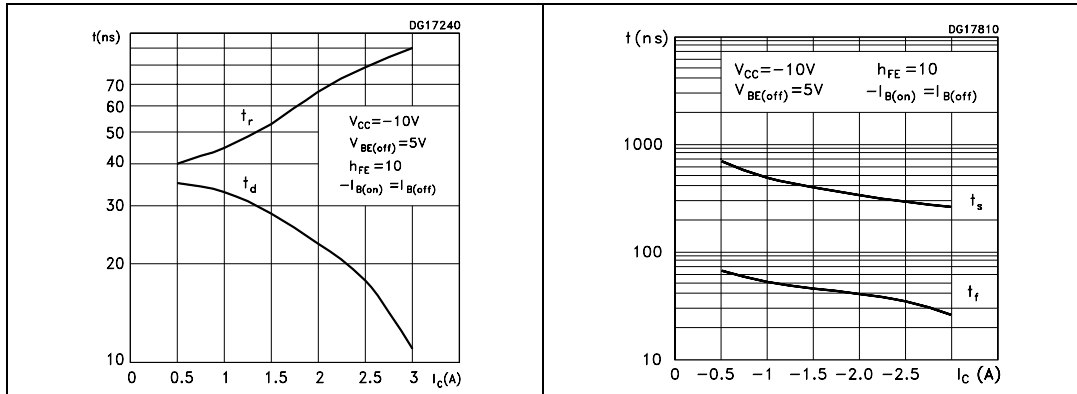
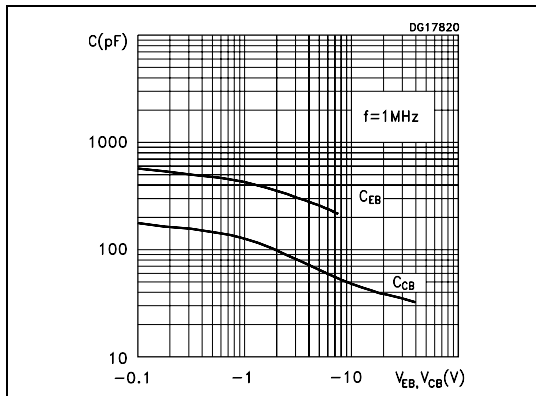
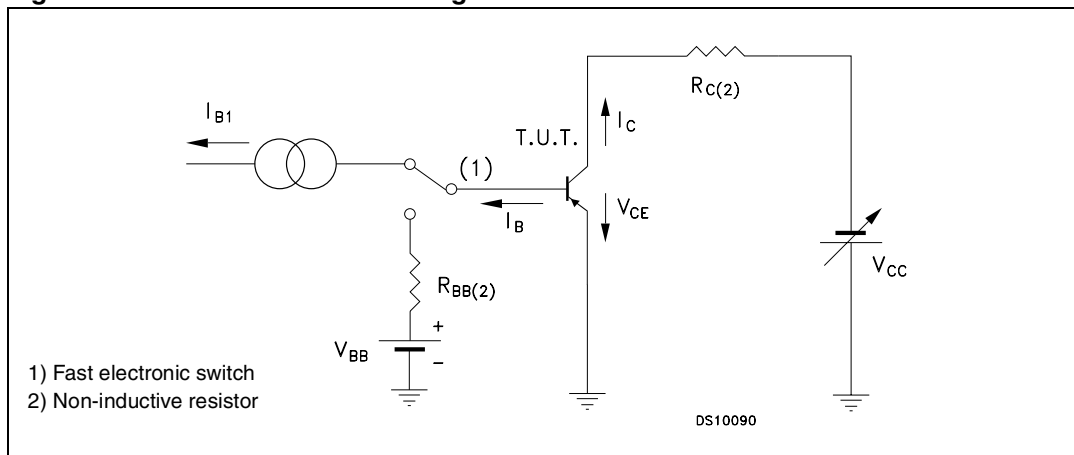


Figure 10. Capacitance curves



## 2.2 Test circuits

Figure 11. Resistive load switching test circuit



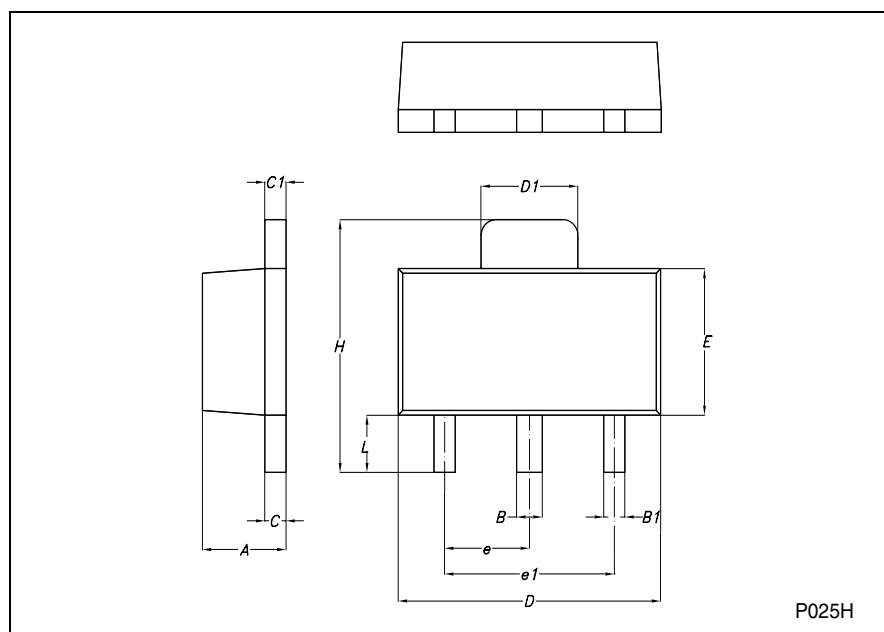
### 3 Package mechanical data

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](http://www.st.com)



## SOT-89 MECHANICAL DATA

DIM.	mm			mils		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	1.4		1.6	55.1		63.0
B	0.44		0.56	17.3		22.0
B1	0.36		0.48	14.2		18.9
C	0.35		0.44	13.8		17.3
C1	0.35		0.44	13.8		17.3
D	4.4		4.6	173.2		181.1
D1	1.62		1.83	63.8		72.0
E	2.29		2.6	90.2		102.4
e	1.42		1.57	55.9		61.8
e1	2.92		3.07	115.0		120.9
H	3.94		4.25	155.1		167.3
L	0.89		1.2	35.0		47.2



## 4 Revision history

**Table 5. Document revision history**

Date	Revision	Changes
04-Dec-2007	1	Initial release.

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