

## Low voltage fast-switching NPN power transistor

### Features

- Very low collector-emitter saturation voltage
- High current gain characteristic
- Fast switching speed

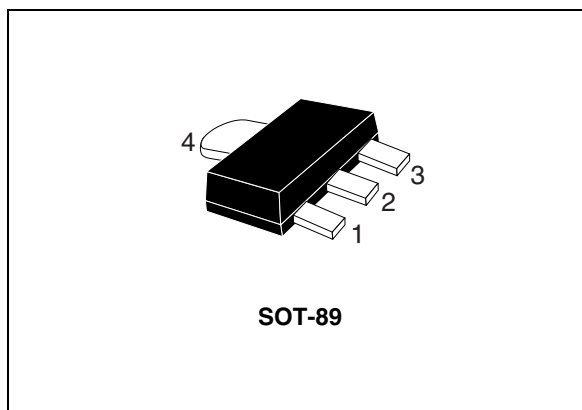
### Applications

- LED
- Motherboard & hard disk drive
- Mobile equipment
- DC-DC converter

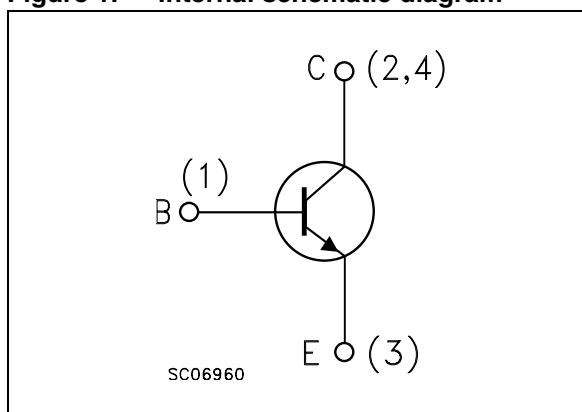
### Description

The 2STF1340 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 2STF2340.



**Figure 1. Internal schematic diagram**



**Table 1. Device summary**

Order code	Marking	Package	Packaging
2STF1340	1340	SOT-89	Tape and reel

# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{CES}$	Collector-emitter voltage ( $V_{BE} = 0$ )	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 ( $t_P < 5$ ms)	6	A
$P_{tot}$	Total dissipation at $T_{amb} = 25$ °C	1.4	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	89	°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 ( $I_{\text{E}} = 0$ )	$V_{\text{CB}} = 40\text{ V}$			0.1	$\mu\text{A}$
$I_{\text{EBO}}$	Emitter cut-off current ( $I_{\text{C}} = 0$ )	$V_{\text{EB}} = 5\text{ V}$			0.1	$\mu\text{A}$
$V_{(\text{BR})\text{CBO}}$	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	$I_{\text{C}} = 2\text{ A}$ $I_{\text{B}} = 100\text{ mA}$ $I_{\text{C}} = 3\text{ A}$ $I_{\text{B}} = 150\text{ mA}$			250 350	mV mV
$V_{\text{BE}(\text{sat})}^{(1)}$	Base-emitter saturation voltage	$I_{\text{C}} = 2\text{ A}$ $I_{\text{B}} = 100\text{ mA}$			1.2	V
$h_{\text{FE}}^{(1)}$	DC current gain	$I_{\text{C}} = 0.1\text{ A}$ $V_{\text{CE}} = 2\text{ V}$ $I_{\text{C}} = 1\text{ A}$ $V_{\text{CE}} = 2\text{ V}$ $I_{\text{C}} = 3\text{ A}$ $V_{\text{CE}} = 2\text{ V}$	100 180	220	450	
$f_{\text{T}}$	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 ( $I_{\text{E}} = 0$ )	$f = 1\text{ MHz}$ $V_{\text{CB}} = 10\text{ V}$		30		pF
$t_{\text{on}}$ $t_{\text{off}}$	Resistive load Turn-on time Turn-off time	$I_{\text{C}} = 1.5\text{ A}$ $V_{\text{CC}} = 10\text{ V}$ $I_{\text{B}(\text{on})} = - I_{\text{B}(\text{off})} = 150\text{ mA}$ $V_{\text{BB}(\text{off})} = - 5\text{ V}$		65 750		ns ns

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

## 2.1 Electrical characteristics (curves)

Figure 2. Output characteristics

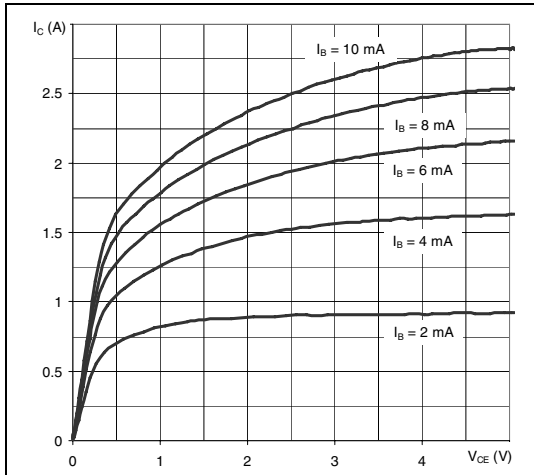


Figure 3. Derating curve

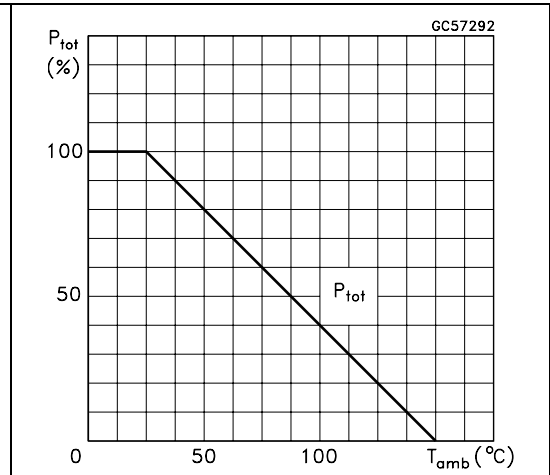


Figure 4. DC current gain ( $V_{CE} = 2 V$ )

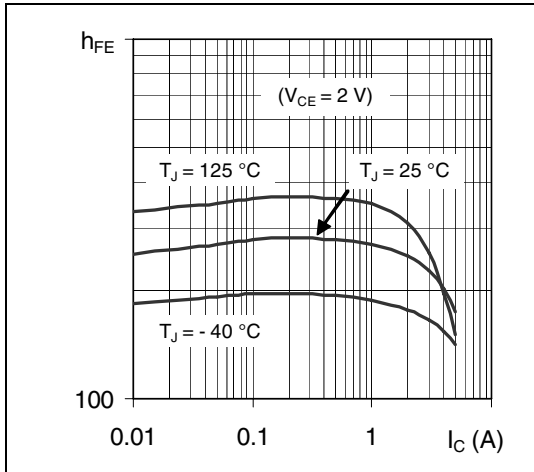


Figure 5. DC current gain ( $V_{CE} = 5 V$ )

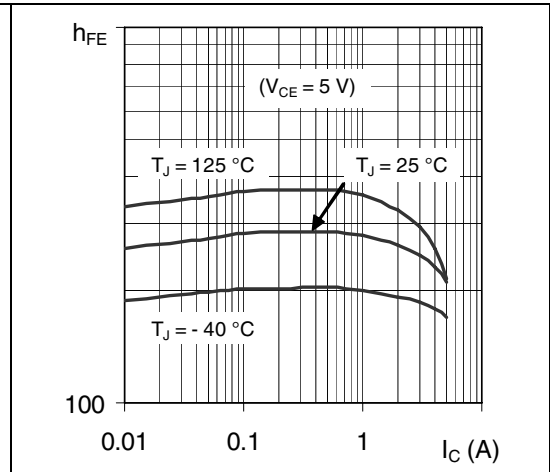


Figure 6. Collector-emitter saturation voltage

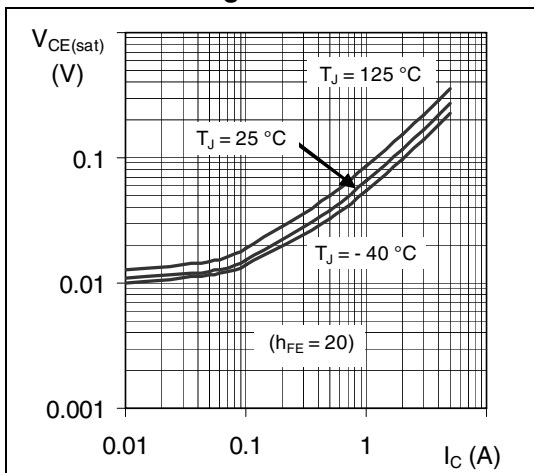


Figure 7. Base-emitter saturation voltage

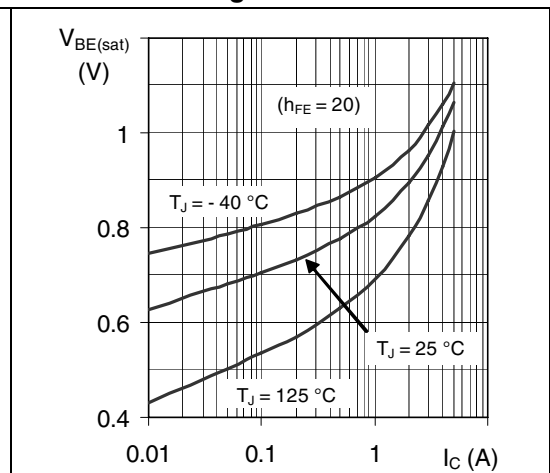


Figure 8. Resistive load switching on

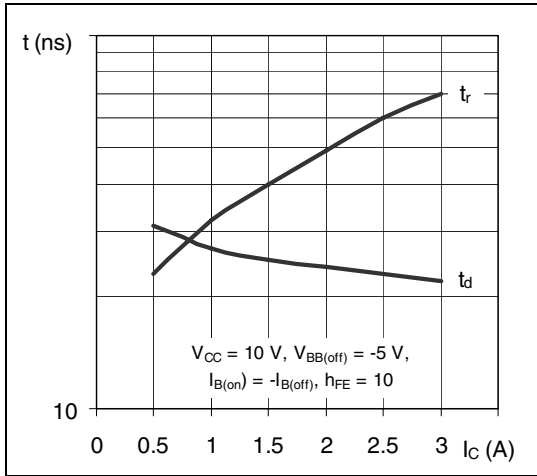


Figure 9. Resistive load switching off

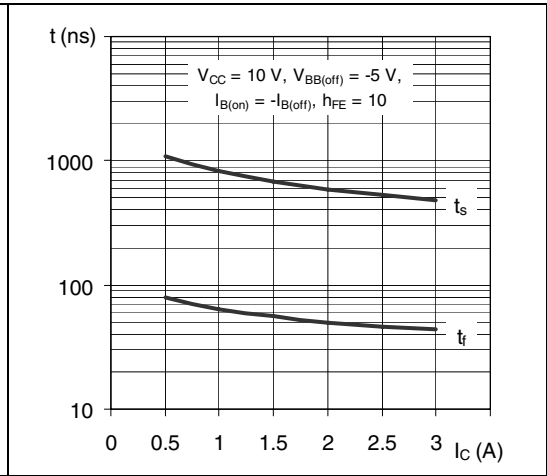
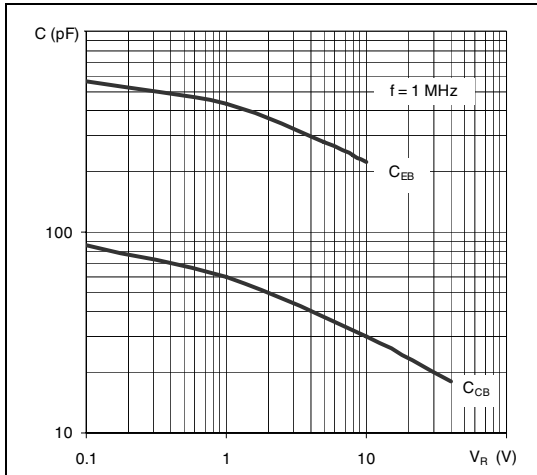
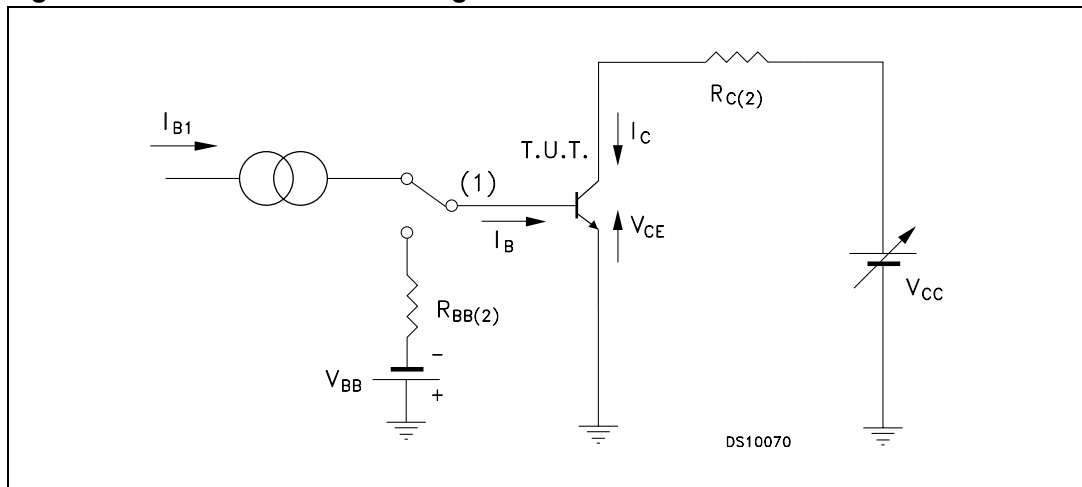


Figure 10. Capacitance curves



## 2.2 Test circuits

Figure 11. Resistive load switching



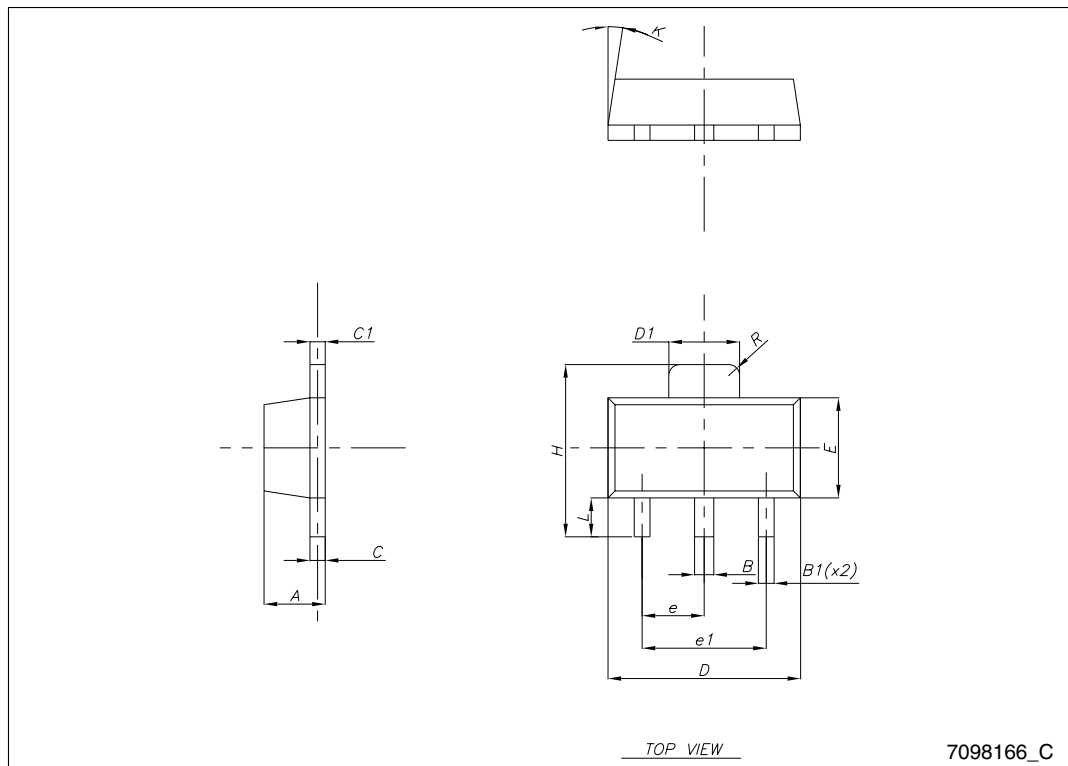
1. Fast electronic switch
2. Non-inductive resistor

### 3 Package mechanical data

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**SOT-89 mechanical data**

Dim.	mm		
	Min.	Typ.	Max.
A	1.40		1.60
B	0.44		0.56
B1	0.36		0.48
C	0.35		0.44
C1	0.35		0.44
D	4.40		4.60
D1	1.62		1.83
E	2.29		2.60
e	1.42		1.57
e1	2.92		3.07
H	3.94		4.25
K	1°		8°
L	0.89		1.20
R		0.25	





## 4 Revision history

**Table 5. Document revision history**

Date	Revision	Changes
20-Oct-2006	1	Initial release
19-Oct-2009	2	Document status promoted from preliminary data to datasheet, inserted electrical characteristics (curves) section and updated mechanical data

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