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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.

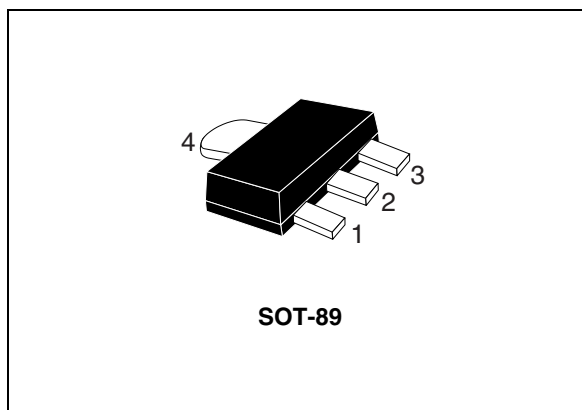


Figure 1. Internal schematic diagram

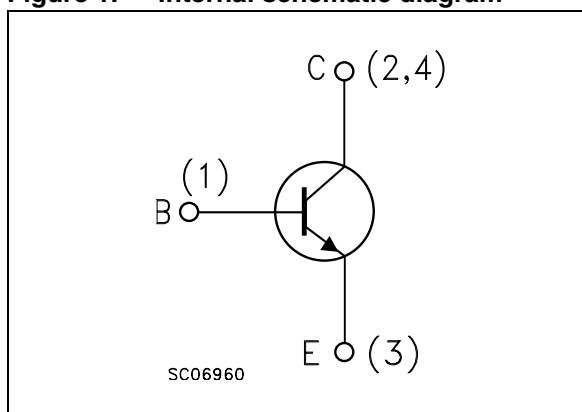


Table 1. Device summary

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 cm²

2 Electrical characteristics

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

Table 4. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CBO}	Collector cut-off current ($I_{\text{E}} = 0$)	$V_{\text{CB}} = 40\text{ V}$			0.1	μA
I_{EBO}	Emitter cut-off current ($I_{\text{C}} = 0$)	$V_{\text{EB}} = 5\text{ V}$			0.1	μA
$V_{(\text{BR})\text{CBO}}$	Collector-base breakdown voltage ($I_{\text{E}} = 0$)	$I_{\text{C}} = 100\text{ }\mu\text{A}$	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 ($I_{\text{C}} = 0$)	$I_{\text{E}} = 100\text{ }\mu\text{A}$	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_{T}	Transition frequency	$I_{\text{C}} = 0.1\text{ A}$ $V_{\text{CE}} = 5\text{ V}$ $f = 100\text{ MHz}$	100			MHz
C_{CBO}	Collector-base capacitance ($I_{\text{E}} = 0$)	$f = 1\text{ MHz}$ $V_{\text{CB}} = 10\text{ V}$		30		pF
t_{on} t_{off}	Resistive load Turn-on time Turn-off time	$I_{\text{C}} = 1.5\text{ A}$ $V_{\text{CC}} = 10\text{ V}$ $I_{\text{B}(\text{on})} = -I_{\text{B}(\text{off})} = 150\text{ mA}$ $V_{\text{BB}(\text{off})} = -5\text{ V}$		65 750		ns ns

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

2.1 Electrical characteristics (curves)

Figure 2. Output characteristics

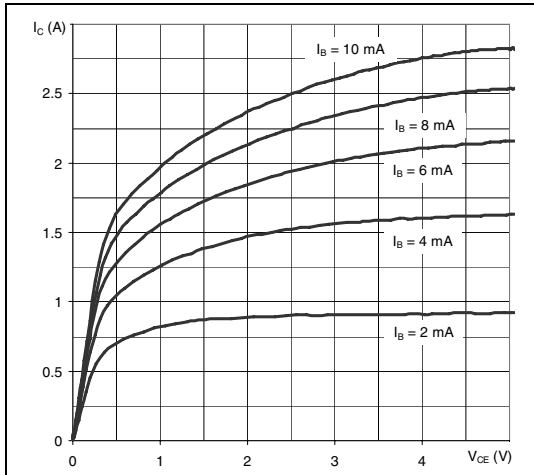


Figure 3. Derating curve

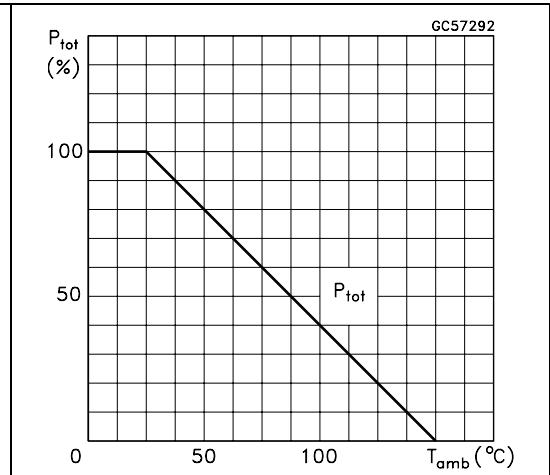


Figure 4. DC current gain ($V_{CE} = 2 V$)

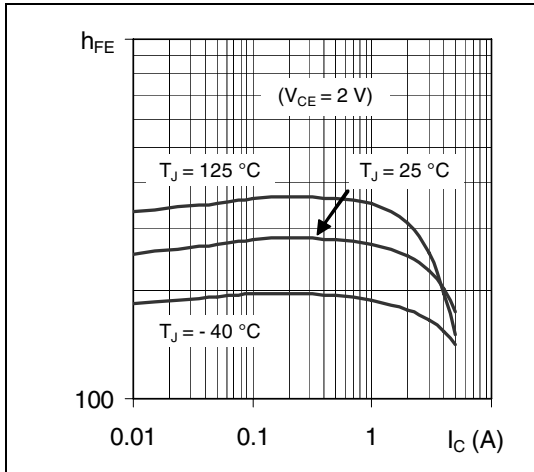


Figure 5. DC current gain ($V_{CE} = 5 V$)

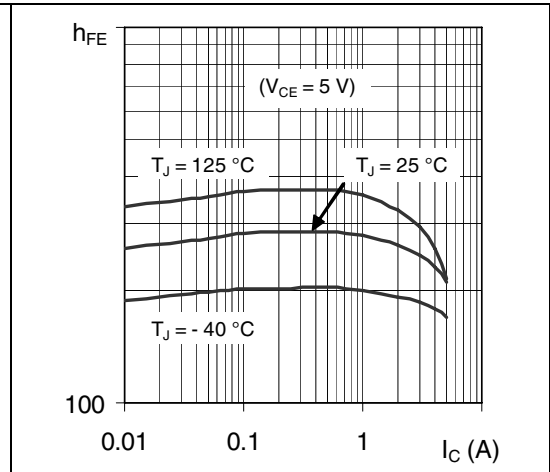


Figure 6. Collector-emitter saturation voltage

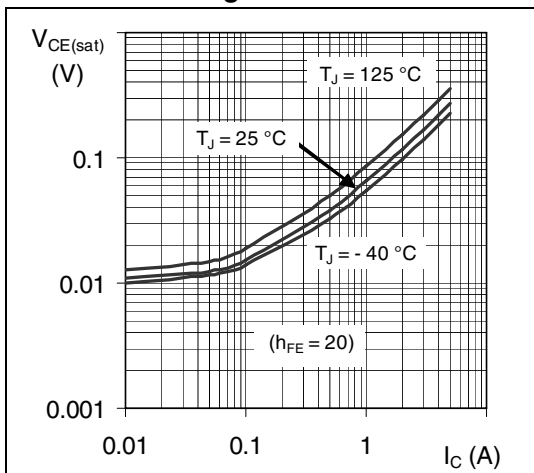


Figure 7. Base-emitter saturation voltage

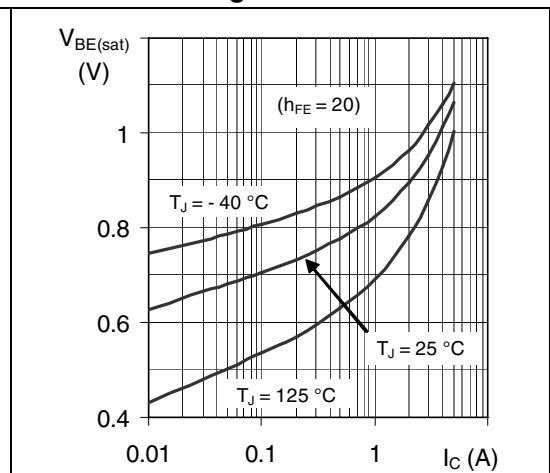


Figure 8. Resistive load switching on

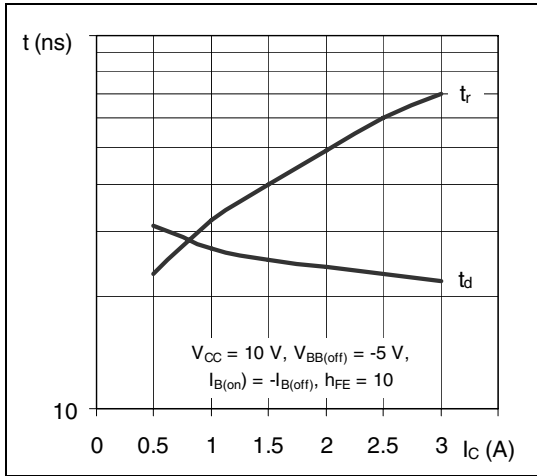


Figure 9. Resistive load switching off

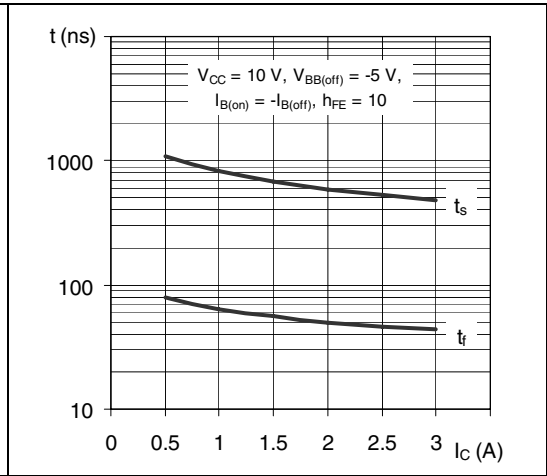
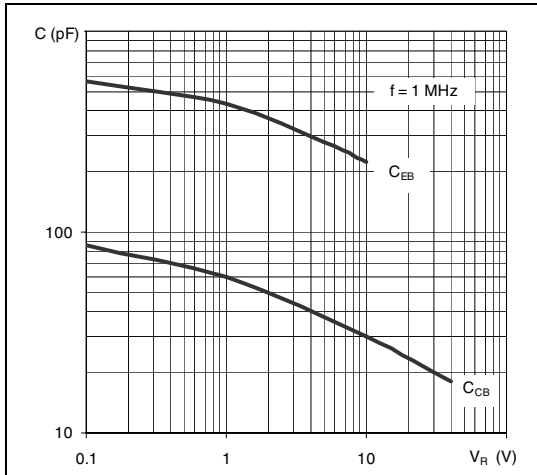
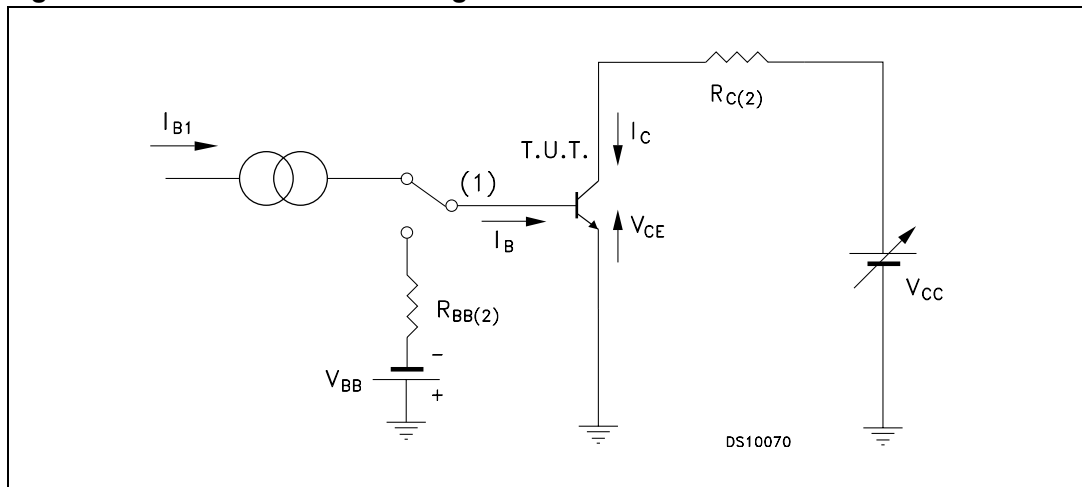


Figure 10. Capacitance curves



2.2 Test circuits

Figure 11. Resistive load switching



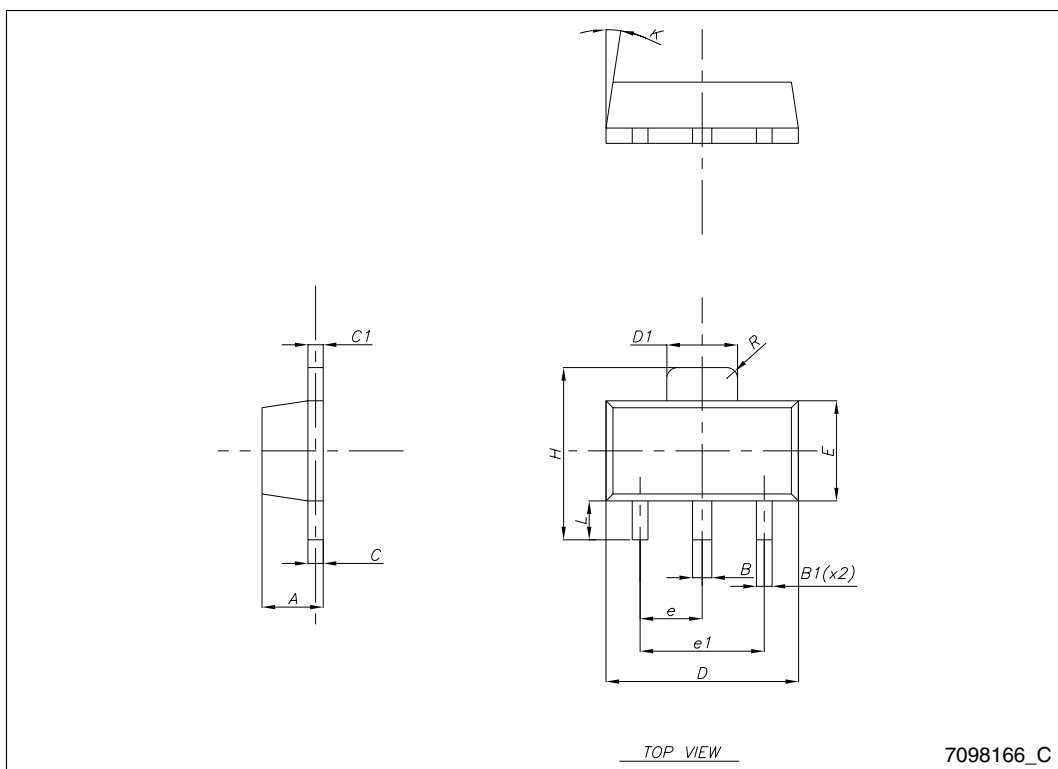
1. Fast electronic switch
2. Non-inductive resistor

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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