2STD1360
2STF1360 - 2STN1360

Low voltage fast-switching NPN power transistors

Features

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

Applications

- Emergency lighting
- LED
- Voltage regulation
- Relay drive

Description

The devices are NPN transistors 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 PNP types are the 2STD2360T4, the 2STF2360 and the 2STN2360.

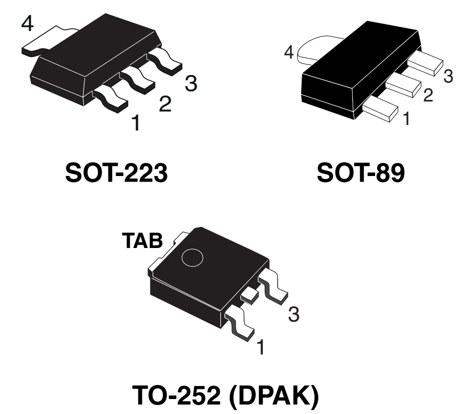


Figure 1. Internal schematic diagram

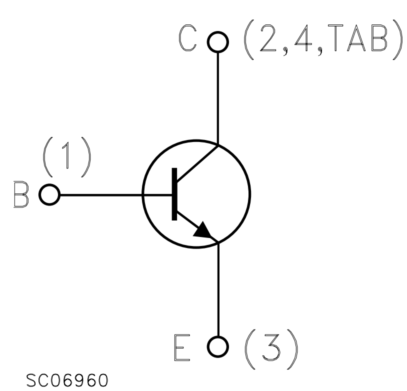


Table 1. Device summary

Order codes	Marking	Packages	Packaging
2STD1360T4	D1360	DPAK	Tape and reel
2STF1360	1360	SOT-89	Tape and reel
2STN1360	N1360	SOT-223	Tape and reel

1 Absolute maximum ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value			Unit
		2STD1360	2STF1360	2STN1360	
		DPAK	SOT-89	SOT-223	
V_{CBO}	Collector-base voltage ($I_E = 0$)	80			V
V_{CEO}	Collector-emitter voltage ($I_B = 0$)	60			V
V_{EBO}	Emitter-base voltage ($I_C = 0$)	6			V
I_C	Collector current	3			A
I_{CM}	Collector peak current ($t_P < 5$ ms)	5			A
I_B	Base current	0.2			A
I_{BM}	Base peak current ($t_P < 5$ ms)	0.4			A
P_{TOT}	Total dissipation at T_{amb} = 25 °C	15	1.4	1.6	W
T_{stg}	Storage temperature	-65 to 150			°C
T_J	Max. operating junction temperature	150			°C

Table 3. Thermal data

Symbol	Parameter		DPAK	SOT-89	SOT-223	Unit
R_{thJA}[(1)]	Thermal resistance junction-ambient	Max	8.3	89	78	°C/W

1. Device mounted on a PCB area of 1 cm^2

2 Electrical characteristics

T_{CASE} = 25°C; unless otherwise specified.

Table 4. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CBO}	Collector cut-off current (I_E = 0)	V_{CB} = 80 V			100	nA
I_{EBO}	Emitter cut-off current (I_C = 0)	V_{EB} = 6 V			100	nA
$V_{BE(on)}$	Base-emitter on voltage	V_{CE} = 2 V I_C = 100 mA	630	650	730	mV
$V_{CE(sat)}$ (1)	Collector-emitter saturation voltage	I_C = 2 A I_B = 100 mA I_C = 3 A I_B = 150 mA		130 180	300 500	mV mV
$V_{BE(sat)}$ (1)	Base-emitter saturation voltage	I_C = 2 A I_B = 100 mA		0.9	1.2	V
h_{FE} (1)	DC current gain	I_C = 100 mA V_{CE} = 2 V I_C = 1 A V_{CE} = 2 V	80 160		 400	
t_d t_r t_s t_f	Resistive load Delay time Rise time Storage time Fall time	I_C = 3 A V_{CC} = 10 V $I_{B(on)}$ = - $I_{B(off)}$ = 300 mA $V_{BE(off)}$ = - 5 V		17 81 620 54	20 100 720 65	ns ns ns ns
f_T	Transition frequency	I_C = 0.1 A V_{CE} = 10 V		130		MHz

1. Pulse test: pulse duration ≤ 300 µs, duty cycle ≤ 2 %

2.1 Typical characteristics (curves)

Figure 2. DC current gain (V_{CE} = 5 V)

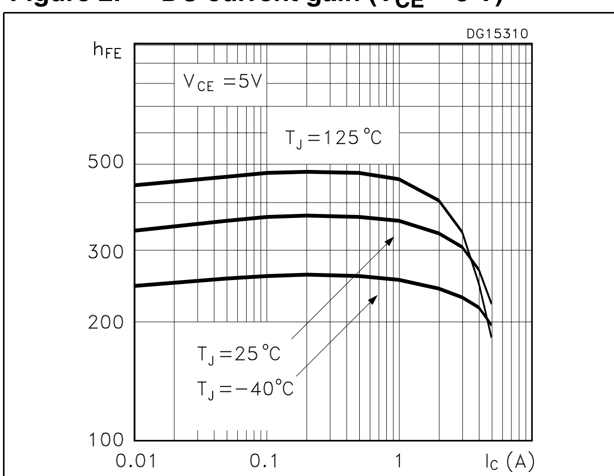


Figure 3. DC current gain (V_{CE} = 2 V)

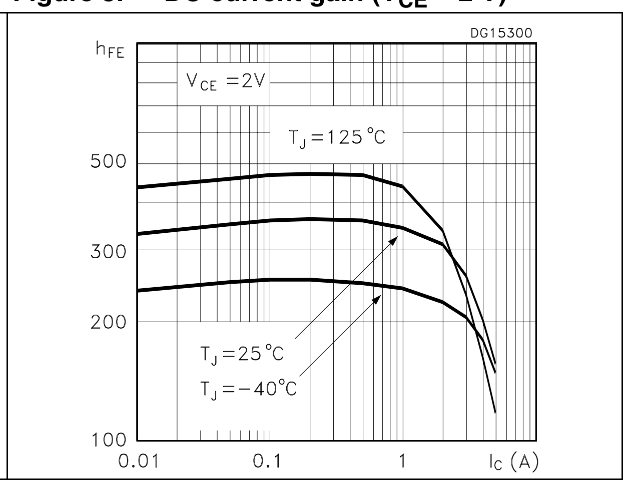


Figure 4. Collector emitter saturation voltage

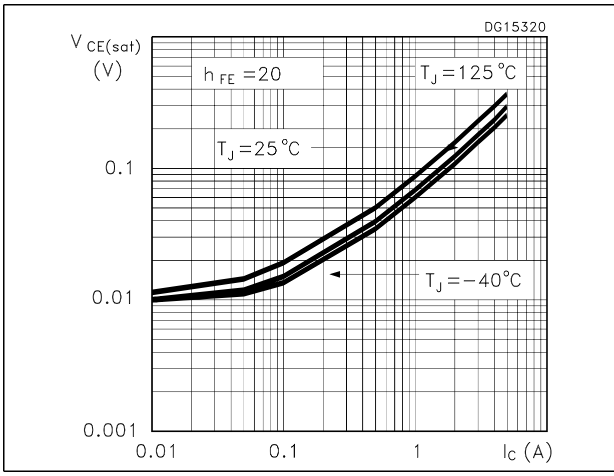


Figure 5. Base emitter saturation voltage

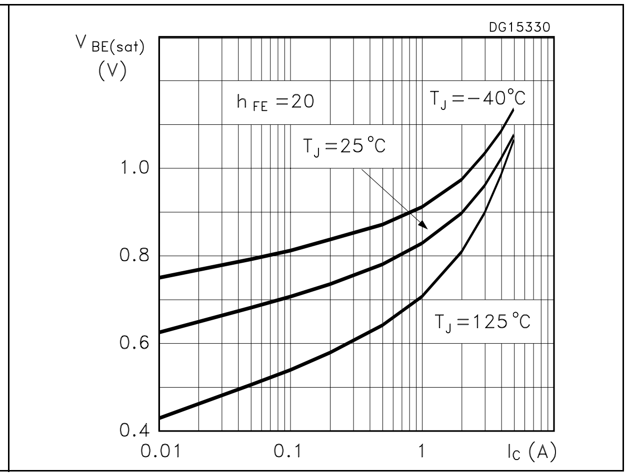


Figure 6. Resistive load switching on

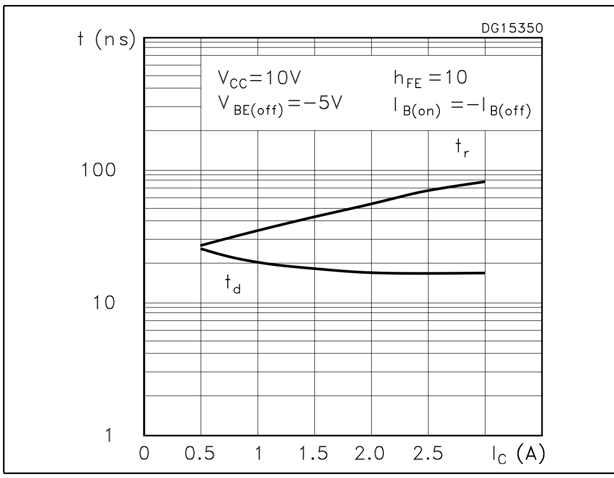


Figure 7. Resistive load switching off

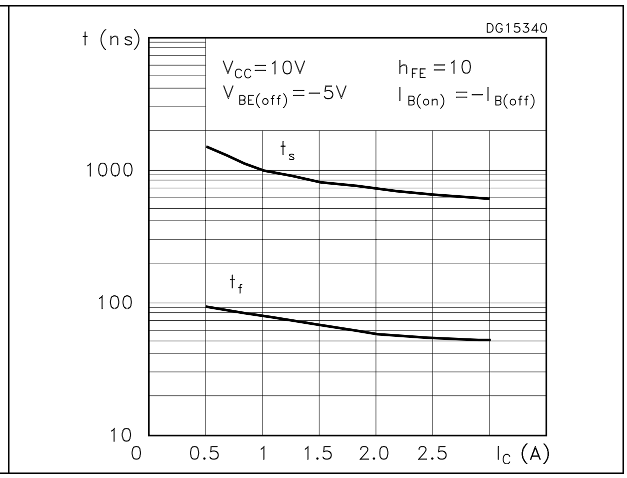
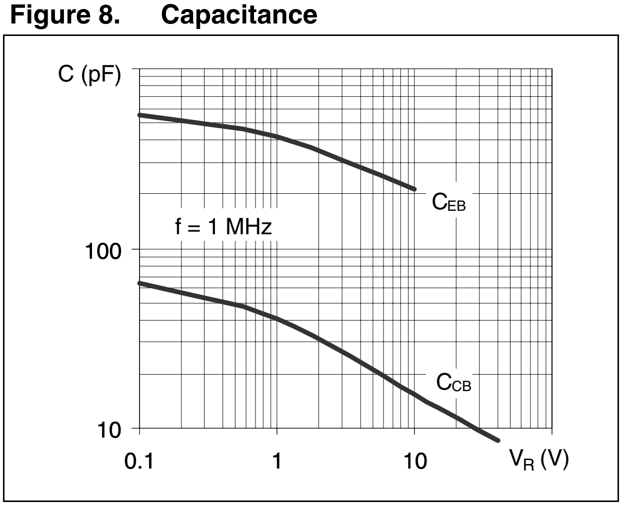
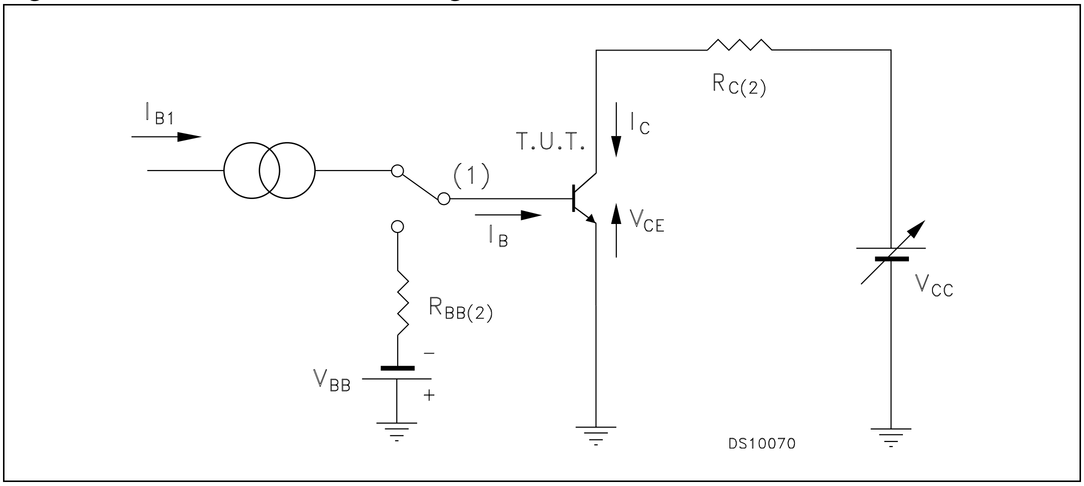


Figure 8. Capacitance



2.2 Test circuits

Figure 9. Resistive load switching



1. Fast electronic switch
2. Non-inductive resistor

3 Package mechanical data

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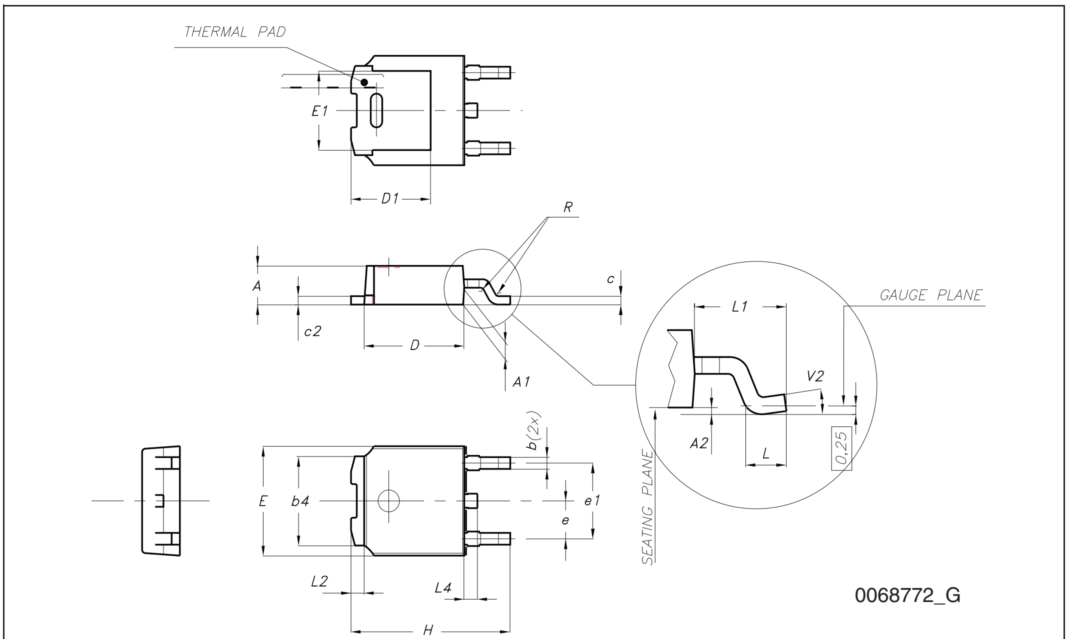
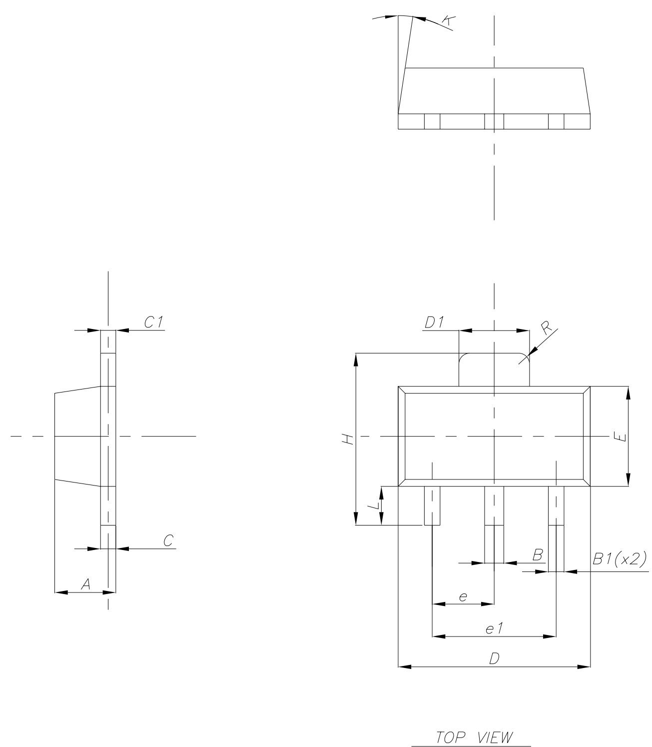
TO-252 (DPAK) mechanical data

DIM.	mm.		
	min.	typ	max.
A	2.20		2.40
A1	0.90		1.10
A2	0.03		0.23
b	0.64		0.90
b4	5.20		5.40
c	0.45		0.60
c2	0.48		0.60
D	6.00		6.20
D1		5.10	
E	6.40		6.60
E1		4.70	
e		2.28	
e1	4.40		4.60
H	9.35		10.10
L	1		
L1		2.80	
L2		0.80	
L4	0.60		1
R		0.20	
V2	0 °		8 °



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	



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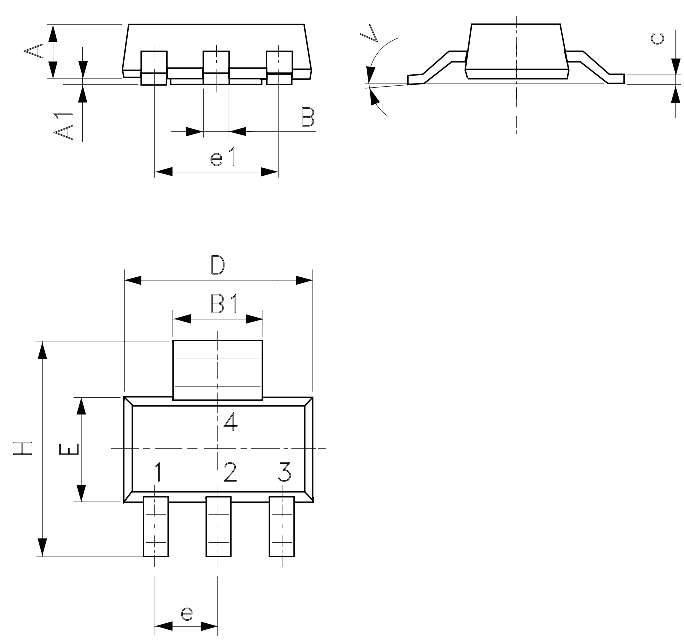
SOT-223 mechanical data

DIM.	mm.		
	min.	typ	max.
A			1.80
A1	0.02		0.1
B	0.60	0.70	0.85
B1	2.90	3.00	3.15
c	0.24	0.26	0.35
D	6.30	6.50	6.70
e		2.30	
e1		4.60	
E	3.30	3.50	3.70
H	6.70	7.00	7.30
V			10 °



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4 Revision history

Table 5. Document revision history

Date	Revision	Changes
21-Nov-2005	1	Initial release
09-Oct-2009	2	Added 2STD1360T4 in TO-252 (DPAK) package

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