2STD1360, 2STF1360, 2STN1360

Low voltage fast-switching NPN power transistors

Datasheet – production data

Features

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

Applications

- Emergency lighting
- LED
- Voltage regulation
- Relay drive

Description

This device is an NPN transistor manufactured using new low voltage planar technology with double metal process. The result is a transistor which boasts exceptionally high gain performance coupled with very low saturation voltage.

The complementary PNP types are the 2STD2360T4, the 2STF2360 and the 2STN2360.

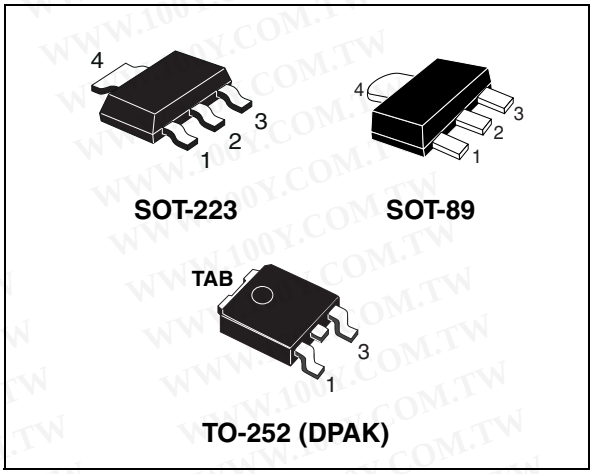


Figure 1. Internal schematic diagram

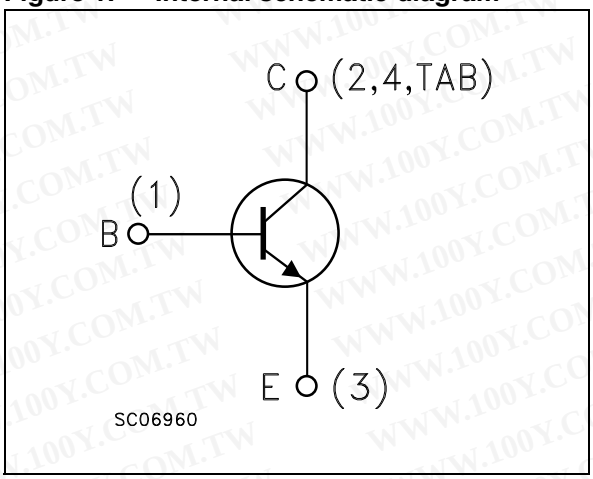


Table 1. Device summary

Order codes	Marking	Packages	Packaging
2STD1360T4	2STD1360	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	
	Resistive load					
t_d	Delay time	I_C = 3 A V_{CC} = 10 V		17	20	ns
t_r	Rise time	$I_{B(on)}$ = - $I_{B(off)}$ = 300 mA		81	100	ns
t_s	Storage time	$V_{BE(off)}$ = - 5 V		620	720	ns
t_f	Fall time			54	65	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)

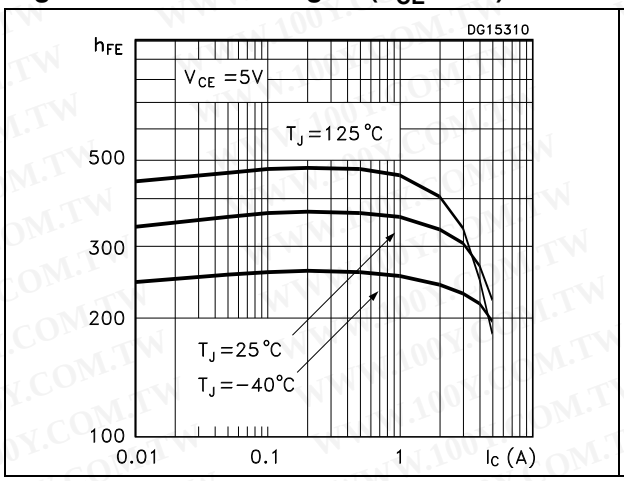


Figure 3. DC current gain (V_{CE} = 2 V)

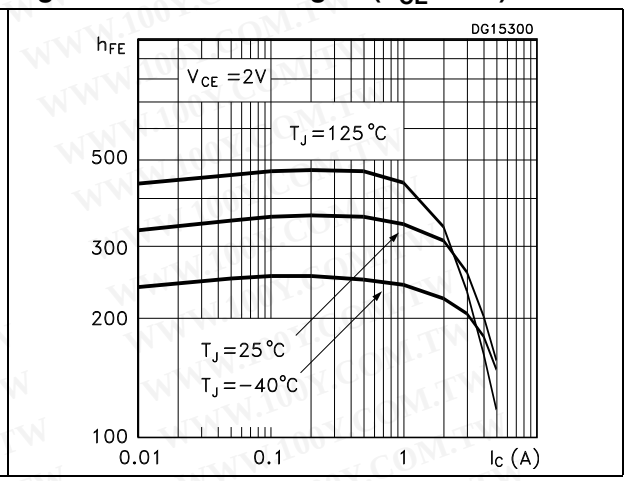


Figure 4. Collector emitter saturation voltage

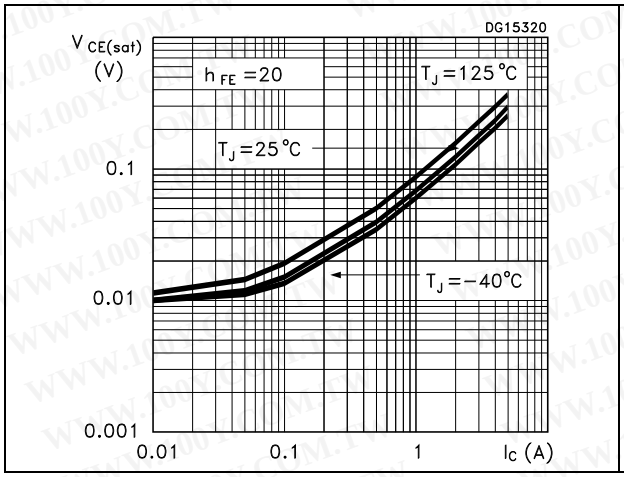


Figure 5. Base emitter saturation voltage

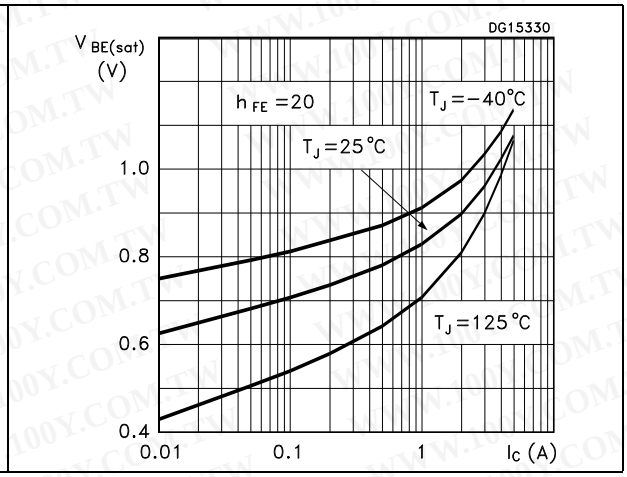


Figure 6. Resistive load switching on

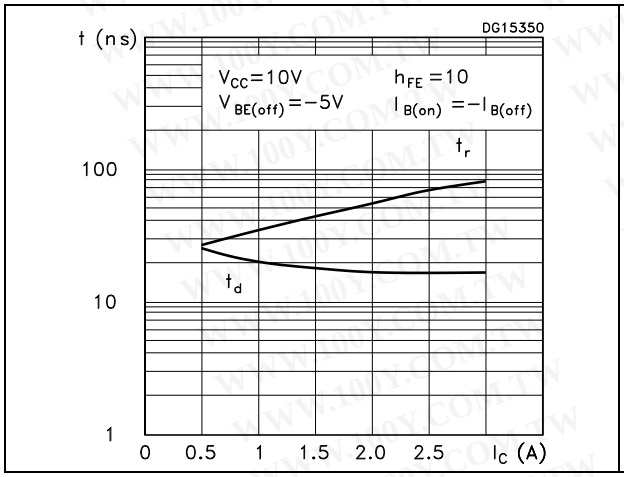


Figure 7. Resistive load switching off

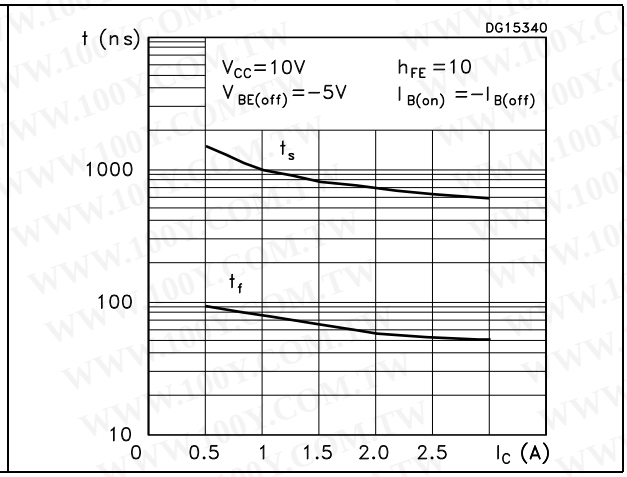
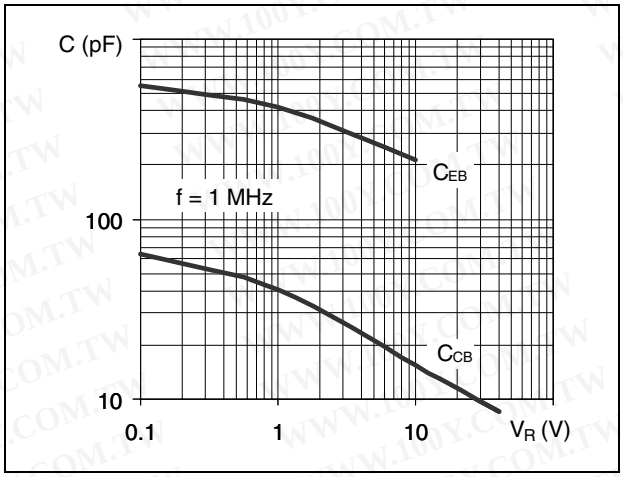
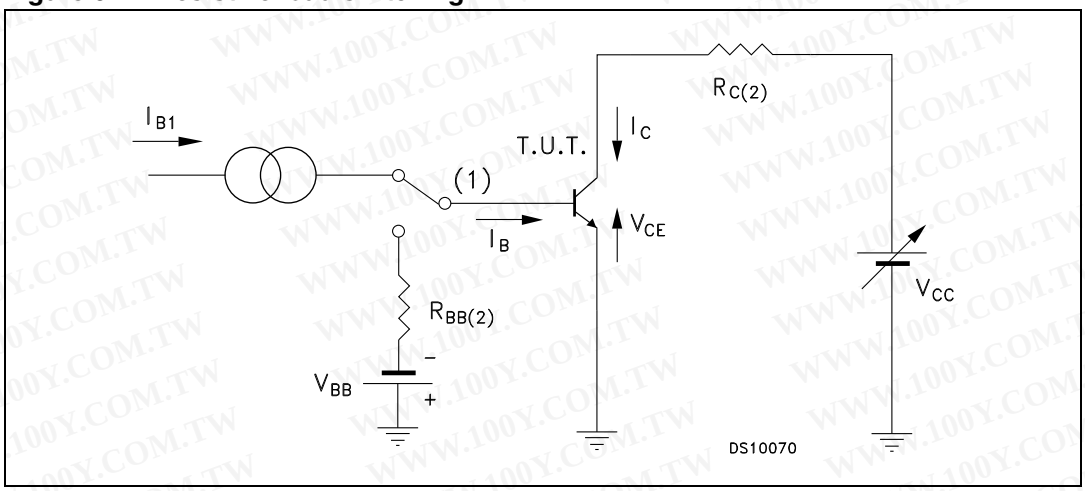


Figure 8. Capacitance



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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Table 5. DPAK (TO-252) 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°

Figure 10. DPAK (TO-252) drawing

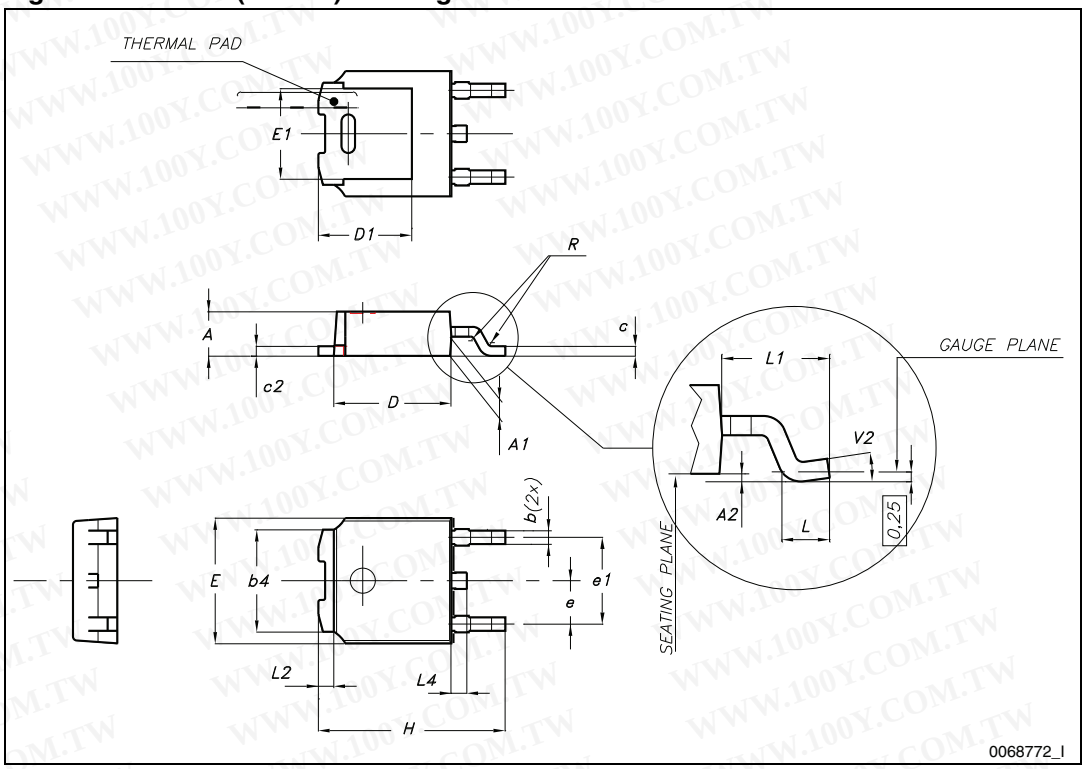
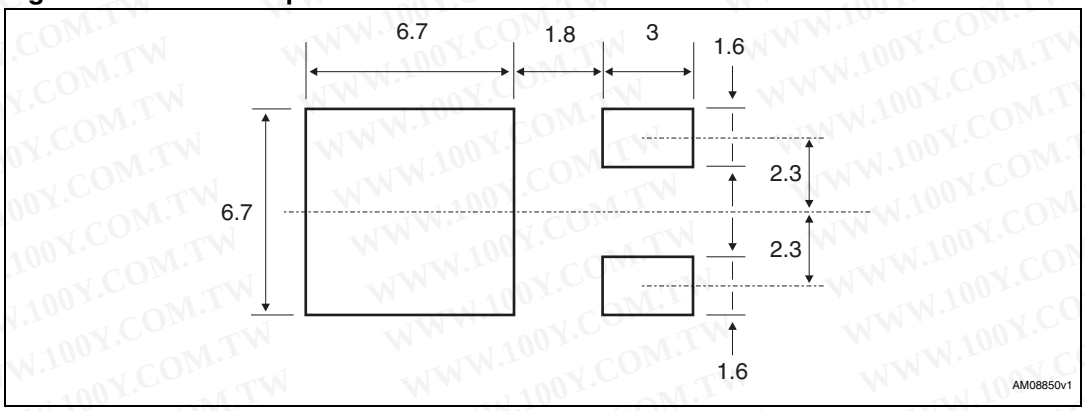


Figure 11. DPAK footprint[a]



a. All dimensions are in millimeters

Table 6. DPAK (TO-252) tape and reel mechanical data

Tape			Reel		
Dim.	mm		Dim.	mm	
	Min.	Max.		Min.	Max.
A0	6.8	7	A		330
B0	10.4	10.6	B	1.5	
B1		12.1	C	12.8	13.2
D	1.5	1.6	D	20.2	
D1	1.5		G	16.4	18.4
E	1.65	1.85	N	50	
F	7.4	7.6	T		22.4
K0	2.55	2.75			
P0	3.9	4.1	Base qty.		2500
P1	7.9	8.1	Bulk qty.		2500
P2	1.9	2.1			
R	40				
T	0.25	0.35			
W	15.7	16.3			

Figure 12. Tape for DPAK (TO-252)

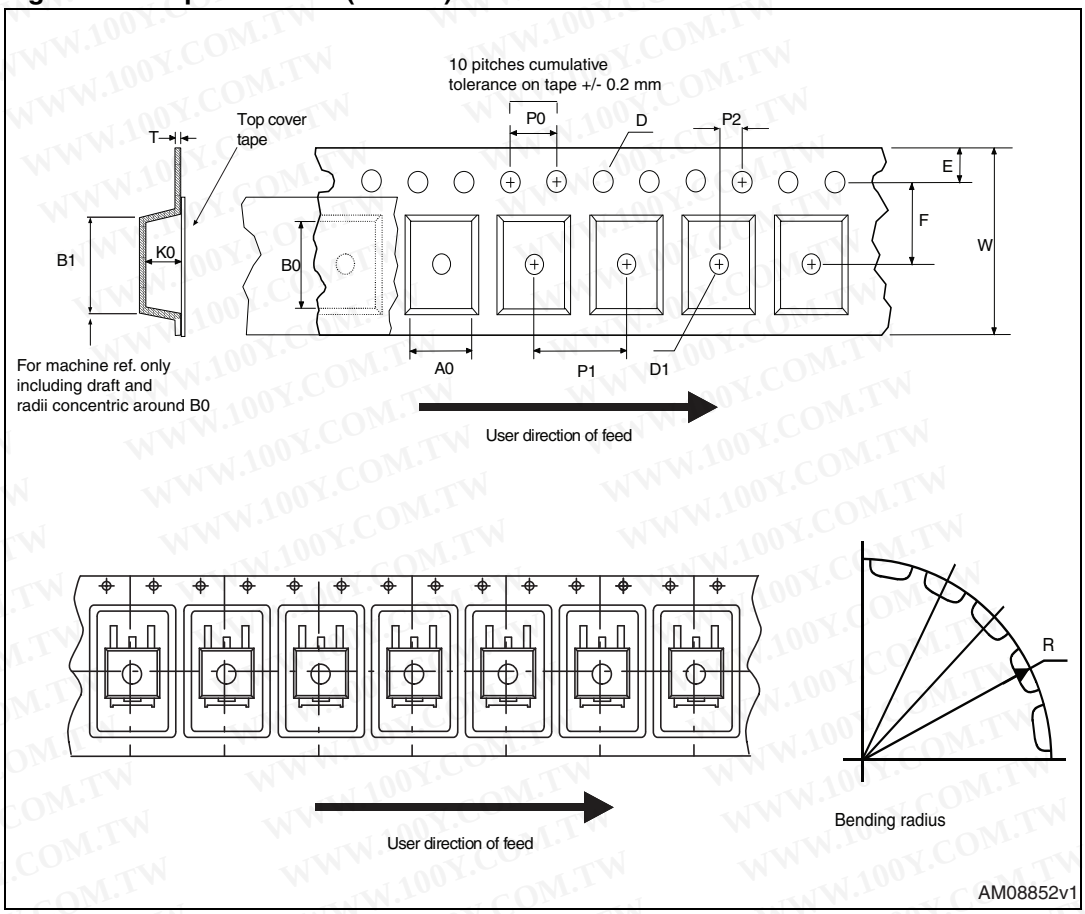


Figure 13. Reel for DPAK (TO-252)

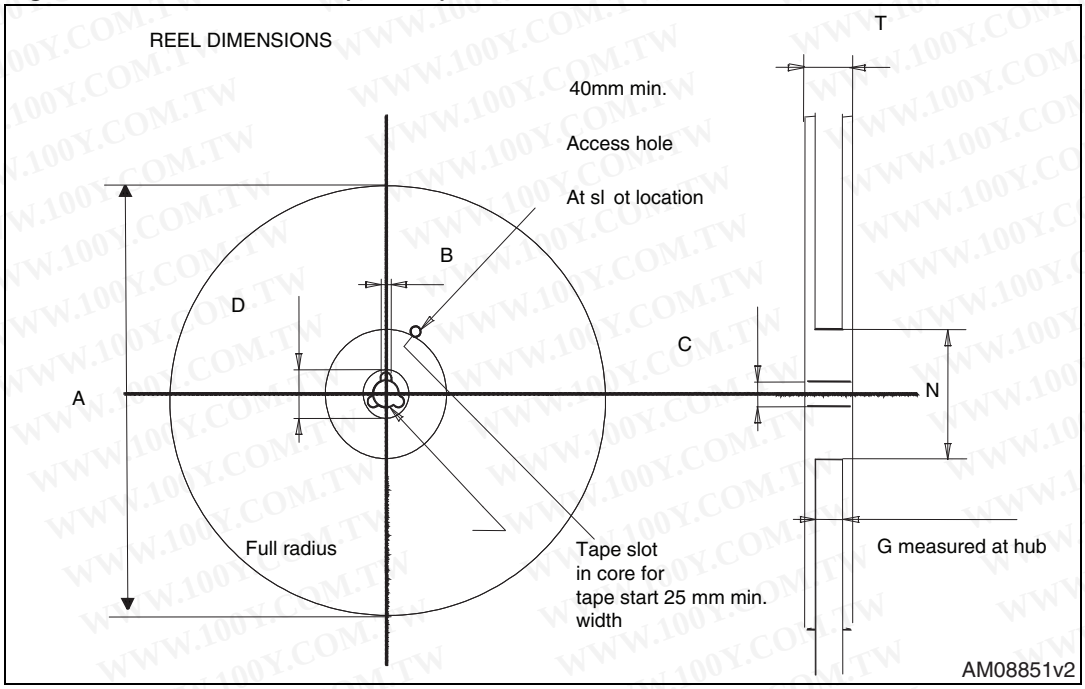


Table 7. SOT-89 mechanical data

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
D3		0.90	
E	2.29		2.60
e	1.42		1.57
e1	2.92		3.07
H	3.94		4.25
H1	2.70		3.10
K	1°		8°
L	0.89		1.20
R		0.25	
β		90°	

Figure 14. SOT-89 drawings

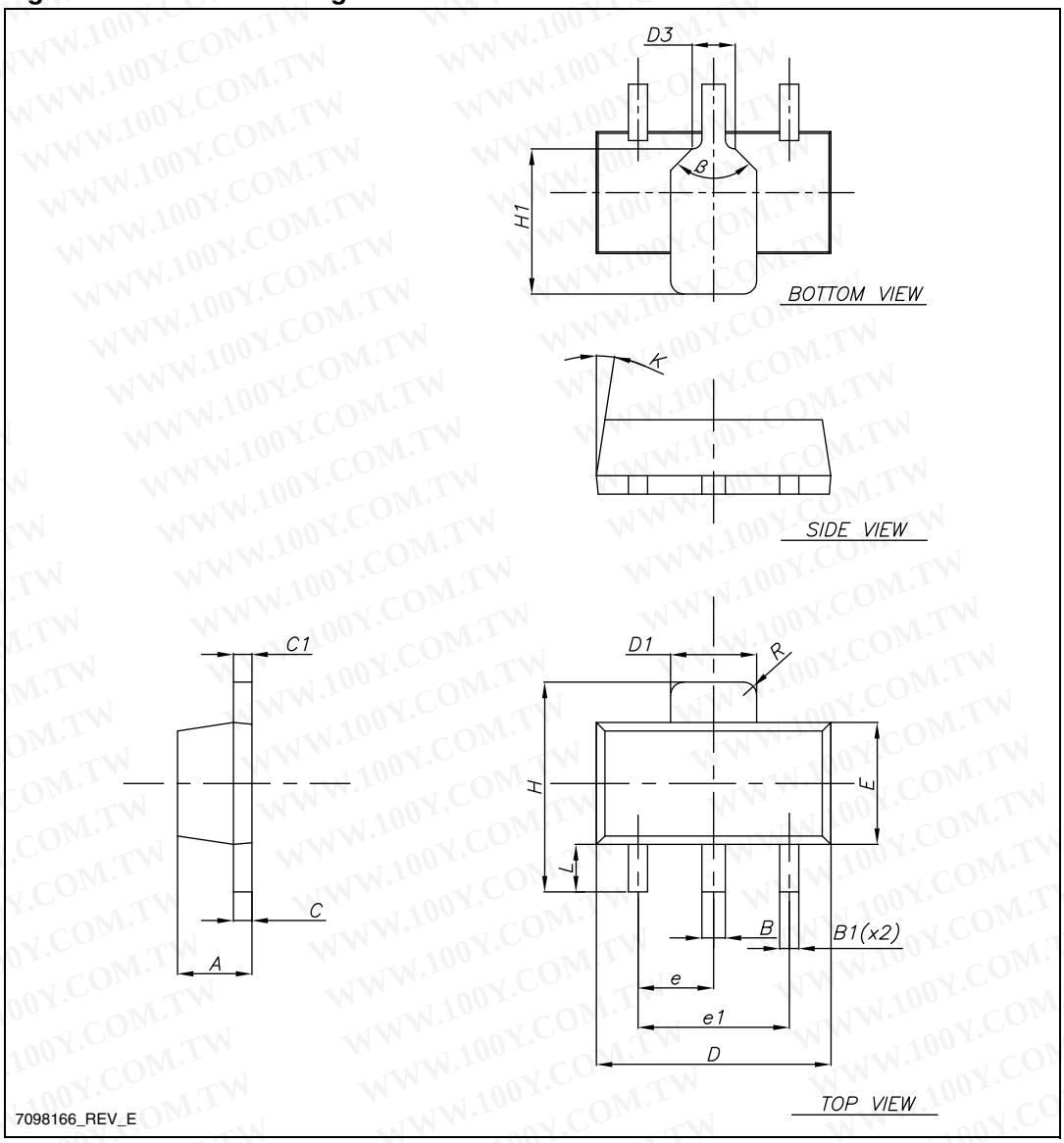


Figure 15. SOT-89 recommended footprint

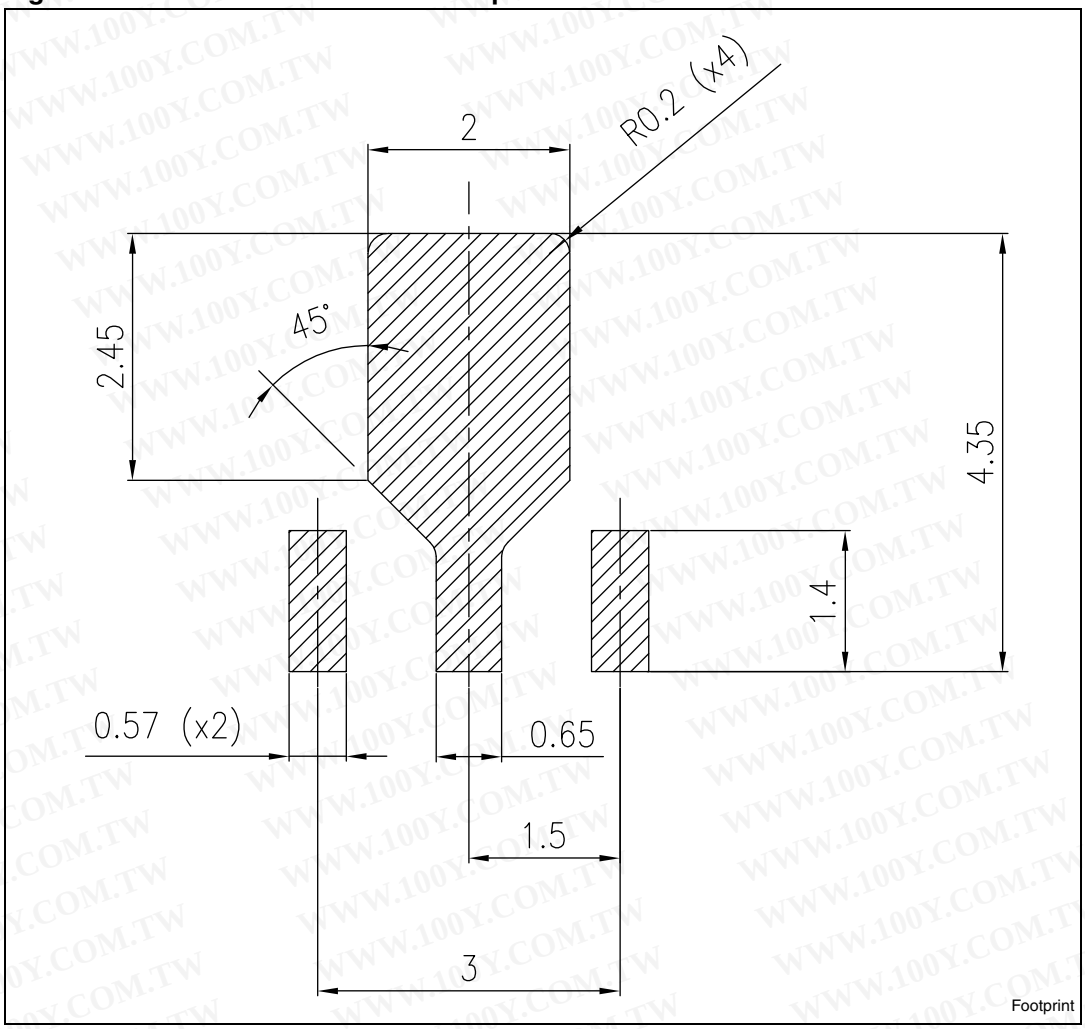
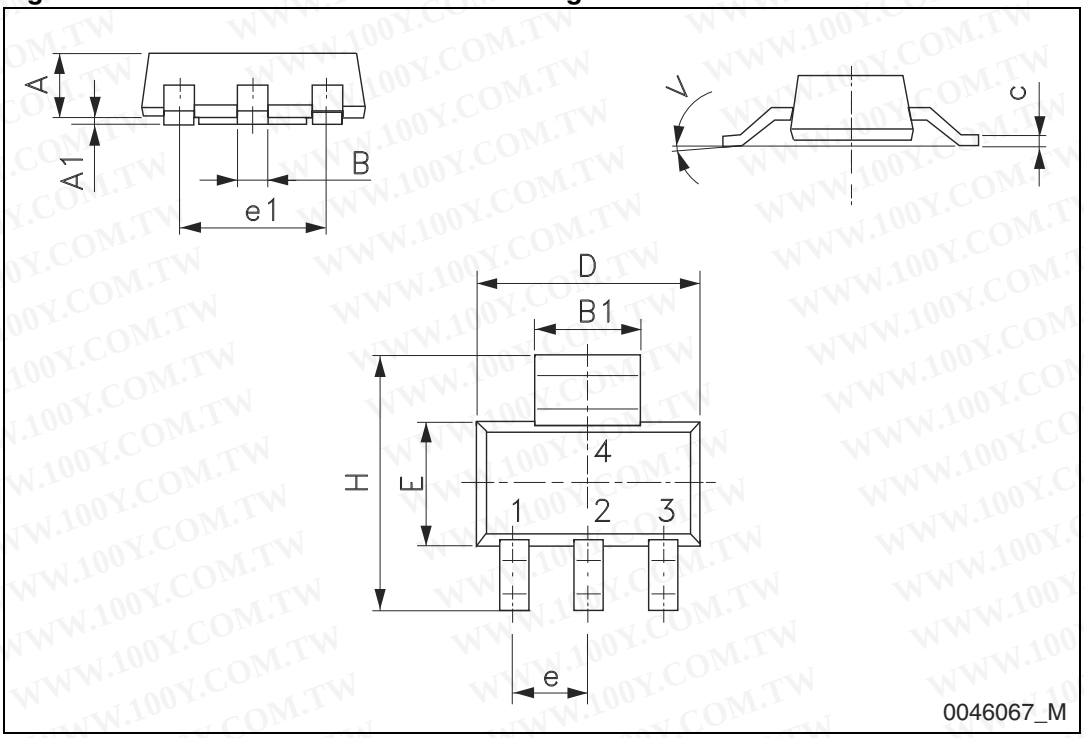


Table 8. SOT-223 mechanical data

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°

Figure 16. SOT-223 mechanical data drawing



4 Revision history

Table 9. Document revision history

Date	Revision	Changes
21-Nov-2005	1	Initial release
09-Oct-2009	2	Added 2STD1360T4 in TO-252 (DPAK) package
13-Aug-2012	3	Modified: marking for DPAK in *Table 1*

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