STN2580

High voltage fast switching NPN power transistor

Datasheet — production data

Features

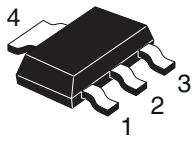
- High voltage capability
- Fast switching speed

Applications

- Lighting
- Switch mode power supply

Description

This device is a high voltage fast-switching NPN power transistor. It is manufactured using high voltage multi epitaxial planar technology for high switching speeds and medium voltage capability. It uses a cellular emitter structure with planar edge termination to enhance switching speeds while maintaining a wide RBSOA. The device is designed for use in lighting applications and low cost switch-mode power supplies.



SOT-223

Figure 1. Internal schematic diagram

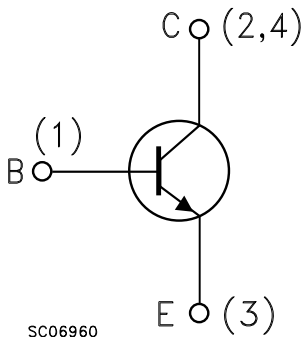


Table 1. Device summary

Order codes	Marking	Package	Packaging
STN2580	N2580	SOT-223	Tape and reel

Contents

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CES}	Collector-emitter voltage (V_{BE} = 0)	800	V
V_{CEO}	Collector-emitter voltage (I_B = 0)	400	V
V_{EBO}	Emitter-base voltage (I_C = 0)	9	V
I_C	Collector current	1	A
I_{CM}	Collector peak current (t_P < 5 ms)	2	A
I_B	Base current	0.5	A
P_{TOT}	Total dissipation at T_{amb} = 25 °C	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	Value	Unit
R_{thJA}	Thermal resistance junction-ambient max(1)	78	°C/W

1. When mounted on PCB area of 1cm^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} = 800 V			10	µA
I_{EBO}	Emitter cut-off current (I_C = 0)	V_{EB} = 8 V			100	µA
$V_{(BR)CEO}$ (1)	Collector-emitter breakdown voltage (I_B = 0)	I_C = 10 mA	400			V
$V_{(BR)EBO}$	Emitter-base breakdown voltage (I_C = 0)	I_E = 100 µA	9			V
h_{FE} (1)	DC current gain	I_C = 250 mA V_{CE} = 5 V	60	100		
$V_{CE(sat)}$ (1)	Collector-emitter saturation voltage	I_C = 1 A I_B = 0.2 A			1	V
$V_{BE(sat)}$ (1)	Base-emitter saturation voltage	I_C = 1 A I_B = 0.2 A			1.1	V
	Resistive load					
t_r	Rise time	V_{CC}=200 V, I_C=0.3 A		140		ns
t_s	Storage time	I_{B1}=20 mA, I_{B2}=-50 mA		4		µs
t_f	Fall time	T_p=30 µs		90		ns

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

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

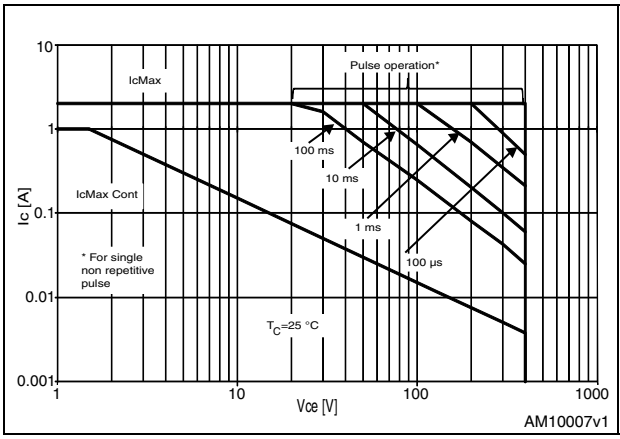


Figure 3. Derating curve

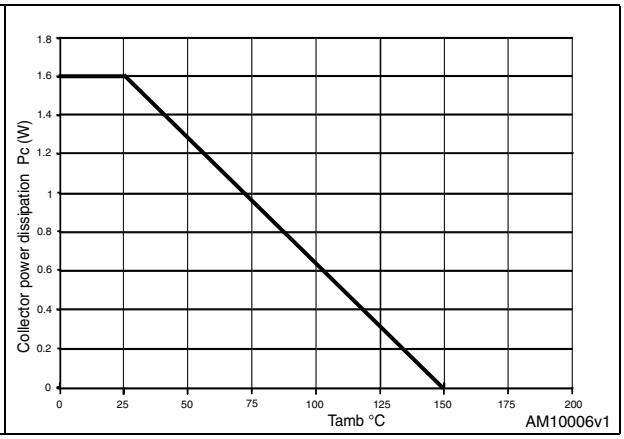


Figure 4. Output curves up to V_{CE}=2 V

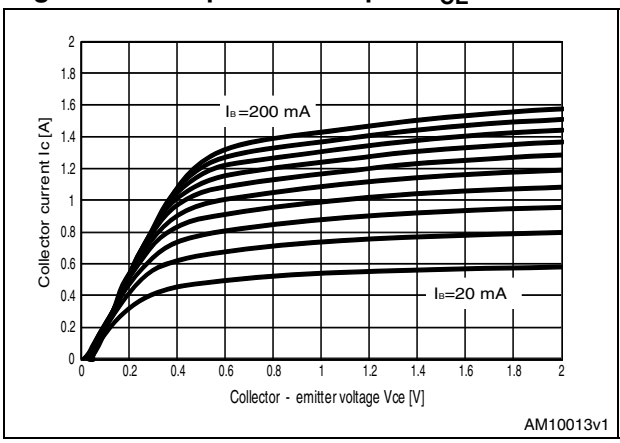


Figure 5. Output curves up to V_{CE}=10 V

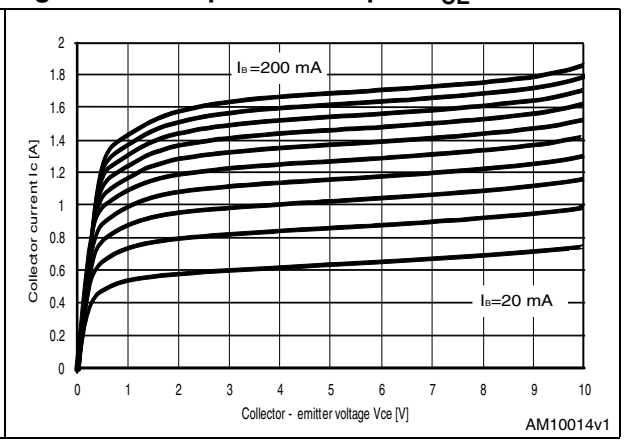


Figure 6. DC current gain (V_{CE} = 1 V)

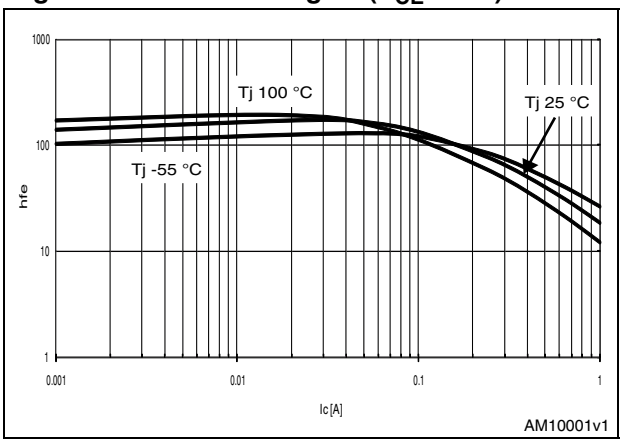


Figure 7. DC current gain (V_{CE} = 5 V)

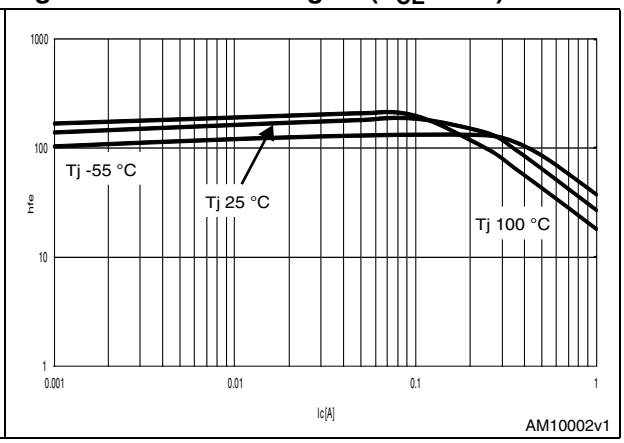


Figure 8. Collector-emitter saturation voltage

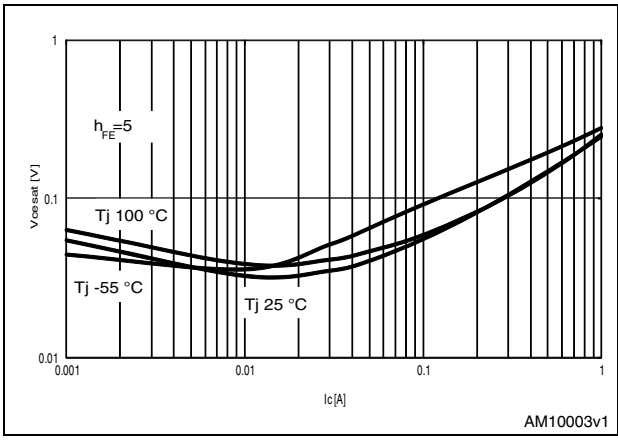


Figure 9. Base-emitter saturation voltage

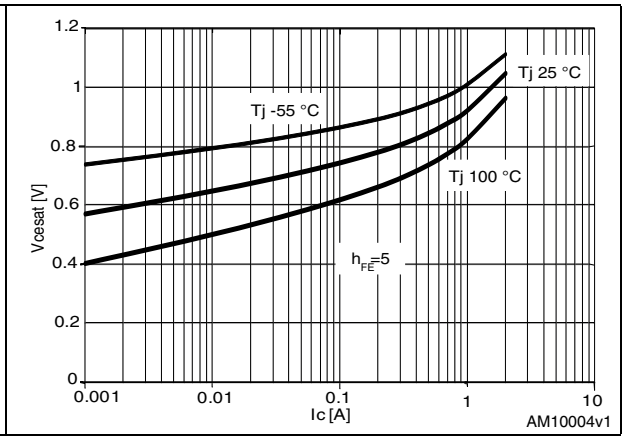


Figure 10. Base-emitter on voltage

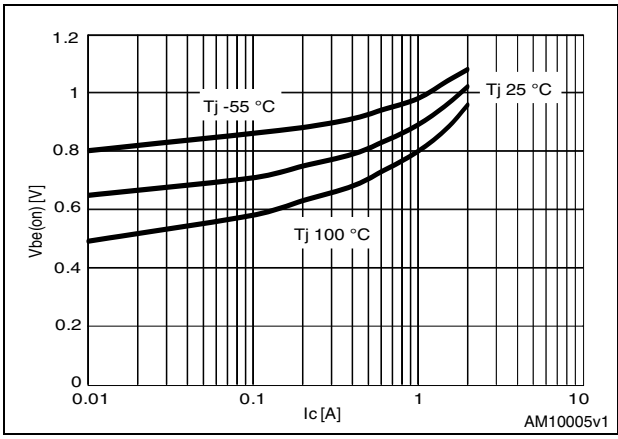


Figure 11. Capacitance variation

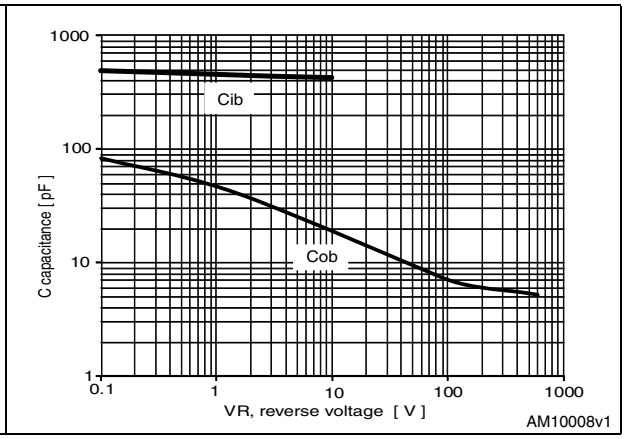


Figure 12. Resistive switching time

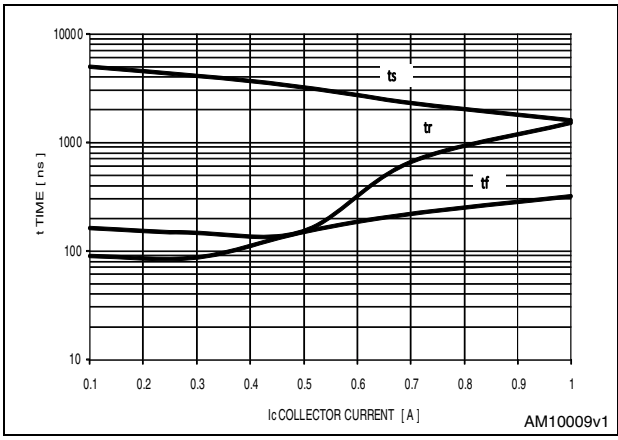


Figure 13. $V_{be(sat)}$ vs. I_C

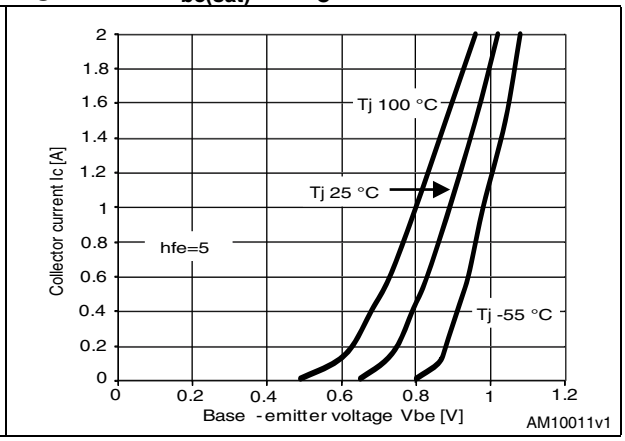
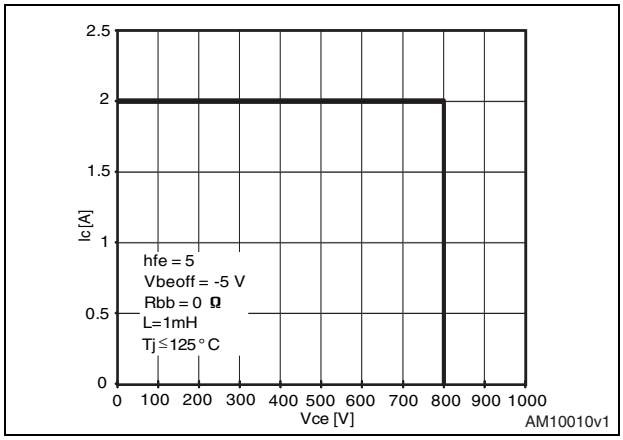
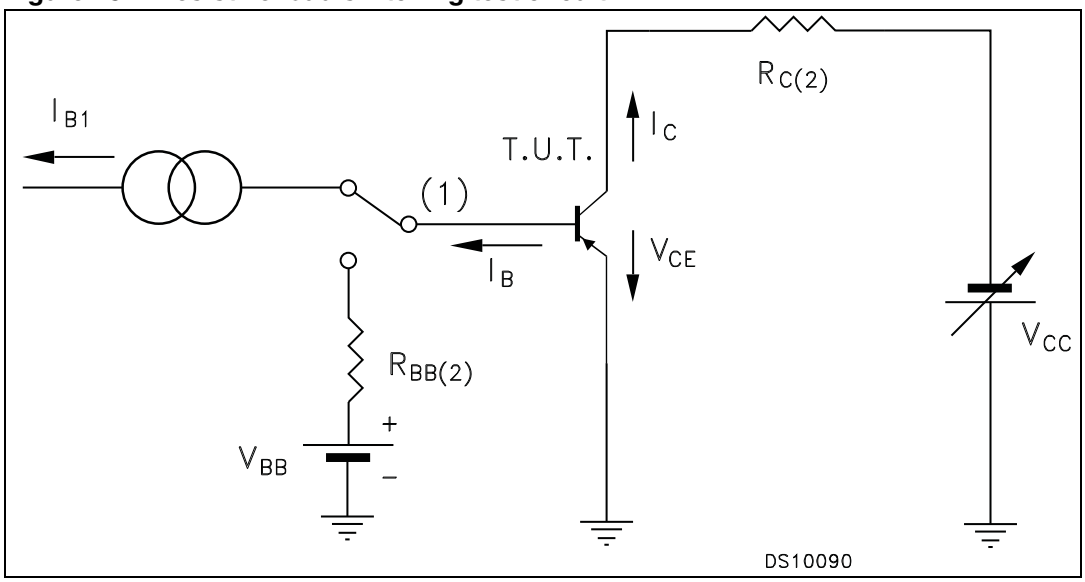


Figure 14. Reverse biased operating area



3 Test circuit

Figure 15. Resistive load switching test circuit



1. Fast electronic switching
2. Non-inductive resistor

4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com*. ECOPACK® is an ST trademark.

Table 5. 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

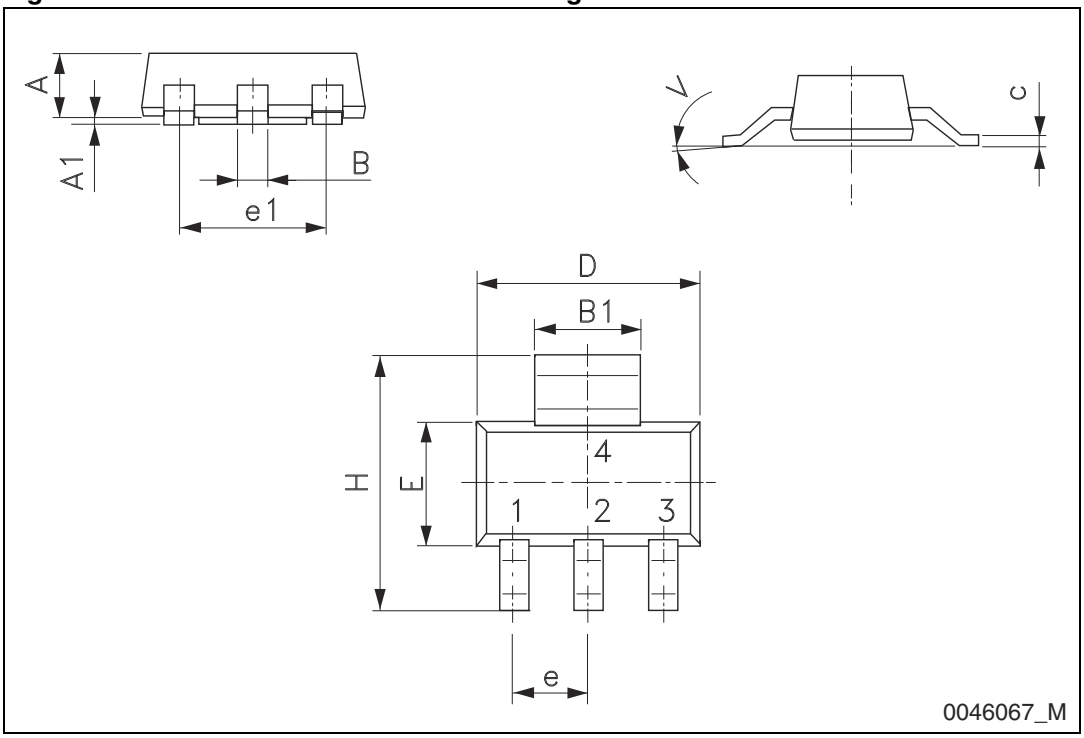
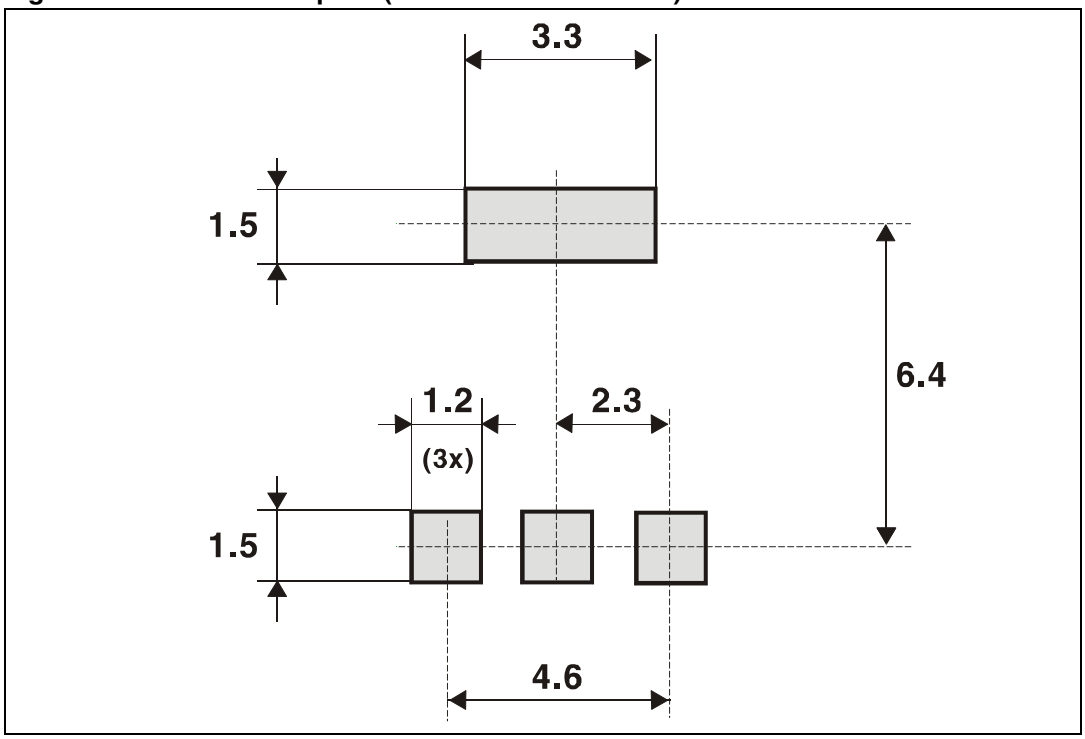


Figure 17. SOT-223 footprint (dimensions are in mm)

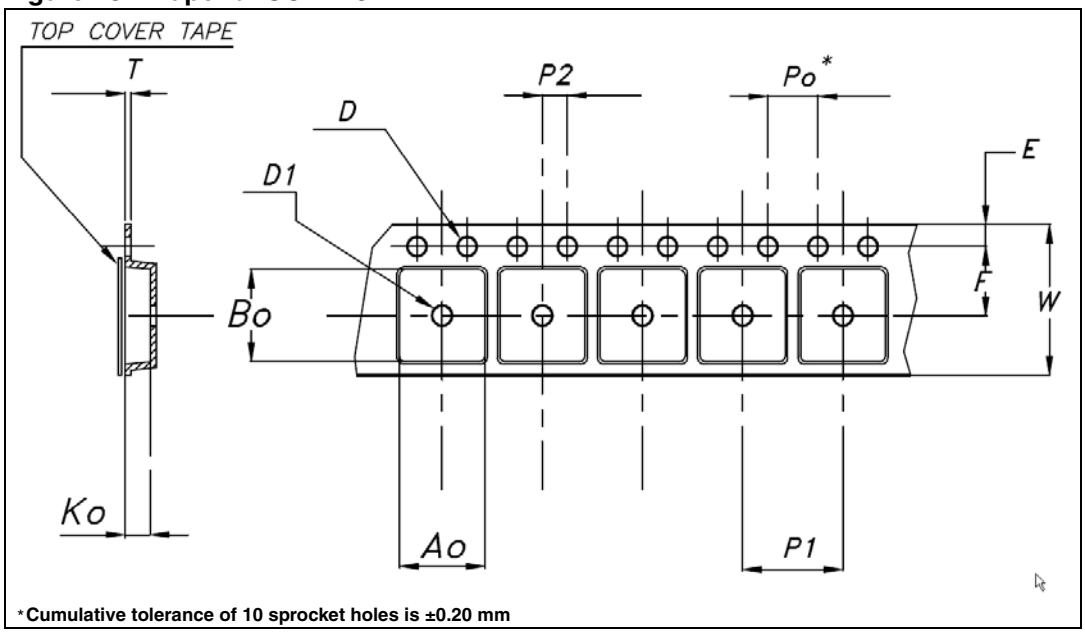


5 Packaging mechanical data

Table 6. SOT-223 tape and reel mechanical data

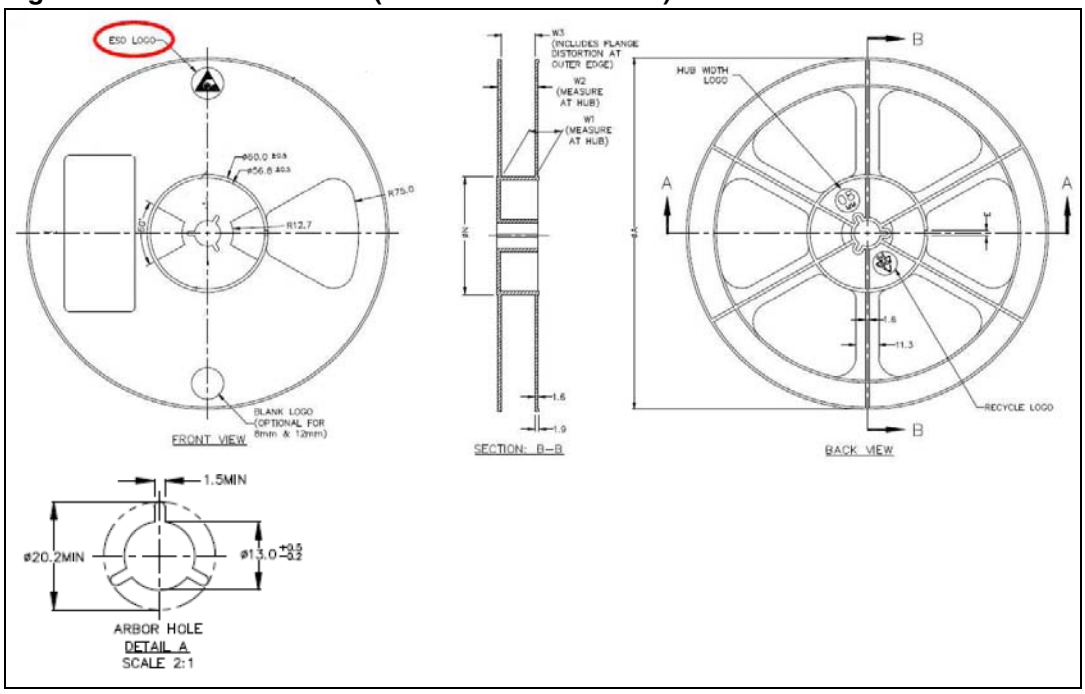
Tape				Reel		
Dim.	mm			Dim.	mm	
	Min.	Typ.	Max.		Min.	Max.
A0	6.75	6.85	6.95	A		180
B0	7.30	7.40	7.50	N	60	
K0	1.80	1.90	2.00	W1		12.4
F	5.40	5.50	5.60	W2		18.4
E	1.65	1.75	1.85	W3	11.9	15.4
W	11.7	12	12.3			
P2	1.90	2	2.10	Base quantity pcs		1000
P0	3.90	4	4.10	Bulk quantity pcs		1000
P1	7.90	8	8.10			
T	0.25	0.30	0.35			
Dϕ	1.50	1.55	1.60			
D1ϕ	1.50	1.60	1.70			

Figure 18. Tape for SOT-223



*Cumulative tolerance of 10 sprocket holes is ±0.20 mm

Figure 19. Reel for SOT-223 (dimensions are in mm)



6 Revision history

Table 7. Document revision history

Date	Revision	Changes
30-Oct-2012	1	Initial release.
10-Jan-2013	2	Added new section: *Packaging mechanical data*

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