

High voltage fast switching NPN power transistor

Datasheet - production data

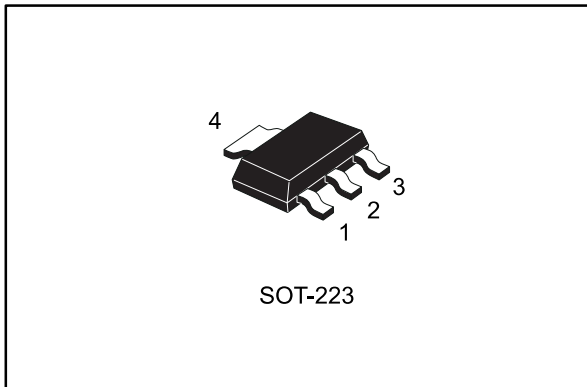
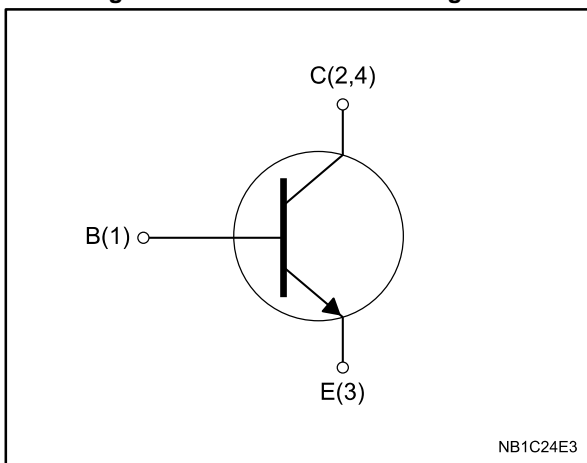


Figure 1: Internal schematic diagram



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.

Table 1: Device summary

Order codes	Marking	Package	Packing
2STN2780	N2780	SOT-223	Tape and reel

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1 Electrical ratings

Table 2: Device summary

Symbol	Parameter	Value	Unit
V_{CES}	Collector-emitter voltage ($V_{BE} = 0\text{ V}$)	900	V
V_{CEO}	Collector-emitter voltage ($I_B = 0\text{ A}$)	400	V
V_{EBO}	Emitter-base voltage ($I_C = 0\text{ A}$)	$V_{(BR)EBO}$	V
I_C	Collector current	1	A
I_{CM}	Collector peak current ($t_P < 5\text{ ms}$)	2	A
I_B	Base current	0.5	A
P_{TOT}	Total dissipation at $T_{amb} = 25\text{ °C}$	1.6	W
T_{STG}	Storage temperature range	-65 to 150	°C
T_J	Operating junction temperature range		

Table 3: Device summary

Symbol	Parameter	Value	Unit
R_{thJA}	Thermal resistance junction-ambient max. ⁽¹⁾	78	°C/W

Notes:

⁽¹⁾when mounted on 1 cm² PCB area

2 Electrical characteristics

$T_C = 25\text{ °C}$ unless otherwise specified.

Table 4: Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CBO}	Collector cut-off current ($I_E = 0\text{ A}$)	$V_{CB} = 900\text{ V}$			10	μA
I_{EBO}	Emitter cut-off current ($I_B = 0\text{ A}$)	$V_{EB} = 12\text{ V}$			100	μA
$V_{(BR)CEO}^{(1)}$	Collector-emitter breakdown voltage ($I_B = 0\text{ A}$)	$I_C = 10\text{ mA}$	400			V
$V_{(BR)EBO}$	Emitter-base breakdown voltage ($I_C = 0\text{ A}$)	$I_E = 100\text{ }\mu\text{A}$	12		24	V
$h_{FE}^{(1)}$	DC current gain	$I_C = 10\text{ mA}$, $V_{CE} = 5\text{ V}$	80			
		$I_C = 250\text{ mA}$, $V_{CE} = 5\text{ V}$	60	120		
		$I_C = 1\text{ A}$, $V_{CE} = 5\text{ V}$	8			
$V_{CE(sat)}^{(1)}$	Collector-emitter saturation voltage	$I_C = 0.5\text{ A}$, $I_B = 100\text{ mA}$			0.8	V
		$I_C = 1\text{ A}$, $I_B = 200\text{ mA}$			1	
$V_{BE(sat)}^{(1)}$	Collector-emitter saturation voltage	$I_C = 0.5\text{ A}$, $I_B = 100\text{ mA}$			1	V
		$I_C = 1\text{ A}$, $I_B = 200\text{ mA}$			1.1	
t_r	Rise time	Resistive load: $V_{CC} = 200\text{ V}$, $I_C = 0.3\text{ A}$, $I_{B1} = 30\text{ mA}$, $I_{B2} = -60\text{ mA}$, $t_p = 30\text{ }\mu\text{s}$		200		ns
t_s	Storage time			4.8		μs
t_f	Fall time			120		ns

Notes:

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

2.1 Electrical characteristics (curves)

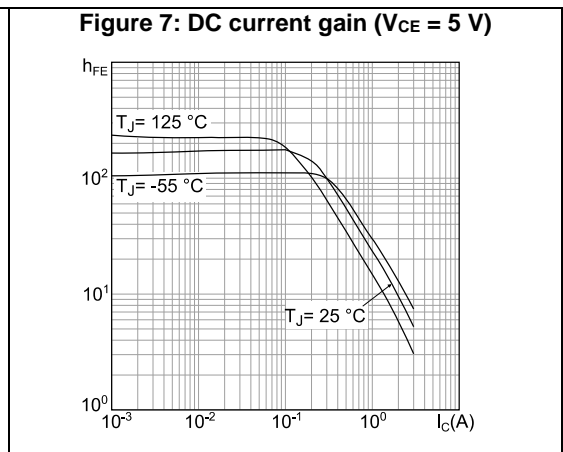
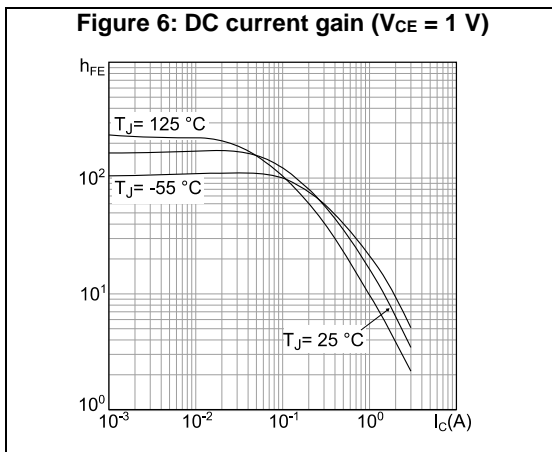
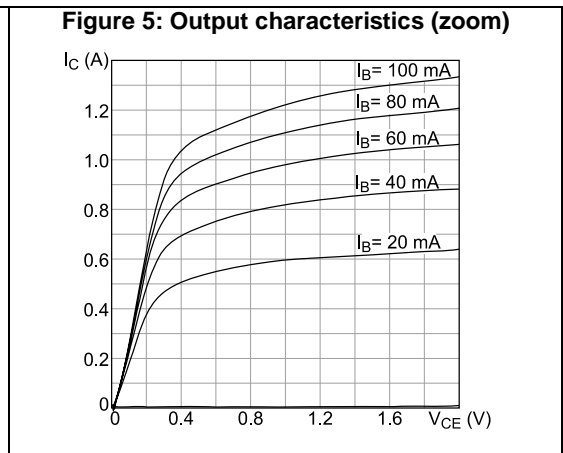
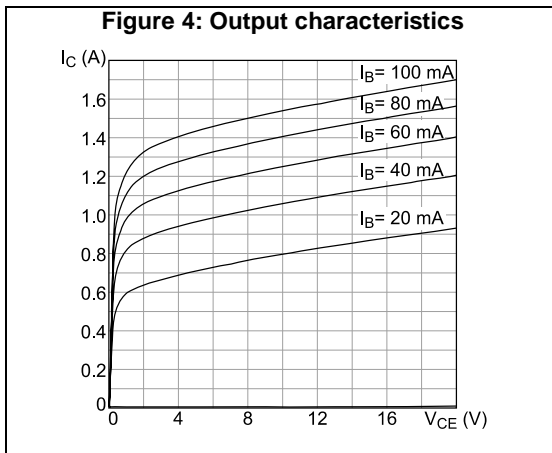
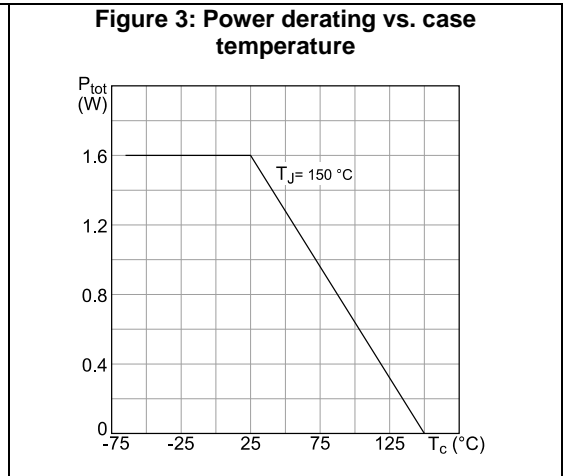
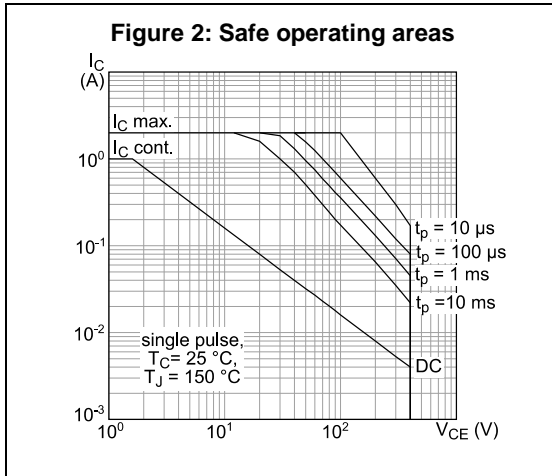


Figure 8: Collector-emitter saturation voltage ($h_{FE} = 5$)

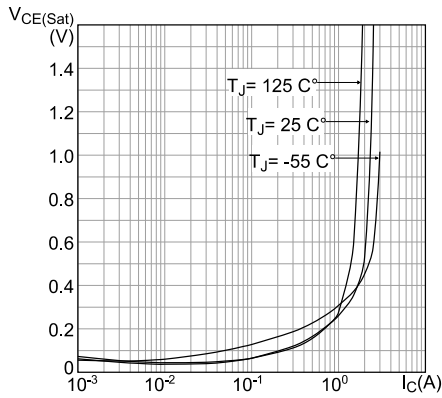


Figure 9: Base-emitter saturation voltage ($h_{FE} = 5$)

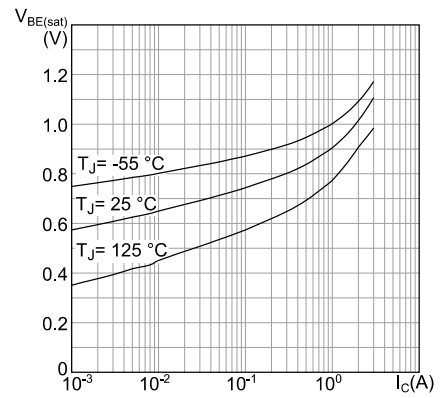


Figure 10: Capacitance variation

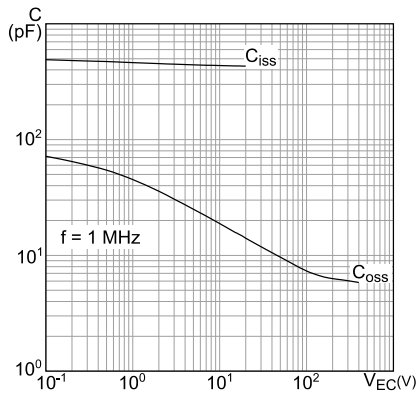


Figure 11: Resistive load switching times

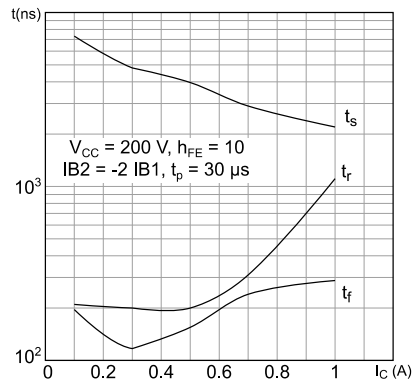
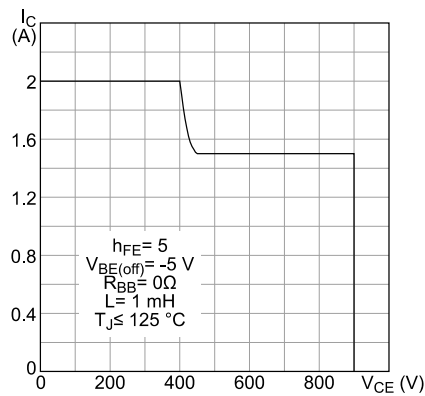
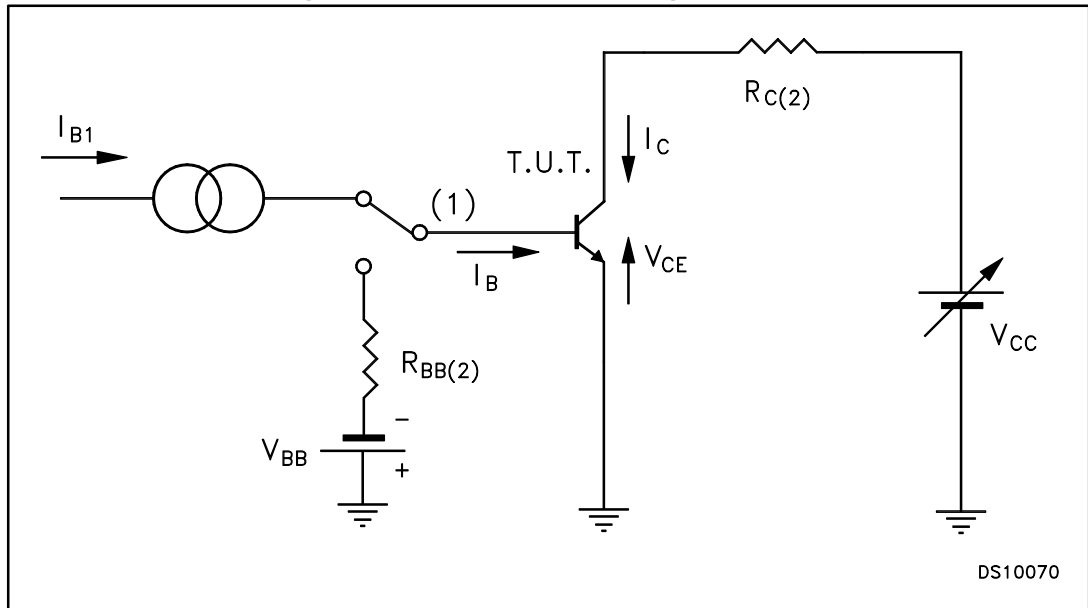


Figure 12: Reverse biased safe operating area



3 Test circuits

Figure 13: Resistive load switching test circuit

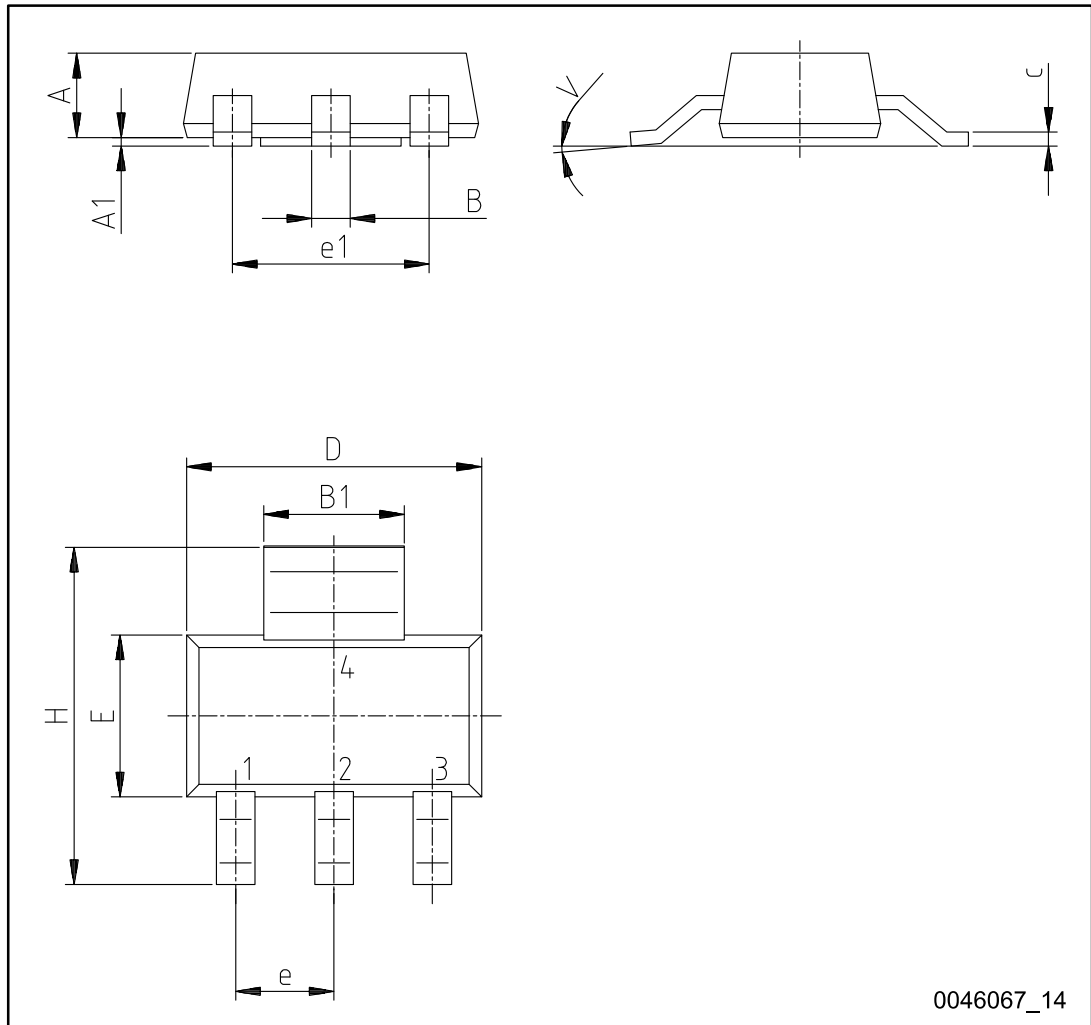


4 Package information

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.

4.1 SOT-223 package information

Figure 14: SOT-223 package outline

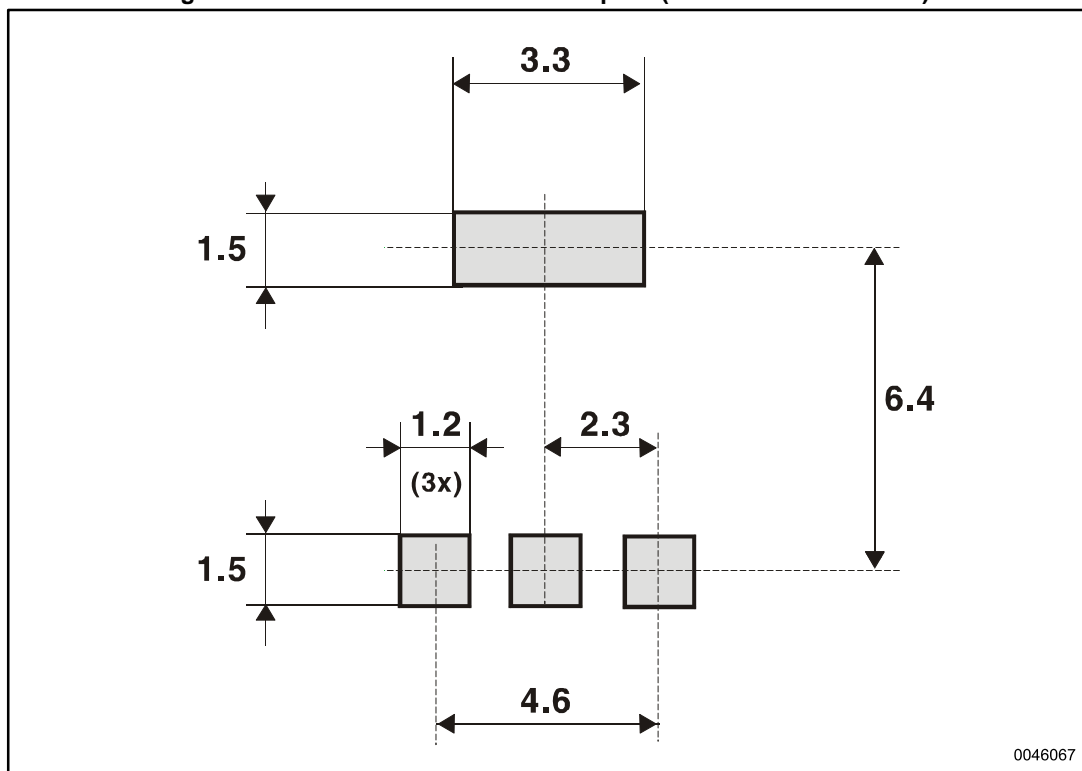


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Table 5: SOT-223 package mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A			1.8
B	0.6	0.7	0.85
B1	2.9	3	3.15
c	0.24	0.26	0.35
D	6.3	6.5	6.7
e		2.3	
e1		4.6	
E	3.3	3.5	3.7
H	6.7	7.0	7.3
V			10°
A1		0.02	0.1

Figure 15: SOT-223 recommended footprint (dimensions are in mm)



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4.2 SOT-223 packing information

Figure 16: SOT-223 tape outline

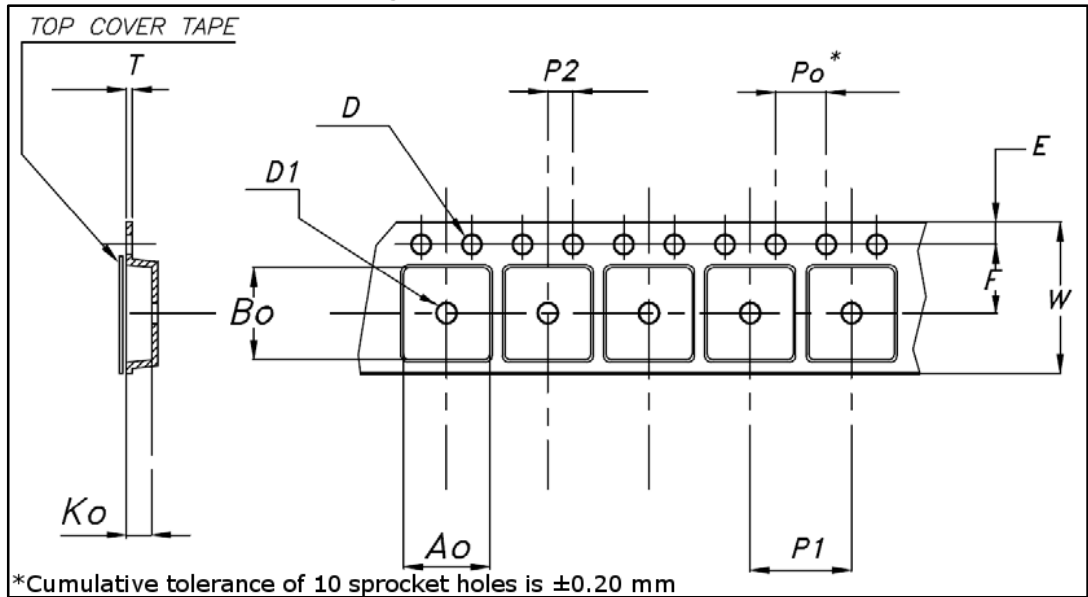


Figure 17: SOT-223 reel outline

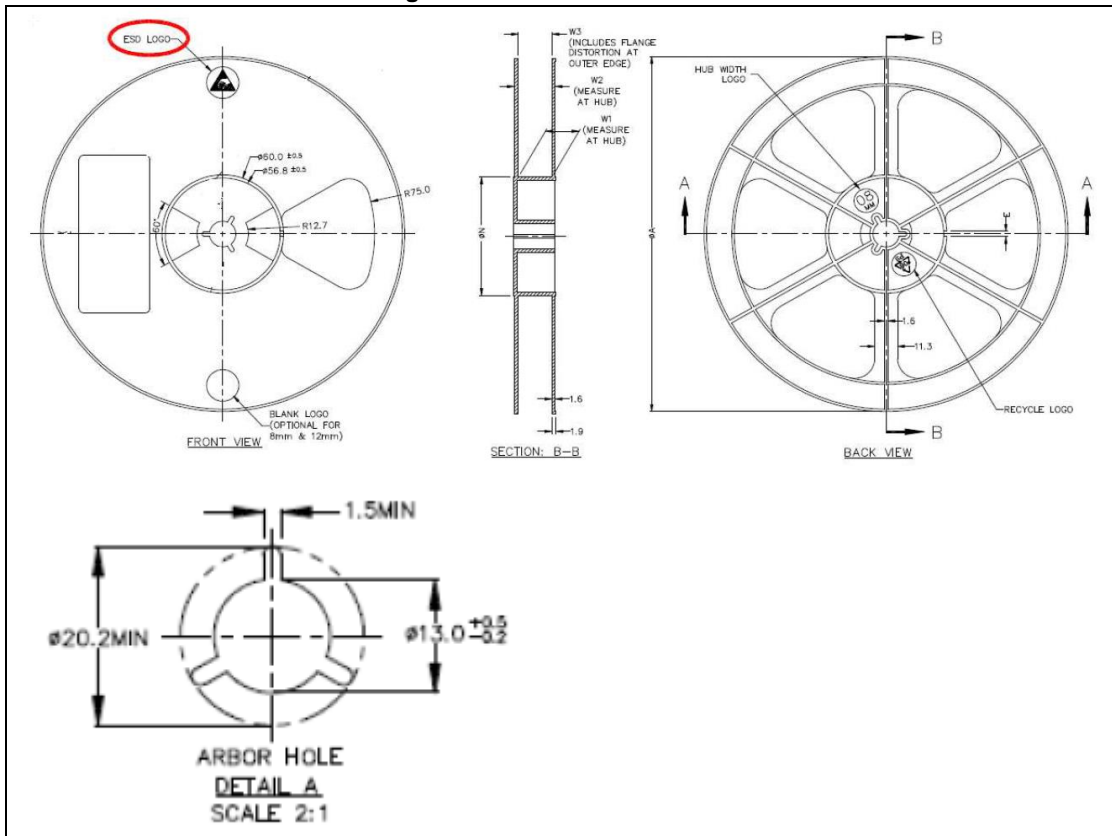


Table 6: SOT-223 tape and reel mechanical data

Tape				Tape		
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	12.0	12.3			
P2	1.90	2.00	2.10	Base quantity pcs		1000
P0	3.90	4.00	4.10	Bulk quantity pcs		1000
P1	7.90	8.00	8.10			
T	0.25	0.30	0.35			
DΦ	1.50	1.55	1.60			
D1Φ	1.50	1.60	1.70			

5 Revision history

Table 7: Document revision history

Date	Revision	Changes
06-May-2016	1	Initial release.

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