ESDA041-1JY, ESDA041-2W3Y

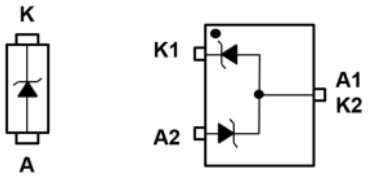
Datasheet

Automotive 4 V TVS for BMS in SOD323 and SOT323



SOD323
(Jedec DO-215)

SOT323-3L
(Jedec TO-236)



Features

- AEC-Q101 qualified
- Low leakage current: 50 nA max. at 3.6 V
- Low clamping during hot plug surges
- Unidirectional devices
- Protection of 2 battery cells in 1 package
- ECOPACK2 compliant component
- ISO 10605 / IEC 61000-4-2: C = 150 pF, R = 330 Ω, exceeds level 4
  - ±30 kV (air discharge)
  - ±30 kV (contact discharge)
- ISO 10605: C = 330 pF, R = 330 Ω, exceeds level 4
  - ±30 kV (air discharge)
  - ±30 kV (contact discharge)
- IEC 61000-4-4
- ISO 7637-3
  - Fast transient pulse a: Vs = -150 V
  - Fast transient pulse b: Vs = +150 V
  - Slow transient negative pulse: Vs = -85 V
  - Slow transient positive pulse: Vs = +85 V

Product status link
ESDA041-1JY
ESDA041-2W3Y

Application

Protection of battery monitoring systems (BMS) in electrical vehicle and hybrid electric vehicles such as e-bikes, cars and buses. The low clamping voltage during ESD and hot plug surges provides an efficient protection of the discrete and/or integrated MOS to ensure robustness and longevity of the battery management system. The low leakage current is compatible with a precise read-out of the state of charge of cells to maximize the global battery charge.

Description

These ESDA041 devices are unidirectional single and dual line TVS protection devices designed to protect battery monitoring system (BMS) and other circuits around batteries against ESD transients and hot plug-in overshoots.

The dual TVS version in SOT323 provides space saving and cost effectiveness.

These devices are packaged in SOD323 and in SOT323-3L.

1 Characteristics

Table 1. Absolute maximum ratings (T_{amb} = 25 °C)

Symbol	Parameter		Value	Unit
V_{PP}	Peak pulse voltage	ISO10605 / IEC 61000-4-2 (C = 150 pF, R = 330 Ω): Contact discharge Air discharge	 30 30	kV
		ISO10605 (C = 330 pF, R = 330 Ω) Contact discharge Air discharge	 30 30	
		ISO 10605 - C = 330 pF, R = 2 kΩ	30	
I_{PP}	Peak pulse current	8/20 µs	20	A
T_j	Operating junction temperature range		-55 to +150	°C
T_{stg}	Storage temperature range		-55 to +150	°C
T_L	Maximum lead temperature for soldering during 10 s		260	°C

Figure 1. Electrical characteristics - parameter definitions

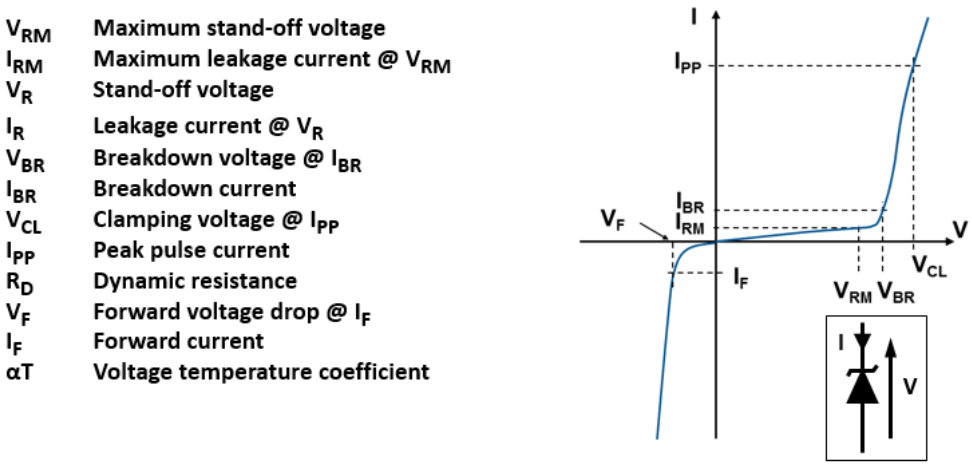


Table 2. Electrical characteristics - parameter values (T_{amb} = 25 °C, unless otherwise specified)

Type	I_{RM} max at V_R			I_{RM} max at V_{RM}			V_{BR} at 1 mA			V_F at 10 mA		8 / 20µs			C at 0 V
												V_{CL} (1)	I_{PP}	R_D	
	25 °C	85 °C		25 °C	85 °C		Min.	Typ.	Max.	Typ.	Max.	Max.		Max.	Typ.
	µA		V	µA		V	V	V	V	V	V	V	A	Ω	pF
ESDA041-1JY	0.05	0.1	3.6	0.1	0.2	4	6.2	6.5	6.8	0.78	0.9	9	7	0.3	190
ESDA041-2W3Y	0.05	0.1	3.6	0.1	0.2	4	6.2	6.5	6.8	0.78	0.9	9	7	0.3	190

1. *To calculate V_{CL} max versus I_{PP} appli: V_{CL} max = V_{BR} max + R_D x I_{PP}appli.*

1.1 Characteristics (curves)

Figure 2. Maximum peak current dissipation versus initial junction temperature

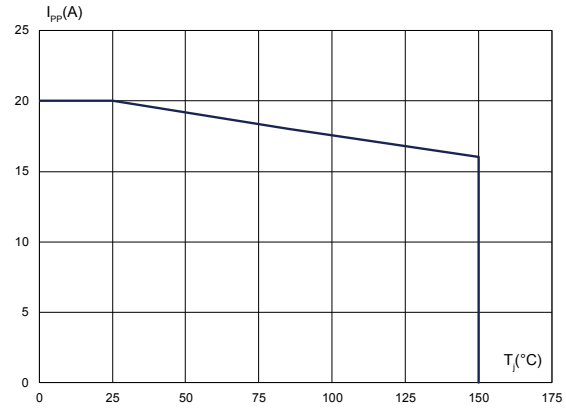


Figure 3. Maximum peak pulse current versus exponential pulse duration

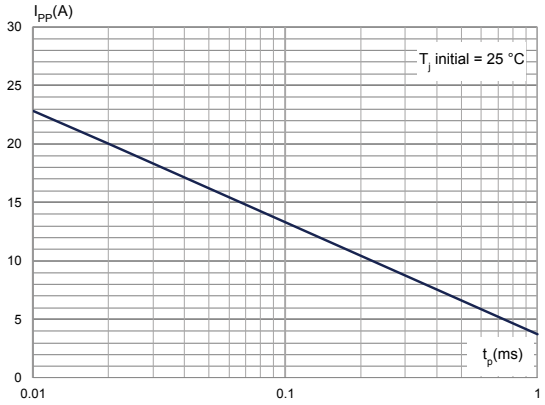


Figure 4. Peak pulse current versus clamping voltage

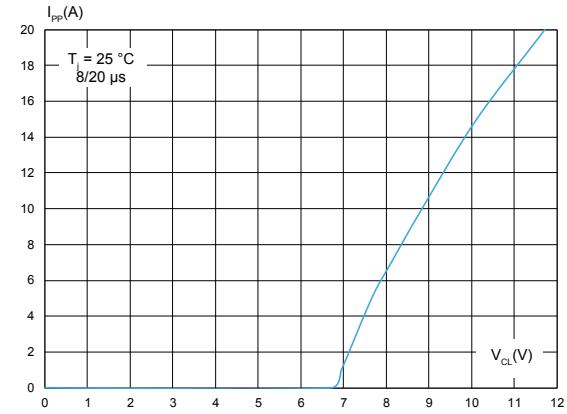


Figure 5. Leakage current versus junction temperature

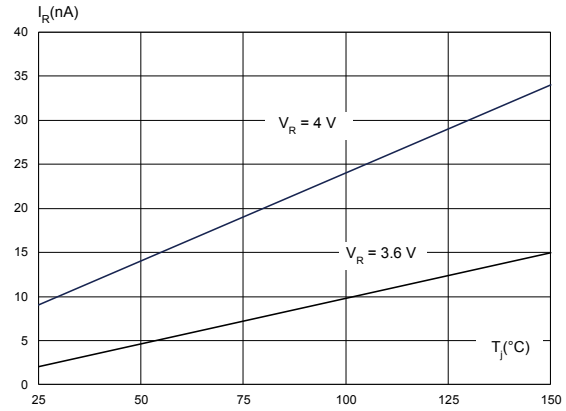


Figure 6. Leakage current versus reverse voltage

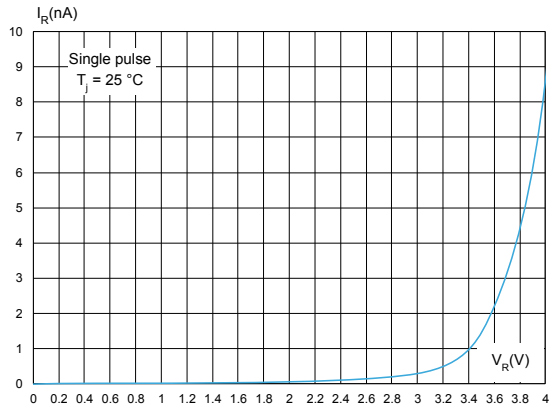


Figure 7. Forward current versus forward voltage drop

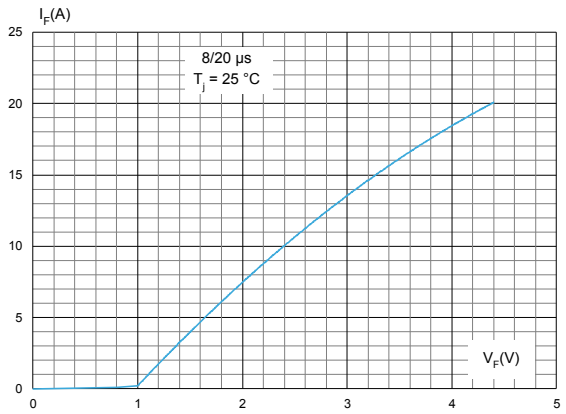


Figure 8. Response to ISO 10605 -C = 150 pF, R = 330 Ω (-8 kV contact)

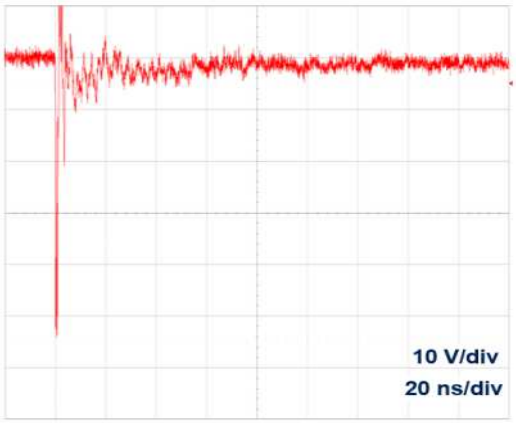


Figure 9. Response to ISO 10605 -C = 150 pF, R = 330 Ω (+8 kV contact)

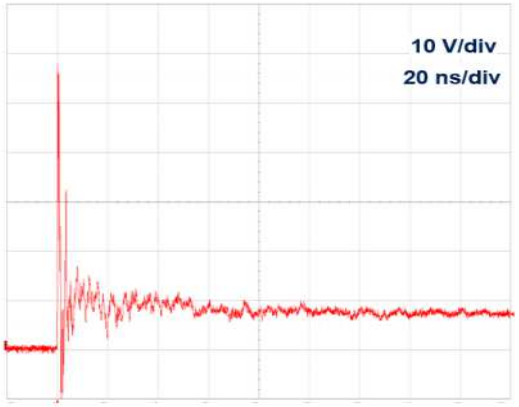


Figure 10. Response to ISO 7637-3 fast transient pulse a: -150 V

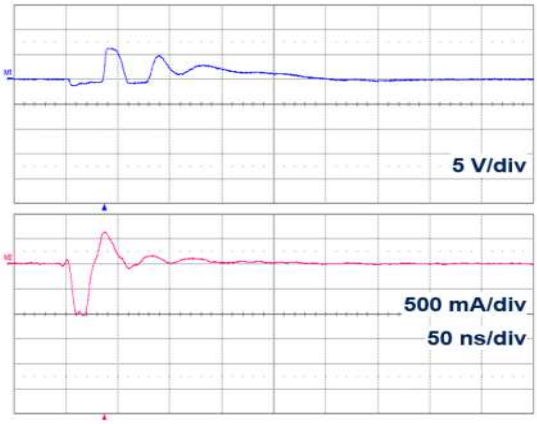


Figure 11. Response to ISO 7637-3 fast transient pulse b: +150 V

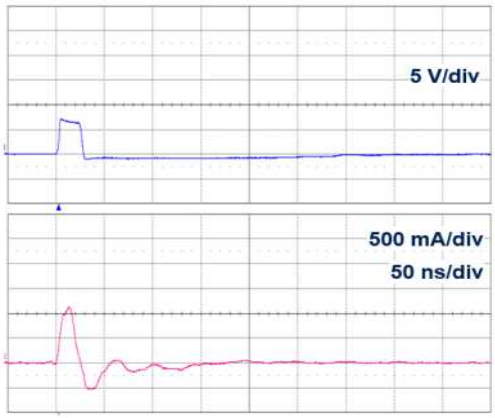


Figure 12. Response to ISO 7637-3 slow transient negative pulse: -85 V

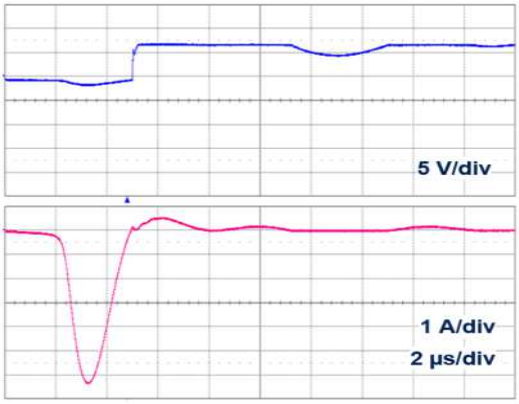


Figure 13. Response to ISO 7637-3 slow transient positive pulse: +85 V

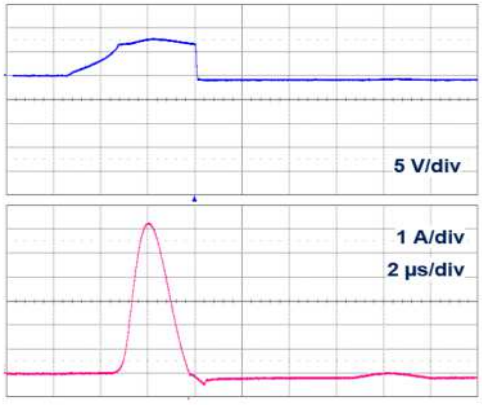
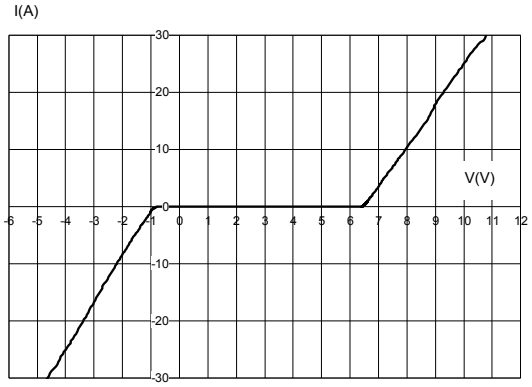


Figure 14. **TLP**



2 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.

2.1 SOT323-3L package information

Figure 15. SOT323-3L package outline

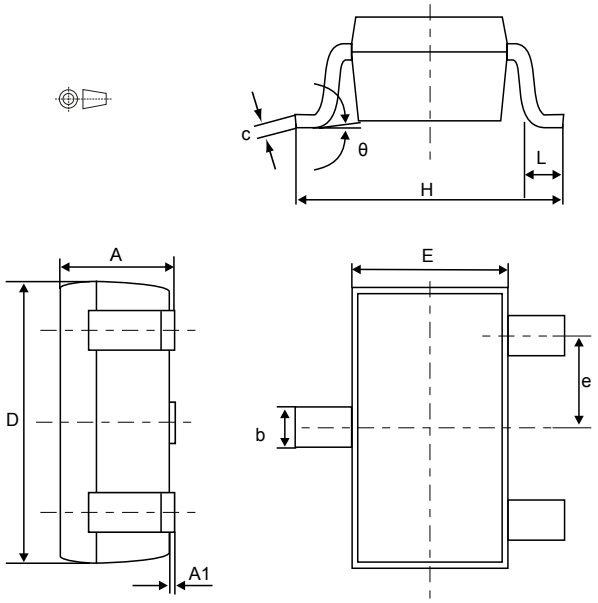


Table 3. SOT323-3L package mechanical data

Ref.	Dimensions					
	Millimeters			Inches[1]		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.80		1.10	0.031		0.044
A1	0.00		0.10	0.000		0.004
b	0.25		0.40	0.009		0.016
c	0.10		0.26	0.003		0.011
D	1.80	2.00	2.20	0.070	0.079	0.087
E	1.15	1.25	1.35	0.045	0.049	0.054
e	0.60	0.65	0.70	0.023	0.026	0.028
H	1.80	2.10	2.40	0.070	0.083	0.095
L	0.10	0.20	0.30	0.004	0.008	0.012
Θ		0	30°		0	30°

1. *Values in inches are converted from mm and rounded to 3 decimal digits*

2.2 SOT323-3L packing information

Figure 16. SOT323-3L footprint in mm

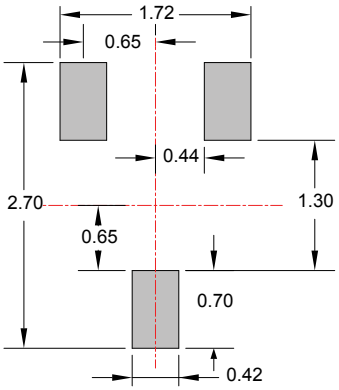


Figure 17. SOT323-3L marking

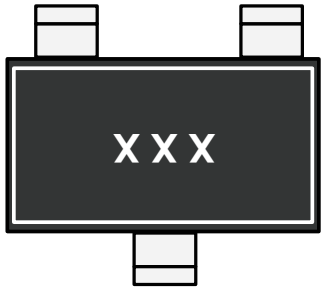
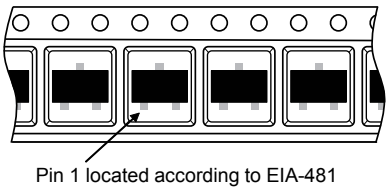


Figure 18. Package orientation in reel



Note: Pocket dimensions are not on scale
Pocket shape may vary depending on package

Figure 19. Tape and reel orientation

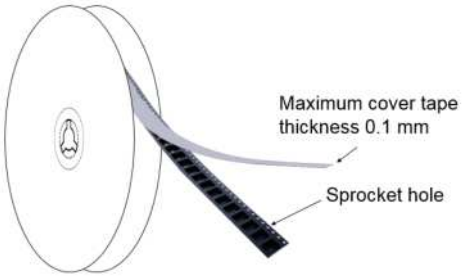


Figure 20. 7" reel dimension values

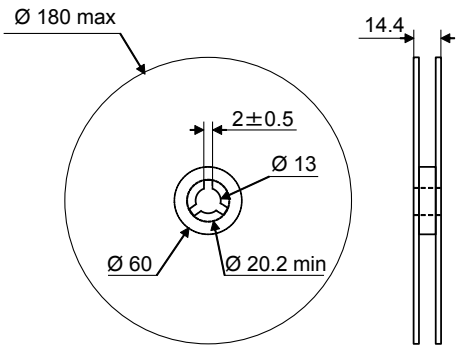


Figure 21. Inner box dimension values

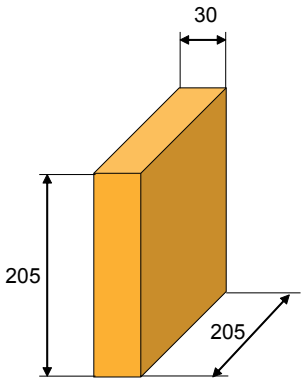
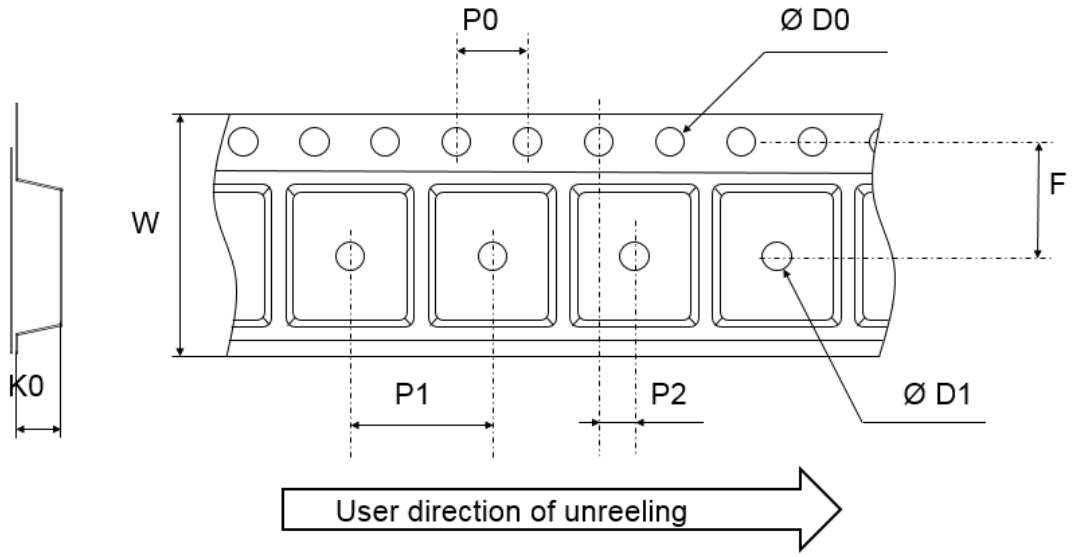


Figure 22. **Tape outline**



Note: Pocket dimensions are not on scale
Pocket shape may vary depending on package

Table 4. **Tape dimension values**

Ref.	Dimensions		
	Millimeters		
	Min.	Typ.	Max.
D0	1.50	1.55	1.6
D1	1.00		
F	3.45	3.50	3.55
K0	1.12	1.22	1.32
P0	3.90	4.00	4.10
P1	3.90	4.00	4.10
P2	1.95	2.00	2.05
W	7.90	8.00	8.30

2.3 SOD323 package information

Figure 23. **SOD323 package outline**

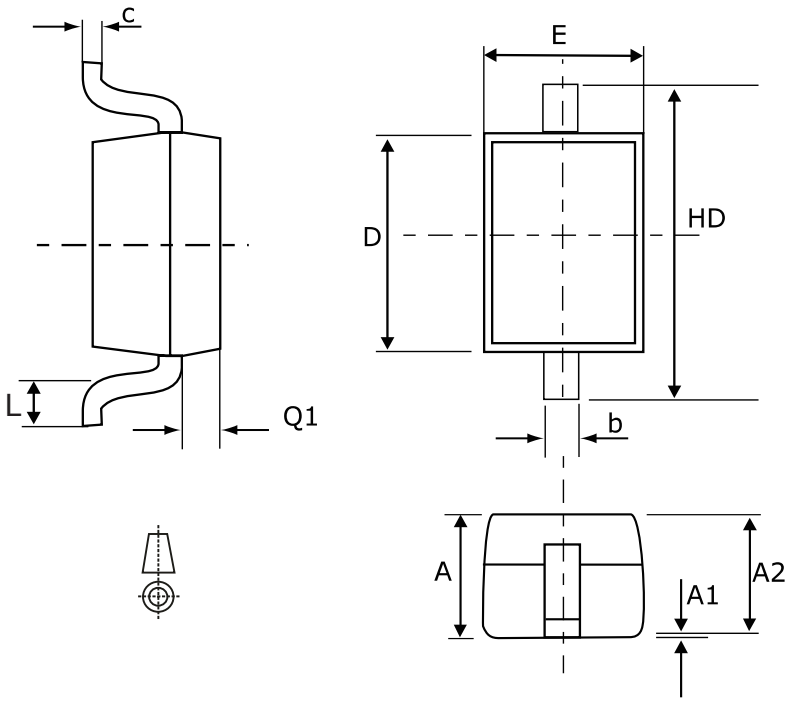


Table 5. **SOD323 package mechanical data**

Ref.	Dimensions			
	Millimeters		Inches[1]	
	Min.	Max.	Min.	Max.
A		1.17		0.046
A1	0.00	0.10	0.000	0.004
A2				
b	0.25	0.44	0.010	0.018
c	0.10	0.25	0.003	0.010
D	1.52	1.80	0.059	0.071
E	1.11	1.45	0.043	0.058
HD	2.30	2.70	0.090	0.107
L	0.10	0.46	0.003	0.019
Q1	0.10	0.41	0.003	0.017

1. *Values in inches are converted from mm and rounded to 3 decimal digits*

2.4 SOD323 packing information

Figure 24. **SOD323 footprint in mm**

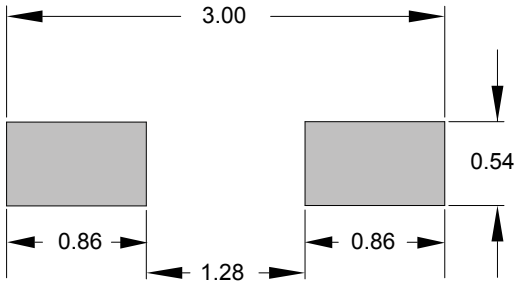
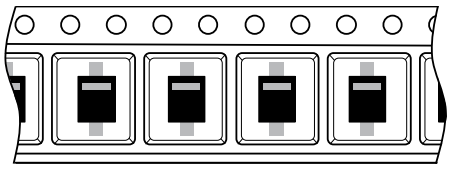


Figure 25. **SOD323 marking**



Figure 26. **Package orientation in reel**



Taped according to EIA-481
Note: Pocket dimensions are not on scale
Pocket shape may vary depending on package

Figure 27. **Tape and reel orientation**

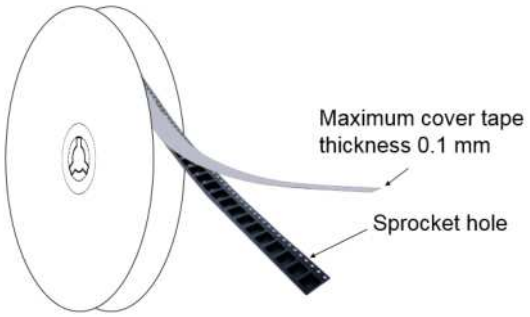


Figure 28. **7" reel dimension values**

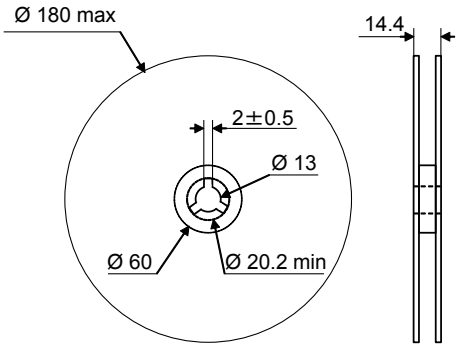


Figure 29. **Inner box dimension values**

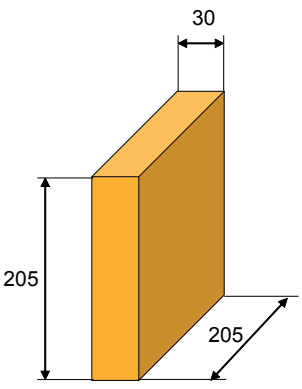
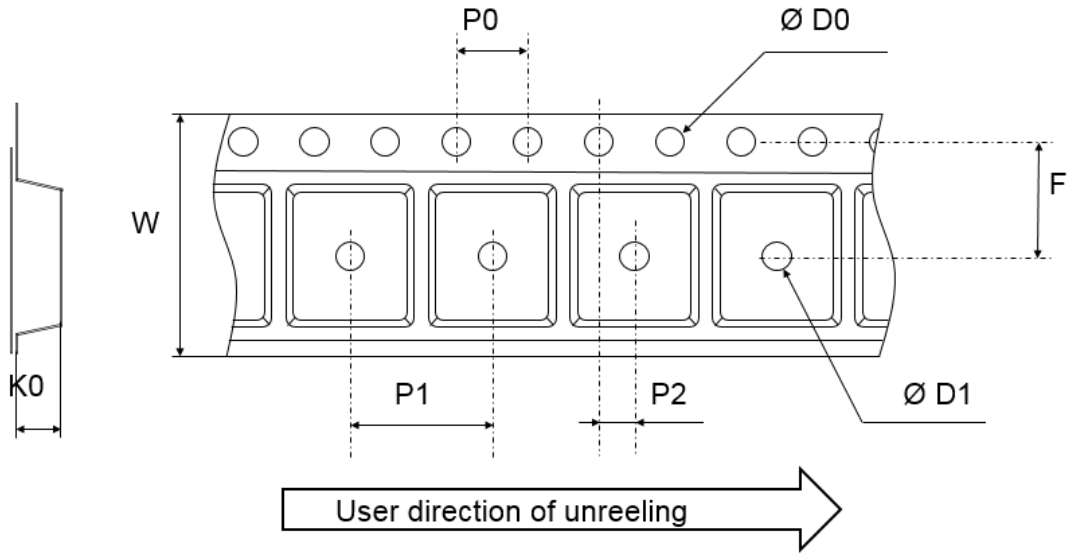


Figure 30. **Tape outline**



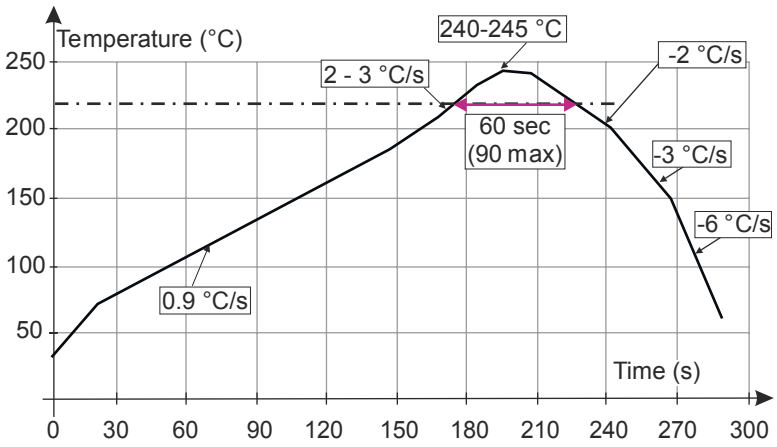
Note: Pocket dimensions are not on scale
Pocket shape may vary depending on package

Table 6. **Tape dimension values**

Ref.	Dimensions		
	Millimeters		
	Min.	Typ.	Max.
D0	1.50	1.55	1.6
D1	1.00		
F	3.45	3.50	3.55
K0	1.12	1.22	1.32
P0	3.90	4.00	4.10
P1	3.90	4.00	4.10
P2	1.95	2.00	2.05
W	7.90	8.00	8.30

2.5 Reflow profile

Figure 31. ST ECOPACK recommended soldering reflow profile for PCB mounting



Note: Minimize air convection currents in the reflow oven to avoid component movement. Maximum soldering profile corresponds to the latest IPC/JEDEC J-STD-020.

2.6 Ordering information

Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
ESDA041-1JY	B4	SOD323	5.3 mg	3000	Tape and reel
ESDA041-2W3Y	B41	SOT323-3L	6.56 mg	3000	Tape and reel

Revision history

Table 8. **Document revision history**

Date	Revision	Changes
28-Oct-2019	1	Initial release.

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