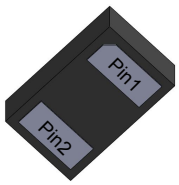
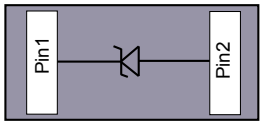
ESDA9P25-1T2

Datasheet

7.9 V, 24 A unidirectional TVS in SOD882T



SOD882T package



Pin configuration

Features

- Low clamping voltage
- Unidirectional diode
- Low leakage current
- SOD882T (0402) package
- ECOPACK2 compliant component
- Exceeds the IEC 61000-4-2 level 4 standard:
  - ± 30 kV (air discharge)
  - ± 30 kV (contact discharge)

Application

Where transient over voltage protection in ESD sensitive equipment is required, such as:

- Smartphones, mobile phones, and accessories
- Tablets and notebooks
- Portable multimedia devices and accessories
- Wearable, home automation, healthcare
- Highly integrated systems

Description

The ESDA9P25-1T2 is a unidirectional single line TVS diode designed to protect the power line or other low speed I/O against ESD and small surge transients.

The device is ideal for applications where high power TVS and board space saving are required.

Product status link
ESDA9P25-1T2

1 Characteristics

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

Symbol	Parameter		Value	Unit
V_{pp}	Peak pulse voltage	IEC 61000-4-2 contact discharge IEC 61000-4-2 air discharge	30 30	kV
P_{pp}	Peak pulse power (8/20 µs)		300	W
I_{pp}	Peak pulse current (8/20 µs)		24	A
T_{op}	Operating junction temperature range		-55 to 150	°C
T_{stg}	Storage junction temperature range		-55 to 150	°C
T_L	Maximum lead temperature for soldering during 10 s		260	°C

Figure 1. Electrical characteristics (definitions)

Symbol — Parameter

V_{BR} = Breakdown voltage
V_{CL} = Clamping voltage
I_{RM} = Leakage current @V_{RM}
V_{RM} = Stand-off voltage
I_{PP} = Peak pulse current
R_D = Dynamic resistance
I_R = Breakdown current

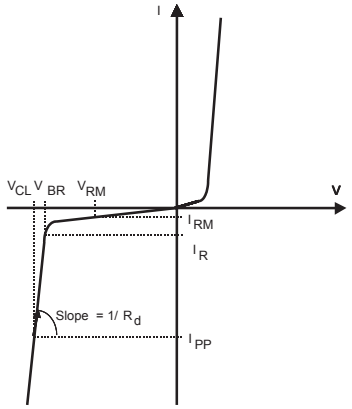


Table 2. Electrical characteristics (values) (T_{amb} = 25° C)

Symbol	Test conditions		Min.	Typ.	Max.	Unit
V_{RM}	Stand-off voltage				7.9	V
I_{RM}	Leakage current	V_{RM} = 7.9 V		15	300	nA
V_{BR}	Breakdown voltage	I_R = 1 mA	8.1	8.7	9.2	V
V_{CL}	Reverse clamping voltage	I_{PP} = 20 A 8/20µs		12.3	13.5	V
		I_{PP} = 24 A 8/20µs		13.7	14.5	
		TLP 16 A		10		
R_D	Dynamic resistance	8/20 µs waveform		0.18		Ω
		TLP – Pulse duration 100 ns		0.09		
C_{LINE}	Line capacitance	V_{LINE} = 0 V, F = 1 MHz		130		pF

1.1 Characteristics (curves)

Figure 2. Peak pulse power dissipation versus initial junction temperature (typical value)

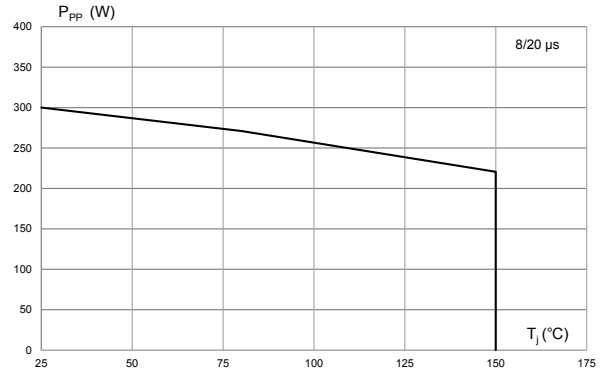


Figure 3. Peak pulse power versus exponential pulse duration (maximum values)

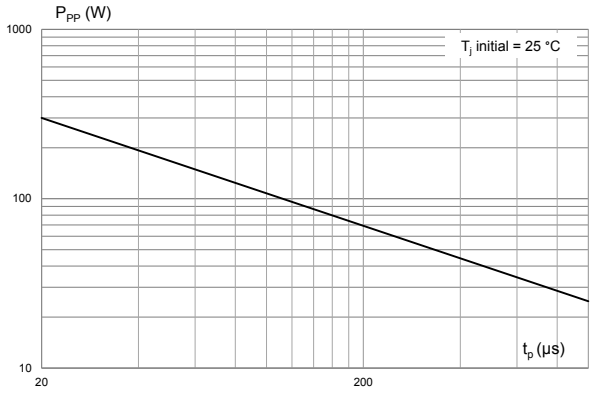


Figure 4. Peak pulse current versus clamping voltage (maximum value)

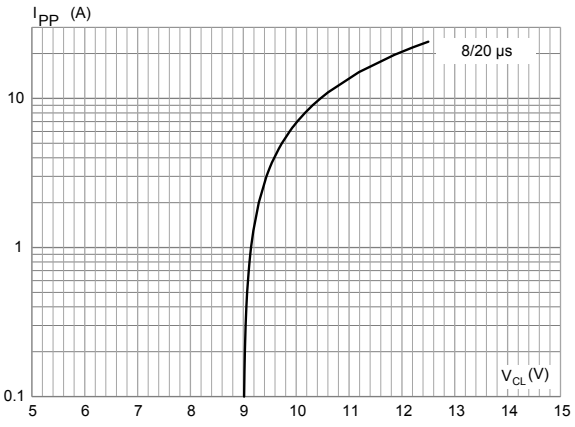


Figure 5. Leakage current versus junction temperature (typical value)

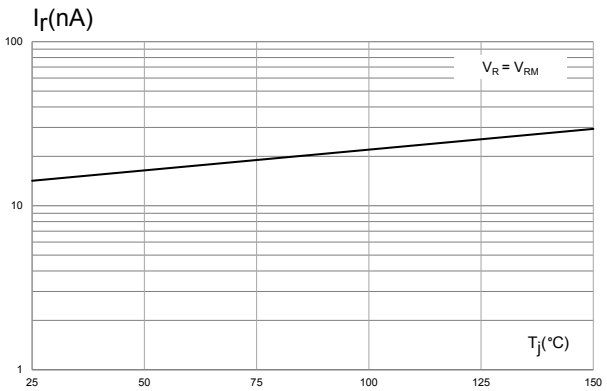


Figure 6. ESD response to IEC 61000-4-2 (+8kV contact discharge)

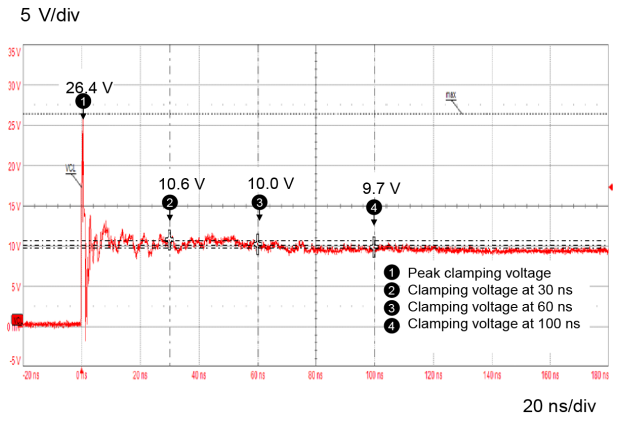
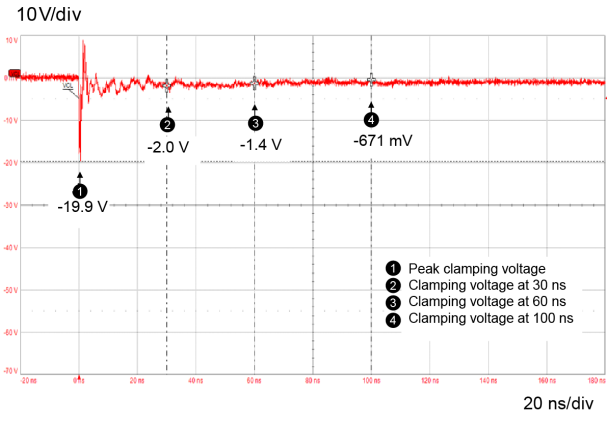


Figure 7. ESD response to IEC 61000-4-2 (-8kV contact discharge)



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 SOD882T package information

Figure 8. SOD882T package outline

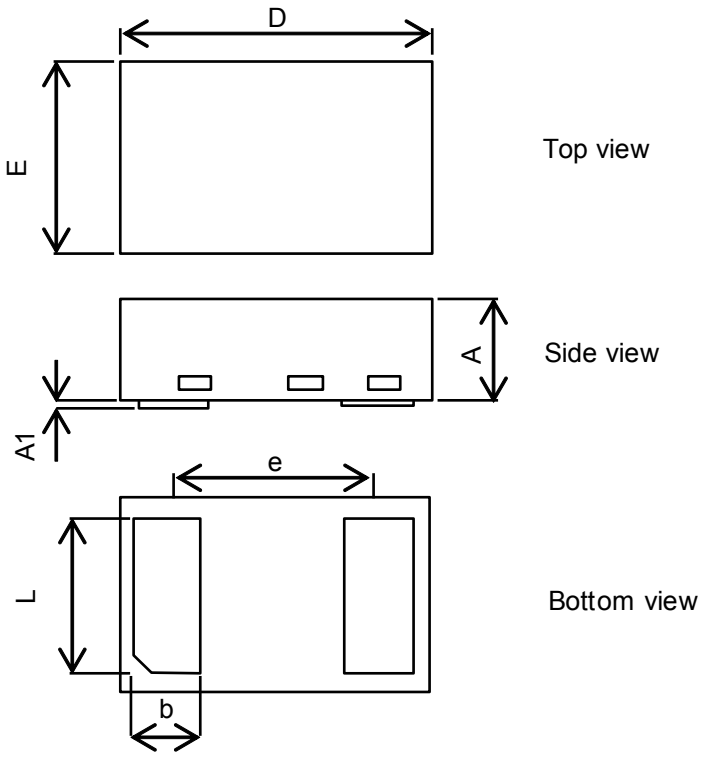


Table 3. SOD882T package mechanical data

Ref.	Dimensions		
	Millimeters		
	Min.	Typ.	Max.
A	0.30		0.40
A1	0.00	0.02	0.05
L	0.45	0.50	0.55
D		1.00	
E		0.60	
e		0.65	
b	0.20	0.25	0.30

Figure 9. **SOD882T recommended footprint**

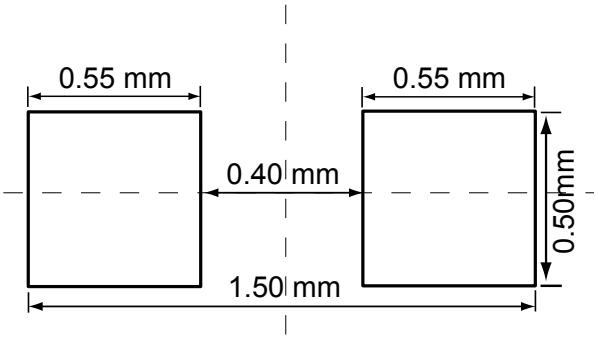
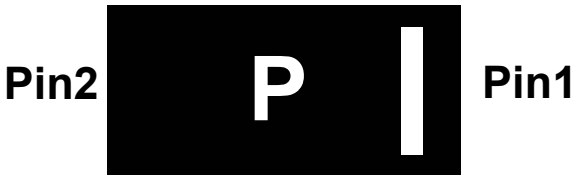
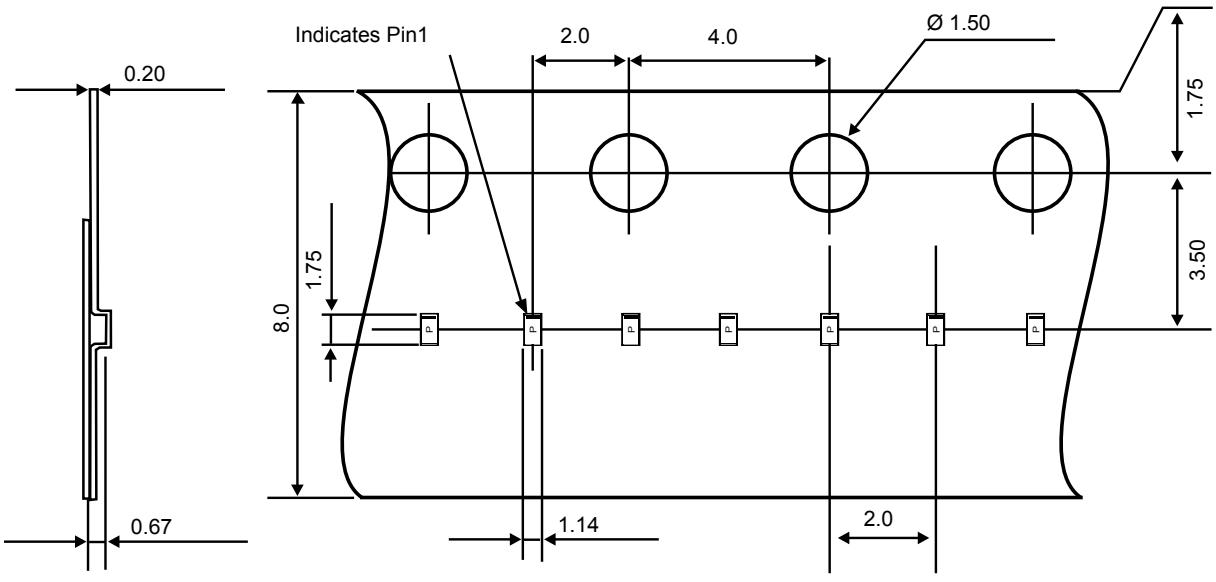


Figure 10. **Marking**



Note: The marking can be rotated by multiples of 90° to differentiate assemble location. In no case should this product marking be used to orient the component for its placement on a PCB. Only pin 1 mark is to be used for this purpose.

Figure 11. **Tape and reel specification**



All dimensions are typical values in mm

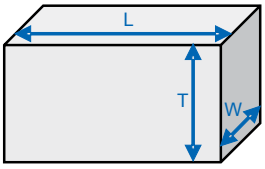
User direction of unreeling

3 Recommendation on PCB assembly

3.1 Stencil opening design

1. General recommendation on stencil opening design
   a. Stencil opening dimensions: L (Length), W (Width), T (Thickness).

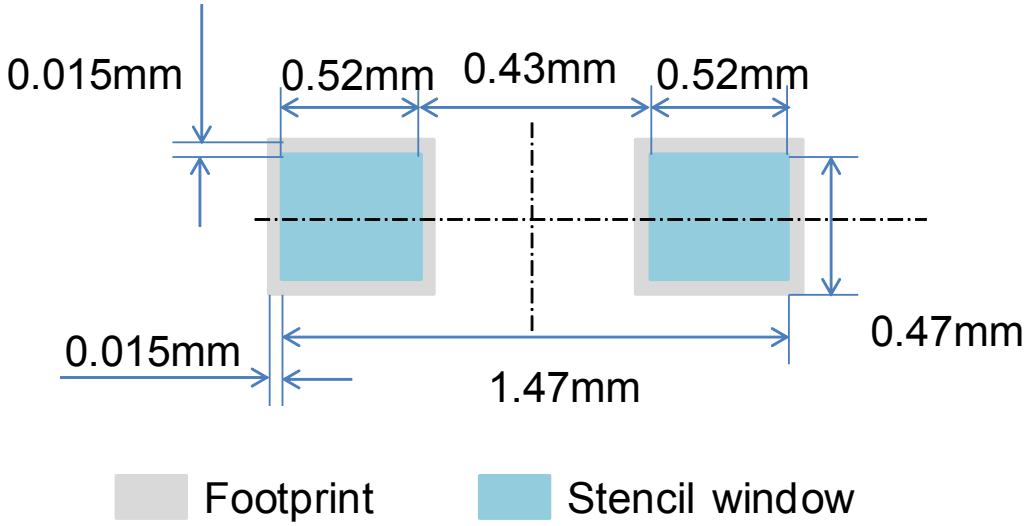
Figure 12. Stencil opening recommendation



   b. General design rule
      - Stencil thickness (T) = 75 ~ 125 µm
      - $\frac{W}{T} \geq 1.5$
      - $\frac{L \times W}{2T(L+W)} \geq 0.66$

1. Reference design
   a. Stencil opening thickness: 100 µm
   b. Stencil opening for leads: Opening to footprint ratio is 90%

Figure 13. Recommended stencil window position in mm



3.2 Solder paste

1. Halide-free flux qualification ROL0 according to ANSI/J-STD-004.
2. “No clean” solder paste is recommended.
3. Offers a high tack force to resist component movement during high speed.
4. Use solder paste with fine particles: powder particle size 20-45 µm.

3.3 Placement

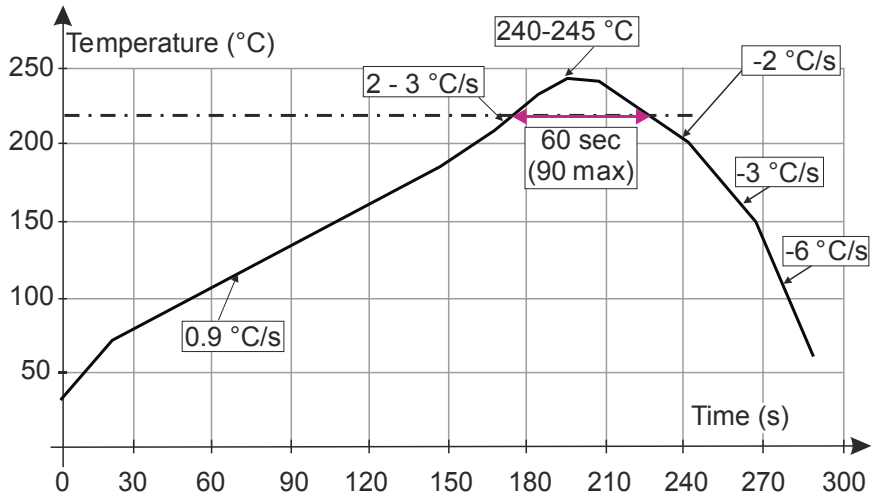
1. Manual positioning is not recommended.
2. It is recommended to use the lead recognition capabilities of the placement system, not the outline centering
3. Standard tolerance of ±0.05 mm is recommended.
4. 3.5 N placement force is recommended. Too much placement force can lead to squeezed out solder paste and cause solder joints to short. Too low placement force can lead to insufficient contact between package and solder paste that could cause open solder joints or badly centered packages.
5. To improve the package placement accuracy, a bottom side optical control should be performed with a high resolution tool.
6. For assembly, a perfect supporting of the PCB (all the more on flexible PCB) is recommended during solder paste printing, pick and place and reflow soldering by using optimized tools.

3.4 PCB design preference

1. To control the solder paste amount, the closed via is recommended instead of open vias.
2. The position of tracks and open vias in the solder area should be well balanced. A symmetrical layout is recommended, to avoid any tilt phenomena caused by asymmetrical solder paste due to solder flow away.

3.5 Reflow profile

Figure 14. ST ECOPACK recommended soldering reflow profile for PCB mounting



Note: Minimize air convection currents in the reflow oven to avoid component movement.

4 Ordering information

Figure 15. **Ordering information scheme**

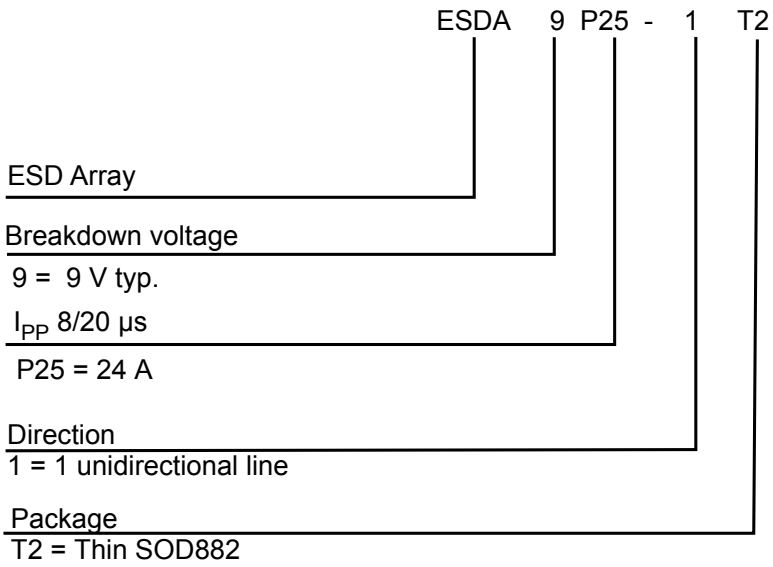


Table 4. **Ordering information**

Order code	Marking[1]	Package	Weight	Base qty.	Delivery mode
ESDA9P25-1T2	P	SOD882T (0402)	0.76 mg	12000	Tape and reel

1. *The marking can be rotated by multiples of 90° to differentiate assembly location.*

Revision history

Table 5. **Document revision history**

Date	Revision	Changes
15-Sep-2020	1	First issue.