ESDAVLC8-1BM2, ESDAVLC8-1BT2

Single line low capacitance Transil™ for ESD protection

Features

- Single line bidirectional protection
- Breakdown voltage = 8.5 V min.
- Very low capacitance = 4.5 pF @ 0 V
- Lead-free packages
- “Halogen-free” according to ECOPACK®2

Benefits

- Very low capacitance for optimized data integrity
- Very low reverse current < 50 nA
- Low PCB space consumption: 0.6 mm^2 max
- High reliability offered by monolithic integration

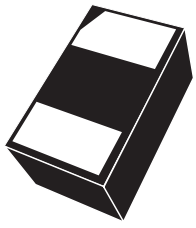
Complies with the following standards:

- IEC 61000-4-2 level 4
  - 15 kV (air discharge)
  - 8 kV (contact discharge)
- MIL STD 883G - Method 3015-7: class 3
  - HBM (human body model)

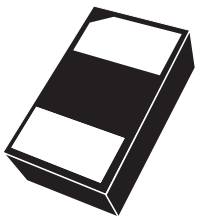
Applications

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

- Computers
- Printers
- Communication systems
- Cellular phone handsets and accessories
- Video equipment

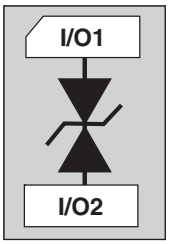


SOD882
ESDAVLC8-1BM2



SOD882T
ESDAVLC8-1BT2

Figure 1. Functional diagram



Description

The ESDAVLC8-1BM2 and ESDAVLC8-1BT2 are bidirectional single line TVS diodes designed to protect datalines or other I/O ports against ESD transients.

The devices are ideal for applications where both printed circuit board space and power absorption capability are required.

TM: Transil is a trademark of STMicroelectronics

1 Characteristics

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

Symbol	Parameter		Value	Unit
V_{PP}(1)	Peak pulse voltage	IEC 61000-4-2 contact discharge IEC 61000-4-2 air discharge MIL STD 883G - Method 3015-7: class 3	17 17 25	kV
P_{PP}(1)	Peak pulse power dissipation (8/20 µs)	T_j initial = T_{amb}	30	W
I_{PP}	Peak pulse current (8/20 µs)		1.3	A
T_{OP}	Operating junction temperature range		- 55 to + 150	°C
T_{stg}	Storage temperature range		- 65 to + 150	°C
T_L	Maximum lead temperature for soldering during 10 s		260	°C

1. For a surge greater than the maximum values, the diode will fail in short-circuit.

Figure 2. 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
I_R	=	Breakdown current
I_{PP}	=	Forward current
$R_{I/O}$	=	Series resistanc between input and output
C_{line}	=	Input capacitance per line

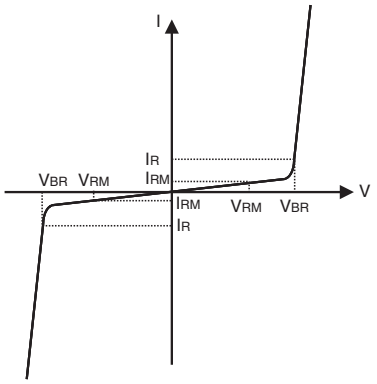


Table 2. Electrical characteristics (values, T_{amb} = 25 °C)

Symbol	Test condition	Min.	Typ.	Max.	Unit
V_{BR}	From pin1 to pin2, I_R = 1 mA direct	14.5	17		V
	From pin2 to pin1, I_R = 1 mA reverse	8.5	11		
I_{RM}	V_{RM} = 3 V			50	nA
R_d	Square pulse, I_{PP} = 1 A t_p = 2.5 µs		2		Ω
C_{line}	F = 1 MHz, V_R = 0 V		4.5	5.5	pF

Figure 3. Relative variation of peak pulse power versus initial junction temperature

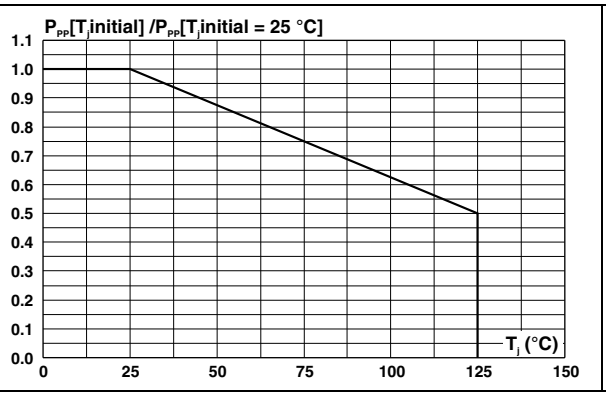


Figure 4. Junction capacitance versus reverse voltage applied (typical values, direct and reverse)

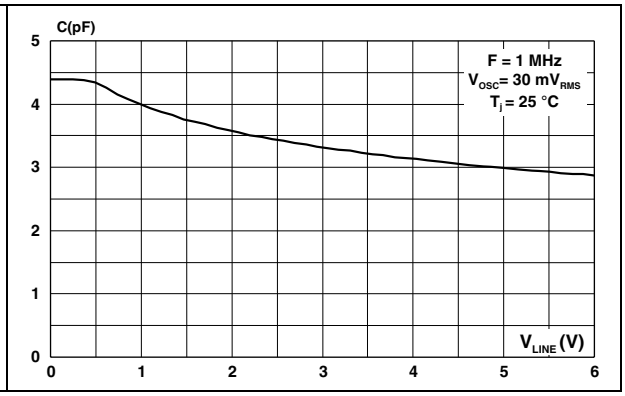


Figure 5. Peak pulse power versus exponential pulse duration (direct)

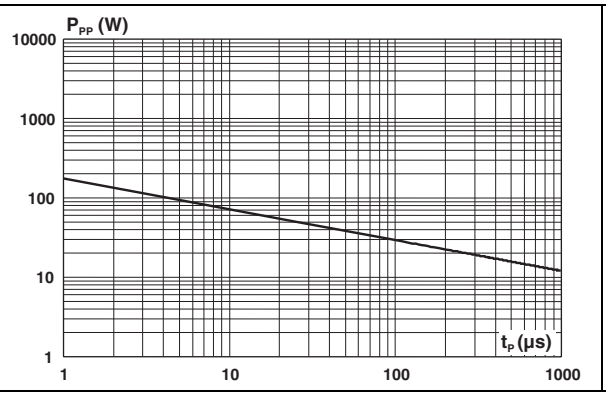


Figure 6. Peak pulse power versus exponential pulse duration (reverse)

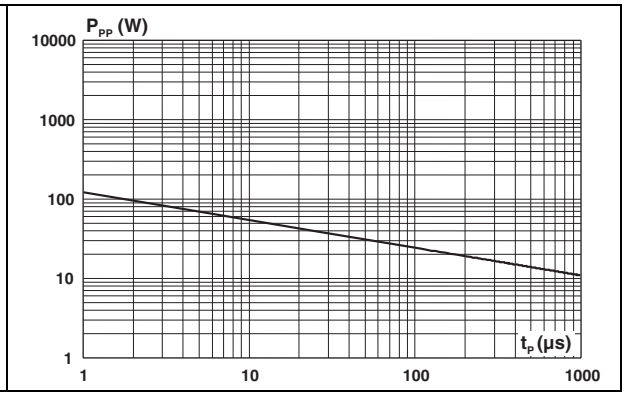


Figure 7. Clamping voltage versus peak pulse current (typical values, exponential waveform, direct)

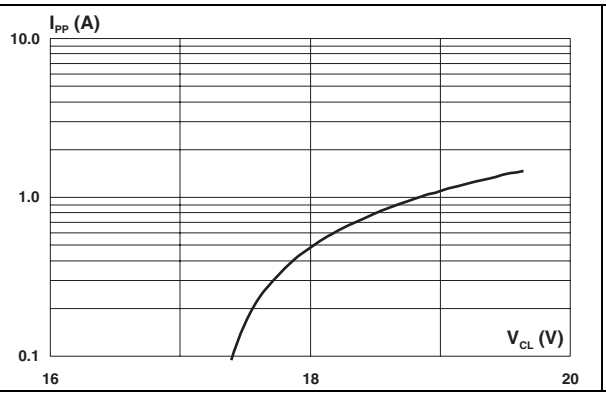


Figure 8. Clamping voltage versus peak pulse current (typical values, exponential waveform, reverse)

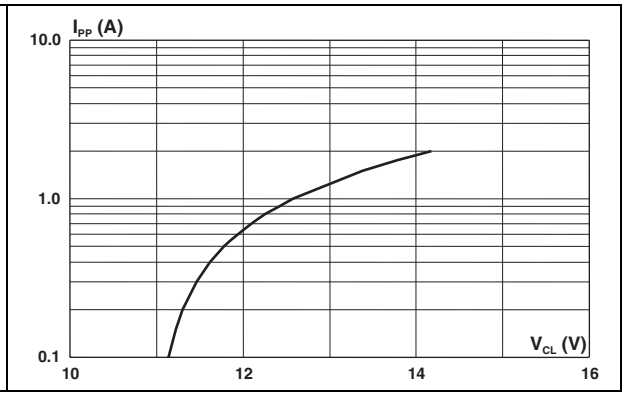


Figure 9. Relative variation of leakage current versus junction temperature

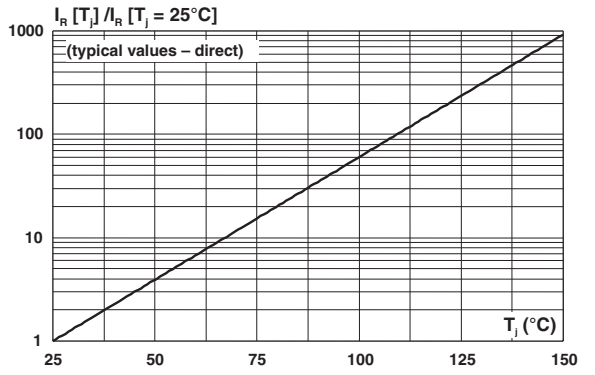


Figure 10. Relative variation of leakage current versus junction temperature

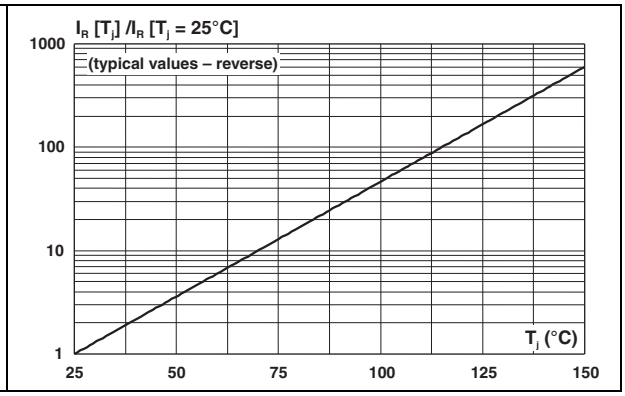


Figure 11. ESD response to IEC 61000-4-2 (+15kV air discharge)

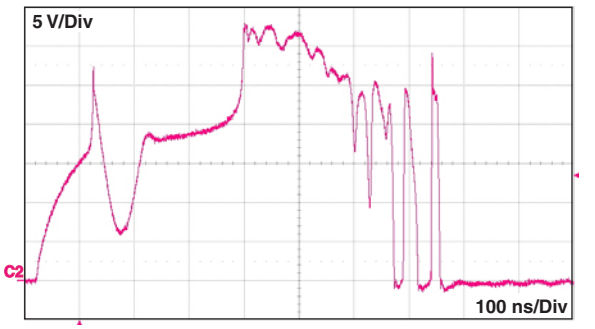


Figure 12. ESD response to IEC 61000-4-2 (-15kV air discharge)

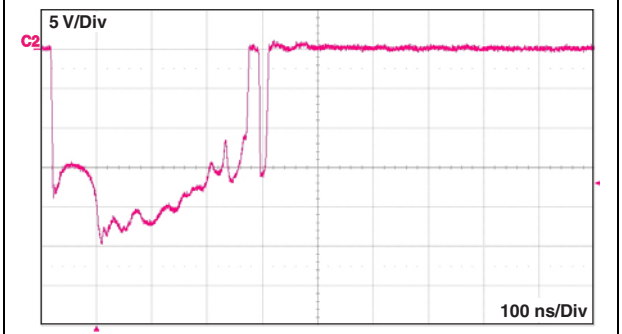


Figure 13. S21 attenuation measurement result

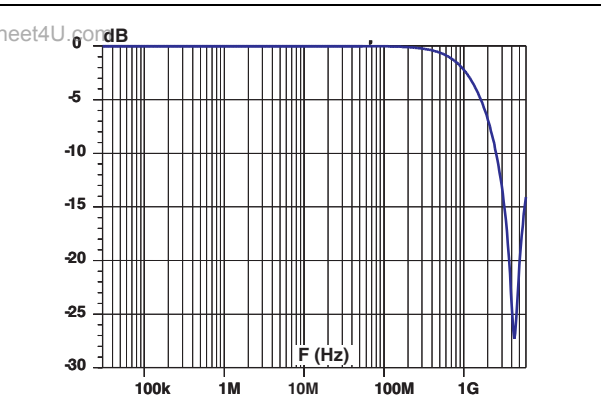
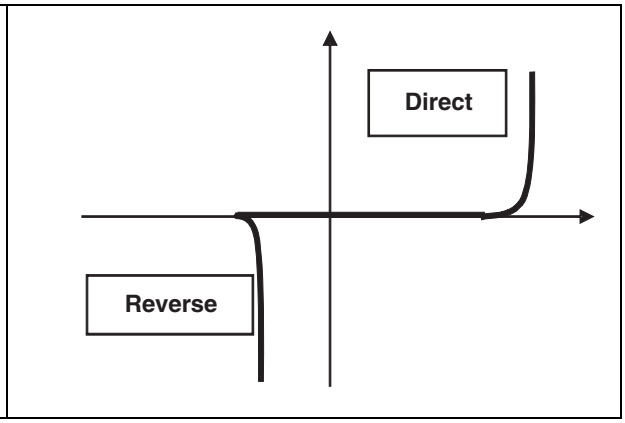
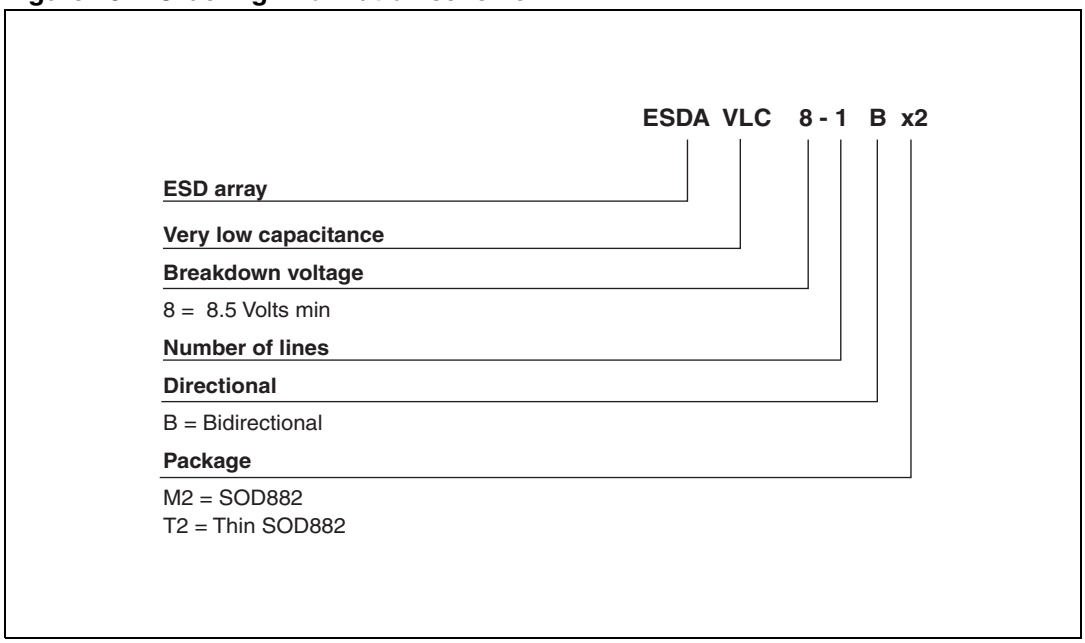


Figure 14. Static characteristic



2 Ordering information scheme

Figure 15. Ordering information scheme



3 Package information

- Epoxy meets UL94, V0
- Lead-free packages

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.

Figure 16. SOD882 dimension definitions

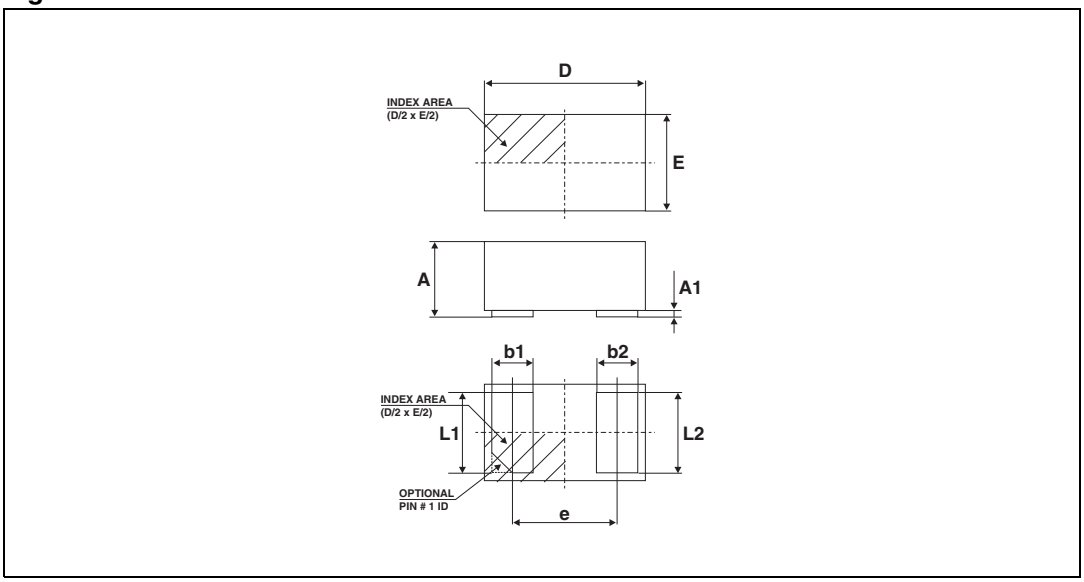


Table 3. SOD882 dimension values

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.40	0.47	0.50	0.016	0.019	0.020
A1	0.00		0.05	0.000		0.002
b1	0.20	0.25	0.30	0.008	0.010	0.012
b2	0.20	0.25	0.30	0.008	0.010	0.012
D		1.00			0.039	
E		0.60			0.024	
e		0.65			0.026	
L1	0.45	0.50	0.55	0.018	0.020	0.022
L2	0.45	0.50	0.55	0.018	0.020	0.022

Figure 17. SOD882 footprint in mm (inches)

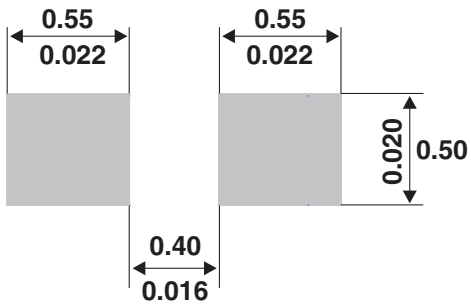


Figure 18. SOD882 marking

Note: Product marking may be rotated by 90° for assembly plant differentiation. 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 19. SOD882T dimension definitions

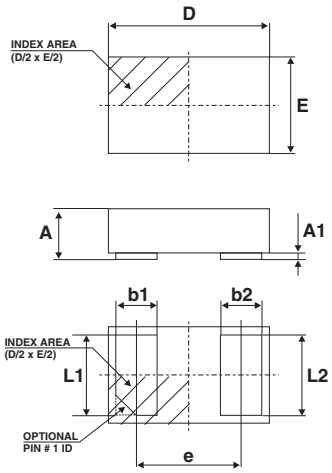


Table 4. SOD882T dimension values

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.30		0.40	0.012		0.016
A1	0.00		0.05	0.000		0.002
b1	0.20	0.25	0.30	0.008	0.010	0.012
b2	0.20	0.25	0.30	0.008	0.010	0.012
D		1.00			0.039	
E		0.60			0.024	
e		0.65			0.026	
L1	0.45	0.50	0.55	0.018	0.020	0.022
L2	0.45	0.50	0.55	0.018	0.020	0.022

Figure 20. SOD882T footprint

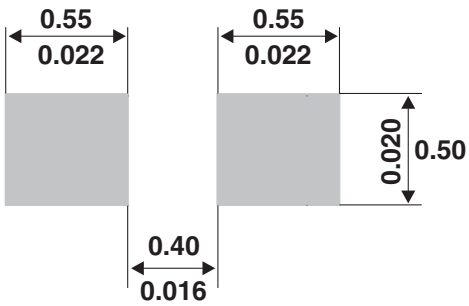
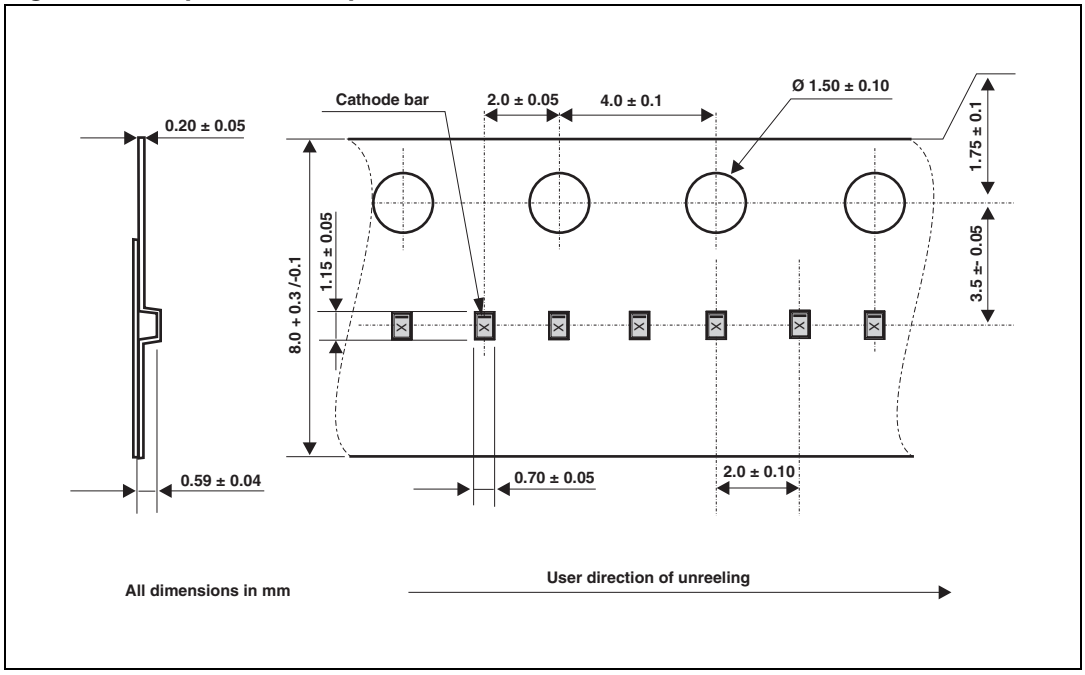


Figure 21. SOD882T marking

Note: Product marking may be rotated by 90° for assembly plant differentiation. 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 22. Tape and reel specifications

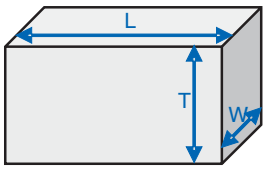


4 Recommendation on PCB assembly

4.1 Stencil opening design

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

Figure 23. Stencil opening dimensions



   b) General design rule

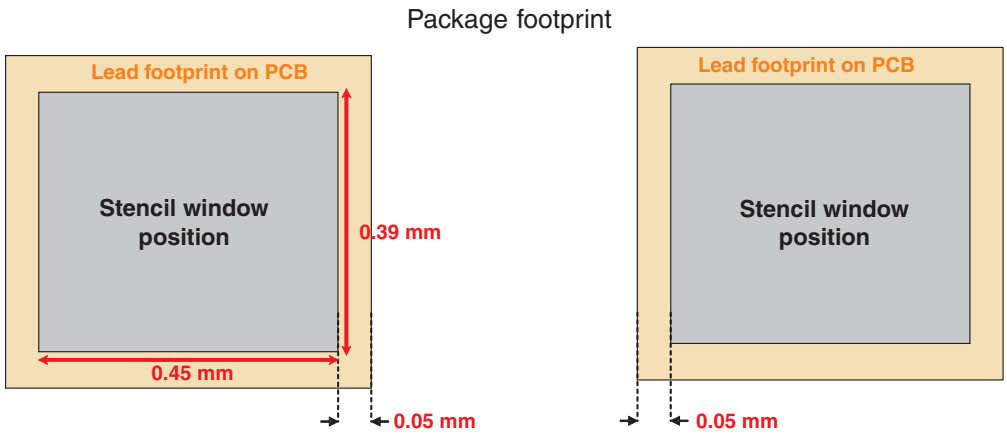
   Stencil thickness (T) = 75 ~ 125 µm

$$\text{Aspect Ratio} = \frac{W}{T} \geq 1.5$$

$$\text{Aspect Area} = \frac{L \times W}{2T(L+W)} \geq 0.66$$

2. Reference design
   a) Stencil opening thickness: 100 µm
   b) Stencil opening for central exposed pad: Opening to footprint ratio is 50%.
   c) Stencil opening for leads: Opening to footprint ratio is 90%.

Figure 24. Recommended stencil window position



4.2 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. Solder paste with fine particles: powder particle size is 20-45 µm.

4.3 Placement

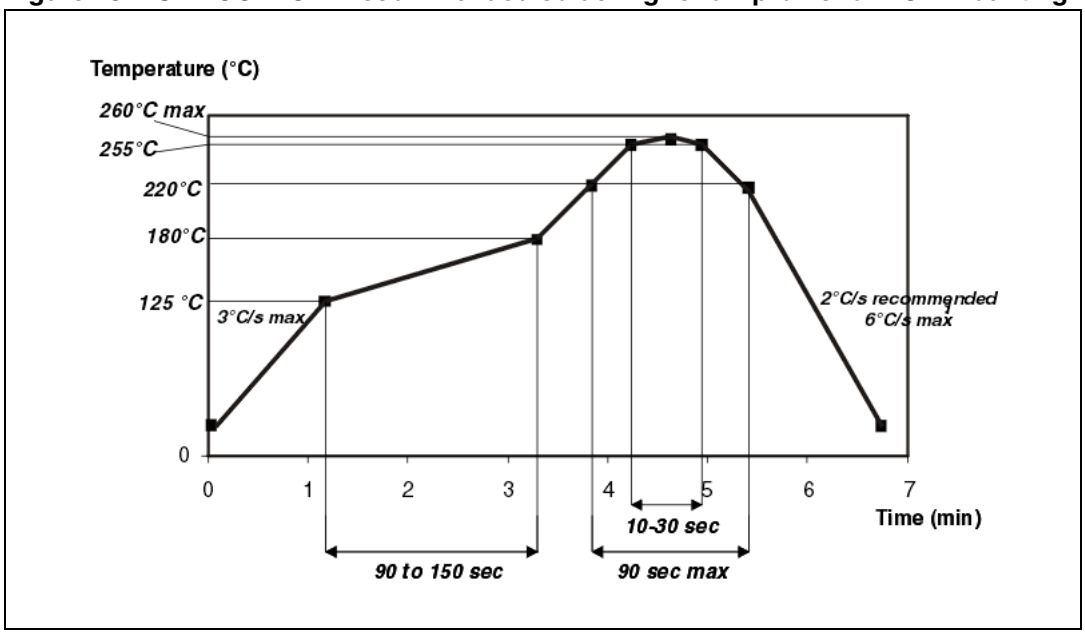
1. Manual positioning is not recommended.
2. It is recommended to use the lead recognition capabilities of the placement system, not the outline centering.
3. Standard tolerance of ± 0.05 mm is recommended.
4. 3.5 N placement force is recommended. Too much placement force can lead to squeezed out solder 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.

4.4 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. The symmetrical layout is recommended, in case any tilt phenomena caused by asymmetrical solder paste amount due to the solder flow away.

4.5 Reflow profile

Figure 25. ST ECOPACK® recommended soldering reflow profile for PCB mounting



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

5 Ordering information

Table 5. Ordering information

Order code	Marking[1]	Package	Weight	Base qty	Delivery mode
ESDAVLC8-1BM2	I	SOD882	0.92 mg	12000	Tape and reel
ESDAVLC8-1BT2	J	SOD882T	0.76 mg	12000	Tape and reel

1. The marking can be rotated by 90° to diferentiate assembly location

6 Revision history

Table 6. Document revision history

Date	Revision	Changes
22-Jan-2010	1	Initial release.

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