ESDA-1K

EOS and ESD Transil™ protection for charger and battery port

Features

- Breakdown voltage: 12 V, 18 V
- Unidirectional device
- High peak power dissipation: 450 W (8/20 µs waveform)
- ESD protection level better than IEC 61000-4-2 level 4: 30 kV contact discharge.
- Low leakage current < 0.5 µA at 5 V
- PCB area: 1.3 mm^2

Benefits

- High EOS and ESD protection level
- High integration
- Suitable for high density board
- Small package

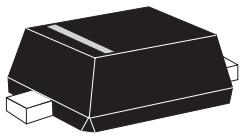
Complies with the following standards

- IEC 61000-4-2 level 4
  - 15 kV (air discharge)
  - 8 kV (contact discharge)
- MIL STD 883G - Method 3015-7 Class 3B
  - HBM (Human Body Model): ≥ 8 kV

Applications

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

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



SOD-523

Figure 1. Functional diagram

Description

The ESDA-1K is a single line Transil diode designed specifically for the protection of integrated circuits in portable equipment and miniaturized electronics devices subject to ESD and EOS transient overvoltages.

TM: Transil is a trademark of STMicroelectronics.

1 Characteristics

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

Symbol	Parameter		Value	Unit
V_{PP}	Peak pulse voltage	IEC 61000-4-2 air discharge IEC 61000-4-2 contact discharge	30 30	kV
T_j	Operating Junction temperature rage		-40 to +150	°C
T_{stg}	Storage temperature range		-65 to +150	°C
T_L	Maximum lead temperature for soldering during 10 s		260	°C

Table 2. Absolute maximum ratings (t_{amb} = 25 °C) - product specific parameters

Order code	I_{PP} (A) peak pulse current (8/20 µs)	P_{PP} (W) peak pulse power (8/20 µs)
ESDA12-1K	16	450
ESDA18-1K	12	400

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_F	=	Forward current
I_{PP}	=	Peak pulse current
I_R	=	Breakdown current
V_F	=	Forward voltage drop
R_d	=	Dynamic impedance
αT	=	Voltage temperature

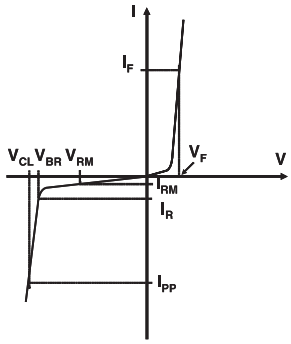


Table 3. Electrical characteristics (values, T_{amb} = 25 °C)

Order code	V_{BR} @ I_R			I_{RM} @ V_{RM}		V_{CL}@ I_{PP} (8/20 µs)				C_{line}(1)
	Min.	Typ.		Max.		Max.		Max.		Max.
	V	V	mA	µA	V	V	A	V	A	pF
ESDA12-1K	12	13	1	0.5	10	16.5	1	28	16	150
ESDA18-1K	18	19	1	0.5	15	24	1	34	12	105

1. V_R = 0 V, F_{osc} = 1 MHz, V_{osc} = 30 mV

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

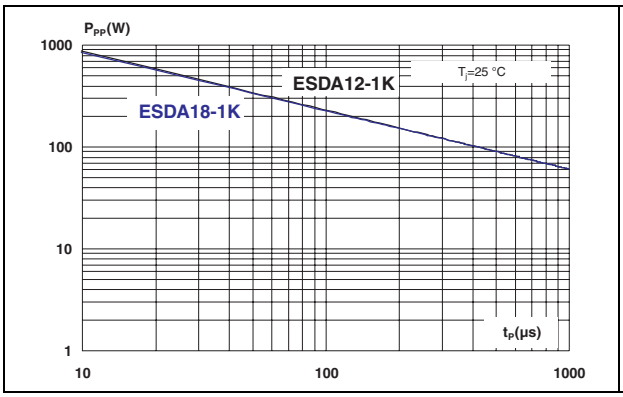


Figure 4. Peak pulse power dissipation versus initial junction temperature (typical values)

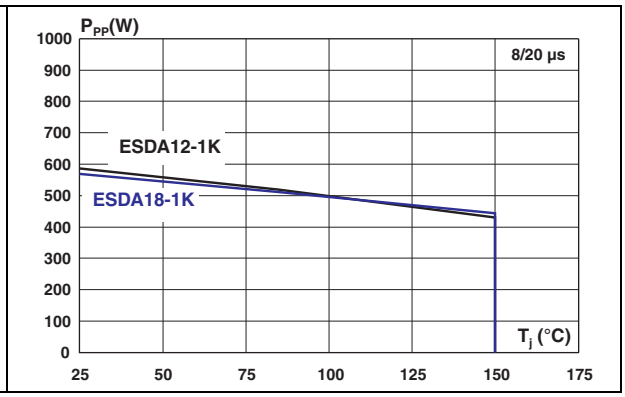


Figure 5. Clamping voltage versus peak pulse current (typical values)

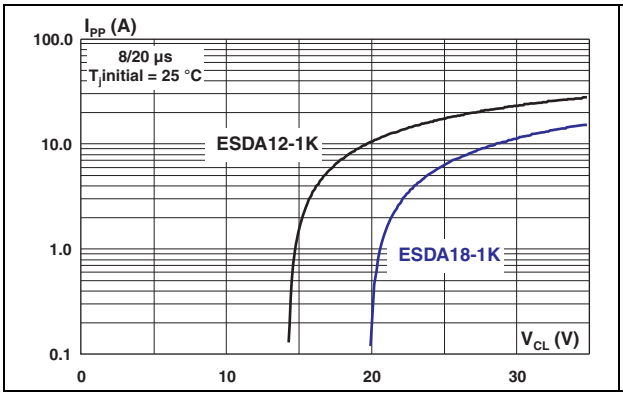


Figure 6. Leakage current versus junction temperature (typical values)

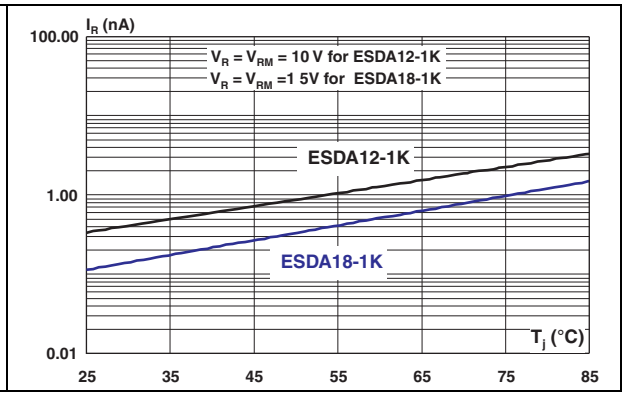


Figure 7. ESD response to IEC 61000-4-2 (+15 kV air discharge) ESDA12-1K

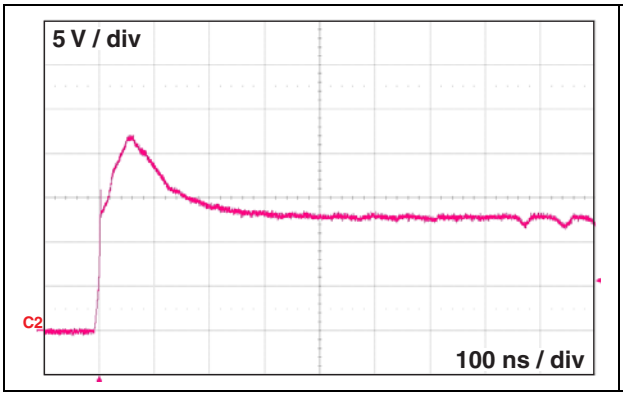
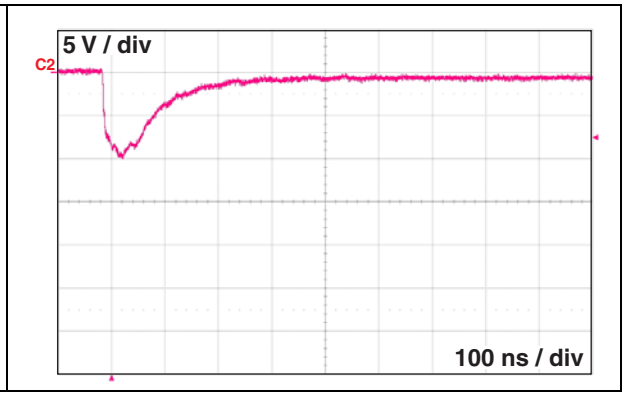
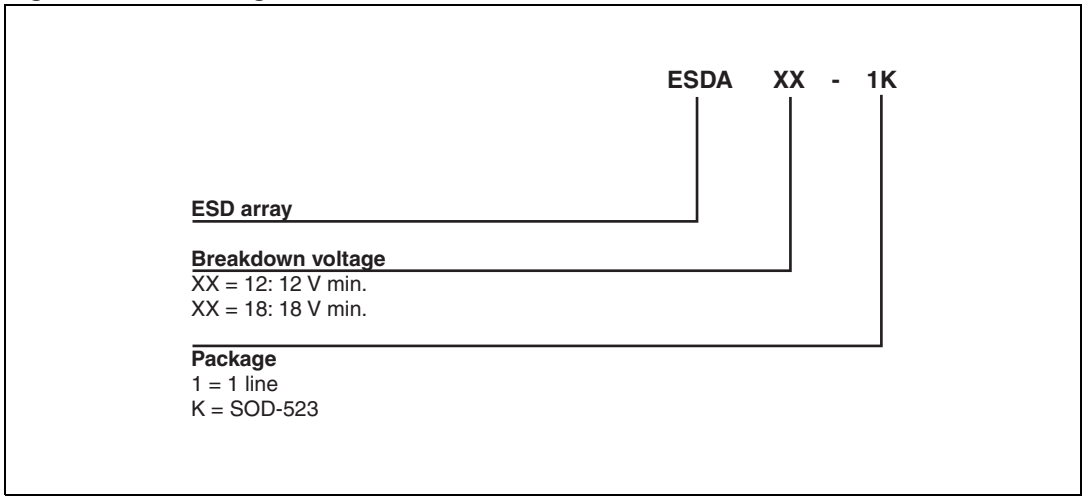


Figure 8. ESD response to IEC 61000-4-2 (-15 kV air discharge) ESDA12-1K



2 Ordering information scheme

Figure 9. Ordering information scheme

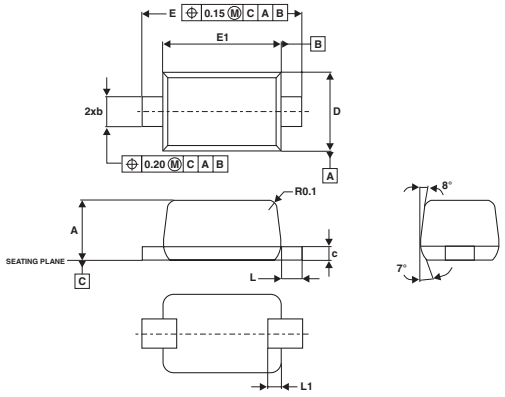


3 Package information

- Epoxy meets UL94,V0
- Lead-free package

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 4. SOD-523 dimensions



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.50	0.60	0.70	0.020	0.024	0.028
E	1.50	1.60	1.70	0.059	0.063	0.067
E1	1.10	1.20	1.30	0.043	0.047	0.051
D	0.70	0.80	0.90	0.028	0.031	0.035
b	0.25		0.35	0.010		0.014
c	0.07		0.20	0.003		0.008
L	0.15	0.20	0.25	0.006	0.008	0.010
L1	0.05		0.20	0.002		0.008

Figure 10. Footprint (dimensions in mm)

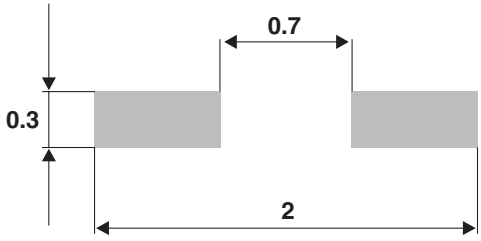
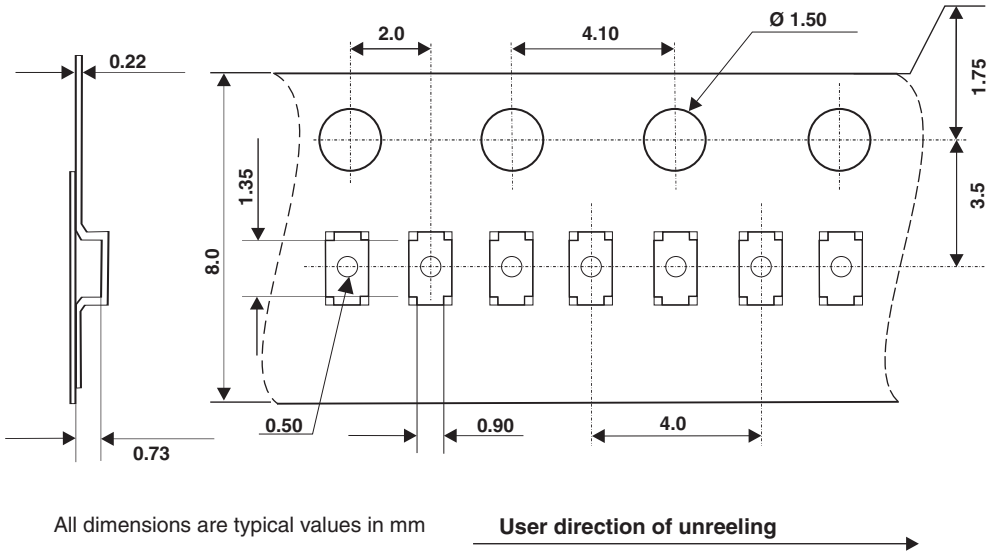


Figure 11. Marking

Note: Product marking may be rotated by multiples of 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 12. Tape and reel specification



4 Recommendation on PCB assembly

4.1 Solder paste

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

4.2 Placement

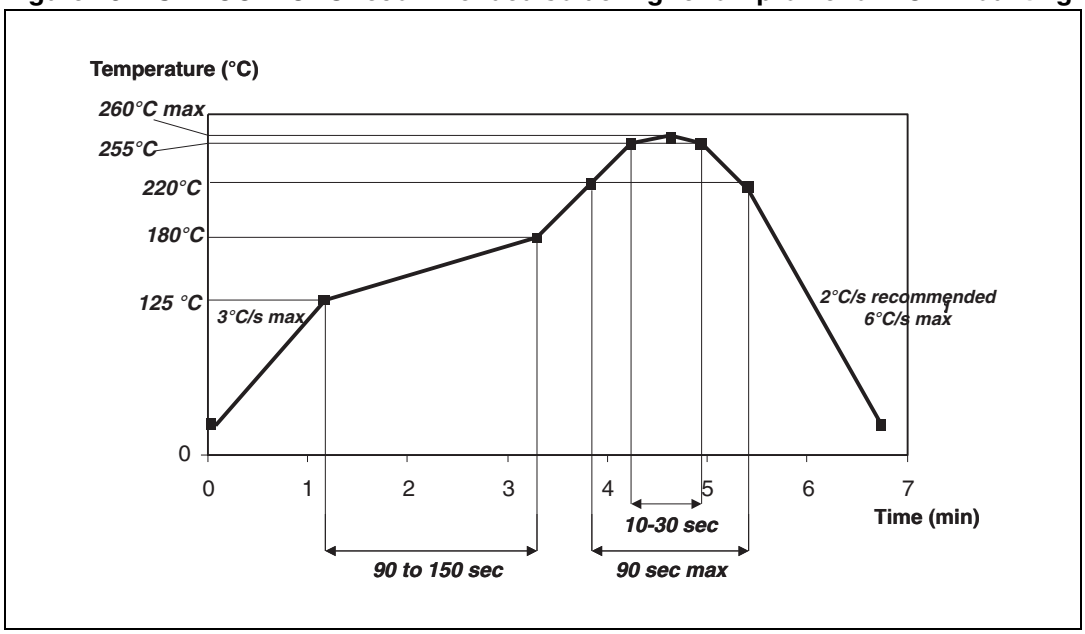
1. Manual positioning is not recommended.
2. It is recommended to use the lead recognition capabilities of the placement system, not the outline centering.
3. Standard tolerance of ± 0.05 mm is recommended.
4. 3.5 N placement force is recommended. Too much placement force can lead to squeezed out solder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

4.3 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.

4.4 Reflow profile

Figure 13. 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	Package	Weight	Base qty	Delivery mode
ESDA12-1K	12	SOD-523	1.46	3000	Tape and reel
ESDA18-1K	18				

Note: The marking can be rotated by multiples of 90° to differentiate assembly location.

6 Revision history

Table 6. Document revision history

Date	Revision	Changes
02-Sep-2010	1	First issue.

Please Read Carefully:

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries (“ST”) reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST’s terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

UNLESS OTHERWISE SET FORTH IN ST’S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

UNLESS EXPRESSLY APPROVED IN WRITING BY AN AUTHORIZED ST REPRESENTATIVE, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER’S OWN RISK.

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

STMicroelectronics:

ESDA12-1K ESDA18-1K