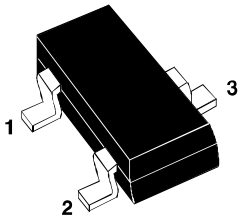
ESDAL

Dual Transil™ array for ESD protection

Datasheet - production data



SOT23-3L

Features

- Unidirectional device
- Low leakage current (I_R max. < 20 µA at V_{BR})
- 300 W peak pulse power (8/20 µs)

Benefits

- High ESD protection level: up to 30 kV
- High integration
- Suitable for high density boards

Complies with the following standards

- IEC 61000-4-2 (exceeds level 4) :
  - 30 kV (air discharge)
  - 30 kV (contact discharge)

Applications

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

- Entertainment
- Signal communications
- Connectivity
- Comfort and convenience

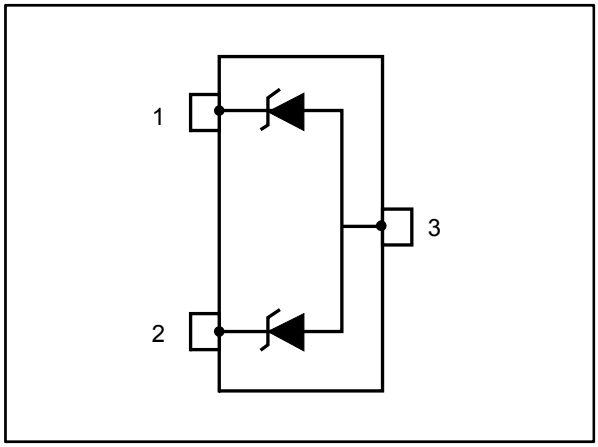
Description

This device is a diode array designed to protect 1 line or 2 lines against ESD transients.

The device is ideal for applications where both reduced line capacitance and board space saving are required.

It can also be used as bidirectional suppressor by connecting only pin 1 and 2.

Figure 1: Functional diagram



1 Characteristics

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

Symbol	Parameter		Value	Unit
V_{pp}	Peak pulse voltage(1)	IEC 61000-4-2: Contact discharge Air discharge	 30 30	kV
P_{pp}	Peak pulse power (8/20 µs)		300	W
I_{pp}	Peak pulse current (8/20 µs)	ESDA5V3L ESDA6V1L ESDA14V2L ESDA25L ESDA37L	25 18 14 7 6.3	A
T_j	Operating junction temperature range		-40 to 150	°C
T_{stg}	Storage junction temperature range		-65 to 150	°C
T_L	Maximum lead temperature for soldering during 10 s at 5 mm from case		260	°C

Notes:

(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
V_{RM}	=	Stand-off voltage
I_{RM}	=	Leakage current
I_F	=	Forward current
I_{PP}	=	Peak pulse current
I_R	=	Breakdown current
V_F	=	Forward voltage drop
C	=	Capacitance
R_d	=	Dynamic impedance
αT	=	Voltage temperature

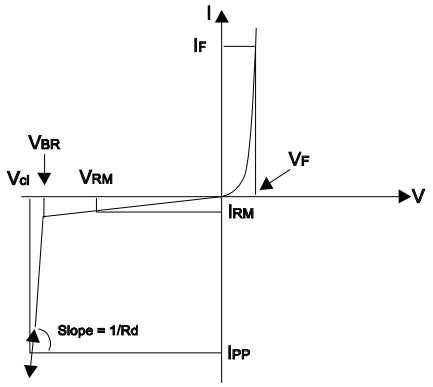


Table 2: Electrical characteristics (T_{amb} = 25 °C)

Order code	V_{BR} at I_R			I_{RM} at V_{RM}		R_d(1)	αT(2)	C_{line}	V_F at I_F	
	Min.	Max.		Max.		Typ.	Max.	Typ. at 0 V bias	Max.	
	V	V	mA	µA	V	mΩ	10^{-4}/°C	pF	V	mA
ESDA5V3L	5.3	5.9	1	2	3	280	5	220	1.25	200
ESDA6V1L	6.1	7.2	1	20	5.25	350	6	140	1.25	200
ESDA14V2L	14.2	15.8	1	5	12	650	10	90	1.25	200
ESDA25L	25	30	1	1	24	1000	10	50	1.2	10
ESDA37L	37	43.3	1	1	36	2400	10	48	0.9	10

Notes:

(1)Square pulse I_{pp} = 15 A, t_p = 2.5 µs

(2)$\Delta V_{BR} = \alpha T \times (T_{amb} - 25\ °C) \times V_{BR}$ (25 °C)

1.1 Characteristics (curves)

Figure 3: Variation of peak pulse power versus initial junction temperature

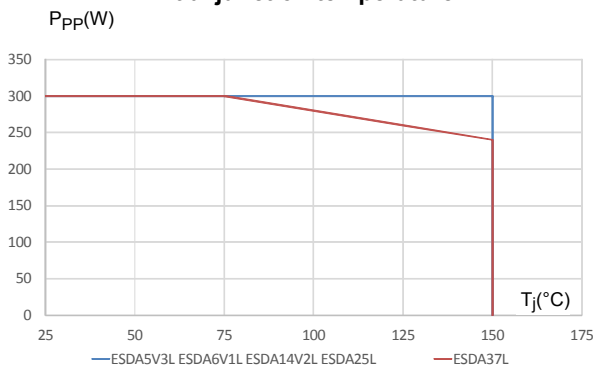


Figure 4: Peak pulse power versus exponential pulse duration

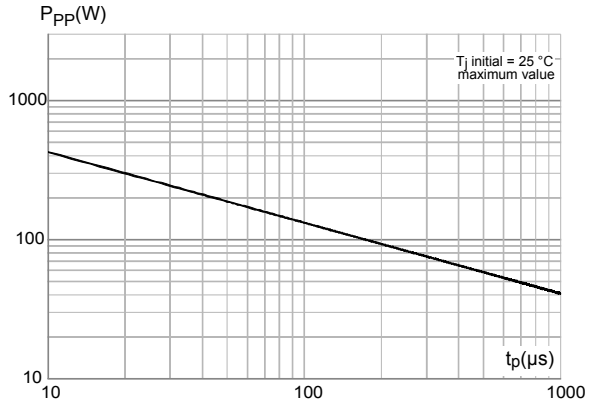


Figure 5: Variation of clamping voltage versus peak pulse current (max. values, 8/20 µs waveform)

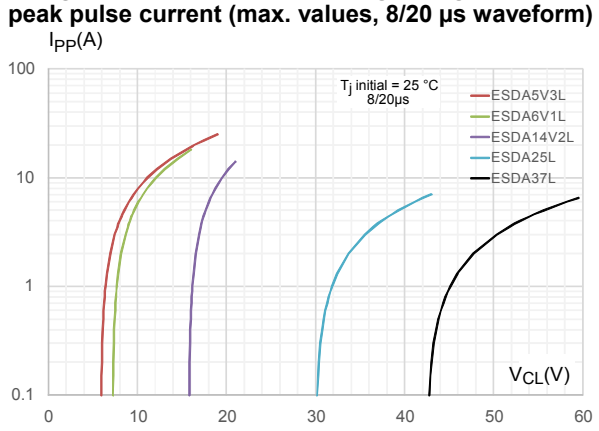
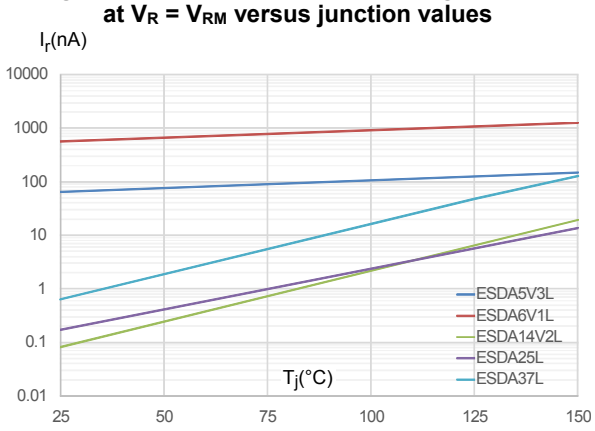


Figure 6: Relative variation of leakage current at $V_R = V_{RM}$ versus junction values



2 Application and design guidelines

Refer to STMicroelectronics application note:

- AN2689: Protection of automotive electronics from electrical hazards, guidelines for design and component selection.

3 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.

- Epoxy meets UL 94,V0
- Lead-free package

3.1 SOT23-3L mechanical data

Figure 7: SOT23-3L package outline

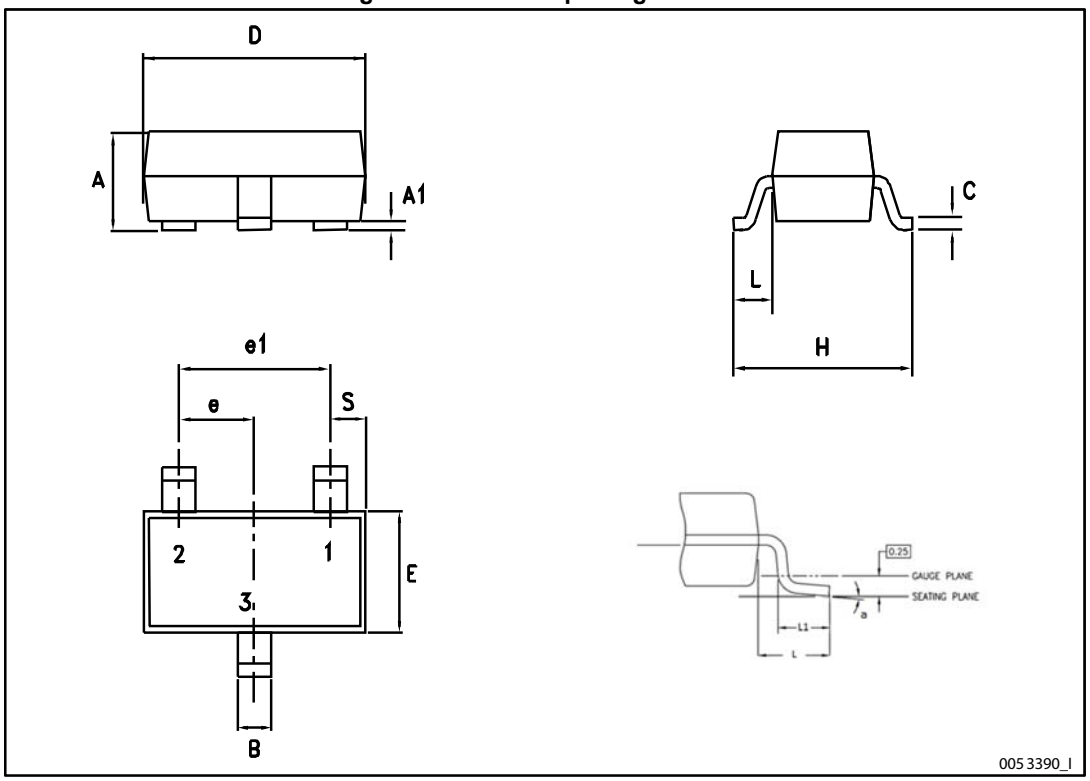
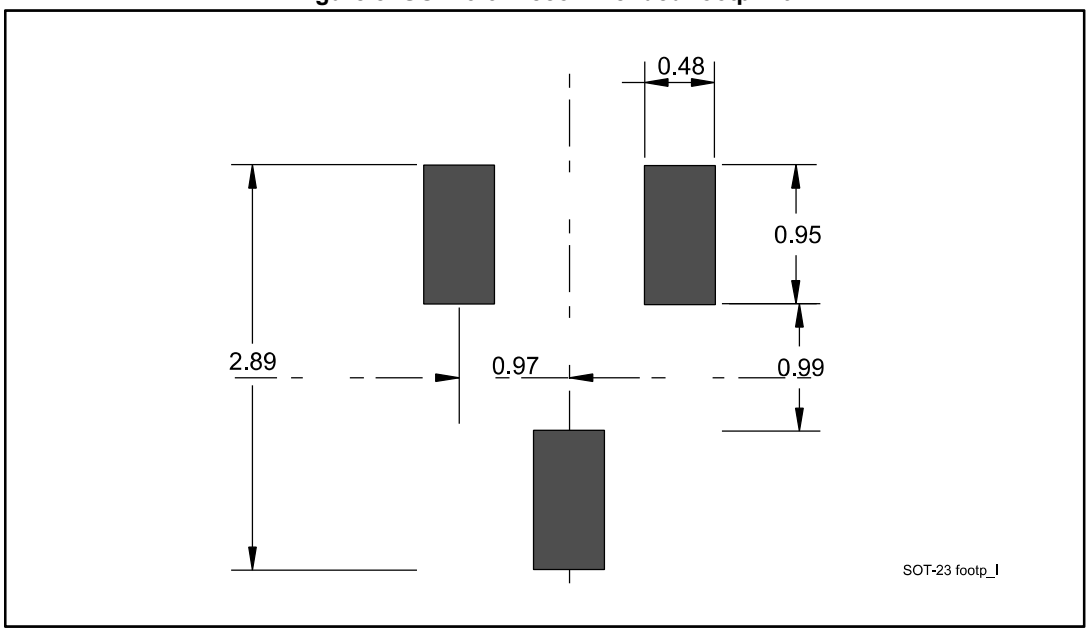


Table 3: SOT23-3L mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	0.89		1.40
A1	0		0.10
B	0.30		0.51
C	0.085		0.18
D	2.75		3.04
e	0.85		1.05
e1	1.70		2.10
E	1.20		1.75
H	2.10		3.00
L		0.60	
S	0.35		0.65
L1	0.25		0.55
a	0°		8°

Figure 8: SOT23-3L recommended footprint



Dimensions are in mm.

4 Recommendation on PCB assembly

4.1 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.

4.2 Placement

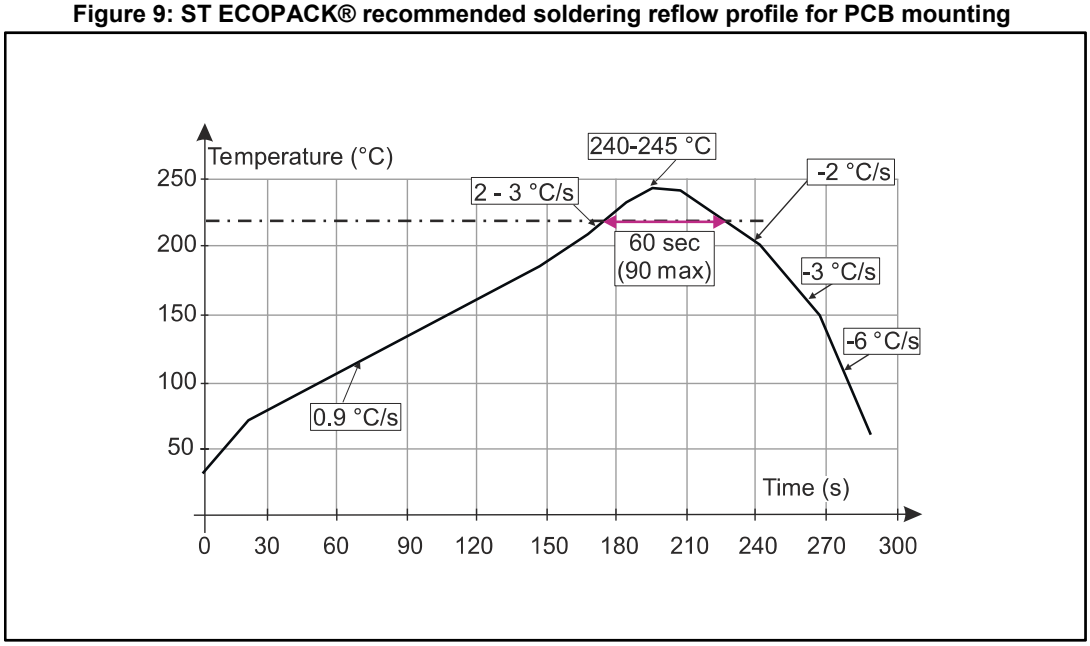
1. Manual positioning is not recommended.
2. It is recommended to use the lead recognition capabilities of the placement system, not the outline centering
3. Standard tolerance of ±0.05 mm is recommended.
4. 3.5 N placement force is recommended. Too much placement force can lead to squeezed out solder 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. A symmetrical layout is recommended, to avoid any tilt phenomena caused by asymmetrical solder paste due to solder flow away.

4.4 Reflow profile

Figure 9: ST ECOPACK® recommended soldering reflow profile for PCB mounting



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

5 Ordering information

Figure 10: Ordering information scheme

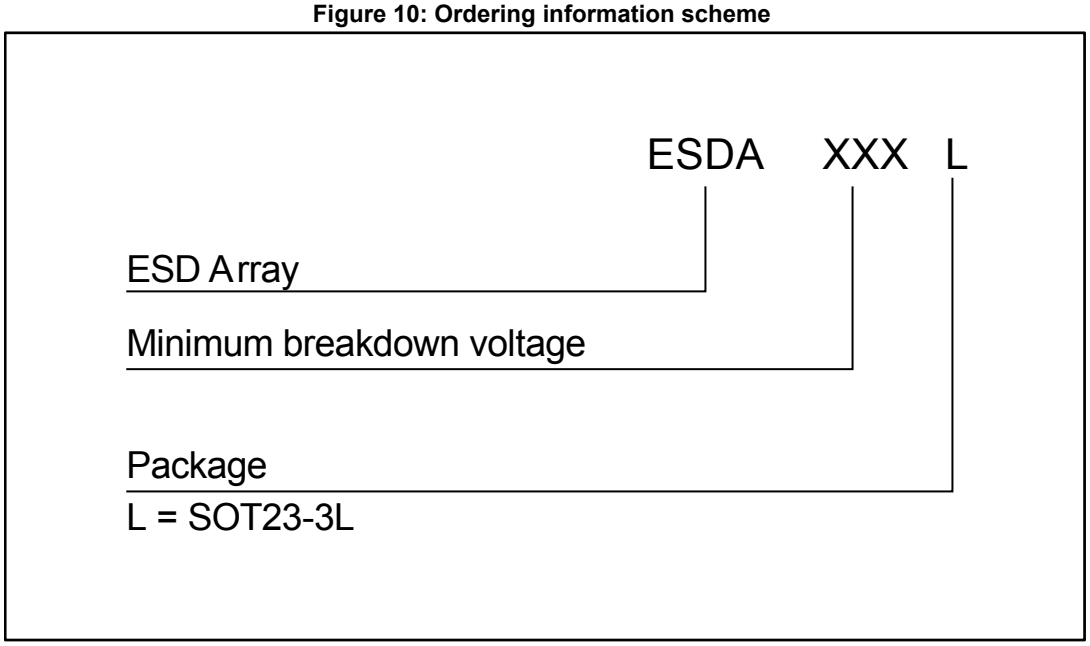


Table 3: Ordering information

Order code	Marking(1)	Package	Weight	Base qty.	Delivery mode
ESDA5V3L	EL53	SOT23-3L	8.7 mg	3000	Tape and reel
ESDA6V1L	EL61				
ESDA14V2L	EL15				
ESDA25L	EL25				
ESDA37L	EL37		9.8 mg		

Notes:

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

6 Revision history

Table 4: Document revision history

Date	Revision	Changes
31-Jul-2012	4	First issue.
20-Jul-2017	5	Added ESDA37L package information.