ESDZL5-1F4

Low clamping, low capacitance unidirectional single line ESD protection

Datasheet - production data

0201 package

Features

- Low clamping voltage
- Unidirectional device
- Low leakage current
- 0201 package
- Ultra-low PCB area: 0.18 mm^2
- ECOPACK®2 compliant component
- Exceeds the followig standard:
  - IEC 61000-4-2 level 4 = ±30 kV (air discharge) and ±15 kV (contact discharge)

Applications

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

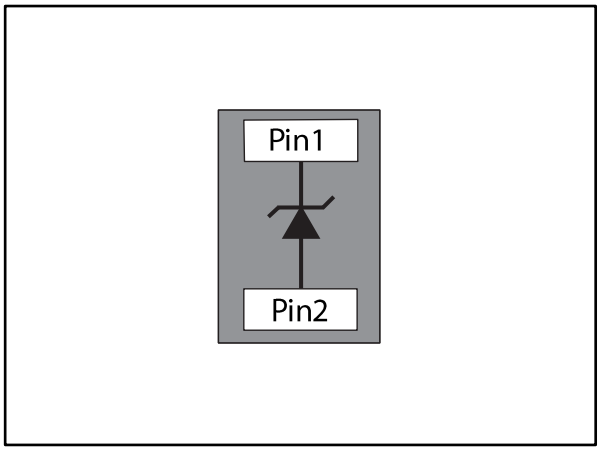
- Smartphones, mobile phones and accessories
- Tablets and notebooks
- Portable multimedia devices and accessories
- Wearable, home automation, healthcare
- Highly integrated systems

Description

The ESDZL5-1F4 is an unidirectional single line TVS diode designed to protect the data line or other I/O ports against ESD transients.

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

Figure 1: Functional diagram



This is information on a product in full production.

1 Characteristics

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

Symbol	Parameter		Value	Unit
V_{PP}	Peak pulse voltage	Contact discharge Air discharge	15 30	kV
P_{PP}	Peak pulse power dissipation (8/20 µs)		60	W
I_{PP}	Peak pulse current (8/20 µs)		7	A
T_j	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

Figure 2: Electrical characteristics (definitions)

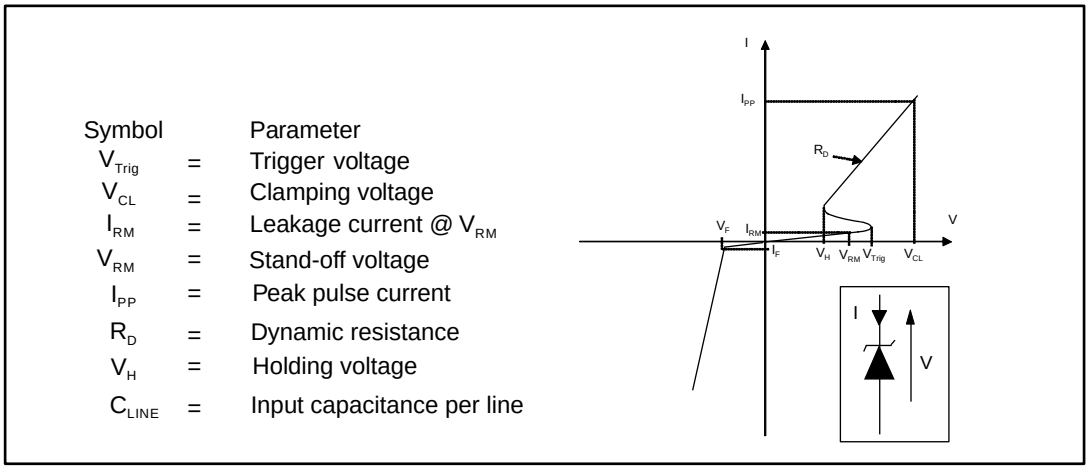


Table 2: Electrical characteristics (T_{amb} = 25 °C)

Symbol	Test condition	Min.	Typ.	Max.	Unit
V_F	I_F = 10 mA	0.7		0.9	V
V_{Trig}	Higher voltage than V_{Trig} guarantees the protection turn-on	5.8		10	V
V_H	Lower voltage than V_H guarantees the protection turn-off(1)	4.0	4.6		V
V_{RM}				5.5	V
I_{RM}	V_{RM} = 5.5 V			100	nA
V_{CL}	8 kV contact discharge after 30 ns, IEC 61000-4-2-Pin1 to Pin2		9.5		V
V_{CL}	8 kV contact discharge after 30 ns, IEC 61000-4-2-Pin2 to Pin1		3		V
V_{CL}	8/20 µs waveform, I_{PP} = 7 A			10	V
C_{LINE}	F = 1 MHz, V_{LINE} = 0 V, V_{OSC} = 30 mV		7.5	9.5	pF
R_D	Pulse duration 100 ns		0.2		Ω

Notes:

(1)Application note: when used to protect a line connected to a DC source, the DC voltage must be lower than the minimum V_H to enable the diode to return to its non-conducting state after the transient.

1.1 Characteristics (curves)

Figure 3: Leakage current versus junction temperature (typical values)

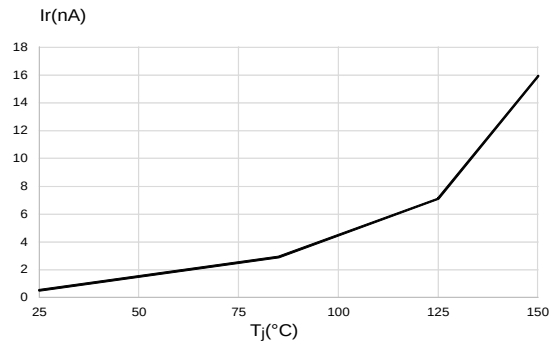


Figure 4: Junction capacitance versus reverse voltage applied (typical values)

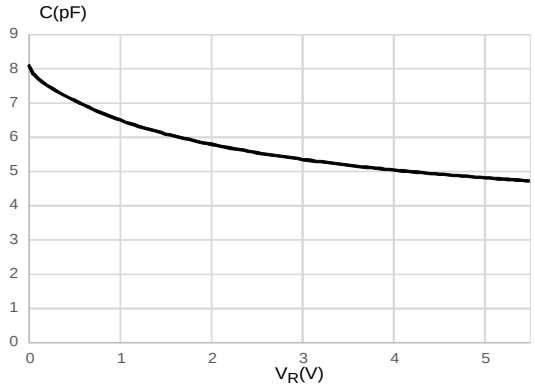


Figure 5: ESD response to IEC 61000-4-2 (+8 kV contact discharge)

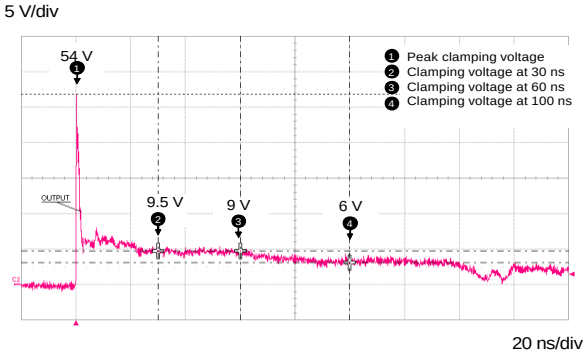


Figure 6: ESD response to IEC 61000-4-2 (-8 kV contact discharge)

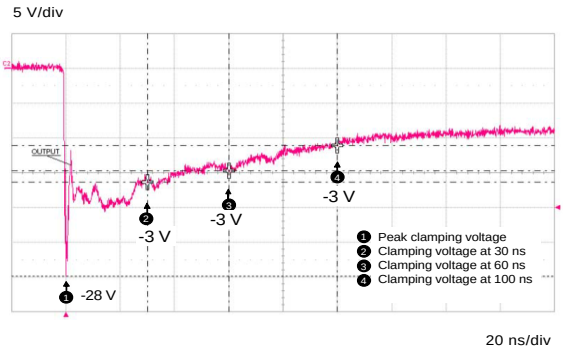


Figure 7: TLP characteristic

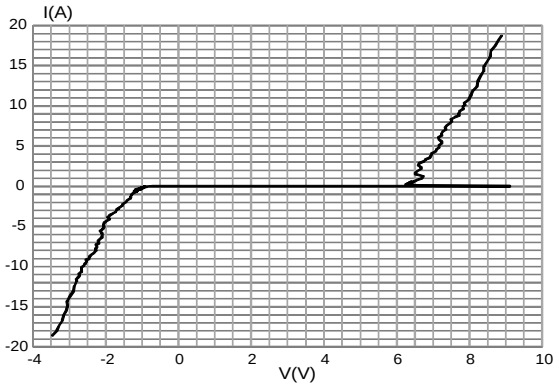
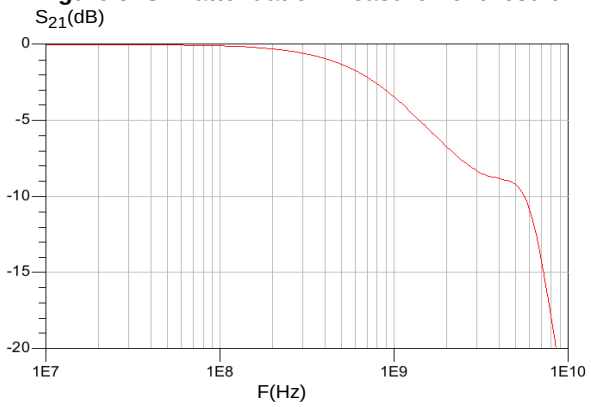


Figure 8: S21 attenuation measurement result

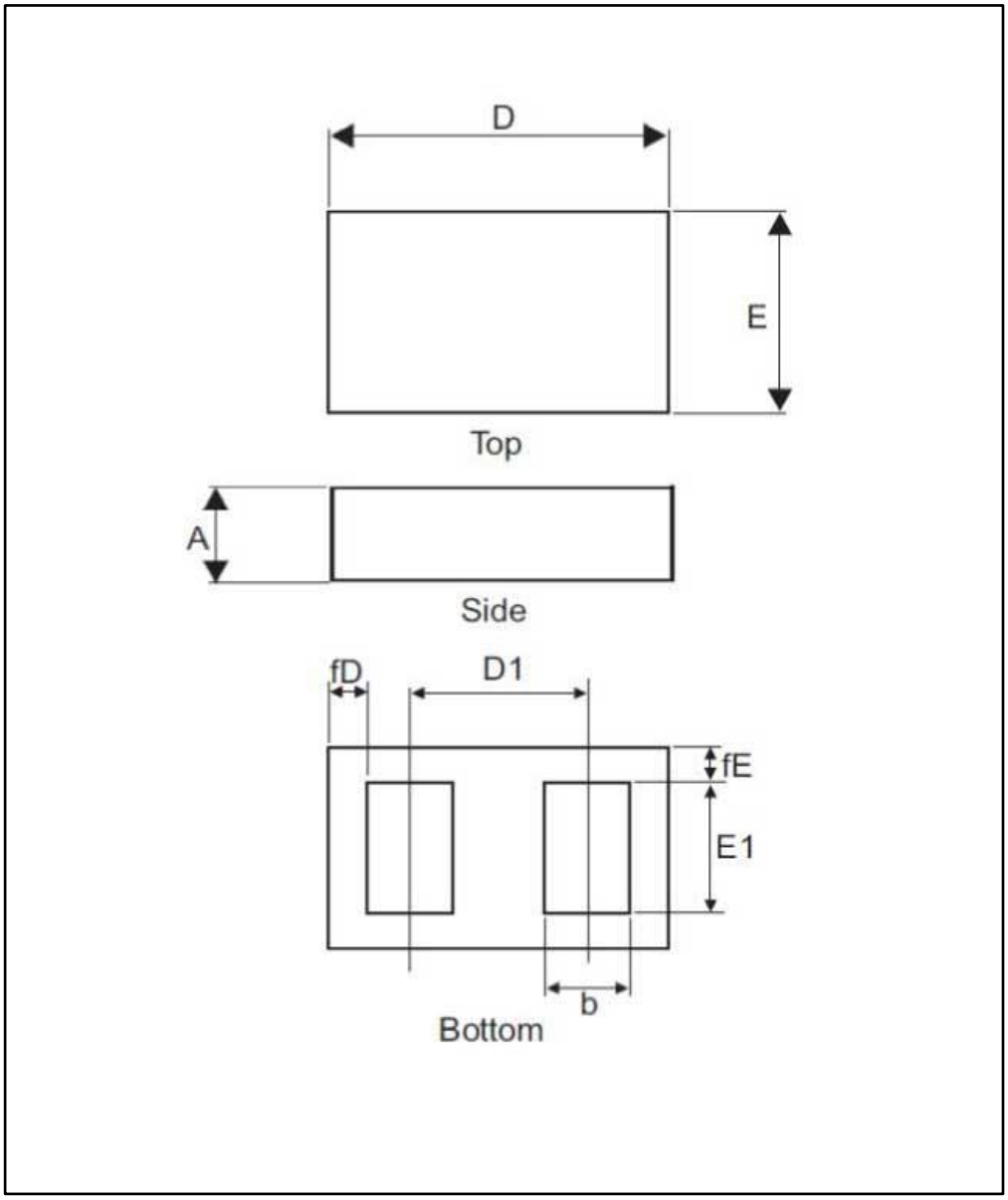


2 Package information

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 0201 package information

Figure 9: 0201 package outline



The marking codes can be rotated by 90 ° or 180° to differentiate assembly 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.

Table 3: 0201 package mechanical data

Ref.	Dimensions		
	Millimeters		
	Min.	Typ.	Max.
A	0.270	0.300	0.330
b	0.1675	0.1875	0.2075
D	0.560	0.580	0.600
D1		0.3375	
E	0.260	0.280	0.300
E1	0.205	0.225	0.245
fD	0.0175	0.0275	0.0375
fE	0.0175	0.0275	0.0375

Figure 10: Marking

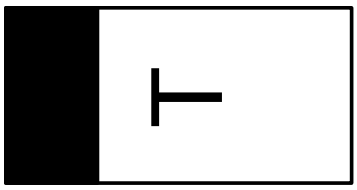
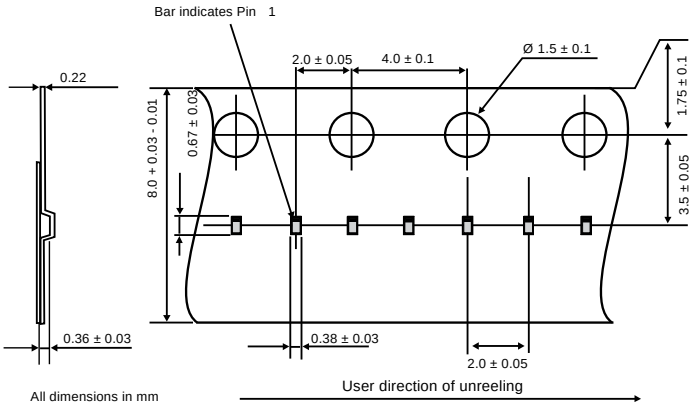


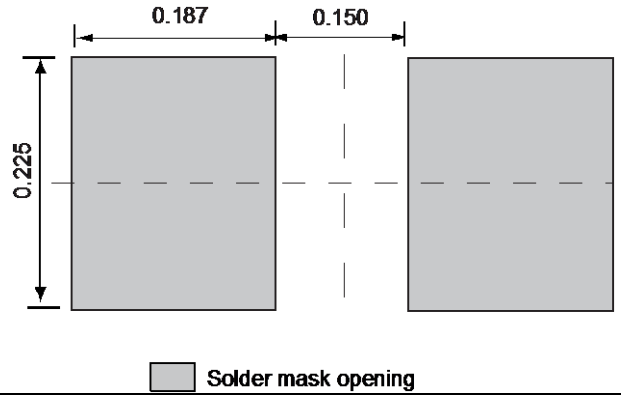
Figure 11: Tape and reel specification (in mm)



3 Recommendation on PCB assembly

3.1 Footprint

Figure 12: Footprint (dimensions in mm)

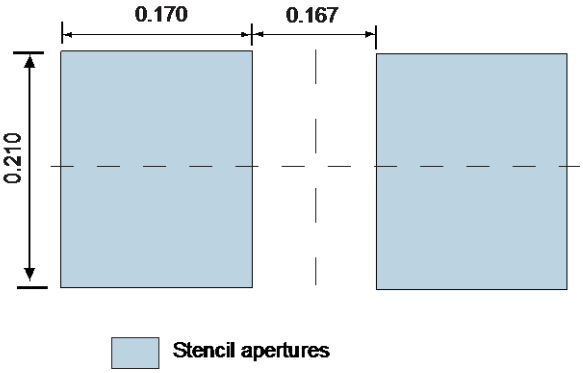


1. SMD footprint design is recommended.

3.2 Stencil opening design

1. Recommended design reference
   a. Stencil opening thickness: 75 µm / 3 mils

Figure 13: Recommended stencil window position in mm (inches)



3.3 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 particle size 20-38 µm

3.4 Placement

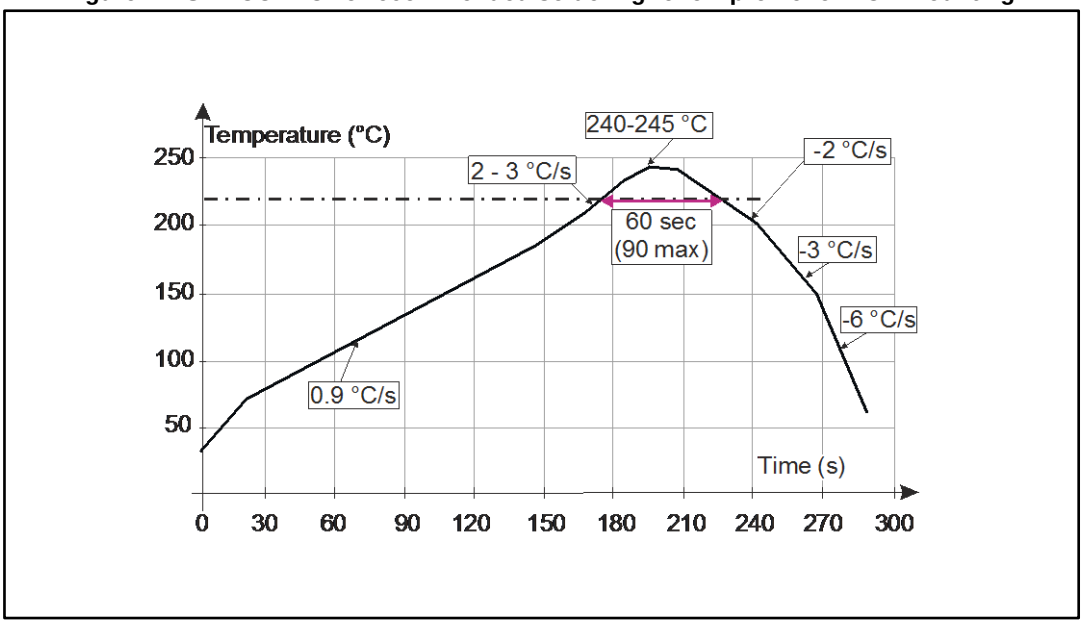
1. Manual positioning is not recommended.
2. It is recommended to use the lead recognition capabilities of the placement system, not the outline centering
3. Standard tolerance of ±0.05 mm is recommended.
4. 1.0 N placement force is recommended. Too much placement force can lead to squeezed out solder 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.

3.5 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.

3.6 Reflow profile

Figure 14: ST ECOPACK® recommended soldering reflow profile for PCB mounting



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

4 Ordering information

Figure 15: Ordering information scheme

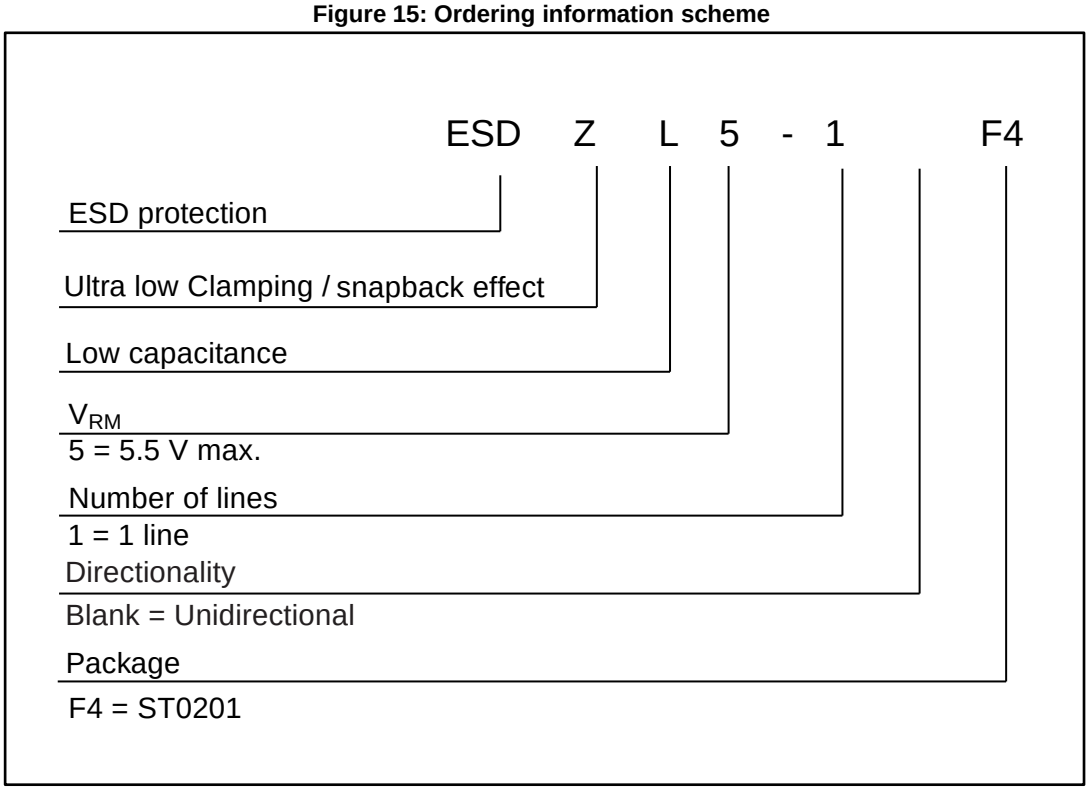


Table 4: Ordering information

Order code	Marking(1)	Package	Weight	Base qty.	Delivery mode
ESDZL5-1F4	T	0201	0.116 mg	15000	Tape and reel

Notes:

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

5 Revision history

Table 5: Document revision history

Date	Revision	Changes
01-Jun-2017	1	First issue.
28-Jul-2017	2	Updated footprint title.

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