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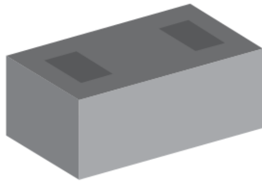
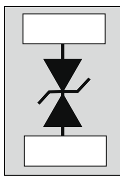
ESDZV053-1BF5

Datasheet

Ultra low clamping single line bidirectional ESD protection in extra small 01005 package



ST01005 package



Product status link
ESDZV053-1BF5

Product summary	
Order code	ESDZV053-1BF5
Package	ST01005
Packing	Tape and reel

Features

- Ultra-low clamping voltage: +/-10 V IEC 61000-4-2 8 kV contact discharge at 30 ns
- Bidirectional device
- Low leakage current
- 01005 size package
- Exceeds IEC 61000-4-2 standards:
  - ±16 kV (contact discharge)
  - ±16 kV (air discharge)
- ECOPACK2 compliant component

Applications

- Where transient overvoltage protection in ESD sensitive equipment is required, such as:
  - Smartphones, mobile phone and accessories
  - Tablet and notebooks
  - Portable multimedia devices and accessories
  - Wearable, home automation, healthcare
  - Highly integrated systems

Description

Bidirectional single line TVS diode designed to protect the data lines or other I/O ports against ESD transients.

The ESDZV053-1BF5 is a very small 16 kV ESD protection with high efficiency, ideal for applications where both reduced line capacitance, board space saving and high ESD protection levels are required.

1 Characteristics

Table 1. **Absolute maximum ratings**

Symbol	Parameter		Value	Unit
V_{PP}	Peak pulse voltage	IEC 61000-4-2: Contact discharge Air discharge	 16 16	kV
		IEC 61000-4-4	2	
I_{PP}	Peak pulse current	8/20µs	5.5	A
P_{PP}	Peak pulse power		50	W
T_j	Maximum operating junction temperature		-40 to +150	°C
T_{stg}	Storage junction temperature range		-65 to +150	
T_L	Maximum temperature for soldering during 10 s		260	°C

Figure 1. **Electrical characteristics (definitions)**

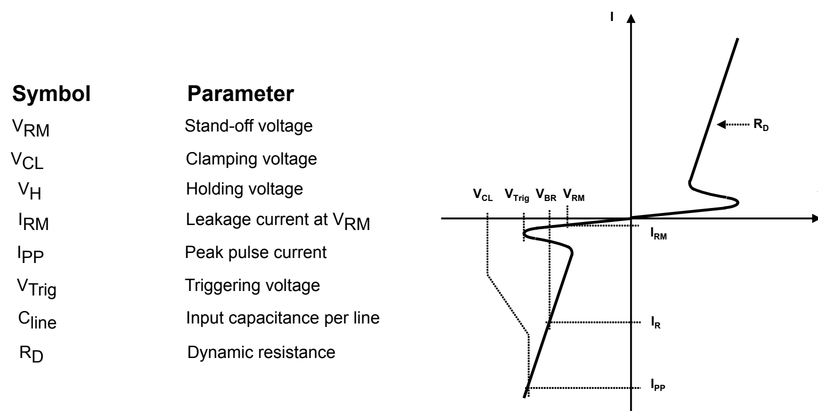


Table 2. **Electrical characteristics (T_{amb} = 25 °C)**

Symbol	Test conditions	Min.	Typ.	Max.	Unit
V_{Trig}		9		12	V
V_H		5.5			V
I_{RM}	V_{RM}[(1)] = 5.5 V		2	25	nA
V_{CL}	8 kV contact discharge after 30 ns, IEC 61000-4-2			10	V
R_D	Pulse duration 100 ns		0.18		Ω
C_{line}	V_{LINE} = 0 V, F = 1 MHz, V_{OSC} = 30 mV		4.5	5.5	pF

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 2. Leakage current versus junction temperature (typical values)

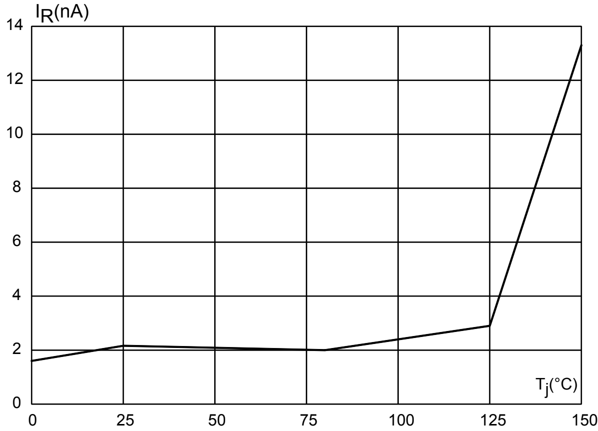


Figure 3. Junction capacitance versus applied voltage (typical values)

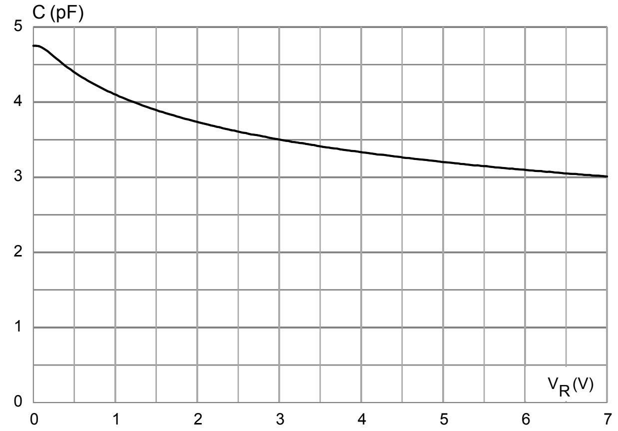


Figure 4. ESD response to IEC 61000-4-2 (+8 kV contact discharge)

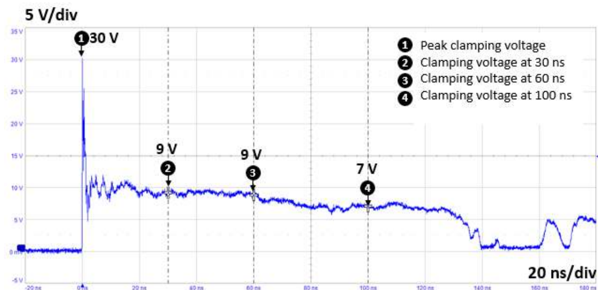


Figure 5. ESD response to IEC 61000-4-2 (-8 kV contact discharge)

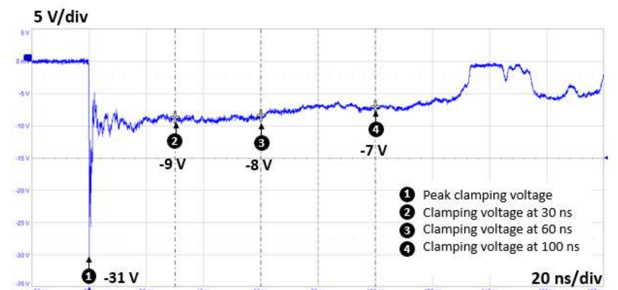


Figure 6. TLP characteristic

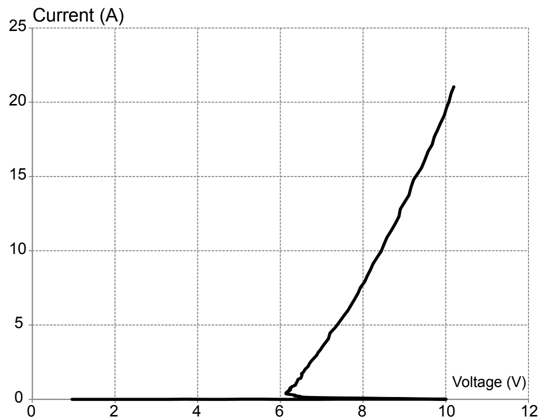
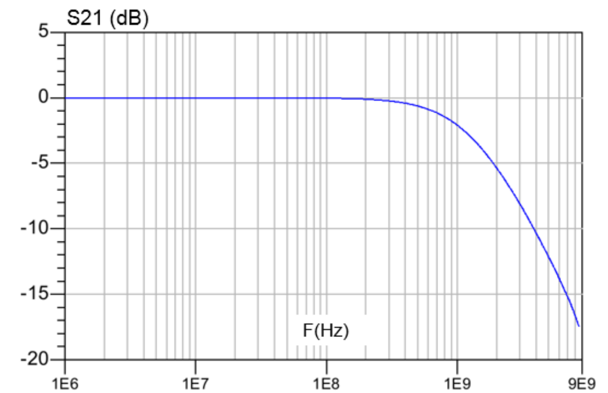


Figure 7. S21 attenuation measurement result



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 ST01005 package information

Figure 8. ST01005 package outline

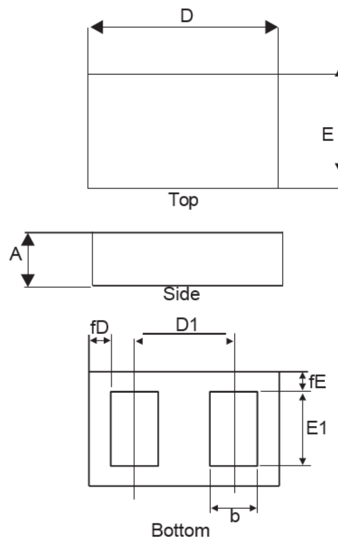


Table 3. ST01005 package mechanical data

Ref.	Dimensions		
	Millimeters		
	Min.	Typ.	Max.
A	0.130	0.150	0.180
b		0.130	
D	0.440	0.455	0.470
D1		0.280	
E	0.230	0.245	0.260
E1		0.200	
fD		0.0225	
fE		0.0225	

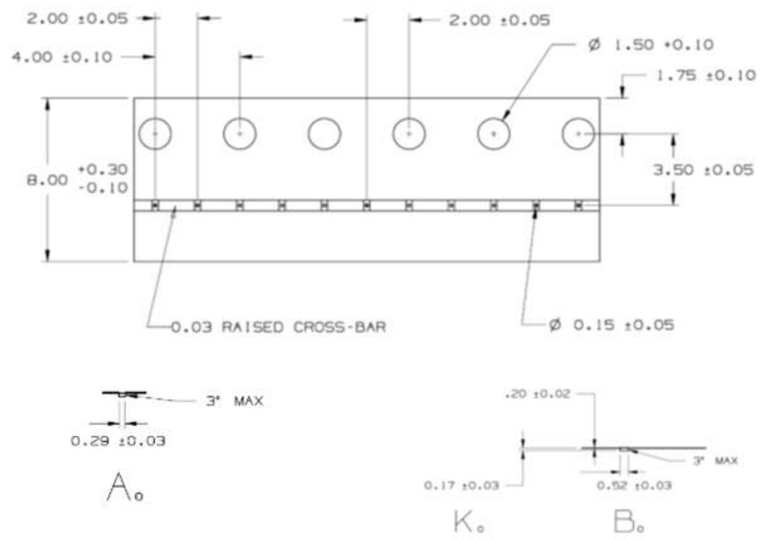
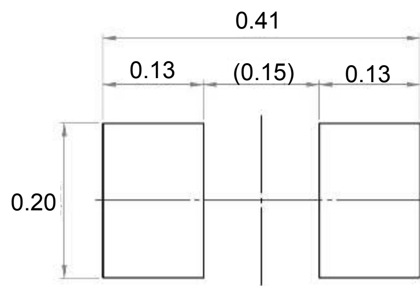


Figure 9. Tape and reel mechanical data

3 Recommendation on PCB assembly

3.1 Footprint

Figure 10. Footprint in mm

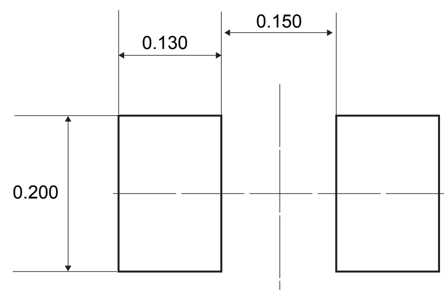


1. SMD footprint design is recommended

3.2 Stencil opening design

1. Recommended design reference
    a. Stencil opening thickness: 75 µm.
    b. Stencil aperture ratio: 100%

Figure 11. Stencil opening dimensions



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 fine particles: Type 4 (powder particle size 20-38 µm per IPCJ STD-005).

3.4 Placement

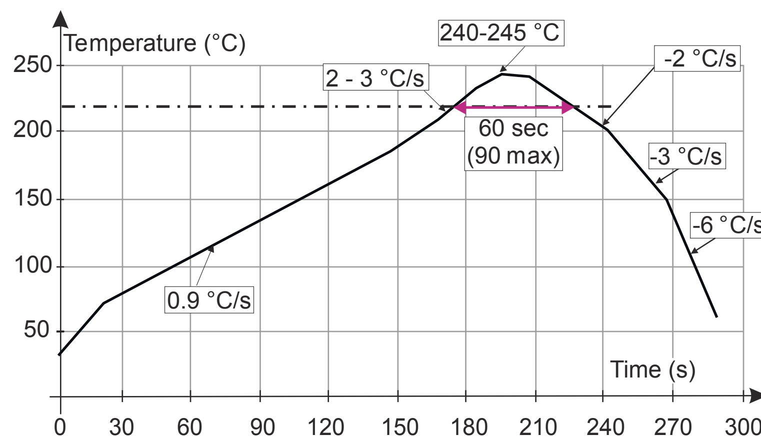
1. Manual positioning is not recommended.
2. It is recommended to use the lead recognition capabilities of the placement system, not the outline centering
3. Standard tolerance of ±0.05 mm is recommended.
4. 1.0 N placement force is recommended. Too much placement force can lead to squeezed out solder 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 12. ST ECOPACK® recommended soldering reflow profile for PCB mounting



Note: Minimize air convection currents in the reflow oven to avoid component movement. Maximum soldering profile corresponds to the latest IPC/JEDEC J-STD-020.

4 Ordering information

Table 4. **Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
ESDZV053-1BF5	M	ST01005	0.041 mg	20000	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	Version	Changes
24-Jul-2019	1	Initial release.

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