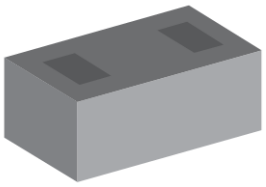
ESDZV5-1BV2

Datasheet

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



ST01005 package

Features

- Ultra-low clamping voltage: +/-7 V IEC 61000-4-2 8 kV contact discharge at 30 ns
- Bidirectional device
- Low leakage current
- 01005 package
- ECOPACK2 compliant component
- ESD / transient protection according to:
  - IEC61000-4-2 (ESD): 15kV / 25kV contact / air discharge
  - IEC61000-4-4 (EFT): 40A
  - IEC61000-4-5 (surge): 5A

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

Product status
ESDZV5-1BV2

Description

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

The ESDZV5-1BV2 is the smallest and most efficient 15 kV ESD protection, 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	 15 25	kV
I_{PP}	Peak pulse current	8/20µs	5	A
P_{PP}	Peak pulse power		45	W
T_{stg}	Storage junction temperature range		-65 to +150	°C
T_j	Maximum operating junction temperature		-40 to +150	
T_L	Maximum temperature for soldering during 10 s		260	°C

Figure 1. Electrical characteristics (definitions)

Symbol	Parameter
V_{RM}	Stand-off voltage
V_{CL}	Clamping voltage
V_H	Holding voltage
I_{RM}	Leakage current at V_{RM}
I_{PP}	Peak pulse current
V_{Trig}	Triggering voltage
C_{line}	Input capacitance per line
R_D	Dynamic resistance

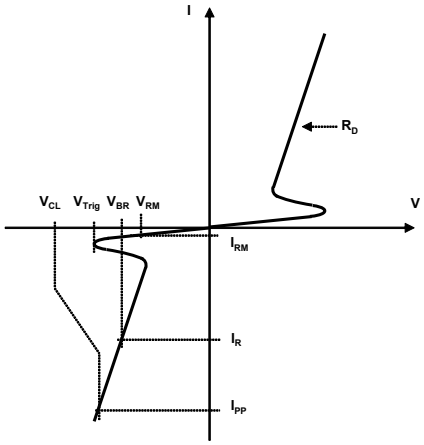


Table 2. Electrical characteristics (T_{amb} = 25 °C)

Symbol	Test conditions	Min.	Typ.	Max.	Unit
V_{Trig}	Higher voltage than V_{TRIG} guarantees the protection turn-on	5.8		8.5	V
I_{RM}	V_{RM} = 5.5 V(1)			100	nA
R_D	Pulse duration 100 ns		0.18		Ω
V_{CL}	8 kV contact discharge after 30 ns, IEC 61000-4-2		7		V
C_{line}	F = 1 MHz, V_{OSC} = 30 mV		5	6	pF
V_H	Lower voltage than V_H guarantees the protection turn-off	4	4.3	4.8	V

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)

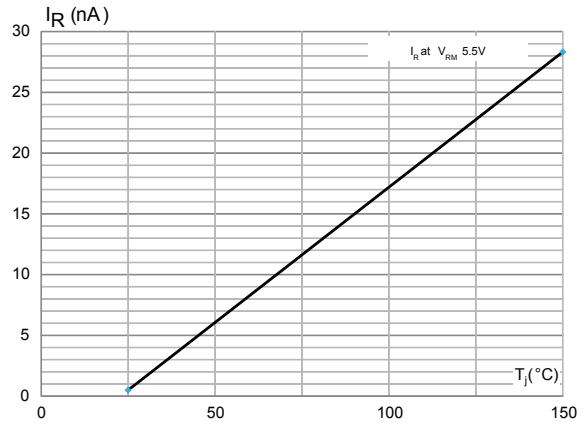


Figure 3. Junction capacitance versus applied voltage (typical values)

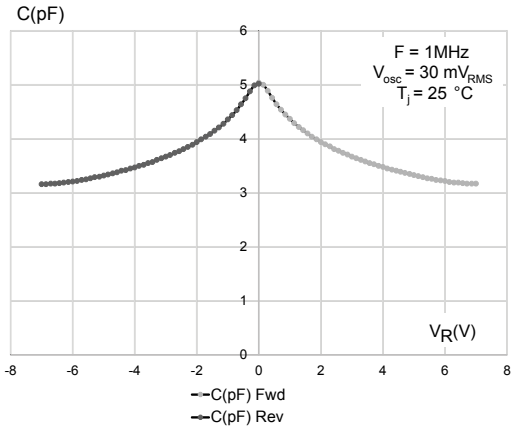


Figure 4. ESD response to IEC 61000-4-2 (+8 kV contact discharge)

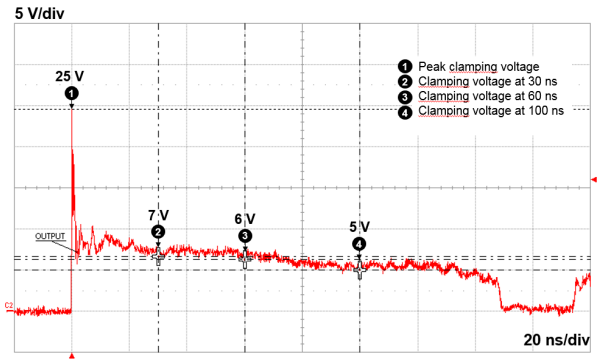


Figure 5. ESD response to IEC 61000-4-2 (-8 kV contact discharge)

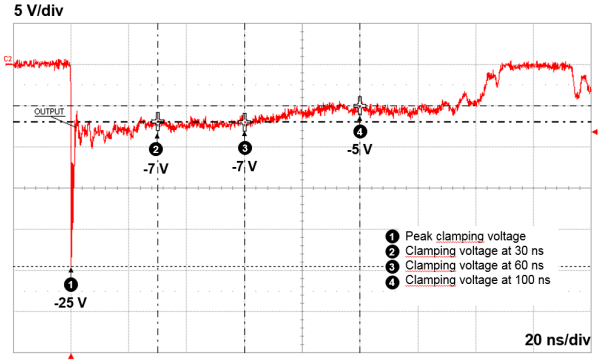


Figure 6. TLP characteristic

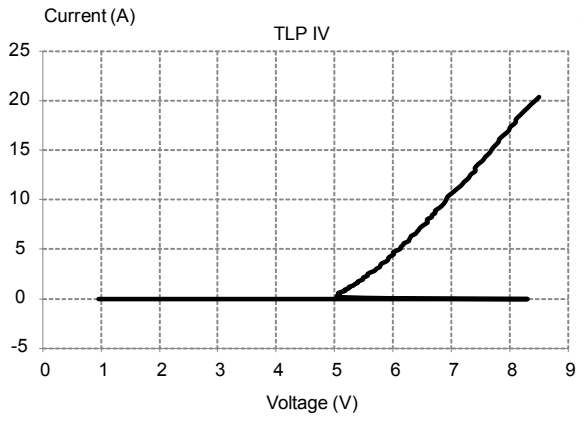
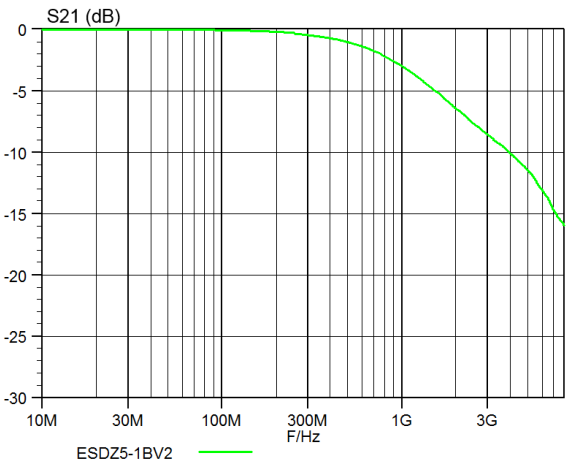


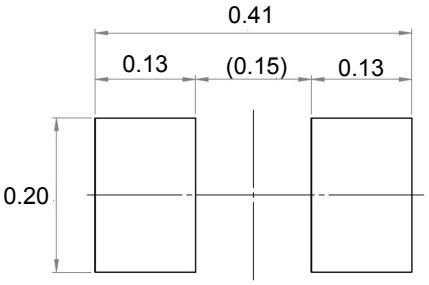
Figure 7. S21 attenuation measurement result



2 Recommendation on PCB assembly

2.1 Footprint

Figure 8. Footprint in mm

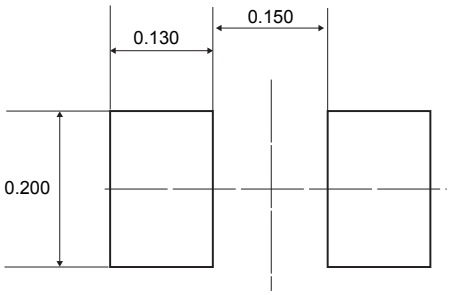


1. SMD footprint design is recommended

2.2 Stencil opening design

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

Figure 9. Stencil opening dimensions



2.3 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).

2.4 Placement

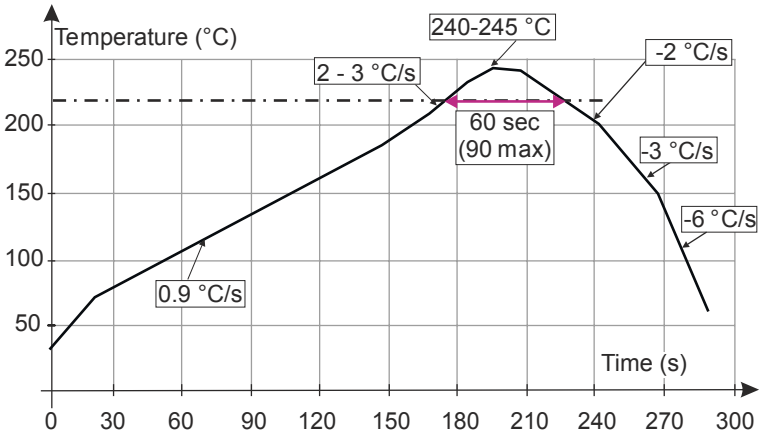
1. Manual positioning is not recommended.
2. It is recommended to use the lead recognition capabilities of the placement system, not the outline centering
3. Standard tolerance of ±0.05 mm is recommended.
4. 1.0 N placement force is recommended. Too much placement force can lead to squeezed out solder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

2.5 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.

2.6 Reflow profile

Figure 10. 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.

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.

3.1 ST01005 package information

Figure 11. ST01005 package outline

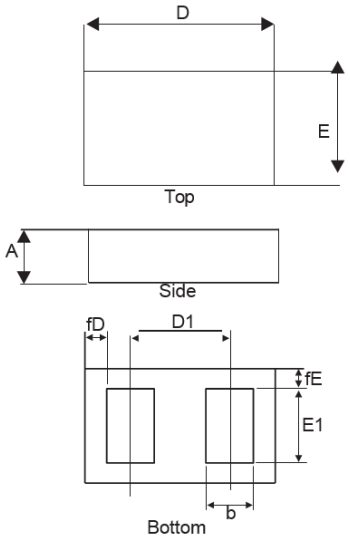


Table 3. ST01005 package mechanical data

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 12. **Marking layout**

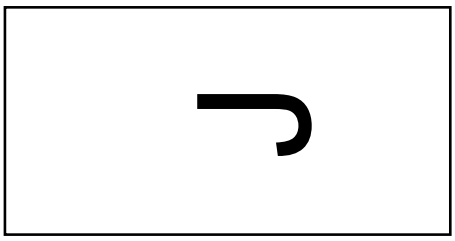
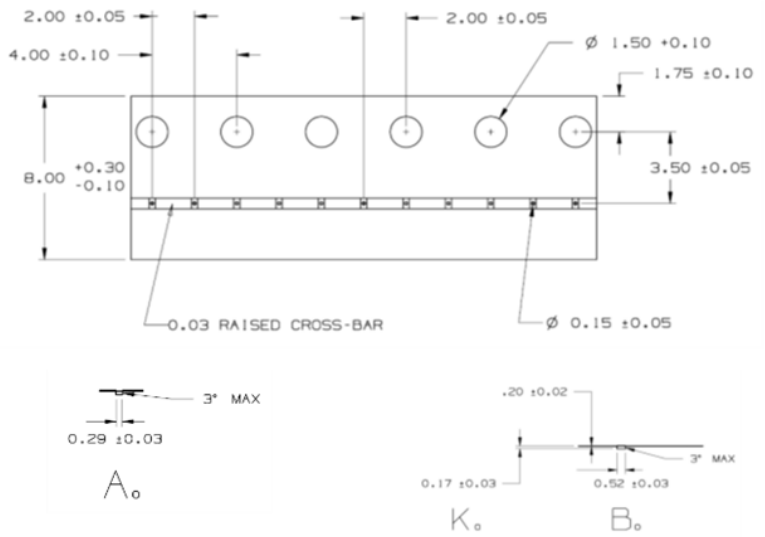


Figure 13. **Tape and reel mechanical data**



4 Ordering information

Figure 14. **Ordering information scheme**

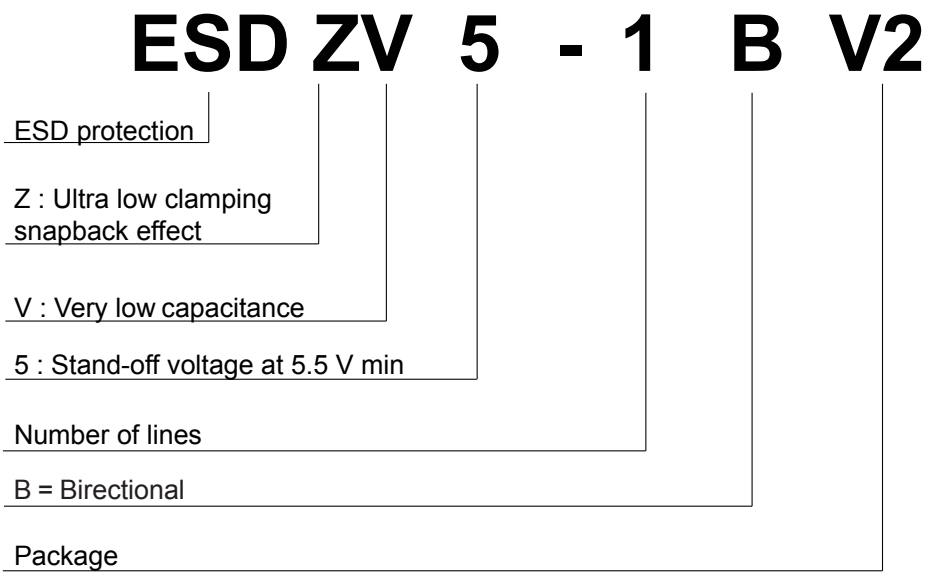


Table 4. **Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
ESDZV5-1BV2	J	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	Revision	Changes
16-Nov-2017	1	Initial release.
27-Feb-2018	2	Updated Section Features and Table 1. Absolute maximum ratings.
06-Nov-2018	3	Updated Section 2.1 Footprint and Table 3. ST01005 package mechanical data.
08-Dec-2020	4	Updated Figure 13. Marking layout.

Mouser Electronics

Authorized Distributor

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

STMicroelectronics:

ESDZV5-1BV2