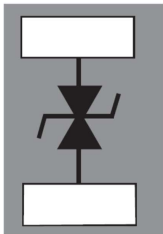


## Ultra low clamping single line bidirectional ESD protection



0201 package



### Features

- Ultra low clamping voltage:
  - 10 V (IEC 61000-4-2 contact discharge 8 kV at 30 ns/ 16 A TLP)
- Bidirectional and symmetrical device
- High holding voltage for DC line protection
- 0201 package
- ECOPACK2 compliant component
- Complies with IEC 61000-4-2 level 4
  - ±30 kV (air discharge)
  - ±14 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

#### Product status link

[ESDZV5H-1BU2](#)

#### Product summary

<b>Order code</b>	ESDZV5H-1BU2
<b>Package</b>	ST0201
<b>Packing</b>	Tape and reel

### Description

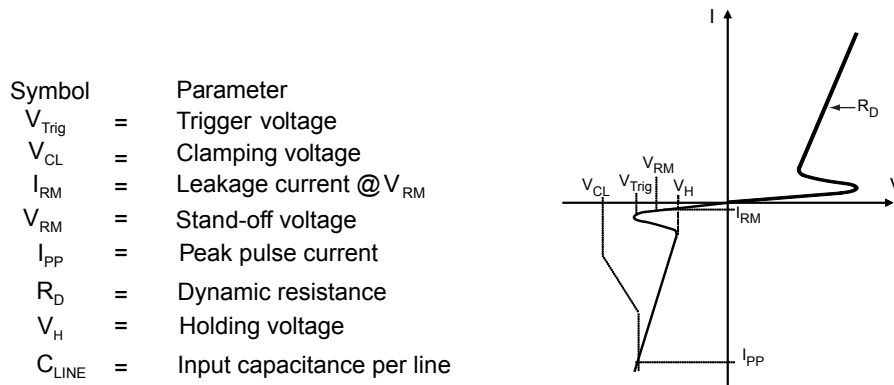
The **ESDZV5H-1BU2** is a bidirectional single line TVS diode designed to protect the data line or other I/O ports against ESD transients.

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

# 1 Characteristics

**Table 1. Absolute maximum ratings ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ )**

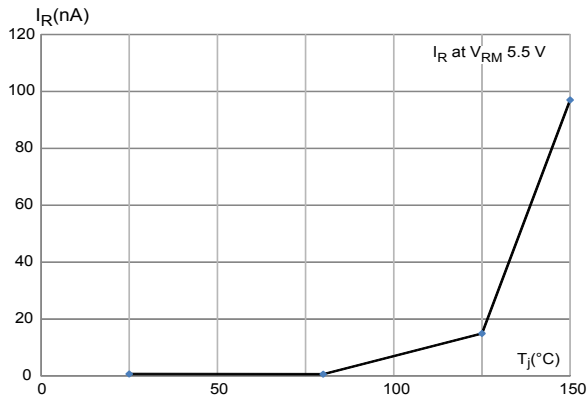
Symbol	Parameter		Value	Unit
$V_{PP}$	Peak pulse voltage	IEC 61000-4-2 contact discharge	14	kV
		IEC 61000-4-2 air discharge	30	
$P_{PP}$	Peak pulse power dissipation (8/20 $\mu\text{s}$ )		40	W
$I_{PP}$	Peak pulse current (8/20 $\mu\text{s}$ )		4	A
$T_j$	Operating junction temperature range		-55 to +150	$^{\circ}\text{C}$
$T_{stg}$	Storage temperature range		-65 to +150	$^{\circ}\text{C}$
$T_L$	Maximum lead temperature for soldering during 10 s		260	$^{\circ}\text{C}$

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

**Table 2. Electrical characteristics ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ )**

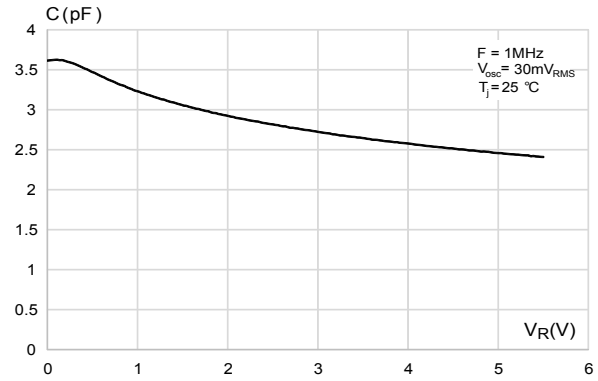
Symbol	Test condition	Min.	Typ.	Max.	Unit
$V_{Trig}$	Higher voltage than $V_{Trig}$ guarantees the protection turn-on	6.5		10	V
$V_H$	Lower voltage than $V_H$ guarantees the protection turn-off	5.5	5.9		V
$V_{RM}$				5.5	V
$I_{RM}$	$V_{RM} = 5.5\text{ V}$		10	50	nA
	8 kV contact discharge after 30 ns, IEC 61000-4-2		10		V
$V_{CL}$	8/20 $\mu\text{s}$ waveform, $I_{PP} = 4\text{ A}$			11	V
$C_{LINE}$	$F = 1\text{ MHz}$ , $V_{LINE} = 0\text{ V}$ , $V_{OSC} = 30\text{ mV}$		4	5	pF
$R_D$	Pulse duration 100 ns		0.18		$\Omega$

## 1.1 Characteristics (curves)

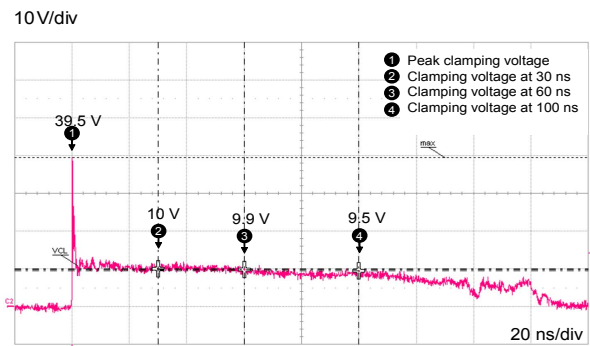
**Figure 2. Leakage current versus junction temperature (typical values)**



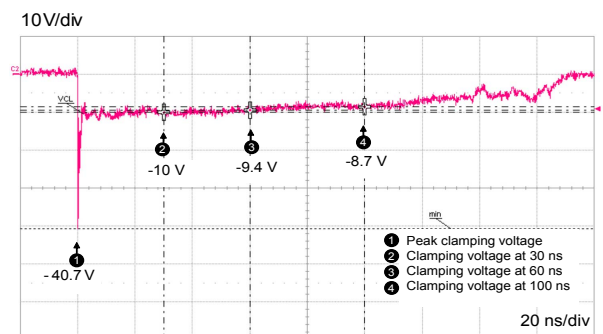
**Figure 3. Junction capacitance versus applied voltage (typical values)**



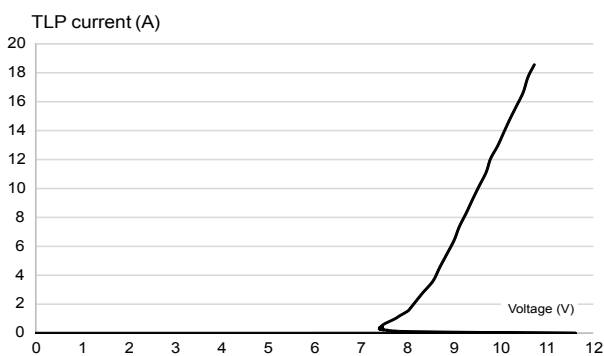
**Figure 4. ESD response to IEC 61000-4-2 (+8 kV contact discharge)**



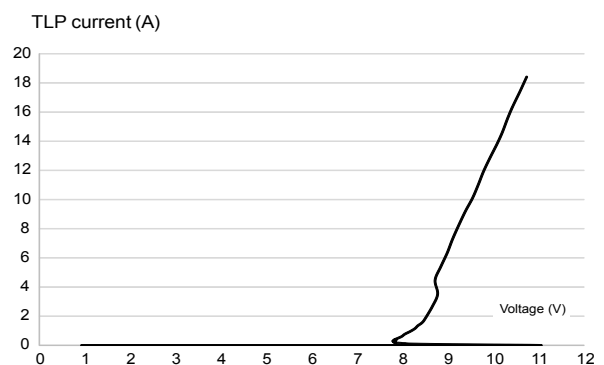
**Figure 5. ESD response to IEC 61000-4-2 (-8 kV contact discharge)**



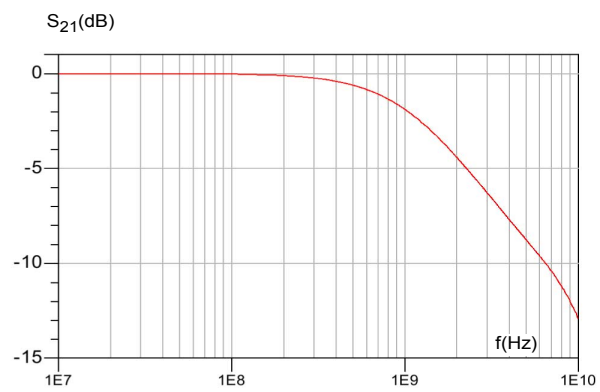
**Figure 6. Positive TLP characteristic**



**Figure 7. Negative TLP characteristic**



**Figure 8. S21 attenuation measurement result**

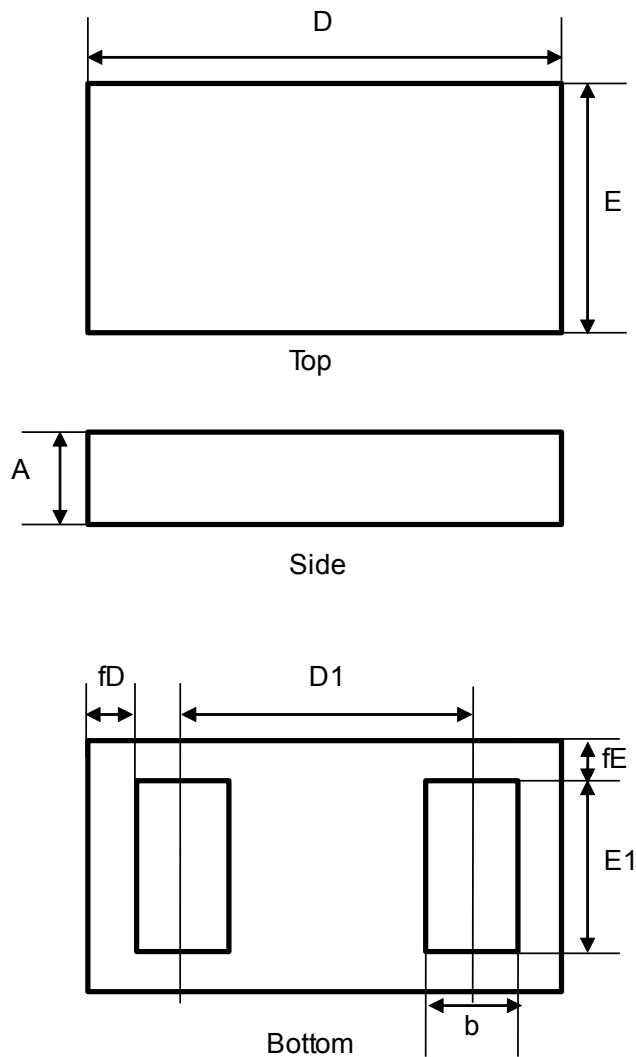


## 2 Package information

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](http://www.st.com). ECOPACK is an ST trademark.

### 2.1 ST0201 package information

Figure 9. ST0201 package outline

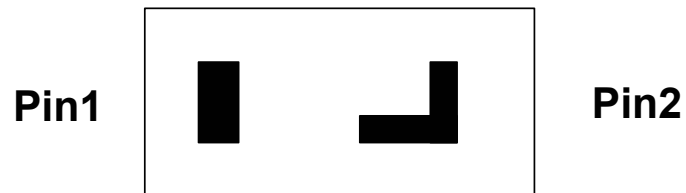


**Note:** *Note: The marking codes can be rotated by 90 ° or 180° to differentiate assembly location. In no case should this product marking be used to orient the component for its placement on a PCB. Only pin 1 mark is to be used for this purpose.*

**Table 3. ST0201 package mechanical data**

Ref.	Dimensions		
	Millimeters		
	Min.	Typ.	Max.
A	0.210	0.240	0.270
b	0.140	0.170	0.200
D	0.550	0.580	0.610
D1		0.330	
E	0.250	0.280	0.310
E1	0.170	0.200	0.230
fD		0.040	
fE		0.040	

**Figure 10. 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.*

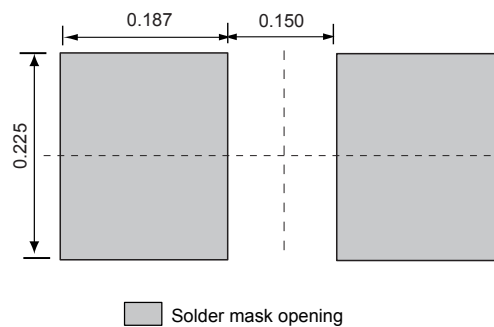


### 3 Recommendation on PCB assembly

#### 3.1 Footprint

1. Footprint in mm
  - a. SMD footprint design is recommended.

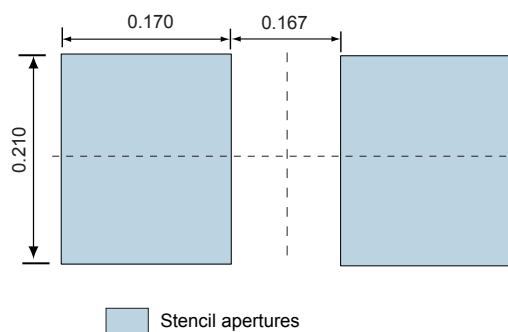
Figure 12. Footprint in mm



#### 3.2 Stencil opening design

1. Reference design
  - a. Stencil opening thickness: 75  $\mu\text{m}$  / 3 mils
  - b. Stencil aperture ratio : 100%

Figure 13. Recommended stencil window position in mm



#### 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: powder particle size 20-38  $\mu\text{m}$ .

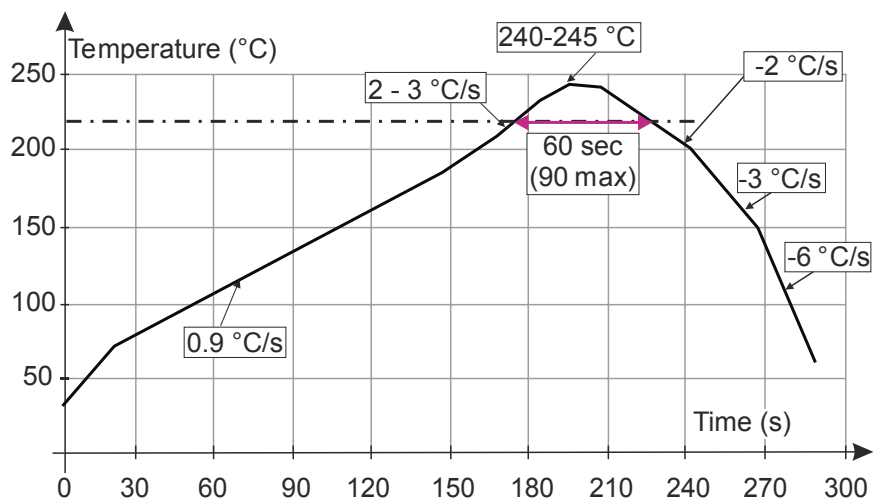


### 3.4 Placement

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  $\pm 0.05$  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 Reflow profile

**Figure 14. 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

Figure 15. Ordering information scheme

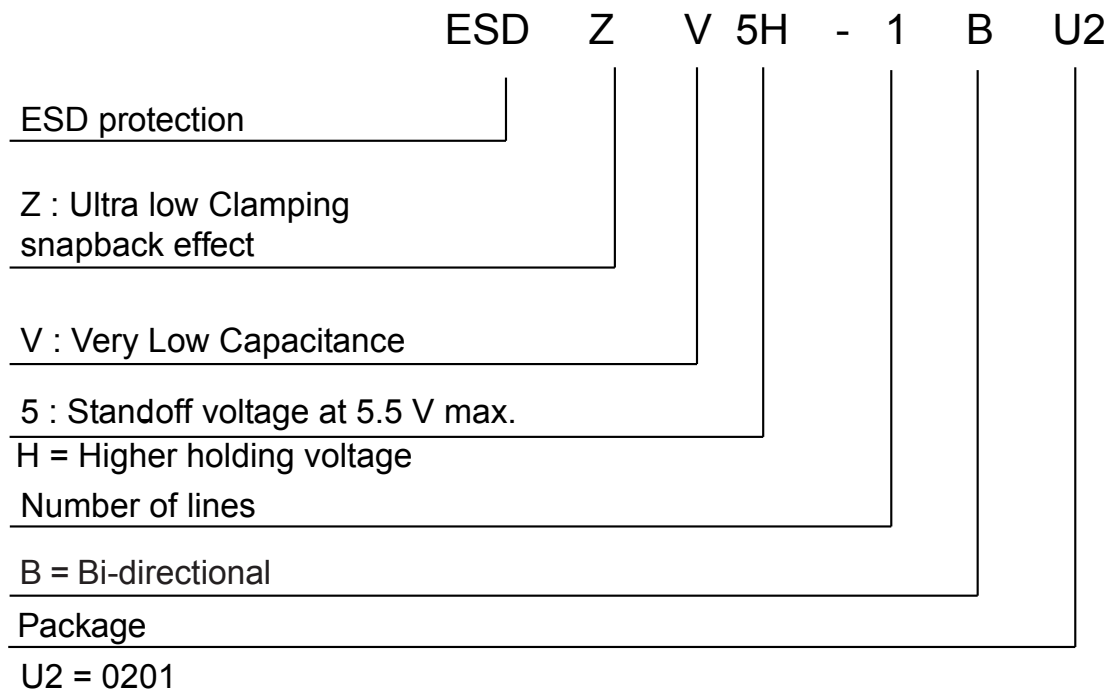


Table 4. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
ESDZV5H-1BU2	L	0201	0.116 mg	15000	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
18-Jul-2017	1	First issue.
05-Jan-2018	2	Updated <i>Figure 11: "Marking"</i> .
10-Sep-2018	3	Updated <a href="#">Table 1</a> . Absolute maximum ratings ( $T_{amb} = 25\text{ °C}$ ).
17-Jul-2019	4	Updated <a href="#">Section 3.1 Footprint</a> .
31-Mar-2020	5	Updated <a href="#">Figure 9</a> and <a href="#">Table 3</a> .

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