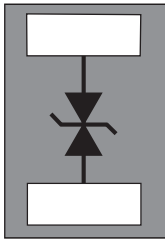


Ultra-low clamping single line bidirectional ESD protection



0201 WLCSP 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 WLCSP package
- Complies with the following standards: IEC 61000-4-2 level 4
 - ± 15 kV (air discharge)
 - ± 10 kV (contact discharge)
- ECOPACK^{®2} compliant component

Application

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

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

Product status link

[ESDZV5HS-1BF4](#)

Description

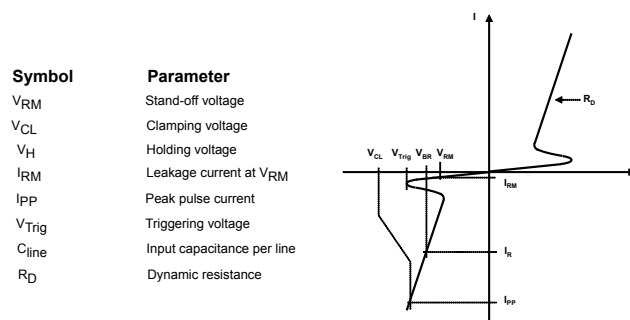
The [ESDZV5HS-1BF4](#) is a bidirectional single line TVS diode designed to protect the data line or other I/O ports against ESD transients.

The device is ideal for applications where both 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 | ± 10 | kV |
| | | IEC 61000-4-2 air discharge | ± 15 | |
| P_{pp} | Peak pulse power (8/20 μs) | | 40 | W |
| I_{pp} | Peak pulse current (8/20 μs) | | 4 | A |
| T_j | Operating junction temperature range | | -55 to +150 | $^{\circ}\text{C}$ |
| T_{stg} | Storage junction temperature range | | -65 to +150 | |
| T_L | Maximum lead temperature for soldering during 10 s | | 260 | |

Figure 1. Electrical characteristics (definitions)

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

| Symbol | Parameter | Test condition | Min. | Typ. | Max. | Unit |
|------------|---|---|------|------|------|----------|
| V_{trig} | | | 10 | 12 | 13.5 | V |
| V_H | | | 6.5 | 7 | | V |
| I_{RM} | Leakage current | $V_{RM} = 5.5\text{ V}$ | | | 100 | nA |
| V_{CL} | Clamping voltage | IEC 61000-4-2, 8 kV contact discharge measured after 30 ns | | 10 | | V |
| R_D | Dynamic resistance, pulse duration 100 ns | | | 0.18 | | Ω |
| C_{LINE} | Line capacitance | $V_{LINE} = 0\text{ V}$, $F = 1\text{ MHz}$, $V_{OSC} = 30\text{ mV}$ | | 4 | 4.5 | pF |

1.1 Characteristics (curves)

Figure 2. Variation of leakage current versus junction temperature (typical values)

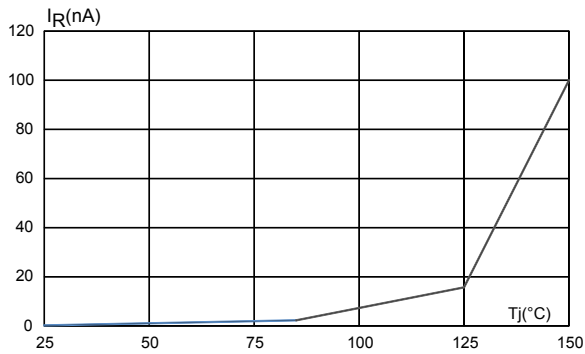


Figure 3. Junction capacitance versus frequency

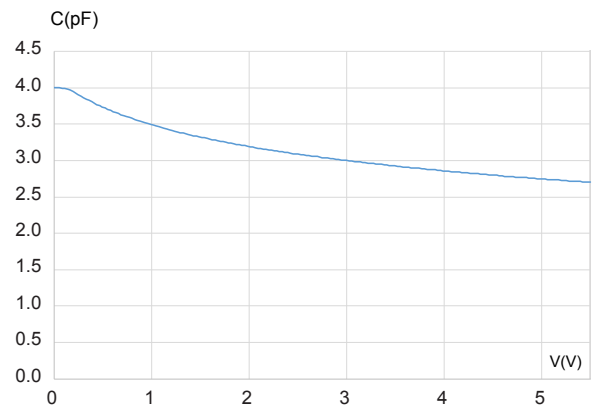


Figure 4. ESD response to IEC 61000-4-2 (+8 kV contact discharge)

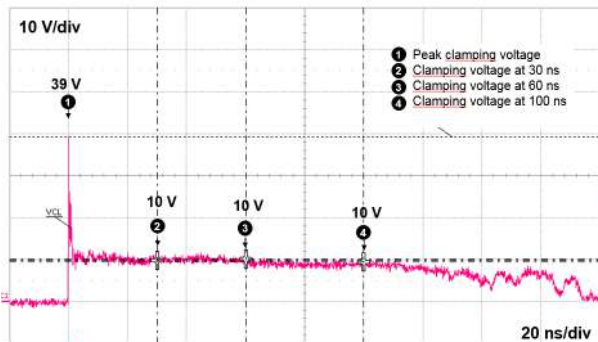


Figure 5. ESD response to IEC 61000-4-2 (-8 kV contact discharge)

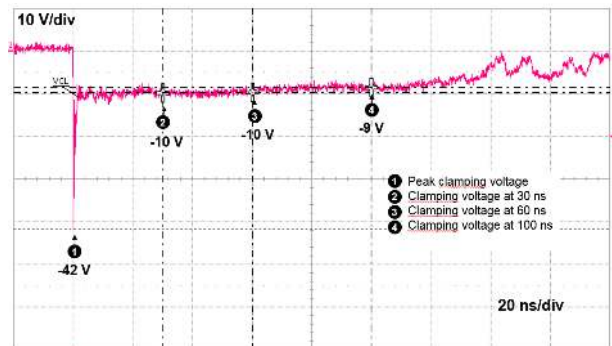


Figure 6. TLP

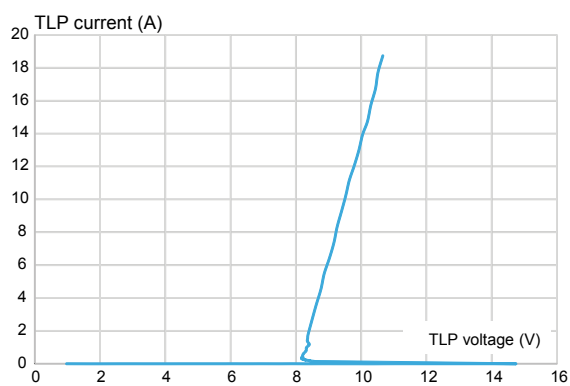
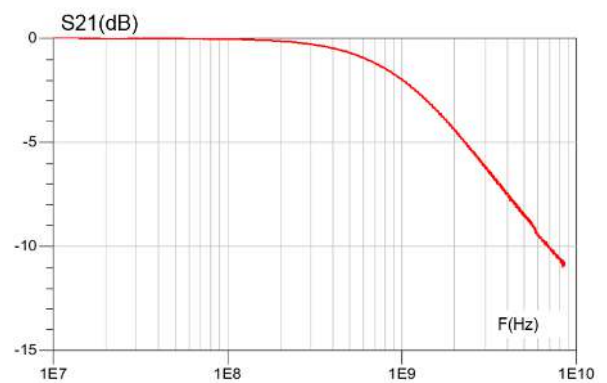


Figure 7. S21 attenuation



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 WLCSP package information

Figure 8. 0201 WLCSP package outline

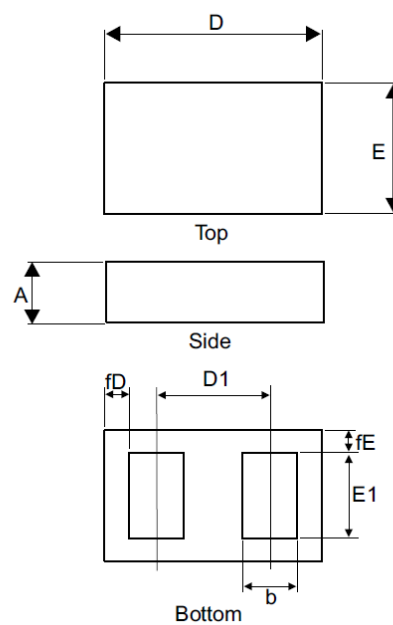


Table 3. 0201 WLCSP package mechanical data

| 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 | 0.070 |

Figure 9. Marking

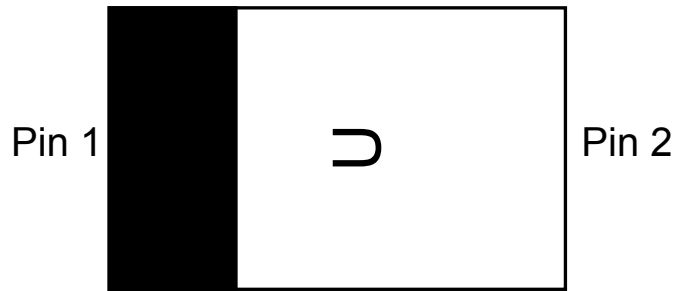
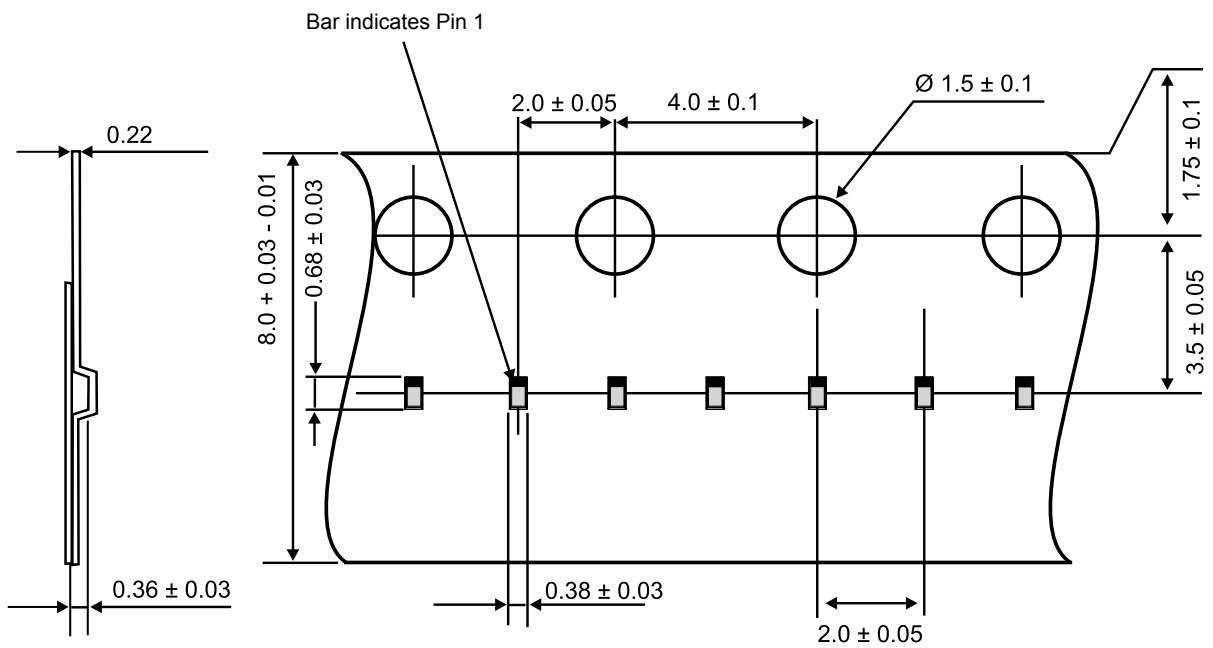


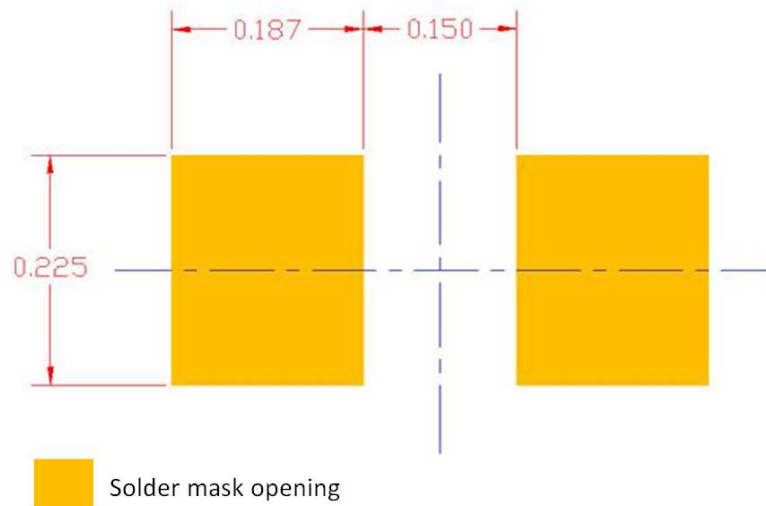
Figure 10. Tape and reel specification



3 Recommendation on PCB assembly

3.1 Footprint

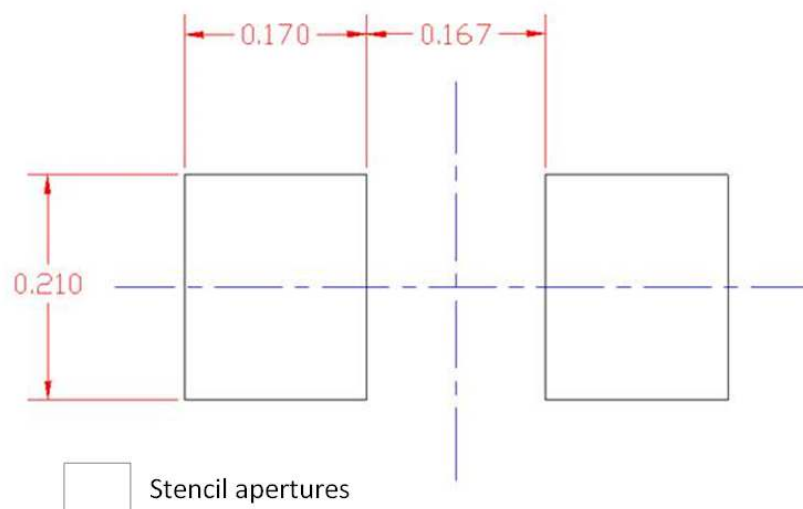
Figure 11. Footprint in mm



3.2 Stencil opening design

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

Figure 12. Stencil opening recommendations



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 μm .

3.4 Placement

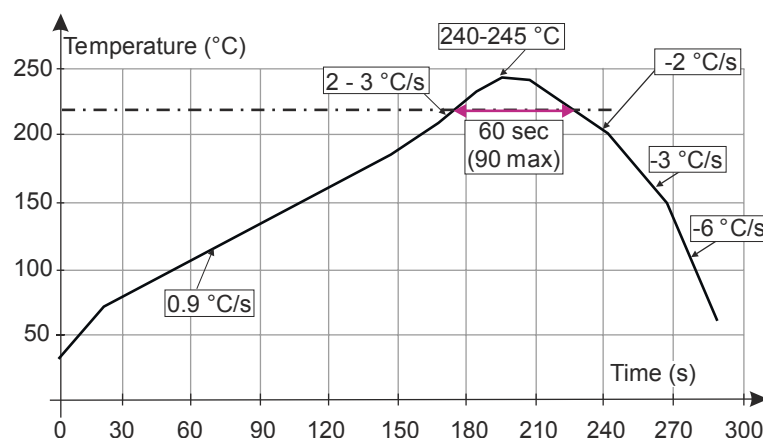
1. Manual positioning is not recommended.
2. It is recommended to use the lead recognition capabilities of the placement system, not the outline centering
3. Standard tolerance of ± 0.05 mm is recommended.
4. 1.0 N placement force is recommended. Too much placement force can lead to squeezed out solder 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 13. 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

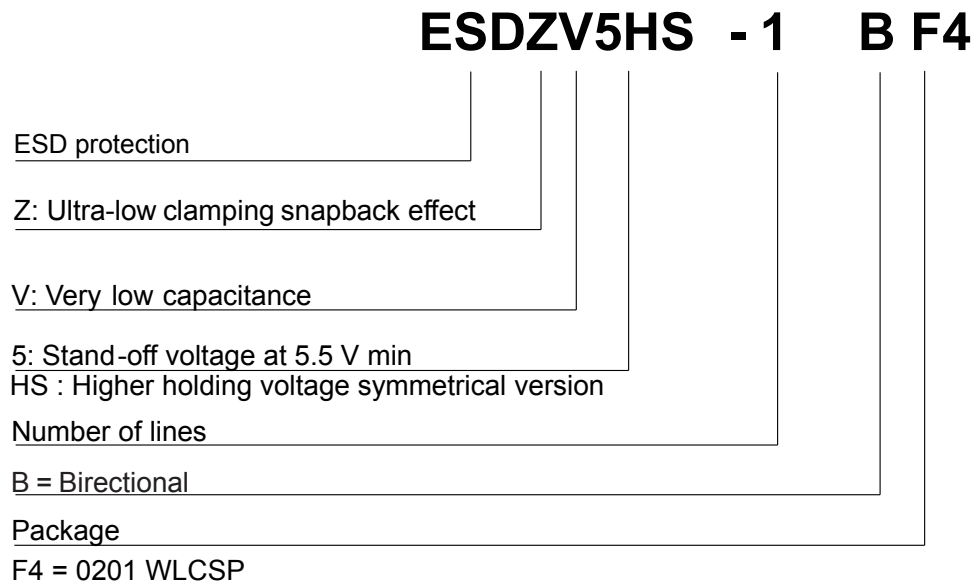


Table 4. Ordering information

| Order code | Marking | Package | Weight | Base qty. | Delivery mode |
|---------------|---------|------------|----------|-----------|---------------|
| ESDZV5HS-1BF4 | U | 0201 WLCSP | 0.116 mg | 15000 | Tape and reel |

Revision history

Table 5. Document revision history

| Date | Revision | Changes |
|-------------|----------|--|
| 02-Nov-2017 | 1 | Initial release. |
| 16-Feb-2018 | 2 | Updated Table 3: "0201 package mechanical data". |
| 28-Jun-2018 | 3 | Updated package information naming. |

IMPORTANT NOTICE – PLEASE READ CAREFULLY

STMicroelectronics NV and its subsidiaries (“ST”) reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST’s terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers’ products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2018 STMicroelectronics – All rights reserved