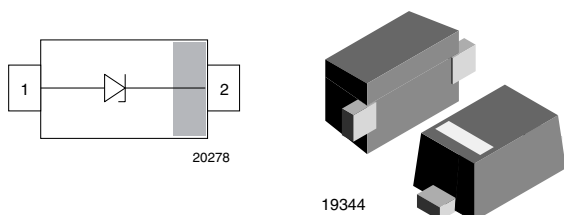


# Low Capacitance Single Line ESD-Protection Diode in SOD-523



## MARKING (example only)



Bar = cathode marking

X = date code

Y = type code (see table below)

## LINKS TO ADDITIONAL RESOURCES



## FEATURES

- Compact SOD-523 package
- Low package height < 0.75 mm
- 1-line ESD-protection
- AEC-Q101 qualified available
- Working range 5.5 V
- Low leakage current < 0.1  $\mu$ A
- Low load capacitance  $C_D$  = 0.7 pF typ.
- ESD-protection acc. IEC 61000-4-2  
± 18 kV contact discharge  
± 18 kV air discharge
- Lead plating: Sn (e3)  
Soldering can be checked by standard vision inspection.  
AOI = automated optical inspection  
No X-ray necessary
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



## ORDERING INFORMATION

| PART NUMBER<br>(EXAMPLE) | AEC-Q101<br>QUALIFIED | ENVIRONMENTAL AND QUALITY CODE                     |            |                               | ORDERING CODE<br>(EXAMPLE) |
|--------------------------|-----------------------|--|------------|-------------------------------|----------------------------|
|                          |                       | RoHS COMPLIANT +<br>LEAD (Pb)-FREE<br>TERMINATIONS | TIN PLATED | 8K PER 7" REEL<br>(8 mm TAPE) |                            |
|                          |                       | GREEN  |            | MOQ = 8K/BOX                  |                            |
| VBUS05M1-02V             | -                     | G  | 3          | -08                           | VBUS05M1-02V-G3-08         |
| VBUS05M1-02V             | H                     | G  | 3          | -08                           | VBUS05M1-02VHG3-08         |

## PACKAGE DATA

| DEVICE NAME  | PACKAGE NAME | PIN PLATING | TYPE CODE | WEIGHT | MOLDING COMPOUND<br>FLAMMABILITY RATING | MOISTURE SENSITIVITY LEVEL           | SOLDERING CONDITIONS            |
|--------------|--------------|-------------|-----------|--------|---|--------------------------------------|---------------------------------|
| VBUS05M1-02V | SOD-523      | e3          | B         | 1.4 mg | UL 94 V-0                               | MSL level 1<br>(according J-STD-020) | Peak temperature<br>max. 260 °C |

## ABSOLUTE MAXIMUM RATINGS

| PARAMETER             | TEST CONDITIONS   | SYMBOL    | VALUE       | UNIT |
|-----------------------|---|-----------|-------------|------|
| Peak pulse current    | acc. IEC 61000-4-5, 8/20 $\mu$ s/single shot                            | $I_{PPM}$ | 4.5         | A    |
| Peak pulse power      | Pin 1 to pin 2<br>acc. IEC 61000-4-5; $t_p$ = 8/20 $\mu$ s; single shot | $P_{PP}$  | 70          | W    |
| ESD immunity          | Contact discharge acc. IEC 61000-4-2; 10 pulses                         | $V_{ESD}$ | ± 18        | kV   |
|                       | Air discharge acc. IEC 61000-4-2; 10 pulses                             |           | ± 18        |      |
| Operating temperature | Junction temperature  | $T_J$     | -55 to +150 | °C   |
| Storage temperature   |   | $T_{stg}$ | -55 to +150 | °C   |

## ESD-PROTECTION FOR HIGH-SPEED SIGNAL OR DATA LINES

The VBUS05M1-02V is a bidirectional but asymmetrical (BiAs) ESD-protection device which clamps positive and negative overvoltage transients to ground. Connected between the signal or data line and the ground the VBUS05M1-02V offers a high isolation (low leakage current, low capacitance) within the specified working range. Due to the short leads and small package size of the small SOD-523 package the line inductance is very low, so that fast transients like an ESD-strike can be clamped with minimal over- or undershoots. Due to the very low capacitance the VBUS05M1-02V can be used for high speed data ports like HDMI, USB, or Thunderbolt.

### ELECTRICAL CHARACTERISTICS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

| PARAMETER                 | TEST CONDITIONS/REMARKS   | SYMBOL        | MIN. | TYP. | MAX. | UNIT          |
|---------------------------|---|---------------|------|------|------|---------------|
| Protection paths          | Number of lines which can be protected  | $N_{channel}$ | -    | -    | 1    | lines         |
| Reverse stand-off voltage | Max. reverse working voltage  | $V_{RWM}$     | -    | -    | 5.5  | V             |
| Reverse voltage           | At $I_R = 0.1\text{ }\mu\text{A}$   | $V_R$         | 5.5  | -    | -    | V             |
| Reverse current           | At $V_{RWM} = 5.5\text{ V}$   | $I_R$         | -    | -    | 0.1  | $\mu\text{A}$ |
| Reverse breakdown voltage | At $I_R = 1\text{ mA}$  | $V_{BR}$      | 6.5  | 7.5  | 8.5  | V             |
| Reverse clamping voltage  | At $I_{PP} = 1\text{ A}$  | $V_C$         | -    | 9    | 11   | V             |
|                           | At $I_{PP} = I_{PPM} = 4.5\text{ A}$  | $V_C$         | -    | 12.5 | 15   | V             |
| Capacitance               | At $V_R = 0\text{ V}$ ; $f = 1\text{ MHz}$                                      | $C_D$         | -    | 0.7  | 0.8  | pF            |
|                           | At $V_R = 3.3\text{ V}$ ; $f = 1\text{ MHz}$                                    | $C_D$         | -    | 0.7  | -    | pF            |
| Clamping voltage          | Transmission Line Pulse (TLP); $t_p = 100\text{ ns}$<br>$I_{TLP} = 8\text{ A}$  | $V_{C-TLP}$   | -    | 15   | -    | V             |
|                           | Transmission Line Pulse (TLP); $t_p = 100\text{ ns}$<br>$I_{TLP} = 16\text{ A}$ |               | -    | 21   | -    |               |
| Dynamic resistance        | Transmission Line Pulse (TLP); $t_p = 100\text{ ns}$                            | $R_{DYN}$     | -    | 0.7  | -    | $\Omega$      |

### TYPICAL CHARACTERISTICS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

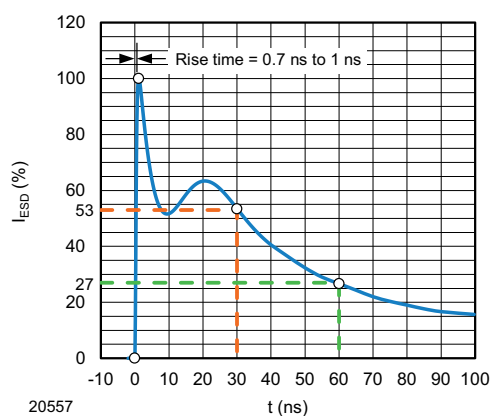


Fig. 1 - ESD Discharge Current Wave Form  
acc. IEC 61000-4-2 (330  $\Omega$  / 150 pF)

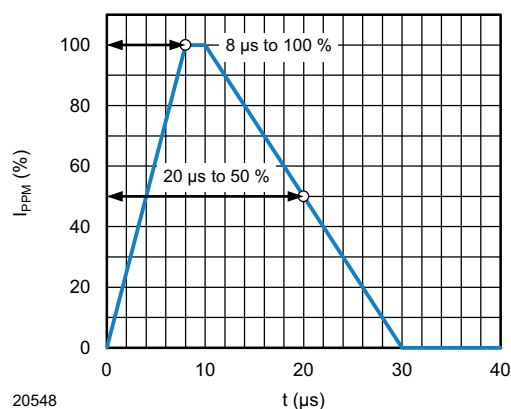


Fig. 2 - 8/20  $\mu\text{s}$  Peak Pulse Current Wave Form  
acc. IEC 61000-4-5

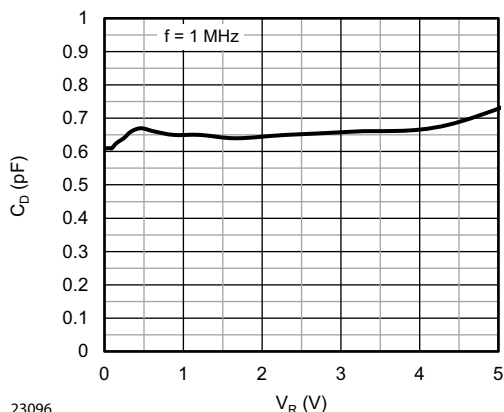


Fig. 3 - Typical Capacitance vs. Reverse Voltage

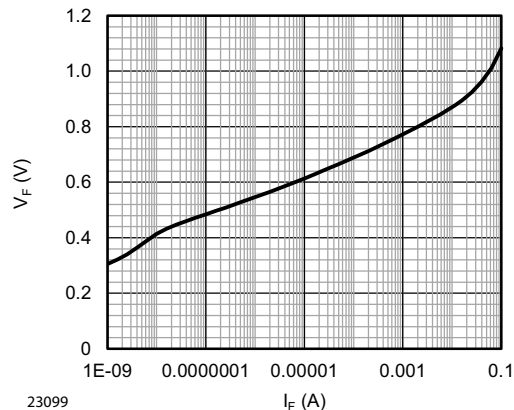


Fig. 6 - Typical Forward Voltage vs. Forward Current

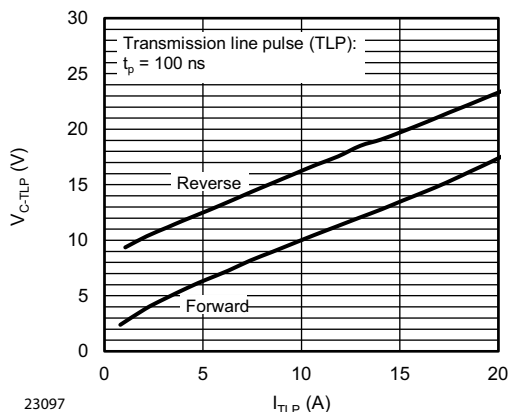


Fig. 4 - Typical Clamping Voltage vs. Peak Pulse Current

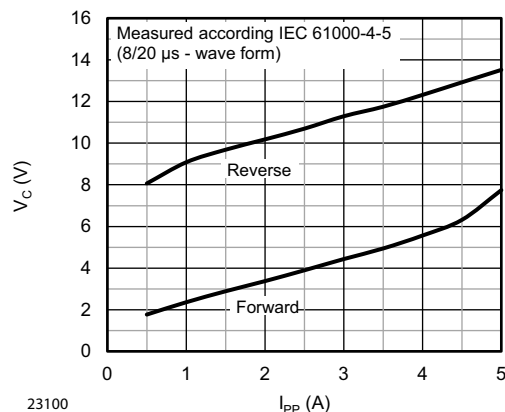


Fig. 7 - Typical Peak Clamping Voltage vs. Peak Pulse Current

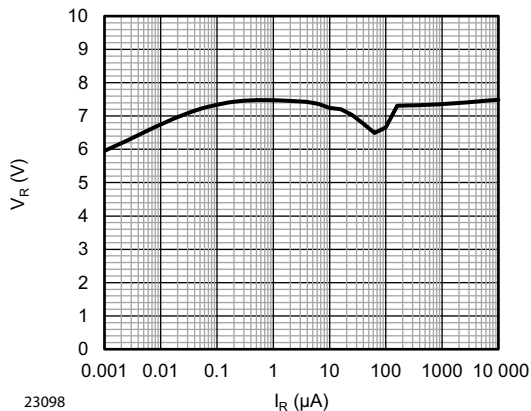
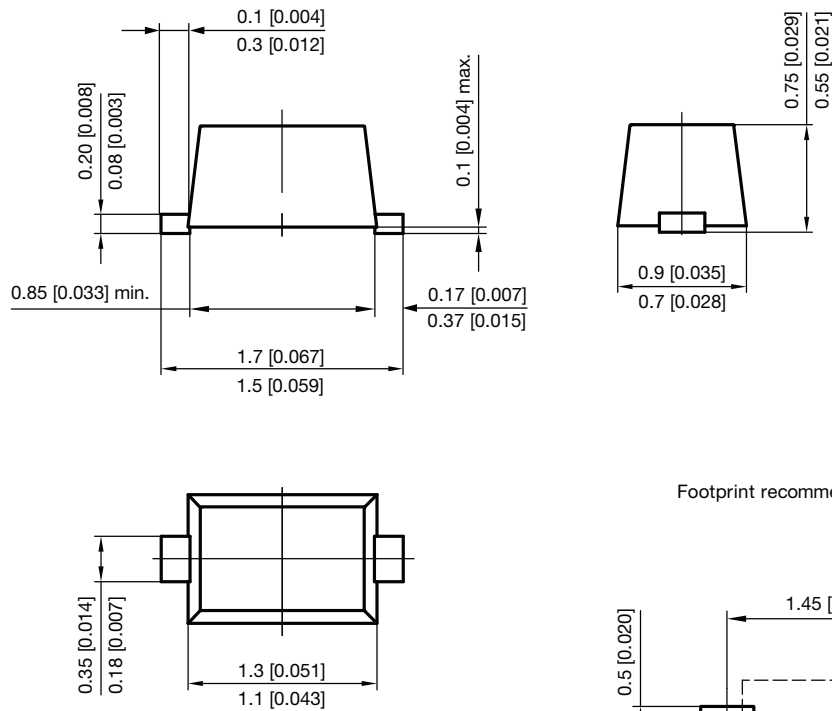


Fig. 5 - Typical Reverse Voltage vs. Reverse Current

**PACKAGE DIMENSIONS** in millimeters [inches]: **SOD-523**


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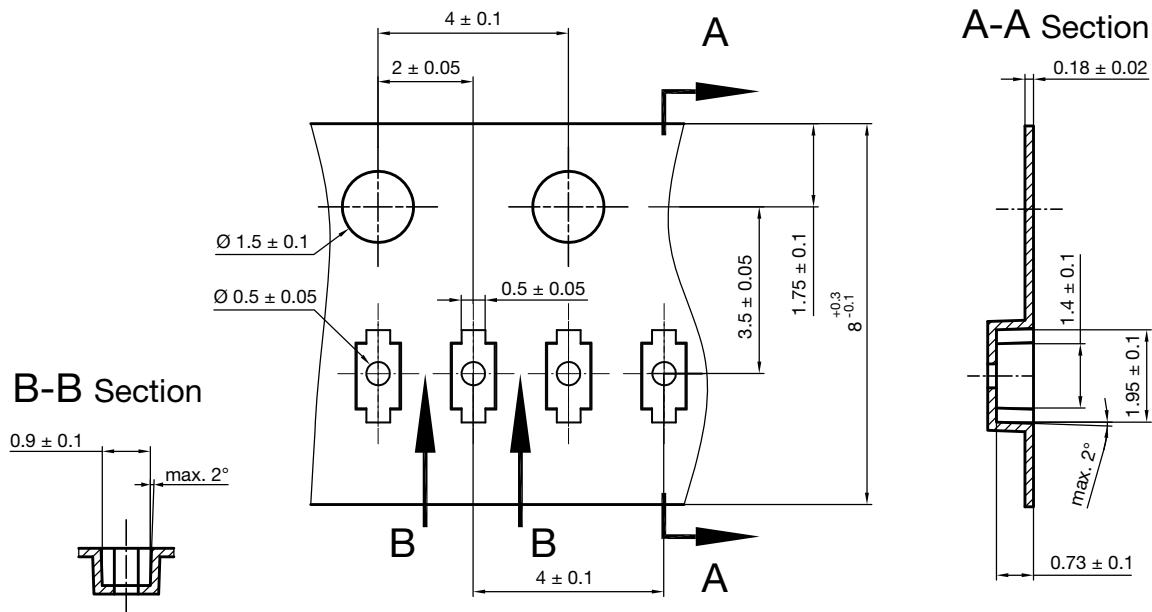
Created - Date: 04. April 2017

Rev. 4 - Date: 03. Aug. 2020

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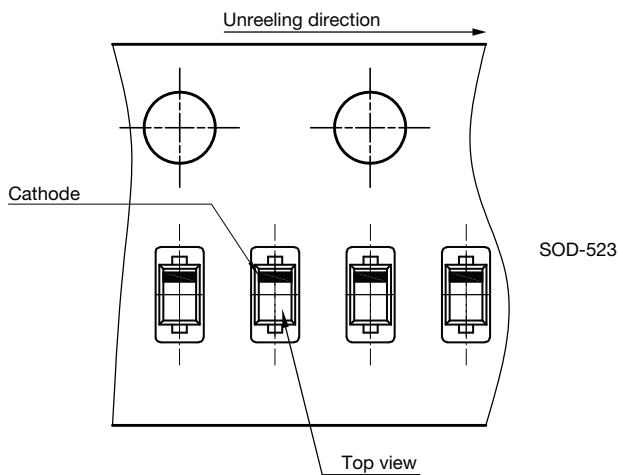


CARRIER TAPE SOD-523



S8-V-3717.03-005 (4)  
05.07.2018  
22959

ORIENTATION IN CARRIER TAPE SOD-523



S8-V-3717.03-006 (4)  
05.07.2018  
22958



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