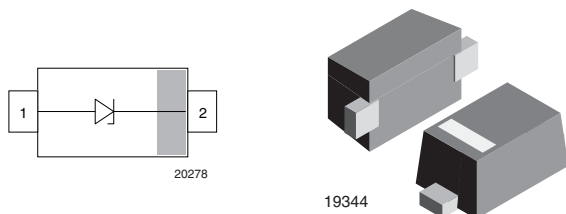


# Single ESD-Protection Diode in SOD-523



## MARKING (example only)



Bar = cathode marking

X = date code

Y = type code (see table below)

## DESIGN SUPPORT TOOLS AVAILABLE



## FEATURES

- Compact SOD-523 package
- Low package height < 0.7 mm
- 1-line ESD-protection
- AEC-Q101 qualified
- Working range 5 V
- Low leakage current  $I_R < 0.1 \mu A$
- Capacitance typical  $C_D = 12 \text{ pF}$
- ESD-protection acc. IEC 61000-4-2  
± 30 kV contact discharge  
± 30 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 (EXAMPLE)	AEC-Q101 QUALIFIED	ENVIRONMENTAL AND QUALITY CODE			ORDERING CODE (EXAMPLE)
		RoHS COMPLIANT + LEAD (Pb)-FREE TERMINATIONS	TIN PLATED	8K PER 7" REEL (8 mm TAPE)	
		GREEN		MOQ = 8K/BOX	
VESD05B1-02V	-	G	3	-08	VESD05B1-02V-G3-08
VESD05B1-02V	H	G	3	-08	VESD05B1-02VHG3-08

PACKAGE DATA						
DEVICE NAME	PACKAGE NAME	TYPE CODE	WEIGHT	MOLDING COMPOUND FLAMMABILITY RATING	MOISTURE SENSITIVITY LEVEL	SOLDERING CONDITIONS
VESD05B1-02V	SOD-523	. H	1.32 mg	UL 94 V-0	MSL level 1 (according J-STD-020)	Peak temperature max. 260 °C

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	TEST CONDITIONS	SYMBOL	VALUE	UNIT
Peak pulse current	Acc. IEC 61000-4-5, 8/20 μs/single shot	I <sub>PPM</sub>	3.5	A
Peak pulse power	Acc. IEC 61000-4-5, 8/20 μs/single shot	P <sub>PP</sub>	40	W
ESD immunity	Contact discharge acc. IEC 61000-4-2; 10 pulses	V <sub>ESD</sub>	± 30	kV
	Air discharge acc. IEC 61000-4-2; 10 pulses		± 30	kV
Operating temperature	Junction temperature	T <sub>J</sub>	-55 to +150	°C
Storage temperature		T <sub>stg</sub>	-55 to +150	°C

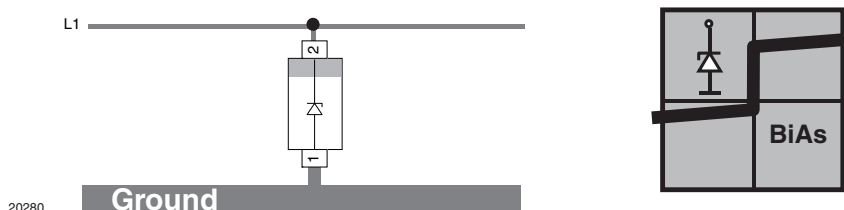
**BiAs-MODE** (bidirectional asymmetrical protection mode)

With the VESD05B1-02V one signal- or data-lines (L1) can be protected against voltage transients. With pin 1 connected to ground and pin 2 connected to a signal- or data-line which has to be protected. As long as the voltage level on the data- or signal-line is between 0 V (ground level) and the specified maximum reverse working voltage ( $V_{RWM}$ ) the protection diode between data line and ground offers a high isolation to the ground line. The protection device behaves like an open switch.

As soon as any positive transient voltage signal exceeds the break down voltage level of the protection diode, the diode becomes conductive and shorts the transient current to ground. Now the protection device behaves like a closed switch. The clamping voltage ( $V_C$ ) is defined by the break down voltage ( $V_{BR}$ ) level plus the voltage drop at the series impedance (resistance and inductance) of the protection device.

Any negative transient signal will be clamped accordingly. The negative transient current is flowing in the forward direction of the protection diode. The low forward voltage ( $V_F$ ) clamps the negative transient close to the ground level.

Due to the different clamping levels in forward and reverse direction the VESD05B1-02V clamping behavior is bidirectional and asymmetrical (BiAs).



<b>ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , 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	V
Reverse voltage	at $I_R = 0.1\text{ }\mu\text{A}$	$V_R$	5	-	-	V
Reverse current	at $V_R = 5\text{ V}$	$I_R$	-	0.01	0.1	$\mu\text{A}$
Reverse breakdown voltage	at $I_R = 1\text{ mA}$	$V_{BR}$	6	6.8	7.5	V
Reverse clamping voltage	at $I_{PP} = 1\text{ A}$ , $t_p = 300\text{ }\mu\text{s}$	$V_C$	-	7.2	9.5	V
	at $I_{PP} = I_{PPM} = 3.5\text{ A}$ , $t_p = 8/20\text{ }\mu\text{s}$	$V_C$	-	8.6	11	V
Forward clamping voltage	at $I_{PP} = 0.2\text{ A}$ , $t_p = 300\text{ }\mu\text{s}$	$V_F$	-	0.95	1.2	V
	at $I_{PP} = 1\text{ A}$ , $t_p = 300\text{ }\mu\text{s}$	$V_F$	-	1.3	-	V
	at $I_{PP} = I_{PPM} = 3.5\text{ A}$ , $t_p = 300\text{ }\mu\text{s}$	$V_F$	-	1.9	-	V
Dynamic resistance	$t_p = 100\text{ ns}$ (TLP); pin 1-2	$r_{dyn}$	-	0.2	-	$\Omega$
	$t_p = 100\text{ ns}$ (TLP); pin 2-1		-	0.31	-	$\Omega$
Capacitance	at $V_R = 0\text{ V}$ ; $f = 1\text{ MHz}$	$C_D$	-	19	23	pF
	at $V_R = 2.5\text{ V}$ ; $f = 1\text{ MHz}$	$C_D$	-	12	-	pF

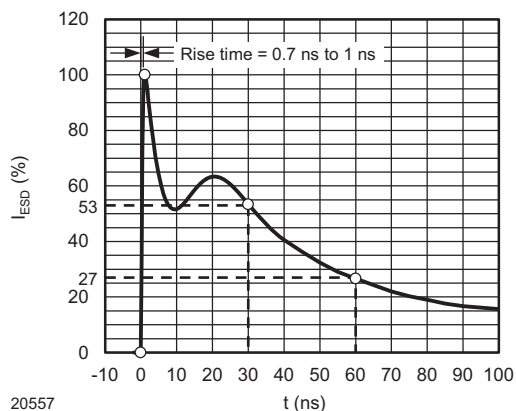


Fig. 1 - ESD Discharge Current Wave Form acc. IEC 61000-4-2 (330  $\Omega$  / 150 pF)

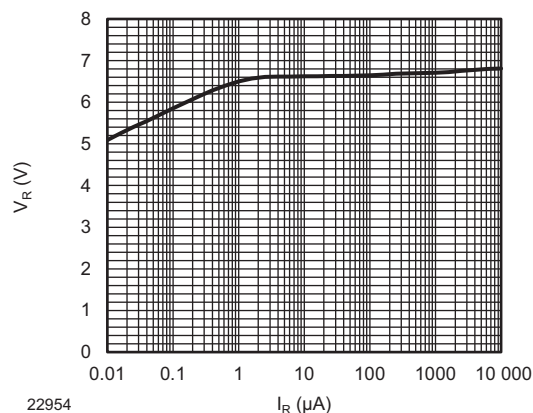


Fig. 4 - Typical Reverse Voltage vs. Reverse Current

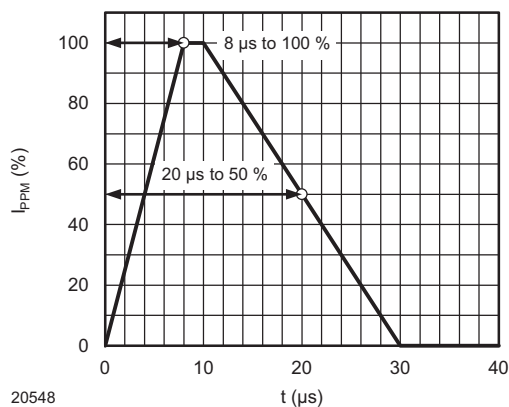


Fig. 2 - 8/20  $\mu$ s Peak Pulse Current Wave Form acc. IEC 61000-4-5

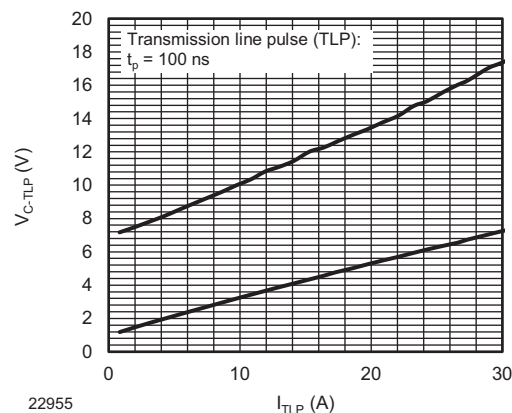


Fig. 5 - Typical Clamping Voltage vs. Peak Pulse Current

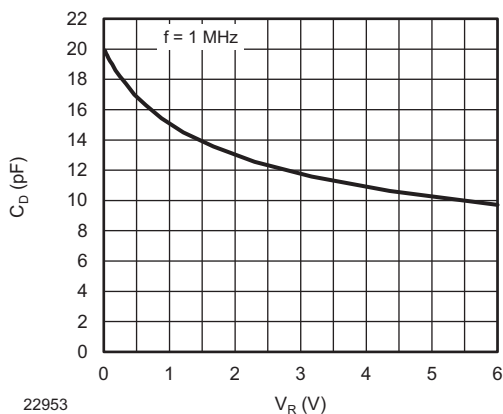


Fig. 3 - Typical Capacitance vs. Reverse Voltage

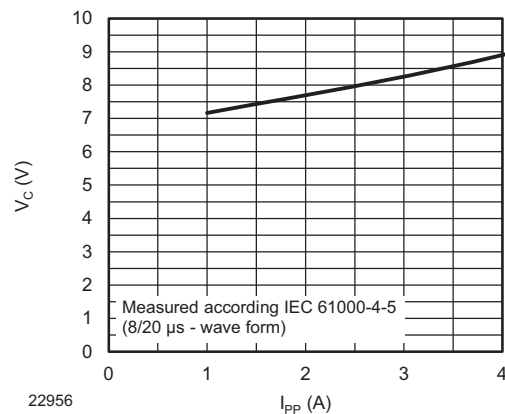
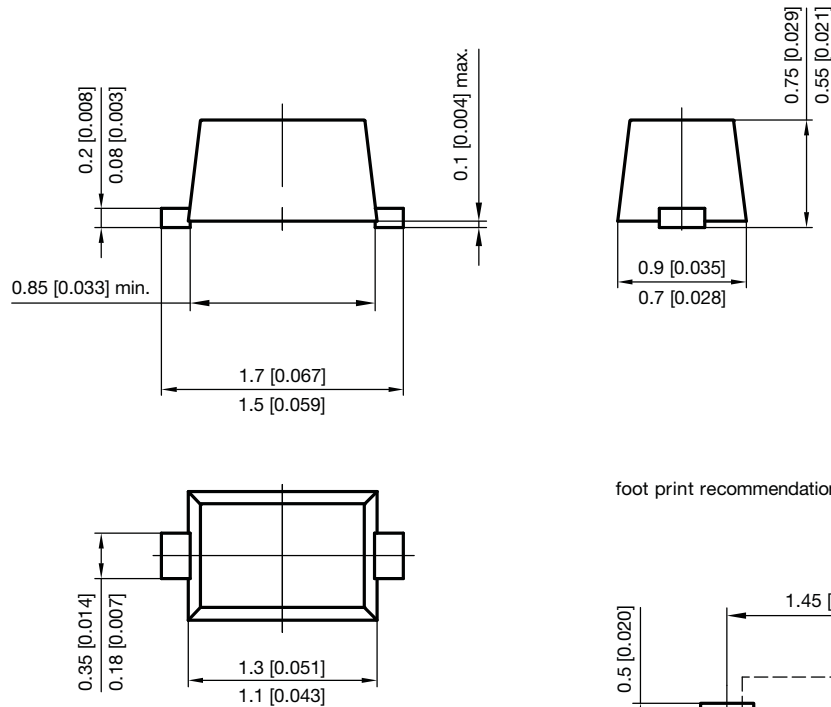
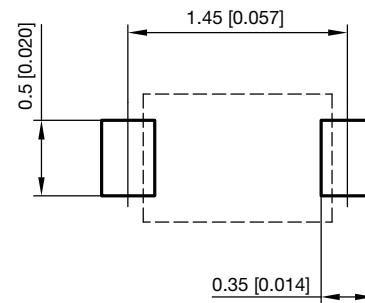


Fig. 6 - Typical Peak Clamping Voltage vs. Peak Pulse Current

**PACKAGE DIMENSIONS** in millimeters (Inches): **SOD-523**


foot print recommendation:

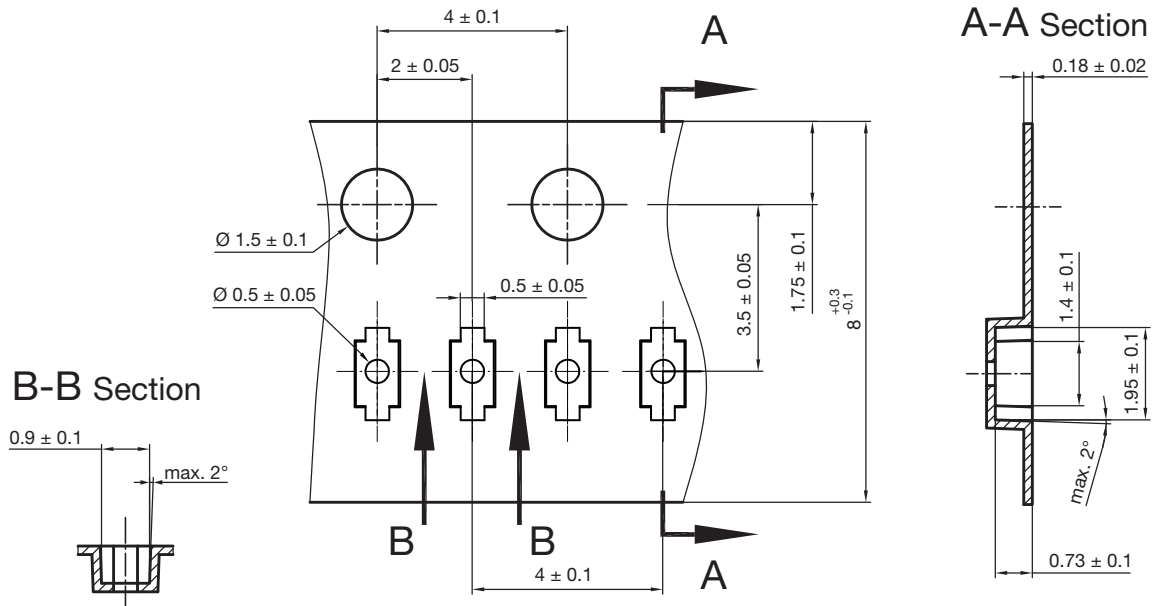


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**CARRIER TAPE SOD-523**


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05.07.2018

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Rev. 1.1, 04-Jun-2019

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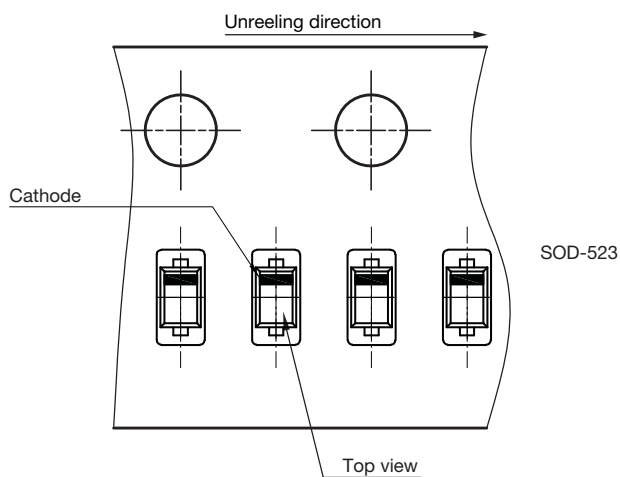
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For technical questions, contact: [ESDprotection@vishay.com](mailto:ESDprotection@vishay.com)

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**ORIENTATION IN CARRIER TAPE SOD-523**



S8-V-3717.03-006 (4)

05.07.2018

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