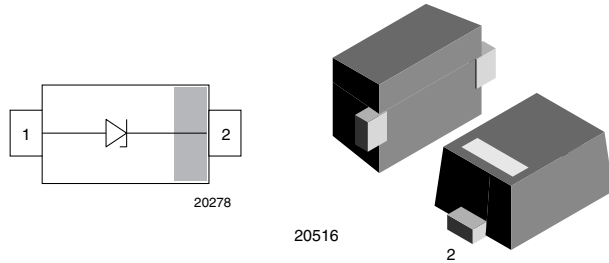


## ESD-Protection Diode in SOD-923



### MARKING (example only)



Bar = cathode marking

X = date code

Y = type code (see table below)

### FEATURES

- Single-line ESD-protection device
- ESD-immunity acc. IEC 61000-4-2  
> 20 kV contact discharge  
> 30 kV air discharge
- Tiny SOD-923 package
- Package height = 0.4 mm
- Typ. capacitance 12 pF  
( $V_R = 2.5$  V;  $f = 1$  MHz)
- Leakage current  $< 0.1 \mu\text{A}$  ( $V_R = 5$  V)
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC



### ORDERING INFORMATION

DEVICE NAME	ORDERING CODE	TAPED UNITS PER REEL (8 mm TAPE on 7" REEL)	MINIMUM ORDER QUANTITY
VESD05A1B-02Z	VESD05A1B-02Z-GS08	8000	8000

### PACKAGE DATA

DEVICE NAME	PACKAGE NAME	TYPE CODE	WEIGHT	MOLDING COMPOUND FLAMMABILITY RATING	MOISTURE SENSITIVITY LEVEL	SOLDERING CONDITIONS
VESD05A1B-02Z	SOD-923	H	0.45 mg	UL 94 V-0	MSL level 1 (according J-STD-020)	260 °C/10 s at terminals

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	TEST CONDITIONS	SYMBOL	VALUE	UNIT
Peak pulse current	acc. IEC 61000-4-5; $t_p = 8/20 \mu\text{s}$ ; single shot	$I_{PPM}$	3	A
Peak pulse power	acc. IEC 61000-4-5; $t_p = 8/20 \mu\text{s}$ ; single shot	$P_{PP}$	33	W
ESD immunity	Contact discharge acc. IEC 61000-4-2; 10 pulses	$V_{ESD}$	$\pm 20$	kV
	Air discharge acc. IEC 61000-4-2; 10 pulses	$V_{ESD}$	$\pm 30$	kV
Operating temperature	Junction temperature	$T_J$	- 40 to + 125	°C
Storage temperature		$T_{stg}$	- 55 to + 150	°C

\*\* Please see document "Vishay Material Category Policy": [www.vishay.com/doc?99902](http://www.vishay.com/doc?99902)

ELECTRICAL CHARACTERISTICS VESD05A1B-02Z BIAS mode (between pin 1 and pin 2)						
PARAMETER	TEST CONDITIONS/REMARKS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Protection paths	Number of lines which can be protected	$N_{lines}$	-	-	1	lines
Reverse stand off voltage	at $I_R = 0.1 \mu A$	$V_{RWM}$	5	-	-	V
Reverse current	at $V_R = 5 V$	$I_R$	-	0.01	0.1	$\mu A$
Reverse breakdown voltage	at $I_R = 1 mA$	$V_{BR}$	6	6.8	7.5	V
Reverse Clamping voltage	at $I_{PP} = 1 A$	$V_C$	-	8	9.5	V
	at $I_{PP} = I_{PPM} = 3 A$	$V_C$	-	8.9	11	V
Forward clamping voltage	at $I_{PP} = 0.2 A$	$V_F$	-	0.95	1.2	V
	at $I_{PP} = 1 A$	$V_F$	-	1.3	-	V
	at $I_{PP} = I_{PPM} = 3 A$	$V_F$	-	1.9	-	V
Capacitance	at $V_R = 0 V$ ; $f = 1 MHz$	$C_D$	-	19	23	pF
	at $V_R = 2.5 V$ ; $f = 1 MHz$	$C_D$	-	12	-	pF

**Note**

- Ratings at 25 °C, ambient temperature unless otherwise specified

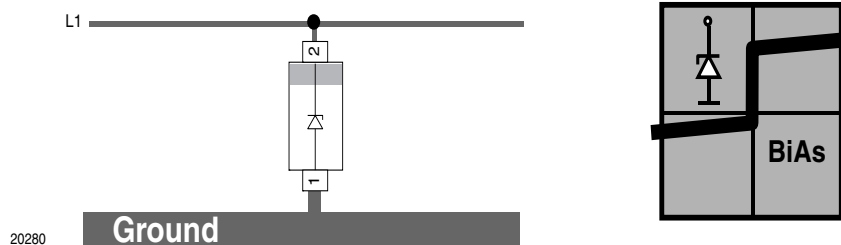
**BIAS-MODE (BIDIRECTIONAL ASYMMETRICAL PROTECTION MODE)**

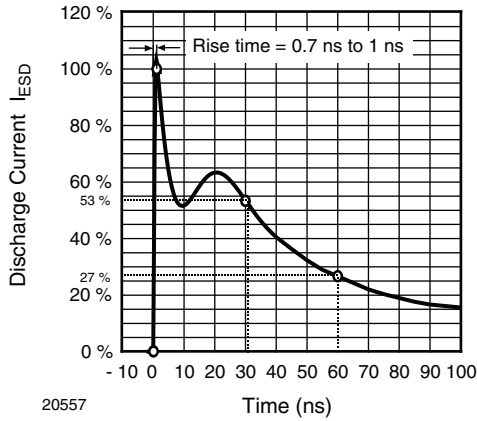
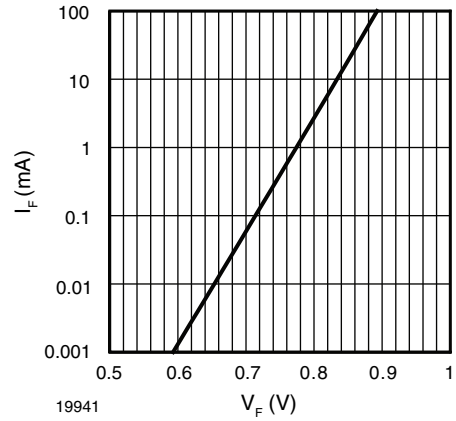
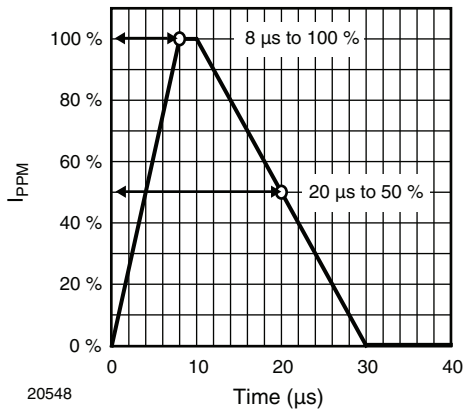
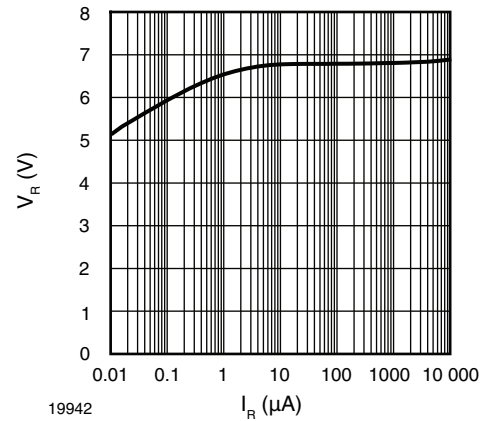
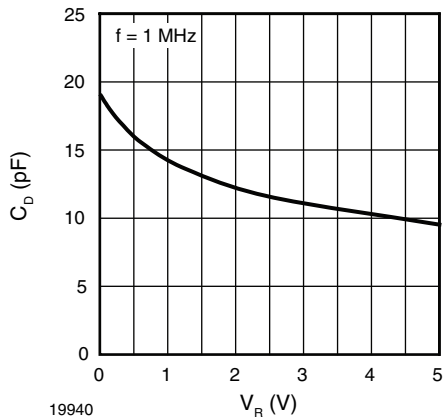
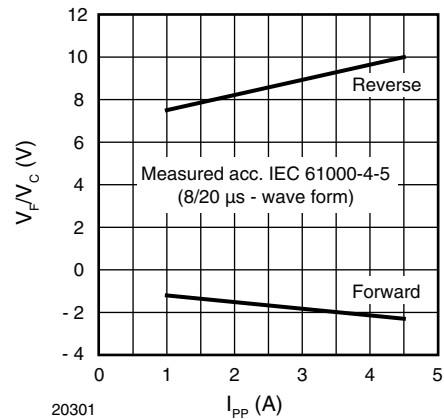
With the **VESD05A1B-02Z** one signal- or data-lines (L1) can be protected against voltage transients. With pin 1 connected to ground and pin 2 connected to a signal- or data-line which has to be protected. As long as the voltage level on the data- or signal-line is between 0 V (ground level) and the 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 through 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 **Breakthrough 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 **VESD05A1B-02Z** clamping behaviour is **Bidirectional** and **Asymmetrical (BiAs)**.



**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. 4 - Typical Forward Current  $I_F$  vs. Forward Voltage  $V_F$ 

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

 Fig. 5 - Typical Reverse Voltage  $V_R$  vs. Reverse Current  $I_R$ 

 Fig. 3 - Typical Capacitance  $C_D$  vs. Reverse Voltage  $V_R$ 

 Fig. 6 - Typical Clamping Voltage vs. Peak Pulse Current  $I_{PP}$

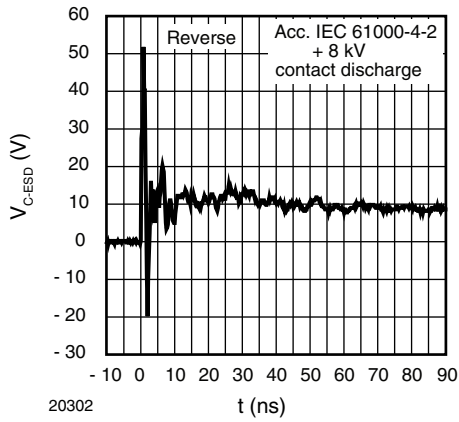


Fig. 7 - Typical Clamping Performance at + 8 kV Contact Discharge (acc. IEC 61000-4-2)

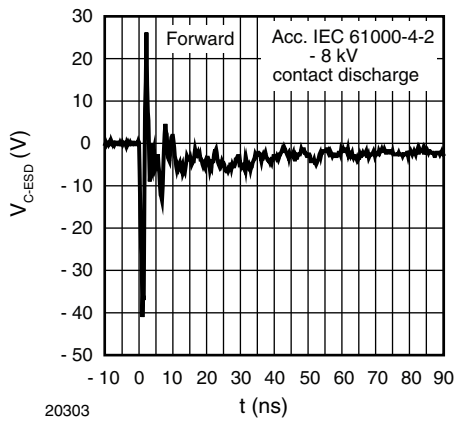


Fig. 8 - Typical Clamping Performance at - 8 kV Contact Discharge (acc. IEC 61000-4-2)

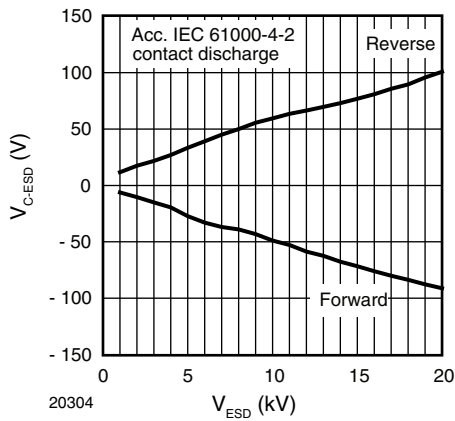
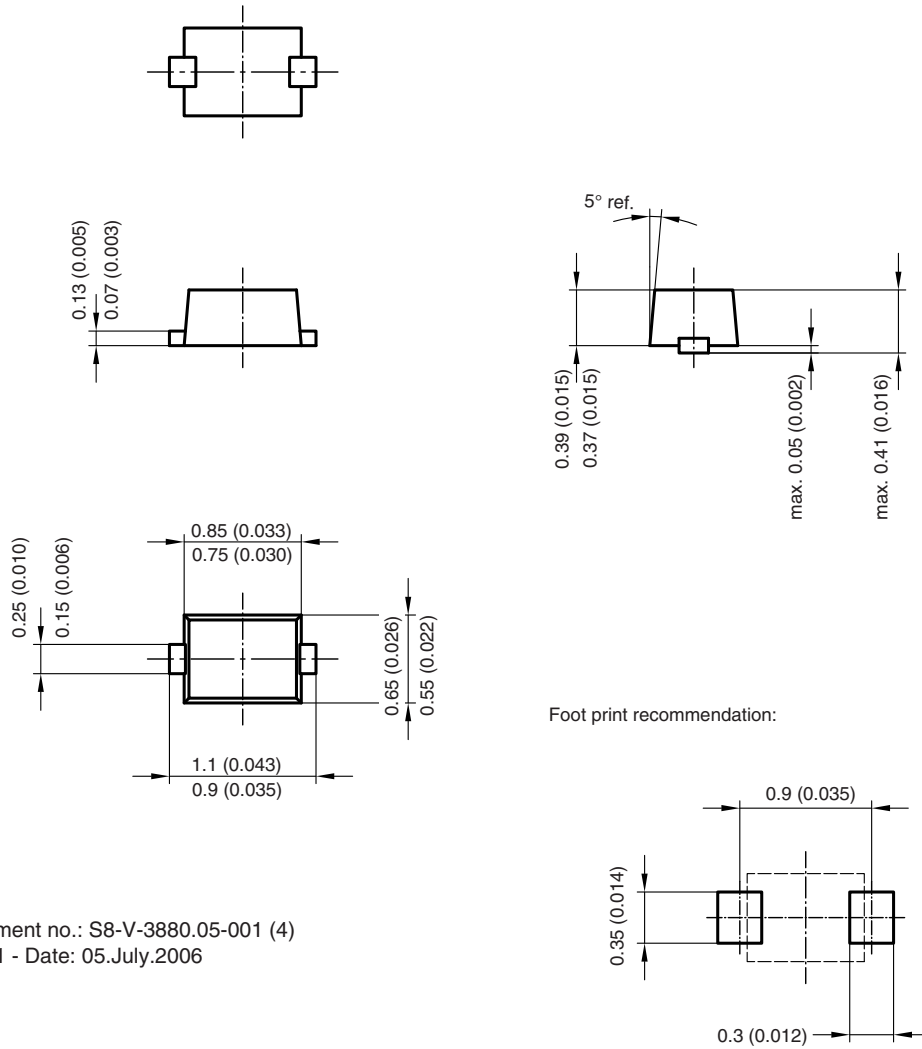


Fig. 9 - Typical Clamping Voltage at ± ESD Contact Discharge (acc. IEC 61000-4-2)

**PACKAGE DIMENSIONS** in millimeters (inches): **SOD-923**


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 Rev. 1 - Date: 05.July.2006  
 20096



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