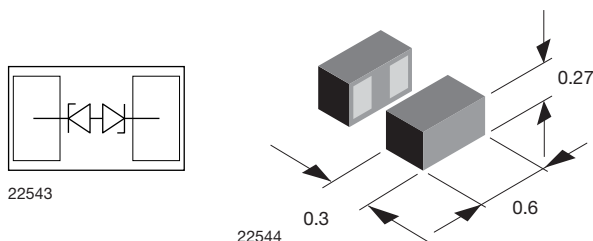


# Ultra Low Capacitance Bidirectional Symmetrical (BiSy) Single Line ESD Protection Diode in Silicon Package



## MARKING (example only)



1 = year code

Open circle = month code and pin 1

XY = type code

## FEATURES

- Ultra compact CLP0603 package
- Low package height < 0.3 mm
- 1-line ESD protection
- Working range  $\pm 3.3$  V
- Low leakage current < 0.05  $\mu$ A
- Ultra low load capacitance  $C_D = 0.29$  pF typ.
- ESD immunity acc. IEC 61000-4-2  
 $\pm 16$  kV contact discharge  
 $\pm 16$  kV air discharge
- Lead plating: Au (e4)
- Lead material: Ni
- Backside coating
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
**HALOGEN**  
**FREE**  
**GREEN**  
(5-2008)

## DESIGN SUPPORT TOOLS AVAILABLE



ORDERING INFORMATION				
PART NUMBER (EXAMPLE)	ENVIRONMENTAL AND QUALITY CODE		PACKAGING CODE	ORDERING CODE (EXAMPLE)
	RoHS-COMPLIANT + LEAD (Pb)-FREE TERMINATIONS	GOLD PLATED	15K PER 7" REEL (8 mm TAPE) 15K/BOX = MOQ	
	GREEN			
VBUS03B1-SD0-	G	4	-08	VBUS03B1-SD0-G4-08

PACKAGE DATA				
DEVICE NAME	PACKAGE NAME	TYPE CODE	WEIGHT	SOLDERING CONDITIONS
VBUS03B1-SD0	CLP0603-2L	3B	0.12 mg	Peak temperature max. 260 °C Reflow soldering according JEDEC® STD-020

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	TEST CONDITIONS	SYMBOL	VALUE	UNIT
Peak pulse current	acc. IEC 61000-4-5, 8/20 $\mu$ s/single shot	$I_{PPM}$	2.5	A
Peak pulse power	Pin 1 to pin 2 acc. IEC 61000-4-5; $t_p = 8/20$ $\mu$ s; single shot	$P_{PP}$	45	W
ESD immunity	Contact discharge acc. IEC 61000-4-2; 10 pulses	$V_{ESD}$	$\pm 16$	kV
	Air discharge acc. IEC 61000-4-2; 10 pulses		$\pm 16$	
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 VBUS03B1-SD0 is a Bidirectional and Symmetrical (BiSy) ESD protection device which clamps positive and negative overvoltage transients to ground. Connected between the signal or data line and the ground the VBUS03B1-SD0 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 tiny CLP0603 package the line inductance is very low, so that fast transients like and ESD strike can be clamped with minimal over- or undershoots. Due to the very low capacitance the VBUS03B1-SD0 can be used for high speed data ports like HDMI, USB 3.0 or Thunderbolt.

<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	$V_{RWM}$	-	-	3.3	V
Reverse voltage	at $I_R = 0.05\text{ }\mu\text{A}$	$V_R$	3.3	-	-	V
Reverse current	at $V_{RWM} = 3.3\text{ V}$	$I_R$	-	$< 0.0009^{(1)}$	0.05	$\mu\text{A}$
Reverse breakdown voltage	at $I_R = 1\text{ mA}$	$V_{BR}$	6.0	8.5	10	V
Reverse clamping voltage	at $I_{PP} = 1\text{ A}$	$V_C$	-	12	14	V
	at $I_{PP} = I_{PPM} = 2.5\text{ A}$	$V_C$	-	15	18	V
Capacitance	at $V_R = 0\text{ V}$ ; $f = 1\text{ MHz}$	$C_D$	-	0.29	0.4	pF
	at $V_R = 3.3\text{ V}$ ; $f = 1\text{ MHz}$	$C_D$	-	0.29	-	pF
Clamping voltage	Transmission Line Pulse (TLP); $t_p = 100\text{ ns}$ $I_{TLP} = 8\text{ A}$	$V_{C-TLP}$	-	20	-	V
	Transmission Line Pulse (TLP); $t_p = 100\text{ ns}$ $I_{TLP} = 16\text{ A}$		-	29	-	
Dynamic resistance	Transmission Line Pulse (TLP); $t_p = 100\text{ ns}$	$R_{DYN}$	-	1.14	-	$\Omega$

**Note**

<sup>(1)</sup> Defined by design. Such a low leakage current is too low for a 100 % final test verification

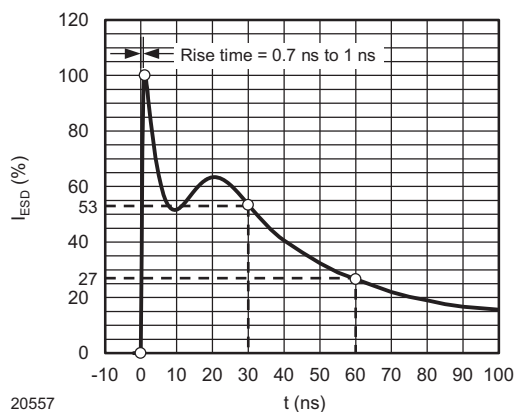
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


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

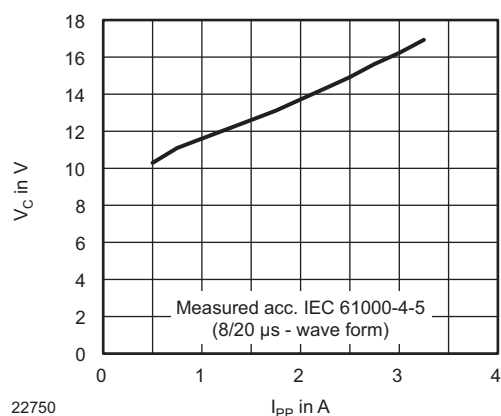


Fig. 4 - Typical Peak Clamping Voltage  $V_C$  vs.  
Peak Pulse Current  $I_{PP}$

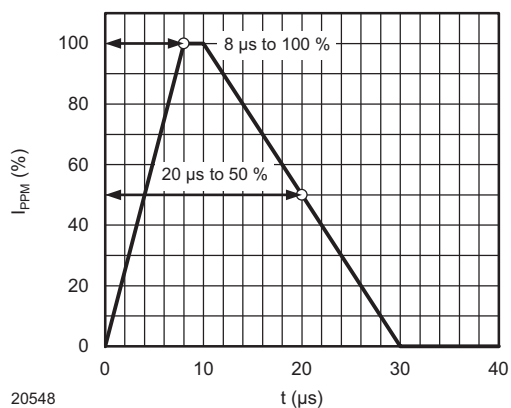


Fig. 2 - 8/20  $\mu$ s Peak Pulse Current Wave Form  
acc. IEC 61000-4-5

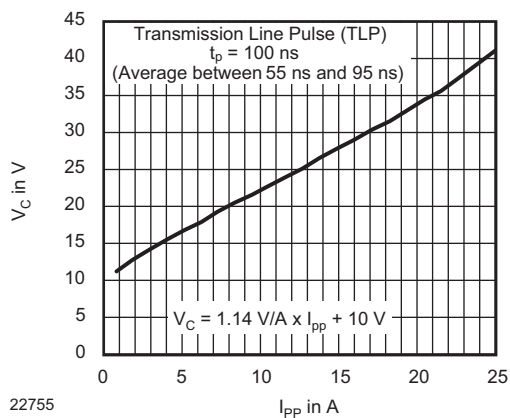


Fig. 5 - Typical Peak Clamping Voltage  $V_C$  vs.  
Peak Pulse Current  $I_{PP}$

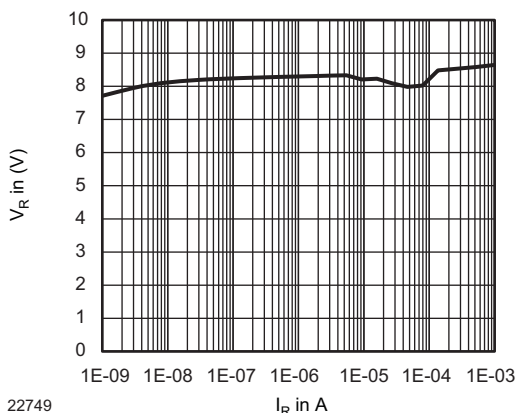


Fig. 3 - Typical Reverse Voltage  $V_R$  vs. Reverse Current  $I_R$

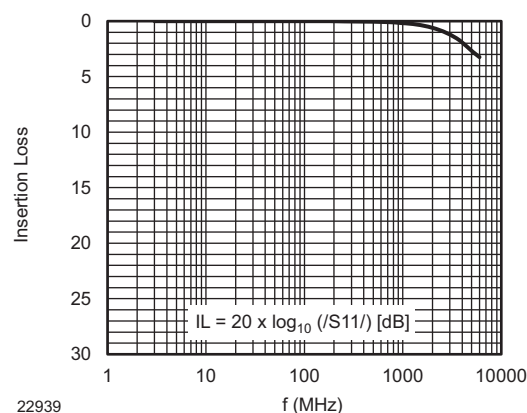
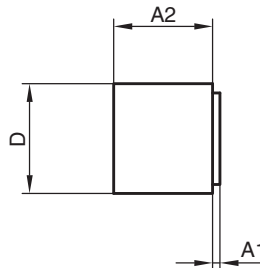
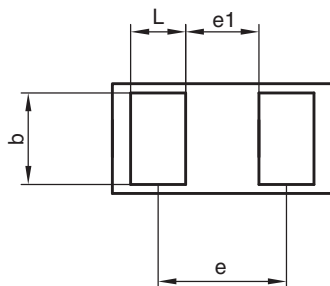
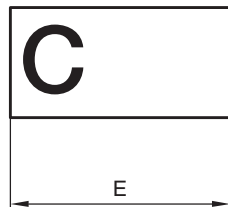


Fig. 6 - Typical Insertion Loss (IL) vs. Frequency

**PACKAGE DIMENSIONS** in millimeters (mils): **CLP0603-2L**


Package = chip dimensions in mm [mils]



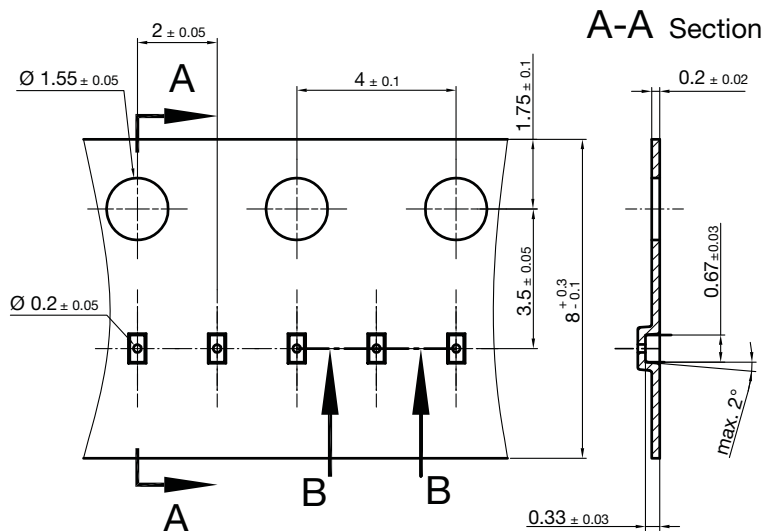
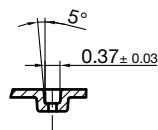
	Millimeters			mils		
	min.	nom.	max.	min.	nom.	max.
A	0.25	0.28	0.30	9.84	11.02	11.81
A1	0.01	0.01	0.02	0.39	0.39	0.79
A2	0.24	0.27	0.28	9.45	10.63	11.02
b	0.22	0.25	0.28	8.66	9.84	11.02
D	0.27	0.30	0.33	10.62	11.81	12.99
E	0.57	0.60	0.63	22.44	23.62	24.80
e		0.40			15.75	
e1		0.25			9.84	
L	0.12	0.15	0.18	4.72	5.91	7.09

22941

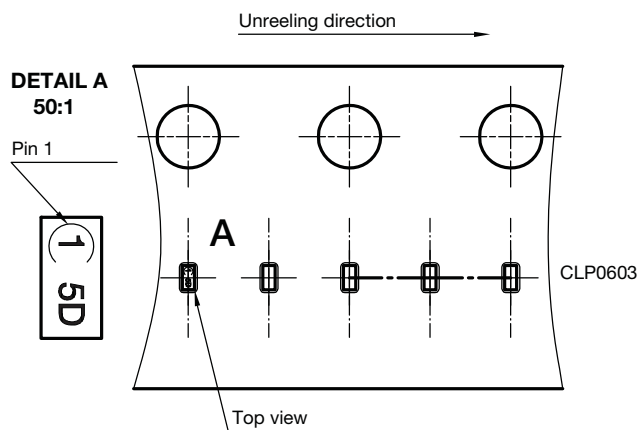
2 terminal leadless package (CLP)  
Document no.: S8-V-3906.04-023 (4)  
Created - Date: 22. Nov. 2010  
Rev.8 - Date: 11. Nov. 2016

**Footprint and soldering recommendation:**

please see Application Note: [www.vishay.com/doc?85917](http://www.vishay.com/doc?85917)

**CARRIER TAPE** in millimeters: **CLP0603-2L**

**B-B Section**

Cumulative tolerances of 10 sprocket holes is  $\pm 0.2\text{mm}$ 

22591  
Document no. S8-V-3906.04-0025 (4)  
Created - Date: 22. Nov. 2010

**ORIENTATION IN CARRIER CLP0603-2L**


22607

Orientation in Carrier Tape (CLP0603)  
S8-V-3906.04-026 (4)  
22.10.2010



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