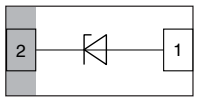
Low Capacitance, Single-Line ESD-Protection Diode



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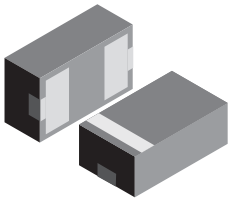
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FEATURES

- Ultra compact LLP1006-2L package
- Low package profile < 0.4 mm
- 1-line ESD-protection
- High surge current acc. IEC 61000-4-5 I_{PPM} > 3 A
- Low leakage current I_R < 0.1 µA
- Low load capacitance C_D = 0.9 pF
- ESD-protection acc. IEC 61000-4-2
  ± 15 kV contact discharge
  ± 15 kV air discharge
- Soldering can be checked by standard vision inspection; no X-ray necessary
- Pin plating NiPdAu (e4) no whisker growth
- e4 - precious metal (e.g. Ag, Au, NiPd, NiPdAu) (no Sn)
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e4

RoHS COMPLIANT

GREEN (5-2008)

MARKING (example only)

21121

Bar = cathode marking
Y = type code (see table below)
X = date code

ORDERING INFORMATION

DEVICE NAME	ORDERING CODE	TAPED UNITS PER REEL (8 mm TAPE ON 7" REEL)	MINIMUM ORDER QUANTITY
VBUS051BD-HD1	VBUS051BD-HD1-GS08	8000	8000

PACKAGE DATA

DEVICE NAME	PACKAGE NAME	TYPE CODE	WEIGHT	MOLDING COMPOUND FLAMMABILITY RATING	MOISTURE SENSITIVITY LEVEL	SOLDERING CONDITIONS
VBUS051BD-HD1	LLP1006-2L	A	0.72 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 µs; single shot	I_{PPM}	3	A
Peak pulse power	acc. IEC 61000-4-5; t_p = 8/20 µs; single shot	P_{PP}	45	W
ESD immunity	Contact discharge acc. IEC 61000-4-2; 10 pulses	V_{ESD}	± 15	kV
	Air discharge acc. IEC 61000-4-2; 10 pulses		± 15	kV
Operating temperature	Junction temperature	T_J	- 55 to + 145	°C
Storage temperature		T_{STG}	- 55 to + 150	°C

ELECTRICAL CHARACTERISTICS

(Ratings at 25 °C ambient temperature, unless otherwise specified)

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	Max. reverse working voltage	V_{RWM}	-	-	5	V
Reverse voltage	at I_R = 0.1 µA; pin 2 to pin 1	V_R	5	-	-	V
Reverse current	at $V_R = V_{RWM}$ = 5 V; pin 2 to pin 1	I_R	-	< 0.01	0.1	µA
Reverse breakdown voltage	at I_R = 1 mA; pin 2 to pin 1	V_{BR}	6.9	7.9	8.7	V
Reverse clamping voltage	at I_{PP} = 3 A; acc. IEC 61000-4-5; pin 2 to pin 1	V_C	-	-	16	V
Forward clamping voltage	at I_F = 3 A; acc. IEC 61000-4-5; pin 1 to pin 2	V_F	-	3.4	4	V
Capacitance	at V_R = 0 V; f = 1 MHz; pin 2 to pin 1	C_D	-	0.9	1.3	pF

APPLICATION NOTE

The VBUS051BD-HD1 is an ESD-protection device with the characteristic of a Z-diode with a high ESD-immunity and a very low capacitance which makes it usable for high frequency applications like USB2.0 or HDMI.
With the VBUS051BD-HD1 one high speed data line can be protected against transient voltage signals like ESD (electro static discharge). Connected to the data line (pin 2) and to ground (pin 1) negative transients will be clamped close below the ground level while positive transients will be clamped close above the 5 V working range. The clamping behaviour of the VBUS051BD-HD1 is bidirectional but asymmetrical (BiAs) and so it offers the best protection for applications running up to 5 V.

TYPICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

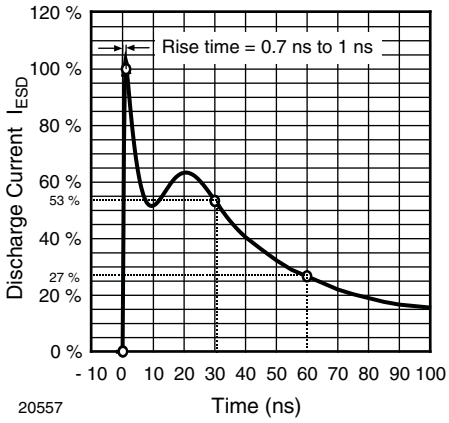


Fig. 1 - ESD Discharge Current Wave Form acc. IEC 61000-4-2 (330 Ω/150 pF)

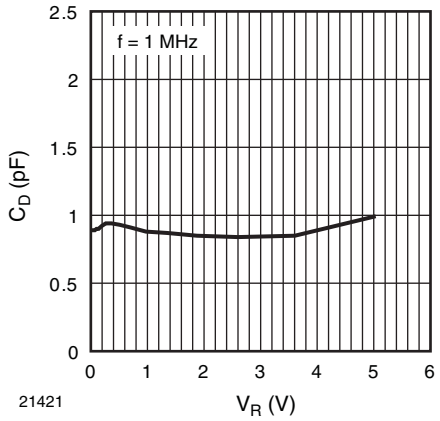


Fig. 3 - Typical Capacitance C_D vs. Reverse Voltage V_R

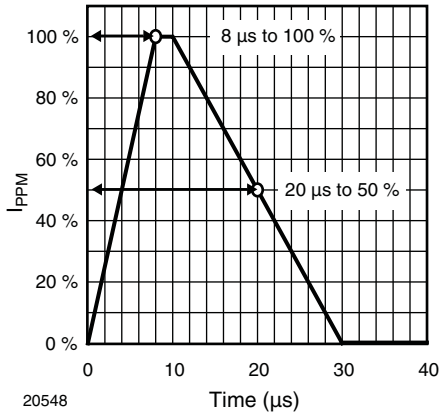


Fig. 2 - 8/20 µs Peak Pulse Current Wave Form acc. IEC 61000-4-5

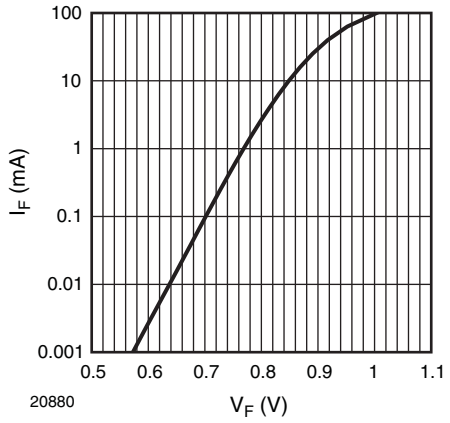


Fig. 4 - Typical Forward Current I_F vs. Forward Voltage V_F

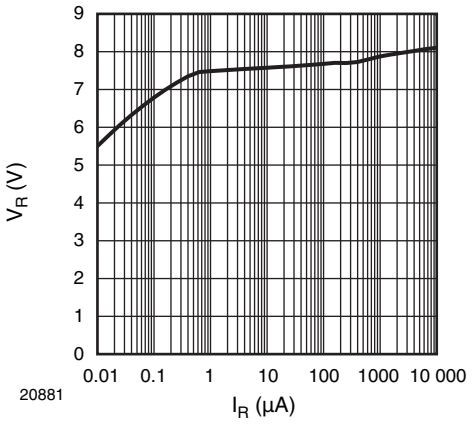


Fig. 5 - Typical Reverse Voltage V_R vs. Reverse Current I_R

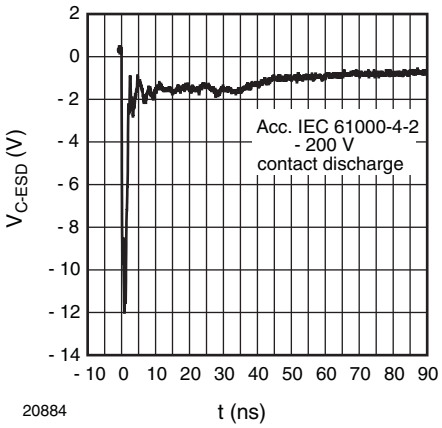


Fig. 8 - Typical Clamping Performance at - 200 V Contact Discharge (acc. IEC 61000-4-2)

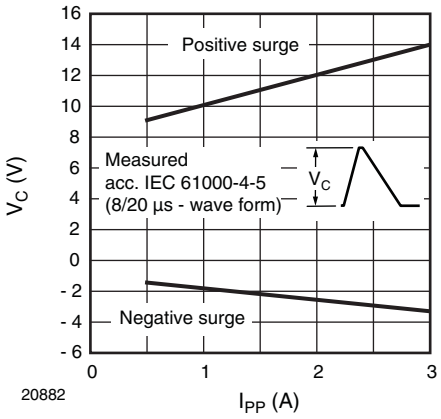


Fig. 6 - Typical Peak Clamping Voltage V_C vs. Peak Pulse Current I_{PP}

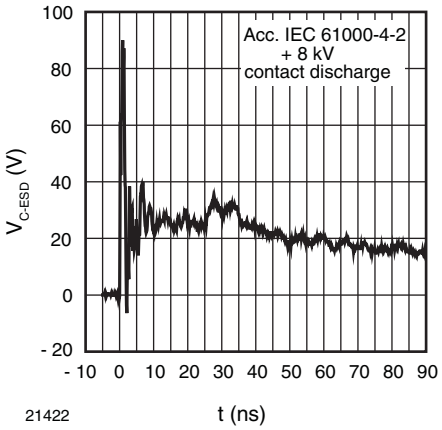


Fig. 9 - Typical Clamping Performance at + 8 kV Contact Discharge (acc. IEC 61000-4-2)

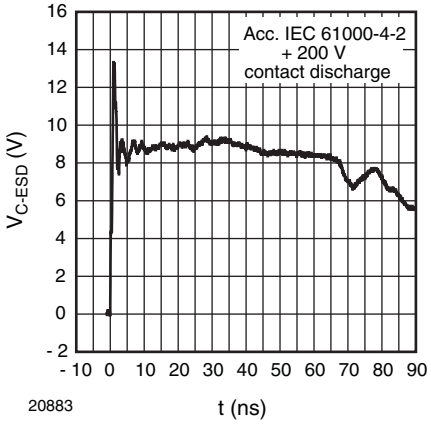


Fig. 7 - Typical Clamping Performance at + 200 V Contact Discharge (acc. IEC 61000-4-2)

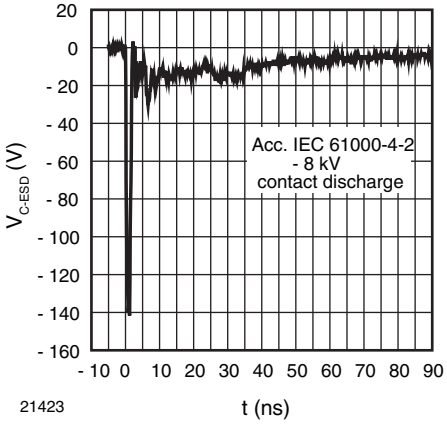


Fig. 10 - Typical Clamping Performance at - 8 kV Contact Discharge (acc. IEC 61000-4-2)

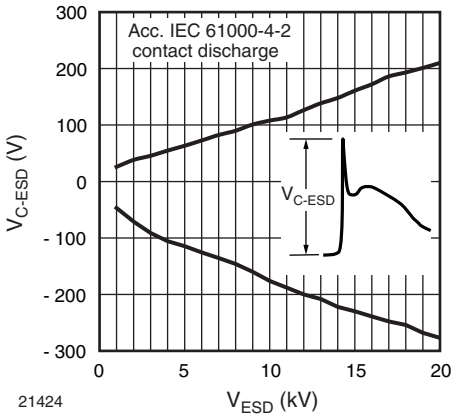
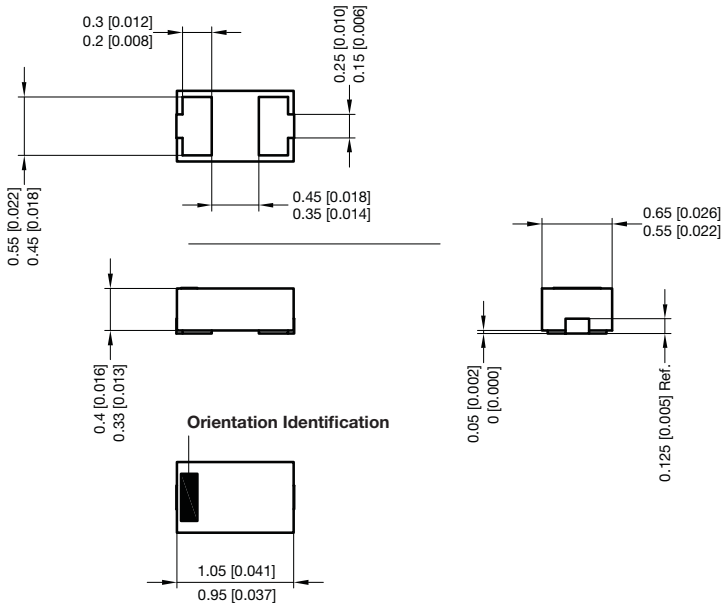
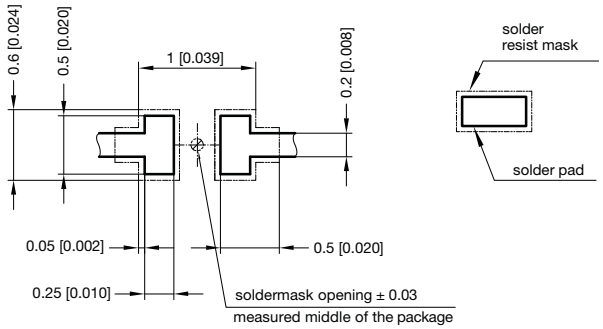


Fig. 11 - Typical Peak. Clamping Voltage at ESD Contact Discharge
(acc. IEC 61000-4-2)

PACKAGE DIMENSIONS in millimeters (inches) **LLP1006-2L**



Foot print recommendation:



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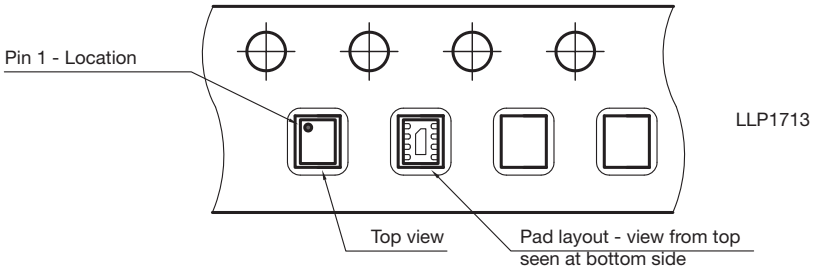

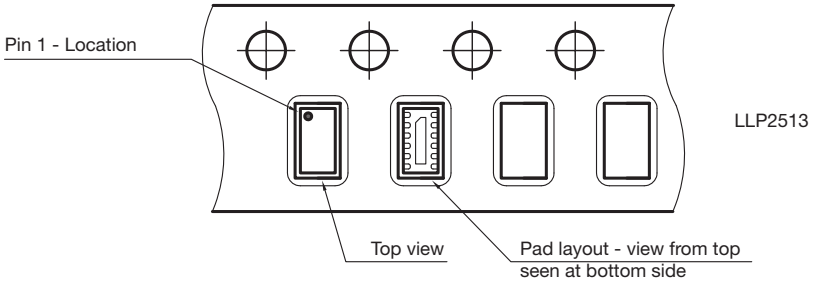

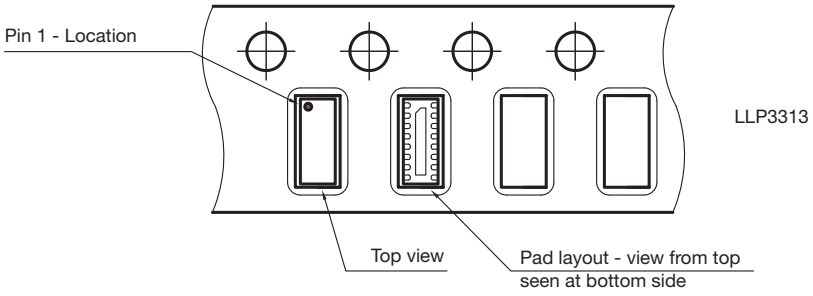

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