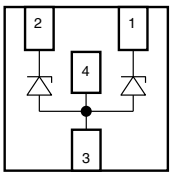
Low Capacitance, 2-Line ESD Protection Diode



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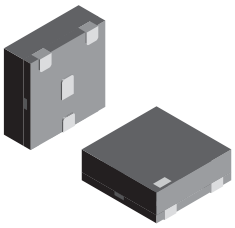


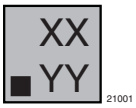
20903

FEATURES

- Compact LLP75-4L package
- Low package height < 0.6 mm
- 2-line ESD protection
- Low leakage current < 0.1 µA
- Low load capacitance C_D = 1.5 pF
- ESD immunity acc. IEC 61000-4-2
  ± 15 kV contact discharge
  ± 15 kV air discharge
- High surge current acc. IEC 61000-4-5 I_{PP} > 3 A
- Soldering can be checked by standard vision inspection. no X-ray necessary
- 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
HALOGEN FREE
GREEN (5-2008)

MARKING (example only)



Dot = pin 1 marking
YY = type code (see table below)
XX = date code

DESIGN SUPPORT TOOLS

click logo to get started

3D Models Available

ORDERING INFORMATION			
DEVICE NAME	ORDERING CODE	TAPED UNITS PER REEL (8 mm TAPE ON 7" REEL)	MINIMUM ORDER QUANTITY
VBUS052BD-HTF	VBUS052BD-HTF-GS08	3000	15 000

PACKAGE DATA						
DEVICE NAME	PACKAGE NAME	TYPE CODE	WEIGHT	MOLDING COMPOUND FLAMMABILITY RATING	MOISTURE SENSITIVITY LEVEL	SOLDERING CONDITIONS
VBUS052BD-HTF	LLP75-4L	U7	4.2 mg	UL 94 V-0	MSL level 1 (according J-STD-020)	Peak temperature max. 260 °C

ABSOLUTE MAXIMUM RATINGS VBUS052BD-HTF				
RATING	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	-40 to +125	°C
Storage temperature		T_{STG}	-40 to +150	°C

For technical questions, contact: ESDprotection@vishay.com
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APPLICATION NOTE

The VBUS052BD-HTF is a two-line 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 VBUS052BD-HTF two high speed data lines can be protected against transient voltage signals like ESD (electro static discharge). Connected to the data line (pin 1 and 2) and to ground (pin 3) 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 behavior of the VBUS052BD-HTF is bidirectional but asymmetrical (BiAs) and so it offers the best protection for applications running up to 5 V.

ELECTRICAL CHARACTERISTICS VBUS052BD-HTF						
PARAMETER	TEST CONDITIONS/REMARKS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Protection paths	Number of lines which can be protected	$N_{channel}$	-	-	2	lines
Reverse stand-off voltage	at I_R = 0.1 µA; pin 1 or pin 2 to pin 3	V_{RWM}	-	-	5	V
Reverse current	at $V_R = V_{RWM}$ = 5 V; pin 1 or pin 2 to pin 3	I_R	-	< 0.01	0.1	µA
Reverse breakdown voltage	at I_R = 1 mA; pin 1 or pin 2 to pin 3	V_{BR}	6.9	7.9	8.7	V
Reverse clamping voltage	at I_{PP} = 3 A, acc. IEC 61000-4-5; pin 1 or pin 2 to pin 3	V_C	-	-	16	V
Forward clamping voltage	at I_F = 3 A, acc. IEC 61000-4-5; pin 3 to pin 1 or pin 2	V_F	-	4.8	6	V
Capacitance	at V_R = 0 V; f = 1 MHz; pin 1 or pin 2 to pin 3	C_D	-	1.5	2.5	pF

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

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

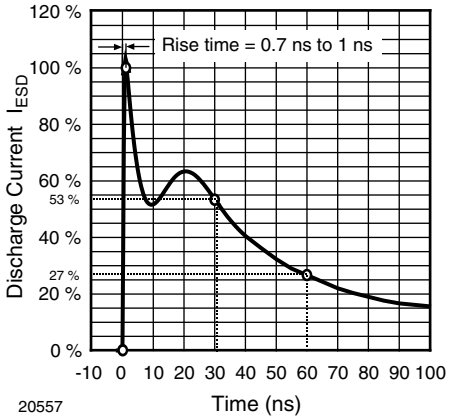

Fig. 1 - ESD Discharge Current Wave Form acc. IEC 61000-4-2 (330 Ω/150 pF)

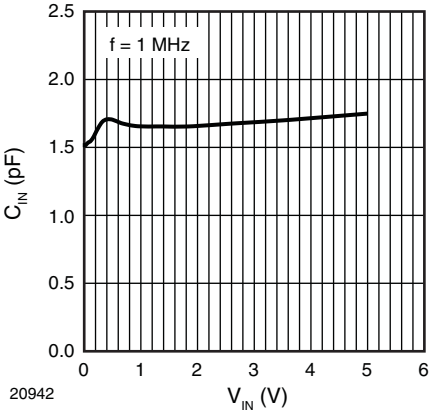

Fig. 3 - Typical Capacitance C_D vs. Reverse Voltage V_R

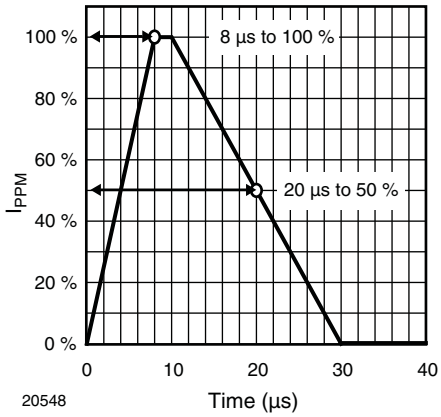

Fig. 2 - 8/20 µs Peak Pulse Current Wave Form acc. IEC 61000-4-5

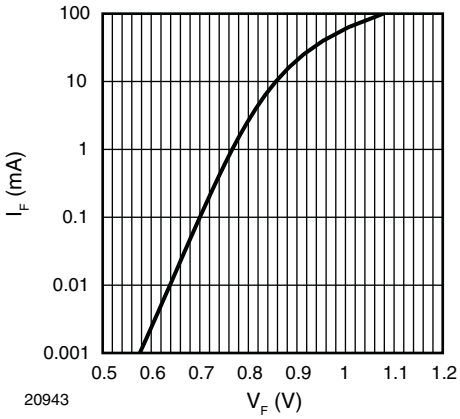

Fig. 4 - Typical Forward Current I_F vs. Forward Voltage V_F

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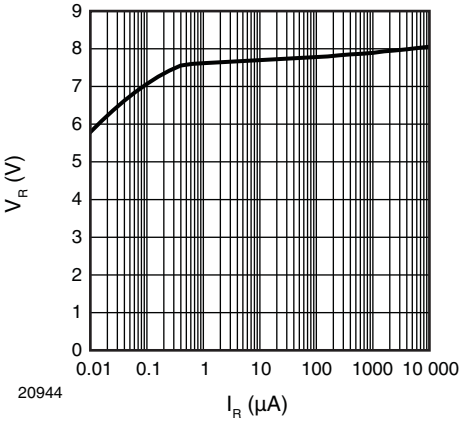

Fig. 5 - Typical Reverse Voltage V_R vs. Reverse Current I_R

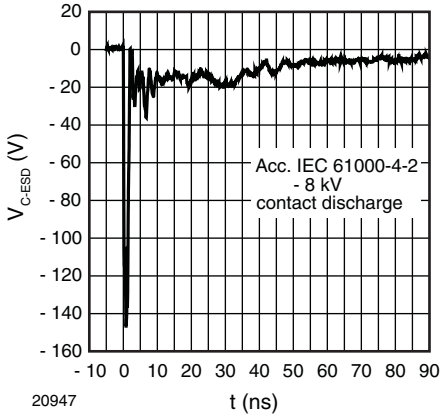

Fig. 8 - Typical Clamping Performance at - 8 kV Contact Discharge (acc. IEC 61000-4-2)

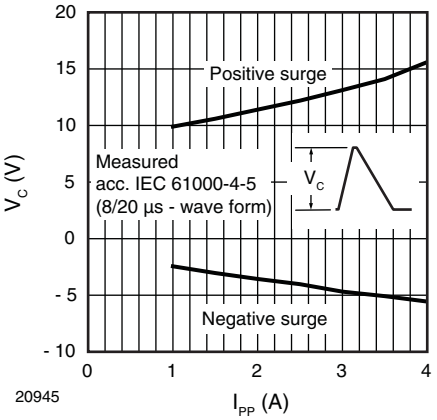

Fig. 6 - Typical Clamping Voltage vs. Peak Pulse Current I_{PP}

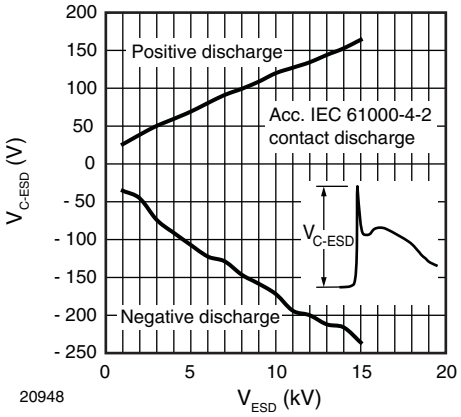

Fig. 9 - Typical Peak Clamping Voltage at ± ESD Contact Discharge (acc. IEC 61000-4-2)

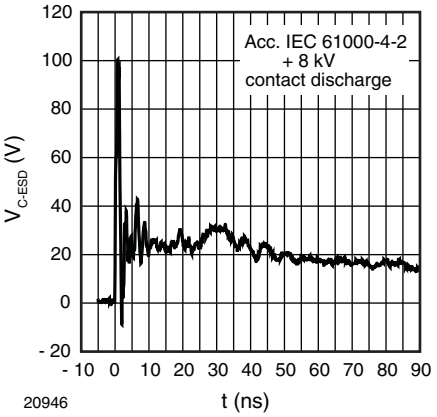

Fig. 7 - Typical Clamping Performance at + 8 kV Contact Discharge (acc. IEC 61000-4-2)

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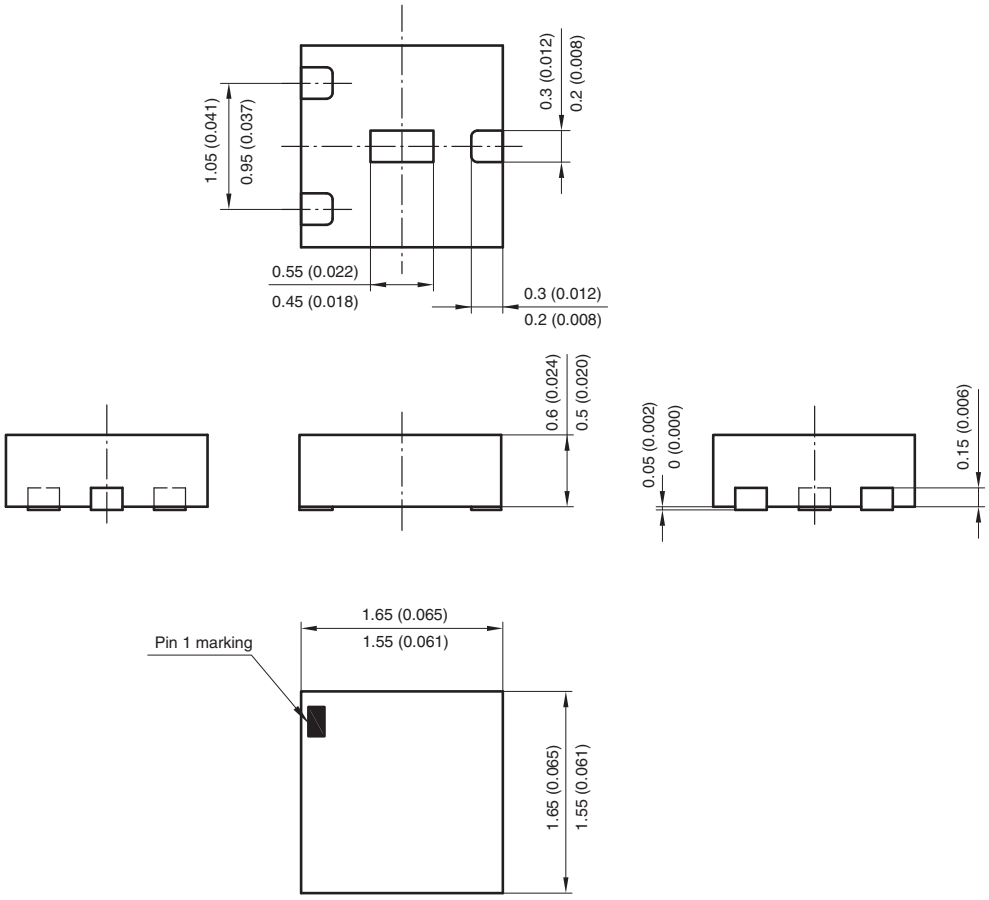
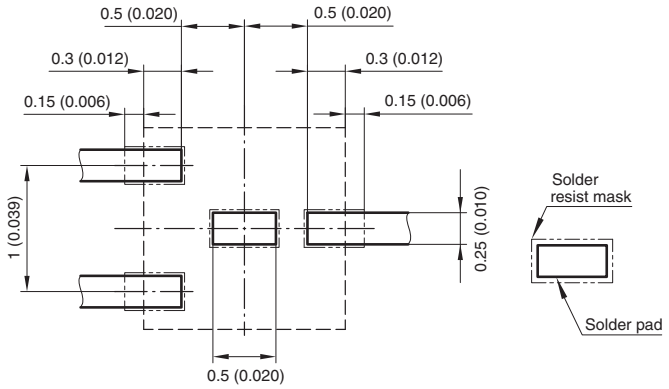
PACKAGE DIMENSIONS in millimeters (inches): **LLP75-4L**



Foot print recommendation:



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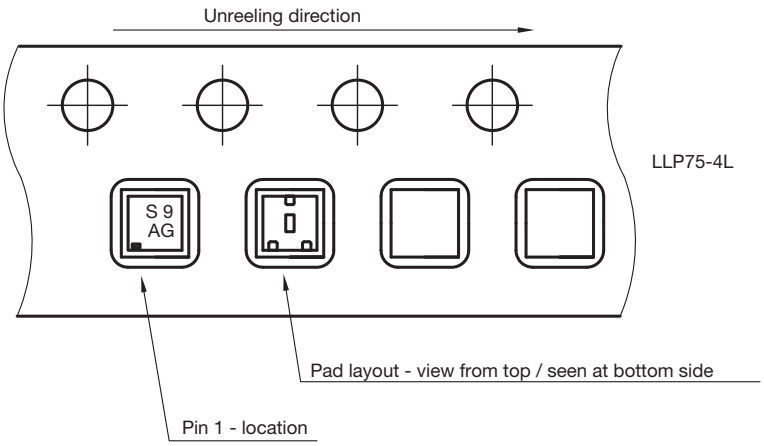

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