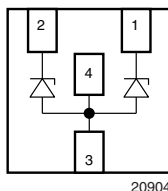
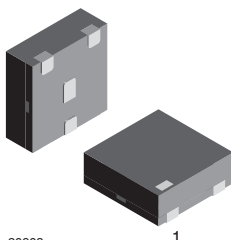


## Low Capacitance, 2-Line ESD Protection Diode



20904



20903

1

### MARKING (example only)



21001

Dot = pin 1 marking

YY = type code (see table below)

XX = date code

### DESIGN SUPPORT TOOLS

[click logo to get started](#)

**3D**  
Models  
Available

### FEATURES

- Compact LLP75-4L package
- Low package height < 0.6 mm
- 2-line ESD protection
- Low leakage current < 0.1  $\mu$ A
- Low load capacitance  $C_D = 1.5$  pF
- ESD immunity acc. IEC 61000-4-2  
 $\pm 15$  kV contact discharge  
 $\pm 15$  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](http://www.vishay.com/doc?99912)



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

### 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, $t_p = 8/20$ $\mu$ s/single shot	$I_{PPM}$	3	A
Peak pulse power	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	$V_{ESD}$	$\pm 15$	kV
	Air discharge acc. IEC 61000-4-2; 10 pulses		$\pm 15$	kV
Operating temperature	Junction temperature	$T_J$	-40 to +125	°C
Storage temperature		$T_{STG}$	-40 to +150	°C

## 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 $I_R = 0.1 \mu A$ ; 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	$\mu A$
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 $T_{amb} = 25^\circ C$ , unless otherwise specified

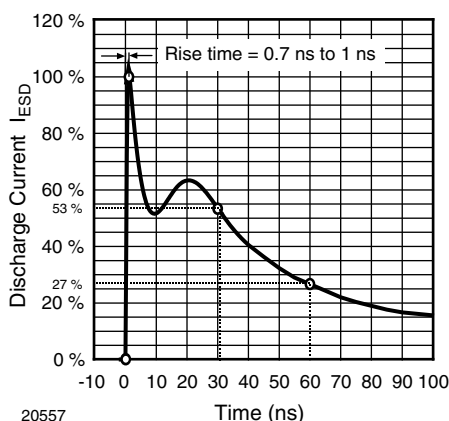


Fig. 1 - ESD Discharge Current Wave Form  
acc. IEC 61000-4-2 (330  $\Omega$ /150 pF)

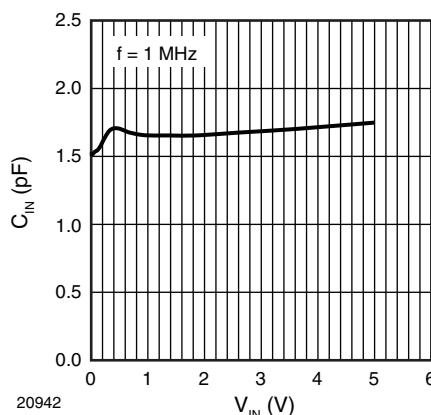


Fig. 3 - Typical Capacitance  $C_D$  vs. Reverse Voltage  $V_R$

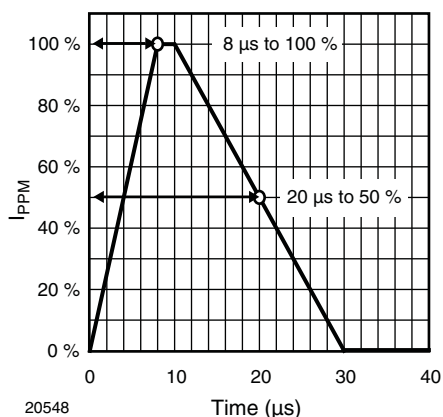


Fig. 2 - 8/20  $\mu s$  Peak Pulse Current Wave Form  
acc. IEC 61000-4-5

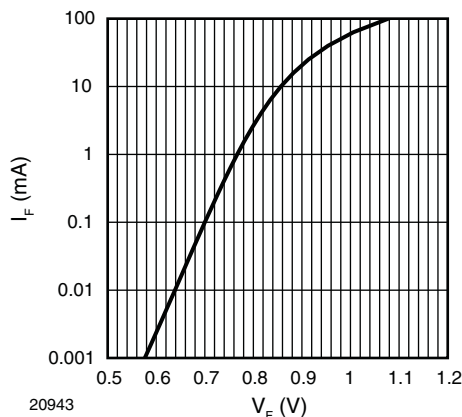


Fig. 4 - Typical Forward Current  $I_F$  vs. Forward Voltage  $V_F$

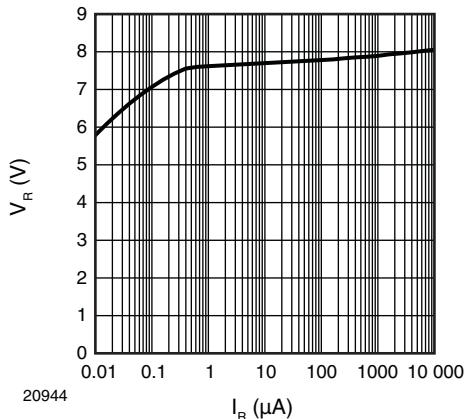


Fig. 5 - Typical Reverse Voltage  $V_R$  vs. Reverse Current  $I_R$

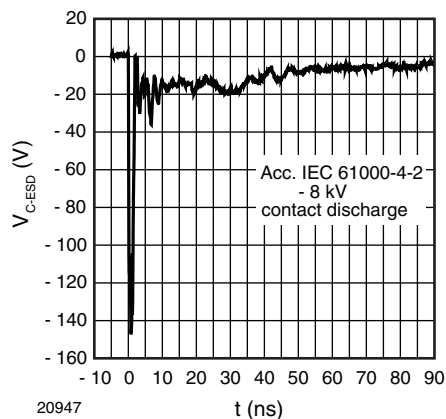


Fig. 8 - Typical Clamping Performance at - 8 kV Contact Discharge (acc. IEC 61000-4-2)

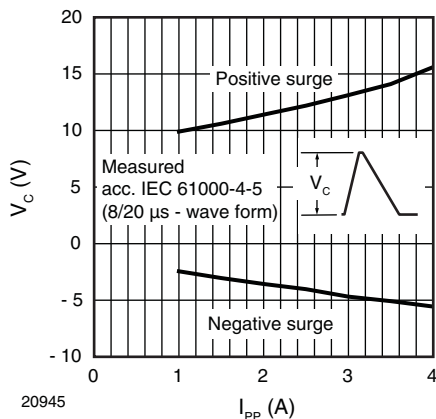


Fig. 6 - Typical Clamping Voltage vs. Peak Pulse Current  $I_{PP}$

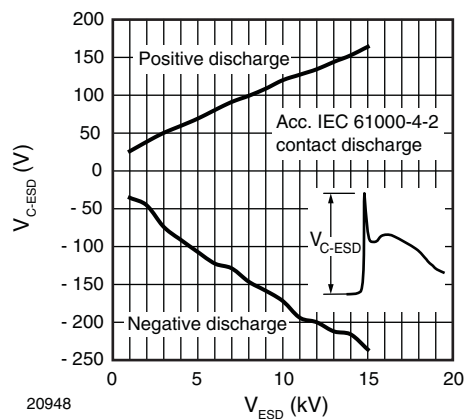


Fig. 9 - Typical Peak Clamping Voltage at  $\pm$  ESD Contact Discharge (acc. IEC 61000-4-2)

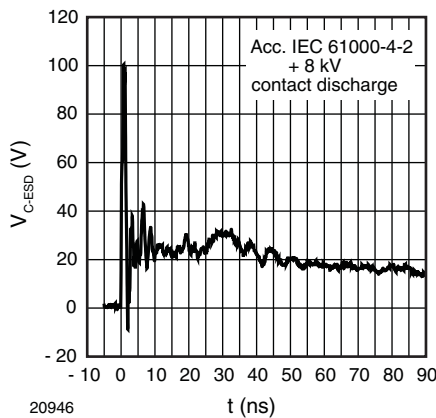
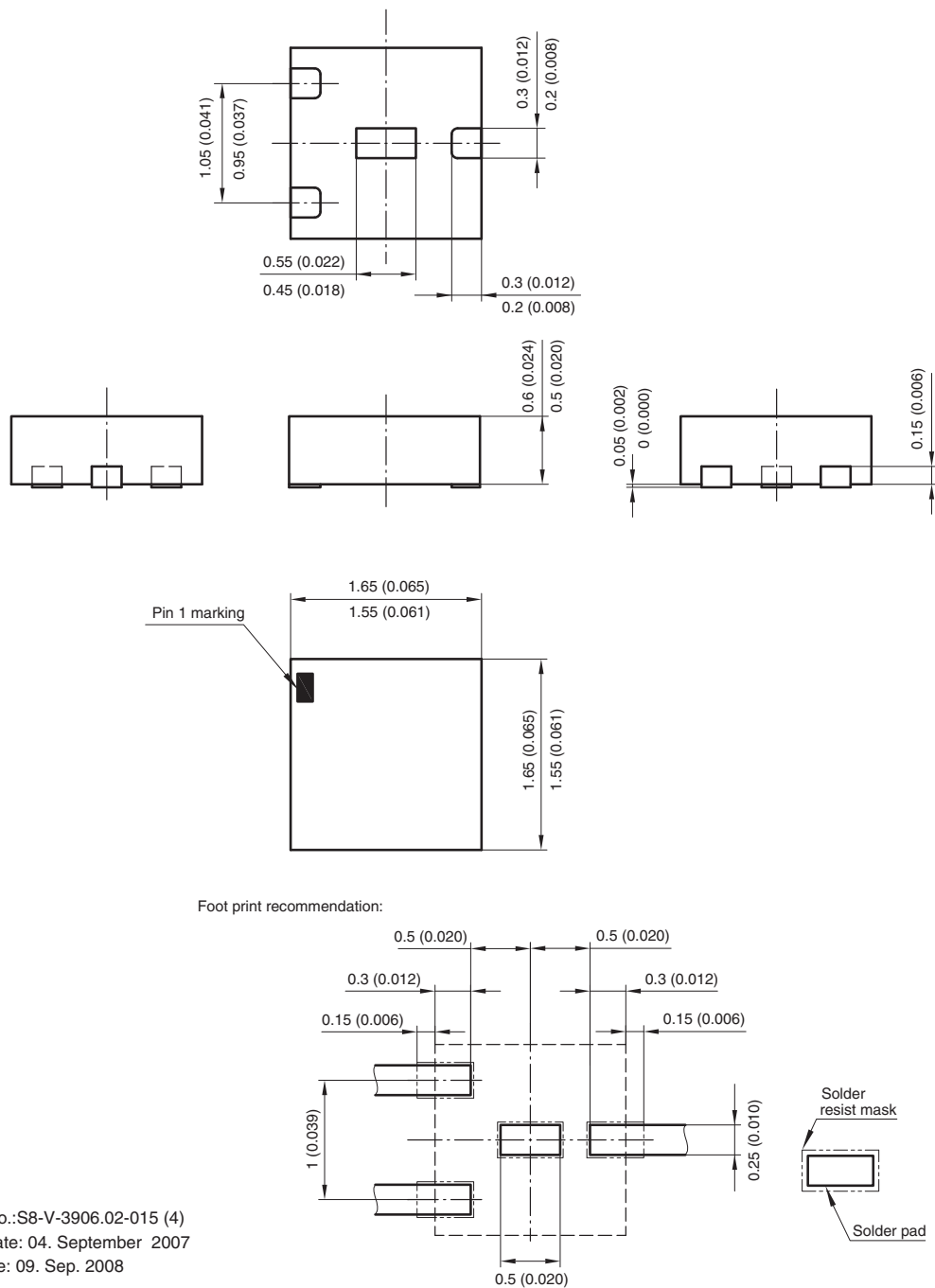


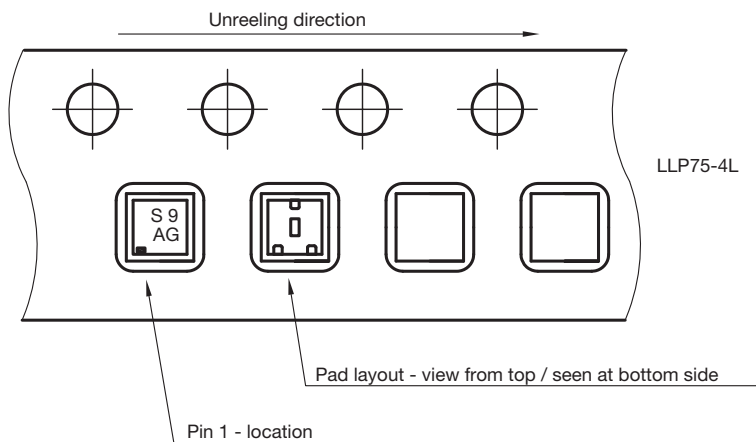
Fig. 7 - Typical Clamping Performance at + 8 kV Contact Discharge (acc. IEC 61000-4-2)



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



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20906





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