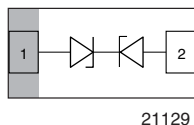
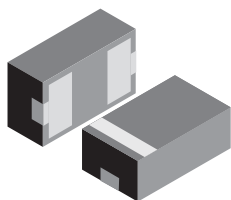


# Bidirectional Symmetrical (BiSy) Low Capacitance, Single-Line ESD Protection Diode in LLP1006-2M



21129



20855

## MARKING (example only)



21121

Bar = pin 1 marking

X = date code

Y = type code (see table below)

## DESIGN SUPPORT TOOLS


[click logo to get started](#)

## FEATURES

- Ultra compact LLP1006-2M package
- Low package height < 0.4 mm
- 1-line ESD protection
- Working range  $\pm 5.5$  V
- Low leakage current  $I_R < 0.1 \mu A$
- Very low load capacitance  $C_D = 0.3$  pF
- ESD immunity acc. IEC 61000-4-2  
 $\pm 15$  kV contact discharge  
 $\pm 16$  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)
- PATENT(S): [www.vishay.com/patents](http://www.vishay.com/patents)
- 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<br>(8 mm TAPE ON 7" REEL) | MINIMUM ORDER QUANTITY |
|--------------|-------------------|------------------------------------------------|------------------------|
| VBUS05L1-DD1 | VBUS05L1-DD1-G-08 | 8000                                           | 8000                   |

## PACKAGE DATA

| DEVICE NAME  | PACKAGE NAME | TYPE CODE | WEIGHT  | MOLDING COMPOUND<br>FLAMMABILITY RATING | MOISTURE<br>SENSITIVITY LEVEL        | SOLDERING CONDITIONS         |
|--------------|--------------|-----------|---------|-----------------------------------------|--------------------------------------|------------------------------|
| VBUS05L1-DD1 | LLP1006-2M   | R         | 0.72 mg | UL 94 V-0                               | MSL level 1<br>(according J-STD-020) | Peak temperature max. 260 °C |

## ABSOLUTE MAXIMUM RATINGS VBUS05L1-DD1

| PARAMETER             | TEST CONDITIONS                                                      | SYMBOL    | VALUE       | UNIT |
|-----------------------|----------------------------------------------------------------------|-----------|-------------|------|
| Peak pulse current    | Acc. IEC 61000-4-5; $t_p = 8/20 \mu s$ ; single shot                 | $I_{PPM}$ | 2           | A    |
| Peak pulse power      | Pin 1 to pin 2, acc. IEC 61000-4-5; $t_p = 8/20 \mu s$ ; single shot | $P_{PP}$  | 34          | 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                          |           | $\pm 16$    | kV   |
| Operating temperature | Junction temperature                                                 | $T_J$     | -40 to +125 | °C   |
| Storage temperature   |                                                                      | $T_{STG}$ | -40 to +150 | °C   |

PATENT(S): [www.vishay.com/patents](http://www.vishay.com/patents)

This Vishay product is protected by one or more United States and international patents.

**ELECTRICAL CHARACTERISTICS VBUS05L1-DD1**

( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , 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                 | $V_{RWM}$     | -    | -    | 5.5  | V             |
| Reverse voltage           | at $I_R = 0.05\text{ }\mu\text{A}$           | $V_R$         | 5.5  | -    | -    | V             |
| Reverse current           | at $V_{RWM} = 5.5\text{ V}$                  | $I_R$         | -    | -    | 0.05 | $\mu\text{A}$ |
| Reverse breakdown voltage | at $I_R = 1\text{ mA}$                       | $V_{BR}$      | 7    | 8.4  | 9.5  | V             |
| Reverse clamping voltage  | at $I_{PP} = 1\text{ A}$                     | $V_C$         | -    | 11.5 | 14   | V             |
|                           | at $I_{PP} = I_{PPM} = 2\text{ A}$           | $V_C$         | -    | 14   | 17   | V             |
| Capacitance               | at $V_R = 0\text{ V}$ , $f = 1\text{ MHz}$   | $C_D$         | -    | 0.33 | 0.4  | pF            |
|                           | at $V_R = 2.5\text{ V}$ , $f = 1\text{ MHz}$ | $C_D$         | -    | 0.34 | -    | pF            |

**VBUS05L1-DD1: ESD PROTECTION WITH LOWEST LOAD CAPACITANCE**

The VBUS05L1-DD1 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 VBUS05L1-DD1 offers a high isolation (low leakage current, lowest capacitance) within the specified working range. Due to the short leads and small package size of the tiny LLP1006-2M package the line inductance is very low, so that fast transients like an ESD strike can be clamped with minimal over- or undershoots.

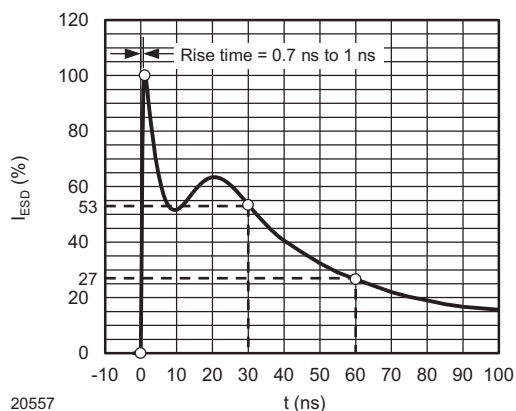
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


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

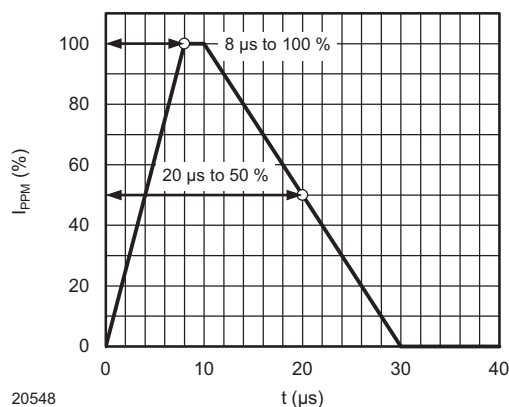


Fig. 2 - 8/20  $\mu\text{s}$  Peak Pulse Current Wave Form  
acc. IEC 61000-4-5

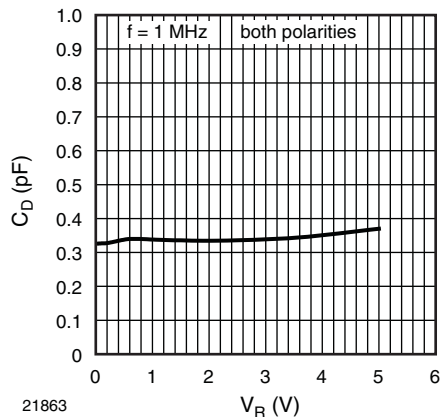
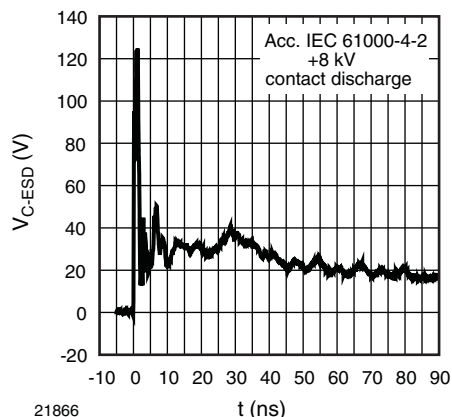

Fig. 3 - Typical Capacitance  $C_D$  vs. Reverse Voltage  $V_R$ 


Fig. 6 - Typical Clamping Performance at +8 kV Contact Discharge (acc. IEC 61000-4-2)

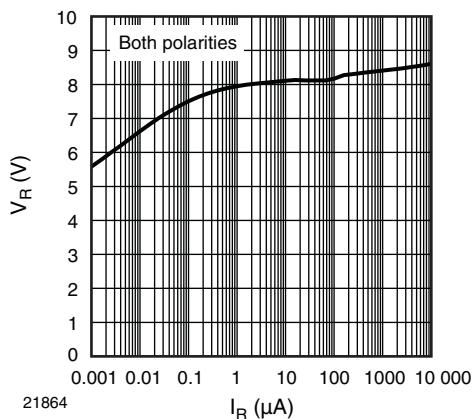
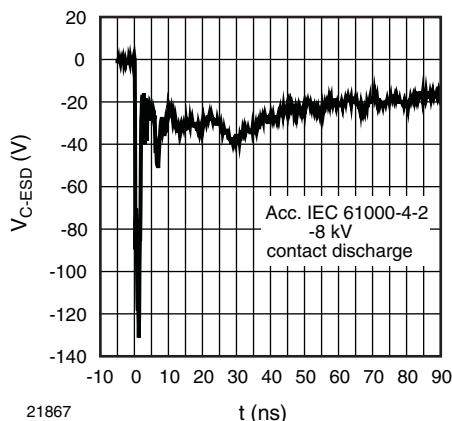

Fig. 4 - Typical Reverse Voltage  $V_R$  vs. Reverse Current  $I_R$ 


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

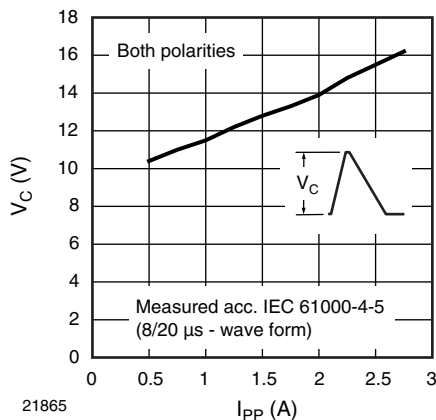
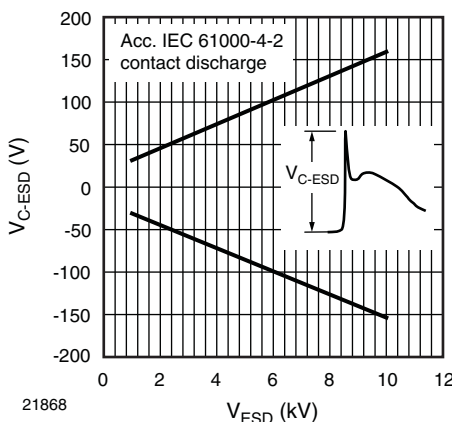
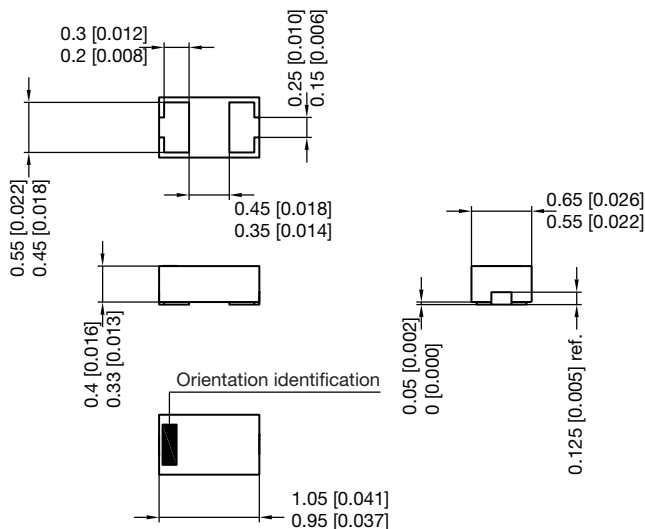
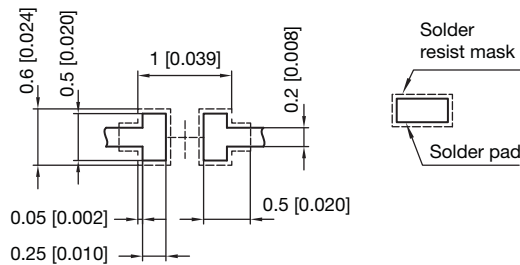
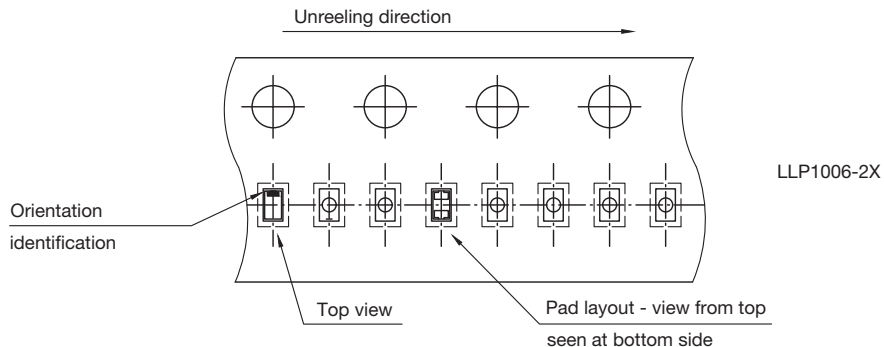

Fig. 5 - Typical Peak Clamping Voltage  $V_C$  vs. Peak Pulse Current  $I_{PP}$ 


Fig. 8 - Typical Peak Clamping Voltage at ESD Contact Discharge (acc. IEC 61000-4-2)

**PACKAGE DIMENSIONS** in millimeters (inches): **LLP1006-2M**

**Foot print recommendation:**


Pad Design Patented:  
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Rev. 7 - Date: 11.May 2016  
20812



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02.05.2017  
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