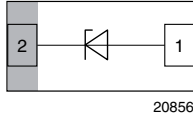
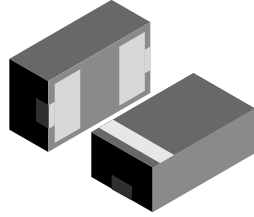


ESD-Protection Diode in LLP1006-2L



20856



20855

MARKING (example only)



Bar = cathode marking

X = date code

Y = type code (see table below)

FEATURES

- Ultra compact LLP1006-2L package
- Low package height < 0.4 mm
- 1-line ESD-protection
- Low leakage current < 0.1 μ A
- Low load capacitance $C_D = 12$ pF ($V_R = 2.5$ V; $f = 1$ MHz)
- ESD-protection acc. IEC 61000-4-2 ± 30 kV contact discharge ± 30 kV air discharge
- High surge current acc. IEC61000-4-5 $I_{PP} > 3$ A
- 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)
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC



ORDERING INFORMATION

| DEVICE NAME | ORDERING CODE | TAPED UNITS PER REEL (8 mm TAPE on 7" REEL) | MINIMUM ORDER QUANTITY |
|---------------|--------------------|--|------------------------|
| VESD05A1B-HD1 | VESD05A1B-HD1-GS08 | 8000 | 8000 |

PACKAGE DATA

| DEVICE NAME | PACKAGE NAME | TYPE CODE | WEIGHT | MOLDING COMPOUND FLAMMABILITY RATING | MOISTURE SENSITIVITY LEVEL | SOLDERING CONDITIONS |
|---------------|--------------|-----------|---------|---|--------------------------------------|--------------------------|
| VESD05A1B-HD1 | LLP1006-2L | D | 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; $t_p = 8/20$ μ s; single shot | I_{PPM} | 3 | A |
| Peak pulse power | acc. IEC 61000-4-5; $t_p = 8/20$ μ s; single shot | P_{PP} | 33 | W |
| ESD immunity | Contact discharge acc. IEC 61000-4-2; 10 pulses | V_{ESD} | ± 30 | kV |
| | Air discharge acc. IEC 61000-4-2; 10 pulses | V_{ESD} | ± 30 | kV |
| Operating temperature | Junction temperature | T_J | - 40 to + 125 | °C |
| Storage temperature | | T_{stg} | - 55 to + 150 | °C |

** Please see document "Vishay Material Category Policy": www.vishay.com/doc?99902

| ELECTRICAL CHARACTERISTICS VESD05A1B-HD1 Bias mode (between pin 1 and pin 2) | | | | | | |
|--|--|-------------|------|------|------|---------|
| 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 | at $I_R = 0.1 \mu A$ | V_{RWM} | 5 | - | - | V |
| Reverse current | at $V_R = 5 V$ | I_R | - | 0.01 | 0.1 | μA |
| Reverse breakdown voltage | at $I_R = 1 mA$ | V_{BR} | 6 | 6.8 | 7.5 | V |
| Reverse clamping voltage | at $I_{PP} = 1 A$ | V_C | - | 8 | 9.5 | V |
| | at $I_{PP} = I_{PPM} = 3 A$ | V_C | - | 8.9 | 11 | V |
| Forward clamping voltage | at $I_{PP} = 0.2 A$ | V_F | - | 0.95 | 1.2 | V |
| | at $I_{PP} = 1 A$ | V_F | - | 1.3 | - | V |
| | at $I_{PP} = I_{PPM} = 3 A$ | V_F | - | 1.9 | - | V |
| Capacitance | at $V_R = 0 V$; $f = 1 MHz$ | C_D | - | 19 | 23 | pF |
| | at $V_R = 2.5 V$; $f = 1 MHz$ | C_D | - | 12 | - | pF |

Note

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

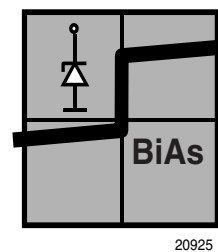
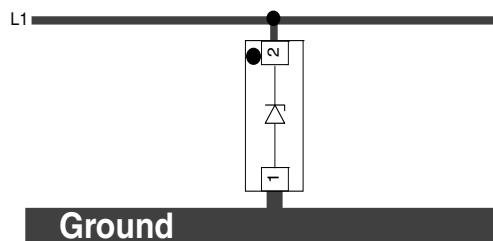
BIAS-MODE (BIDIRECTIONAL ASYMMETRICAL PROTECTION MODE)

With the **VESD05A1B-HD1** one signal- or data-lines (L1) can be protected against voltage transients. With pin 1 connected to ground and pin 2 connected to a signal- or data-line which has to be protected. As long as the voltage level on the data- or signal-line is between 0 V (ground level) and the specified **Maximum Reverse Working Voltage** (V_{RWM}) the protection diode between data line and ground offers a high isolation to the ground line. The protection device behaves like an open switch.

As soon as any positive transient voltage signal exceeds the break through voltage level of the protection diode, the diode becomes conductive and shorts the transient current to ground. Now the protection device behaves like a closed switch. The **Clamping Voltage** (V_C) is defined by the **Breakthrough Voltage** (V_{BR}) level plus the voltage drop at the series impedance (resistance and inductance) of the protection device.

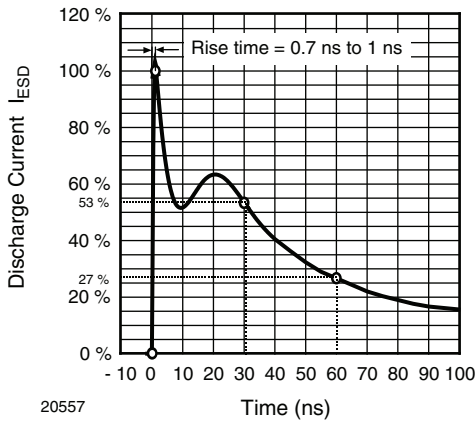
Any negative transient signal will be clamped accordingly. The negative transient current is flowing in the forward direction of the protection diode. The low **Forward Voltage** (V_F) clamps the negative transient close to the ground level.

Due to the different clamping levels in forward and reverse direction the **VESD05A1B-HD1** clamping behaviour is **Bidirectional** and **Asymmetrical (BiAs)**.

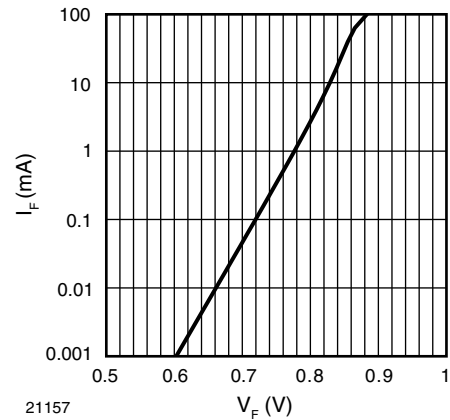


20925

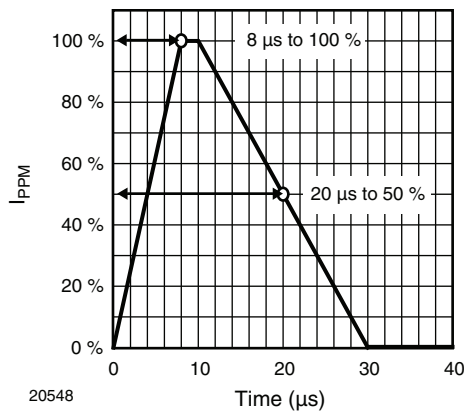
TYPICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)



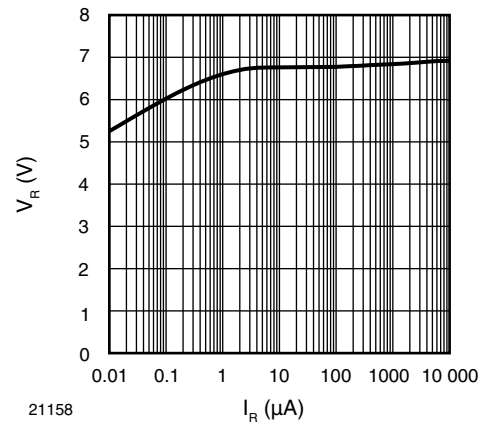
20557
Fig. 1 - ESD Discharge Current Wave Form
acc. IEC 61000-4-2 (330 Ω /150 pF)



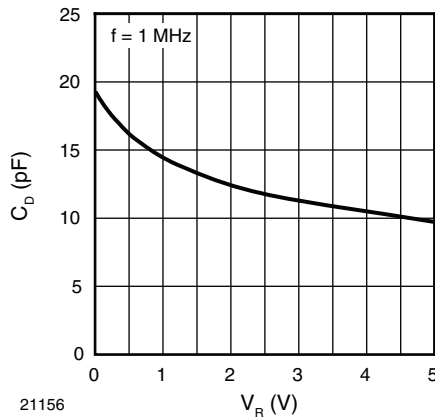
21157
Fig. 4 - Typical Forward Current I_F vs. Forward Voltage V_F



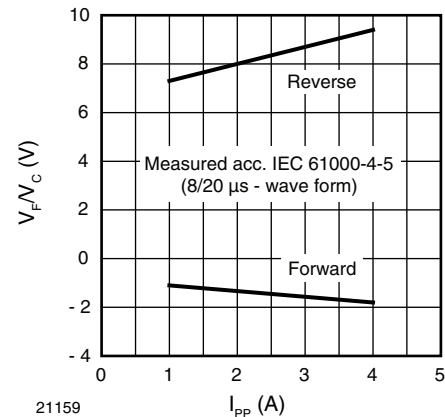
20548
Fig. 2 - 8/20 μs Peak Pulse Current Wave Form
acc. IEC 61000-4-5



21158
Fig. 5 - Typical Reverse Voltage V_R vs.
Reverse Current I_R



21156
Fig. 3 - Typical Capacitance C_D vs. Reverse Voltage V_R



21159
Fig. 6 - Typical Clamping Voltage vs.
Peak Pulse Current I_{PP}

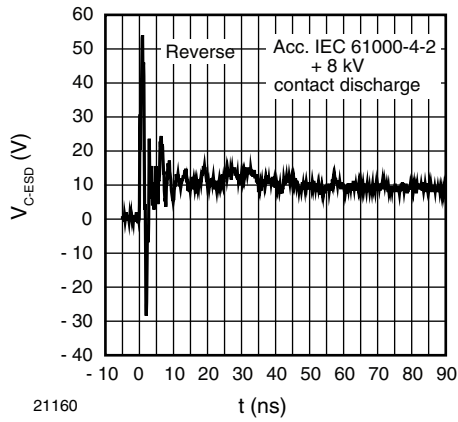


Fig. 7 - Typical Clamping Performance at + 8 kV Contact Discharge (acc. IEC 61000-4-2)

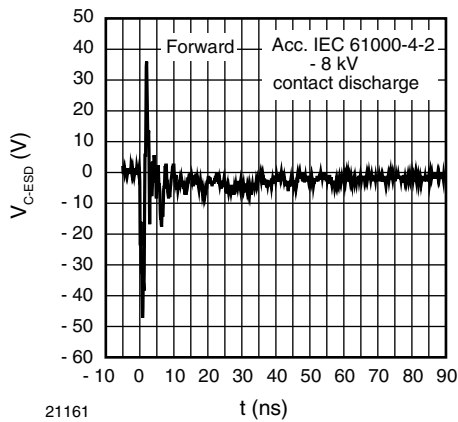


Fig. 8 - Typical Clamping Performance at - 8 kV Contact Discharge (acc. IEC 61000-4-2)

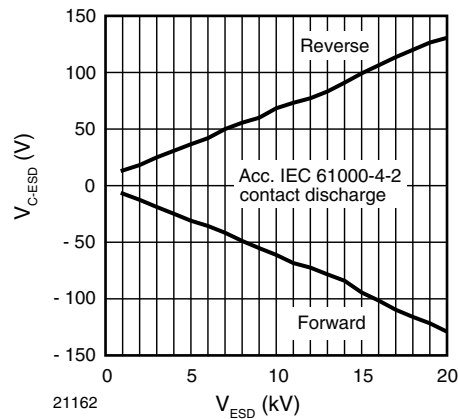
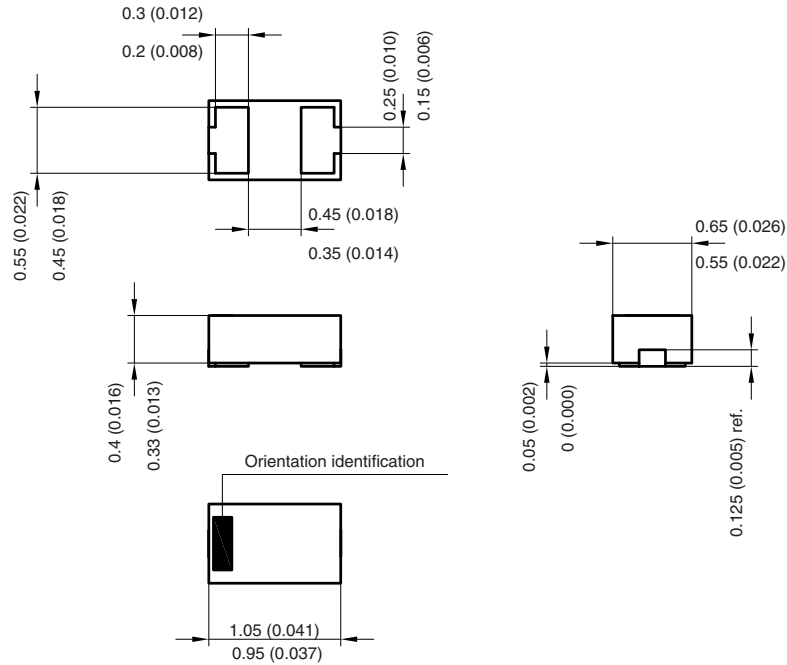
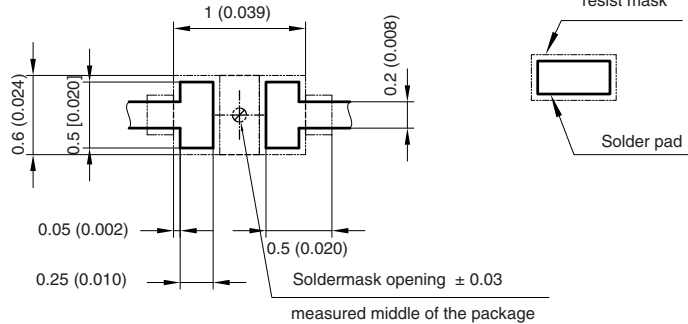


Fig. 9 - Typical Clamping Voltage at ± ESD Contact Discharge (acc. IEC 61000-4-2)

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



Foot print recommendation:



Created - Date: 13. July, 2007
 Rev. 4 - Date: 12. Sept. 2008
 Document no.: S8-V-3906.04-005 (4)
 20812



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