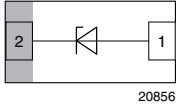
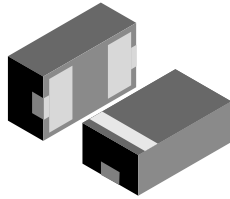




Low Capacitance, Single-Line ESD Protection Diode



20856



20855

MARKING (example only)



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

LINKS TO ADDITIONAL RESOURCES



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 CD = 0.6 pF
- ESD immunity to IEC 61000-4-2
± 15 kV contact discharge
± 15 kV air discharge
- High surge current acc. IEC 61000-4-5 $I_{PP} > 2$ A
- Soldering can be checked by standard vision inspection; no X-ray necessary
- Pin plating NiPdAu (e4) no whisker growth
- PATENT(S): www.vishay.com/patents
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



| ORDERING INFORMATION | | | |
|----------------------|--------------------|--|------------------------|
| DEVICE NAME | ORDERING CODE | TAPED UNITS PER REEL (8 MM TAPE ON 7" REEL) | MINIMUM ORDER QUANTITY |
| VBUS051CD-HD1 | VBUS051CD-HD1-G-08 | 8000 | 8000 |

| PACKAGE DATA | | | | | | |
|---------------|--------------|-----------|---------|---|--------------------------------------|------------------------------|
| DEVICE NAME | PACKAGE NAME | TYPE CODE | WEIGHT | MOLDING COMPOUND FLAMMABILITY RATING | MOISTURE SENSITIVITY LEVEL | SOLDERING CONDITIONS |
| VBUS051CD-HD1 | LLP1006-2L | T | 0.72 mg | UL 94 V-0 | MSL level 1 (according J-STD-020) | Peak temperature max. 260 °C |

| ABSOLUTE MAXIMUM RATINGS VBUS051CD-HD1 | | | | | |
|--|---|--|-----------|-------------|------|
| 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 | Acc. IEC 61000-4-5; $t_p = 8/20 \mu$ s; single shot | | P_{PP} | 28 | 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 |

PATENT(S): www.vishay.com/patents

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



| ELECTRICAL CHARACTERISTICS VBUS051CD-HD1 ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified) | | | | | | |
|---|---|---------------|------|--------|------|---------------|
| PARAMETER | TEST CONDITIONS/REMARKS | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| Protection paths | Number of line which can be protected | $N_{channel}$ | - | - | 1 | lines |
| Reverse stand-off voltage | Max. reverse working voltage | V_{RWM} | - | - | 5.5 | V |
| Reverse voltage | At $I_R = 0.1\text{ }\mu\text{A}$ pin 2 to pin 1 | V_R | 5.5 | - | - | V |
| Reverse current | At $V_R = V_{RWM} = 5.5\text{ V}$; pin 2 to pin 1 | I_R | - | < 0.01 | 0.1 | μA |
| Reverse breakdown voltage | At $I_R = 1\text{ mA}$ pin 2 to pin 1 | V_{BR} | 6.5 | 7.6 | 8.5 | V |
| Reverse clamping voltage | At $I_{PP} = 2\text{ A}$; acc. IEC 61000-4-5 pin 2 to pin 1 | V_C | - | - | 14 | V |
| Forward clamping voltage | At $I_F = 2\text{ A}$; acc. IEC 61000-4-5 pin 1 to pin 2 | V_F | - | - | 3.5 | V |
| Capacitance | At $V_R = 0\text{ V}$; $f = 1\text{ MHz}$ pin 2 to pin 1 | C_D | - | 0.6 | 0.8 | pF |

APPLICATION NOTE

The VBUS051CD-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 VBUS051CD-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 5.5 V working range. The clamping behavior of the VBUS051CD-HD1 is bidirectional but asymmetrical (BiAs) and so it offers the best protection for applications running up to 5 V.

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

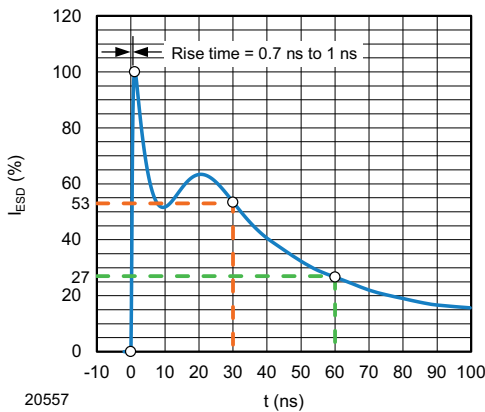


Fig. 1 - ESD Discharge Current Wave Form
acc. IEC 61000-4-2 (330 Ω /150 pF)

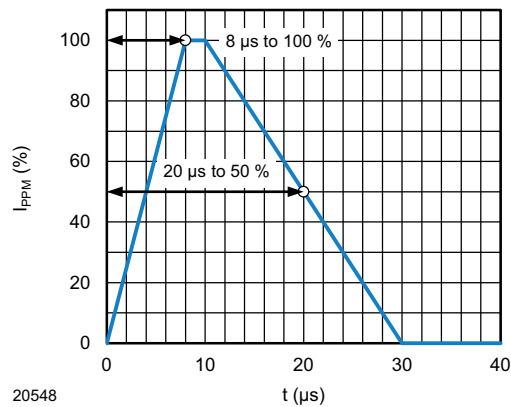


Fig. 2 - 8/20 μs Peak Pulse Current Wave Form
acc. IEC 61000-4-5

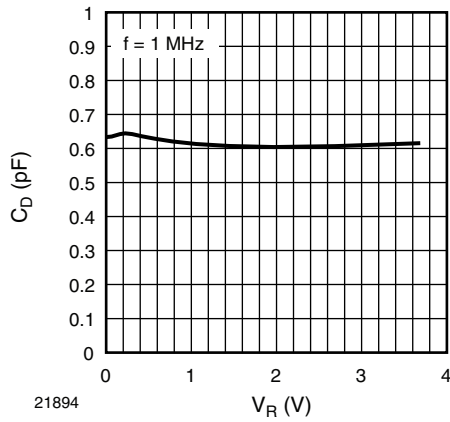


Fig. 3 - Typical Capacitance C_D vs. Reverse Voltage V_R

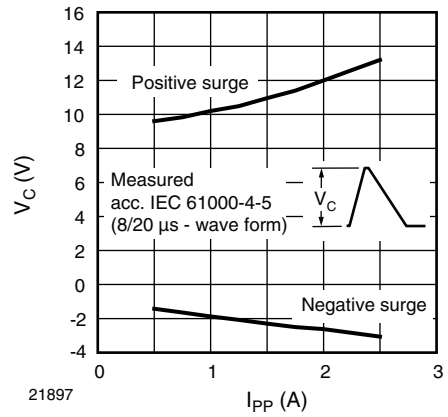


Fig. 6 - Typical Peak Clamping Voltage V_C vs. Peak Pulse Current I_{PP}

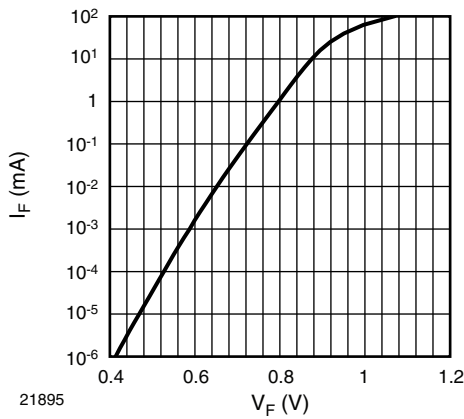


Fig. 4 - Typical Forward Current I_F vs. Forward Voltage V_F

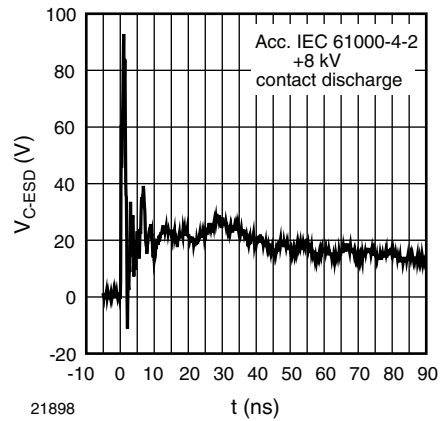


Fig. 7 - Typical Clamping Performance at +8 kV Contact Discharge (acc. IEC 61000-4-2)

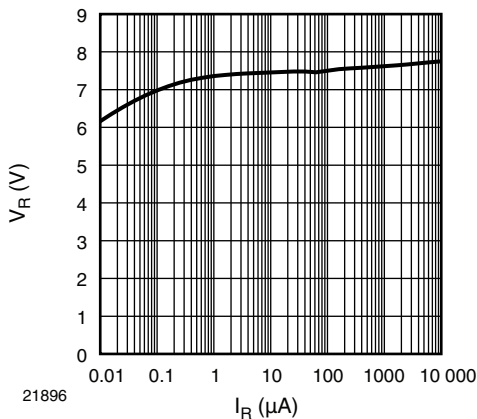


Fig. 5 - Typical Reverse Voltage V_R vs. Reverse Current I_R

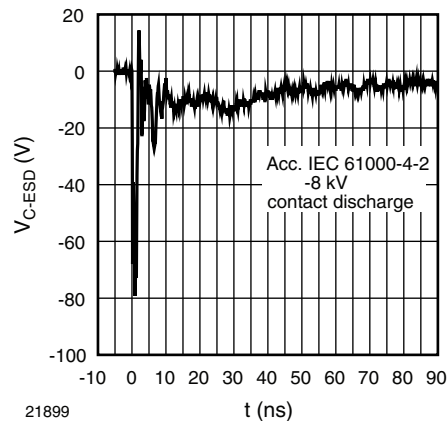


Fig. 8 - Typical Clamping Performance at -8 kV Contact Discharge (acc. IEC 61000-4-2)

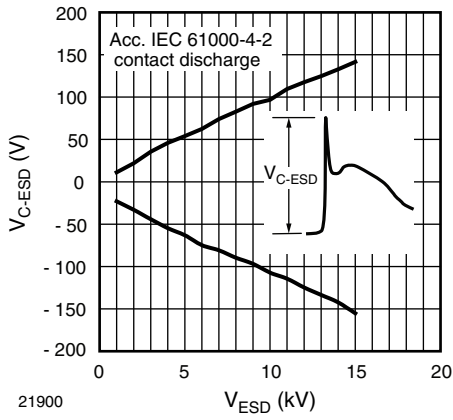
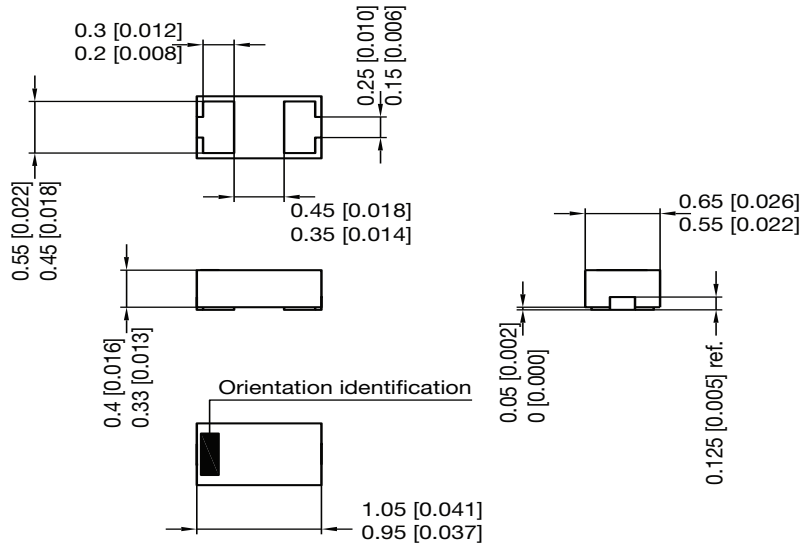


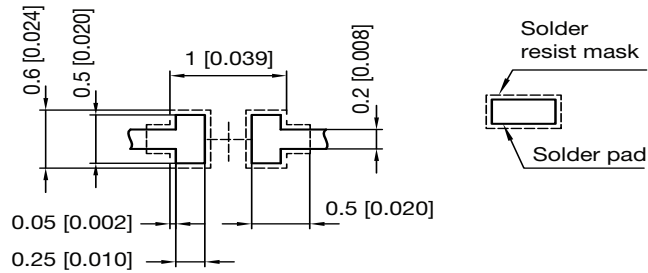
Fig. 9 - Typical Peak Clamping Voltage at ESD Contact Discharge (acc. IEC 61000-4-2)



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

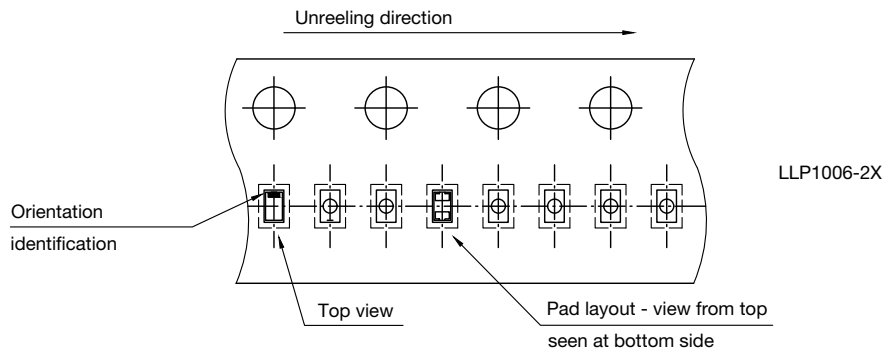


Foot print recommendation:



Pad Design Patented:
(©US 9.018.537 B2)

Document no.: S8-V-3906.04-005 (4)
Rev. 7 - Date: 11.May 2016
20812



S8-V-3906.04-017 (4)
02.05.2017
22965



Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.