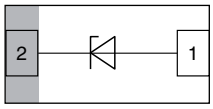
ESD-Protection Diode in LLP1006-2L



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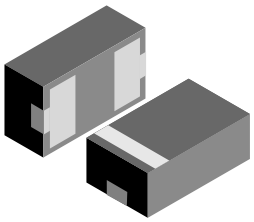
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FEATURES

- Ultra compact LLP1006-2L package
- Low package height < 0.4 mm
- 1-line ESD-protection
- Low leakage current < 0.01 µA
- Low load capacitance C_D = 12.5 pF (V_R = 6 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} > 4 A
- Soldering can be checked by standard vision inspection. No X-ray necessary
- Pin plating NiPdAu (e4) no whisker growth
- 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)

21121

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

ORDERING INFORMATION

DEVICE NAME	ORDERING CODE	TAPED UNITS PER REEL (8 mm TAPE ON 7" REEL)	MINIMUM ORDER QUANTITY
VESD12A1C-HD1	VESD12A1C-HD1-GS08	8000	8000

PACKAGE DATA

DEVICE NAME	PACKAGE NAME	TYPE CODE	WEIGHT	MOLDING COMPOUND FLAMMABILITY RATING	MOISTURE SENSITIVITY LEVEL	SOLDERING CONDITIONS
VESD12A1C-HD1	LLP1006-2L	G	0.72 mg	UL 94 V-0	MSL level 1 (according J-STD-020)	260 °C/10 s at terminals

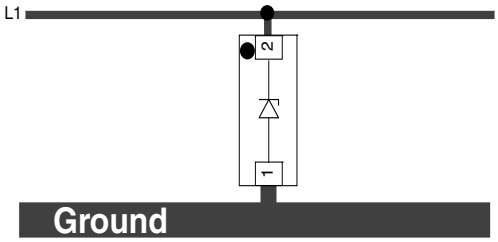
ABSOLUTE MAXIMUM RATINGS VESD12A1C-HD1

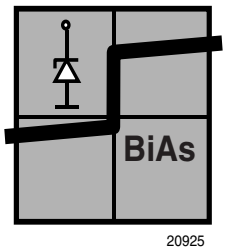
PARAMETER	TEST CONDITIONS	SYMBOL	VALUE	UNIT
Peak pulse current	Acc. IEC 61000-4-5; t_p = 8/20 µs; single shot	I_{PPM}	4	A
Peak pulse power	Acc. IEC 61000-4-5; t_p = 8/20 µs; single shot	P_{PP}	92	W
ESD immunity	Contact discharge, acc. IEC61000-4-2; 10 pulses	V_{ESD}	± 30	kV
	Air discharge, acc. IEC61000-4-2; 10 pulses	V_{ESD}	± 30	kV
Operating temperature	Junction temperature	T_J	-40 to +125	°C
Storage temperature		T_{STG}	-55 to +150	°C

PATENT(S): www.vishay.com/patents
This Vishay product is protected by one or more United States and International patents.

BiAs-MODE (Bidirectional asymmetrical protection mode)

With the VESD12A1C-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 VESD12A1C-HD1 clamping behavior is bidirectional and asymmetrical (BiAs).





ELECTRICAL CHARACTERISTICS VESD12A1C-HD1 BiAs mode (between pin 1 and pin 2) (T_{amb} = 25 °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}	-	-	12	V
Reverse voltage	at I_R = 0.1 µA	V_R	12	-	-	V
Reverse current	at V_{RWM} = 12 V	I_R	-	< 0.01	0.1	µA
Reverse breakdown voltage	at I_R = 1 mA	V_{BR}	13.5	14	16	V
Reverse clamping voltage	at I_{PP} = 1 A	V_C	-	15.8	17	V
	at I_{PP} = I_{PPM} = 4 A	V_C	-	20	23	V
Forward clamping voltage	at I_{PP} = 0.2 A	V_F		0.9	1.2	V
	at I_{PP} = 1 A	V_F		1.1	1.5	V
	at I_{PP} = I_{PPM} = 4 A	V_F		1.7	2.1	V
Capacitance	at V_R = 0 V; f = 1 MHz	C_D	-	30	36	pF
	at V_R = 6 V; f = 1 MHz	C_D	-	12.5	-	pF

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

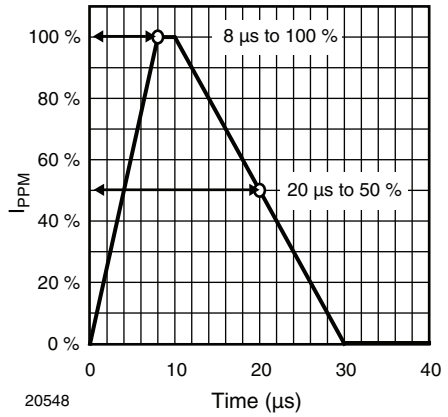


Fig. 1 - 8/20 µs Peak Pulse Current Wave Form (acc. IEC 61000-4-5)

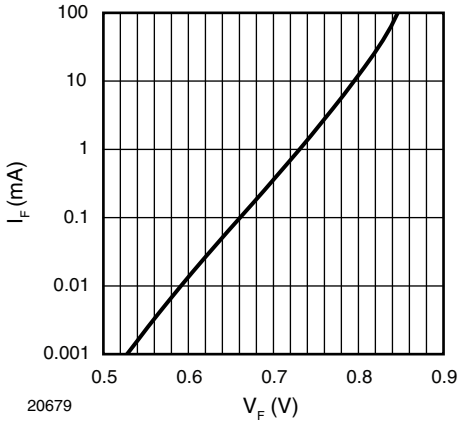


Fig. 4 - Typical Forward Current I_F vs. Forward Voltage V_F

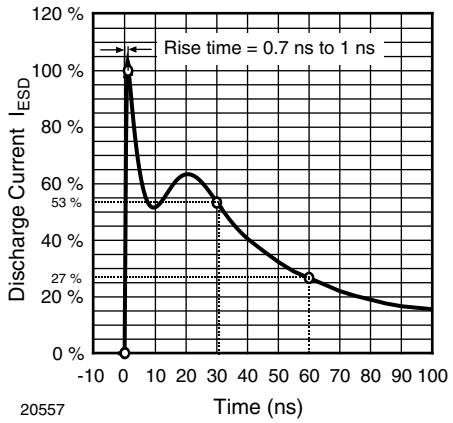


Fig. 2 - ESD Discharge Current Wave Form acc. IEC 61000-4-2 (330 Ω/150 pF)

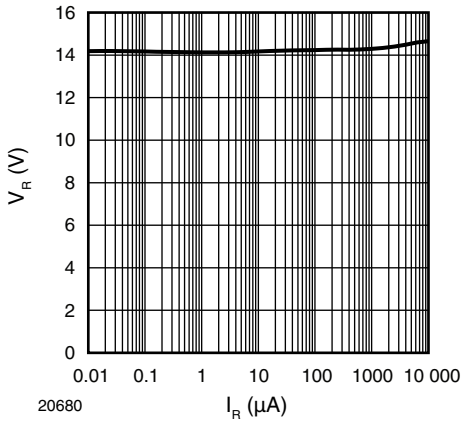


Fig. 5 - Typical Reverse Voltage V_R vs. Reverse Current I_R

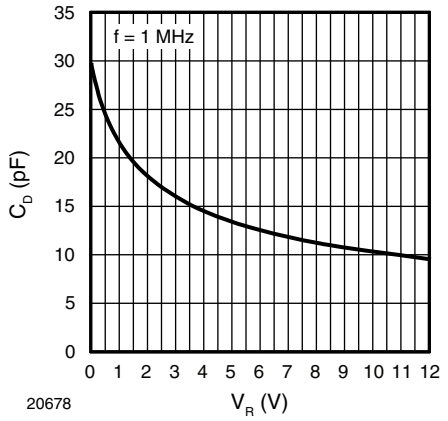


Fig. 3 - Typical Capacitance C_D vs. Reverse Voltage V_R

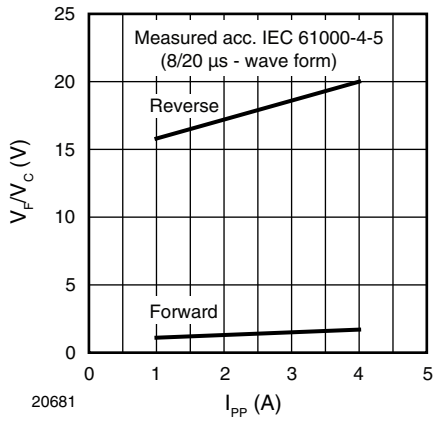


Fig. 6 - Typical Clamping Voltage vs. Peak Pulse Current I_{PP}

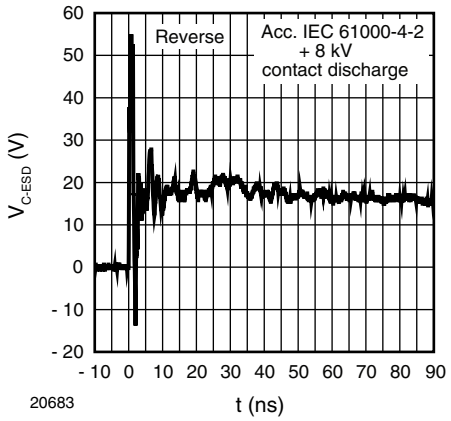


Fig. 7 - Typical Clamping Performance at + 8 kV Contact Discharge
(acc. IEC 61000-4-2)

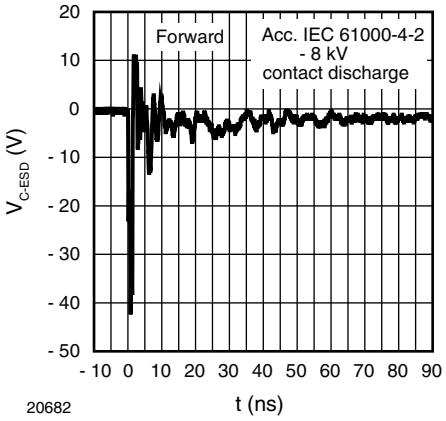


Fig. 8 - Typical Clamping Performance at - 8 kV Contact Discharge
(acc. IEC 61000-4-2)

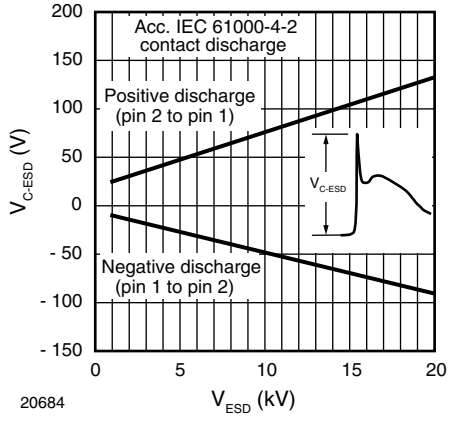
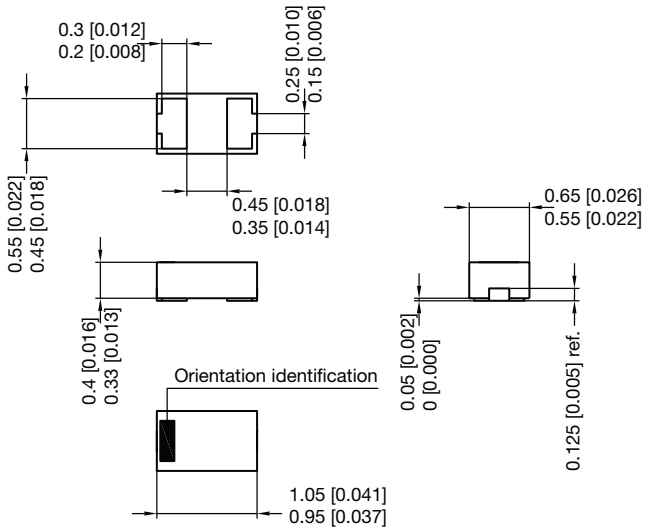
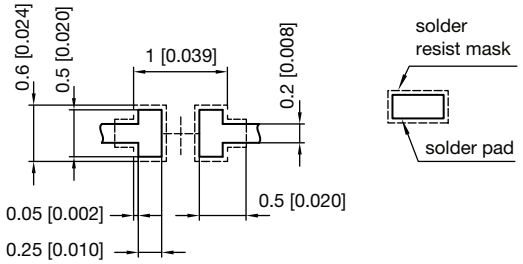


Fig. 9 - Typical Clamping Voltage at ± ESD Contact Discharge
Fig. 10 - (acc. IEC 61000-4-2)

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
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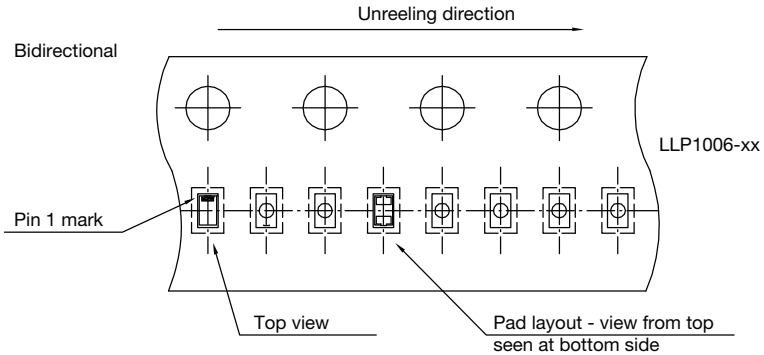

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