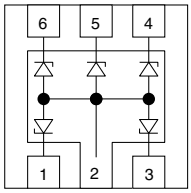
# 5-Line ESD-Protection Diode Array in LLP75



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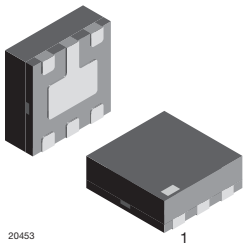


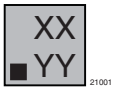
20453

## FEATURES

- Ultra compact LLP75-6L package
- Low profile < 0.6 mm
- 5-line ESD-protection
- Low leakage current $I_R$ < 0.1 µA
- Low load capacitance $C_D$ = 13 pF
- ESD-protection acc. IEC 61000-4-2
  ± 15 kV contact discharge
  ± 15 kV air discharge
- Working voltage range $V_{RWM}$ = 5 V
- e4 - precious metal (e.g. Ag, Au, NiPd, NiPdAu) (no Sn)
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

Pb-free
e4
RoHS COMPLIANT
GREEN (5-2008)

## MARKING (example only)



21001

Dot = pin 1 marking
XX = date code
YY = type code (see table below)

## ORDERING INFORMATION

| DEVICE NAME | ORDERING CODE | TAPED UNITS PER REEL (8 mm TAPE ON 7" REEL) | MINIMUM ORDER QUANTITY |
|---|---|---|---|
| VESD05A5A-HSF | VESD05A5A-HSF-GS08 | 3000 | 15 000 |

## PACKAGE DATA

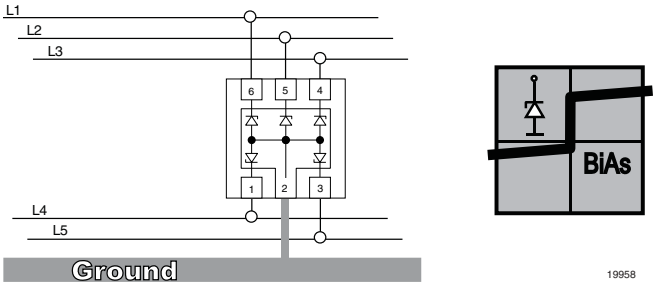
| DEVICE NAME | PACKAGE NAME | TYPE CODE | WEIGHT | MOLDING COMPOUND FLAMMABILITY RATING | MOISTURE SENSITIVITY LEVEL | SOLDERING CONDITIONS |
|---|---|---|---|---|---|---|
| VESD05A5A-HSF | LLP75-6L | AR | 4.2 mg | UL 94 V-0 | MSL level 1 (according J-STD-020) | 260 °C/10 s at terminals |

## ABSOLUTE MAXIMUM RATINGS

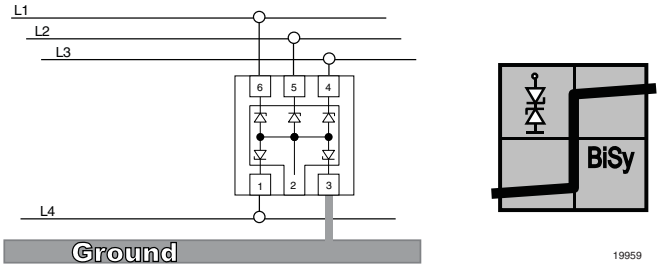
| PARAMETER | TEST CONDITIONS | | SYMBOL | VALUE | UNIT |
|---|---|---|---|---|---|
| Peak pulse current | BiAs-mode: each input (pin 1 to pin 6) to ground (pin 2); acc. IEC 61000-4-5; $t_p$ = 8/20 µs; single shot | | $I_{PPM}$ | 2.5 | A |
| | BiSy-mode: each input (pin 1 to pin 6) to any other input pin. Pin 2 not connected. Acc. IEC 61000-4-5; $t_p$ = 8/20 µs; single shot | | | 2.5 | A |
| Peak pulse power | BiAs-mode: each input (pin 1 to pin 6) to ground (pin 2); acc. IEC 61000-4-5; $t_p$ = 8/20 µs; single shot | | $P_{PP}$ | 33 | W |
| | BiSy-mode: each input (pin 1 - pin 6) to any other input pin. Pin 2 not connected. Acc. IEC 61000-4-5; $t_p$ = 8/20 µs; single shot | | | 43 | W |
| ESD immunity | acc. IEC61000-4-2; 10 pulses BiAs-mode: each input (pin 1 to pin 6) to ground (pin 2) | Contact discharge | $V_{ESD}$ | ± 15 | kV |
| | | Air discharge | | ± 15 | kV |
| ESD immunity | acc. IEC 61000-4-2 ; 10 pulses BiSy-mode: each input (pin 1 to pin 6) to any other input pin. Pin 2 not connected. | Contact discharge | $V_{ESD}$ | ± 10 | kV |
| | | Air discharge | | ± 10 | kV |
| Operating temperature | Junction temperature | | $T_J$ | - 40 to + 125 | °C |
| Storage temperature | | | $T_{STG}$ | - 55 to + 150 | °C |

## APPLICATION NOTE:

a. With the VESD05A5A-HSF 5 different signal or data lines can be clamped to ground. Due to the different clamping levels in forward and reverse direction the VESD05A5A-HSF clamping behavior is bidirectional and asymmetrical (BiAs).




b. If symmetrical clamping behaviour is required the VESD05A5A-HSF can also be used as a bidirectional symmetrical protection device protecting up to 4 lines. In this case pin no. 2 must not be connected.




| **ELECTRICAL CHARACTERISTICS** (Between pin 1, 3, 4, 5 or 6, 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 | $N_{channel}$ | - | - | 5 | lines |
| Reverse stand-off voltage | Max. reverse working voltage | $V_{RWM}$ | - | - | 5 | V |
| Reverse voltage | at $I_R$ = 0.1 µA | $V_R$ | 5 | - | - | V |
| Max. 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 | 6.7 | 7.5 | V |
| Reverse clamping voltage | at $I_{PP}$ = 1 A | $V_C$ | - | 9 | 10 | V |
| | at $I_{PP}$ = $I_{PPM}$ = 2.5 A | $V_C$ | - | 12 | 13 | V |
| Forward clamping voltage | at $I_{PP}$ = 1 A | $V_F$ | - | 2 | 2.5 | V |
| | at $I_{PP}$ = $I_{PPM}$ = 2.5 A | $V_F$ | - | 3.2 | 4 | V |
| Line capacitance | at $V_R$ = 0 V; f = 1 MHz | $C_D$ | - | 13 | 15 | pF |
| | at $V_R$ = 2.5 V; f = 1 MHz | $C_D$ | - | 8 | - | pF |

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

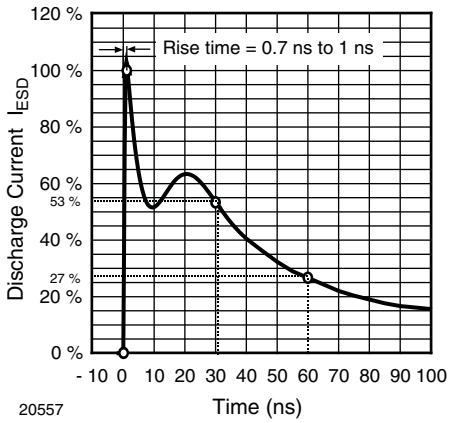



Fig. 1 - ESD Discharge Current Wave Form acc. IEC 61000-4-2 (330 Ω/150 pF)

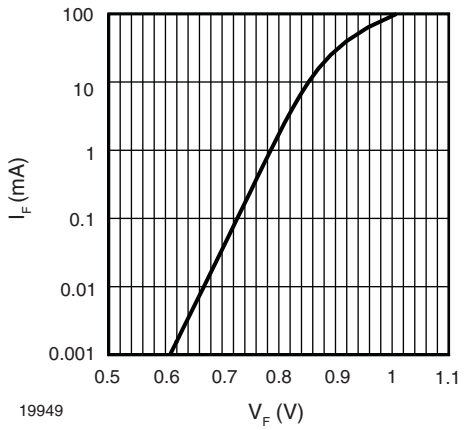



Fig. 4 - Typical Forward Current $I_F$ vs. Forward Voltage $V_F$

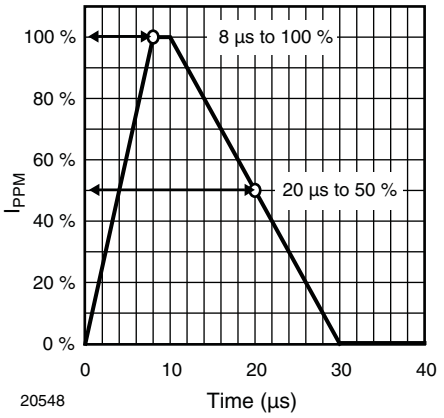



Fig. 2 - 8/20 µs Peak Pulse Current Wave Form acc. IEC 61000-4-5

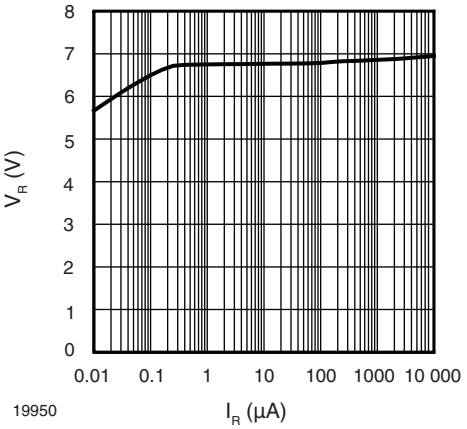



Fig. 5 - Typical Reverse Voltage $V_R$ vs. Reverse Current $I_R$

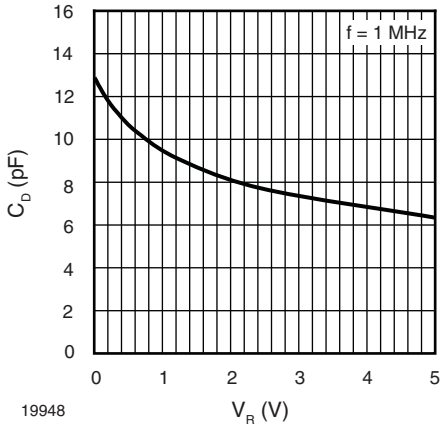



Fig. 3 - Typical Capacitance $C_D$ vs. Reverse Voltage $V_R$

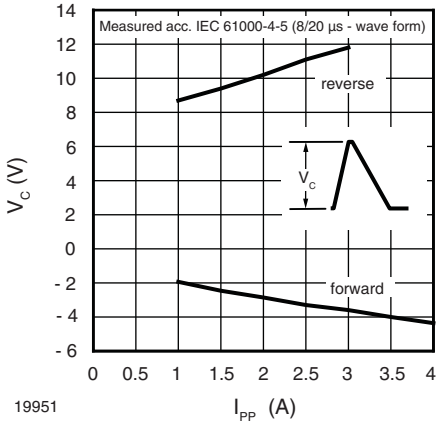



Fig. 6 - Typical Peak Clamping Voltage $V_C$ vs. Peak Pulse Current $I_{PP}$

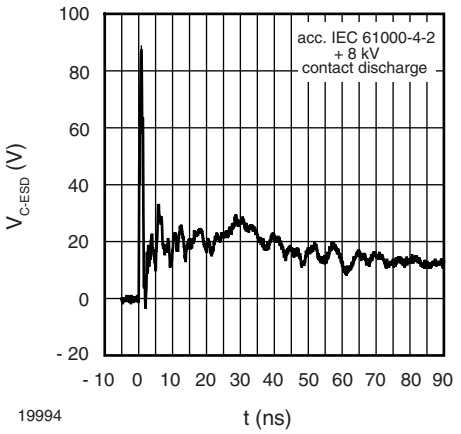



Fig. 7 - Typical Clamping Performance at + 8 kV Contact Discharge (acc. IEC 61000-4-2)

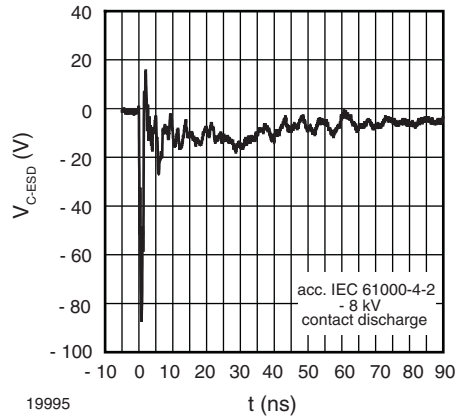



Fig. 8 - Typical Clamping Performance at - 8 kV Contact Discharge (acc. IEC 61000-4-2)

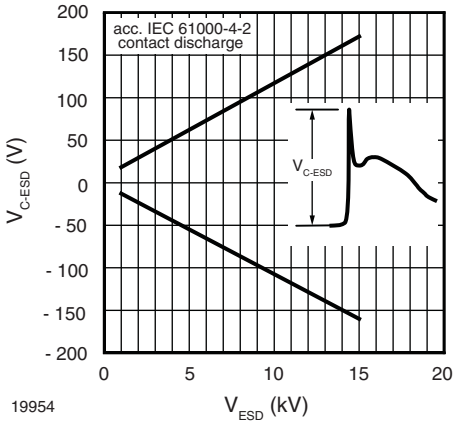
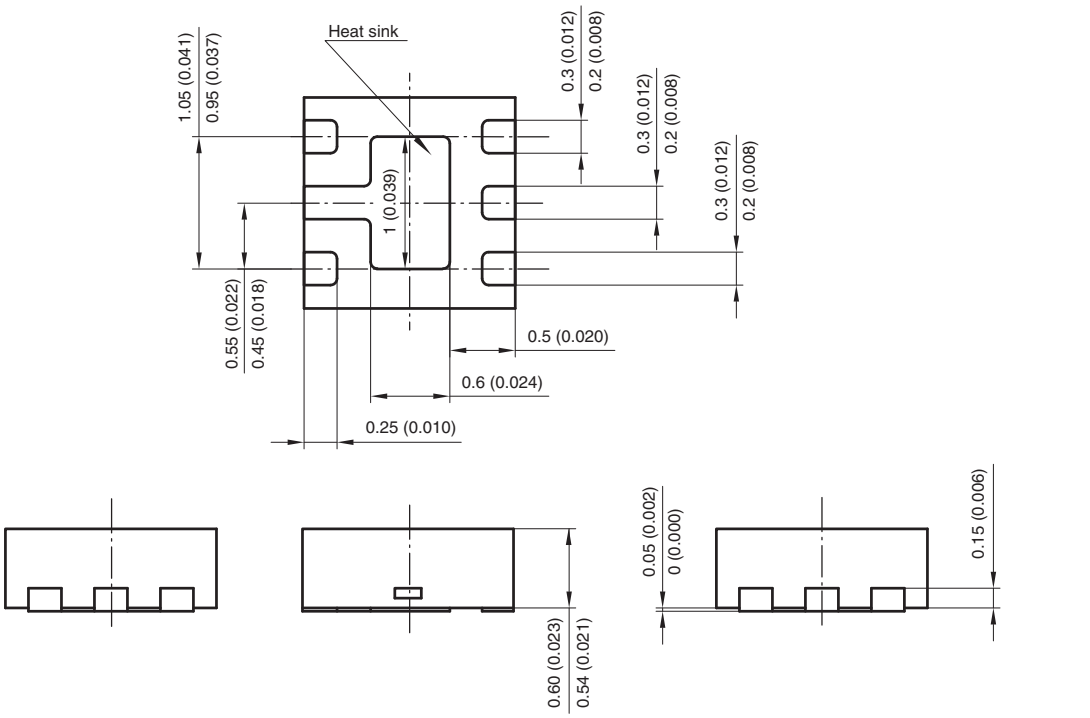
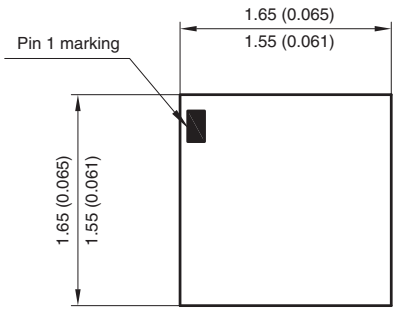


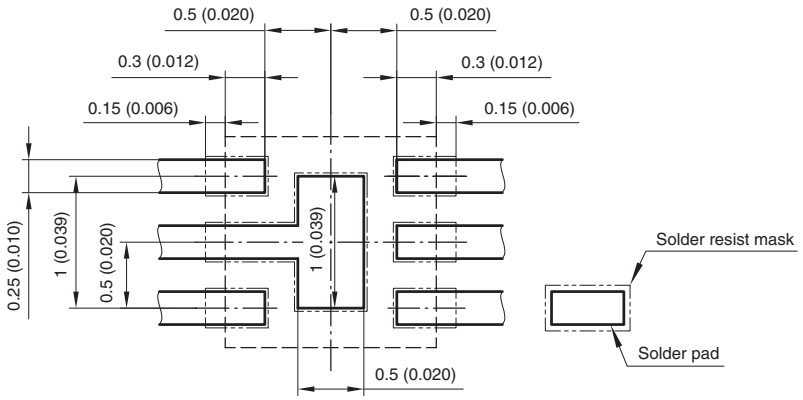

Fig. 9 - Typical max. Clamping Voltage at ESD Contact Discharge (acc. IEC 61000-4-2)

**PACKAGE DIMENSIONS** in millimeters (Inches): **LLP75-6L**




Foot print recommendation:

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