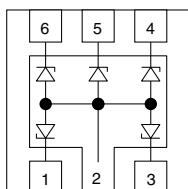
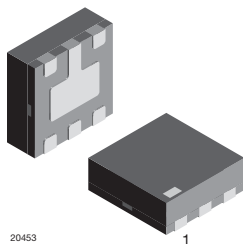


## 5-Line ESD-Protection Diode Array in LLP75



19956



20453

1

### MARKING (example only)



21001

Dot = pin 1 marking

XX = date code

YY = type code (see table below)

### FEATURES

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


**RoHS**  
COMPLIANT  
**GREEN**  
(5-2008)

### ORDERING INFORMATION

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

### PACKAGE DATA

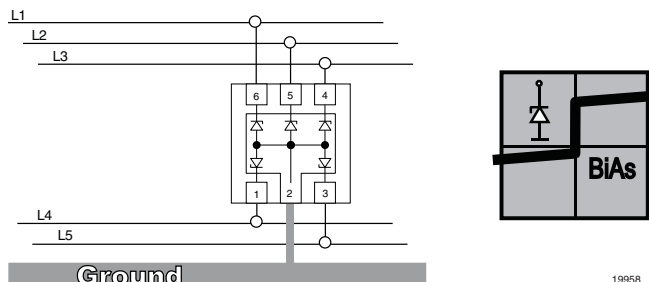
| DEVICE NAME   | PACKAGE NAME | TYPE CODE | WEIGHT | MOLDING COMPOUND<br>FLAMMABILITY RATING | MOISTURE<br>SENSITIVITY LEVEL           | SOLDERING<br>CONDITIONS  |
|---------------|--------------|-----------|--------|-----------------------------------------|-----------------------------------------|--------------------------|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

### ABSOLUTE MAXIMUM RATINGS

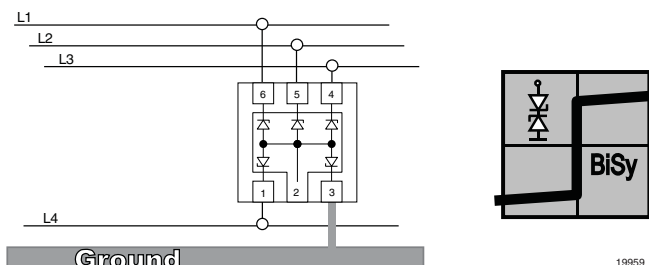
| PARAMETER             | TEST CONDITIONS                                                                                                                             | SYMBOL            | VALUE         | UNIT |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------|------|
| Peak pulse current    | BiAs-mode: each input (pin 1 to pin 6) to ground (pin 2);<br>acc. IEC 61000-4-5; $t_p = 8/20 \mu s$ ; single shot                           | $I_{PPM}$         | 2.5           | A    |
|                       | BiSy-mode: each input (pin 1 to pin 6) to any other input pin.<br>Pin 2 not connected. Acc. IEC 61000-4-5; $t_p = 8/20 \mu s$ ; single shot |                   | 2.5           | A    |
| Peak pulse power      | BiAs-mode: each input (pin 1 to pin 6) to ground (pin 2);<br>acc. IEC 61000-4-5; $t_p = 8/20 \mu s$ ; single shot                           | $P_{PP}$          | 33            | W    |
|                       | BiSy-mode: each input (pin 1 - pin 6) to any other input pin.<br>Pin 2 not connected. Acc. IEC 61000-4-5; $t_p = 8/20 \mu s$ ; single shot  |                   | 43            | W    |
| ESD immunity          | acc. IEC61000-4-2; 10 pulses<br>BiAs-mode: each input (pin 1 to pin 6) to ground (pin 2)                                                    | Contact discharge | ± 15          | kV   |
|                       |                                                                                                                                             | Air discharge     | ± 15          | kV   |
| ESD immunity          | acc. IEC 61000-4-2 ; 10 pulses<br>BiSy-mode: each input (pin 1 to pin 6) to any other input pin.<br>Pin 2 not connected.                    | Contact discharge | ± 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)

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

| PARAMETER                 | TEST CONDITIONS/REMARKS                      | SYMBOL        | MIN. | TYP.   | MAX. | UNIT          |
|---------------------------|----------------------------------------------|---------------|------|--------|------|---------------|
| Protection paths          | Number of lines which can be protected       | $N_{channel}$ | -    | -      | 5    | lines         |
| Reverse stand-off voltage | Max. reverse working voltage                 | $V_{RWM}$     | -    | -      | 5    | V             |
| Reverse voltage           | at $I_R = 0.1\text{ }\mu\text{A}$            | $V_R$         | 5    | -      | -    | V             |
| Max. reverse current      | at $V_R = 5\text{ V}$                        | $I_R$         | -    | < 0.01 | 0.1  | $\mu\text{A}$ |
| Reverse breakdown voltage | at $I_R = 1\text{ mA}$                       | $V_{BR}$      | 6    | 6.7    | 7.5  | V             |
| Reverse clamping voltage  | at $I_{PP} = 1\text{ A}$                     | $V_C$         | -    | 9      | 10   | V             |
|                           | at $I_{PP} = I_{PPM} = 2.5\text{ A}$         | $V_C$         | -    | 12     | 13   | V             |
| Forward clamping voltage  | at $I_{PP} = 1\text{ A}$                     | $V_F$         | -    | 2      | 2.5  | V             |
|                           | at $I_{PP} = I_{PPM} = 2.5\text{ A}$         | $V_F$         | -    | 3.2    | 4    | V             |
| Line capacitance          | at $V_R = 0\text{ V}$ ; $f = 1\text{ MHz}$   | $C_D$         | -    | 13     | 15   | pF            |
|                           | at $V_R = 2.5\text{ V}$ ; $f = 1\text{ MHz}$ | $C_D$         | -    | 8      | -    | pF            |

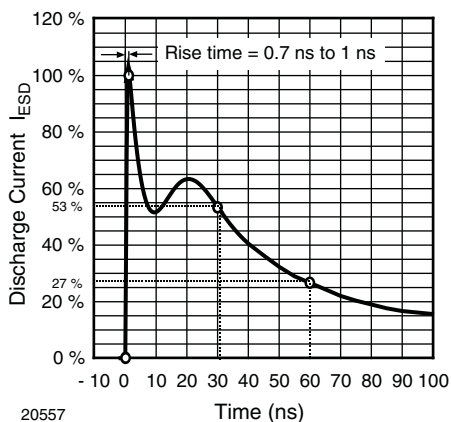
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


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

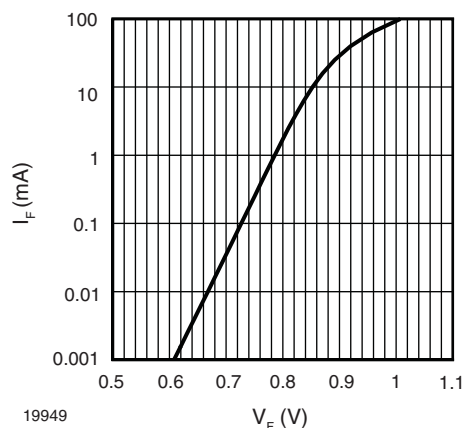


Fig. 4 - Typical Forward Current  $I_F$  vs. Forward Voltage  $V_F$

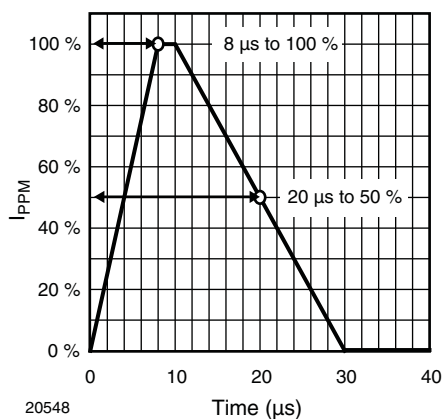


Fig. 2 - 8/20  $\mu\text{s}$  Peak Pulse Current Wave Form  
acc. IEC 61000-4-5

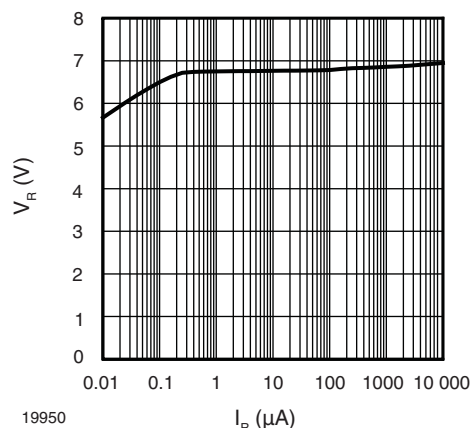


Fig. 5 - Typical Reverse Voltage  $V_R$  vs. Reverse Current  $I_R$

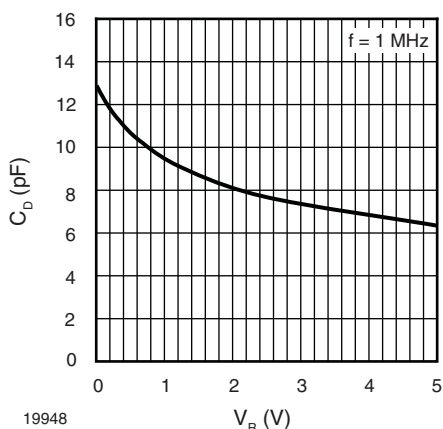


Fig. 3 - Typical Capacitance  $C_D$  vs. Reverse Voltage  $V_R$

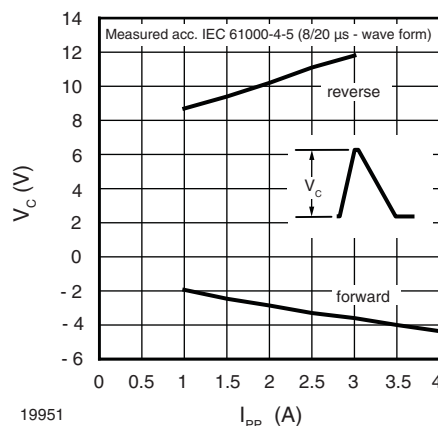


Fig. 6 - Typical Peak Clamping Voltage  $V_C$  vs.  
Peak Pulse Current  $I_{PP}$

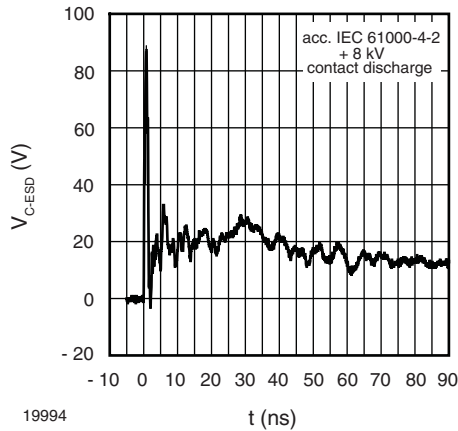


Fig. 7 - Typical Clamping Performance at + 8 kV Contact Discharge (acc. IEC 61000-4-2)

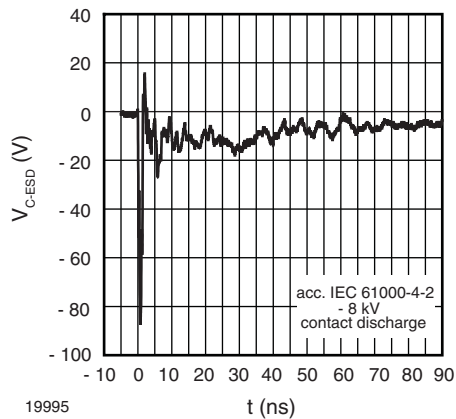


Fig. 8 - Typical Clamping Performance at - 8 kV Contact Discharge (acc. IEC 61000-4-2)

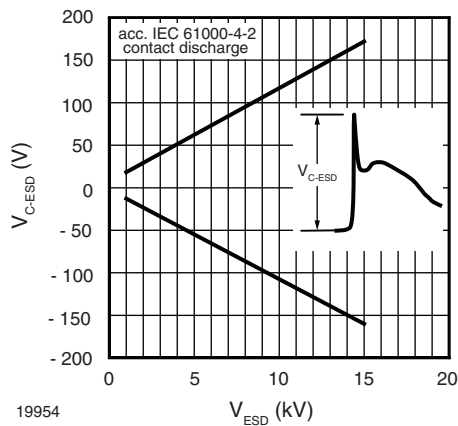
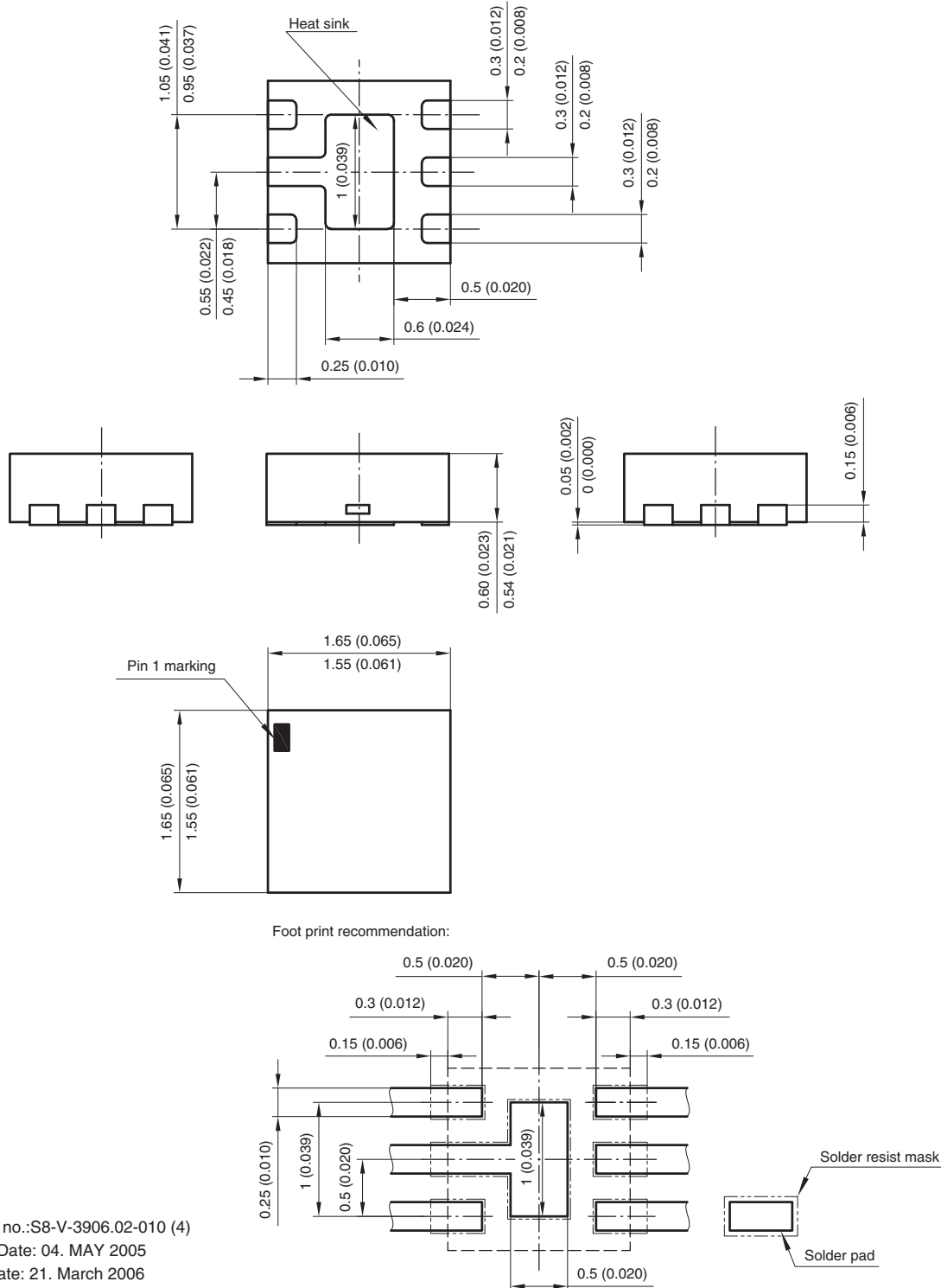


Fig. 9 - Typical max. Clamping Voltage at ESD Contact Discharge (acc. IEC 61000-4-2)

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


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Created - Date: 04. MAY 2005  
Rev. 4 - Date: 21. March 2006  
20454



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