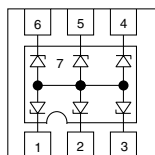
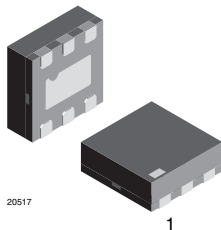


## 6-Line ESD Protection Diode Array in LLP75



19371



20517

1

### MARKING (example only)



Dot = pin 1 marking

XX = date code

YY = type code (see table below)

### DESIGN SUPPORT TOOLS

[click logo to get started](#)


### FEATURES

- Ultra compact LLP75-7L package
- 6-line ESD protection
- Low leakage current  $I_R < 0.1 \mu A$
- Low load capacitance  $C_D = 13 pF$
- ESD immunity 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](http://www.vishay.com/doc?99912)



### ORDERING INFORMATION

| DEVICE NAME   | ORDERING CODE      | TAPED UNITS PER REEL<br>(8 mm TAPE ON 7" REEL) | MINIMUM ORDER QUANTITY |
|---------------|--------------------|------------------------------------------------|------------------------|
| VESD05A6A-HAF | VESD05A6A-HAF-GS08 | 3000                                           | 15 000                 |

### PACKAGE DATA

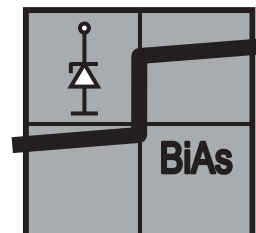
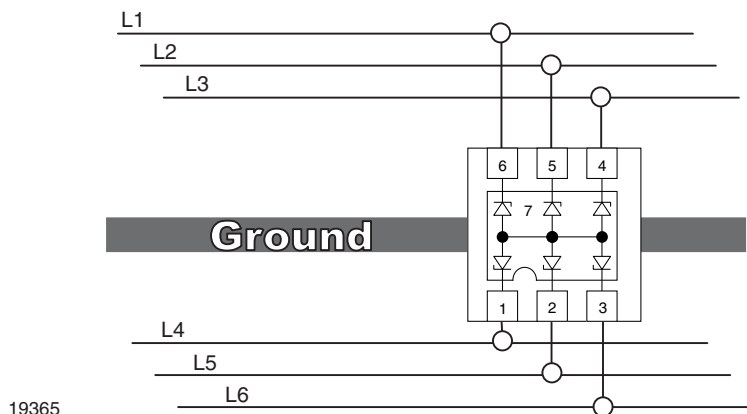
| DEVICE NAME   | PACKAGE NAME | TYPE CODE | WEIGHT | MOLDING COMPOUND<br>FLAMMABILITY RATING | MOISTURE<br>SENSITIVITY LEVEL        | SOLDERING CONDITIONS         |
|---------------|--------------|-----------|--------|-----------------------------------------|--------------------------------------|------------------------------|
| VESD05A6A-HAF | LLP75-7L     | AT        | 4.2 mg | UL 94 V-0                               | MSL level 1<br>(according J-STD-020) | Peak temperature max. 260 °C |

### ABSOLUTE MAXIMUM RATINGS VESD05A6A-HAF

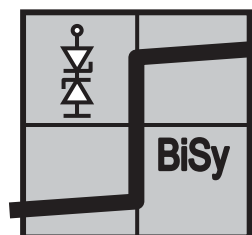
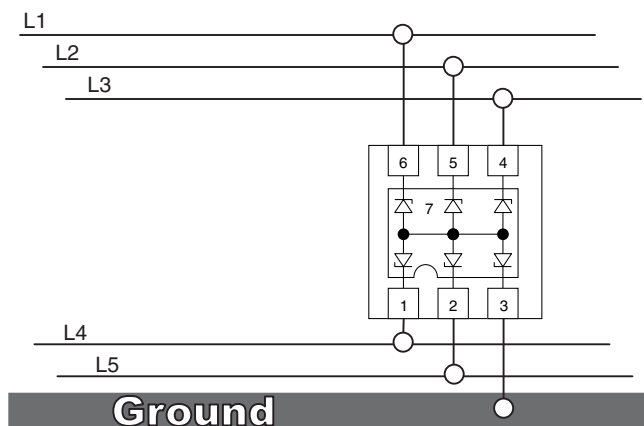
| PARAMETER             | TEST CONDITIONS                                                                                                                            | SYMBOL            | VALUE       | UNIT |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------------|------|
| Peak pulse current    | BiAs-Mode: each input (pin 1 - 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 - 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 | $I_{PPM}$         | 2.5         | A    |
| Peak pulse power      | BiAs-mode: each input (pin 1 - 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 | $P_{PP}$          | 43          | W    |
| ESD immunity          | Acc. IEC 61000-4-2; 10 pulses<br>BiAs-mode: each input (pin 1 - pin 6) to ground (pin 2)                                                   | Contact discharge | ± 15        | kV   |
|                       |                                                                                                                                            | Air discharge     | ± 15        | kV   |
|                       | Acc. IEC 61000-4-2; 10 pulses<br>BiSy-mode: each input (pin 1 - 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

With the VESD05A6A-HAF 6 different signal or data lines can be clamped to ground. Due to the different clamping levels in forward and reverse direction the VESD05A6A-HAF clamping behavior is bidirectional and asymmetrical (BiAs).



If symmetrical clamping behaviour is required the VESD05A6A-HAF can also be used as a bidirectional symmetrical protection device protecting up to 5 lines. In this case pin no. 7 must not be connected.



## ELECTRICAL CHARACTERISTICS VESD05A6A-HAF (Between pin 1, 2, 3, 4, 5 or 6, and pin 7) ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

| PARAMETER                 | TEST CONDITIONS/REMARKS                      | SYMBOL        | MIN. | TYP.   | MAX. | UNIT          |
|---------------------------|----------------------------------------------|---------------|------|--------|------|---------------|
| Protection paths          | Number of lines which can be protected       | $N_{channel}$ | -    | -      | 6    | 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             |
| 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             |
| 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            |

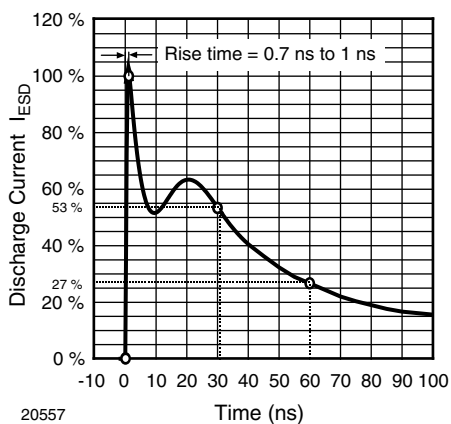
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


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

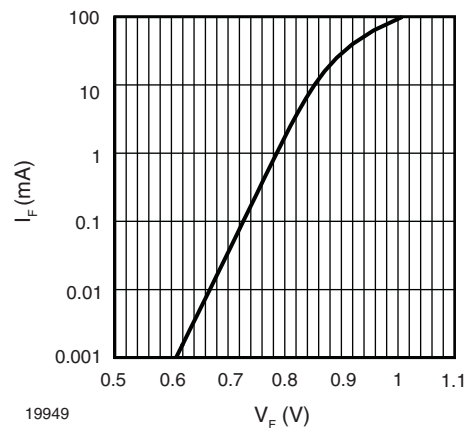


Fig. 4 - Typical Forward Current  $I_F$  vs. Forward Voltage  $V_F$

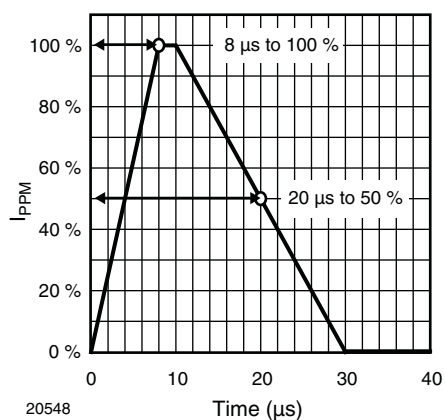


Fig. 2 - 8/20  $\mu$ s Peak Pulse Current Wave Form  
acc. IEC 61000-4-5

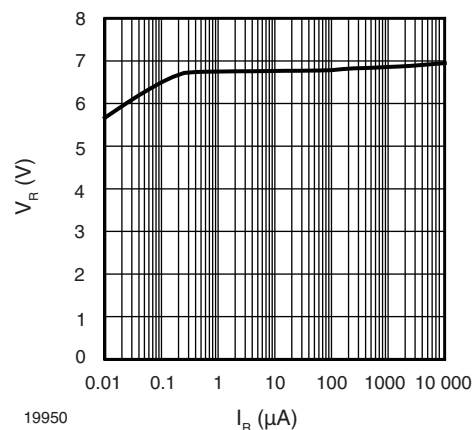


Fig. 5 - Typical Reverse Voltage  $V_R$  vs. Reverse Current  $I_R$

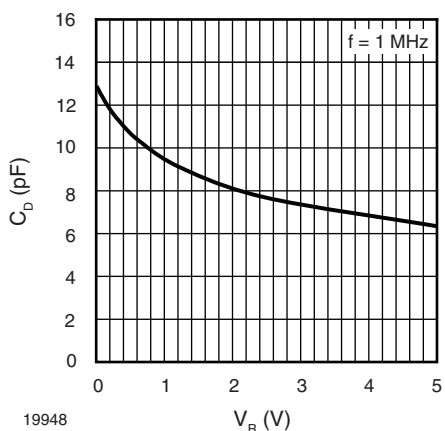


Fig. 3 - Typical Capacitance  $C_D$  vs. Reverse Voltage  $V_R$

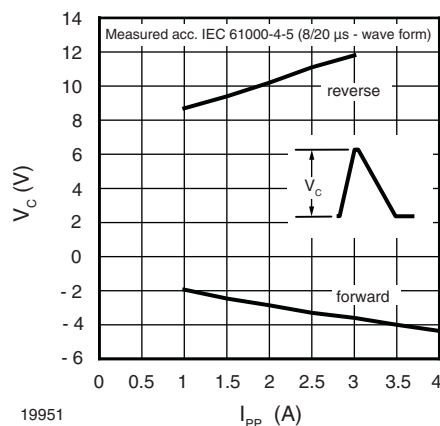


Fig. 6 - Typical Peak Clamping Voltage  $V_C$  vs.  
Peak Pulse Current  $I_{PP}$

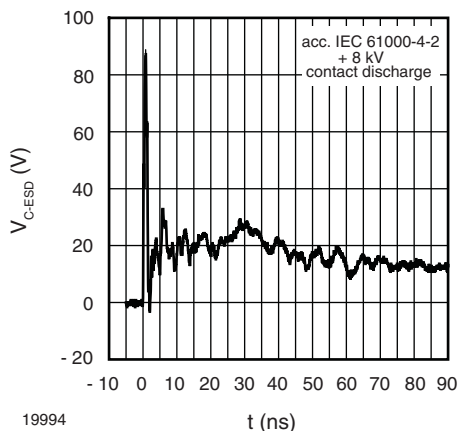


Fig. 7 - Typical Clamping Performance at + 8 kV Contact Discharge (acc. IEC 61000-4-2)

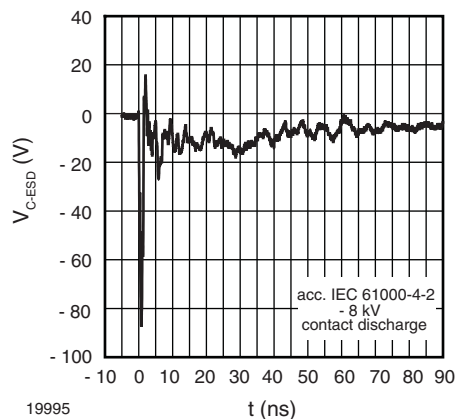


Fig. 8 - Typical Clamping Performance at - 8 kV Contact Discharge (acc. IEC 61000-4-2)

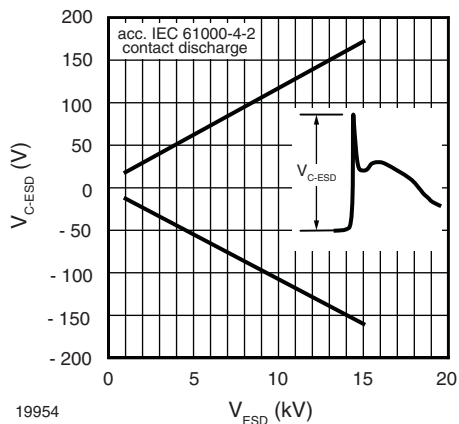
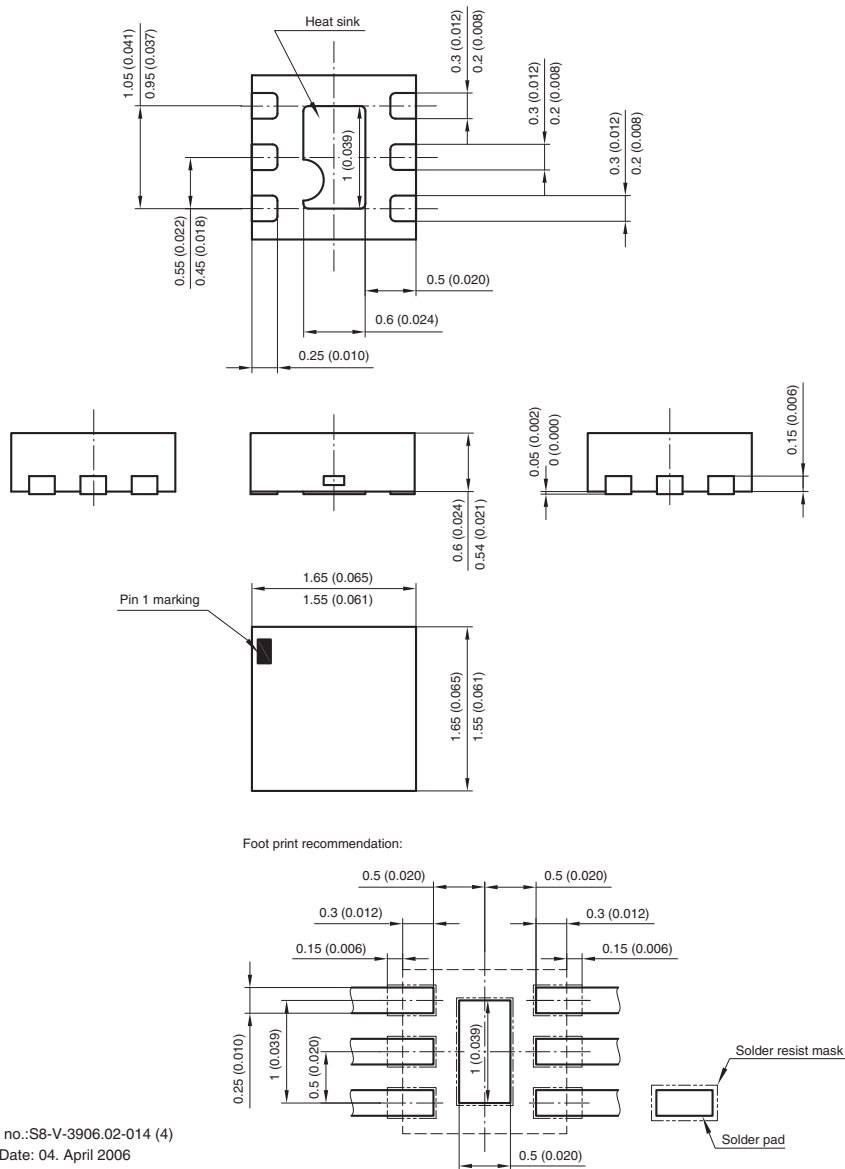
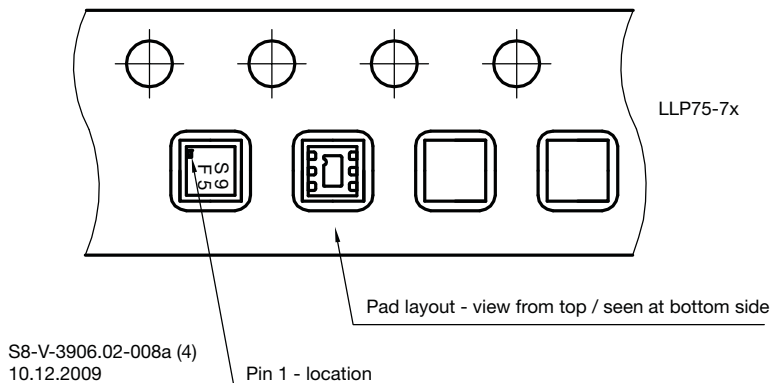


Fig. 9 - Typical max. Clamping Voltage at ESD Contact Discharge (acc. IEC 61000-4-2)

## PACKAGE DIMENSIONS in millimeters (Inches): LLP75-7L



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Created - Date: 04. April 2006  
20500





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