



Application Specific Discretes  
A.S.D.<sup>TM</sup>

## ESDA25B1

TRANSIL<sup>TM</sup> ARRAY  
FOR ESD PROTECTION

### APPLICATIONS

Where transient overvoltage protection in ESD sensitive equipment is required, such as :

- COMPUTER
- PRINTERS
- COMMUNICATION SYSTEMS

It is particularly recommended for RS232 I/O port protection where the line interface withstands only 2 kV ESD surges.

### FEATURES

- 6 BIDIRECTIONAL TRANSIL<sup>TM</sup> FUNCTIONS
- VERY LOW CAPACITANCE :  $C = 20 \text{ pF @ } V_{RM}$
- 150 W peak pulse power (8/20  $\mu\text{s}$ )

### DESCRIPTION

The ESDA25B1 is a monolithic voltage suppressor designed to protect components which are connected to data and transmission lines against EDS.

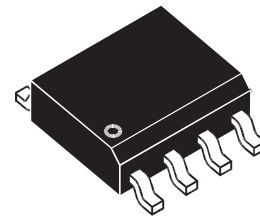
### BENEFITS

High ESD protection level : up to 25 kV  
High integration  
Suitable for high density boards

### COMPLIES WITH THE FOLLOWING STANDARDS :

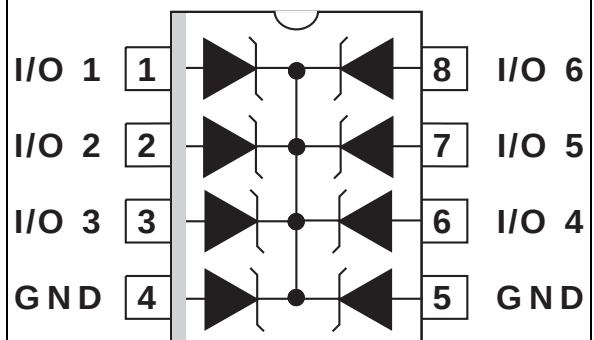
IEC 1000-4-2 : level 4

MIL STD 883C-Method 3015-6 : class 3  
(human body model)



SO-8

### FUNCTIONAL DIAGRAM



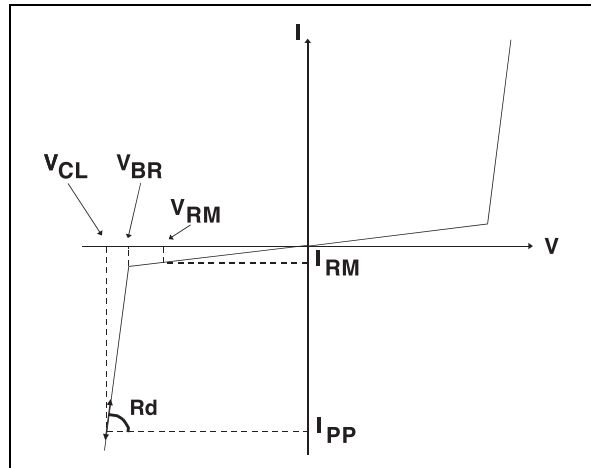
## ESDA25B1

### ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25^{\circ}\text{C}$ )

| Symbol             | Parameter                                                 | Value                | Unit                                     |
|--------------------|-----------------------------------------------------------|----------------------|------------------------------------------|
| $V_{PP}$           | Electrostatic discharge<br>MIL STD 883C - Method 3015-6   | 25                   | kV                                       |
| $P_{PP}$           | Peak pulse power (8/20 $\mu\text{s}$ )                    | 150                  | W                                        |
| $T_{stg}$<br>$T_j$ | Storage temperature range<br>Maximum junction temperature | - 55 to + 150<br>125 | $^{\circ}\text{C}$<br>$^{\circ}\text{C}$ |
| $T_L$              | Maximum lead temperature for soldering during 10s         | 260                  | $^{\circ}\text{C}$                       |

### ELECTRICAL CHARACTERISTICS ( $T_{amb} = 25^{\circ}\text{C}$ )

| Symbol     | Parameter                       |
|------------|---------------------------------|
| $V_{RM}$   | Stand-off voltage               |
| $V_{BR}$   | Breakdown voltage               |
| $V_{CL}$   | Clamping voltage                |
| $I_{RM}$   | Leakage current                 |
| $I_{PP}$   | Peak pulse current              |
| $\alpha T$ | Voltage temperature coefficient |
| C          | Capacitance                     |
| $R_d$      | Dynamic resistance              |



| Types    | $V_{BR}$ @ $I_R$ |      |    | $I_{RM}$ @ $V_{RM}$ |    | $R_d$    | $\alpha T$          | C       |
|----------|------------------|------|----|---------------------|----|----------|---------------------|---------|
|          | min.             | max. |    | max.                |    | typ.     | max.                | typ.    |
|          | note 1           |      |    | note 1              |    | note 2   | note 3              | 0V bias |
|          | V                | V    | mA | $\mu A$             | V  | $\Omega$ | $10^{-4}/^{\circ}C$ | pF      |
| ESDA25B1 | 25               | 30   | 1  | 2                   | 24 | 1.5      | 9.7                 | 15      |

**note 1** : Between any I/O pin and Ground

**note 2** : Square pulse,  $I_{pp} = 25\text{A}$ ,  $t_p = 2.5\mu\text{s}$ .

**note 3** :  $\Delta V_{BR} = \alpha T * (T_{amb} - 25^{\circ}\text{C}) * V_{BR}(25^{\circ}\text{C})$

## CALCULATION OF THE CLAMPING VOLTAGE

### USE OF THE DYNAMIC RESISTANCE

The ESDA family has been designed to clamp fast spikes like ESD. Generally the PCB designers need to calculate easily the clamping voltage  $V_{CL}$ . This is why we give the dynamic resistance in addition to the classical parameters. The voltage across the protection cell can be calculated with the following formula:

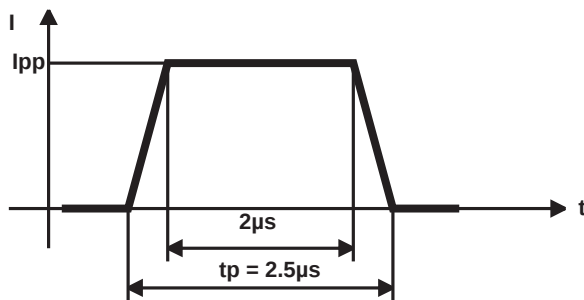
$$V_{CL} = V_{BR} + R_d I_{PP}$$

Where  $I_{PP}$  is the peak current through the ESDA cell.

As the value of the dynamic resistance remains stable for a surge duration lower than  $20\mu s$ , the  $2.5\mu s$  rectangular surge is well adapted. In addition both rise and fall times are optimized to avoid any parasitic phenomenon during the measurement of  $R_d$ .

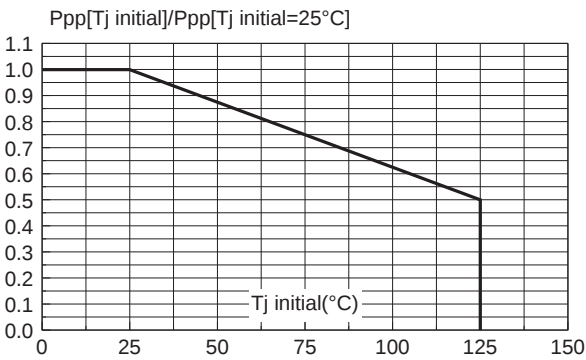
### DYNAMIC RESISTANCE MEASUREMENT

The short duration of the ESD has led us to prefer a more adapted test wave, as below defined, to the classical  $8/20\mu s$  and  $10/1000\mu s$  surges.

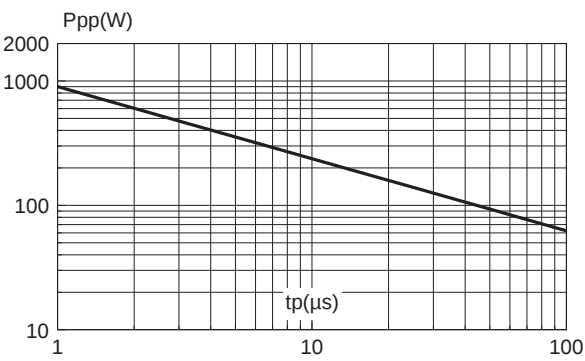


2.5 $\mu s$  duration measurement wave.

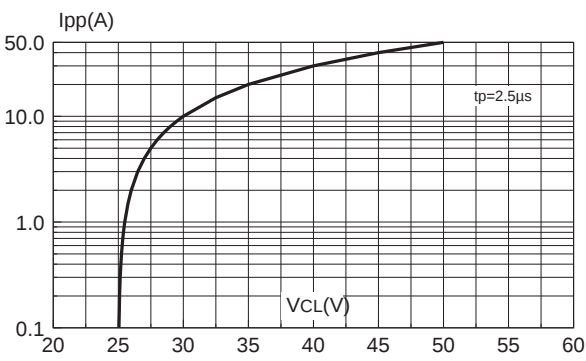
**Fig. 1 :** Peak power dissipation versus initial junction temperature.



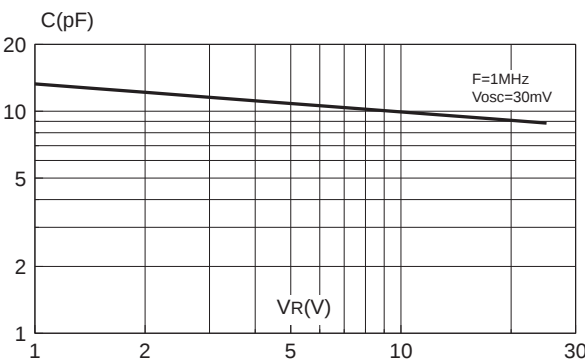
**Fig. 2 :** Peak pulse power versus exponential pulse duration ( $T_j \text{ initial} = 25^\circ\text{C}$ ).



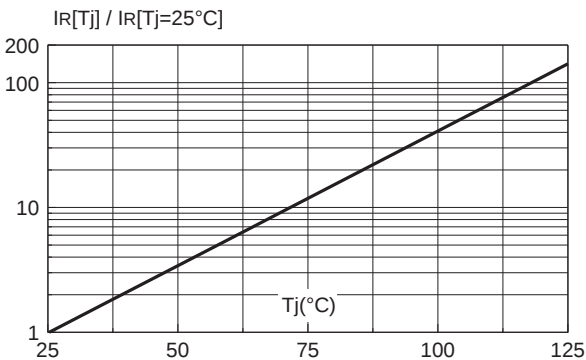
**Fig. 3 :** Clamping voltage versus peak pulse current ( $T_j \text{ initial} = 25^\circ\text{C}$ ). Rectangular waveform  $t_p = 2.5 \mu\text{s}$ .



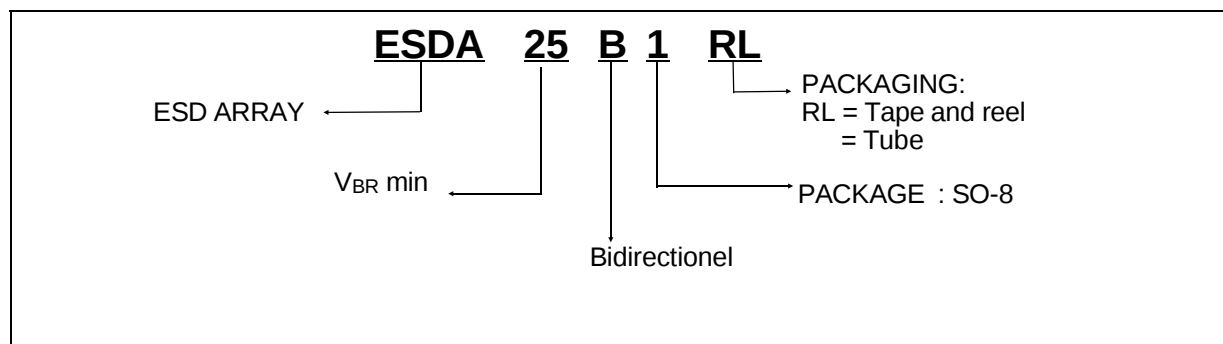
**Fig. 4 :** Capacitance versus reverse applied voltage (typical values).



**Fig. 5 :** Relative variation of leakage current versus junction temperature (typical values).



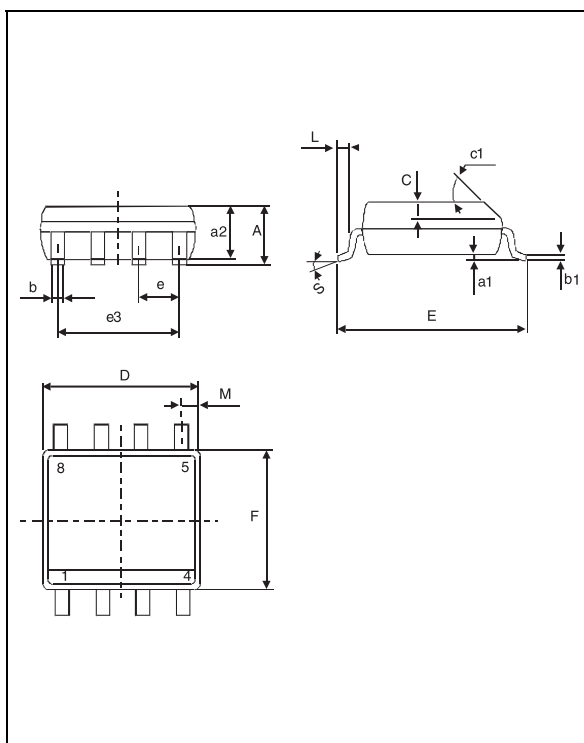
## ORDER CODE



**MARKING** : Logo, Date Code, E25B1

**PACKAGE MECHANICAL DATA**

SO-8 Plastic



| REF. | DIMENSIONS  |      |      |        |       |       |
|------|-------------|------|------|--------|-------|-------|
|      | Millimeters |      |      | Inches |       |       |
|      | Min.        | Typ. | Max. | Min.   | Typ.  | Max.  |
| A    |             |      | 1.75 |        |       | 0.069 |
| a1   | 0.1         |      | 0.25 | 0.004  |       | 0.010 |
| a2   |             |      | 1.65 |        |       | 0.065 |
| a3   | 0.65        |      | 0.85 | 0.026  |       | 0.033 |
| b    | 0.35        |      | 0.48 | 0.014  |       | 0.019 |
| b1   | 0.19        |      | 0.25 | 0.007  |       | 0.010 |
| C    | 0.25        |      | 0.5  | 0.010  |       | 0.020 |
| c1   | 45° (typ)   |      |      |        |       |       |
| D    | 4.8         |      | 5.0  | 0.189  |       | 0.197 |
| E    | 5.8         |      | 6.2  | 0.228  |       | 0.244 |
| e    |             | 1.27 |      |        | 0.050 |       |
| e3   |             | 3.81 |      |        | 0.150 |       |
| F    | 3.8         |      | 4.0  | 0.15   |       | 0.157 |
| L    | 0.4         |      | 1.27 | 0.016  |       | 0.050 |
| M    |             |      | 0.6  |        |       | 0.024 |
| S    | 8° (max)    |      |      |        |       |       |

**Packaging** : Preferred packaging is tape and reel.

**Weight** : 0.08g.

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