



# ESDA18-1F2

ASD  
(Application Specific Devices)

## TRANSIL™: Transient Voltage Suppressor

### FEATURES AND BENEFITS:

- Stand-off voltage 16V
- Unidirectional device
- Low clamping factor  $V_{CL}/V_{BR}$
- Fast response time
- Very thin package: 0.65 mm

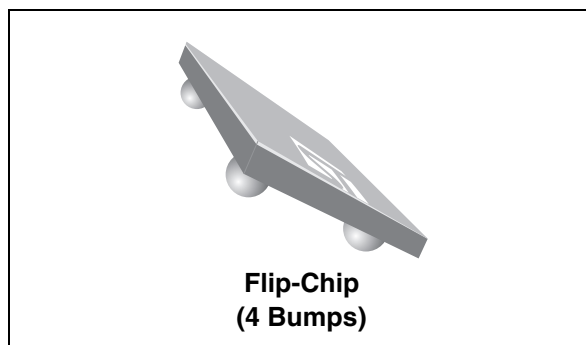
### DESCRIPTION

The ESDA18-1F2 is a single line Transil diode designed specifically for the protection of integrated circuits into portable equipment and miniaturized electronics devices subject to ESD & EOS transient overvoltages.

### COMPLIES WITH THE FOLLOWING STANDARDS:

#### IEC61000-4-2

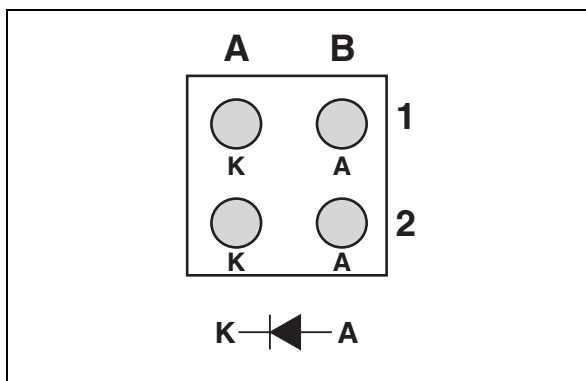
Level 4      15kV (air discharge)  
                  8kV (contact discharge)



**Table 1: Order Code**

| Part Number | Marking |
|-------------|---------|
| ESDA18-1F2  | EE      |

**Figure 1: Pin Configuration (ball side)**

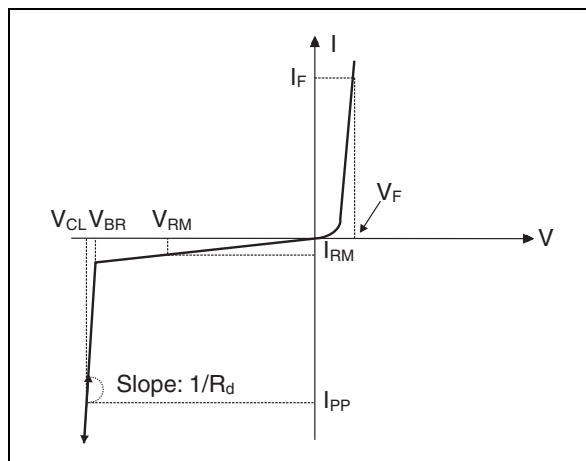


**Table 2: Absolute Ratings** (limiting value, per diode)

| Symbol    | Parameter and test conditions                           |                                          | Value         | Unit         |
|-----------|---------------------------------------------------------|------------------------------------------|---------------|--------------|
| $P_{PP}$  | Peak pulse power dissipation<br>10 / 1000 $\mu$ s pulse | $T_j$ initial = $T_{amb}$                | 100           | W            |
|           | Peak pulse power dissipation<br>8 / 20 $\mu$ s pulse    |                                          | 700           |              |
| $I_{FSM}$ | Non repetitive surge peak forward current               | $t_p=10$ ms<br>$T_j$ initial = $T_{amb}$ | 8             | A            |
| $T_j$     | Maximum operating junction temperature                  |                                          | 125           | $^{\circ}$ C |
| $T_{stg}$ | Storage temperature range                               |                                          | - 65 to + 175 | $^{\circ}$ C |

**Table 3: Electrical Characteristics** ( $T_{amb} = 25^{\circ}$ C)

| Symbol   | Parameter          |
|----------|--------------------|
| $V_{BR}$ | Breakdown voltage  |
| $I_{RM}$ | Leakage current    |
| $V_{RM}$ | Stand-off voltage  |
| $V_{CL}$ | Clamping voltage   |
| $R_d$    | Dynamic impedance  |
| $I_{PP}$ | Peak pulse current |
| C        | Capacitance        |

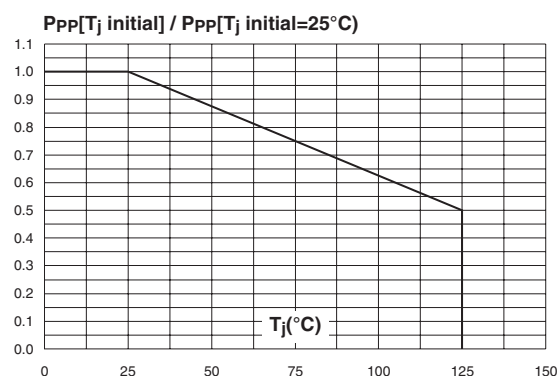


| Part Number | $V_{BR}$ |      | $I_R$ | $I_{RM}$ | $V_{RM}$ | $V_{CL}$ | $I_{PP}^{(1)}$ | $V_F^{(2)}$<br>max.<br>$I_F = 850$ mA | $\alpha T$<br>max.   | C<br>typ.<br>$V_R=0$ V |
|-------------|----------|------|-------|----------|----------|----------|----------------|---------------------------------------|----------------------|------------------------|
|             | min.     | max. |       |          |          |          |                |                                       |                      |                        |
|             | V        | V    | mA    | $\mu$ A  | V        | V        | A              | V                                     | $10^{-4}/^{\circ}$ C | pF                     |
| ESDA18-1F2  | 16       | 18   | 1     | 0.5      | 10       | 20       | 1              | 1.3                                   | 8.5                  | 230                    |

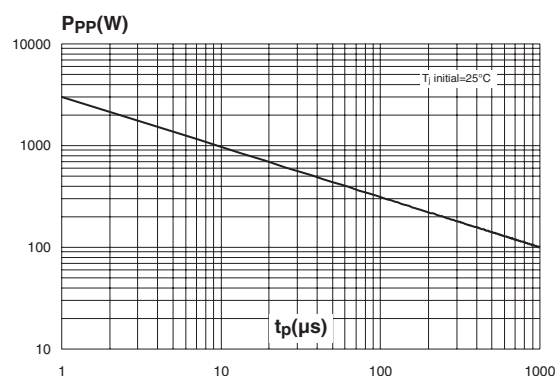
(1) 8 / 20  $\mu$ s pulse waveform.

(2) DC current not recommended for more than 5 sec. Even if Transil failure mode is short circuit the bumps could exceed melting temperature and the component disassembled from the board.

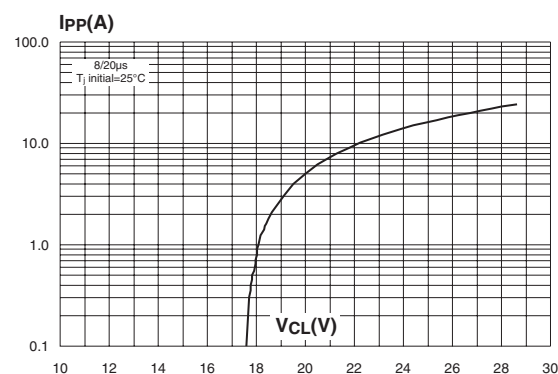
**Figure 2: Relative variation of peak pulse power versus initial junction temperature**



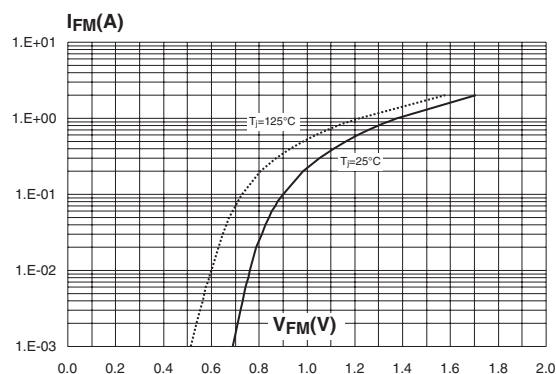
**Figure 3: Peak pulse power versus exponential pulse duration**



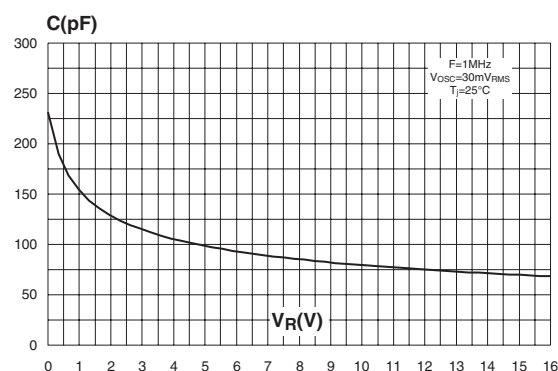
**Figure 4: Clamping voltage versus peak pulse current (typical values, exponential waveform)**



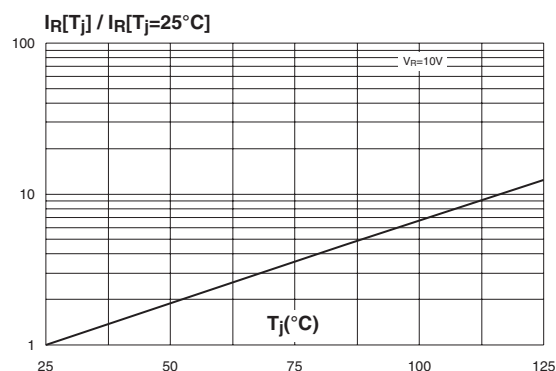
**Figure 5: Forward voltage drop versus peak forward current (typical values)**



**Figure 6: Junction capacitance versus reverse voltage applied (typical values)**



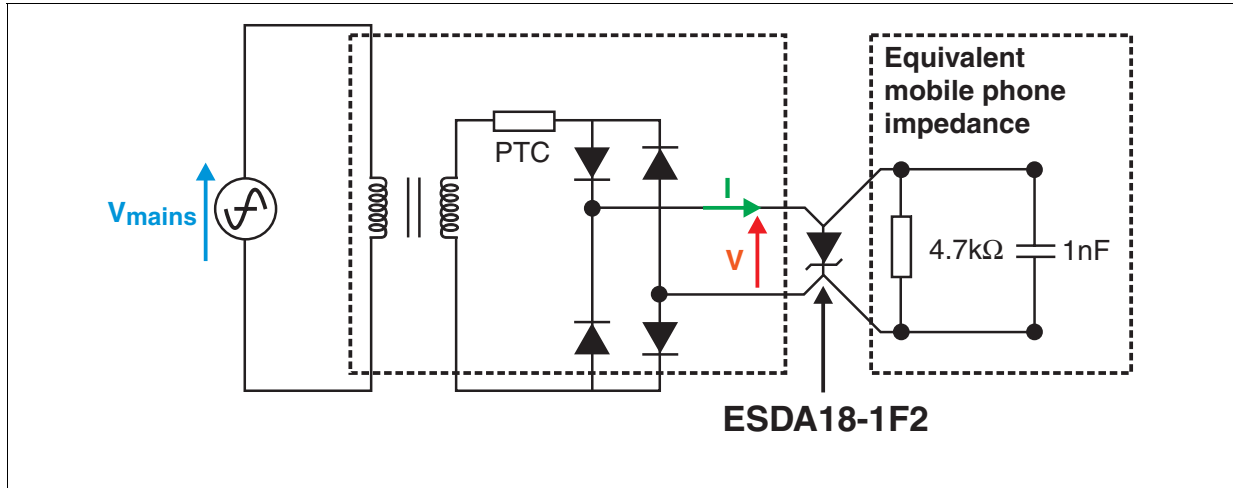
**Figure 7: Relative variation of leakage current versus junction temperature (typical values)**



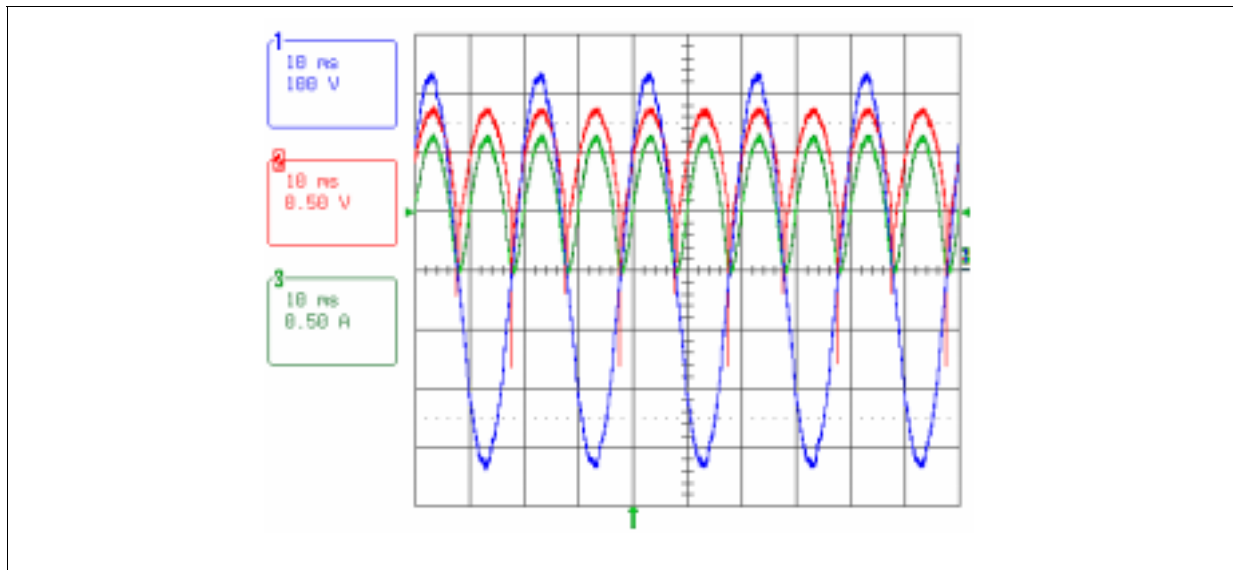
## ESDA18-1F2

One major point is that the ESDA18-1F2 has to ensure the safety during reverse battery operation. Indeed, during this operation the device must clamp the DC reverse voltage below 1.3V @ 0.85A (max current). Thus reverse battery operation has been simulated by inverting the polarity of the TRANSIL (please see figures 8 and 9)

**Figure 8: Reverse battery operation setup**



**Figure 9: Reverse battery operation results**



A short calculation based on Reverse battery operation results figures clearly show that in such real phone application the ESDA18-1F2 clamp the DC voltage below 1.3V.

Typically the ESDA18-1F2 can clamp the DC voltage @ 0.9V @0.76A DC current:

$$V_{DC} = \frac{2 \times V_{max}}{\pi} \approx \frac{2 \times 1.4}{3.14} \approx 0.9V$$

$$I_{DC} = \frac{2 \times I_{max}}{\pi} \approx \frac{2 \times 1.2}{3.14} \approx 0.76A$$

Figure 10: Ordering Information Scheme

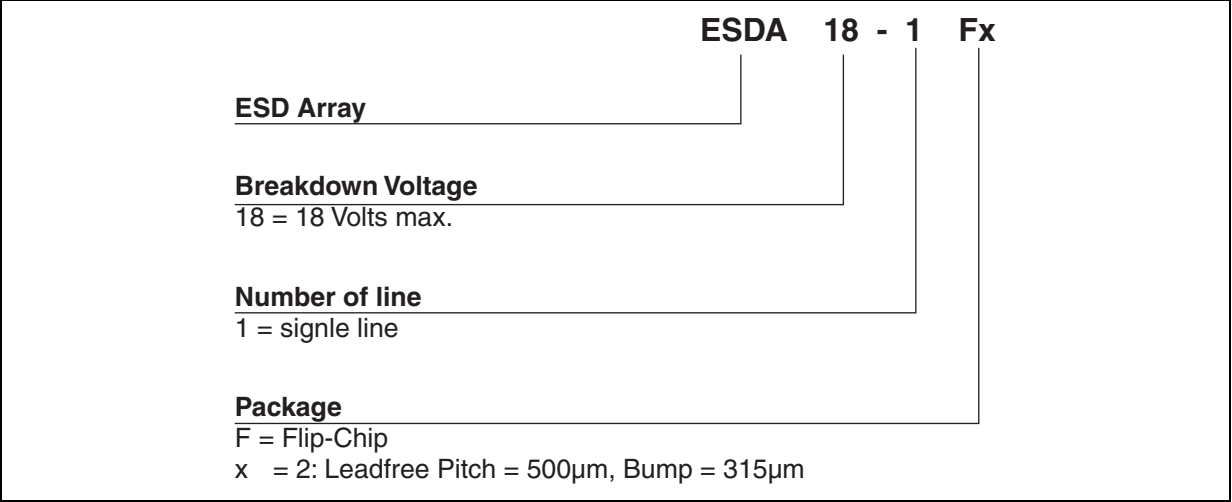


Figure 11: FLIP-CHIP Package Mechanical Data

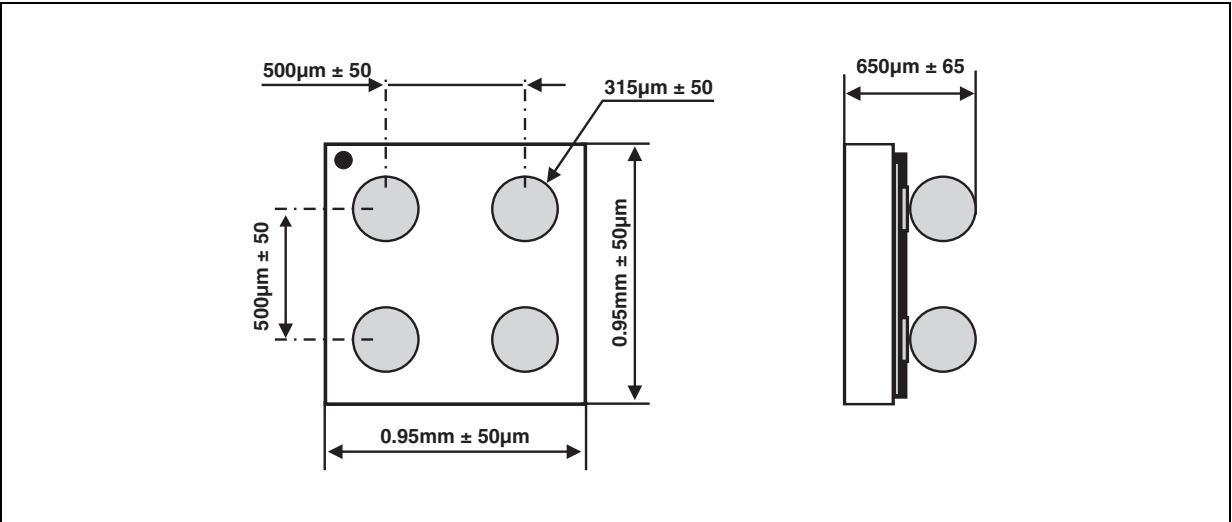


Figure 12: Foot Print Recommendations

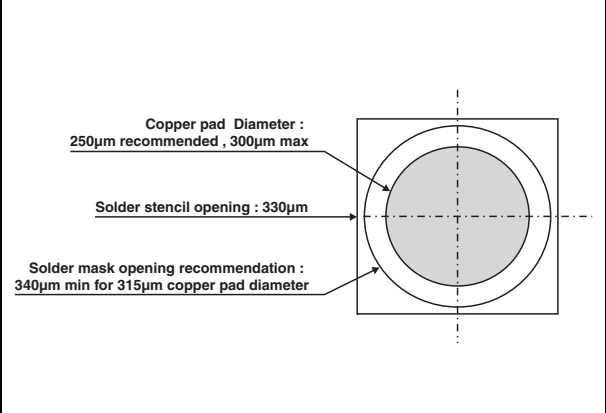


Figure 13: Marking

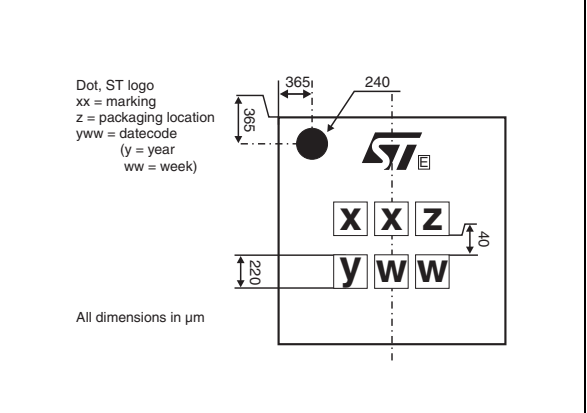


Figure 14: FLIP-CHIP Tape and Reel Specification

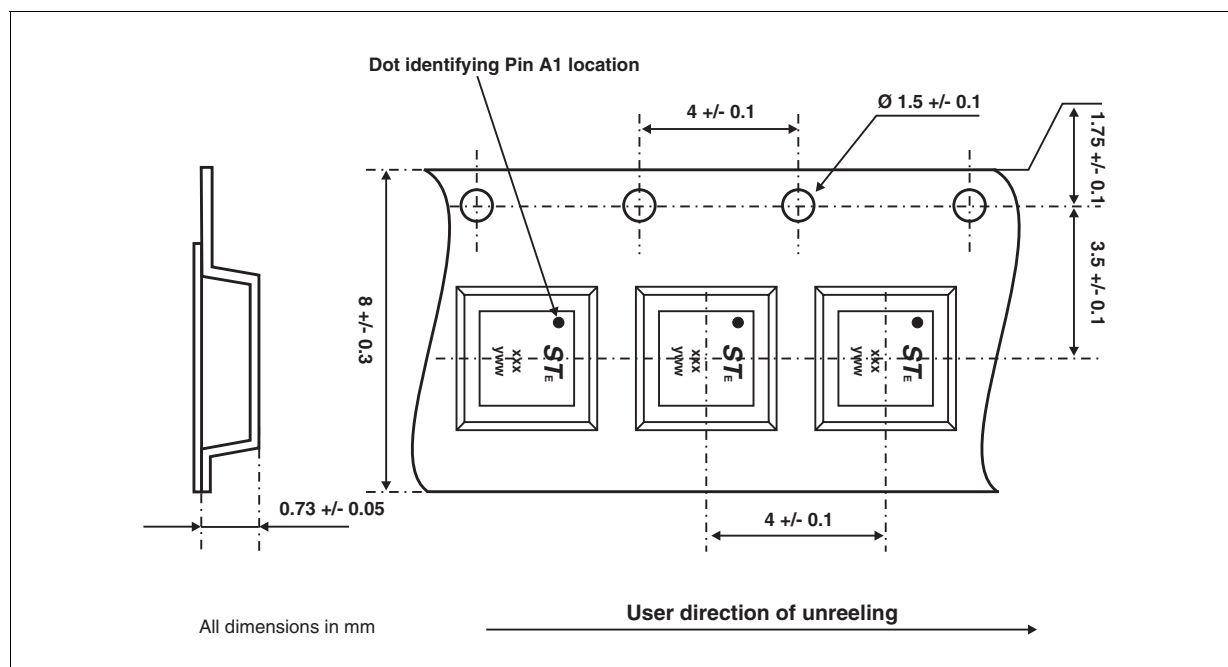


Table 4: Ordering Information

| Ordering code | Marking | Package   | Weight  | Base qty | Delivery mode  |
|---------------|---------|-----------|---------|----------|----------------|
| ESDA18-1F2    | EE      | Flip-Chip | 1.25 mg | 5000     | Tape & reel 7" |

**Note:** More packing informations are available in the application note AN1235: "Flip-Chip: Package description and recommendations for use"

Table 5: Revision History

| Date        | Revision | Description of Changes |
|-------------|----------|------------------------|
| 09-May-2005 | 1        | First issue.           |

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