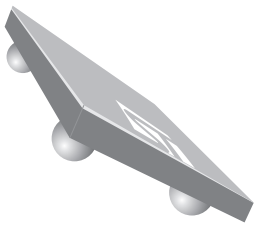
ESDA18-1F2

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



Flip-Chip
(4 Bumps)

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.

Table 1: Order Code

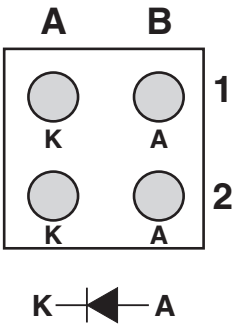
Part Number	Marking
ESDA18-1F2	EE

COMPLIES WITH THE FOLLOWING STANDARDS:

IEC61000-4-2

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

Figure 1: Pin Configuration (ball side)



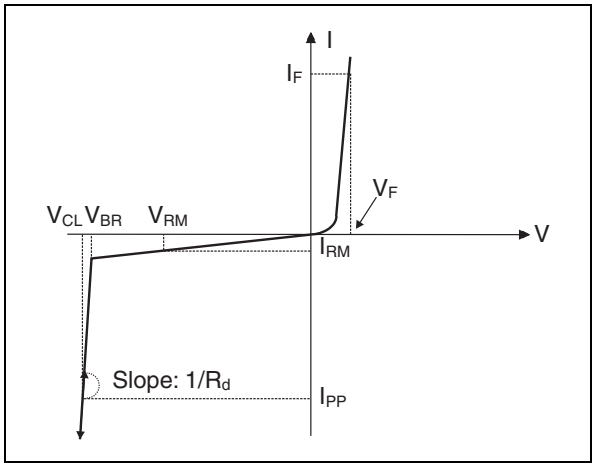
TM: TRANSIL is a trademark of STMicroelectronics.

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

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

Table 3: Electrical Characteristics (T_{amb} = 25°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)	αT	C
	min.	max.		max.		max.		max. I_F = 850mA	max.	typ. V_R=0V
	V	V	mA	µA	V	V	A	V	10^{-4}/°C	pF
ESDA18-1F2	16	18	1	0.5	10	20	1	1.3	8.5	230

(1) 8 / 20 µs 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

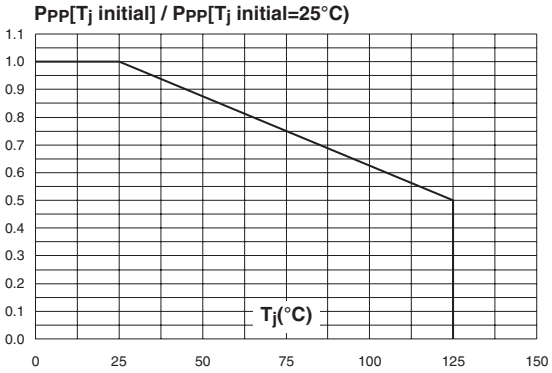


Figure 3: Peak pulse power versus exponential pulse duration

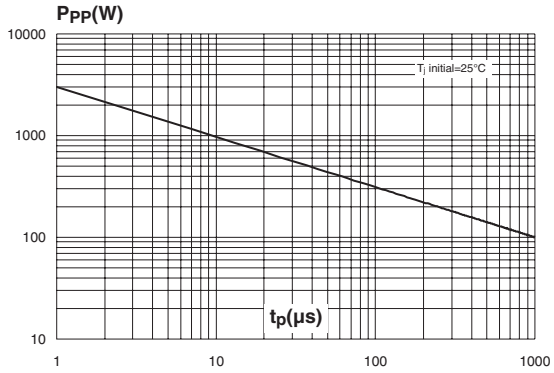


Figure 4: Clamping voltage versus peak pulse current (typical values, exponential waveform)

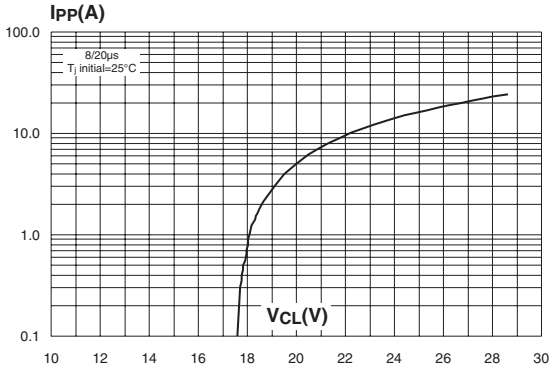


Figure 5: Forward voltage drop versus peak forward current (typical values)

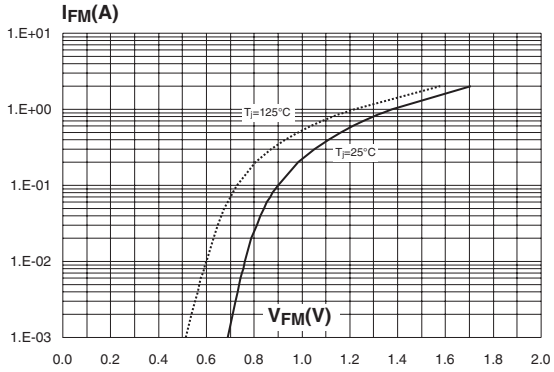


Figure 6: Junction capacitance versus reverse voltage applied (typical values)

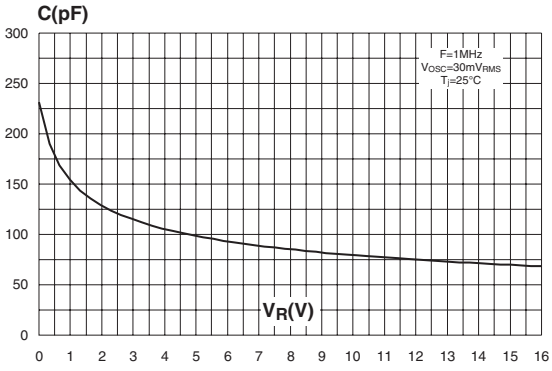
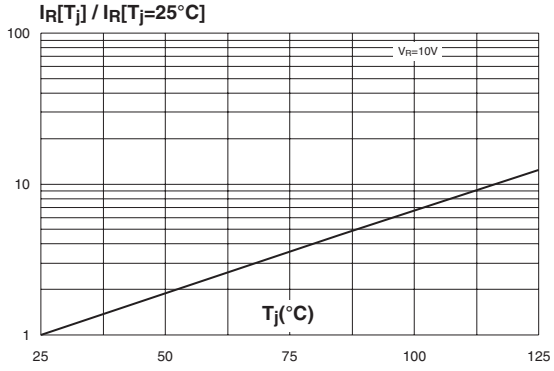


Figure 7: Relative variation of leakage current versus junction temperature (typical values)



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 polatrity of the TRANSIL (please see figures 8 and 9)

Figure 8: Reverse battery operation setup

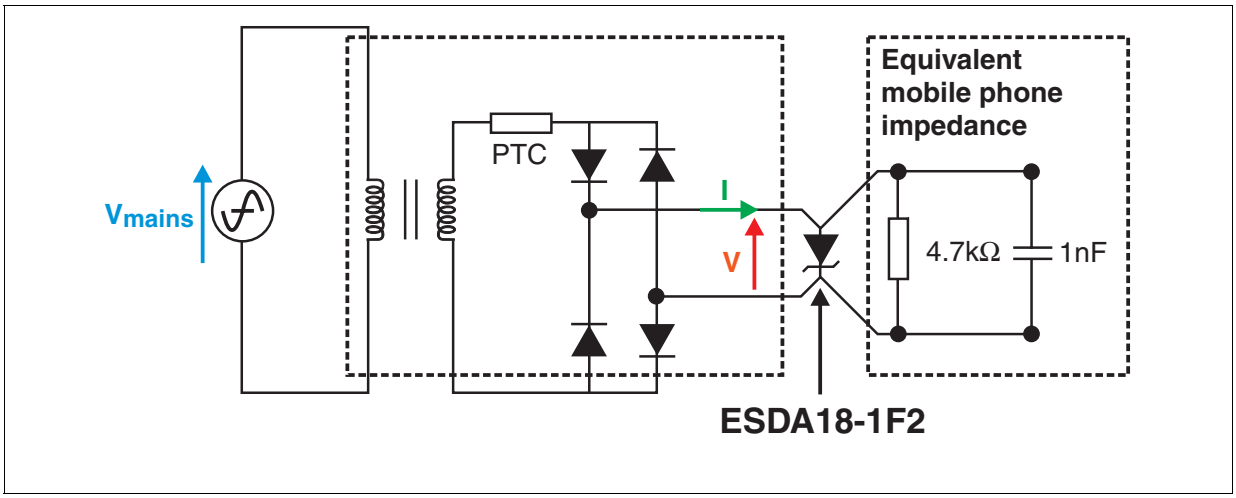
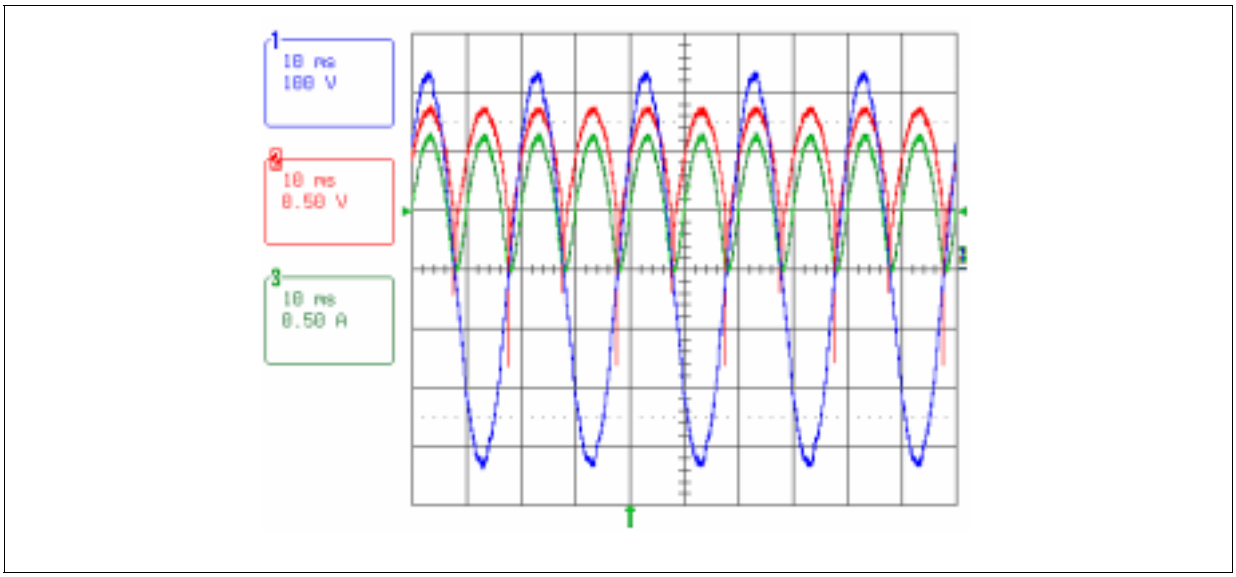


Figure 9: Reverse battery operation results



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

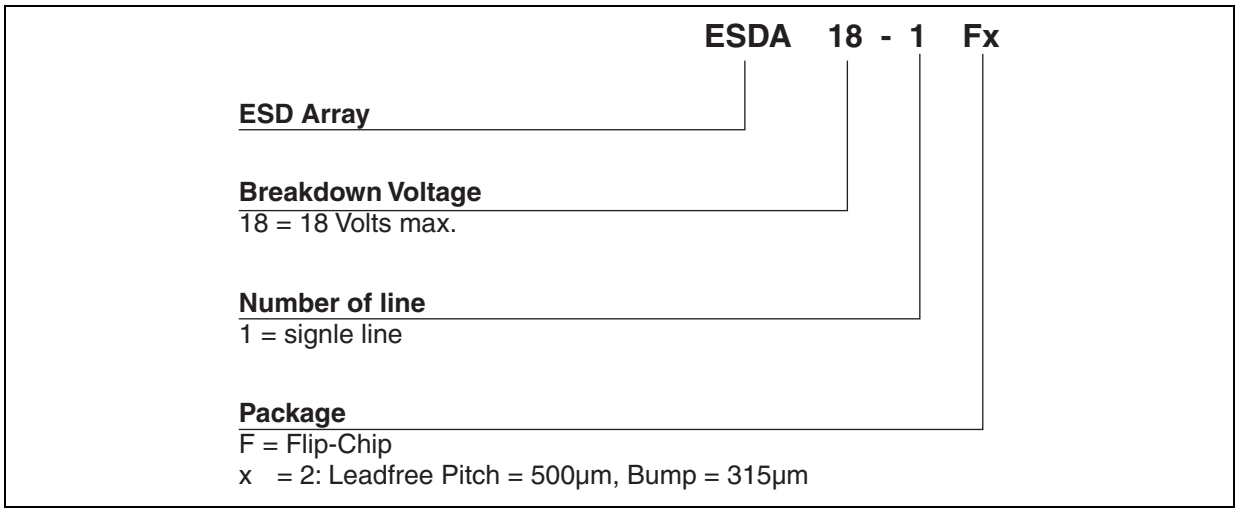


Figure 11: FLIP-CHIP Package Mechanical Data

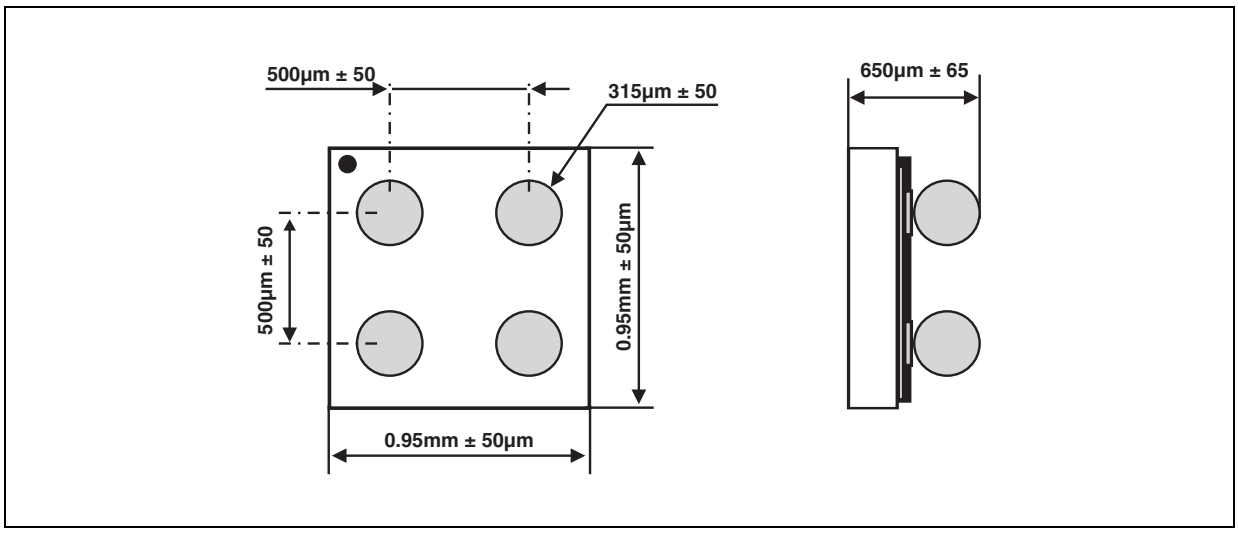


Figure 12: Foot Print Recommendations

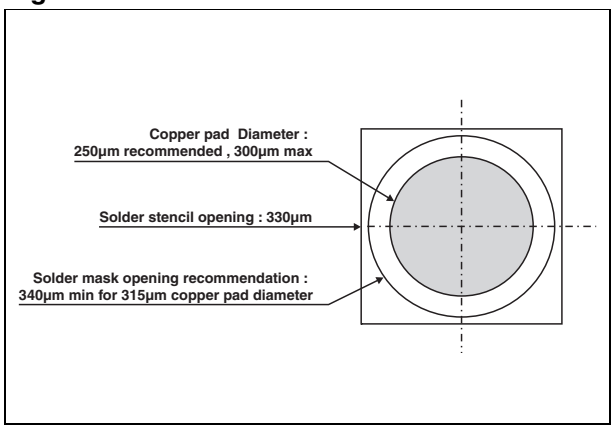


Figure 13: Marking

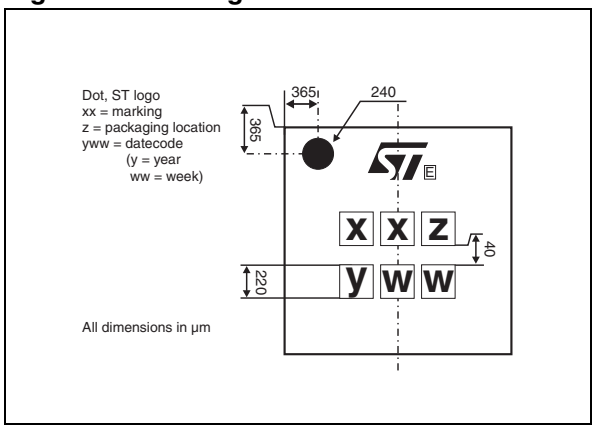


Figure 14: FLIP-CHIP Tape and Reel Specification

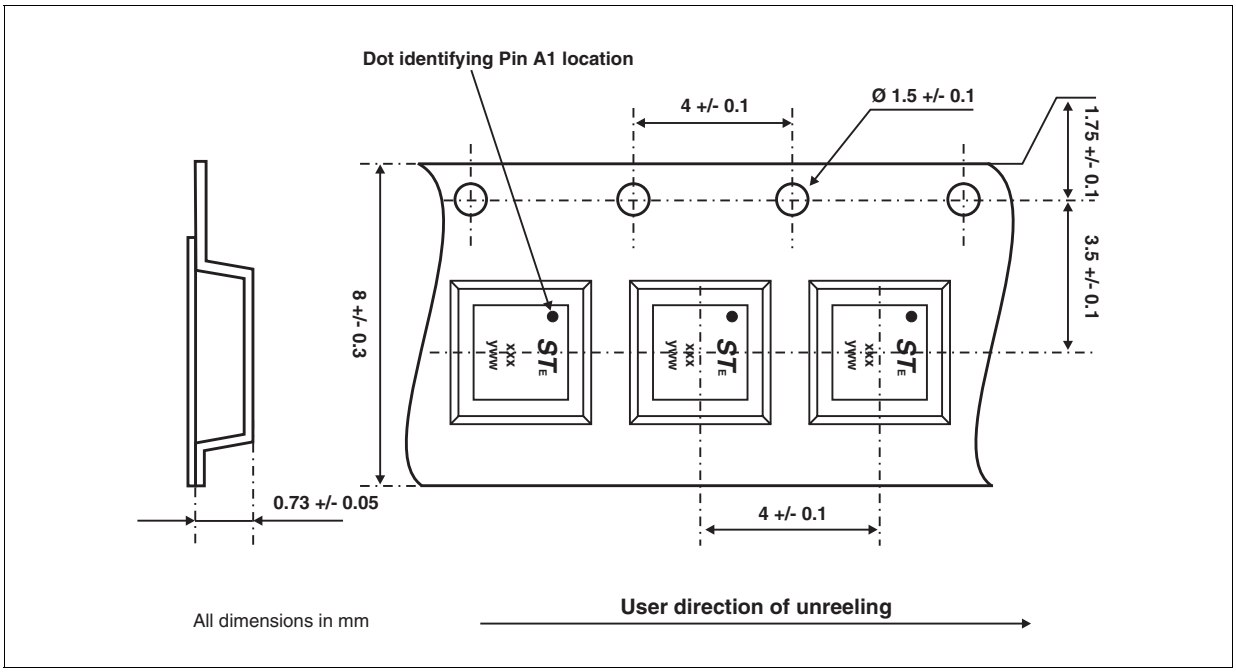


Table 4: Ordering Information

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.