

## LOW CAPACITANCE FLIP CHIP TVS ARRAY



### DESCRIPTION

The ESD4-LFC is a low capacitance flip chip transient voltage suppressor array, designed to protect portable devices from the effects of Electrostatic Discharge (ESD) and Electrical Fast Transients (EFT). This series meets the IEC 61000-4-2 and 61000-4-4 requirements. This device is ideally suited for portable devices, PCMCIA and SMART phones.

The ESD4-LFC features superior clamping performance, low leakage current characteristics and a response time of less than a nanosecond. Their low inductance virtually eliminates overshoot voltage due to package inductance.

### FEATURES

- Compatible with IEC 61000-4-2 (ESD): Air 15kV, Contact 8kV
- Compatible with IEC 61000-4-4 (EFT): 40A, 5/50ns
- ESD Protection > 25 kilovolts
- Unidirectional Configuration
- Low Capacitance: 15pF
- Protection for 4 Data Lines
- RoHS Compliant
- REACH Compliant

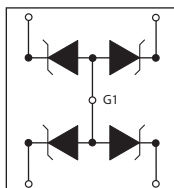
### APPLICATIONS

- SMART Phones
- I/O Port Interfaces
- Portable Devices
- Ground Positioning Systems (GPS)
- SMART Cards

### MECHANICAL CHARACTERISTICS

- 5 Bump Flip Chip Package
- Approximate Weight: 0.73 milligrams
- Lead-Free Plating
- Solder Reflow Temperature:
  - Lead-Free - Sn/Ag/Cu, 96/3.5/0.5: 260-270°C
- Flammability Rating UL 94V-0
- 8mm Tape per EIA Standard 481

### CIRCUIT DIAGRAM



**TYPICAL DEVICE CHARACTERISTICS**
**MAXIMUM RATINGS @ 25°C Unless Otherwise Specified**

PARAMETER	SYMBOL	VALUE	UNITS
DC Power Rating	P	200	mW
Operating Temperature	$T_A$	-40 to 85	°C
Storage Temperature	$T_{STG}$	-55 to 150	°C

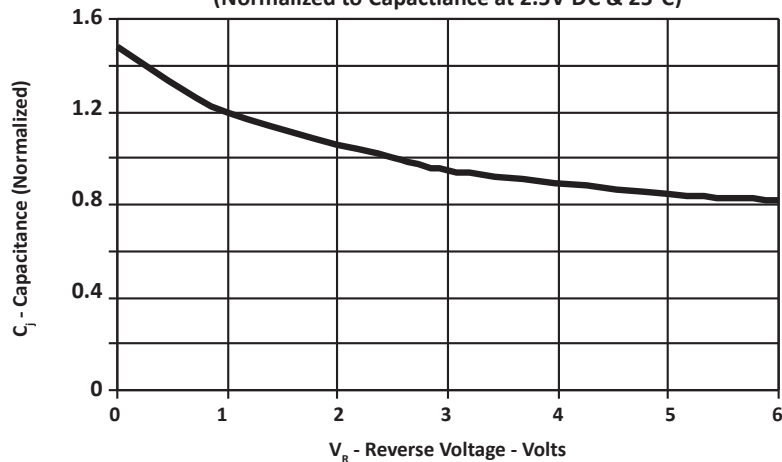
**ELECTRICAL CHARACTERISTICS PER LINE @ 25°C Unless Otherwise Specified**

PART NUMBER	MARKING CODE	RATED STAND-OFF VOLTAGE $V_{WM}$ VOLTS	MINIMUM BREAKDOWN VOLTAGE @ 1mA $V_{(BR)}$ VOLTS	MAXIMUM CLAMPING VOLTAGE @ $I_p = 10mA$ $V_C$ VOLTS	TYPICAL FORWARD VOLTAGE @ 10mA $V_F$ VOLTS	MAXIMUM LEAKAGE CURRENT @ 3.3V $I_D$ $\mu A$	TYPICAL CAPACITANCE PER LINE (Note 1) @ 2.5V, 1MHz C pF
ESD4-LFC	4L	5.0	6.0	8	0.8	0.1	15

**NOTES**

 1.  $\pm 20\%$  tolerance.

**FIGURE 1**  
**CAPACITANCE VS REVERSE VOLTAGE**  
 (Normalized to Capacitance at 2.5V DC & 25°C)



## SOLDER REFLOW INFORMATION

PRINTED CIRCUIT BOARD RECOMMENDATIONS	
PARAMETER	VALUE
Pad Size on PCB	0.275mm
Pad Shape	Round
Pad Definition	Non-Solder Mask Defined Pads
Solder Mask Opening	0.325mm Round
Solder Stencil Thickness	0.150mm
Solder Stencil Aperture Opening (Laser cut, 5% tapered walls)	0.330mm Round
Solder Paste Type	No Clean
Pad Protective Finish	OSP (Entek Cu Plus 106A)
Tolerance - Edge To Corner Ball	±50µm
Solder Ball Side Coplanarity	±20µm
Maximum Dwell Time Above Liquidous (183°C)	60 seconds
Soldering Maximum Temperature	270°C

### REQUIREMENTS

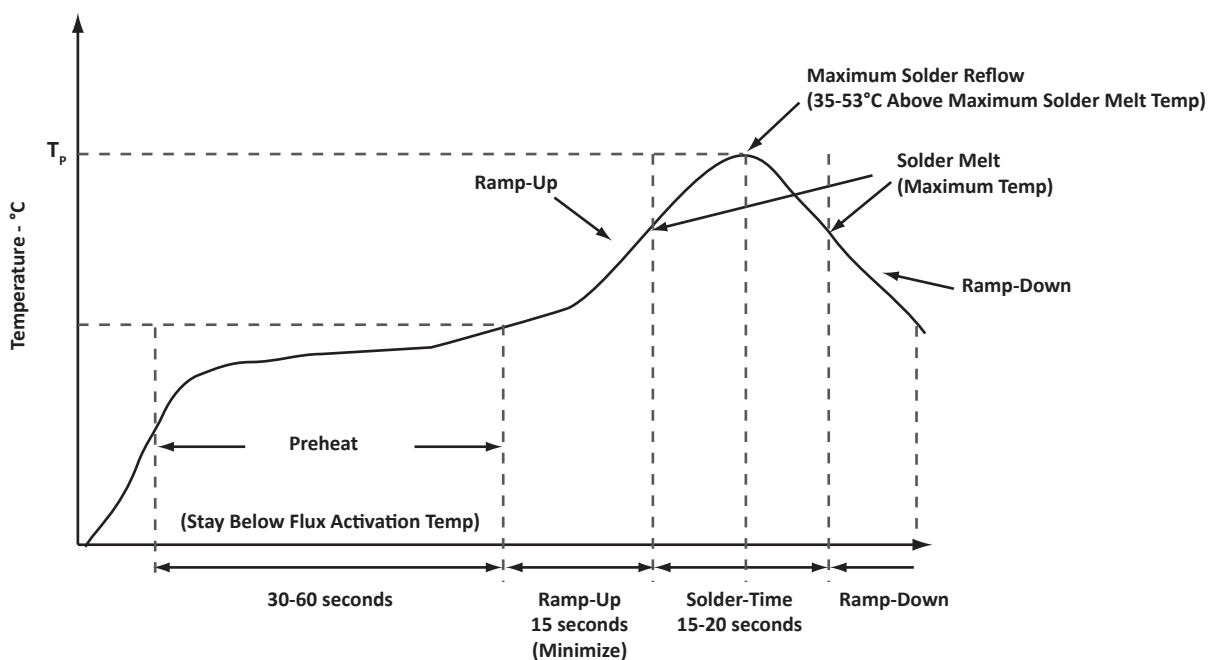
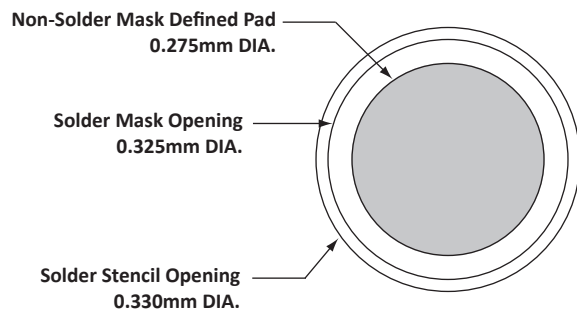
Temperature:

$T_p$  for Lead-Free (Sn/Ag/Cu): 260-270°C

$T_p$  for Tin-Lead: 240-245°C

Preheat time and temperature depends on solder paste and flux activation temperature, component size, weight, surface area and plating.

### RECOMMENDED NON-SOLDER MASK DEFINED PAD ILLUSTRATION



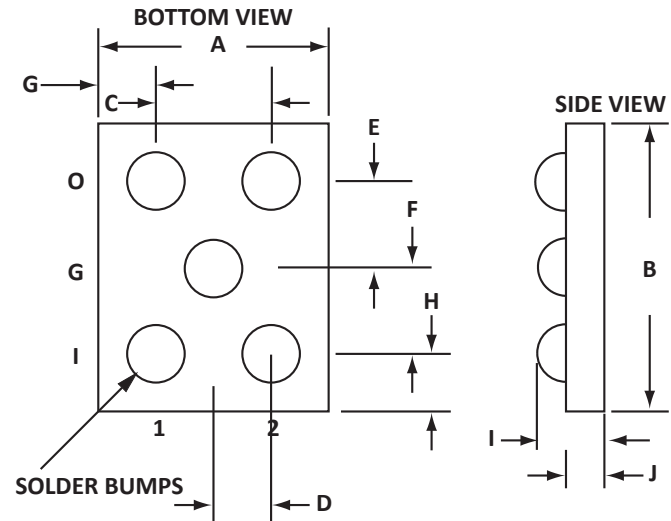
## 5 BUMP PACKAGE INFORMATION

### OUTLINE DIMENSIONS

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.914	1.016	0.036	0.040
B	1.285	1.375	0.0506	0.0541
C	0.495	0.505	0.0195	0.0199
D	0.245	0.255	0.0096	0.0100
E	0.430	0.440	0.0169	0.0173
F	0.430	0.440	0.0169	0.0173
G	0.180	0.280	0.0071	0.0110
H	0.180	0.280	0.0071	0.0110
I	0.432	0.559	0.017	0.022
J	0.330	0.457	0.013	0.018

#### NOTES

- Controlling dimensions in millimeters.
- Solder bumps (63/67 Sn/Pb) 0.30 dia.

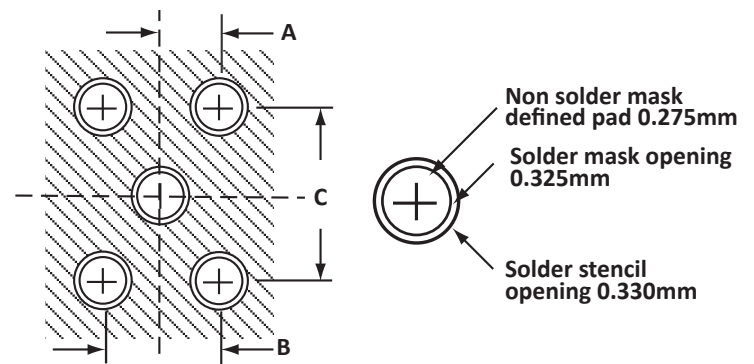


### LAYOUT DIMENSIONS

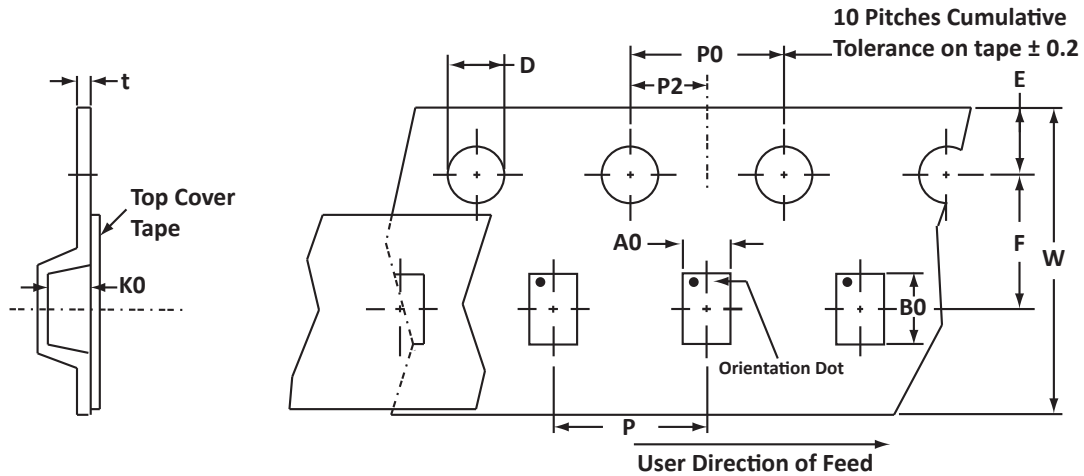
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.25	0.25	0.010	0.010
B	0.50	0.50	0.020	0.020
C	0.86	0.86	0.034	0.034

#### NOTES

- Controlling dimensions in millimeters



## TAPE AND REEL INFORMATION



### SPECIFICATIONS

REEL DIA.	TAPE WIDTH	A0	B0	K0	D	E	F	W	P0	P2	P	Tmax
178(7")	8	1.08±0.05	1.60±0.05	0.72 ± 0.05	1.50 ± 0.10	1.75 ± 0.10	3.50 ± 0.05	8.00 ± 0.30	4.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	0.20±0.025

#### NOTES

1. Dimensions in millimeters.
2. Top view of tape. Solder bumps are face down in tape package.
3. Surface mount product is taped and reeled in accordance with EIA 481.
4. 8mm plastic tape: 7" Reels - 3,000 pieces per reel.

Package outline, pad layout and tape specifications per document number 06055.R2 9/09.

### ORDERING INFORMATION

BASE PART NUMBER	LEADFREE SUFFIX	TAPE SUFFIX	QTY/REEL	REEL SIZE	TUBE QTY
ESD4-LFC	-LF	-T73	3,000	7"	n/a

## COMPANY INFORMATION

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### COMPANY PROFILE

ProTek Devices, based in Tempe, Arizona USA, is a manufacturer of Transient Voltage Suppression (TVS) products designed specifically for the protection of electronic systems from the effects of lightning, Electrostatic Discharge (ESD), Nuclear Electromagnetic Pulse (NEMP), inductive switching and EMI/RFI. With over 25 years of engineering and manufacturing experience, ProTek designs TVS devices that provide application specific protection solutions for all electronic equipment/systems.

ProTek Devices Analog Products Division, also manufactures analog interface, control, RF and power management products.

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PATENT INFORMATION: This device is patented under U.S. Patent No. Des. "D456,367S".