



# SPE0512

## 2-Line ESD Protection Array

### DESCRIPTION

The SPE0512 are designed by TVS device that is to protect sensitive electronics from damage or latch-up due to ESD. They are designed for use in applications where board space is at a premium. SPE0512 will protect up to two lines, and may be used on lines where the signal polarities swing above and below ground.

SPE0512 offer desirable characteristics for board level protection including fast response time, low operating and clamping voltage, and no device degradation.

SPE0512 may be used to meet the immunity requirements of IEC 61000-4-2, level 4. The small SOT-523 package makes them ideal for use in portable electronics such as cell phones, PDA's, notebook computers, and digital cameras.

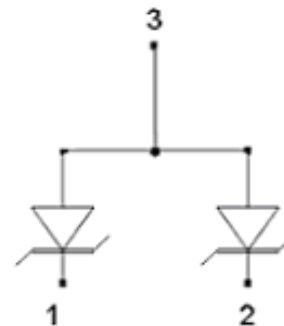
### APPLICATIONS

- ◆ Cellular Handsets and Accessories
- ◆ Cordless Phone
- ◆ PDA
- ◆ Notebooks and Handhelds
- ◆ Portable Instrumentation
- ◆ Digital Cameras
- ◆ MP3 Player

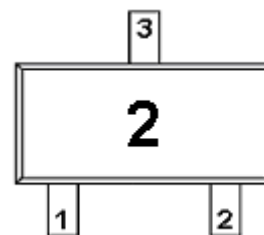
### FEATURES

- ◆ Transient protection for data lines to IEC 61000-4-2 (ESD)  $\pm 15\text{kV}$  (air),  $\pm 8\text{kV}$  (contact)
- ◆ IEC 61000-4-4 (EFT) 40A (5/50ns)
- ◆ Protects two I/O lines
- ◆ Working voltage: 5V
- ◆ Low leakage current
- ◆ Low operating and clamping voltages

### PIN CONFIGURATION ( SOT-523 / SC-89 )



### PART MARKING





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### ORDERING INFORMATION

Part Number	Package	Part Marking
SPE0512S52RG	SOT-523	2
SPE0512S52RGB	SOT-523	2

- ※ SPE0512S52RG : Tape Reel ; Pb – Free
- ※ SPE0512S52RGB : Tape Reel ; Pb – Free; Halogen -Free

### ABSOLUTE MAXIMUM RATINGS

(TA=25°C Unless otherwise noted)

Parameter	Symbol	Typical	Unit
Peak Pulse Power ( tp = 8/20 μs )	Ppk	250	W
Maximum Peak Pulse Current ( tp = 8/20 μs )	Ipp	7	A
ESD per IEC 61000 – 4 – 2 (Air )	Vpp	±15	KV
ESD per IEC 61000 – 4 – 2 (Contact )	Vpp	±8	KV
Operating Junction Temperature	Tj	-55 ~ 125	°C
Storage Temperature Range	TSTG	-55 ~ 150	°C
Lead Soldering Temperature	TL	260 ( 10sec )	°C

### ELECTRICAL CHARACTERISTICS

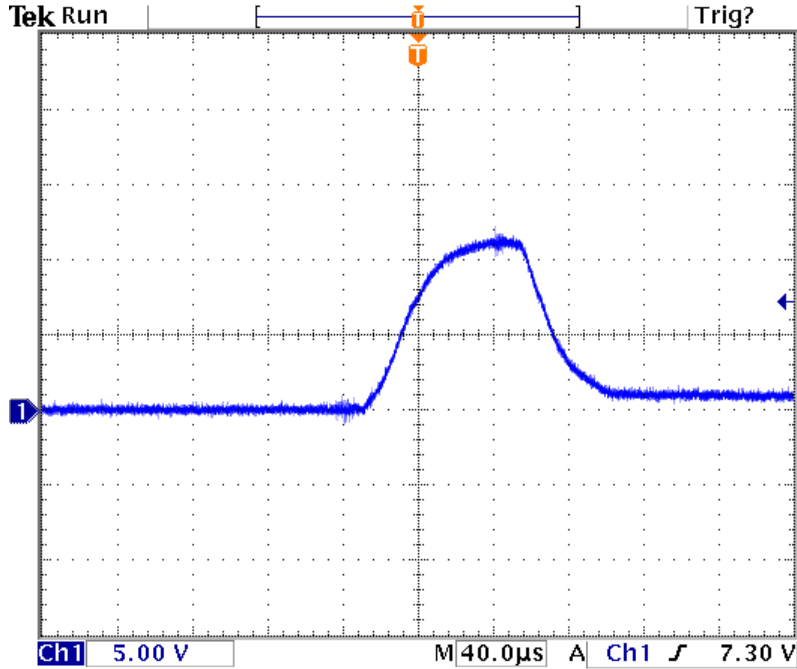
(TA=25°C Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
Reverse Stand – Off Voltage	VRWM				5	V
Reverse Breakdown Voltage	VBR	It = 1mA	6		8.5	V
Reverse Leakage Current	IR	VRWM = 5V , T=25°C		0.01	1	μA
Reverse Leakage Current	IR	VRWM = 3V , T=25°C		0.01	0.5	μA
Clamping Voltage	Vc	Ipp = 1A , tp = 8/20 μs			11.5	V
Clamping Voltage	Vc	Ipp = 7A , tp = 8/20 μs			15	V
Junction Capacitance	Cj	Between I/O Pin and GND VR = 0V , f = 1MHz		10	20	pF



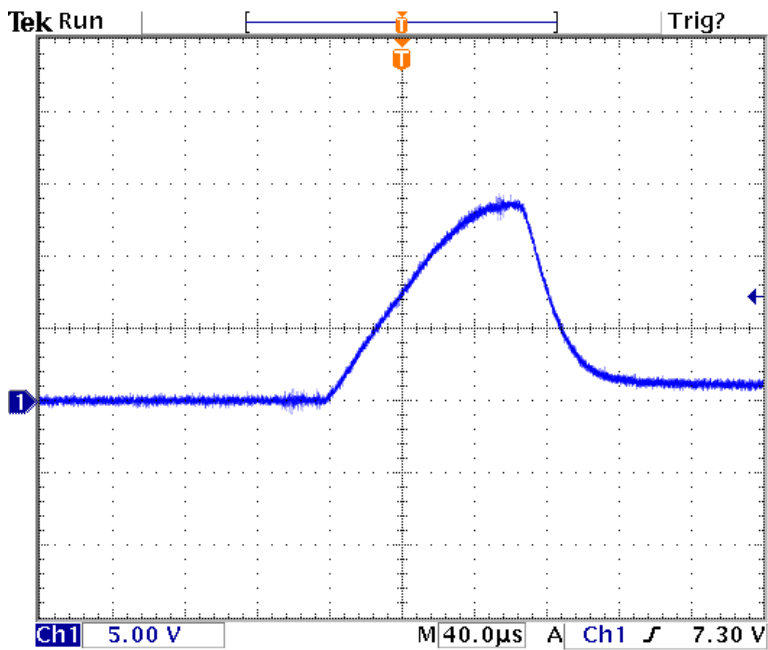
# SPE0512 2-Line ESD Protection Array

## TYPICAL CHARACTERISTICS



Clamping Voltage ( $I_{pp} = 1A$ ,  $t_p = 8/20 \mu s$ )

26 Oct 2005  
12:15:46



Clamping Voltage ( $I_{pp} = 7A$ ,  $t_p = 8/20 \mu s$ )

26 Oct 2005  
12:08:20



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## TYPICAL CHARACTERISTICS

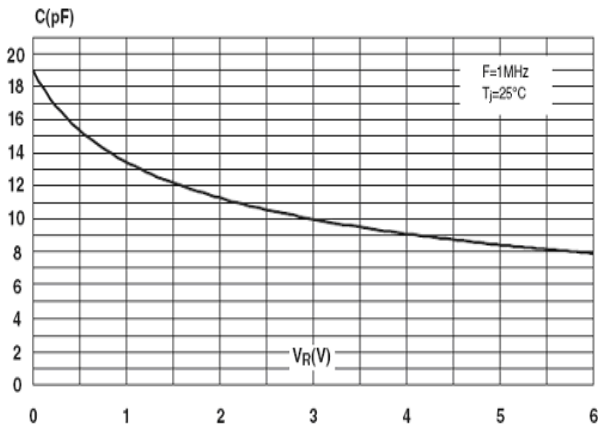


Fig 1 : Junction Capacitance V.S Reverse Voltage Applied

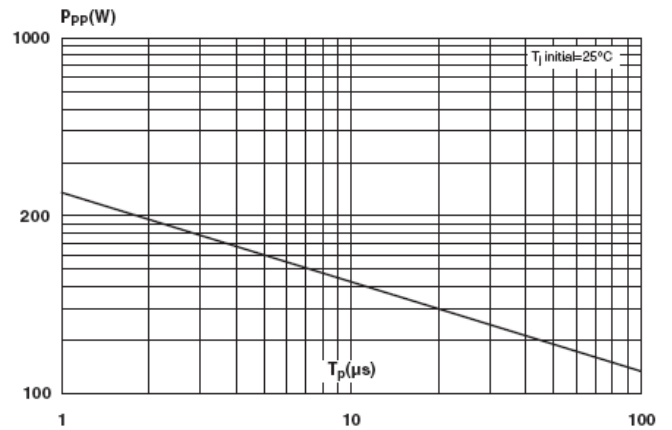


Fig 2 : Peak Plus Power V.S Exponential Plus Duration

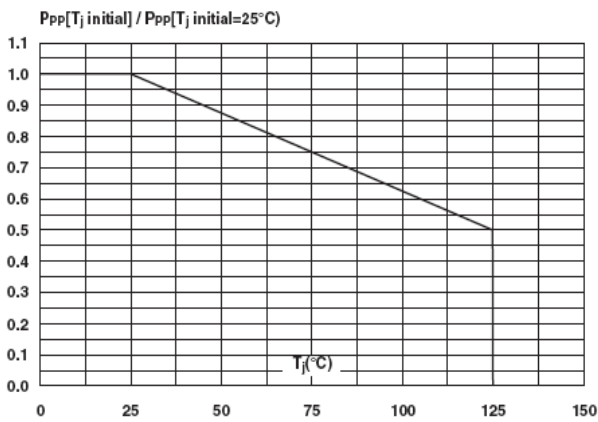


Fig 3 : Relative Variation of Peak Plus Power V.S Initial Junction Temperature

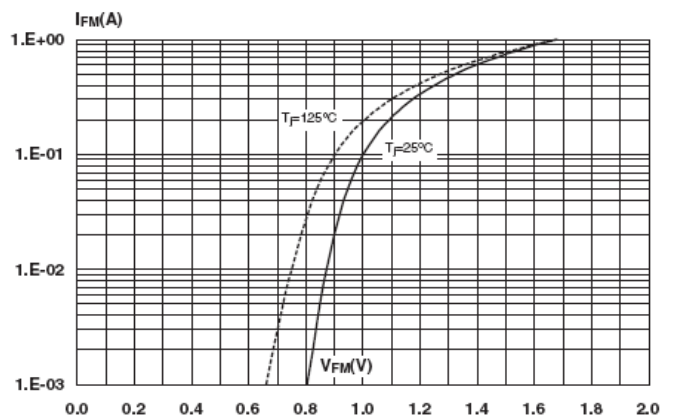


Fig 4 : Forward Voltage Drop V.S Peak Forward Current



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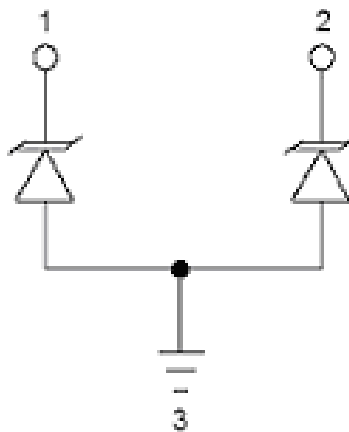
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### APPLICATION NOTE

#### Device Connection for Protection of Two Data Lines

SPE0512 is designed to protect up to two data lines. The device is connected as follows:

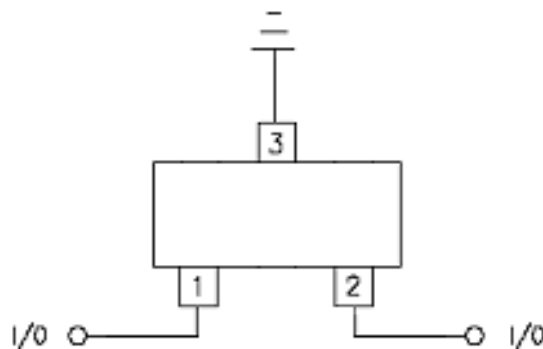
1. The TVS protection of two I/O lines is achieved by connecting pins 1 and 2 to the data lines. Pin 3 is connected to ground. The ground connection should be made directly to the ground plane for best results. The path length is kept as short as possible to reduce the effects of parasitic inductance.



#### Circuit Board Layout Recommendations for Suppression of ESD

Good circuit board layout is critical for the suppression of ESD induced transients. The following guidelines are recommended:

1. Place the TVS near the input terminals or connectors to restrict transient coupling.
2. Minimize the path length between the TVS and the protected line.
3. Minimize all conductive loops including power and ground loops.
4. The ESD transient return path to ground should be kept as short as possible.
5. Never run critical signals near board edges.
6. Use ground planes whenever possible.

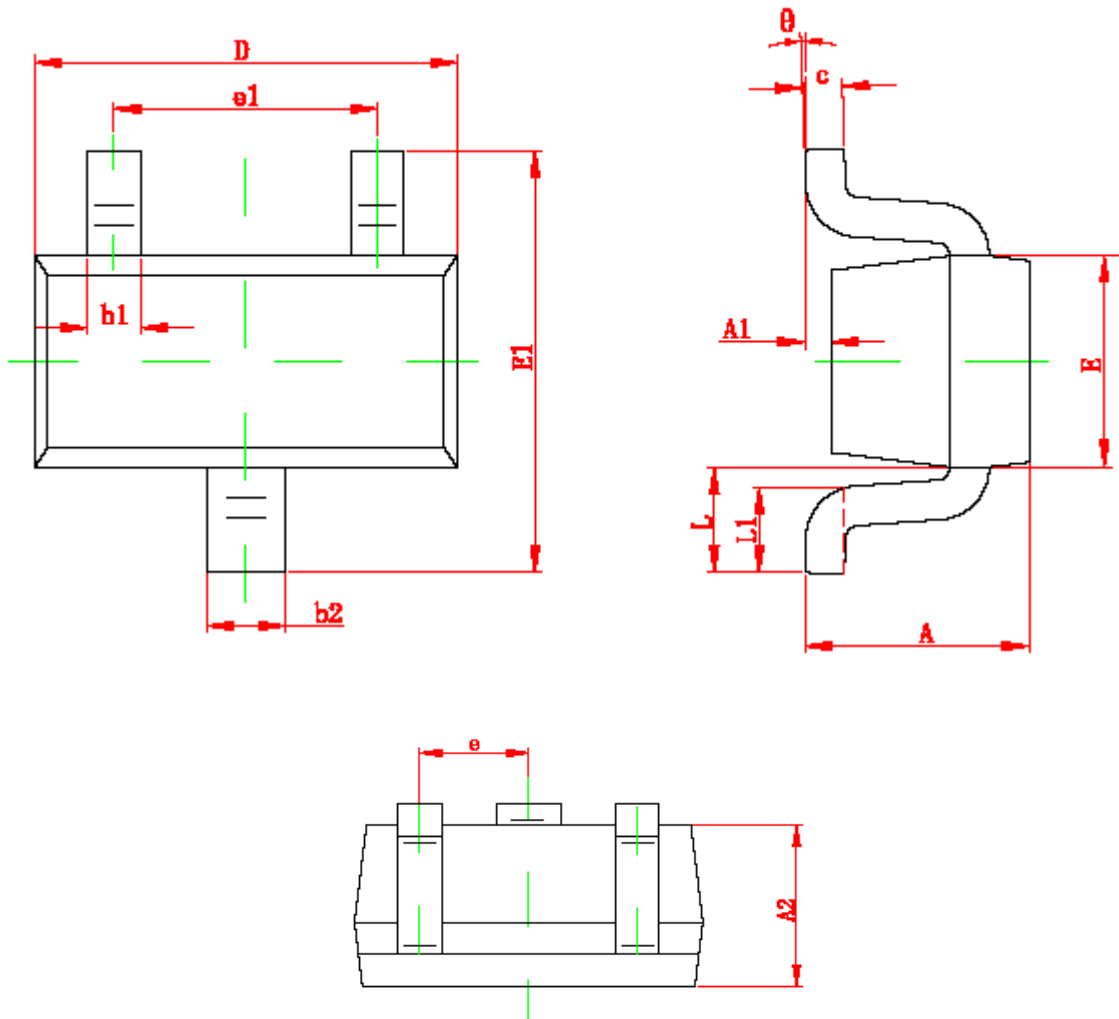




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### SOT-523 PACKAGE OUTLINE



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.700	0.900	0.028	0.035
A1	0.000	0.100	0.000	0.004
A2	0.700	0.800	0.028	0.031
b1	0.150	0.250	0.006	0.010
b2	0.250	0.350	0.010	0.014
c	0.100	0.200	0.004	0.008
D	1.500	1.700	0.059	0.067
E	0.700	0.900	0.028	0.035
E1	1.450	1.750	0.057	0.069
e	0.500 TYP.		0.020 TYP.	
e1	0.900	1.100	0.035	0.043
L	0.400 REF.		0.016 REF.	
L1	0.260	0.460	0.010	0.018
theta	0°	8°	0°	8°



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