



# SPE6V8UW

## Ultra Low Capacitance 4 -Line ESD Protection Array

### DESCRIPTION

The SPE6V8UW is 4-channel very low capacitance ESD transient voltage suppressor which provides a very high level of protection for sensitive electronic components that may be subjected to electrostatic discharge. It is particularly well-suited to protect systems with high speed communication lines from ESD, EFT, and lightning.

The SPE6V8UW is consists of two low capacitance steering diodes and a TVS diode in SOT-363 package. Each channel of SPE6V8UW could safely dissipate ESD strikes of  $\pm 15\text{kV}$  air discharge as well as  $\pm 8\text{kV}$  contact discharge, meeting the requirement of the IEC 61000-4-2 international standard. Using the MIL-STD-883 (Method 3015) specification for Human Body Model (HBM) ESD, the device provides protection for contact discharges to greater than  $\pm 15\text{kV}$ .

### APPLICATIONS

- ◆ Cellular Handsets and Accessories
- ◆ Cordless Phone
- ◆ PDA
- ◆ Notebooks and Handhelds
- ◆ Portable Instrumentation
- ◆ Digital Cameras
- ◆ MP3 Player High Definition Multi-Media Interface Protection
- ◆ USB 2.0 Power and Data Line
- ◆ Monitors and Notebook Computers
- ◆ HDSL, IDSL Secondary IC Side Protection
- ◆ 10/100/1000 Ethernet

### FEATURES

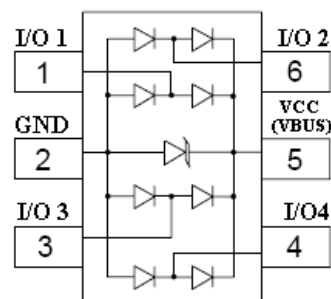
- ◆ Transient protection for data lines to

IEC 61000-4-2 (ESD)  
 $\pm 15\text{kV}$  (air)  
 $\pm 8\text{kV}$  (contact)

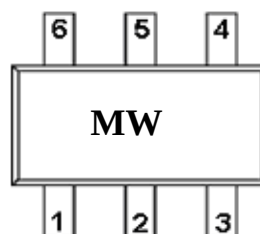
IEC 61000-4-4 (EFT)  
40A (5/50ns)

- ◆ Protects five bidirectional I/O lines
- ◆ Working voltage: 5V
- ◆ Low leakage current
- ◆ Low operating and clamping voltages
- ◆ Low capacitance: 0.7 pF typical

### PIN CONFIGURATION ( SOT-363 / SC-70-6L )



### PART MARKING



M : Month Code  
W : Device Code



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### ORDERING INFORMATION

| Part Number    | Package | Part Marking |
|----------------|---------|--------------|
| SPE6V8UWS36RGB | SOT-363 | MW           |

M = Month Code ( A~Z)

※ SPE6V8UWS36RGB : 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    |
| Forward Voltage @ IF        | VF     | IF = 10mA                                  | 0.4  | 0.8  | 1.5  | V    |
| Reverse Breakdown Voltage   | VBR    | It = 1mA                                   | 6.0  | 7.0  |      | 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                    |      |      | 12   | V    |
| Junction Capacitance        | Cj     | VR = 0V, f = 1MHz<br>Any I/O pin to Ground |      | 1.4  | 1.5  | pF   |
|                             |        | VR = 0V, f = 1MHz<br>Between I/O pins      |      | 0.7  |      |      |

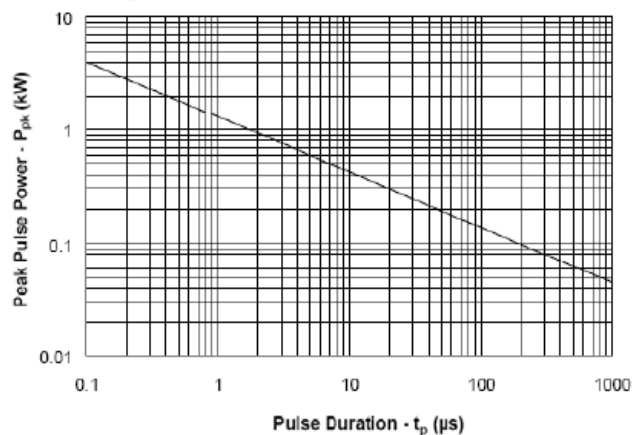


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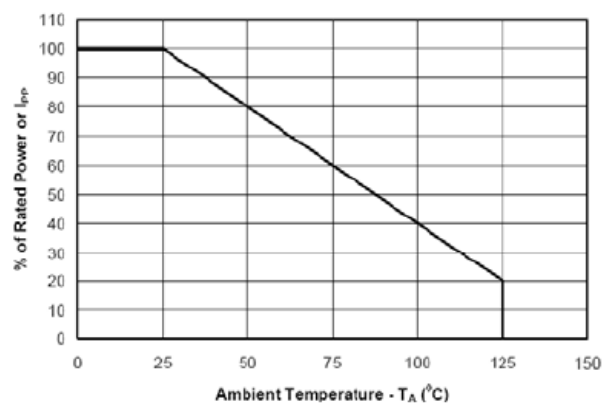
## Ultra Low Capacitance 4 -Line ESD Protection Array

### TYPICAL CHARACTERISTICS

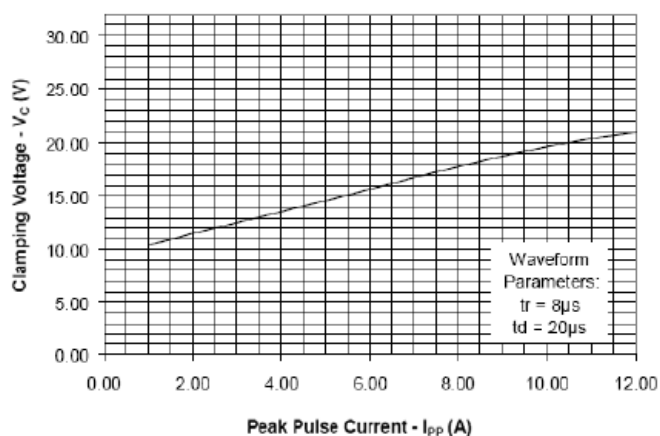
Non-Repetitive Peak Pulse Power vs. Pulse Time



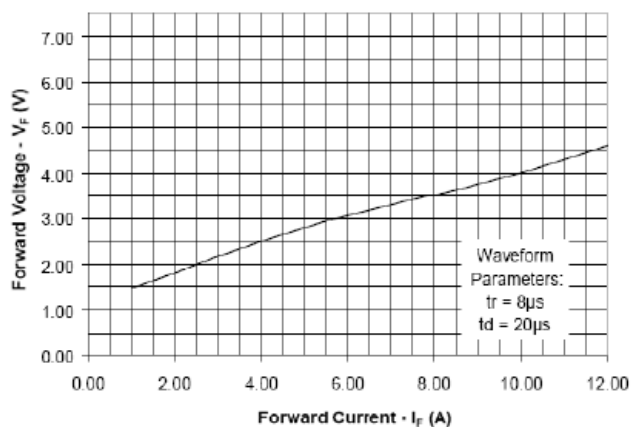
Power Derating Curve



Clamping Voltage vs. Peak Pulse Current



Forward Voltage vs. Forward Current





# SPE6V8UW

## Ultra Low Capacitance 4 -Line ESD Protection Array

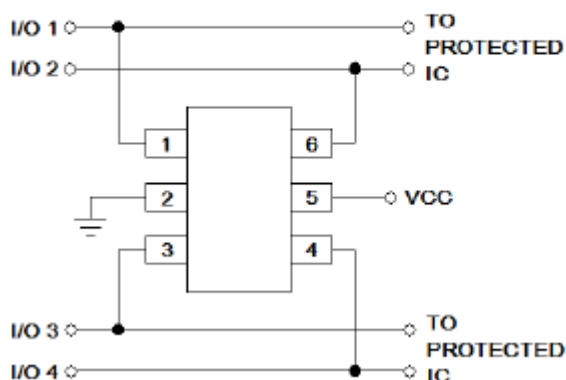
### APPLICATION NOTE

#### SPE6V8UW Device Connection for Protection of Four Data Lines

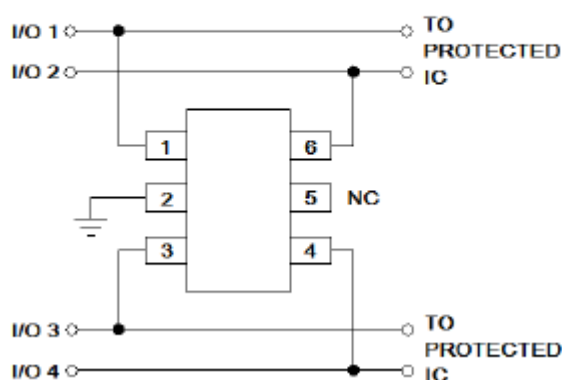
This device is designed to protect data lines by clamping them to a fixed reference. When the voltage on the protected line exceeds the reference voltage the steering diodes are forward biased, conducting the transient current away from the sensitive circuitry. Data lines are connected at pins 1, 3, 4 and 6. Pin 2 should be connected directly to a ground plane. The path length is kept as short as possible to minimize parasitic inductance. The positive reference is connected at pin 5. The options for connecting the positive reference are as follows:

1. To protect data lines and the power line, connect pin 5 directly to the positive supply rail (VCC). In this configuration the data lines are referenced to the supply voltage. The internal TVS diode prevents over-voltage on the supply rail.
2. In applications where the supply rail does not exit the system, the internal TVS may be used as the reference. In this case, pin 5 is not connected. The steering diodes will begin to conduct when the voltage on the protected line exceeds the working voltage of the TVS (plus one diode drop).
3. In applications where complete supply isolation is desired, the internal TVS is again used as the reference and VCC is connected to one of the I/O inputs. An example of this configuration is the protection of a SIM port. The Clock, Reset, I/O, and VCC lines are connected at pins 1, 3, 4, and 6. Pin 2 is connected to ground and pin 5 is not connected.

**Data Line and Power Supply Protection Using Vcc as reference**



**Data Line Protection Using Internal TVS Diode as reference**





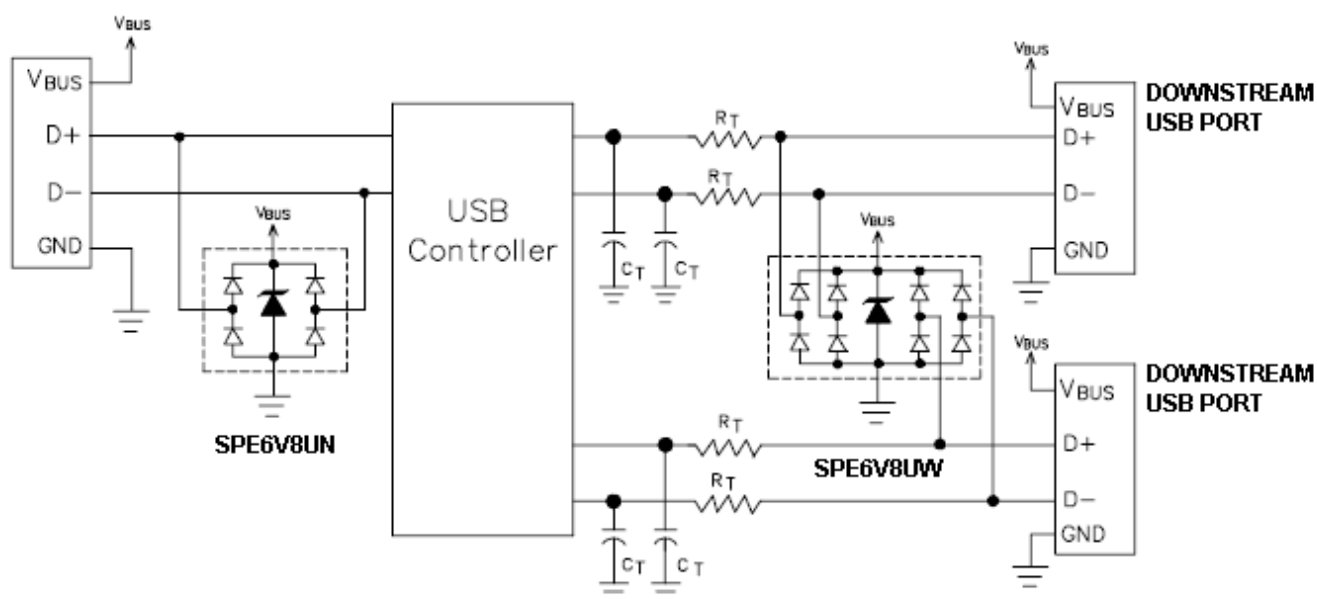
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Ultra Low Capacitance 4 -Line ESD Protection Array

## APPLICATION NOTE

### SPE6V8UW Device Connection for USB Port

UPSTREAM  
USB PORT



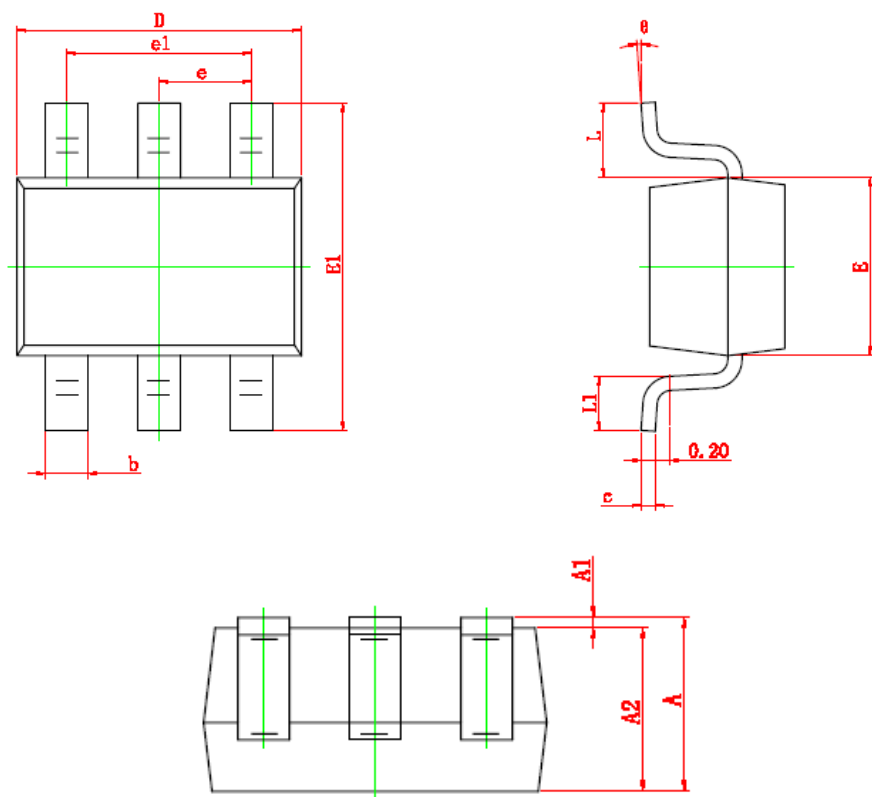
Universal Serial Bus ESD Protection



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### SOT-363 PACKAGE OUTLINE



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 0.900                     | 1.100 | 0.035                | 0.043 |
| A1     | 0.000                     | 0.100 | 0.000                | 0.004 |
| A2     | 0.900                     | 1.000 | 0.035                | 0.039 |
| b      | 0.150                     | 0.350 | 0.006                | 0.014 |
| c      | 0.080                     | 0.150 | 0.003                | 0.006 |
| D      | 2.000                     | 2.200 | 0.079                | 0.087 |
| E      | 1.150                     | 1.350 | 0.045                | 0.053 |
| E1     | 2.150                     | 2.450 | 0.085                | 0.096 |
| e      | 0.650 TYP                 |       | 0.026 TYP            |       |
| e1     | 1.200                     | 1.400 | 0.047                | 0.055 |
| L      | 0.525 REF                 |       | 0.021 REF            |       |
| L1     | 0.260                     | 0.460 | 0.010                | 0.018 |
| θ      | 0°                        | 8°    | 0°                   | 8°    |



# **SPE6V8UW**

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