

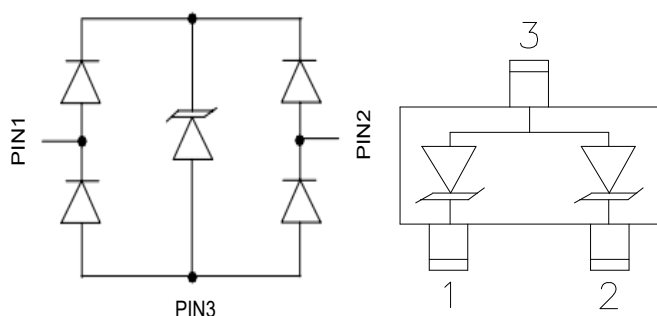
## Description

The WPE0502S2 is an uni-directional TVS diode array, utilizing leading monolithic silicon technology to provide fast response time and low ESD clamping voltage, making this device an ideal solution for protecting sensitive semiconductor components from damage. The WPE0502S2 complies with the IEC 61000-4-2 (ESD) standard with  $\pm 25\text{kV}$  air and  $\pm 20\text{kV}$  contact discharge. It is assembled into a lead-free SOT-23 package. It is designed to protect components which are connected to data and transmission lines from voltage surges .

## Features

- 80W Peak pulse power (8/20us)
- Protects one differential line & two common lines
- Ultra low leakage: nA level
- Ultra low clamping voltage
- Complies with following standards:
  - IEC 61000-4-2 (ESD) immunity test
    - Air discharge:  $\pm 25\text{kV}$
    - Contact discharge:  $\pm 20\text{kV}$
- IEC61000-4-5 (Lightning) 5A (8/20)
- RoHS Compliant

## Dimensions and Pin Configuration



Circuit Diagram

Pin Schematic

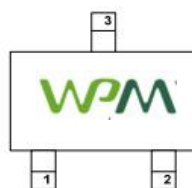
## Mechanical Characteristics

- Package: SOT-23
- Lead Finish: Matte Tin
- Case Material: “Green” Molding Compound.
- Moisture Sensitivity: Level 3 per J-STD-020
- Terminal Connections: See Diagram Below
- Marking Information: See Below

## Applications

- Cellular Handsets and Accessories
- Personal Digital Assistants
- Notebooks and Handhelds
- Portable Instrumentation
- Set Top Box
- Industrial Controls
- Server and Desktop PC

## Marking information



Details marking code reference customer approval list

## Ordering Information

| Part Number | Packaging        | Reel Size |
|-------------|------------------|-----------|
| WPE0502S2   | 3000/Tape & Reel | 7 inch    |

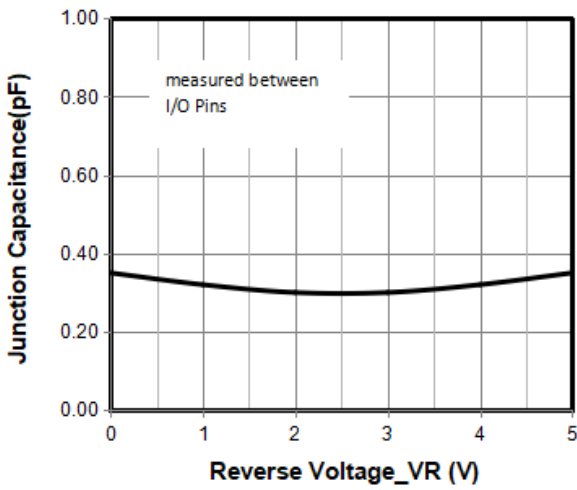
**Absolute Maximum Ratings (T<sub>A</sub>=25°C unless otherwise specified)**

| Parameter                       | Symbol           | Value       | Unit |
|---------------------------------|------------------|-------------|------|
| Peak Pulse Power (8/20μs)       | P <sub>pk</sub>  | 80          | W    |
| Peak Pulse Current (8/20μs)     | I <sub>pp</sub>  | 5           | A    |
| ESD per IEC 61000-4-2 (Air)     | V <sub>ESD</sub> | ±25         | kV   |
| ESD per IEC 61000-4-2 (Contact) |                  | ±20         |      |
| Operating Temperature Range     | T <sub>J</sub>   | -55 to +125 | °C   |
| Storage Temperature Range       | T <sub>stg</sub> | -55 to +150 | °C   |

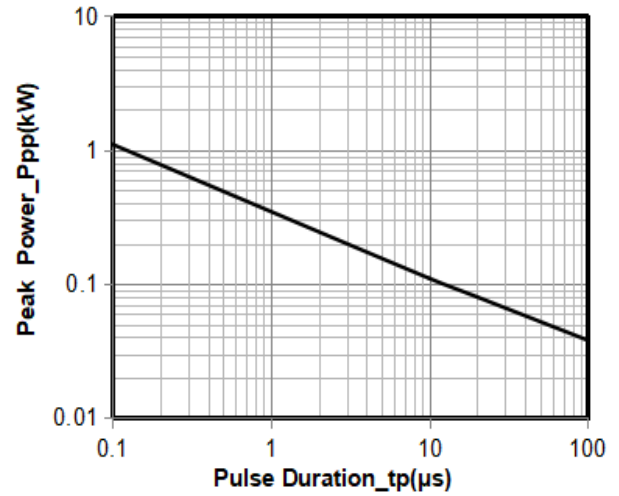
**Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise specified)**

| Parameter               | Symbol           | Min | Typ  | Max | Unit | Test Condition                             |
|-------------------------|------------------|-----|------|-----|------|--|
| Reverse Working Voltage | VR <sub>WM</sub> |     |      | 5   | V    |  |
| Breakdown Voltage       | V <sub>BR</sub>  | 6   |      |     | V    | I <sub>T</sub> = 1mA                       |
| Reverse Leakage Current | I <sub>R</sub>   |     | 0.01 | 0.5 | μA   | VR <sub>WM</sub> = 5.5V                    |
| Clamping Voltage        | V <sub>C</sub>   |     |      | 9   | V    | I <sub>PP</sub> = 1A (8 x 20μs pulse)      |
| Clamping Voltage        | V <sub>C</sub>   |     |      | 16  | V    | I <sub>PP</sub> = 5A (8 x 20μs pulse)      |
| Junction Capacitance    | C <sub>J</sub>   |     | 0.3  | 0.4 | pF   | VR = 0V, f = 1MHz, between pin 1 and pin 2 |
| Junction Capacitance    | C <sub>J</sub>   |     |      | 0.8 | pF   | VR = 0V, f = 1MHz, pin 1 or pin 2 to pin 3 |

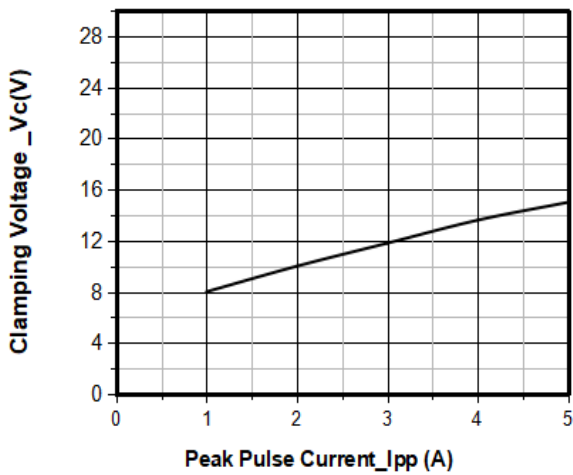
**Typical Performance Characteristics (T<sub>A</sub>=25°C unless otherwise Specified)**



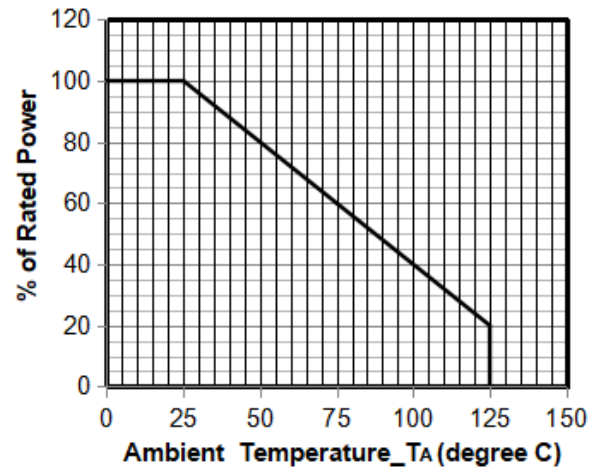
**Junction Capacitance vs. Reverse Voltage**



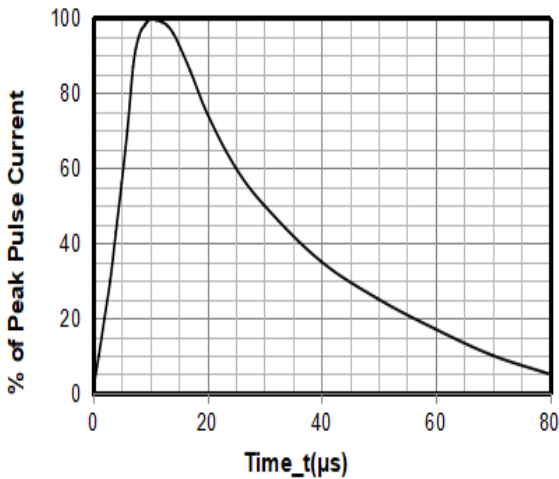
**Peak Pulse Power vs. Pulse Time**



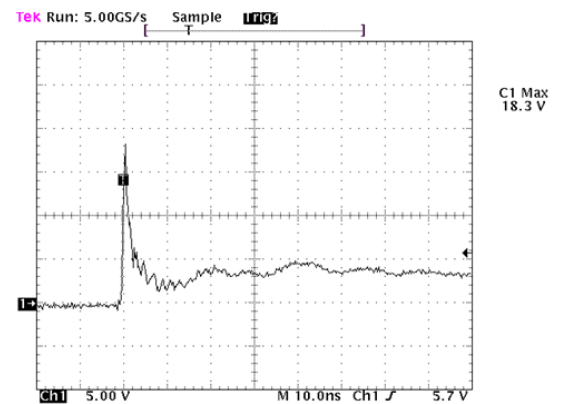
**Clamping Voltage vs. Peak Pulse Current**



**Power Derating Curve**



**8 X 20μs Pulse Waveform**

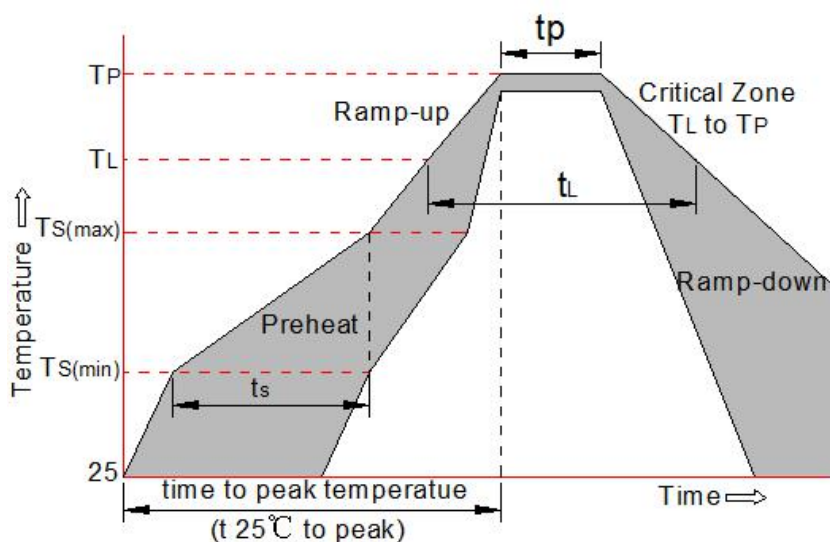


**Note: Data is taken with a 10x attenuator**

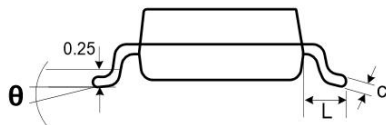
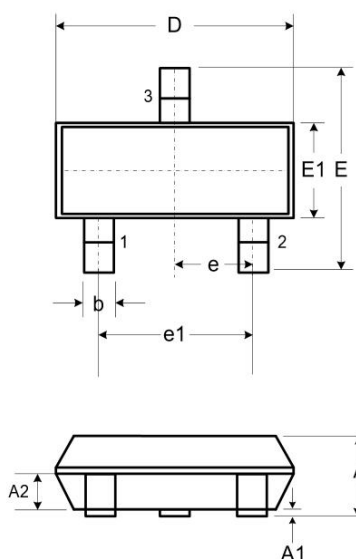
**ESD Clamping Voltage**

**8 kV Contact per IEC61000-4-2**

|   |                                   |                                 |
|---|-----------------------------------|---------------------------------|
| Reflow Condition  |                                   | Pb-Free assembly<br>(see FIG.2) |
| Pre Heat  | -Temperature Min ( $T_{s(min)}$ ) | +150°C                          |
|   | -Temperature Max( $T_{s(max)}$ )  | +200°C                          |
|   | -Time (Min to Max) (ts)           | 60-180 secs.                    |
| Average ramp up rate (Liquid us Temp ( $T_L$ ) to peak) |                                   | 3°C/sec. Max                    |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate                    |                                   | 3°C/sec. Max                    |
| Reflow  | -Temperature( $T_L$ ) (Liquid us) | +217°C                          |
|   | -Temperature( $t_L$ )             | 60-150 secs.                    |
| Peak Temp ( $T_p$ )                                     |                                   | +260(+0/-5)°C                   |
| Time within 5°C of actual Peak Temp ( $t_p$ )           |                                   | 30 secs. Max                    |
| Ramp-down Rate  |                                   | 6°C/sec. Max                    |
| Time 25°C to Peak Temp ( $T_p$ )                        |                                   | 8 min. Max                      |
| Do not exceed   |                                   | +260°C                          |

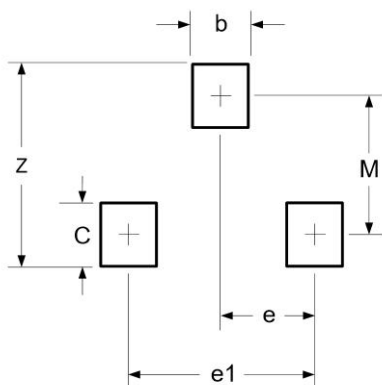


### Package mechanical data



| DIMENSIONS |            |      |            |        |
|------------|------------|------|------------|--------|
| SYMBOL     | MILLIMETER |      | INCHES     |        |
|            | MIN        | MAX  | MIN        | MAX    |
| A          | 0.90       | 1.15 | 0.035      | 0.045  |
| A1         | 0.00       | 0.10 | 0.000      | 0.004  |
| A2         | 0.60       | 0.70 | 0.0236     | 0.0275 |
| b          | 0.30       | 0.50 | 0.012      | 0.020  |
| c          | 0.08       | 0.15 | 0.003      | 0.006  |
| D          | 2.80       | 3.00 | 0.110      | 0.118  |
| E          | 2.25       | 2.55 | 0.089      | 0.100  |
| E1         | 1.20       | 1.40 | 0.047      | 0.055  |
| e          | 0.95 BSC   |      | 0.0374 BSC |        |
| e1         | 1.80       | 2.00 | 0.071      | 0.079  |
| L          | 0.30       | 0.50 | 0.012      | 0.020  |
| θ          | 0          | 8°   | 0          | 8°     |

### Suggested Land Pattern



| DIMENSIONS |           |             |
|------------|-----------|-------------|
| DIM        | INCHES    | MILLIMETERS |
| M          | 0.0795    | 2.02        |
| C          | 0.0315    | 0.80        |
| Z          | 0.111     | 2.82        |
| e          | 0.037 BSC | 0.95 BSC    |
| e1         | 0.075 BSC | 1.9 BSC     |
| b          | 0.0315    | 0.80        |

### Contact Information

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