

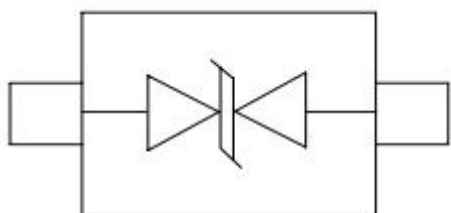
## Description

The WPE4581VD3 is designed to replace multilayer varistors (MLVs) in portable applications such as cell phones, notebook computers and PDA's, using monolithic silicon technology to provide fast response time and ultra low ESD clamping voltage, making this device an ideal solution for protecting sensitive semiconductor components from damage. The WPE4581VD3 complies with the IEC 61000- 4-2 (ESD) standard with  $\pm 30\text{kV}$  air and  $\pm 30\text{kV}$  contact discharge. The WPE4581VD3 is assembled into a lead-free SOD- 323 package and will protect one unidirectional line. These devices will fit on the same PCB pad area as an 0805 MLV device.

## Features

- 2000W peak pulse power (8/20us)
- Protects one data or power line
- Ultra low leakage: nA level
- Stand-off Voltage: 4.5V
- Ultra low clamping voltage
- Complies with following standards:
  - IEC 61000-4-2 (ESD) immunity test
    - Air discharge:  $\pm 30\text{kV}$
    - Contact discharge:  $\pm 30\text{kV}$
  - IEC61000-4-4 (EFT) 80A (5/50ns)
- RoHS Compliant

## Dimensions & Symbol (Unit: mm Max)



## Mechanical Characteristics

- Package: SOD-323
- Lead Finish: Matte Tin
- Case Material: "Green" Molding Compound.
- UL Flammability Classification Rating 94V-0
- 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
- Peripherals
- Pagers Peripherals
- Desktop and Servers

## Marking Information



Bar denotes cathode

Details marking code reference customer approval list

## Ordering Information

| Part Number | Packaging        | Reel Size |
|-------------|------------------|-----------|
| WPE4581VD3  | 3000/Tape & Reel | 7 inch    |

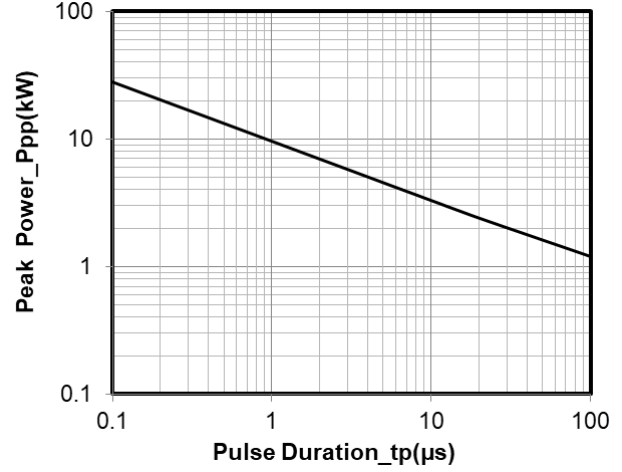
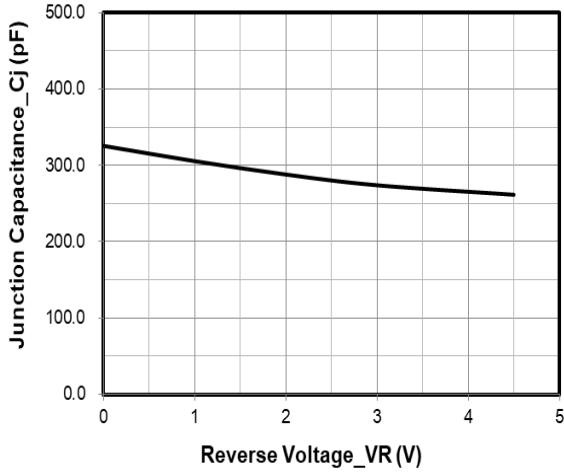
**Absolute Maximum Ratings (T<sub>A</sub>=25°C unless otherwise specified)**

| Parameter                       | Symbol           | Value       | Unit |
|---------------------------------|------------------|-------------|------|
| Peak Pulse Power (8/20μs)       | P <sub>pk</sub>  | 2400        | W    |
| Peak Pulse Current (8/20μs)     | I <sub>pp</sub>  | 140         | A    |
| ESD per IEC 61000-4-2 (Air)     | V <sub>ESD</sub> | ±30         | kV   |
| ESD per IEC 61000-4-2 (Contact) |                  | ±30         |      |
| 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)**

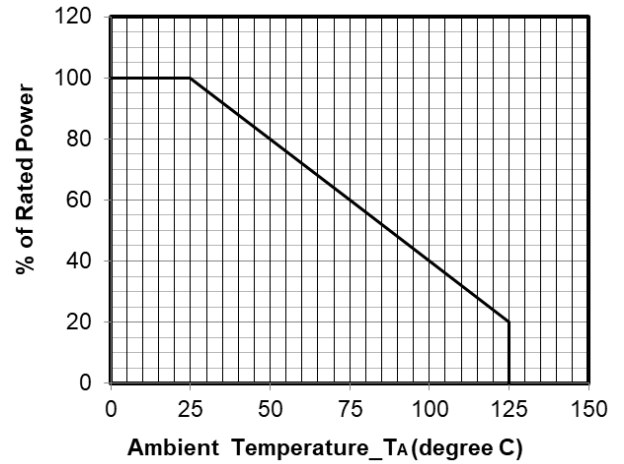
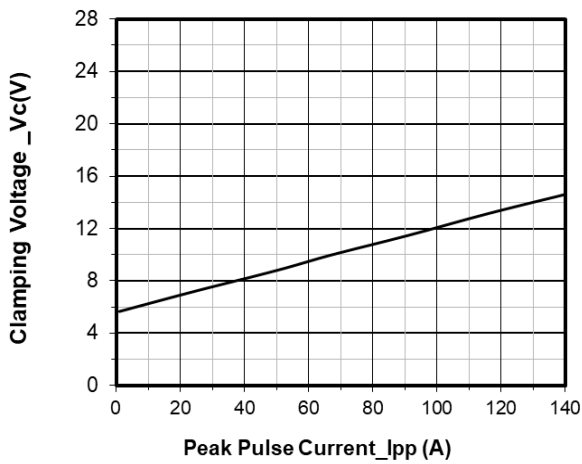
| Parameter               | Symbol           | Min | Typ | Max | Unit | Test Condition                          |
|-------------------------|------------------|-----|-----|-----|------|---|
| Reverse Working Voltage | V <sub>RWM</sub> |     |     | 4.5 | V    |   |
| Breakdown Voltage       | V <sub>BR</sub>  | 4.7 |     |     | V    | I <sub>T</sub> = 1mA                    |
| Reverse Leakage Current | I <sub>R</sub>   |     |     | 1.0 | μA   | V <sub>RWM</sub> = 4.5V                 |
| Clamping Voltage        | V <sub>C</sub>   |     |     | 7.5 | V    | I <sub>PP</sub> = 20A (8 x 20μs pulse)  |
| Clamping Voltage        | V <sub>C</sub>   |     |     | 17  | V    | I <sub>PP</sub> = 140A (8 x 20μs pulse) |
| Junction Capacitance    | C <sub>J</sub>   |     |     | 300 | pF   | V <sub>R</sub> = 0V, f = 1MHz           |

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



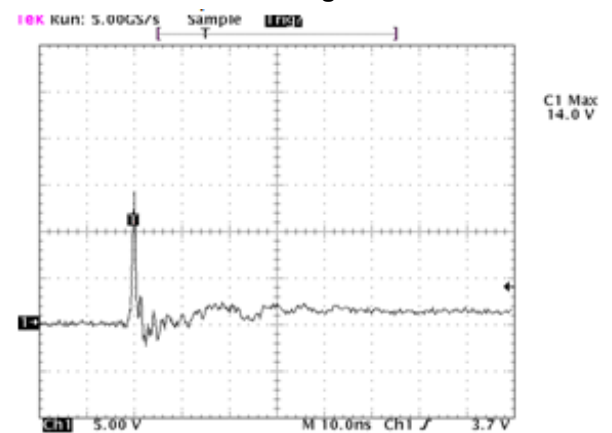
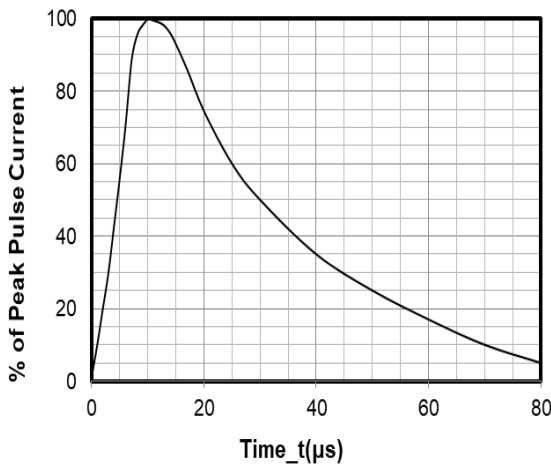
**Junction Capacitance vs. Reverse Voltage**

**Peak Pulse Power vs. Pulse Time**



**Clamping Voltage vs. Peak Pulse Current (t<sub>p</sub> = 8/20μs)**

**Power Derating Curve**

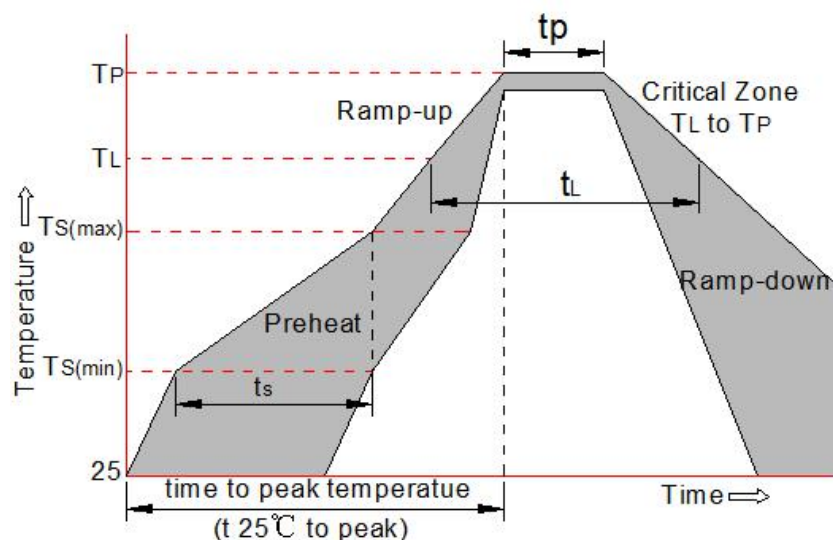


**8 X 20μs Pulse Waveform**

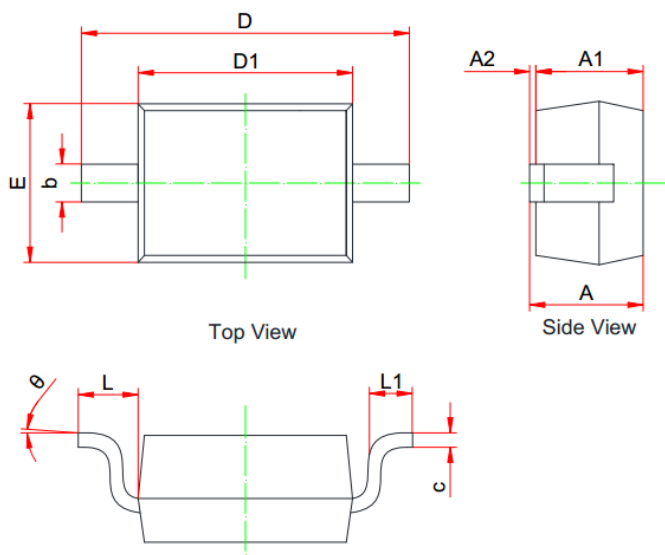
Note: Data is taken with a 10x attenuator  
**ESD Clamping Voltage**  
**8 kV Contact per IEC61000-4-2**

## Soldering Parameters

|   |                                   |                                 |
|---|-----------------------------------|---------------------------------|
| 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) ( $t_s$ )      | 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



| SYM | MILLIMETERS |       |       |
|-----|-------------|-------|-------|
|     | MIN         | NOM   | MAX   |
| A   | 0.800       | --    | 1.100 |
| A1  | 0.800       | --    | 0.900 |
| A2  | 0.000       | --    | 0.100 |
| b   | 0.250       | --    | 0.400 |
| c   | 0.080       | --    | 0.177 |
| D1  | 1.600       | 1.700 | 1.800 |
| D   | 2.300       | --    | 2.800 |
| E   | 1.150       | --    | 1.400 |
| L   | 0.475REF    |       |       |
| L1  | 0.100       | --    | 0.500 |
| Θ   | 0°          | --    | 8°    |

## Suggested Land Pattern



Unit: mm

## Contact information

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