



# WS03DLC-B

## Transient Voltage Suppressor

### Features

- 320 Watts Peak Pulse Power per Line ( $t_p = 8/20\mu s$ )
- Bidirectional Configuration
- Protects One Power or I/O Port
- Low Clamping Voltages
- Ultra Low Capacitance: 1.0 pF Typical

### IEC COMPATIBILITY (EN61000-4)

- IEC 61000-4-2 (ESD)  $\pm 30kV$  (air),  $\pm 30kV$  (contact)
- IEC 61000-4-4 (EFT) 40A (5/50ns)
- IEC 61000-4-5(Surge): 20A (8/20 $\mu s$ )



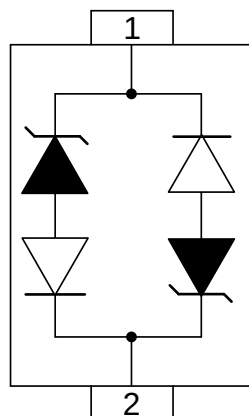
### Mechanical Characteristics

- Molded JEDEC SOD-323 package
- Weight 10 milligrams (Approximate)
- Flammability rating UL 94V-0
- 8mm Tape and Reel Per EIA Standard 481
- Device Marking: Marking Code
- RoHS Compliant

### Applications

- Ethernet - 10/100/1000 Base T
- Cellular Phones
- Handheld - Wireless Systems
- Personal Digital Assistant (PDA)
- USB Interface

### PIN Configuration



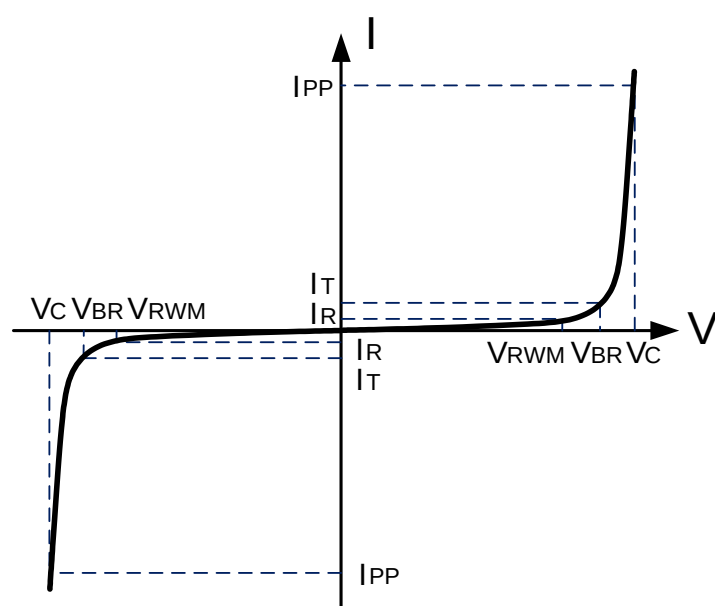
**BIDIRECTIONAL**

## Absolute Maximum Rating

| Rating                                | Symbol    | Value        | Units |
|---------------------------------------|-----------|--------------|-------|
| Peak Pulse Power ( $t_p=8/20\mu s$ )  | $P_{PP}$  | 320          | W     |
| Peak Pulse Current( $t_p=8/20\mu s$ ) | $I_{PP}$  | 20           | A     |
| Operating Temperature                 | $T_J$     | -55 to + 125 | °C    |
| Storage Temperature                   | $T_{STG}$ | -55 to +150  | °C    |

## Electrical Parameters (T=25°C )

| Symbol    | Parameter                           |
|-----------|-------------------------------------|
| $I_{PP}$  | Reverse Peak Pulse Current          |
| $V_C$     | Clamping Voltage @ $I_{PP}$         |
| $V_{RWM}$ | Reverse Stand-Off Voltage           |
| $I_R$     | Reverse Leakage Current @ $V_{RWM}$ |
| $V_{BR}$  | Breakdown Voltage @ $I_T$           |
| $I_T$     | Test Current                        |



## Electrical characteristics

| WS03DLC-B                         |           |                                     |         |         |         |          |
|-----------------------------------|-----------|-------------------------------------|---------|---------|---------|----------|
| Parameter                         | Symbol    | Conditions                          | Minimum | Typical | Maximum | Units    |
| Reverse Stand-Off Voltage         | $V_{RWM}$ |                                     |         |         | 3.3     | V        |
| Reverse Breakdown Voltage         | $V_{BR}$  | $I_T=1mA$                           | 4.0     |         | 7.0     | V        |
| Reverse Leakage Current           | $I_R$     | $V_{RWM}=3.3V$ , $T=25^\circ C$     |         |         | 200     | nA       |
| Clamping Voltage                  | $V_C$     | $I_{PP}=1A$ , $t_p=8/20\mu s$       |         | 8       | 11      | V        |
| Clamping Voltage                  | $V_C$     | $I_{PP}=20A$ , $t_p=8/20\mu s$      |         | 16      | 19      | V        |
| ESD Clamping Voltage <sup>1</sup> | $V_C$     | $I_{PP} = 4A$<br>$t_p = 0.2/100ns$  |         | 8.5     |         | V        |
| ESD Clamping Voltage <sup>1</sup> | $V_C$     | $I_{PP} = 16A$<br>$t_p = 0.2/100ns$ |         | 12.0    |         | V        |
| Dynamic Resistance <sup>1,2</sup> | $R_{DYN}$ | $TLP=0.2/100ns$                     |         | 0.3     |         | $\Omega$ |
| Junction Capacitance              | $C_j$     | $V_R = 0V$ , $f= 1MHz$              |         | 1.0     | 1.5     | pF       |

**Note:** 1、TLP Setting :  $t_p=100ns$ ,  $t_r=0.2ns$ ,  $I_{TLP}$  and  $V_{TLP}$  sample window:  $t_1=70ns$  to  $t_2=90ns$ .

2、Dynamic resistance calculated from  $I_{PP}=4A$  to  $I_{PP}=16A$  using "Best Fit".

# Typical Characteristics

Figure 1: Peak Pulse Power vs. Pulse Time

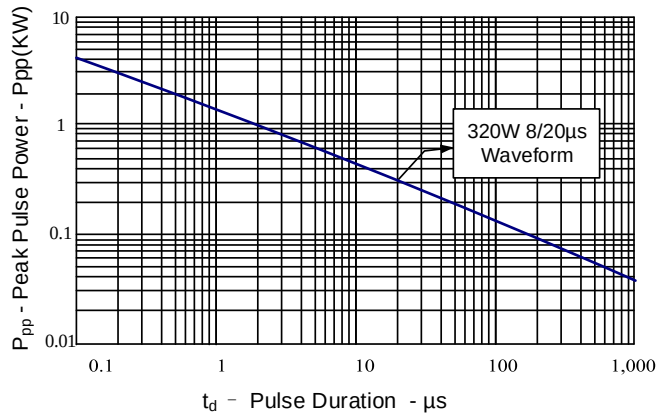


Figure 2: Power Derating Curve

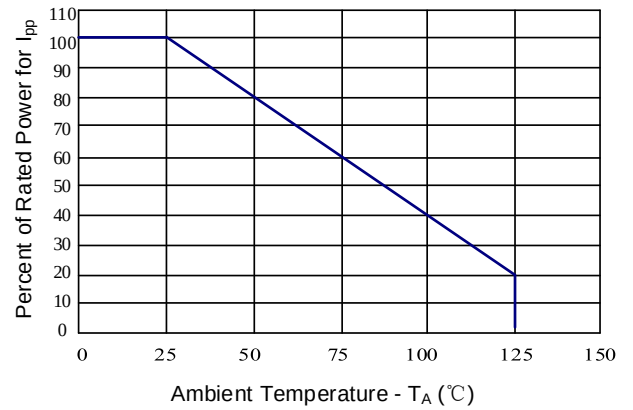


Figure 3: Clamping Voltage vs. Peak Pulse Current

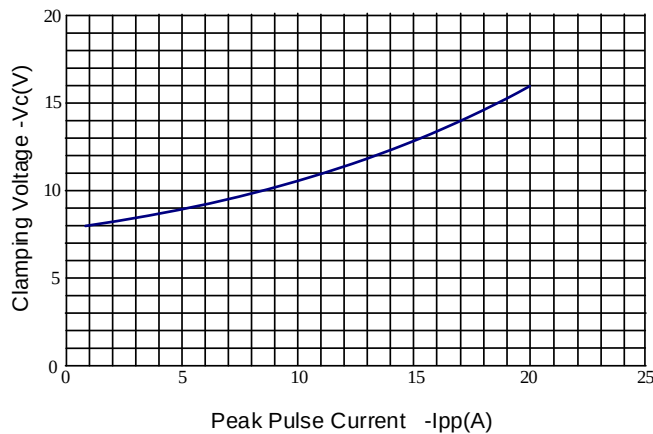


Figure 4: Normalized Junction Capacitance vs. Reverse Voltage

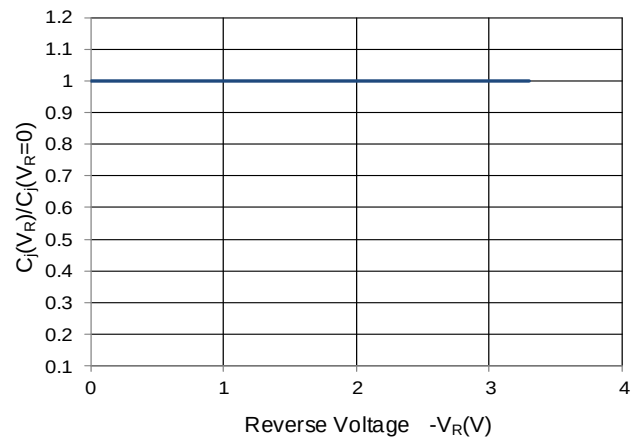


Figure 5: TLP Positive I-V Curve

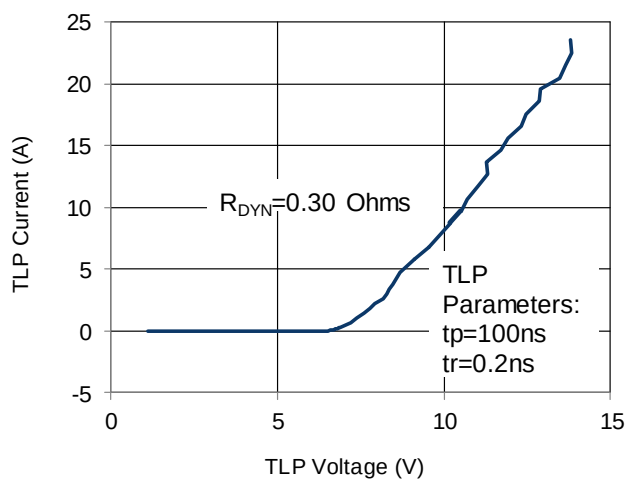
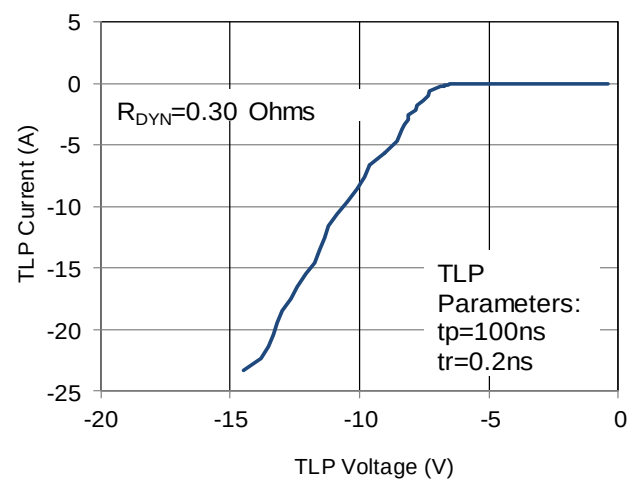
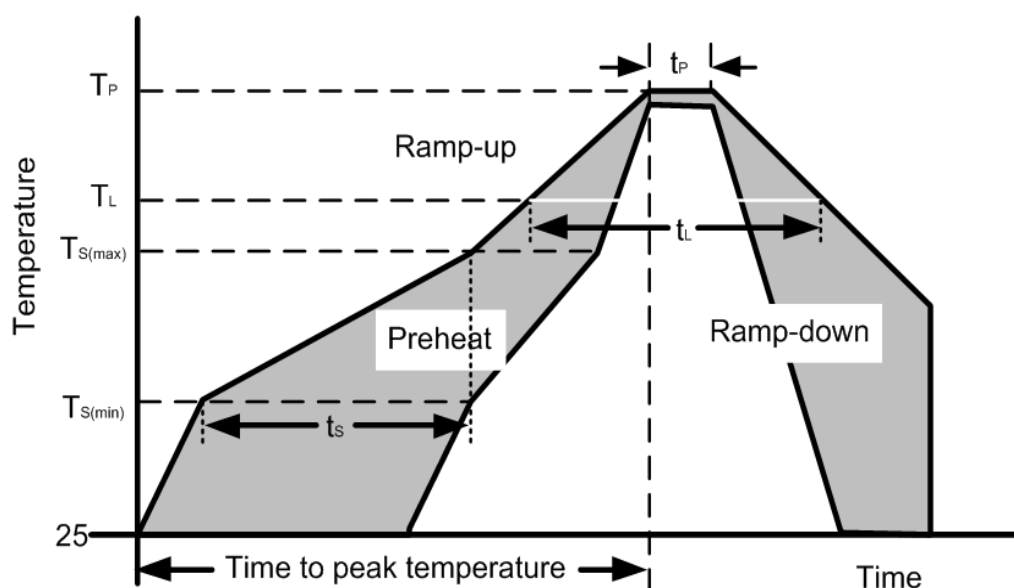


Figure 6: TLP Negative I-V Curve

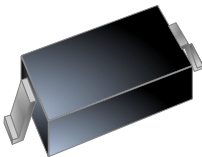


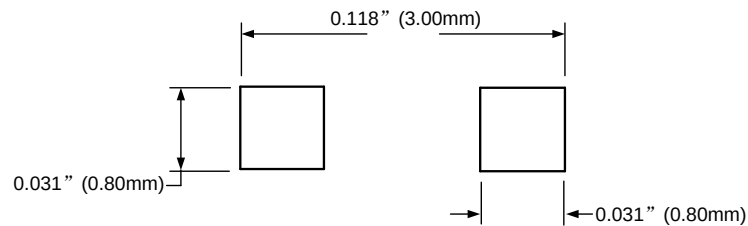
## Soldering Parameters

| Reflow Condition                                       |                                  | Pb – Free assembly |
|--------------------------------------------------------|----------------------------------|--------------------|
| Pre Heat                                               | Temperature Min ( $T_{s(min)}$ ) | 150°C              |
|                                                        | Temperature Max ( $T_{s(max)}$ ) | 200°C              |
|                                                        | Time (min to max) ( $t_s$ )      | 60 – 190 secs      |
| Average ramp up rate (Liquidus Temp) ( $T_L$ ) to peak |                                  | 5°C/second max     |
| $T_{s(max)}$ to $T_L$ ——Ramp-up Rate                   |                                  | 5°C/second max     |
| Reflow                                                 | Temperature ( $T_L$ ) (Liquidus) | 217°C              |
|                                                        | Temperature ( $t_L$ )            | 60 – 150 seconds   |
| Peak Temperature ( $T_P$ )                             |                                  | 260+0/-5 °C        |
| Time within actual peak Temperature ( $t_p$ )          |                                  | 20 – 40 seconds    |
| Ramp-down Rate                                         |                                  | 5°C/second max     |
| Time 25°C to peak Temperature ( $T_P$ )                |                                  | 8 minutes Max.     |
| Do not exceed                                          |                                  | 280°C              |

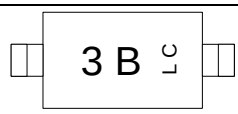


## Outline Drawing – SOD-323

|                 |             |                                                                                                       |          |       |
|-----------------|-------------|-------------------------------------------------------------------------------------------------------|----------|-------|
| PACKAGE OUTLINE |             | <br><b>SOD-323</b> |          |       |
| DIMENSIONS      |             |                                                                                                       |          |       |
| SYMBOL          | MILLIMETERS |                                                                                                       | INCHES   |       |
|                 | MIN         | MAX                                                                                                   | MIN      | MAX   |
| A               | 1.52        | 1.80                                                                                                  | 0.060    | 0.071 |
| B               | 0.25        | 0.40                                                                                                  | 0.010    | 0.016 |
| C               | 2.46        | 2.71                                                                                                  | 0.097    | 0.107 |
| D               | 0.80        | 1.16                                                                                                  | 0.031    | 0.046 |
| E               | 1.11        | 1.40                                                                                                  | 0.044    | 0.055 |
| F               | 0.08        | 0.20                                                                                                  | 0.003    | 0.008 |
| L               | 0.475 REF   |                                                                                                       | 0.019REF |       |
| L1              | 0.25        | 0.40                                                                                                  | 0.010    | 0.016 |
| H               | 0.00        | 0.10                                                                                                  | 0.000    | 0.004 |

|                                                                                     |  |                                              |
|-------------------------------------------------------------------------------------|--|----------------------------------------------|
| MOUNTING PAD                                                                        |  | Notes:<br>Controlling Dimension: Millimeter. |
|  |  |                                              |

## Marking Codes

|              |                                                                                     |
|--------------|-------------------------------------------------------------------------------------|
| Part Number  | WS03DLC-B                                                                           |
| Marking Code |  |

## Package Information

Qty: 3k/Reel

## CONTACT INFORMATION

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Specifications are subject to change without notice.  
 The device characteristics and parameters in this data sheet can and do vary in different applications and actual device performance may vary over time.  
 Users should verify actual device performance in their specific applications.