

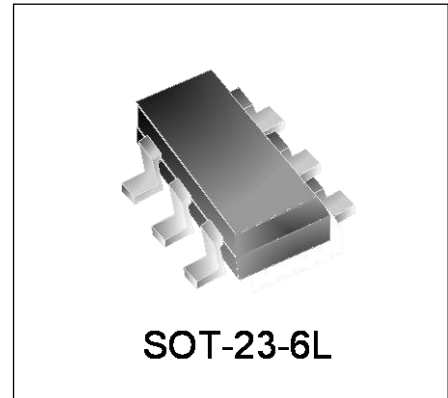


# WS05-4R-AT

## Transient Voltage Suppressor

### Features

- Solid-state silicon-avalanche technology
- 300 Watts Peak Pulse Power per Line ( $t_p=8/20\mu s$ )
- Low operating and clamping voltage
- Up to four I/O Lines of Protection
- Low Leakage current
- Low operating voltage:5V



### 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 (Lightning) 12A (8/20 $\mu s$ )

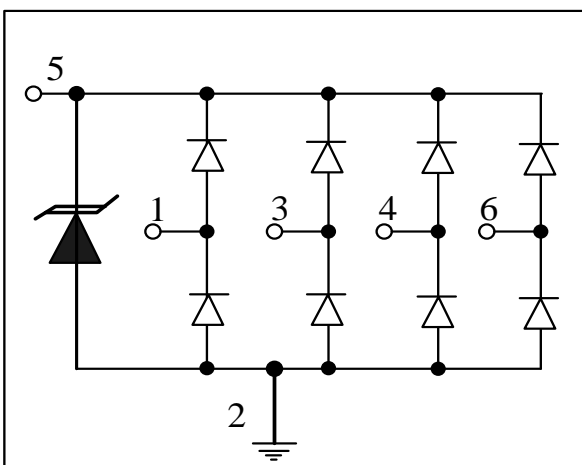
### Mechanical Characteristics

- SOT-23-6L package
- Marking: Marking Code
- Packaging: Tape and Reel
- RoHS Compliant & HF
- Device meets MSL1 requirement
- AEC-Q101 Qualified

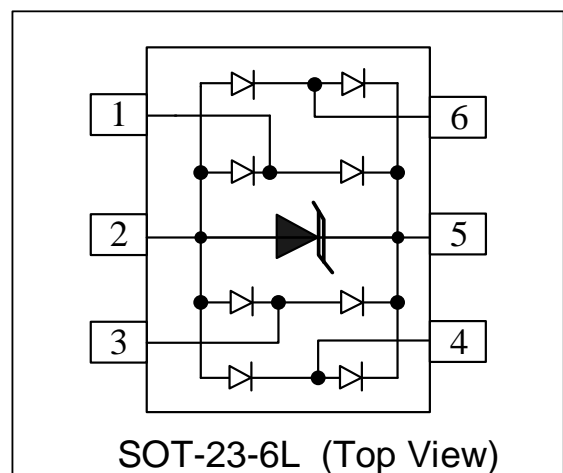
### Applications

- Video/Graphics Card
- Handheld & Portable Electronics
- PC/Notebook USB2.0/IEEE1394 ports
- 10/100/1000 Ethernet
- DVI interfaces
- Wireless data (WAN/LAN) systems

### Circuit Diagram



### Schematic & PIN Configuration

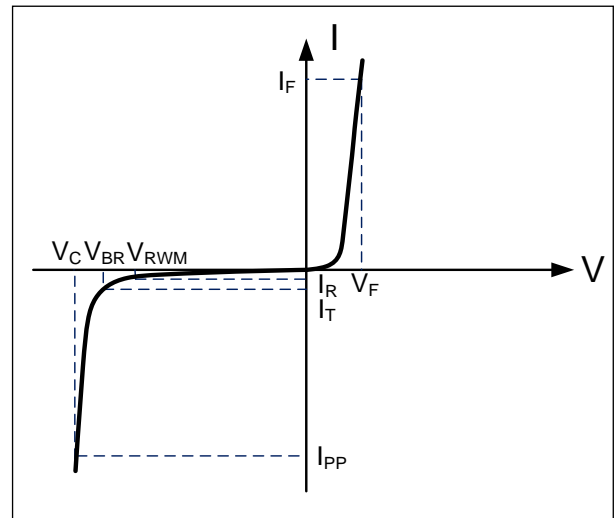


**Absolute Maximum Rating**

| Rating                                   | Symbol    | Value        | Units |
|--|-----------|--------------|-------|
| Peak Pulse Power ( $t_p = 8/20\mu s$ )   | $P_{PP}$  | 300          | Watts |
| Peak Pulse Current ( $t_p = 8/20\mu s$ ) | $I_{PP}$  | 12           | A     |
| Operating Temperature                    | $T_J$     | -55 to + 150 | °C    |
| Storage Temperature                      | $T_{STG}$ | -55 to +150  | °C    |

**Electrical Parameters**

| 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 @ $V_{RWM}$ |
| $V_{BR}$  | Reverse Breakdown Voltage @ $I_T$   |
| $I_T$     | Test Current                        |
| $I_F$     | Forward Current                     |
| $V_F$     | Forward Voltage @ $I_F$             |



**Electrical Characteristics (T=25°C unless otherwise noted)**

| WS05-4R-AT                        |           |   |         |         |         |          |
|-----------------------------------|-----------|---|---------|---------|---------|----------|
| Parameter                         | Symbol    | Conditions  | Minimum | Typical | Maximum | Units    |
| Reverse Stand-Off Voltage         | $V_{RWM}$ |   |         |         | 5       | V        |
| Reverse Breakdown Voltage         | $V_{BR}$  | $I_T = 1mA$   | 6       |         |         | V        |
| Reverse Leakage Current           | $I_R$     | $V_{RWM} = 5V$  |         |         | 500     | nA       |
| Clamping Voltage                  | $V_C$     | $I_{PP} = 12A, t_p = 8/20\mu s$<br>Any I/O pin to GND |         | 20      | 25      | V        |
| Dynamic Resistance <sup>1,2</sup> | $R_{DYN}$ | TLP=0.2/100ns   |         | 0.36    |         | $\Omega$ |
| ESD Clamping Voltage <sup>1</sup> | $V_C$     | $I_{PP} = 4A,$<br>$t_p = 0.2/100ns$ (TLP)             |         | 9.7     |         | V        |
| ESD Clamping Voltage <sup>1</sup> | $V_C$     | $I_{PP} = 16A,$<br>$t_p = 0.2/100ns$ (TLP)            |         | 14      |         | V        |
| Junction Capacitance              | $C_j$     | $V_R = 0V, f = 1MHz$<br>I/O pin to GND                |         | 1.5     | 2       | pF       |
|                                   |           | $V_R = 0V, f = 1MHz$<br>Between I/O pins              |         | 0.75    | 1       | pF       |

Notes : 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

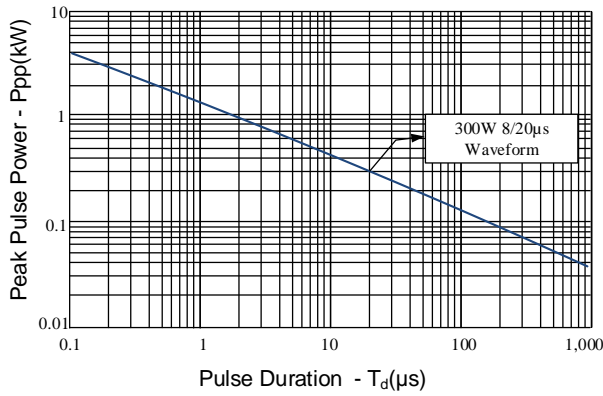


Figure 2: Power Derating Curve

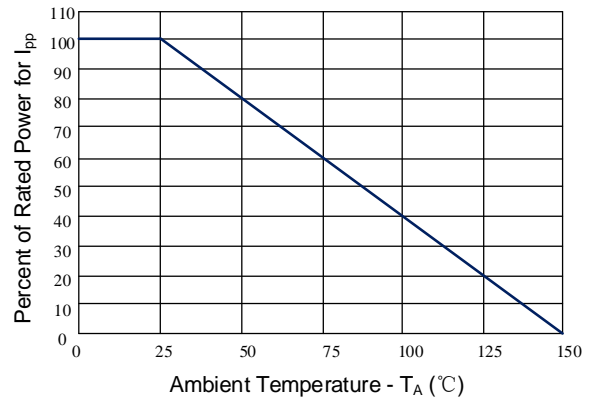


Figure 3: Clamping Voltage vs. Peak Pulse Current

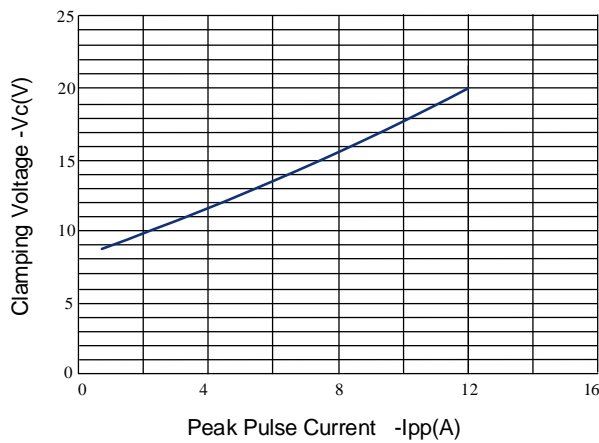


Figure 4: Normalized Junction Capacitance vs. Reverse Voltage (I/O-GND)

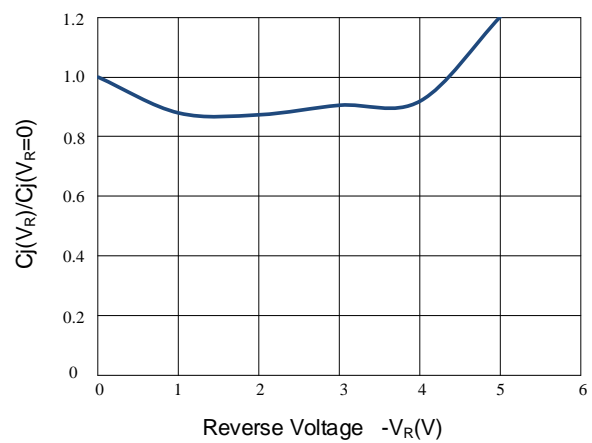


Figure 5: 8/20μs Pulse Waveform

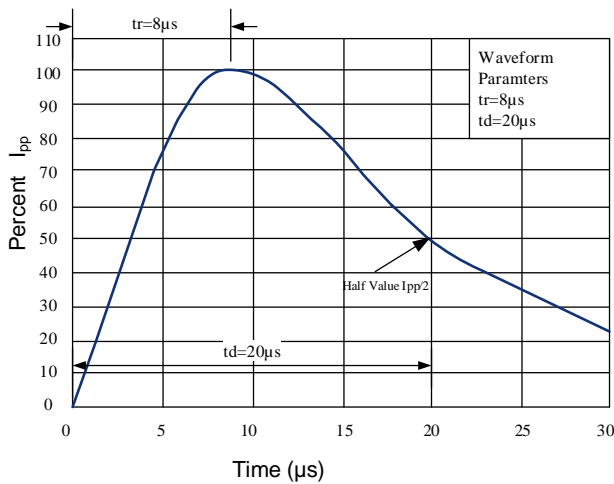
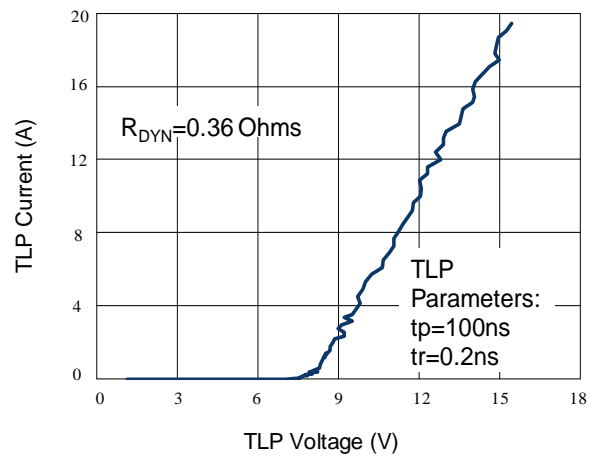
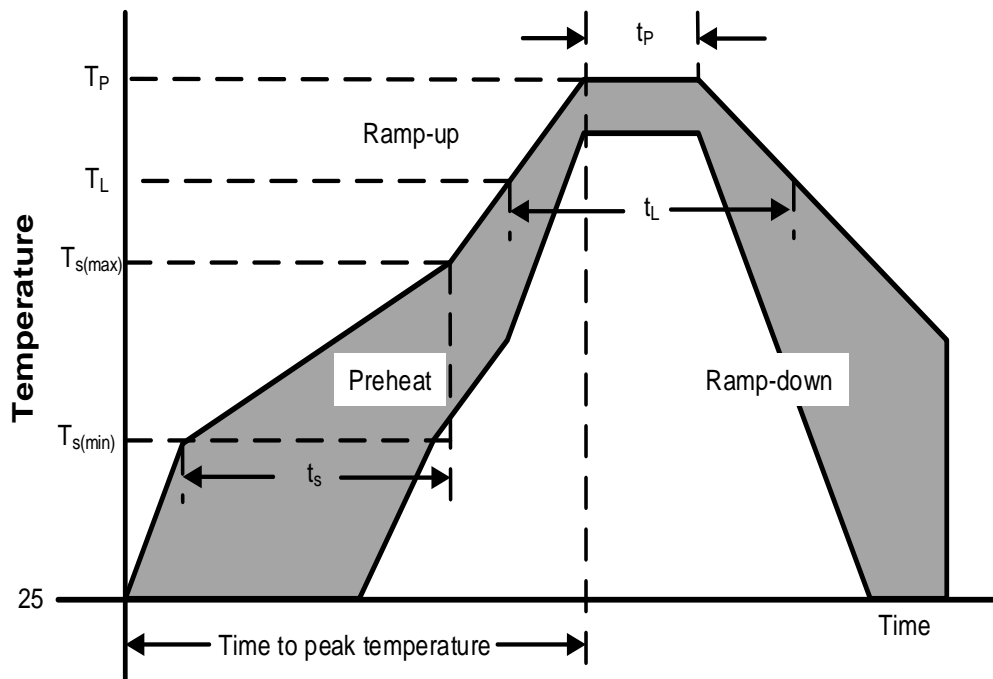


Figure 6: TLP I-V Curve



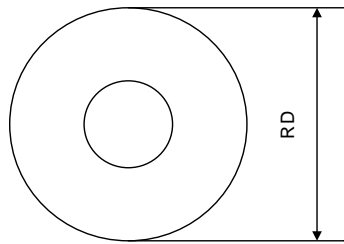
Soldering Parameters

| 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              |

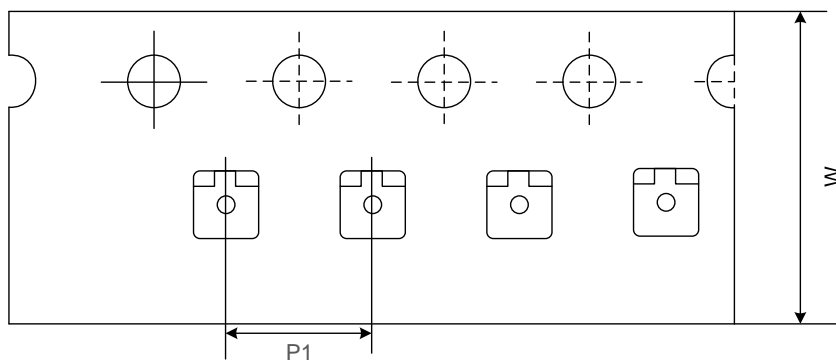


**Tape And Reel Information**

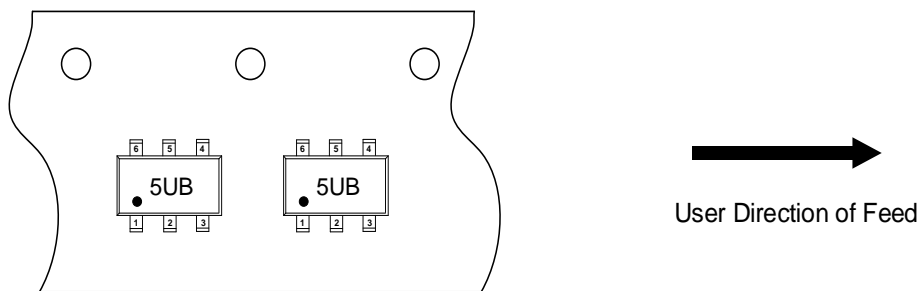
**Reel Dimensions**



**Tape Dimensions**



**Quadrant Assignments For PIN1 Orientation In Tape**



|    |   |        |
|----|---|--------|
| RD | Reel Dimensions                         | 7 inch |
| W  | Overall width of the carrier tape       | 8 mm   |
| P1 | Pitch between successive cavity centers | 4mm    |

Outline Drawing – SOT-23-6L

**PACKAGE OUTLINE**

SOT-23-6L

| DIMENSIONS |           |       |             |      |
|------------|-----------|-------|-------------|------|
| DIM        | INCHES    |       | MILLIMETERS |      |
|            | MIN       | MAX   | MIN         | MAX  |
| A          | 0.035     | 0.057 | 0.90        | 1.45 |
| A1         | 0.000     | 0.006 | 0.00        | 0.15 |
| A2         | 0.035     | 0.051 | 0.90        | 1.30 |
| b          | 0.014     | 0.020 | 0.35        | 0.50 |
| c          | 0.003     | 0.008 | 0.08        | 0.20 |
| D          | 0.110     | 0.119 | 2.80        | 3.02 |
| E1         | 0.060     | 0.069 | 1.50        | 1.75 |
| E          | 0.102     | 0.118 | 2.60        | 3.00 |
| e          | 0.037 BSC |       | 0.95 BSC    |      |
| e1         | 0.075 BSC |       | 1.90 BSC    |      |
| L          | 0.014     | 0.024 | 0.35        | 0.60 |
| L1         | 0.022     | 0.030 | 0.55        | 0.75 |
| θ 1        | 0°        | 8°    | 0°          | 8°   |
| N          | 6         |       | 6           |      |

| DIMENSIONS |        |             |
|------------|--------|-------------|
| DIM        | INCHES | MILLIMETERS |
| C          | 0.098  | 2.50        |
| G          | 0.055  | 1.40        |
| P          | 0.037  | 0.95        |
| X          | 0.024  | 0.60        |
| Y          | 0.043  | 1.10        |
| Z          | 0.141  | 3.60        |

**Notes:**

Controlling Dimension: Millimeter.

**Marking Codes**

|              |         |
|--------------|---------|
| Part Number  | WS05-4R |
| Marking Code |         |

**Package Information**

Qty: 3k/Reel

**CONTACT INFORMATION**

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WAYON website: <http://www.way-on.com>

For additional information, please contact your local Sales Representative.

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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.

单击下面可查看定价，库存，交付和生命周期等信息

[>>WAY-ON\(维安\)](#)