

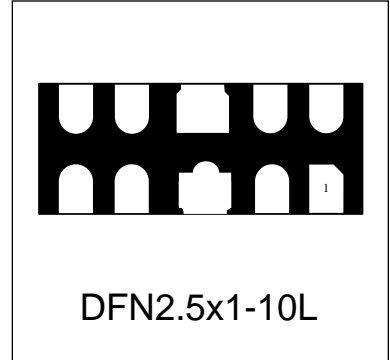


WS5444EC

Transient Voltage Suppressor

Features

- Solid-state silicon-avalanche technology
- Low operating and clamping voltage
- Up to four I/O Lines of Protection
- Low operating voltage:3.3V
- Flow-Through design



IEC COMPATIBILITY (EN61000-4)

- IEC 61000-4-2 (ESD) $\pm 25\text{kV}$ (air), $\pm 20\text{kV}$ (contact)
- IEC 61000-4-4 (EFT) 40A (5/50ns)
- IEC 61000-4-5 (Lightning) 6A (8/20 μs)

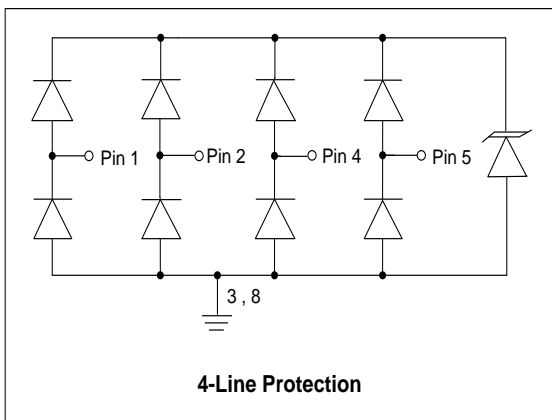
Mechanical Characteristics

- DFN-10L package (2.5x1.0x0.50mm)
- Marking: Marking Code
- Packaging: Tape and Reel
- RoHS Compliant & HF
- Device meets MSL1 requirement

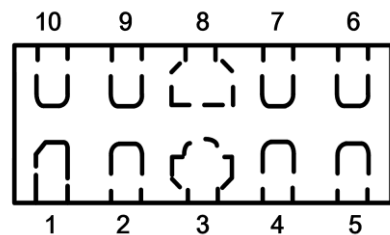
Applications

- Digital Visual Interface(DVI)
- MDDI Ports
- DisplayPort TM Interface
- PCI Express
- High Definition Multi-Media Interface(HDMI)

Circuit Diagram



Schematic & Pin Configuration



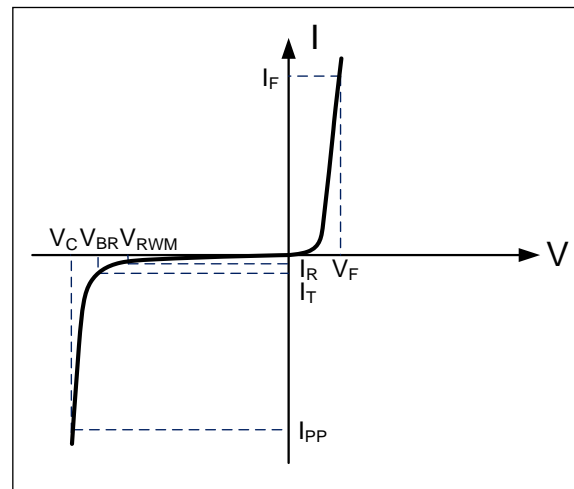
| Pin | Identificaion |
|----------|--|
| 1,2,4,5 | Input Lines |
| 6,7,9,10 | Output Lines (No Internal Connection) |
| 3,8 | Ground |

Absolute Maximum Rating

| Rating | Symbol | Value | Units |
|--|-----------|--------------|-------|
| Peak Pulse Power ($t_p = 8/20\mu s$) | P_{PP} | 54 | Watts |
| Peak Pulse Current ($t_p = 8/20\mu s$) | I_{pp} | 6 | A |
| Operating Temperature | T_J | -55 to + 125 | °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} | 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)

| Parameter | Symbol | Conditions | Minimum | Typical | Maximum | Units |
|-----------------------------------|-----------|--|---------|---------|---------|----------|
| Reverse Stand-Off Voltage | V_{RWM} | Any I/O pin to ground | | | 3.3 | V |
| Reverse Breakdown Voltage | V_{BR} | $I_T = 1mA$ Any I/O pin to ground | 4.5 | | | V |
| Reverse Leakage Current | I_R | $V_{RWM} = 3.3V$, Any I/O pin to ground | | | 500 | nA |
| Forward Voltage | V_F | $I_F = 10mA$ | 0.6 | | 1 | V |
| Clamping Voltage | V_C | $I_{pp} = 6A$, $t_p = 8/20\mu s$ Any I/O pin to ground | | 7.5 | 9 | V |
| Dynamic Resistance ^{1,2} | R_{DYN} | TLP=0.2/100ns | | 0.26 | | Ω |
| ESD Clamping Voltage ¹ | V_C | $I_{PP} = 4A$, $t_p = 0.2/100ns$ (TLP) | | 7.1 | | V |
| ESD Clamping Voltage ¹ | V_C | $I_{PP} = 16A$, $t_p = 0.2/100ns$ (TLP) | | 10.2 | | V |
| Junction Capacitance | C_j | $V_R = 2.5V$, $f = 1MHz$ Any I/O pin to GND | | 0.58 | 0.65 | pF |
| Junction Capacitance | C_j | $V_R = 2.5V$, $f = 1MHz$ Between I/O pin | | 0.3 | 0.35 | 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

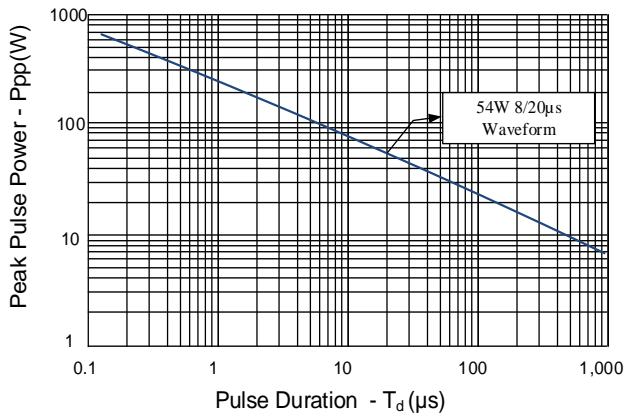


Figure 2: Power Derating Curve

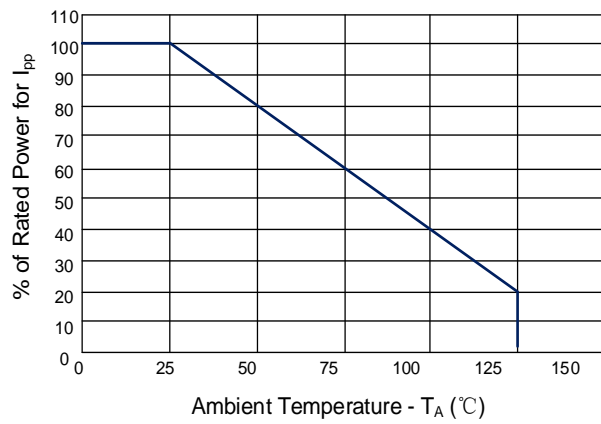


Figure 3: Clamping Voltage vs. Peak Pulse Current

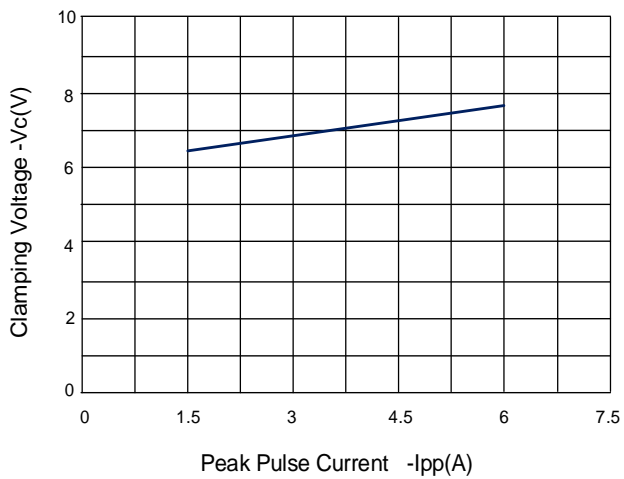


Figure 4: Normalized Junction Capacitance vs. Reverse Voltage

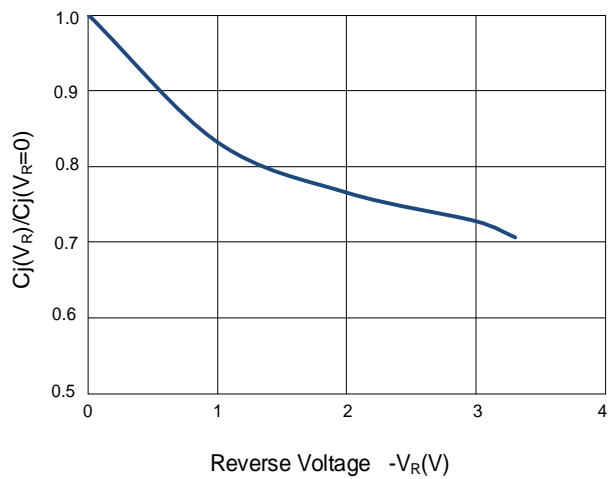


Figure 5: 8/20μs Pulse Waveform

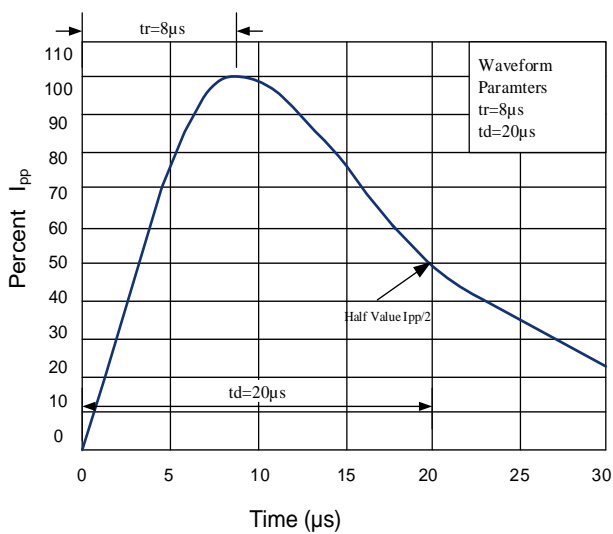
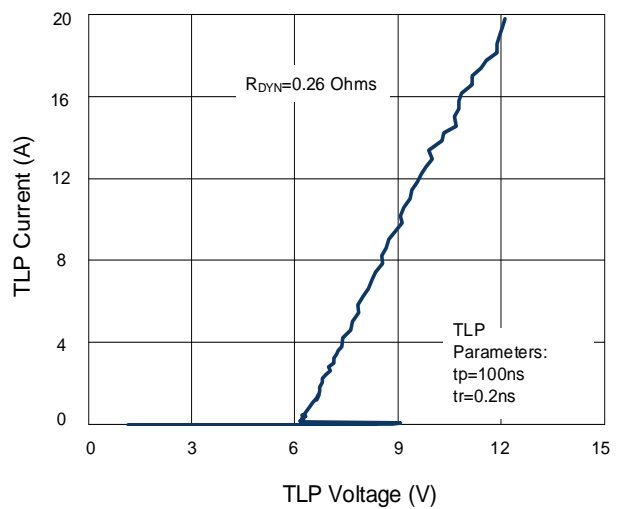
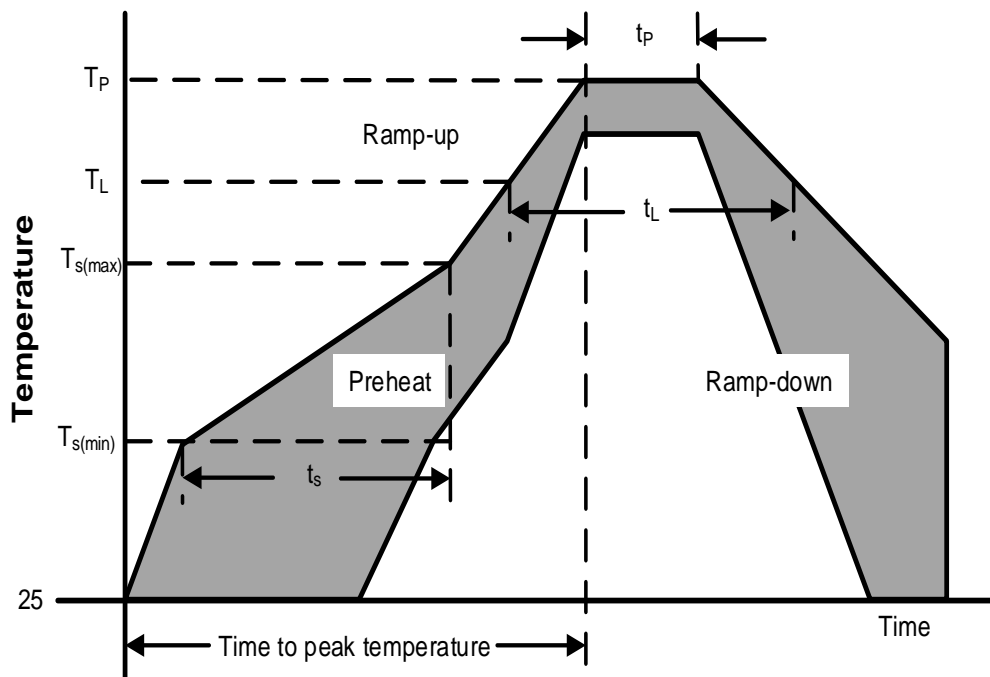


Figure 6: TLP I-V Curve



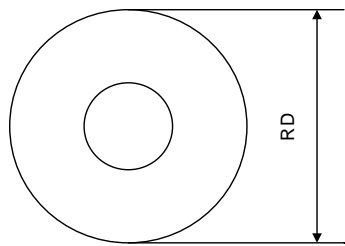
Soldering Parameters

| 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 |

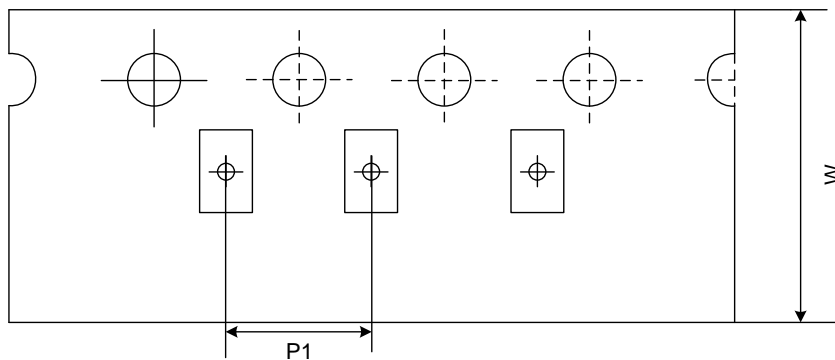


Tape And Reel Information

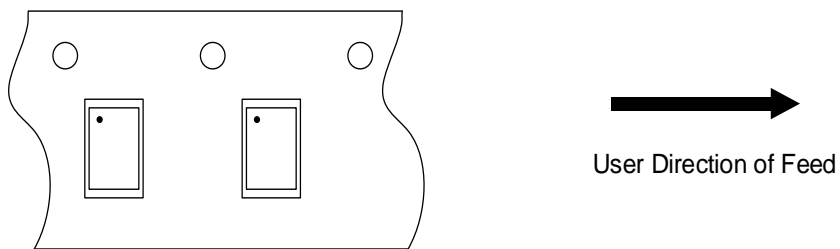
Reel Dimensions



Tape Dimensions

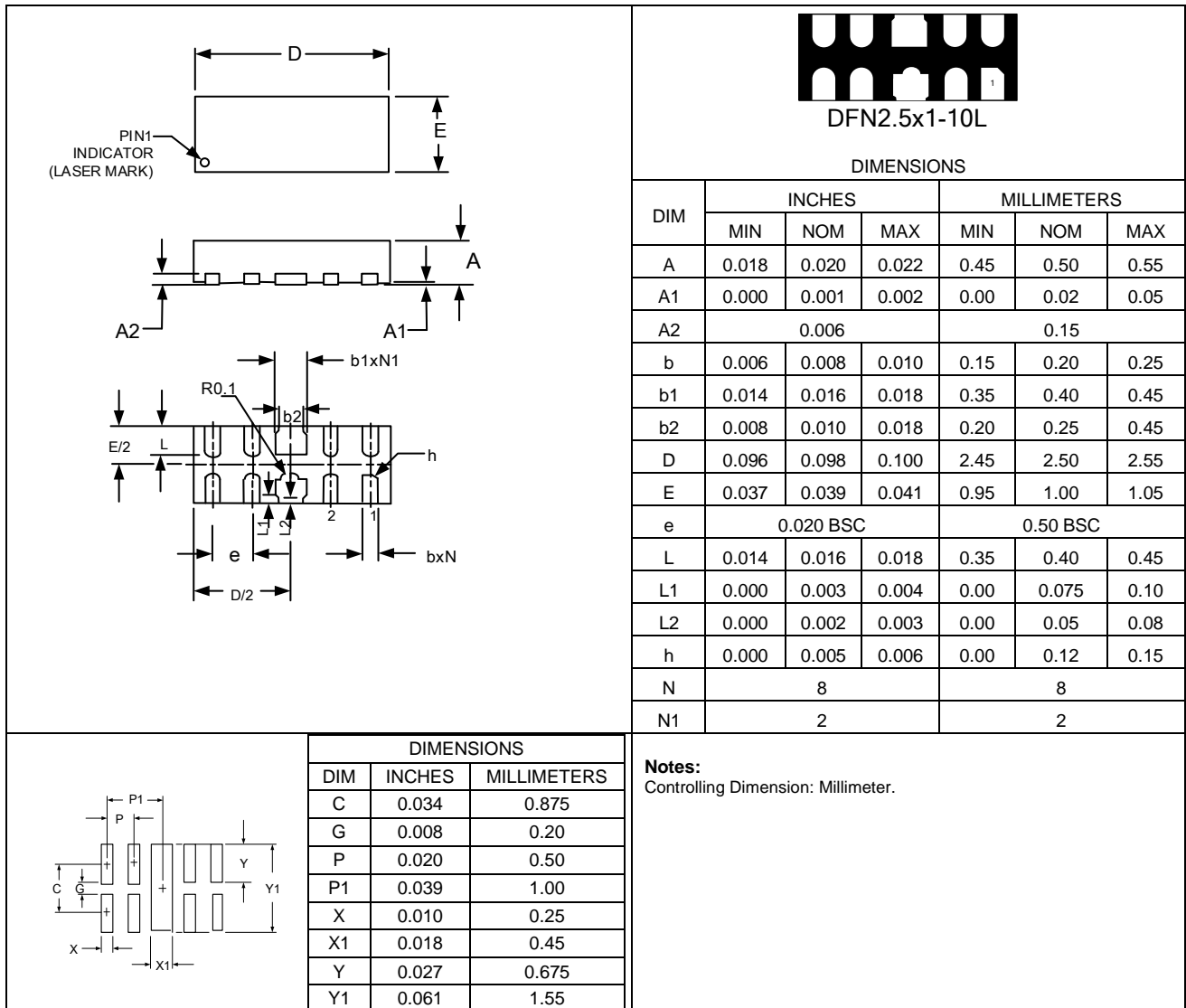


Quadrant Assignments For PIN1 Orientation In Tape



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

Outline Drawing –DFN2510-10L



Marking Codes

| | |
|--------------|----------|
| Part Number | WS5444EC |
| Marking Code | |

Package Information

Qty: 3k/Reel

CONTACT INFORMATION

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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.*