

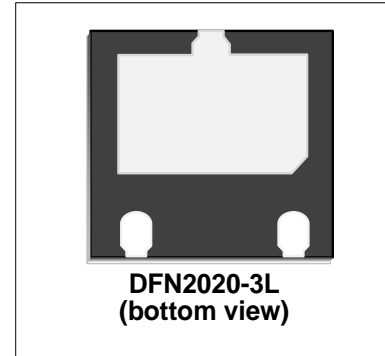


# WS18P4N3A

## Transient Voltage Suppressor

### Features

- 5760 Watts Peak Power ( $t_p = 8/20\mu s$ )
- Working Voltage: 18V
- Excellent Clamping Capability
- Low Leakage Current
- Low profile package



### 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) 160A (8/20 $\mu s$ )

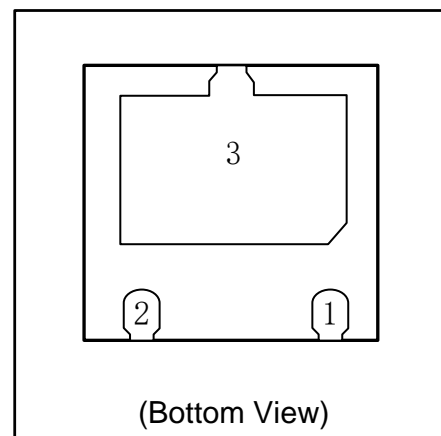
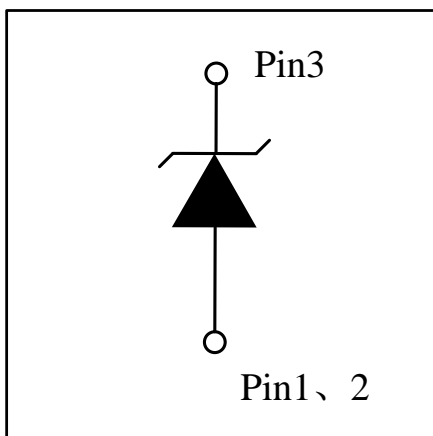
### Mechanical Characteristics

- DFN2020-3L package
- Marking : Making Code
- Packaging : Tape and Reel per EIA 481
- RoHS Compliant

### Applications

- I/O Interfaces
- Power lines
- Automotive and Telecommunication
- Computer & Consumer Electronics
- Industrial Electronics
- Microcontroller Input Protection

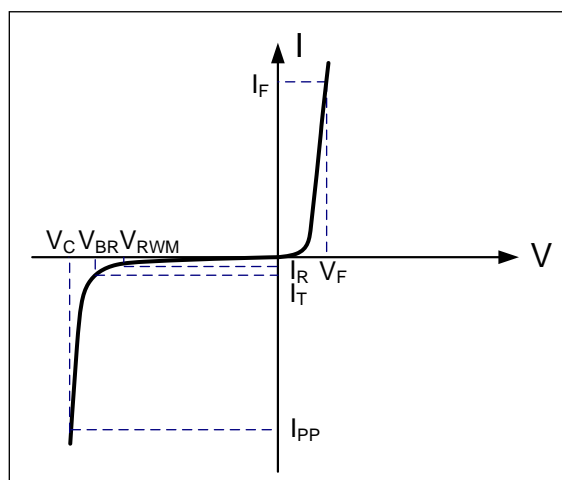
### PIN Configuration



| Absolute Maximum Rating                |           |              |             |
|--|-----------|--------------|-------------|
| Rating                                 | Symbol    | Value        | Units       |
| Peak Pulse Power ( $t_p=8/20\mu s$ )   | $P_{PP}$  | 5760         | Watts       |
| Peak Pulse Current ( $t_p=8/20\mu s$ ) | $I_{PP}$  | 160          | A           |
| Operating Temperature                  | $T_J$     | -55 to + 125 | $^{\circ}C$ |
| Storage Temperature                    | $T_{STG}$ | -55 to +150  | $^{\circ}C$ |

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                        |
| $I_F$     | Forward Current                     |
| $V_F$     | Forward Voltage @ $I_F$             |



Electrical Characteristics

| WS18P4N3A                         |           |                                     |         |         |         |          |
|-----------------------------------|-----------|-------------------------------------|---------|---------|---------|----------|
| Parameter                         | Symbol    | Conditions                          | Minimum | Typical | Maximum | Units    |
| Reverse Stand-Off Voltage         | $V_{RWM}$ |                                     |         |         | 18      | V        |
| Reverse Breakdown Voltage         | $V_{BR}$  | $I_T=1mA$                           | 20      |         | 25      | V        |
| Reverse Leakage Current           | $I_R$     | $V_{RWM}=18V, T=25^{\circ}C$        |         |         | 200     | nA       |
| Forward Voltage                   | $V_F$     | $I_F=10mA$                          | 0.6     |         | 1       | V        |
| Clamping Voltage <sup>1</sup>     | $V_C$     | $I_{PP}=1A, t_p=8/20\mu s$          |         | 21.5    | 25      | V        |
| Clamping Voltage <sup>1</sup>     | $V_C$     | $I_{PP}=150A, t_p=8/20\mu s$        |         | 31      | 33      | V        |
| Clamping Voltage <sup>1</sup>     | $V_C$     | $I_{PP}=160A, t_p=8/20\mu s$        |         | 33      | 36      | V        |
| Dynamic Resistance <sup>2,3</sup> | $R_{DYN}$ | $TLP=0.2/100ns$                     |         | 0.02    |         | $\Omega$ |
| ESD Clamping Voltage <sup>1</sup> | $V_C$     | $I_{PP} = 4A$<br>$t_p = 0.2/100ns$  |         | 22.4    |         | V        |
| ESD Clamping Voltage <sup>1</sup> | $V_C$     | $I_{PP} = 16A$<br>$t_p = 0.2/100ns$ |         | 22.6    |         | V        |
| Junction Capacitance <sup>1</sup> | $C_j$     | $V_R = 0V, f = 1MHz$                |         | 970     | 1500    | pF       |

Notes : 1、 Measured from pin 3 to pin 1 & pin 2.

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

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

### Typical Characteristics

Figure 1: Peak Pulse Power vs. Pulse Time

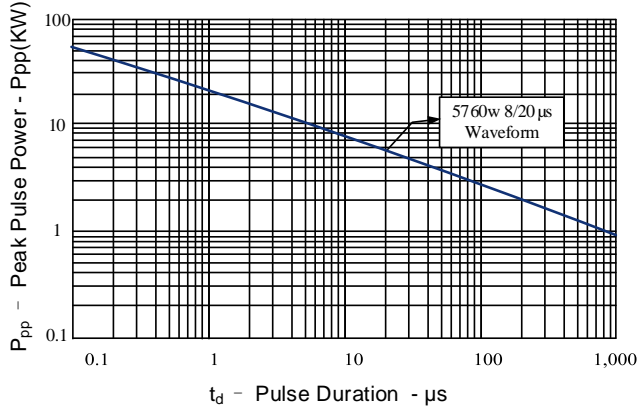


Figure 2: Power Derating Curve

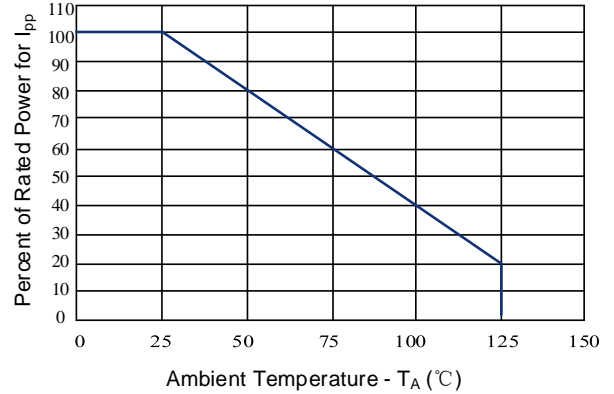


Figure 3: Clamping Voltage vs. Peak Pulse Current

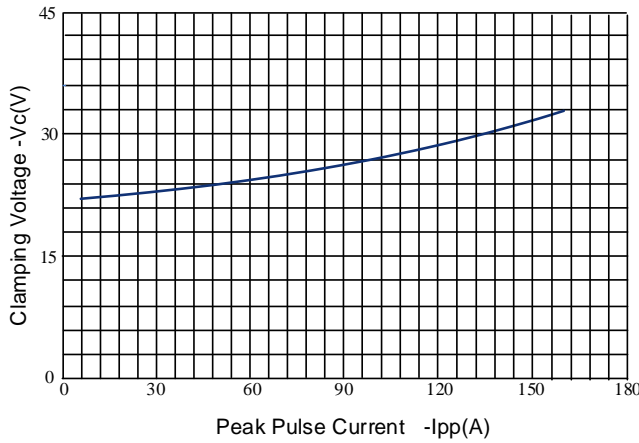


Figure 4: Normalized Junction Capacitance vs. Reverse Voltage

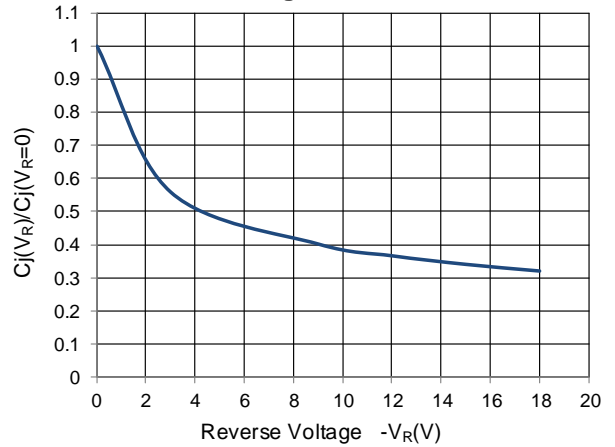


Figure 5: 8/20μs Pulse Waveform

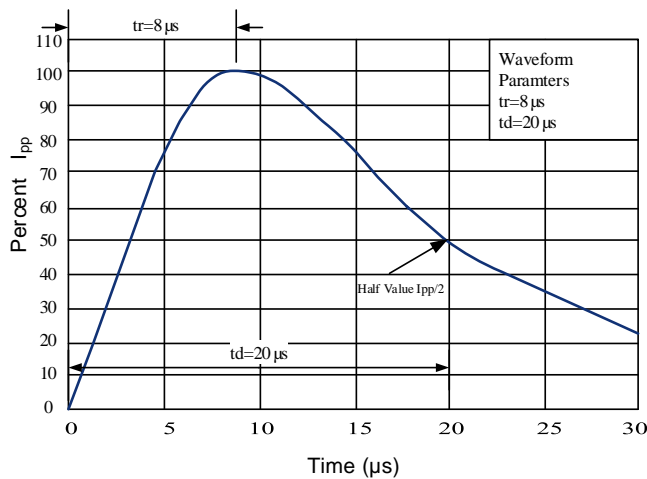
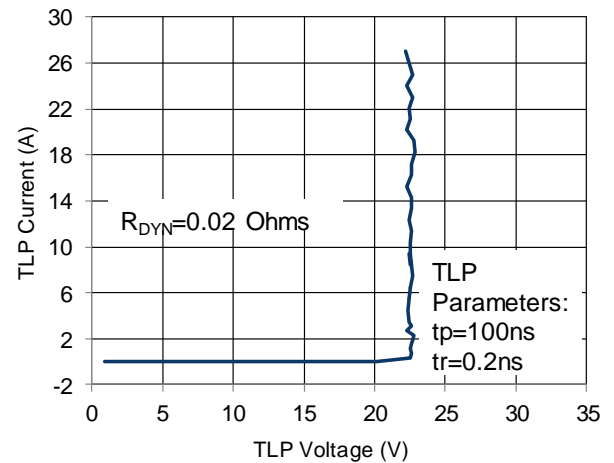
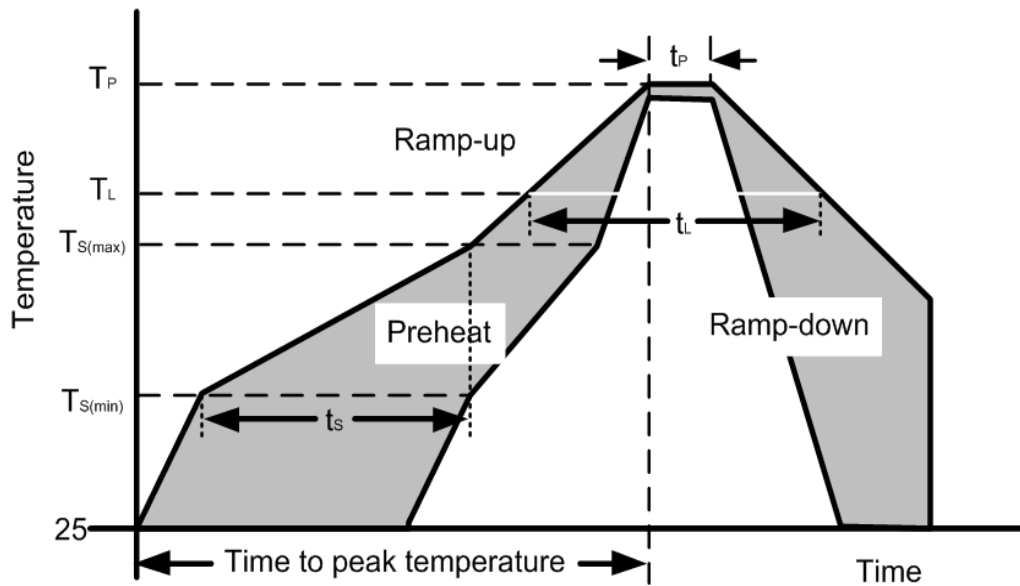


Figure 6: TLP I-V Curve



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              |



Outline Drawing –DFN2020-3L

**PACKAGE OUTLINE**

**TOP VIEW**

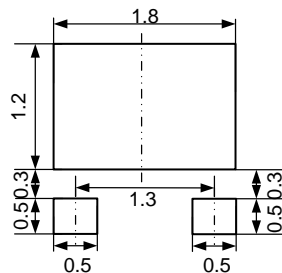
**BOTTOM VIEW**

**SIDE VIEW**

**DFN2020-3L**

| SYMBOL | MILLIMETERS |      |      |
|--------|-------------|------|------|
|        | MIN         | NOM  | MAX  |
| A      | 0.45        | 0.55 | 0.60 |
| A1     | 0.00        | 0.02 | 0.05 |
| b      | 0.25        | 0.30 | 0.35 |
| b1     | 0.20REF     |      |      |
| c      | 0.152REF    |      |      |
| D      | 1.90        | 2.00 | 2.10 |
| D2     | 1.40        | 1.50 | 1.60 |
| e      | 1.30BSC     |      |      |
| E      | 1.90        | 2.00 | 2.10 |
| E2     | 0.95        | 1.05 | 1.15 |
| E3     | 0.20        | 0.30 | 0.40 |
| L      | 0.35        | 0.40 | 0.45 |
| L1     | 0.20        | 0.25 | 0.30 |
| h      | 0.20REF     |      |      |
| K      | 0.20        | 0.30 | 0.40 |

**Land Pattern**



**Marking Codes**

| Part Number | Marking Code                                       |
|-------------|--|
| WS18P4N3A   | <p>M18C=Specific Device Code<br/>XXXX=Lot Code</p> |

**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.*