



# WS12P4N3U

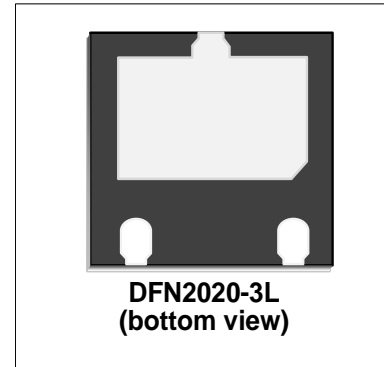
## Transient Voltage Suppressor

### Features

- 5600 Watts Peak Power ( $t_p = 8/20\mu s$ )
- Working Voltage: 12V
- Low Clamping Voltage
- Low Leakage Current

### 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) 200A (8/20 $\mu s$ )



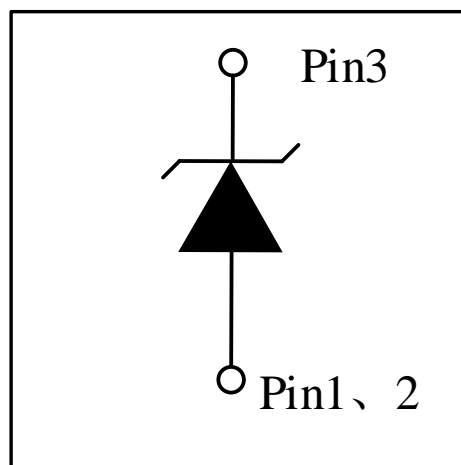
### Mechanical Characteristics

- 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

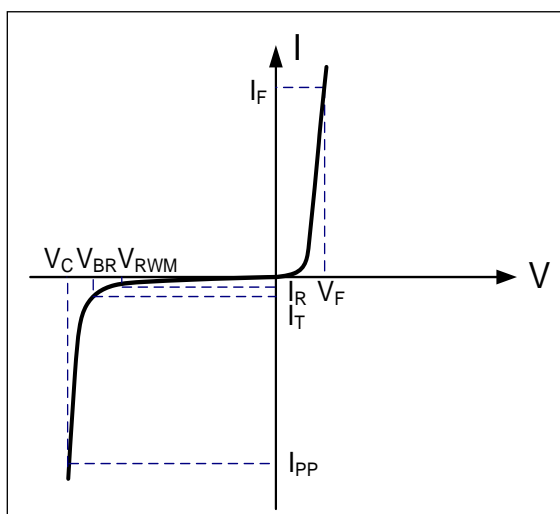
### PIN Configuration



Absolute Maximum Rating			
Rating	Symbol	Value	Units
Peak Pulse Power ( $t_p=8/20\mu s$ )	$P_{PP}$	5600	Watts
Peak Pulse Current ( $t_p=8/20\mu s$ )	$I_{PP}$	200	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

WS12P4N3U						
Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Reverse Stand-Off Voltage	$V_{RWM}$				12	V
Reverse Breakdown Voltage	$V_{BR}$	$I_T=1mA$	13.3			V
Reverse Leakage Current	$I_R$	$V_{RWM}=12V, T=25^{\circ}C$			500	nA
Clamping Voltage <sup>1</sup>	$V_C$	$I_{PP}=200A, t_p=8/20\mu s$		25	28	V
Dynamic Resistance <sup>2,3</sup>	$R_{DYN}$	$TLP=0.2/100ns$		0.06		$\Omega$
ESD Clamping Voltage <sup>1</sup>	$V_C$	$I_{PP} = 4A$ $t_p = 0.2/100ns$		15.2		V
ESD Clamping Voltage <sup>1</sup>	$V_C$	$I_{PP} = 16A$ $t_p = 0.2/100ns$		15.9		V
Junction Capacitance <sup>1</sup>	$C_j$	$V_R = 0V, f = 1MHz$		880	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

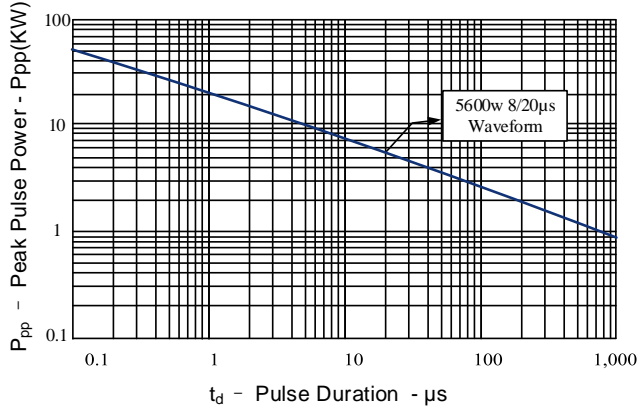


Figure 2: Power Derating Curve

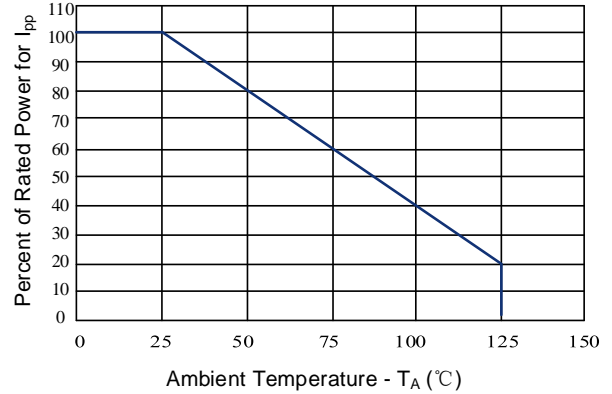


Figure 3: Clamping Voltage vs. Peak Pulse Current

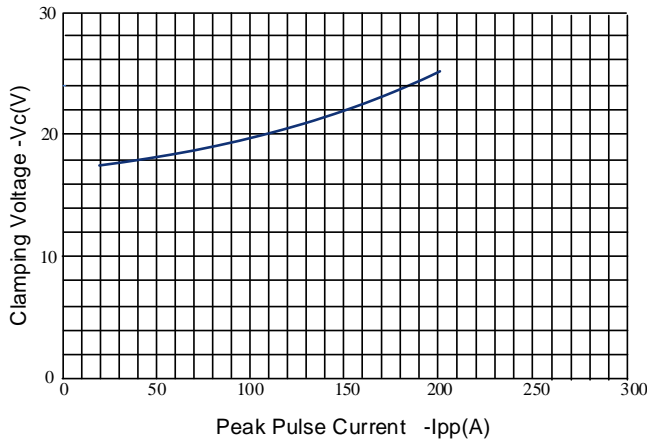


Figure 4: Normalized Junction Capacitance vs. Reverse Voltage

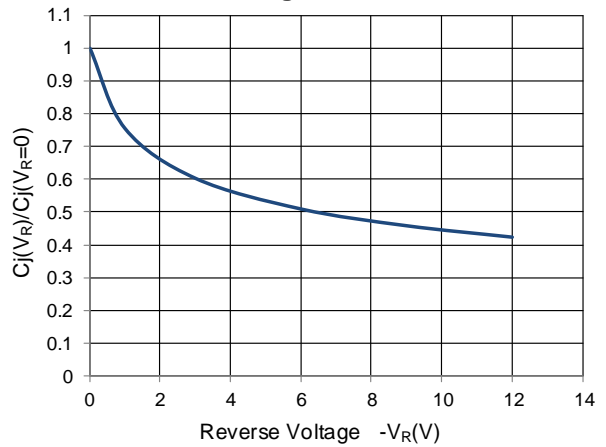


Figure 5: 8/20µs Pulse Waveform

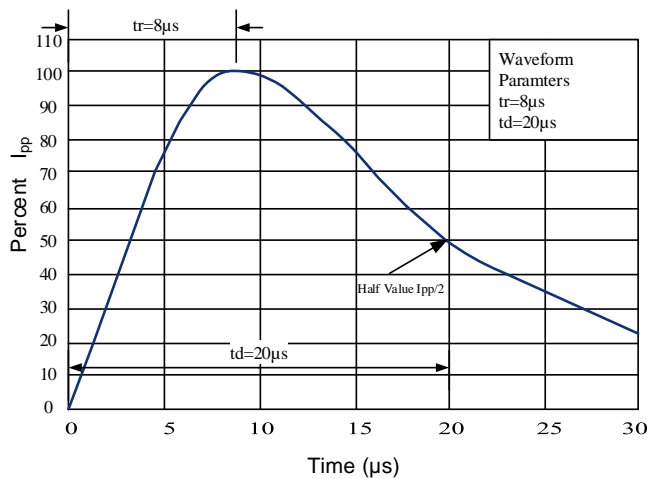
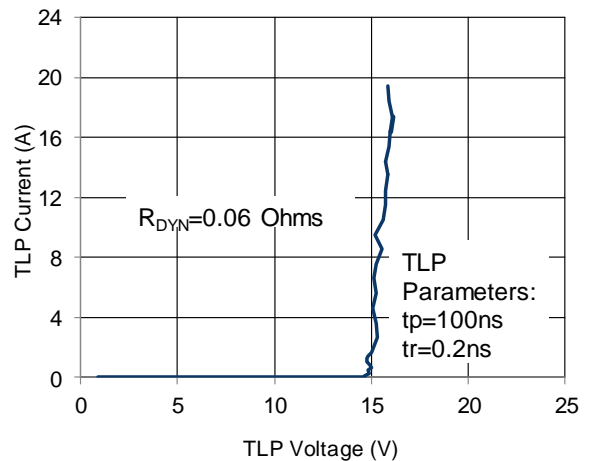
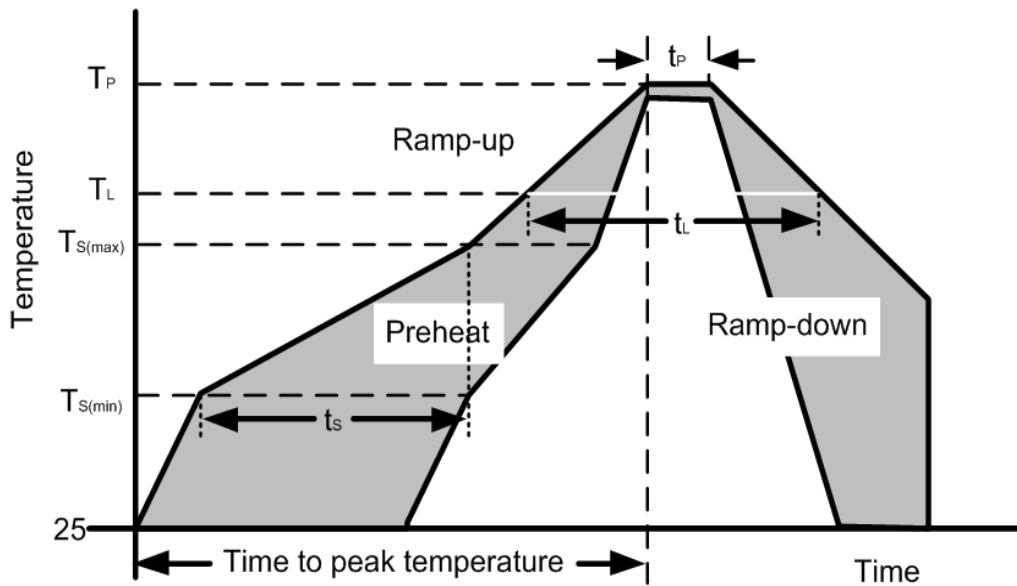


Figure 6: TLP I-V Curve



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	MILIMETER		
	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
WS12P4N3U	<p>M12A=Specific Device Code XXXX=Lot Code<sup>†</sup></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.