

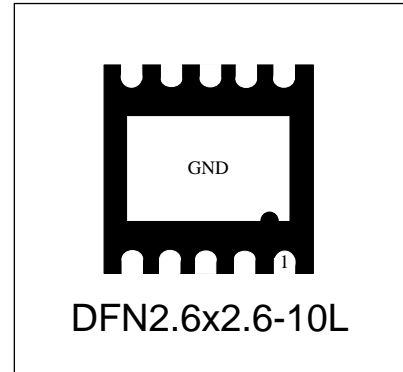


WS3.3-4R1N

Transient Voltage Suppressor

Features

- Array of surge rated diodes with internal TVS Diode
- Small package saves board space
- Protects up to four I/O lines
- Low capacitance for high-speed interfaces
- Low leakage current and clamping voltage
- Low operating voltage: 3.3V
- Solid-state silicon-avalanche technology



IEC COMPATIBILITY (EN61000-4)

- IEC 61000-4-2 (ESD) $\pm 30\text{kV}$ (air), $\pm 30\text{kV}$ (contact)
- IEC 61000-4-4 (EFT) 40A (5/50ns)
- IEC 61000-4-5 (Lightning) 28A (8/20 μs)

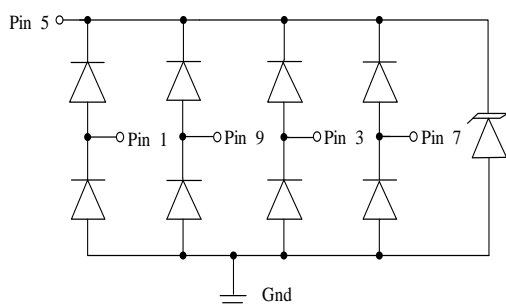
Mechanical Characteristics

- DFN2626-10 package
- Marking : Marking Code
- Packaging : Tape and Reel
- RoHS Compliant

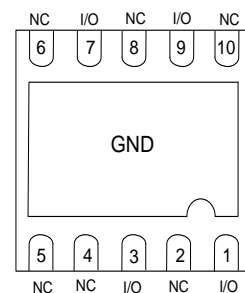
Applications

- USB 2.0
- 10/100/1000 Ethernet
- Digital Visual Interface (DVI)
- T1/E1 Secondary Protection
- T3/E3 Secondary Protection
- Analog Video

Circuit Diagram



Schematic & PIN Configuration

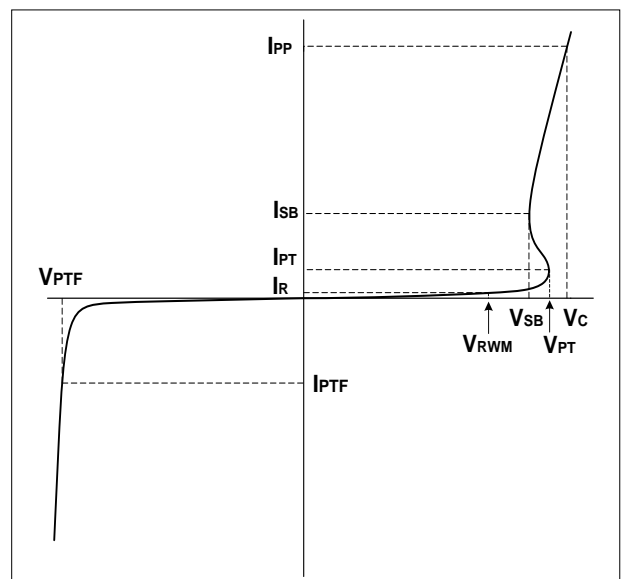


Note: Suggest do not connect pin 5 to a DC supply

Absolute Maximum Rating			
Rating	Symbol	Value	Units
Peak Pulse Power ($t_p = 8/20\mu s$)	P_{PP}	500	Watts
Peak Pulse Current ($t_p = 8/20\mu s$)	I_{PP}	28	A
Operating Temperature	T_J	-55 to +125	$^{\circ}C$
Storage Temperature	T_{STG}	-55 to +150	$^{\circ}C$

Electrical Parameters (T=25°C)

Symb	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_{PT}	Punch-through Breakdown Voltage @ I_T
V_{SB}	Snap-Back Voltage @ I_{SB}
I_{SB}	Snap-Back Current
I_{PT}	Test Current
V_{PTF}	Forward Punch-through Breakdown Voltage @
I_{PTF}	Forward Test Current



Electrical Characteristics

WS3.3-4R1N						
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	3.5			V
Snap-Back Voltage	V_{SB}	$I_{SB} = 50mA$ Any I/O pin to ground	2.8			
Reverse Leakage Current	I_R	$V_{RWM} = 3.3V, T = 25^{\circ}C$ Any I/O pin to ground			500	nA
Clamping Voltage	V_C	$I_{PP} = 28A, t_p = 8/20\mu s$ Any I/O pin to ground		14	18	V
ESD Clamping Voltage ¹	V_C	$I_{PP} = 4A$ $t_p = 0.2/100ns$		8.4		V
ESD Clamping Voltage ¹	V_C	$I_{PP} = 16A$ $t_p = 0.2/100ns$		11.2		V
Dynamic Resistance ^{1,2}	R_{DYN}	TLP=0.2/100ns		0.22		Ω
Junction Capacitance	C_j	$V_R = 0V, f = 1MHz$ I/O pin to GND		2.7	4	pF
		$V_R = 0V, f = 1MHz$ Between I/O pins		1.3	3	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

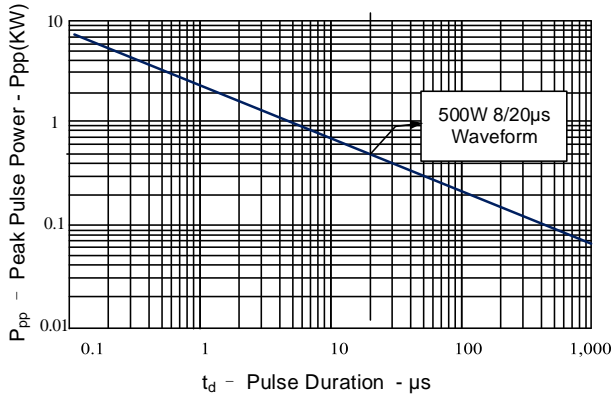


Figure 2: Power Derating Curve

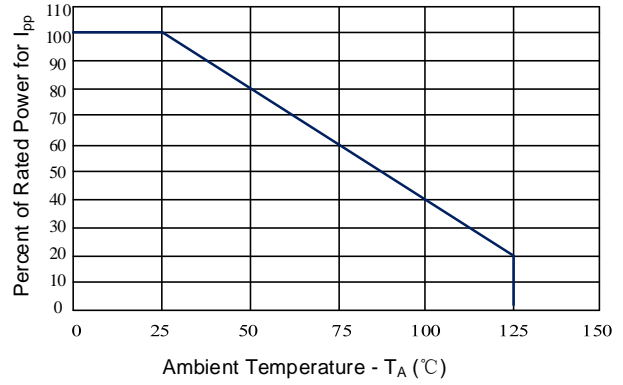


Figure 3: Clamping Voltage vs. Peak Pulse Current

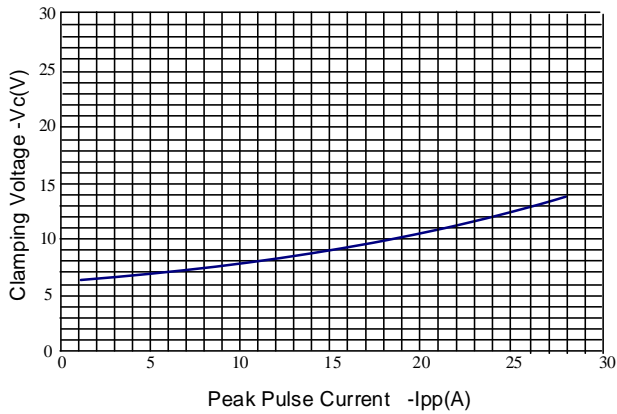


Figure 4: Normalized Junction Capacitance vs. Reverse Voltage

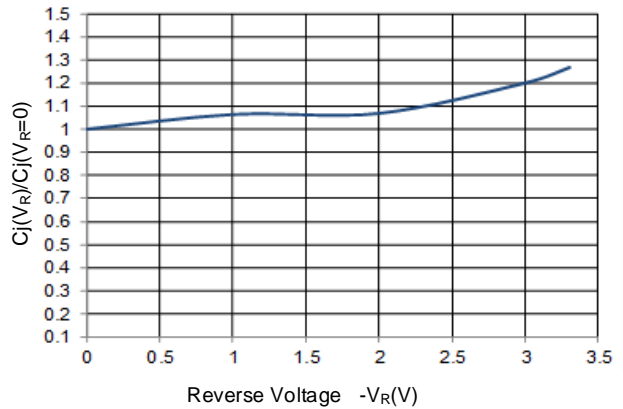


Figure 5: 8/20μs Pulse Waveform

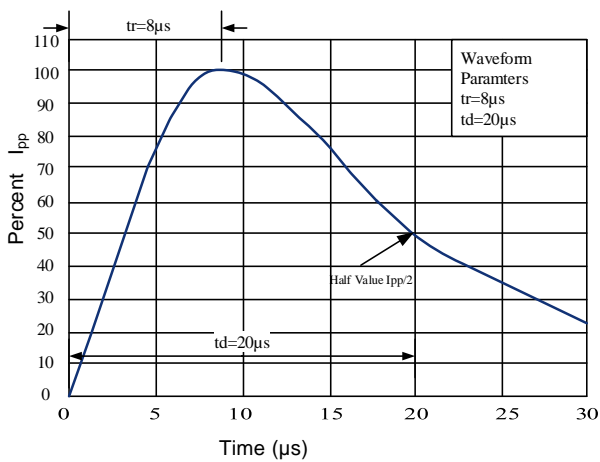
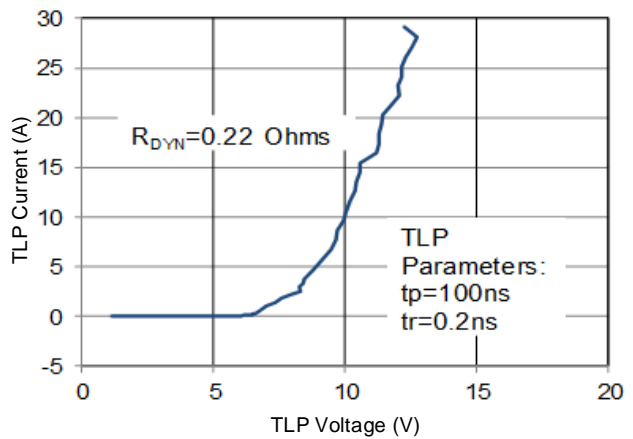
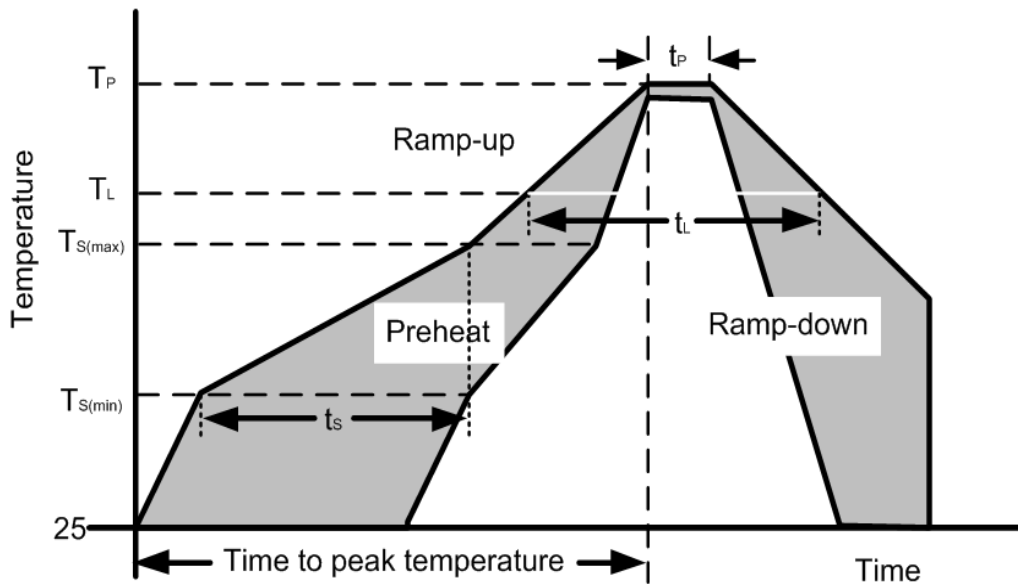


Figure 6: TLP I-V Curve



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 –DFN2.6x2.6-10L

DFN2.6x2.6-10L

DIMENSIONS				
SYMBOL	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	0.450	0.550	0.018	0.022
A2	0.000	0.050	0.000	0.002
A1	0.150REF		0.006REF	
D	2.550	2.650	0.101	0.105
D1	2.100	2.200	0.083	0.087
E	2.550	2.650	0.101	0.105
E1	1.210	1.310	0.048	0.052
b	0.200	0.300	0.008	0.012
e	0.500BSC.		0.020BSC	
L	0.300	0.400	0.012	0.016

DIMENSIONS		
DIM	INCHES	MILLIMETERS
B	0.081	2.05
C	0.100	2.50
F	0.050	1.26
G	0.073	1.85
P	0.020	0.50
X	0.012	0.30
Y	0.025	0.65
Z	0.124	3.15

NOTES:

Controlling Dimension: Millimeter.

Marking Codes

Part Number	WS3.3-4R1N		
Marking Code	2201	YYWW	●

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.