

## Transient Voltage Suppressor

### Features

- Array of surge rated diodes with internal TVS Diode
- Provides protection for two differential data pairs(4 channels)
- Low capacitance
- Low leakage current and clamping voltage
- Low operating voltage:3.3V

### IEC COMPATIBILITY (EN61000-4)

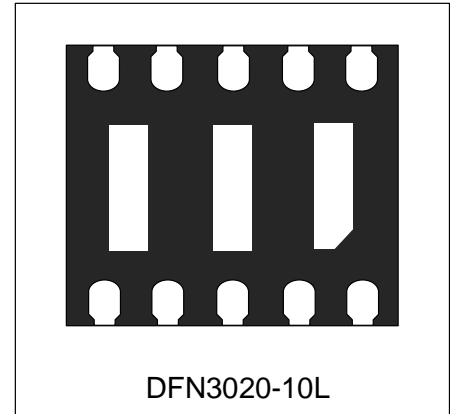
- IEC 61000-4-2 (ESD)  $\pm 30\text{kV}$  (air),  $\pm 30\text{kV}$  (contact)
- IEC 61000-4-4 (EFT) 40A (5/50ns)
- IEC 61000-4-5 (Lightning) 40A (8/20 $\mu\text{s}$ )

### Mechanical Characteristics

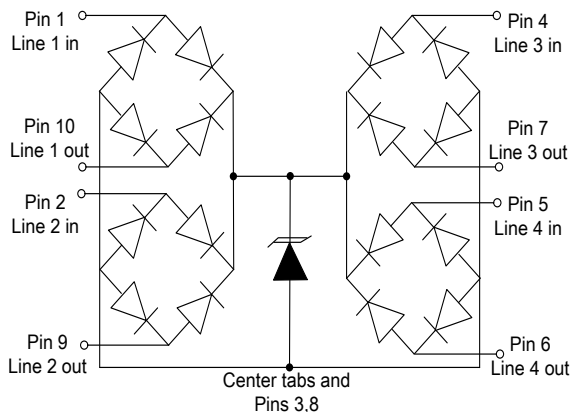
- DFN3020-10L package
- Marking: Marking Code
- Packaging: Tape and Reel
- RoHS Compliant & HF
- Device meets MSL3 requirement

### Applications

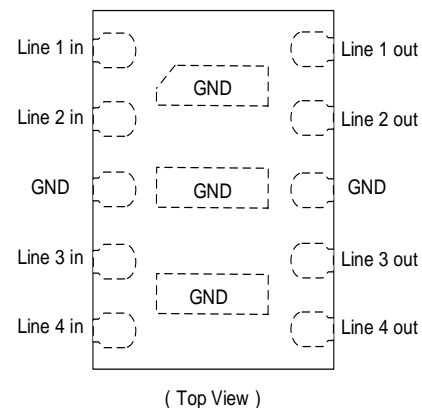
- Automotive
- 10/100/1000 Ethernet
- Digital Visual Interface (DVI)
- T1/E1 Secondary Protection
- LVDS Interfaces
- Analog Video



### Circuit Diagram



### Package Configuration

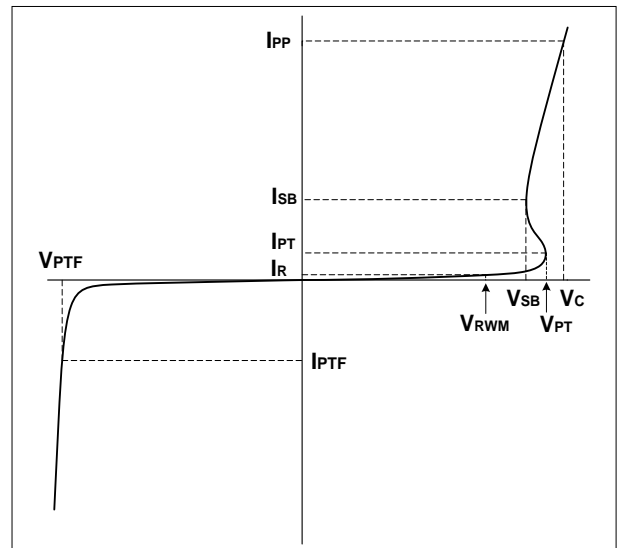


**Absolute Maximum Rating**

Rating	Symbol	Value	Units
Peak Pulse Power ( $t_p = 8/20\mu s$ )	$P_{PP}$	860	Watts
Peak Pulse Current ( $t_p = 8/20\mu s$ )	$I_{PP}$	40	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 @ $V_{RWM}$
$V_{PT}$	Punch-through Voltage @ $I_T$
$V_{SB}$	Snap-Back Voltage @ $I_{SB}$
$I_{SB}$	Snap-Back Current
$I_{PT}$	Punch-through Current
$V_{PTF}$	Forward Punch-through Voltage @ $I_{PTF}$
$I_{PTF}$	Forward Punch-through Current



**Electrical Characteristics**

WS3.3-4R7NS						
Parameter	Symbol	Conditions	Min	Typ	Max	Units
Reverse Stand-Off Voltage	$V_{RWM}$				3.3	V
Punch-through Voltage	$V_{PT}$	$I_{PT} = 2\mu A$	4			V
Snap-Back Voltage	$V_{SB}$	$I_{SB} = 50mA$	3.5			V
Reverse Leakage Current	$I_R$	$V_{RWM} = 3.3V, T = 25^\circ C$			500	nA
Clamping Voltage	$V_C$	$I_{PP} = 25A, t_p = 8/20\mu s$ Any I/O pin to ground			11.5	V
Clamping Voltage <sup>1</sup>	$V_C$	$I_{PP} = 40A, t_p = 8/20\mu s$ Line-to-Line, two I/O Pins connected together on each line			21.5	V
ESD Clamping Voltage <sup>2</sup>	$V_C$	$I_{PP} = 4A$ $t_p = 0.2/100ns$		6.5		V
ESD Clamping Voltage <sup>2</sup>	$V_C$	$I_{PP} = 16A$ $t_p = 0.2/100ns$		8.9		V
Dynamic Resistance <sup>2,3</sup>	$R_{DYN}$	TLP=0.2/100ns		0.2		$\Omega$
Junction Capacitance	$C_j$	$V_R = 0V, f = 1MHz$ I/O pin to GND		3.6	5	pF
		$V_R = 0V, f = 1MHz$ Between I/O pins		1.5	2.5	pF

Notes: 1) Ratings with 2 pins connected together per the recommended configuration (ie pin 1 connected to pin 10, pin 2 connected to pin 9, pin 4 connected to pin 7, and pin 5 connected to pin 6).  
 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

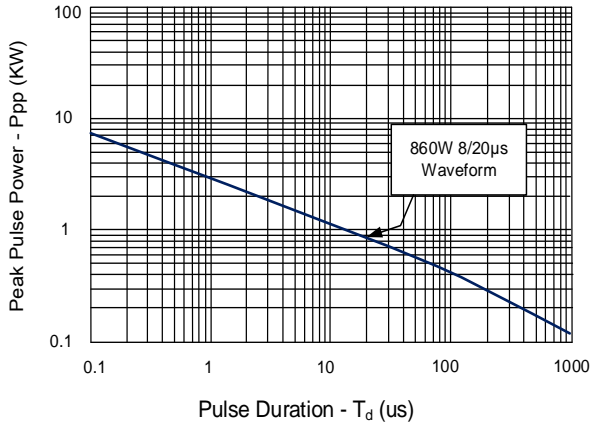


Figure 2: Power Derating Curve

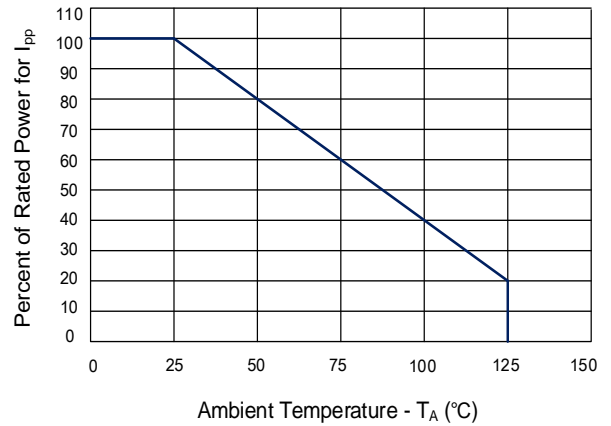


Figure 3: Clamping Voltage vs. Peak Pulse Current

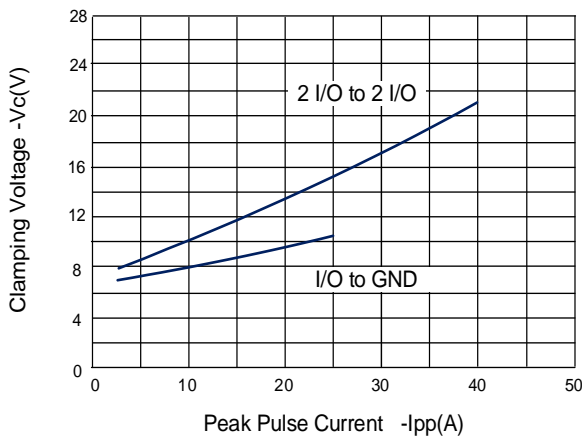


Figure 4: Normalized Junction Capacitance vs. Reverse Voltage (I/O to GND)

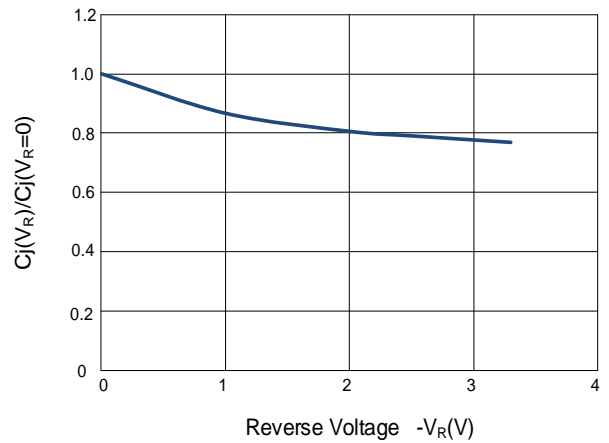


Figure 5: 8/20µs Pulse Waveform

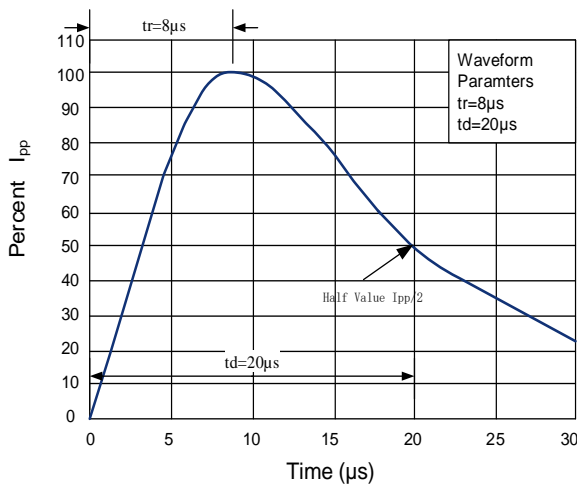
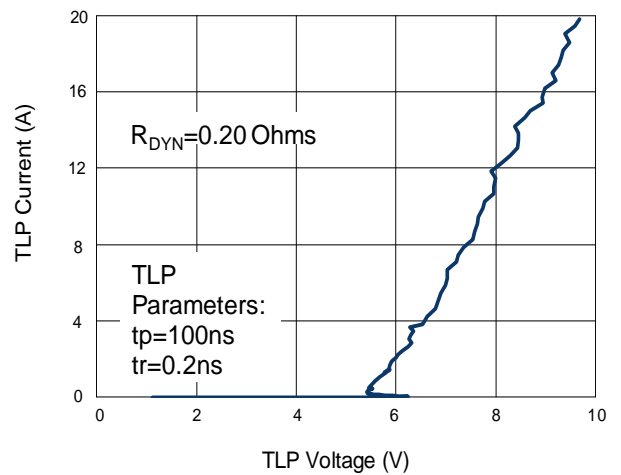
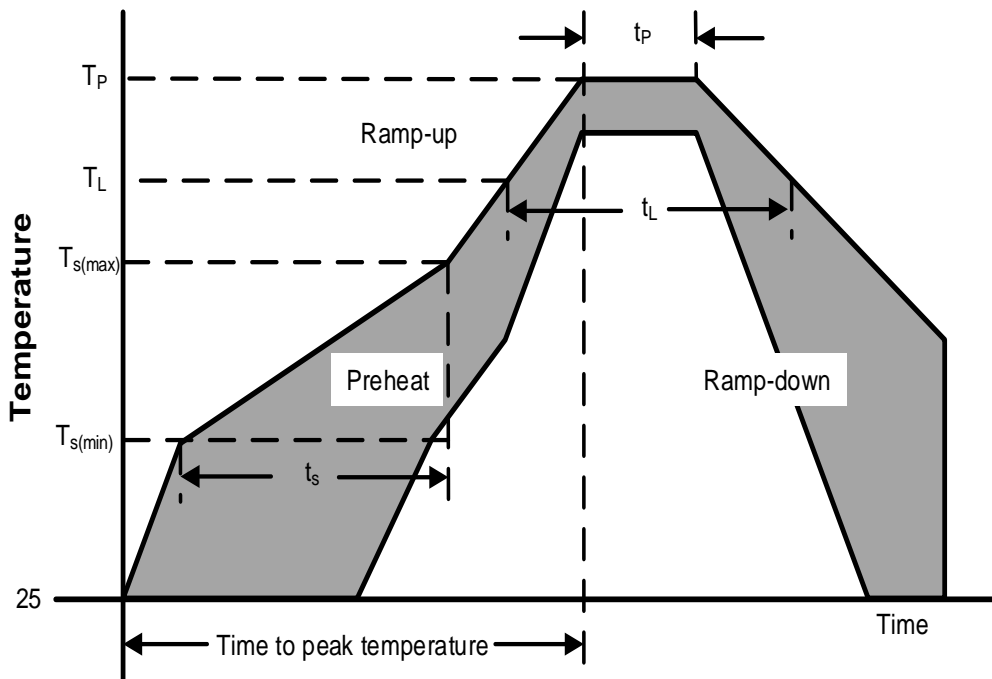


Figure 6: TLP I-V Curve



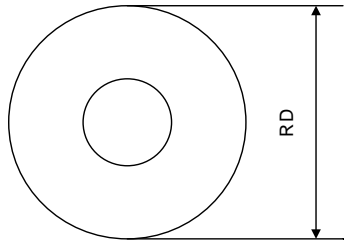
Soldering Parameters

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

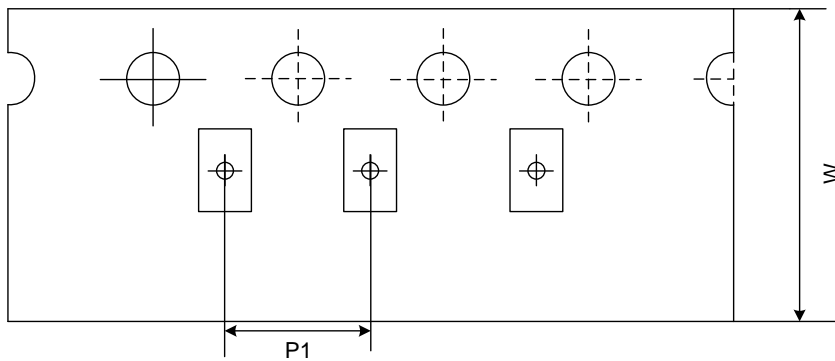


**Tape And Reel Information**

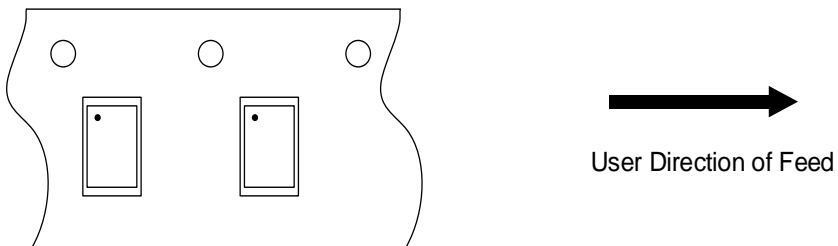
**Reel Dimensions**



**Tape Dimensions**

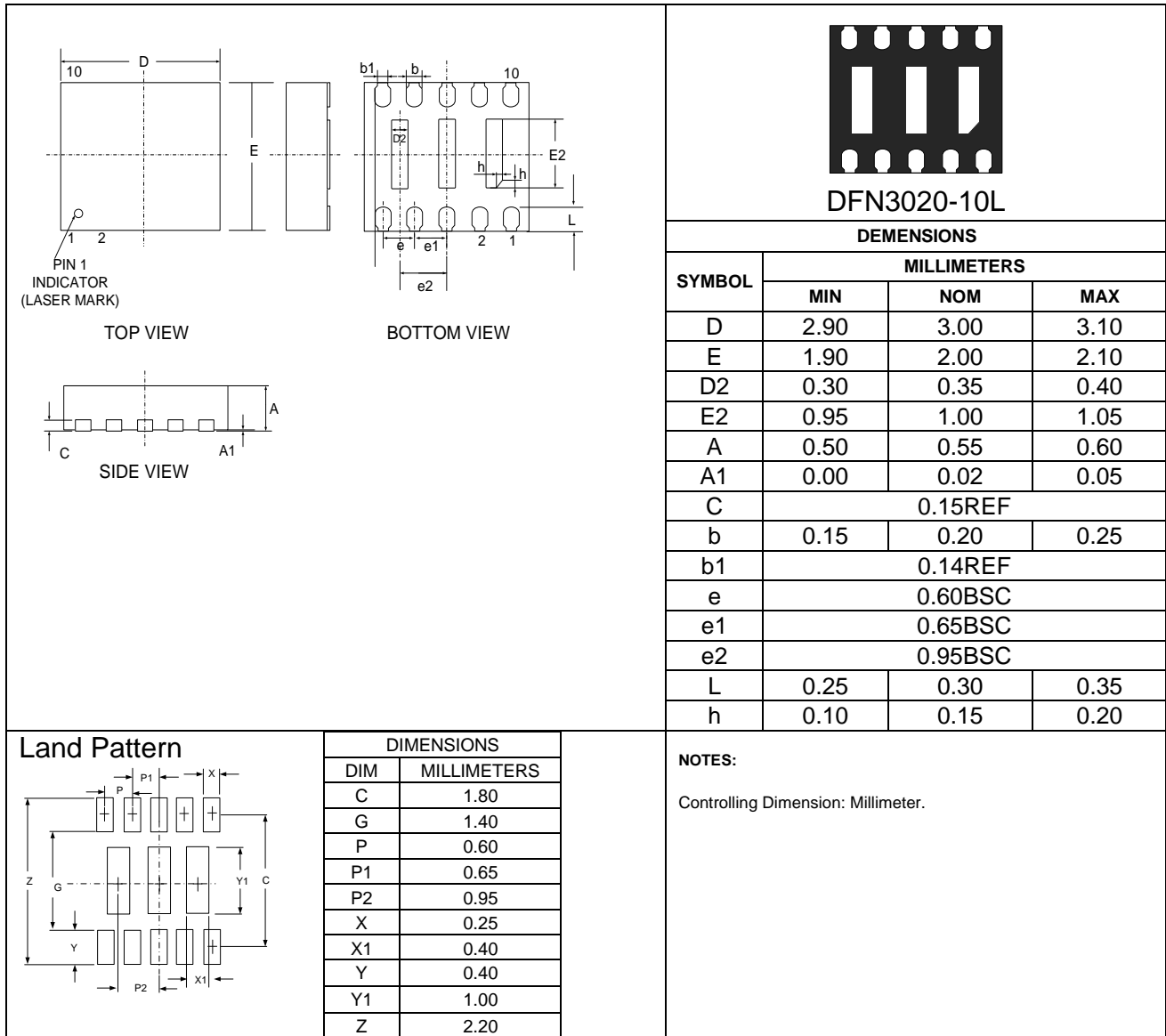


**Quadrant Assignments For PIN1 Orientation In Tape**



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

Outline Drawing –DFN3020-10L



Marking Codes

Part Number	Marking Code	
WS3.3-4R7NS	220425 YYWW	220425=Marking Code YYWW=Date Code

Package Information

Qty: 3k/Reel

CONTACT INFORMATION

No.1001, Shiwan (7) Road, Pudong District, Shanghai, P.R.China.201207

Tel: 86-21-68969993 Fax: 86-21-50757680 Email: [market@way-on.com](mailto:market@way-on.com)

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

For additional information, please contact your local Sales Representative.

**WAYON**® is registered trademark of WAYON Corporation.

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.