



## Features

- Feed-through package
- Low capacitance - 0.04 pF (I/O to I/O)
- ESD protection >8 kV
- RoHS compliant\*
- Halogen free\*\*

## Applications

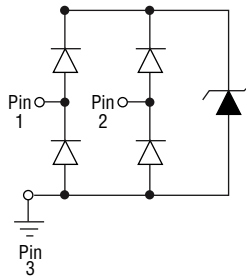
- HDMI
- DisplayPort™
- Digital Visual Interface (DVI)
- SATA and eSATA
- USB 3.1

# CDDFN6-3312P - Surface Mount TVS Diode Array

### General Information

The Model CDDFN6-3312P device provides ESD, CDE and EFT protection for high-speed data ports, meeting IEC 61000-4-2 (ESD) requirements. The Transient Voltage Suppressor array, protecting up to two data lines, offers a Working Peak Reverse Voltage of 3.3 V and a Minimum Breakdown Voltage of 4.5 V.

The DFN6 packaged device has an ultra-low typical capacitance of only 0.04 pF between I/O lines. This allows it to be used for protecting sensitive components used on high-speed interfaces. The small footprint of the device allows for flow-through routing on the PCB, helping to maintain matched impedances of the high-speed data lines.



### Additional Information

Click these links for more information:



### Absolute Maximum Ratings (@ T<sub>A</sub> = 25 °C Unless Otherwise Noted)

Parameter	Symbol	Value	Unit
Peak Pulse Current (t <sub>p</sub> = 8/20 μs)	I <sub>pp</sub>	3	A
Operating Temperature	T <sub>OPR</sub>	-55 to +85	°C
Storage Temperature	T <sub>STG</sub>	-55 to +150	°C
ESD Protection (per IEC 6-1000-4-2)			
Contact	ESD	+8	kV
Air		+15	

### Electrical Characteristics (@ T<sub>A</sub> = 25 °C Unless Otherwise Noted)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Reverse Standoff Voltage	V <sub>RWM</sub>			3.3	V
Breakdown Voltage @ 1 mA	V <sub>BR</sub>	4.5			V
Forward Voltage @ 15 mA	V <sub>F</sub>		0.9	1.1	V
Leakage Current	I <sub>R</sub>			500	nA
ESD Clamping Voltage IEC 61000-4-2, +8 kV (I <sub>TLP</sub> = 16 A)*	V <sub>C</sub>		13		V
Capacitance @ 1.65 V, 1 MHz (I/O to GND, V <sub>pin-3</sub> = 0 V)	C <sub>IN</sub>		0.18	0.27	pF
Capacitance @ 1.65 V, 1 MHz (I/O to I/O, V <sub>pin-3</sub> = 0 V)	C <sub>CROSS</sub>		0.04	0.08	pF

\*Transmission Line Pulsing (TLP) conditions: Z<sub>0</sub> = 50 ohms, t<sub>p</sub> = 100 ns, t<sub>r</sub> = 1 ns



**WARNING Cancer and Reproductive Harm - [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)**

\* RoHS Directive 2015/863, Mar 31, 2015 and Annex.

\*\* Bourns considers a product to be "halogen free" if (a) the Bromine (Br) content is 900 ppm or less; (b) the Chlorine (Cl) content is 900 ppm or less; and (c) the total Bromine (Br) and Chlorine (Cl) content is 1500 ppm or less.

"DisplayPort" is a trademark of VESA.

Specifications are subject to change without notice.

Users should verify actual device performance in their specific applications.

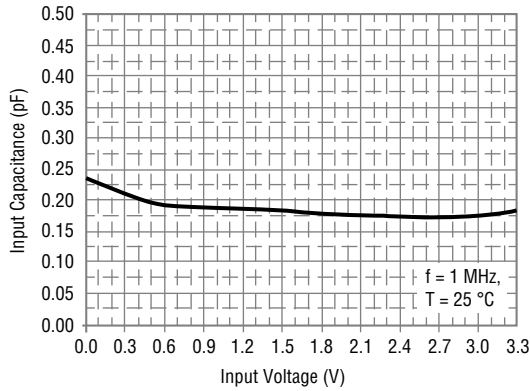
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# CDDFN6-3312P - Surface Mount TVS Diode Array

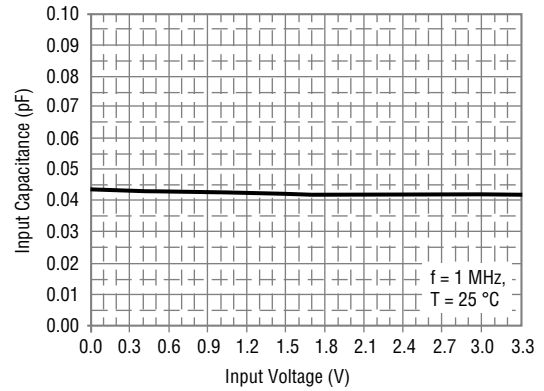
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## Rating & Characteristic Curves

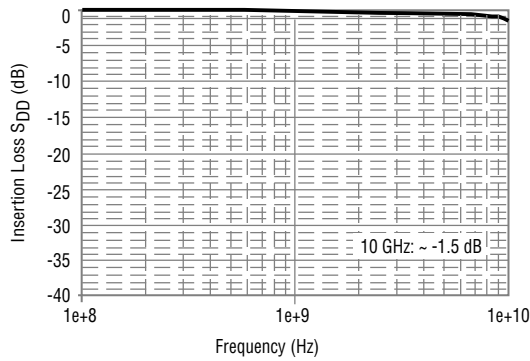
### Typical Voltage vs. Capacitance $C_{IN}$



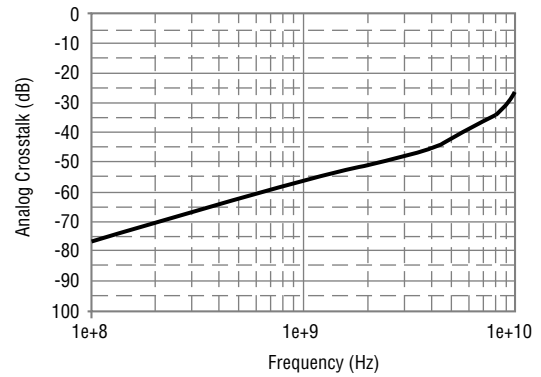
### Typical Voltage vs. Capacitance $C_{CROSS}$



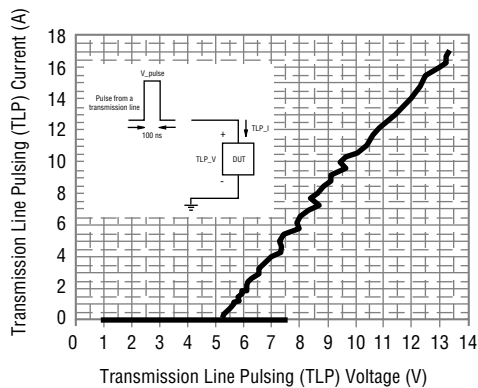
### Typical Insertion Loss $S_{DD}$



### Typical Analog Crosstalk



### Typical Transmission Line Pulsing (TLP)



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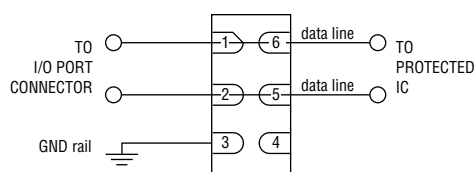
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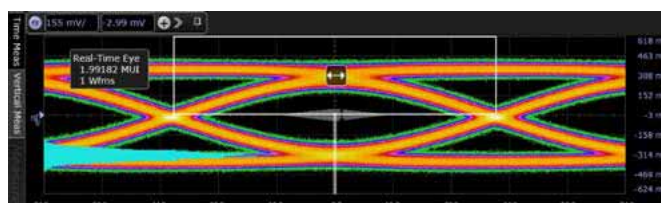
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## Reference Application

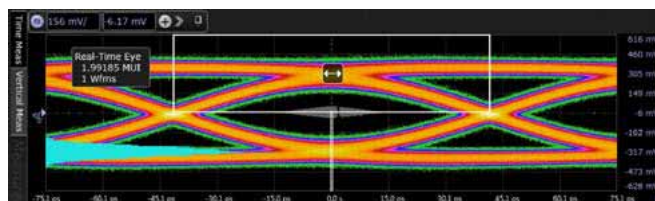
The Bourns® Model CDDFN6-3312P is designed to protect high-speed data ports from ESD transients. For high-speed ports above 12 Gbps such as HDMI 2.1, maintaining signal line impedance is a critical requirement. The use of a DFN6 package using a “feed-through” layout provides minimal impedance change on the high-speed data line, while the ultra-low capacitance performance of the device limits signal degradation on each channel.



*Model CDDFN6-3312P Connection*



*HDMI 2.1 Eye Diagram Test  
Without Model CDDFN6-3312P  
(PCB Only)*



*HDMI 2.1 Eye Diagram Test  
With Model CDDFN6-3312P*

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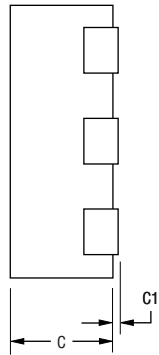
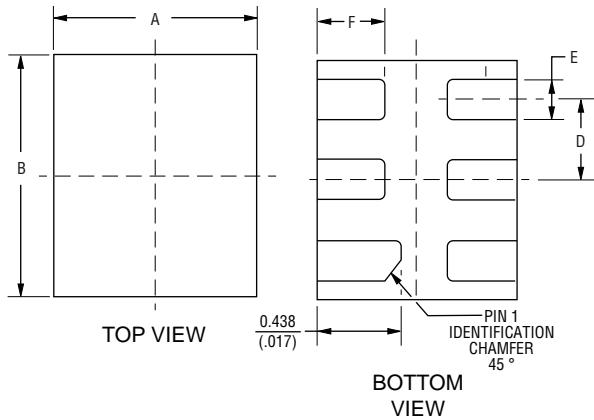
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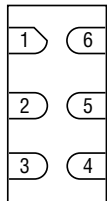
## Product Dimensions



Index	Dimensions		
	Min.	Nom.	Max.
A	0.95 (0.037)	1.00 (0.039)	1.05 (0.041)
B	1.15 (0.045)	1.20 (0.047)	1.25 (0.049)
C	0.41 (0.016)	0.45 (0.018)	0.50 (0.020)
C1	0.00 (0.000)	0.02 (0.0008)	0.05 (0.002)
D	0.40 (0.016)		
E	0.15 (0.006)	0.20 (0.008)	0.25 (0.010)
F	0.25 (0.010)	0.35 (0.014)	0.45 (0.018)

DIMENSIONS:  $\frac{\text{MM}}{\text{(INCHES)}}$

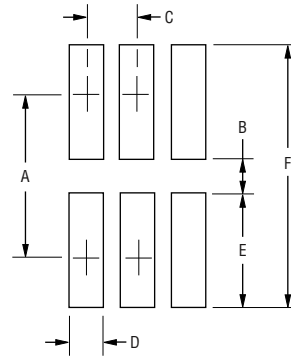
## Device Pinout



Pin	Function
1,2	Data Lines
4,5,6	NC (No Internal Connection) for Feed-Through Layout design
3	GND

TOP VIEW

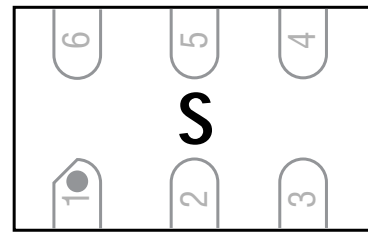
## Recommended Footprint



Index	Dimensions
A	0.875 (0.034)
B	0.20 (0.008)
C	0.40 (0.016)
D	0.20 (0.008)
E	0.675 (0.027)
F	1.55 (0.061)

DIMENSIONS:  $\frac{\text{MM}}{\text{(INCHES)}}$

## Typical Part Marking



## Environmental Specifications

Moisture Sensitivity Level..... 3  
ESD Classification (HBM).....3B

## How to Order

CD DFN6 - 33 12 P

Common Code \_\_\_\_\_  
Chip Diode \_\_\_\_\_

Package \_\_\_\_\_  
DFN6 = DFN-6 Package

Working Peak Reverse Voltage \_\_\_\_\_  
33 = 3.3 V<sub>RWM</sub> (Volts)

Number of Lines \_\_\_\_\_  
12 = 1 Ground Line / 2 Data Lines

Suffix \_\_\_\_\_  
P = Ultra-low Capacitance

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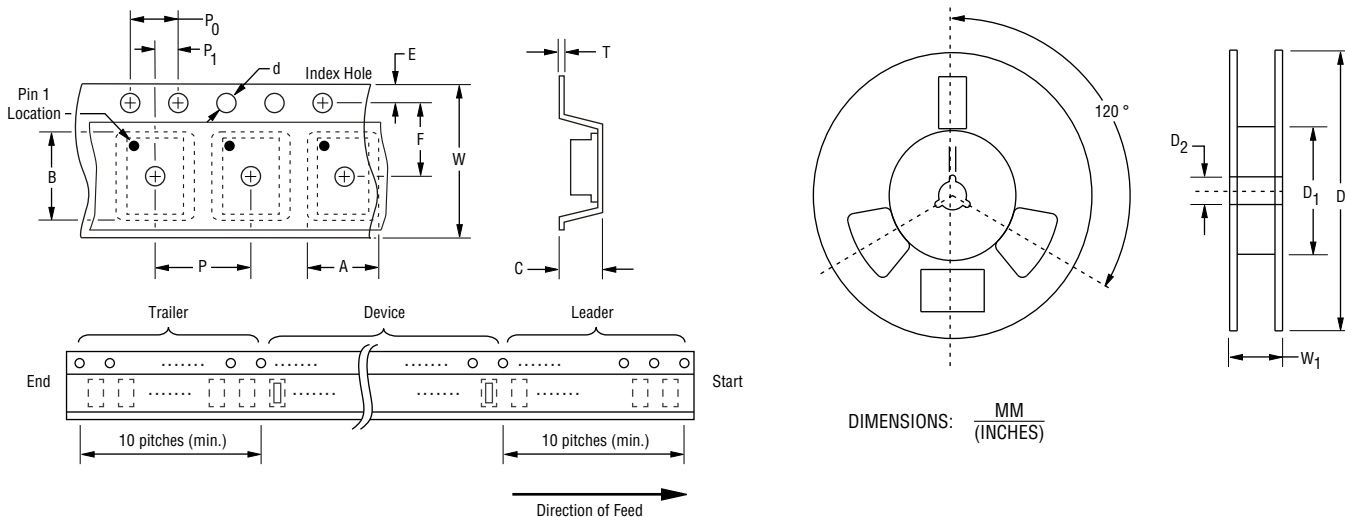
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## Packaging Information

The product is packaged in an 8 mm x 4 mm tape and reel format per EIA-481-D standard.



Item	Symbol	DFN-6
Carrier Width	A	$\frac{1.17 \pm 0.05}{(0.046 \pm 0.002)}$
Carrier Length	B	$\frac{1.4 \pm 0.05}{(0.055 \pm 0.002)}$
Carrier Depth	C	$\frac{0.65 \pm 0.05}{(0.0255 \pm 0.002)}$
Sprocket Hole	d	$\frac{1.55 \pm 0.05}{(0.061 \pm 0.002)}$
Reel Outside Diameter	D	$\frac{180 \pm 2.00}{(7.087 \pm 0.079)}$
Reel Inner Diameter	D <sub>1</sub>	$\frac{50.0}{(1.969)}$ MIN.
Feed Hole Diameter	D <sub>2</sub>	$\frac{13.0 + 0.5/-0.20}{(0.512 + 0.020/-0.008)}$
Sprocket Hole Position	E	$\frac{1.75 \pm 0.10}{(0.069 \pm 0.004)}$
Punch Hole Position	F	$\frac{3.50 \pm 0.05}{(0.138 \pm 0.002)}$
Punch Hole Pitch	P	$\frac{4.00 \pm 0.10}{(0.157 \pm 0.004)}$
Sprocket Hole Pitch	P <sub>0</sub>	$\frac{4.00 \pm 0.10}{(0.157 \pm 0.004)}$
Embossment Center	P <sub>1</sub>	$\frac{2.00 \pm 0.05}{(0.079 \pm 0.002)}$
Overall Tape Thickness	T	$\frac{0.30 \pm 0.05}{(0.012 \pm 0.002)}$
Tape Width	W	$\frac{8.00 \pm 0.05}{(0.315 \pm 0.002)}$
Reel Width	W <sub>1</sub>	$\frac{14.4}{(0.567)}$ MAX.
Quantity per Reel	--	3000

**BOURNS®**

### Asia-Pacific:

Tel: +886-2 2562-4117

Email: asiacus@bourns.com

### Europe:

Tel: +36 88 885 877

Email: eurocus@bourns.com

### The Americas:

Tel: +1-951 781-5500

Email: americus@bourns.com

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