

## Features

- RoHS compliant\*
- Low capacitance - 0.04 pF (I/O to I/O)
- ESD protection to IEC 61000-4-2 (Level 4)

## Applications

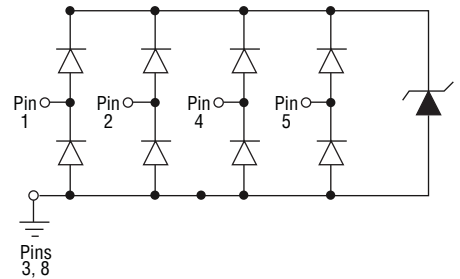
- HDMI 1.3, 1.4 and 2.0
- DisplayPort
- Digital Visual Interface (DVI)
- SATA and eSATA
- USB 3.0
- Memory protection
- SIM card ports

# CDDFN10-3324P - Surface Mount TVS Diode Array

## General Information

The Model CDDFN10-3324P 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 four data lines, offers a Working Peak Reverse Voltage of 3.3 V and a Minimum Breakdown Voltage of 4.5 V.

The DFN10 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.



## Absolute Maximum Ratings (@ $T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

Parameter	Symbol	CDDFN10-3324P	Unit
Peak Pulse Power ( $t_p = 8/20 \mu\text{s}$ )	$P_{pp}$	30	W
Peak Pulse Current ( $t_p = 8/20 \mu\text{s}$ )	$I_{pp}$	4	A
Operating Temperature	$T_J$	-55 to +85	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-55 to +150	$^\circ\text{C}$

## Electrical Characteristics (@ $T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Working Peak Reverse Voltage	$V_{WM}$			3.3	V
Breakdown Voltage @ 1 mA	$V_{BR}$	4.5			V
Leakage Current @ $V_{WM}$	$I_R$		0.1	0.5	$\mu\text{A}$
Capacitance @ 1.65 V, $f = 1 \text{ MHz}$ (I/O to GND)	$C_{IN}$		0.45	0.65	pF
Capacitance @ 1.65 V, $f = 1 \text{ MHz}$ (I/O to I/O)	$C_{CROSS}$		0.04	0.08	pF
Clamping Voltage @ $8/20 \mu\text{s}$ @ $I_{pp}$	$V_C$			7.5	V
ESD Protection per IEC 6-1000-4-2					
Contact Discharge				12	kV
Air Discharge				15	kV

\*RoHS Directive 2002/95/EC Jan. 27, 2003 including annex and RoHS Recast 2011/65/EU June 8, 2011.

Specifications are subject to change without notice.

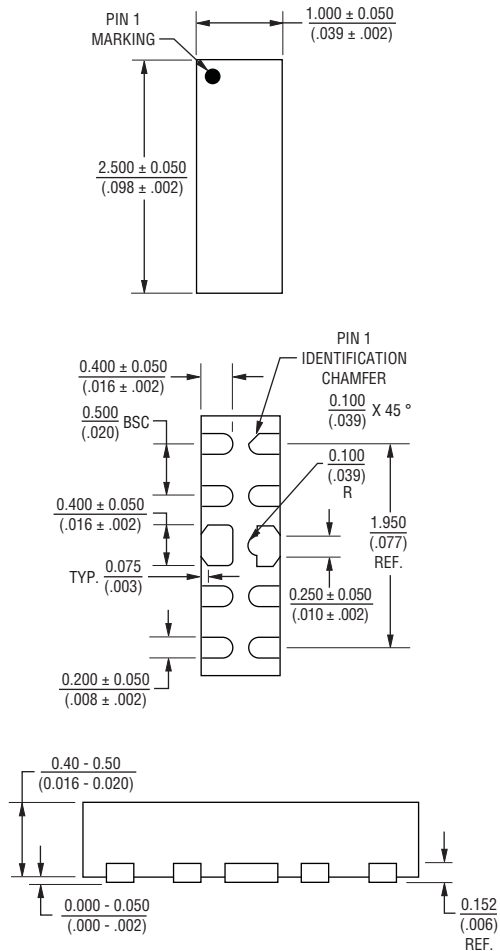
The device characteristics and parameters in this data sheet can and do vary in different applications and actual device performance may vary over time. Users should verify actual device performance in their specific applications.

# CDDFN10-3324P - Surface Mount TVS Diode Array



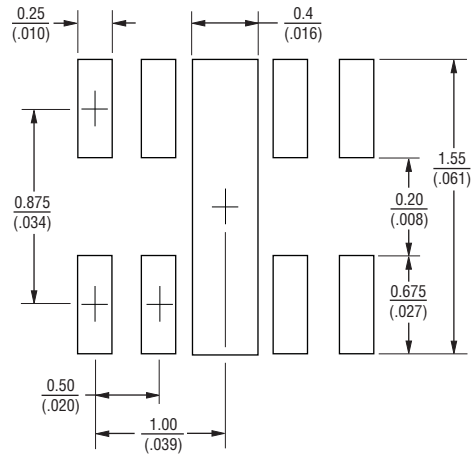
## Product Dimensions

This is a molded DFN10 package with lead free 100 % Matte Sn on the lead frame. It weighs approximately 7 mg and has a flammability rating of UL 94V-0.



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

## Recommended Footprint



## Typical Part Marking

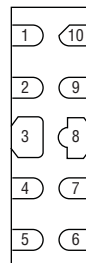
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## How to Order

**CD DFN10 - 33 24 P**

Common Code \_\_\_\_\_  
 Chip Diode \_\_\_\_\_  
 Package \_\_\_\_\_  
 DFN10 = DFN-10 Package \_\_\_\_\_  
 Working Peak Reverse Voltage \_\_\_\_\_  
 33 = 3.3 V<sub>RWM</sub> (Volts) \_\_\_\_\_  
 Number of Lines \_\_\_\_\_  
 24 = 2 Ground / 4 Data Lines \_\_\_\_\_  
 Suffix \_\_\_\_\_  
 P = Ultra-low Capacitance \_\_\_\_\_

## Device Pinout



TOP VIEW

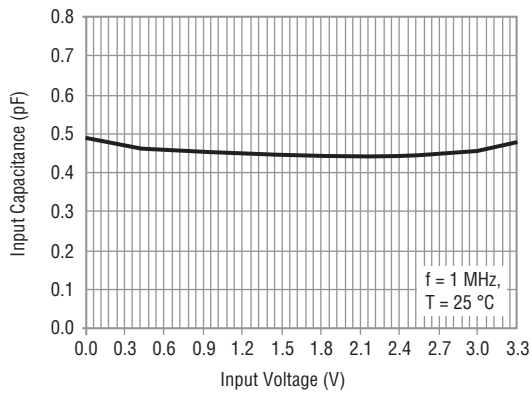
Pin	Function
1,2,4,5	Input Lines
6,7,9,10	Output Lines (No Internal Connection)
3,8	GND

# CDDFN10-3324P - Surface Mount TVS Diode Array

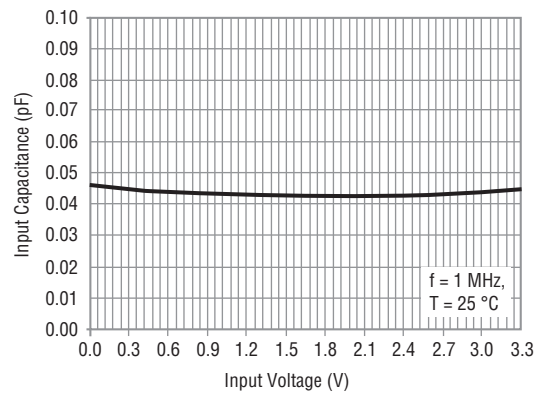
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## Rating & Characteristic Curves

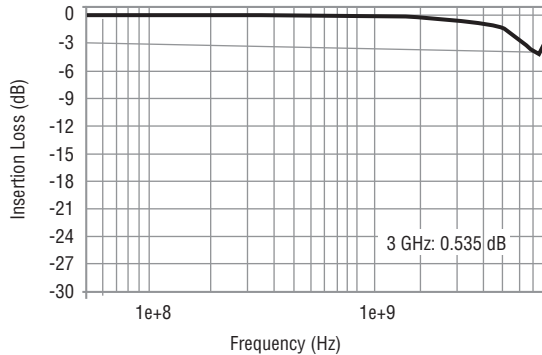
### Typical Voltage vs. Capacitance $C_{IN}$



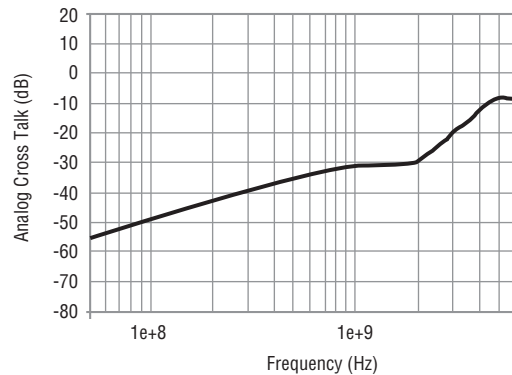
### Typical Voltage vs. Capacitance $C_{CROSS}$



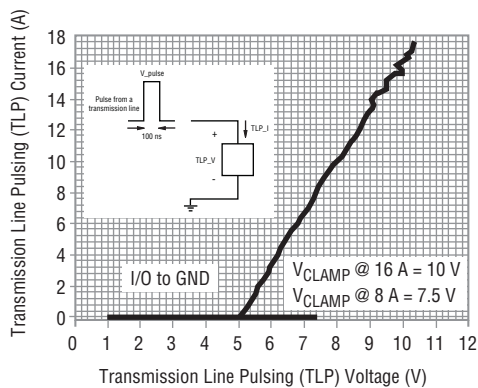
### Typical Insertion Loss S21



### Typical Analog Cross Talk



### Typical Transmission Line Pulsing (TLP)



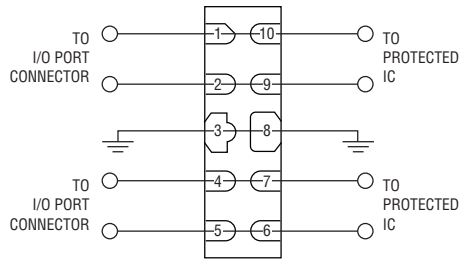
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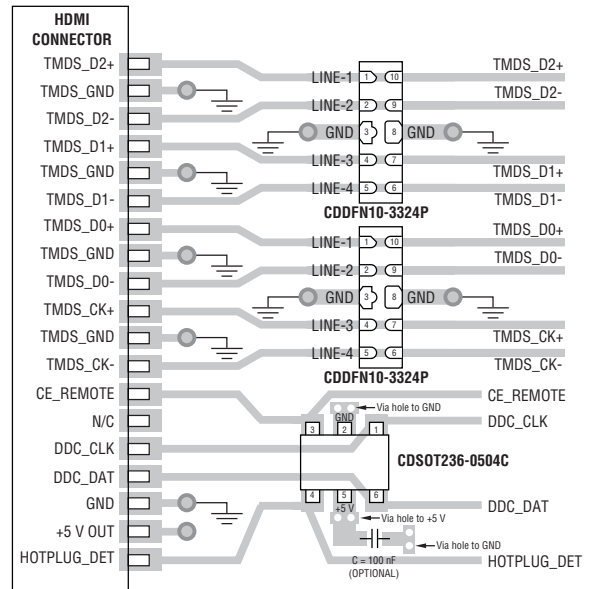


## Reference Application

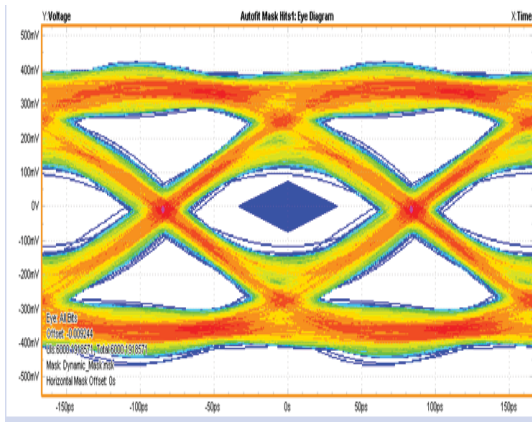
The Bourns® Model CDDFN10-3324P is designed to protect high-speed data ports from ESD transients. For high-speed ports above 5 Gbps such as HDMI 2.0 and USB 3.0, maintaining signal line impedance is a critical requirement. The use of a DFN10 package using a “feed-through” layout provides minimal impedance change on the high-speed data line, while the ultra-low capacitance performance of the device limits signal degradation on each channel.



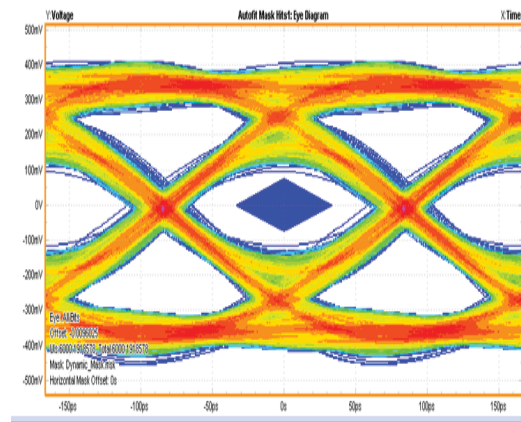
Model CDDFN10-3324P Layout on HDMI Port



Feed-Through Layout - Model CDDFN10-3324P in HDMI Application



HDMI 2.0 Eye Diagram Test Without Model CDDFN10-3324P (PCB Only)



HDMI 2.0 Eye Diagram Test With Model CDDFN10-3324P

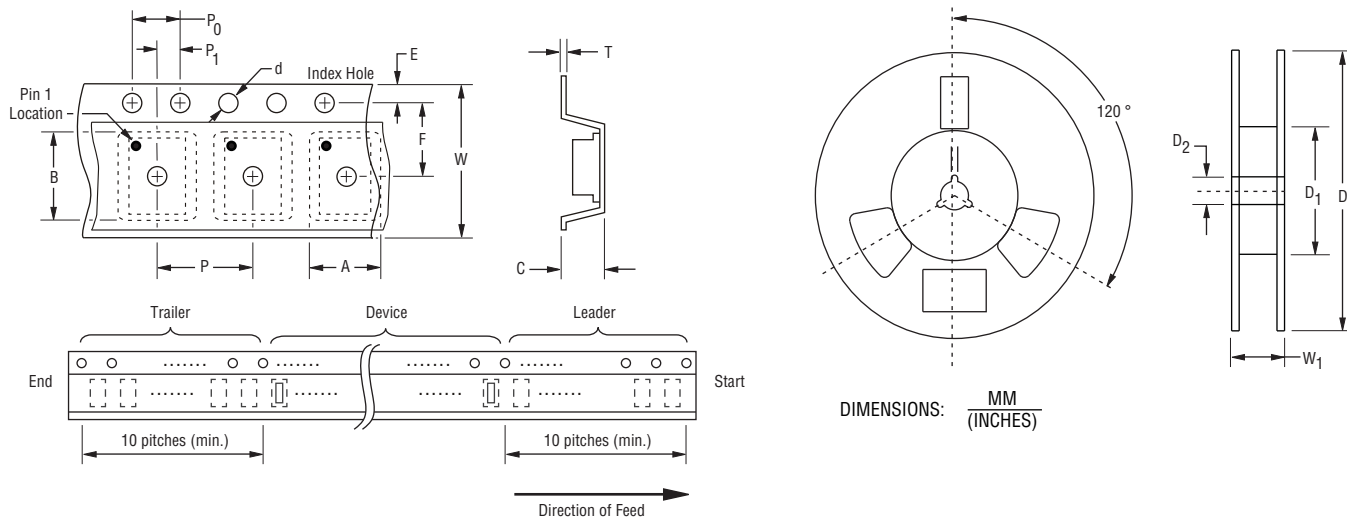
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## Packaging Information

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



Item	Symbol	DFN-10
Carrier Width	A	$\frac{1.70 \pm 0.08}{(0.067 \pm 0.003)}$
Carrier Length	B	$\frac{2.30 \pm 0.08}{(0.091 \pm 0.003)}$
Carrier Depth	C	$\frac{0.75 \pm 0.05}{(0.030 \pm 0.002)}$
Sprocket Hole	d	$\frac{1.15 \pm 0.10}{(0.045 \pm 0.004)}$
Reel Outside Diameter	D	$\frac{178}{(7.008)}$
Reel Inner Diameter	D <sub>1</sub>	$\frac{54.40 \pm 0.40}{(2.142 \pm 0.016)}$
Feed Hole Diameter	D <sub>2</sub>	$\frac{13.0 \pm 0.20}{(0.512 \pm 0.008)}$
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	$\frac{0.20 \pm 0.30}{(0.008 \pm 0.012)}$
Tape Width	W	$\frac{8.00 +0.30/-0.10}{(0.315 +0.012/- 0.004)}$
Reel Width	W <sub>1</sub>	$\frac{12.30 \pm 1.00}{(0.484 \pm 0.039)}$
Quantity per Reel	--	3000

**BOURNS®**

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