

Features

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

Applications

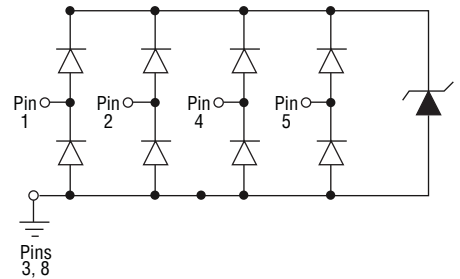
- HDMI 1.3, 1.4 and 2.0
- DisplayPort
- Digital Visual Interface (DVI)
- SATA and eSATA
- USB 3.0
- Memory protection
- SIM card ports

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 °C Unless Otherwise Noted)

| Parameter | Symbol | CDDFN10-3324P | Unit |
|---|------------------|---------------|------|
| Peak Pulse Power (t _p = 8/20 μS) | P _{pp} | 30 | W |
| Peak Pulse Current (t _p = 8/20 μS) | I _{pp} | 4 | A |
| Operating Temperature | T _J | -55 to +85 | °C |
| Storage Temperature | T _{STG} | -55 to +150 | °C |

Electrical Characteristics (@ T_A = 25 °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 | μA |
| Capacitance @ 1.65 V, f = 1 MHz (I/O to GND) | C _{IN} | | 0.45 | 0.65 | pF |
| Capacitance @ 1.65 V, f = 1 MHz (I/O to I/O) | C _{CROSS} | | 0.04 | 0.08 | pF |
| Clamping Voltage @ 8/20 μs @ 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.

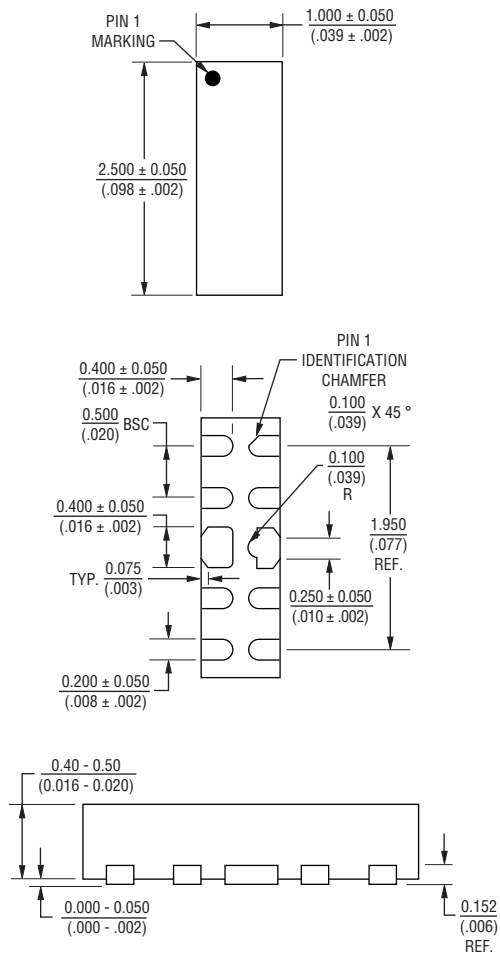
The device characteristics and parameters in this data sheet can and do vary in different applications and actual device performance may vary over time. Users should verify actual device performance in their specific applications.

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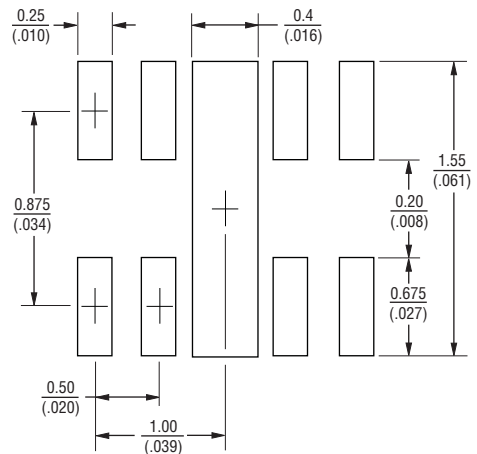
Product Dimensions

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

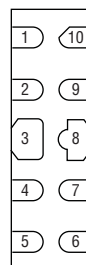
CDDFN10-3324P324

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_{RWM} (Volts)
 Number of Lines _____
 24 = 2 Ground / 4 Data Lines
 Suffix _____
 P = Ultra-low Capacitance

Device Pinout



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

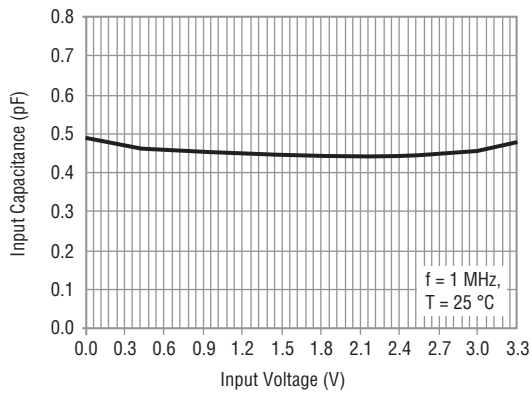
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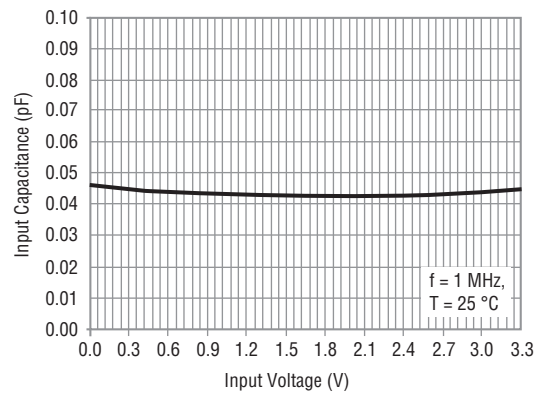
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Rating & Characteristic Curves

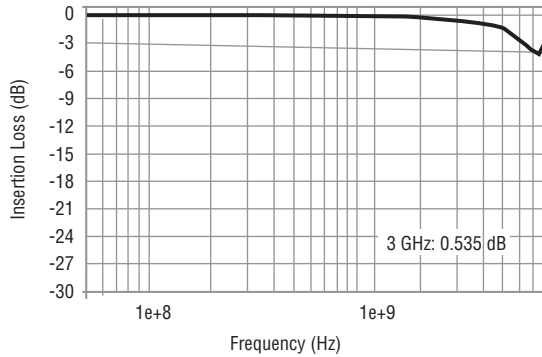
Typical Voltage vs. Capacitance C_{IN}



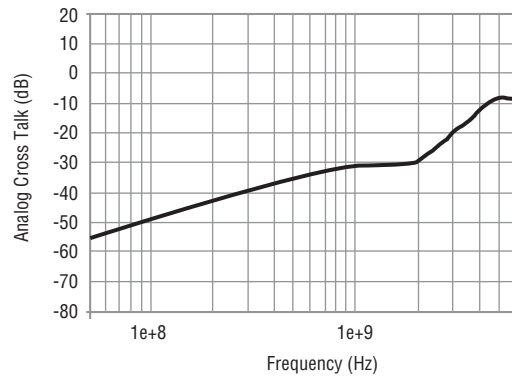
Typical Voltage vs. Capacitance C_{CROSS}



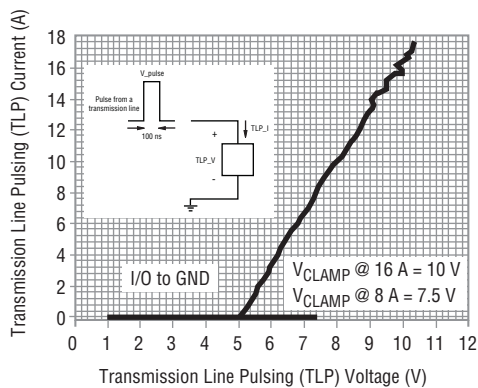
Typical Insertion Loss S21



Typical Analog Cross Talk



Typical Transmission Line Pulsing (TLP)



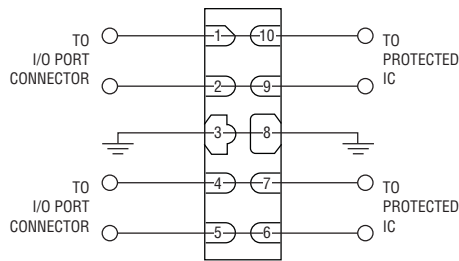
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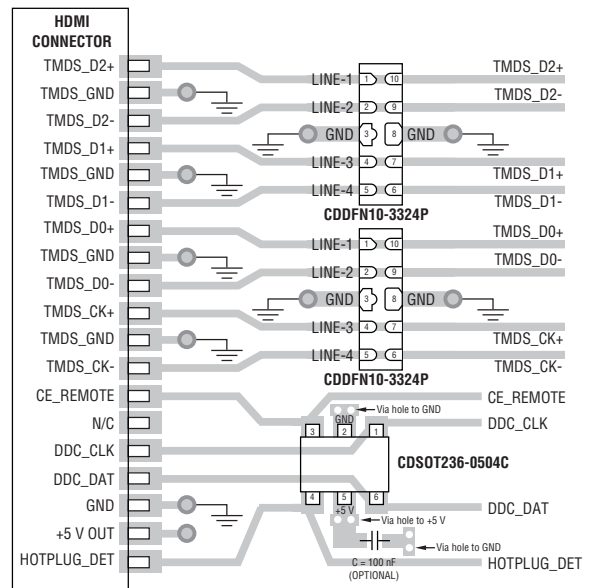


Reference Application

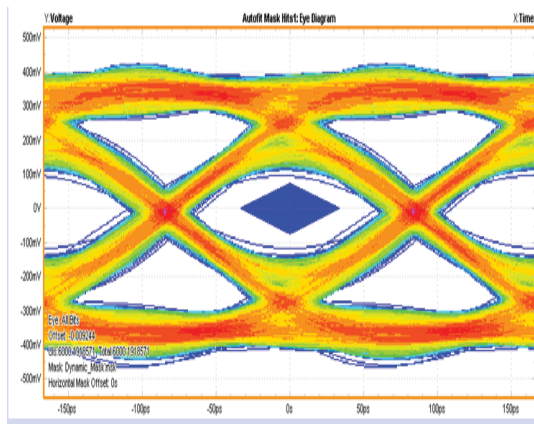
The Bourns® Model CDDFN10-3324P is designed to protect high-speed data ports from ESD transients. For high-speed ports above 5 Gbps such as HDMI 2.0 and USB 3.0, maintaining signal line impedance is a critical requirement. The use of a DFN10 package using a “feed-through” layout provides minimal impedance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



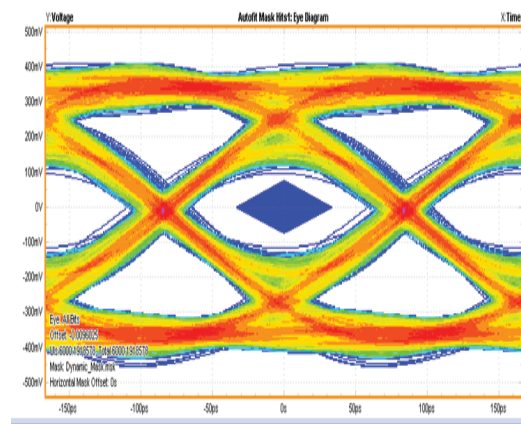
Model CDDFN10-3324P Layout on HDMI Port



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

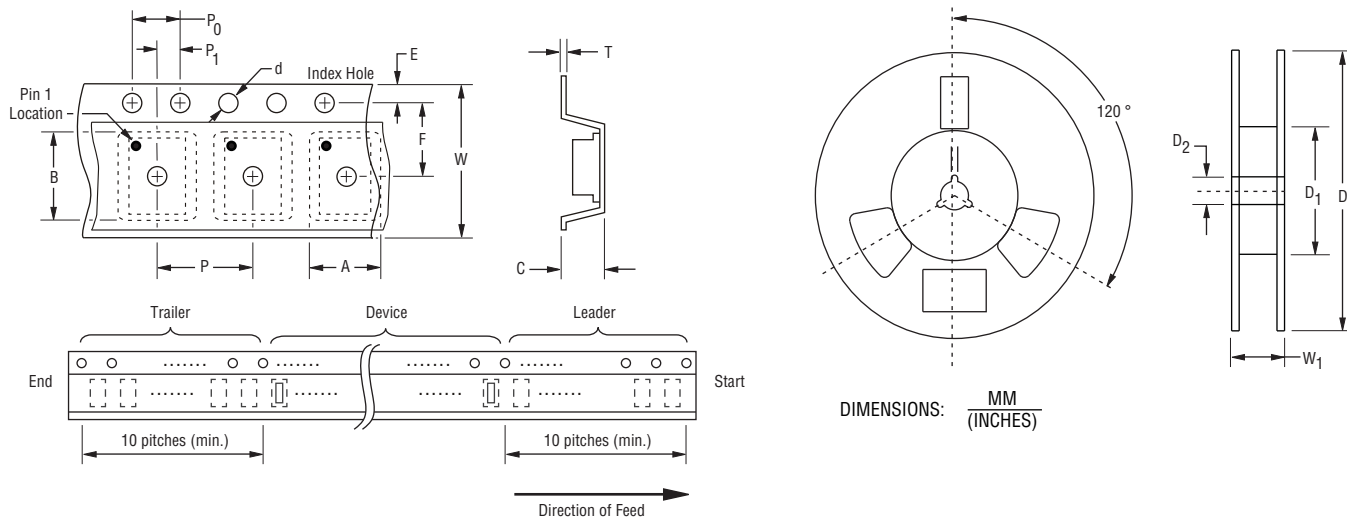
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Packaging Information

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 ₁ | $\frac{54.40 \pm 0.40}{(2.142 \pm 0.016)}$ |
| Feed Hole Diameter | D ₂ | $\frac{13.0 \pm 0.20}{(0.512 \pm 0.008)}$ |
| 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 ₀ | $\frac{4.00 \pm 0.10}{(0.157 \pm 0.004)}$ |
| Embossment Center | P ₁ | $\frac{2.00 \pm 0.05}{(0.079 \pm 0.002)}$ |
| 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 ₁ | $\frac{12.30 \pm 1.00}{(0.484 \pm 0.039)}$ |
| Quantity per Reel | -- | 3000 |

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