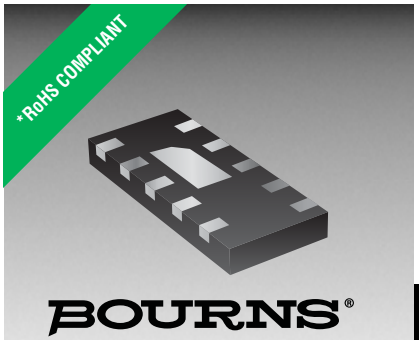



## Features

- Low capacitance - 0.3 pF
- ESD protection
- Vcc + six I/O data lines
- RoHS compliant*

## Applications

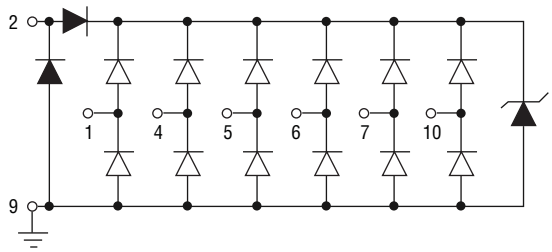
- USB 3.0
- HDMI 1.4
- High speed port protection
- Portable electronics

# CDDFN10-0506N - TVS/Steering Diode Array

## General Information

The Bourns® Model CDDFN10-0506N device provides ESD and EFT protection for high speed data ports meeting IEC 61000-4-2 (ESD) and IEC 61000-4-4 (EFT) requirements. The Transient Voltage Suppressor array, protecting up to six data lines, offers a Working Peak Voltage of 5.0 V.

The DFN-10 package is easy to handle with standard pick and place equipment and their flat configuration minimizes roll away.




## Absolute Maximum Ratings, $T_A$ = 25 °C (Unless Otherwise Noted)

| Parameter | Symbol | Rating | Unit |
|---|---|---|---|
| Peak Pulse Current ($t_p$ = 8/20 µS) | $I_{pp}$ | 3.5 | A |
| Peak Pulse Current ($t_p$ = 8/20 µS) | $P_{pk}$ | 40 | W |
| Operating Supply Votage ($V_{dd}$ - Gnd) | $V_{DC}$ | 6 | V |
| DC Voltage on any I/O Pad | $V_{IO}$ | (Gnd -0.5) to ($V_{dd}$ +0.5) | V |
| Storage Temperature | $T_{STG}$ | -55 to +150 | ºC |
| Operating Temperature | $T_{OPR}$ | -40 to +85 | ºC |
| ESD Protection per IEC 61000-4-2<br>Contact Discharge<br>Air Discharge | | <br>±8<br>±15 | <br>kV<br>kV |
| EFT Protection per IEC 61000-4-4 @ 5/50 ns | | 40 | A |

## Electrical Characteristics (@ $T_A$ = 25 °C Unless Otherwise Noted)

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Working Peak Voltage [1] | $V_{WM}$ | | | 5.0 | V |
| Breakdown Voltage @ 1 mA [1] | $V_{BR}$ | 6.0 | | | V |
| Forward Voltage @ 15 mA [2] | $V_F$ | | 0.8 | 1.2 | V |
| Leakage Current @ $V_{WM}$ [1] | $I_L$ | | | 2.5 | µA |
| Leakage Current @ $V_{WM}$ [3] | $I_{IO}$ | | | 1 | µA |
| Channel Capacitance [3] @ 2.5 V, 1 MHz | $C_{IO}$ | | 0.25 | 0.35 | pF |
| Channel to Channel Capacitance [4] @ 2.5 V, 1 MHz | $C_{CROSS}$ | | 0.05 | 0.07 | pF |
| ESD Dynamic Turn-on Resistance [5] | $R_{dynamic_I/O}$ | | 0.35 | | Ω |
| ESD Dynamic Turn-on Resistance [6] | $R_{dynamic_VDD}$ | | 0.2 | | Ω |

Note 1: Pin 2 to Pin 9
Note 2: Pin 9 to Pin 2.
Note 3: Pin 1, 4, 5, 6, 7 or 10 to Ground.
Note 4: Between I/O 1, 4, 5, 6, 7 or 10.
Note 5: Any I/O Pin to Ground.
Note 6: $V_{DD}$ Pin to Ground.

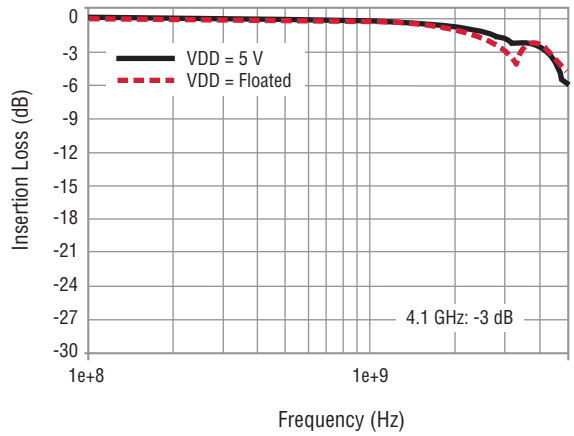
**WARNING Cancer and Reproductive Harm -** www.P65Warnings.ca.gov

*RoHS Directive 2015/863, Mar 31, 2015 and Annex.
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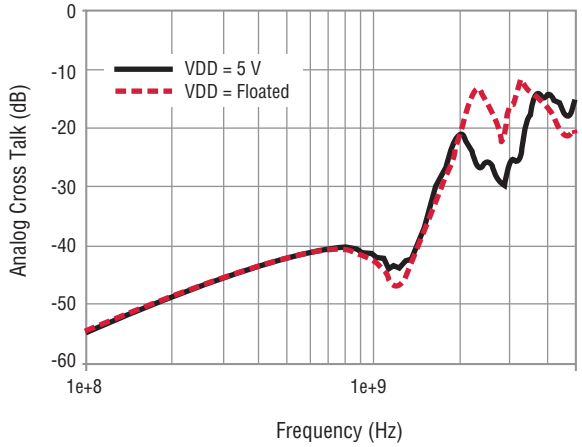
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## Performance Curves

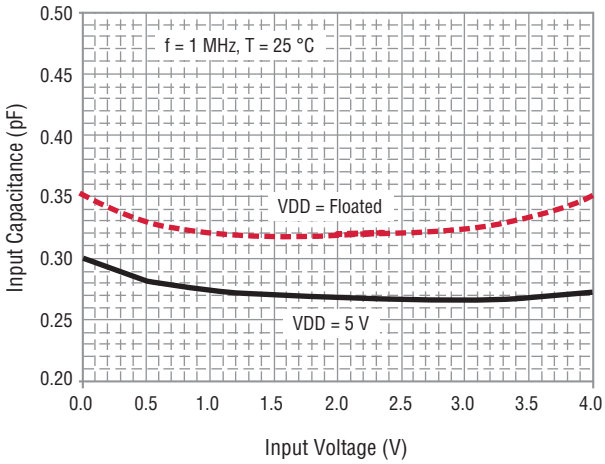
### Insertion Loss S21



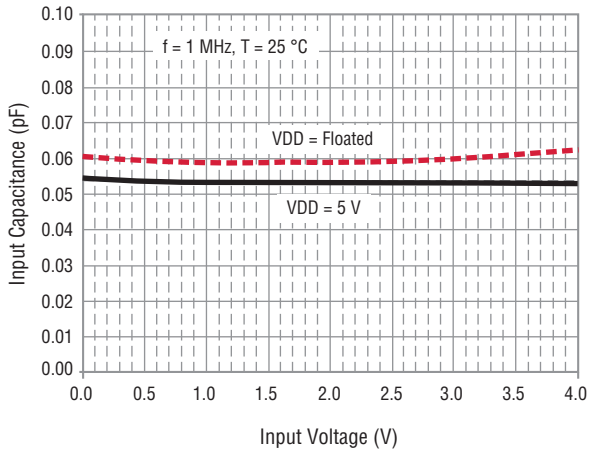

### Crosstalk Between I/Os



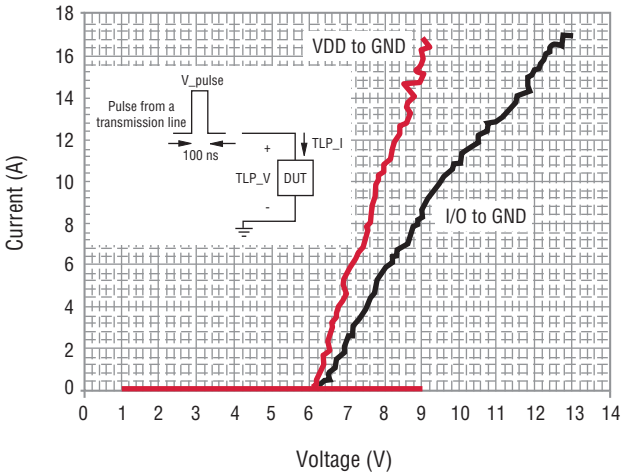

### Channel Capacitance versus Voltage




### Channel to Channel Capacitance versus Voltage




### Typical V/I Characteristic

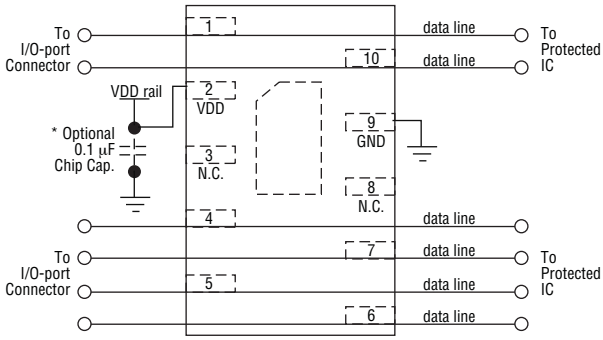



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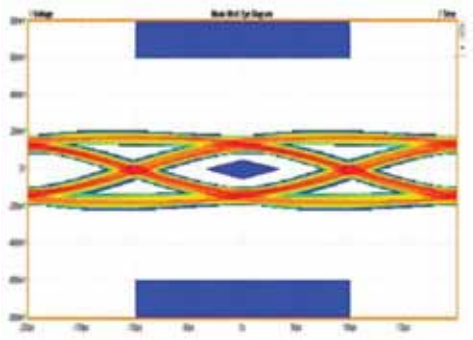
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## Reference Application

Bourns® Model CDDFN10-0506N is designed to protect high speed data ports from ESD transients. For high speed ports above 5 Gb/s such as USB 3.0, differential signalling is used where the need to keep impedance constant is a critical requirement. The use of a DFN-10 package using a “feed through” layout provides a minimum impedance change on the high speed data line while the ultra-low capacitance performance of the device limits the signal loss degradation of each channel.




**CDDFN10-0506N Layout on USB 3.0 Port**



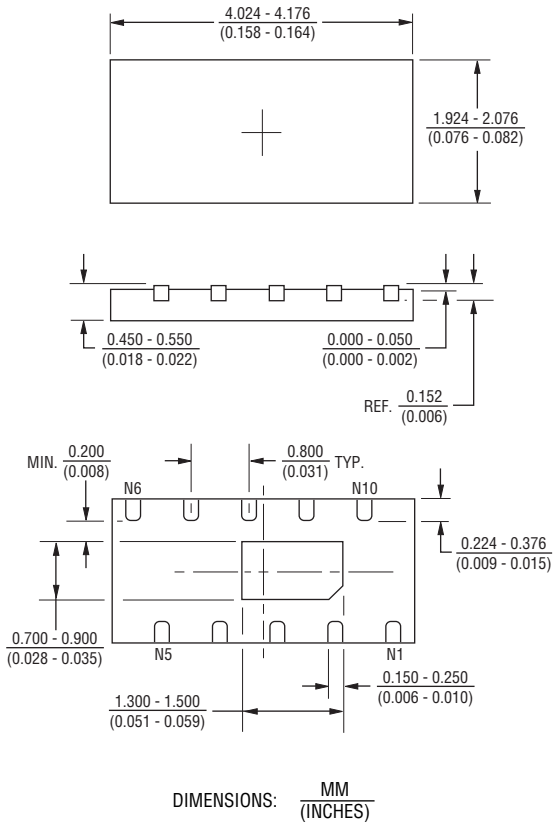
**CDDFN10-0506N Using 5 GHz Eye Diagram**

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## Product Dimensions

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

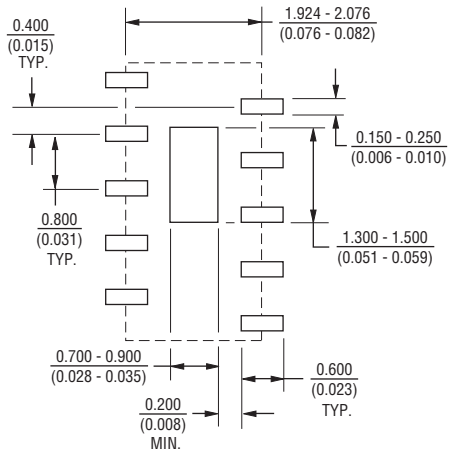



DIMENSIONS: MM / (INCHES)

## Typical Part Marking

CDDFN10-0506N .....506

## Recommended Footprint

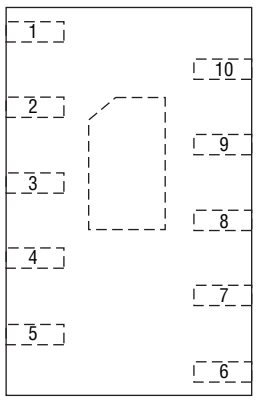



## How to Order

**CD DFN10 - 05 06 N**

- Common Diode / Chip Diode
- Package: DFN10 = DFN-10 Package
- Working Peak Reverse Voltage: 05 = 5.0 $V_{RWM}$ (Volts)
- Number of Lines: 06 = 6 Data Lines
- Suffix: N = Low Capacitance

## Pin Out




TOP VIEW

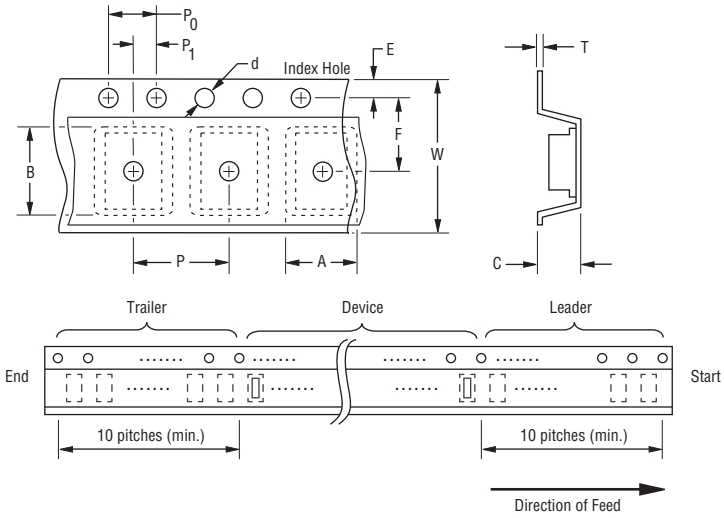
| Pin | Function |
|---|---|
| 1 | I/O LINE |
| 2 | $V_{CC}$ LINE |
| 3 | N.C. |
| 4 | I/O LINE |
| 5 | I/O LINE |
| 6 | I/O LINE |
| 7 | I/O LINE |
| 8 | N.C. |
| 9 | Ground |
| 10 | I/O LINE |
| Center Pad | Ground |

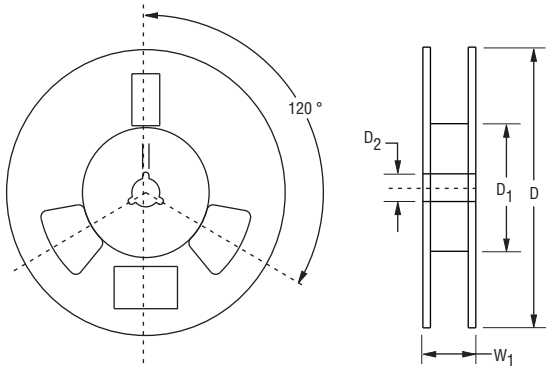
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## Packaging Information

The product will be dispensed in tape and reel format (see diagram below).




DIMENSIONS: MM / (INCHES)

Devices are packed in accordance with EIA standard RS-481-A.

| Item | Symbol | DFN-10 |
|---|---|---|
| Carrier Width | A | 2.21 ± 0.05 (0.087 ± 0.002) |
| Carrier Length | B | 4.22 +0.05/-0.04 (0.166 +0.002/-0.002) |
| Carrier Depth | C | 0.81 ± 0.05 (0.032 ± 0.002) |
| Sprocket Hole | d | 1.50 +0.1/-0 (0.059 +0.004/-0) |
| Reel Outside Diameter | D | 180 ± 3 (7.087 ± .118) |
| Reel Inner Diameter | $D_1$ | 50.0 (1.969) MIN. |
| Feed Hole Diameter | $D_2$ | 13.0 +0.5/-0.2 (0.512 +0.020/-0.008) |
| Sprocket Hole Position | E | 1.75 ± 0.10 (0.069 ± 0.004) |
| Punch Hole Position | F | 5.50 ± 0.05 (0.217 ± 0.002) |
| Punch Hole Pitch | P | 4.00 ± 0.10 (0.157 ± 0.004) |
| Sprocket Hole Pitch | $P_0$ | 4.00 ± 0.10 (0.157 ± 0.004) |
| Embossment Center | $P_1$ | 2.00 ± 0.05 (0.079 ± 0.002) |
| Overall Tape Thickness | T | 0.6 (0.024) MAX. |
| Tape Width | W | 12.3 (0.484) MAX. |
| Reel Width | $W_1$ | 18.4 (0.724) MAX. |
| Quantity per Reel | -- | 3000 |

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