chanhvinh.com



Features

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

Applications

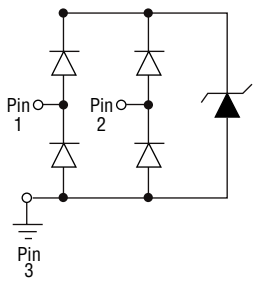
- HDMI
- DisplayPort™
- Digital Visual Interface (DVI)
- SATA and eSATA
- USB 3.1

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:

PRODUCT | TECHNICAL LIBRARY | INVENTORY | SAMPLES | CONTACT

Absolute Maximum Ratings (@ T_A = 25 °C Unless Otherwise Noted)

Parameter	Symbol	Value	Unit
Peak Pulse Current (t_p = 8/20 µs)	I_{pp}	3	A
Operating Temperature	T_{OPR}	-55 to +85	ºC
Storage Temperature	T_{STG}	-55 to +150	ºC
ESD Protection (per IEC 6-1000-4-2) Contact Air	ESD	 +8 +15	kV

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

Parameter	Symbol	Min.	Typ.	Max.	Unit
Reverse Standoff Voltage	V_{RWM}			3.3	V
Breakdown Voltage @ 1 mA	V_{BR}	4.5			V
Forward Voltage @ 15 mA	V_F		0.9	1.1	V
Leakage Current	I_R			500	nA
ESD Clamping Voltage IEC 61000-4-2, +8 kV (I_{TLP} = 16 A)*	V_C		13		V
Capacitance @ 1.65 V, 1 MHz (I/O to GND, Vpin-3 = 0 V)	C_{IN}		0.18	0.27	pF
Capacitance @ 1.65 V, 1 MHz (I/O to I/O, Vpin-3 = 0 V)	C_{CROSS}		0.04	0.08	pF

*Transmission Line Pulsing (TLP) conditions: Z_0 = 50 ohms, t_p = 100 ns, t_r = 1 ns

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

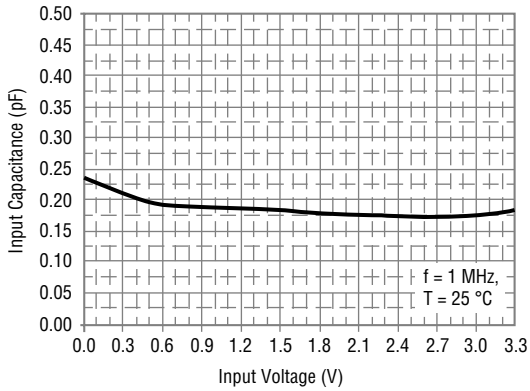
* RoHS Directive 2015/863, Mar 31, 2015 and Annex.
** Bourns considers a product to be "halogen free" if (a) the Bromine (Br) content is 900 ppm or less; (b) the Chlorine (Cl) content is 900 ppm or less; and (c) the total Bromine (Br) and Chlorine (Cl) content is 1500 ppm or less.

"DisplayPort" is a trademark of VESA.
Specifications are subject to change without notice.
Users should verify actual device performance in their specific applications.
The products described herein and this document are subject to specific legal disclaimers as set forth on the last page of this document, and at www.bourns.com/docs/legal/disclaimer.pdf.

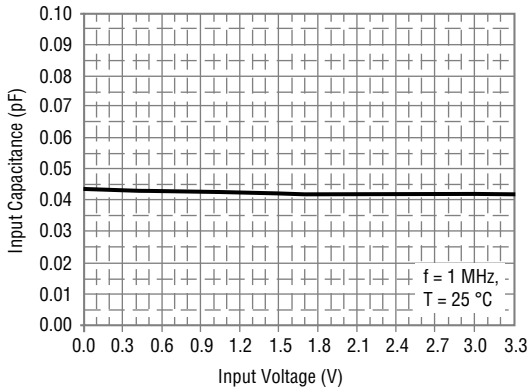
chanhvinh.com

Rating & Characteristic Curves

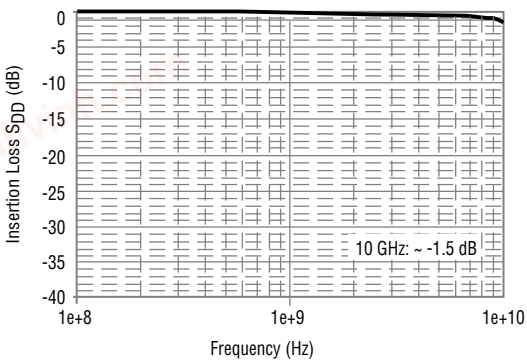
Typical Voltage vs. Capacitance C_{IN}



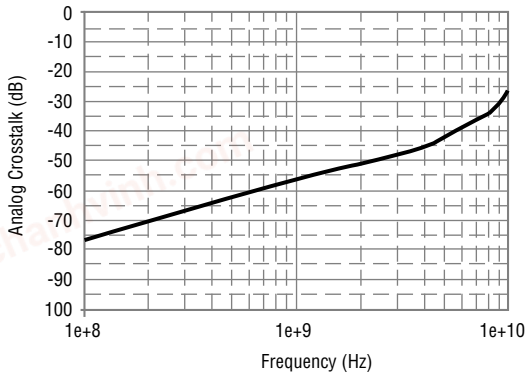
Typical Voltage vs. Capacitance C_{CROSS}



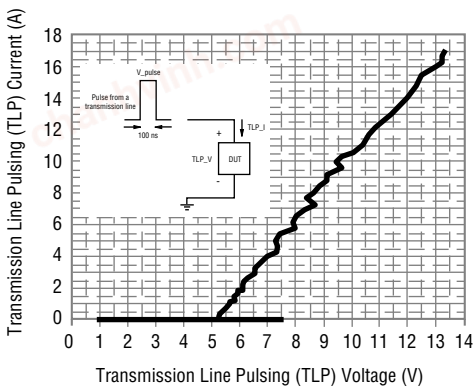
Typical Insertion Loss S_{DD}



Typical Analog Crosstalk



Typical Transmission Line Pulsing (TLP)



Specifications are subject to change without notice.
Users should verify actual device performance in their specific applications.
The products described herein and this document are subject to specific legal disclaimers as set forth on the last page of this document, and at www.bourns.com/docs/legal/disclaimer.pdf.

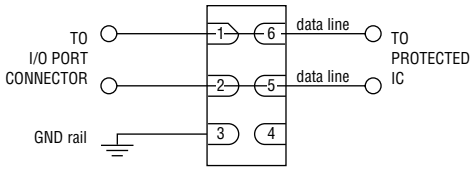
chanhvinh.com

CDDFN6-3312P - Surface Mount TVS Diode Array

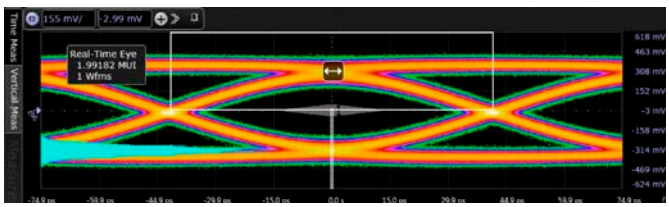
BOURNS®

Reference Application

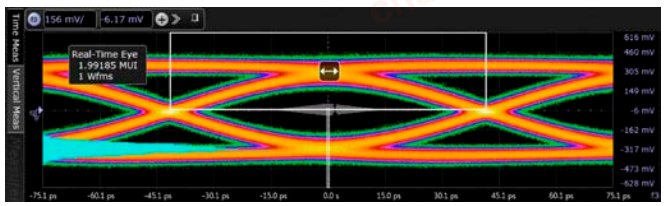
The Bourns® Model CDDFN6-3312P is designed to protect high-speed data ports from ESD transients. For high-speed ports above 12 Gbps such as HDMI 2.1, maintaining signal line impedance is a critical requirement. The use of a DFN6 package using a “feed-through” layout provides minimal impedance change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

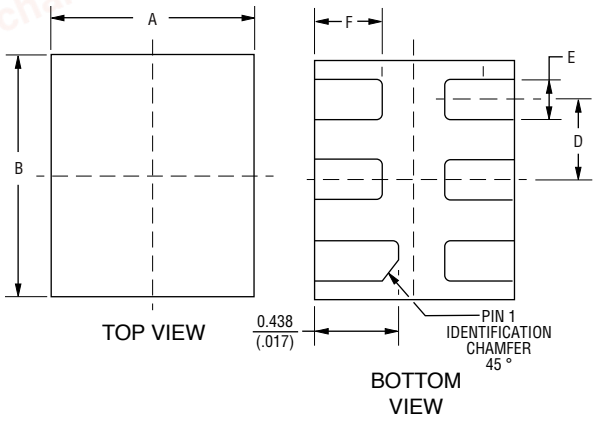
Specifications are subject to change without notice.
Users should verify actual device performance in their specific applications.
The products described herein and this document are subject to specific legal disclaimers as set forth on the last page of this document, and at www.bourns.com/docs/legal/disclaimer.pdf.

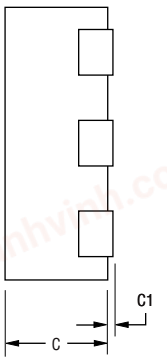
chanhvinh.com

CDDFN6-3312P - Surface Mount TVS Diode Array

BOURNS®

Product Dimensions

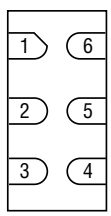




DIMENSIONS: MM / (INCHES)

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)

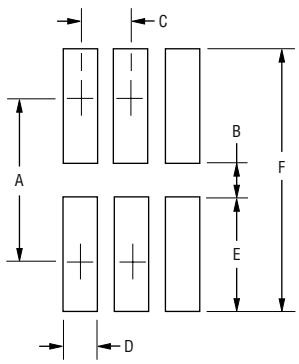
Device Pinout



TOP VIEW

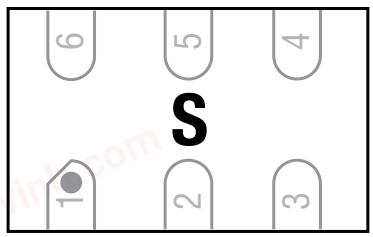
Pin	Function
1,2	Data Lines
4,5,6	NC (No Internal Connection) for Feed-Through Layout design
3	GND

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)

Typical Part Marking



Environmental Specifications

Moisture Sensitivity Level 3
ESD Classification (HBM) 3B

How to Order

CD DFN6 - 33 12 P

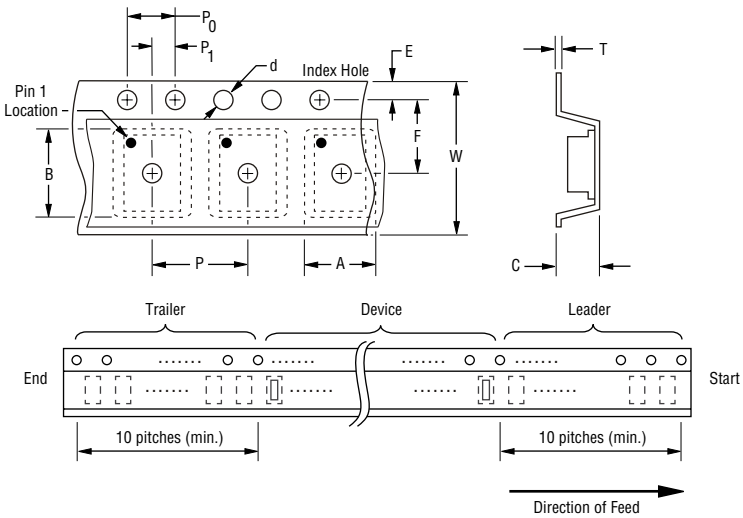
- Common Code: Chip Diode
- Package: DFN6 = DFN-6 Package
- Working Peak Reverse Voltage: 33 = 3.3 V_{RWM} (Volts)
- Number of Lines: 12 = 1 Ground Line / 2 Data Lines
- Suffix: P = Ultra-low Capacitance

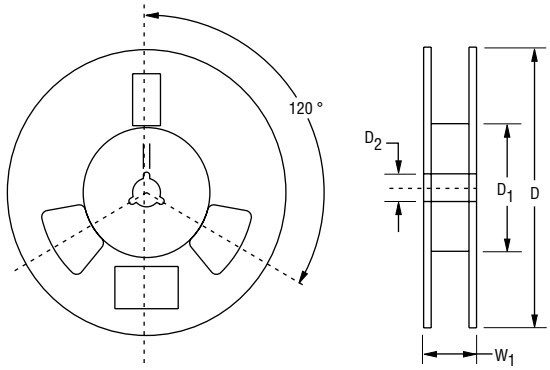
Specifications are subject to change without notice.
Users should verify actual device performance in their specific applications.
The products described herein and this document are subject to specific legal disclaimers as set forth on the last page of this document, and at www.bourns.com/docs/legal/disclaimer.pdf.

chanhvinh.com

Packaging Information

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





DIMENSIONS: MM / (INCHES)

Item	Symbol	DFN-6
Carrier Width	A	1.17 ± 0.05 (0.046 ± 0.002)
Carrier Length	B	1.4 ± 0.05 (0.055 ± 0.002)
Carrier Depth	C	0.65 ± 0.05 (0.0255 ± 0.002)
Sprocket Hole	d	1.55 ± 0.05 (0.061 ± 0.002)
Reel Outside Diameter	D	180 ± 2.00 (7.087 ± 0.079)
Reel Inner Diameter	D_1	50.0 (1.969) MIN.
Feed Hole Diameter	D_2	13.0 +0.5/-0.20 (0.512 +0.020/-0.008)
Sprocket Hole Position	E	1.75 ± 0.10 (0.069 ± 0.004)
Punch Hole Position	F	3.50 ± 0.05 (0.138 ± 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	0.30 ± 0.05 (0.012 ± 0.002)
Tape Width	W	8.00 ± 0.05 (0.315 ± 0.002)
Reel Width	W_1	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

www.bourns.com

06/21

Specifications are subject to change without notice.
Users should verify actual device performance in their specific applications.
The products described herein and this document are subject to specific legal disclaimers as set forth on the last page of this document, and at
www.bourns.com/docs/legal/disclaimer.pdf.

chanhvinh.com

Legal Disclaimer Notice

BOURNS®

This legal disclaimer applies to purchasers and users of Bourns® products manufactured by or on behalf of Bourns, Inc. and its affiliates (collectively, "Bourns").

Unless otherwise expressly indicated in writing, Bourns® products and data sheets relating thereto are subject to change without notice. Users should check for and obtain the latest relevant information and verify that such information is current and complete before placing orders for Bourns® products.

The characteristics and parameters of a Bourns® product set forth in its data sheet are based on laboratory conditions, and statements regarding the suitability of products for certain types of applications are based on Bourns' knowledge of typical requirements in generic applications. The characteristics and parameters of a Bourns® product in a user application may vary from the data sheet characteristics and parameters due to (i) the combination of the Bourns® product with other components in the user's application, or (ii) the environment of the user application itself. The characteristics and parameters of a Bourns® product also can and do vary in different applications and actual performance may vary over time. Users should always verify the actual performance of the Bourns® product in their specific devices and applications, and make their own independent judgments regarding the amount of additional test margin to design into their device or application to compensate for differences between laboratory and real world conditions.

Unless Bourns has explicitly designated an individual Bourns® product as meeting the requirements of a particular industry standard (e.g., ISO/TS 16949) or a particular qualification (e.g., UL listed or recognized), Bourns is not responsible for any failure of an individual Bourns® product to meet the requirements of such industry standard or particular qualification. Users of Bourns® products are responsible for ensuring compliance with safety-related requirements and standards applicable to their devices or applications.

Bourns® products are not recommended, authorized or intended for use in nuclear, lifesaving, life-critical or life-sustaining applications, nor in any other applications where failure or malfunction may result in personal injury, death, or severe property or environmental damage. Unless expressly and specifically approved in writing by two authorized Bourns representatives on a case-by-case basis, use of any Bourns® products in such unauthorized applications might not be safe and thus is at the user's sole risk. Life-critical applications include devices identified by the U.S. Food and Drug Administration as Class III devices and generally equivalent classifications outside of the United States.

Bourns expressly identifies those Bourns® standard products that are suitable for use in automotive applications on such products' data sheets in the section entitled "Applications." Unless expressly and specifically approved in writing by two authorized Bourns representatives on a case-by-case basis, use of any other Bourns® standard products in an automotive application might not be safe and thus is not recommended, authorized or intended and is at the user's sole risk. If Bourns expressly identifies a sub-category of automotive application in the data sheet for its standard products (such as infotainment or lighting), such identification means that Bourns has reviewed its standard product and has determined that if such Bourns® standard product is considered for potential use in automotive applications, it should only be used in such sub-category of automotive applications. Any reference to Bourns® standard product in the data sheet as compliant with the AEC-Q standard or "automotive grade" does not by itself mean that Bourns has approved such product for use in an automotive application.

Bourns® standard products are not tested to comply with United States Federal Aviation Administration standards generally or any other generally equivalent governmental organization standard applicable to products designed or manufactured for use in aircraft or space applications. Bourns expressly identifies Bourns® standard products that are suitable for use in aircraft or space applications on such products' data sheets in the section entitled "Applications." Unless expressly and specifically approved in writing by two authorized Bourns representatives on a case-by-case basis, use of any other Bourns® standard product in an aircraft or space application might not be safe and thus is not recommended, authorized or intended and is at the user's sole risk.

The use and level of testing applicable to Bourns® custom products shall be negotiated on a case-by-case basis by Bourns and the user for which such Bourns® custom products are specially designed. Absent a written agreement between Bourns and the user regarding the use and level of such testing, the above provisions applicable to Bourns® standard products shall also apply to such Bourns® custom products.

Users shall not sell, transfer, export or re-export any Bourns® products or technology for use in activities which involve the design, development, production, use or stockpiling of nuclear, chemical or biological weapons or missiles, nor shall they use Bourns® products or technology in any facility which engages in activities relating to such devices. The foregoing restrictions apply to all uses and applications that violate national or international prohibitions, including embargos or international regulations. Further, Bourns® products and Bourns technology and technical data may not under any circumstance be exported or re-exported to countries subject to international sanctions or embargoes. Bourns® products may not, without prior authorization from Bourns and/or the U.S. Government, be resold, transferred, or re-exported to any party not eligible to receive U.S. commodities, software, and technical data.

To the maximum extent permitted by applicable law, Bourns disclaims (i) any and all liability for special, punitive, consequential, incidental or indirect damages or lost revenues or lost profits, and (ii) any and all implied warranties, including implied warranties of fitness for particular purpose, non-infringement and merchantability.

For your convenience, copies of this Legal Disclaimer Notice with German, Spanish, Japanese, Traditional Chinese and Simplified Chinese bilingual versions are available at:

Web Page: http://www.bourns.com/legal/disclaimers-terms-and-policies

PDF: http://www.bourns.com/docs/Legal/disclaimer.pdf