

**Features**

- RoHS compliant\*
- Protects four I/O lines
- Ultra-low capacitance ~ 0.55 pF
- ESD protection >30 kV
- Surge protection



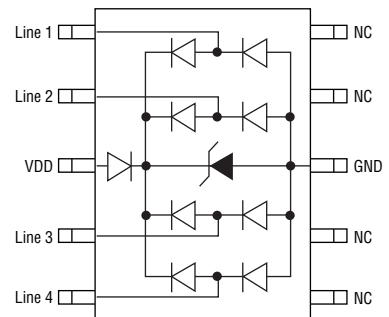
This series is currently available but not recommended for new designs. See [Product Obsolescence Memo](#) for possible replacement part no.

**CDMSP10-0504M – Surface Mount TVS Diode Array**

**General Information**

The CDMSP10-0504M device provides ESD, EFT and Surge protection for high speed data ports meeting IEC 61000-4-2 (ESD), IEC 61000-4-4 (EFT) and IEC 61000-4-5 (Surge) requirements. The Transient Voltage Suppressor array, protecting up to 4 data lines, offers a Working Peak Reverse Voltage of 5 V and Minimum Breakdown Voltage of 6 V.

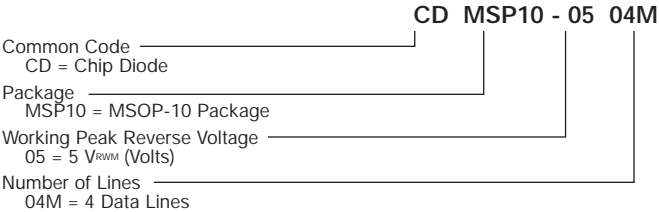
The MSOP-10L packaged device will mount directly onto the industry standard MSOP-10L footprint. Bourns® Chip Diodes conform to JEDEC standards, are easy to handle with standard pick and place equipment and their flat configuration minimizes roll away.



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

| Parameter   | Symbol            | Value                      | Unit  |
|---|-------------------|----------------------------|-------|
| Operating Supply Voltage                          | V <sub>DC</sub>   | 6                          | V     |
| DC Voltage at any I/O Pin                         | V <sub>D</sub>    | (Gnd - 0.5) to (Vdd + 0.5) | V     |
| ESD Performance per IEC 61000-4-2 (I/O Pins)      | Air Discharge     | V <sub>ESD</sub> I/O       | 19 kV |
|   | Contact Discharge | V <sub>ESD</sub> I/O       | 12 kV |
| ESD Performance per IEC 61000-4-2 (VDD, GND Pins) | Air Discharge     | V <sub>ESD</sub> PW        | 30 kV |
|   | Contact Discharge | V <sub>ESD</sub> PW        | 30 kV |
| Storage Temperature                               | T <sub>STG</sub>  | -55 °C to +150 °C          | °C    |
| Operating Temperature                             | T <sub>OPR</sub>  | -55 °C to +150 °C          | °C    |

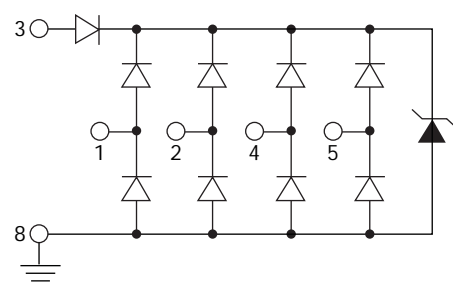
**How To Order**



**Typical Part Marking**

CDMSP10-0504M .....B0504

**Schematic**



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

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## Applications

- High Definition Multimedia Interface (HDMI)
- Digital Visual Interface (DVI)
- Ethernet 10/100/1000 Mb/s
- SATA interface
- Portable electronics

## CDMSP10-0504M – Surface Mount TVS Diode Array

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

| Parameter   | Symbol               | Minimum | Nominal | Maximum | Unit |
|---|----------------------|---------|---------|---------|------|
| Reverse Standoff Voltage <sup>1</sup>   | V <sub>RWM</sub>     |         |         | 5       | V    |
| Leakage Current <sup>1</sup> @ V <sub>RWM</sub>   | I <sub>D</sub>       |         |         | 5       | μA   |
| Channel Leakage Current @ V <sub>RWM</sub>  | I <sub>CD</sub>      |         |         | 1       | μA   |
| Reverse Breakdown Voltage @ V <sub>RWM</sub>  | V <sub>BR</sub>      | 6       |         | 9       | V    |
| Forward Voltage <sup>3</sup> @ I <sub>F</sub> = 15 mA   | V <sub>F</sub>       |         | 0.8     | 1       | V    |
| ESD Clamping Voltage <sup>2</sup><br>@ IEC 61000-4-2 +6 kV, Contact Mode  | V <sub>C</sub>       |         | 12.5    |         | V    |
| ESD Clamping Voltage <sup>1</sup><br>@ IEC 61000-4-2 +6 kV, Contact Mode  | V <sub>C</sub>       |         | 9.5     |         | V    |
| ESD Dynamic Turn-On Resistance - I/O <sup>2</sup>   | R <sub>dyn_io</sub>  |         | 0.33    |         | Ohms |
| ESD Dynamic Turn-On Resistance - V <sub>DD</sub> <sup>1</sup>   | R <sub>dyn_VDD</sub> |         | 0.16    |         | Ohms |
| Channel Input Capacitance <sup>2</sup> - 1<br>@ V <sub>PIN3</sub> =5 V, V <sub>IN</sub> =2.5 V, f = 1 MHz   | C <sub>IN-1</sub>    |         | 0.55    | 0.65    | pF   |
| Channel Input Capacitance <sup>2</sup> - 2<br>@ V <sub>PIN3</sub> =N/C, V <sub>IN</sub> =2.5 V, f = 1 MHz   | C <sub>IN-2</sub>    |         | 0.70    | 0.80    | pF   |
| Channel to Channel Input Capacitance - 1<br>@ V <sub>PIN3</sub> =5 V, V <sub>IN</sub> =2.5 V, f = 1 MHz<br>(Between channel pins)                         | C <sub>CROSS-1</sub> |         | 0.08    | 0.09    | pF   |
| Channel to Channel Input Capacitance - 2<br>@ V <sub>PIN3</sub> =N/C, V <sub>IN</sub> =2.5 V, f = 1 MHz<br>(Between channel pins)                         | C <sub>CROSS-2</sub> |         | 0.10    | 0.11    | pF   |
| Variation of Channel Input Capacitance - 1<br>@ V <sub>PIN3</sub> =5 V, V <sub>IN</sub> =2.5 V, f = 1 MHz<br>(Channel x Pin to GND, Channel y Pin to GND) | ΔC <sub>IN-1</sub>   |         | 0.04    | 0.06    | pF   |
| Variation of Channel Input Capacitance - 2<br>@ V <sub>PIN3</sub> =N/C, V <sub>IN</sub> =2.5 V, f = 1 MHz<br>(Channel x Pin to GND, Channel y Pin to GND) | ΔC <sub>IN-2</sub>   |         | 0.05    | 0.08    | pF   |

#### Notes:

1. Test from V<sub>dd</sub> Pin 3 to Gnd Pin 8
2. Test from Pin 1,2,4 or 5 to Gnd Pin 8
3. Test from Gnd Pin 8 to V<sub>dd</sub> Pin 3

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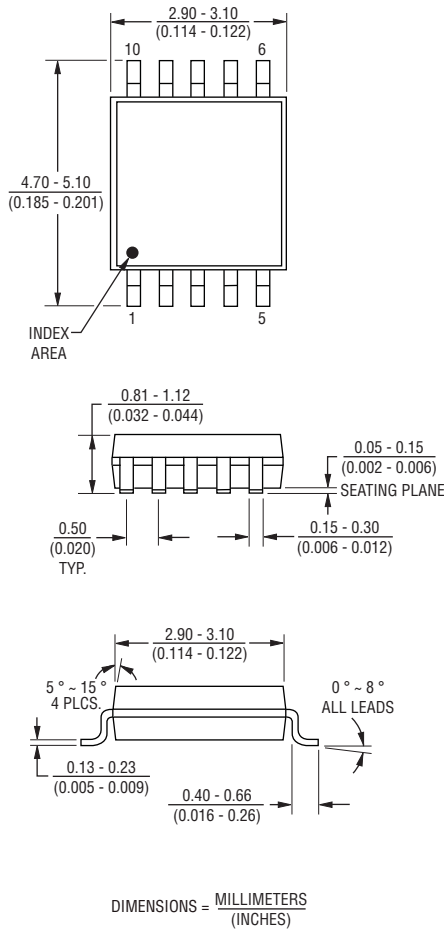
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# CDMSP10-0504M – Surface Mount TVS Diode Array

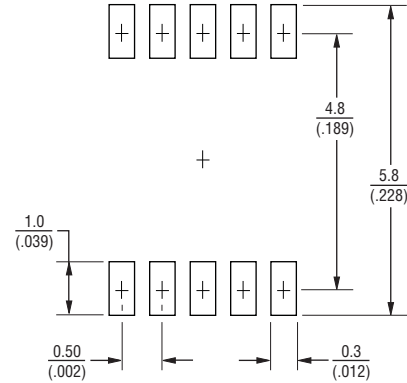


## Product Dimensions

This is a molded JEDEC MSOP-10L 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.



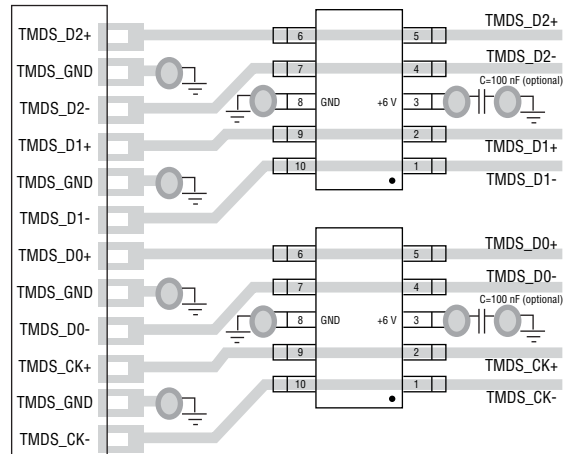
## Recommended Footprint



This LAND LAYOUT is for reference purposes only. Please consult your manufacturing partners to ensure your company's PCB design guidelines are met.

## Typical Application

This ESD protection device is ideal in high speed data port protection such as HDMI where capacitance per line is critical parameter. See example connection below.



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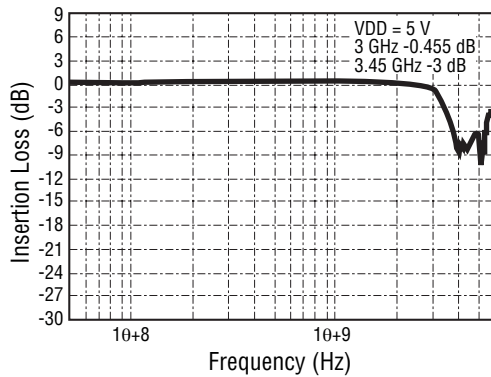
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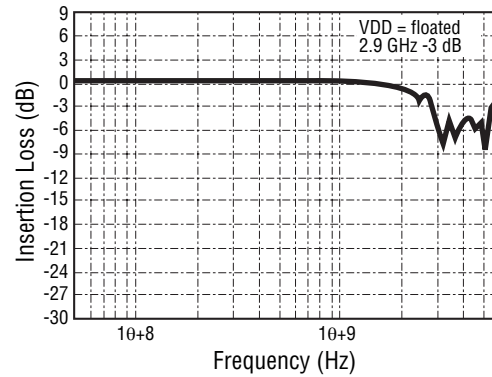
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## Characteristic Curves

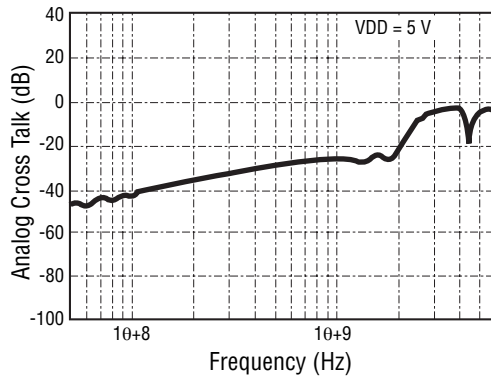
### Insertion Loss S21 (I/O-to-GND)



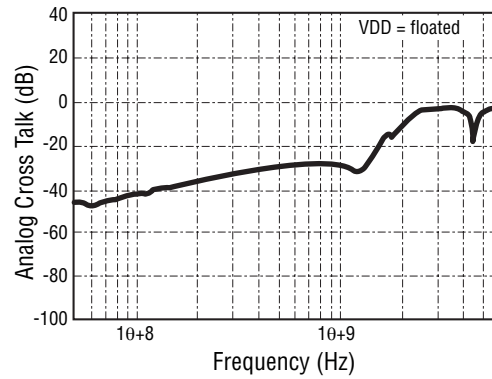
### Insertion Loss S21 (I/O-to-GND)



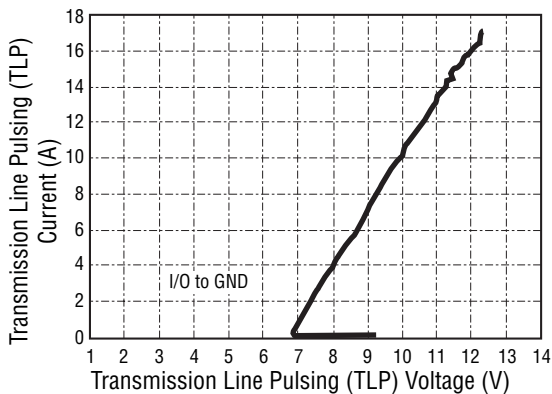
### Analog Cross Talk



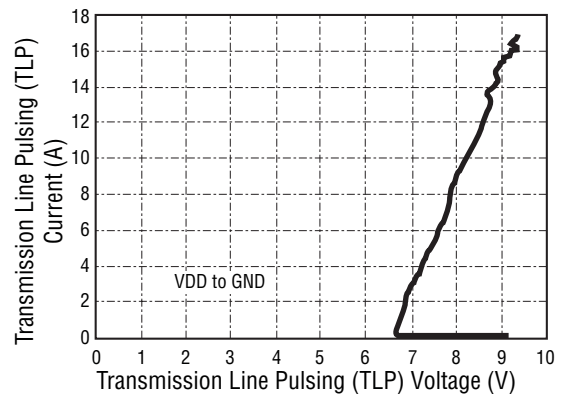
### Analog Cross Talk



### Transmission Line Pulsing (TLP) Measurement



### Transmission Line Pulsing (TLP) Measurement



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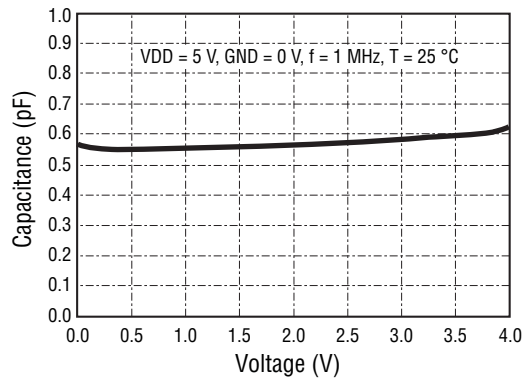
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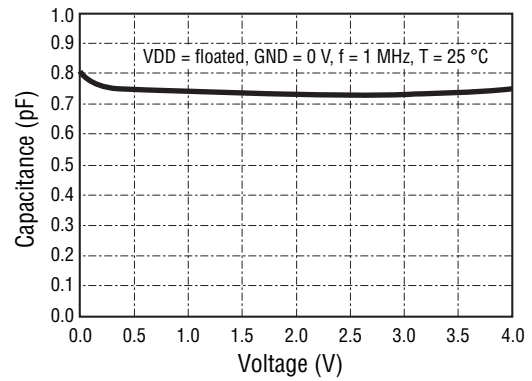
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## Characteristic Curves

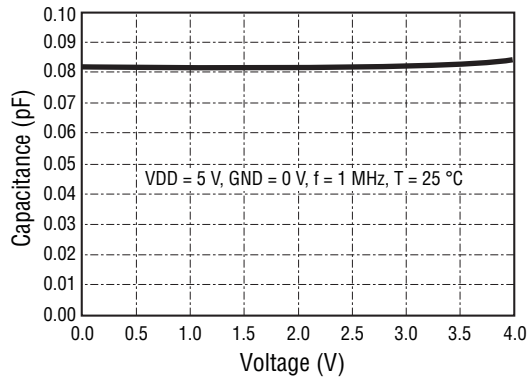
### Typical Variation of $C_{IN}$ vs. $V_{IN}$



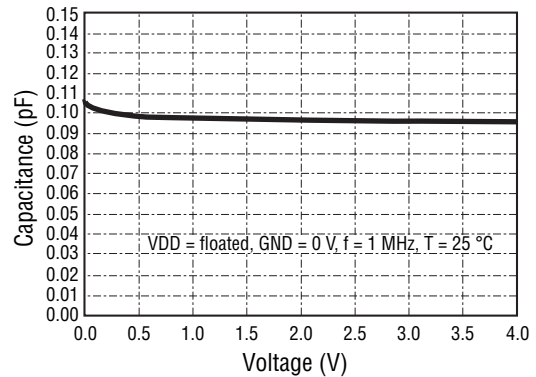
### Typical Variation of $C_{IN}$ vs. $V_{IN}$



### Typical Variation of $C_{IO-to-IO}$ vs. $V_{IN}$



### Typical Variation of $C_{IO-to-IO}$ vs. $V_{IN}$



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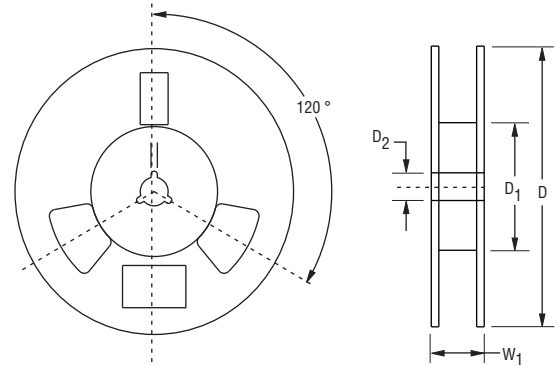
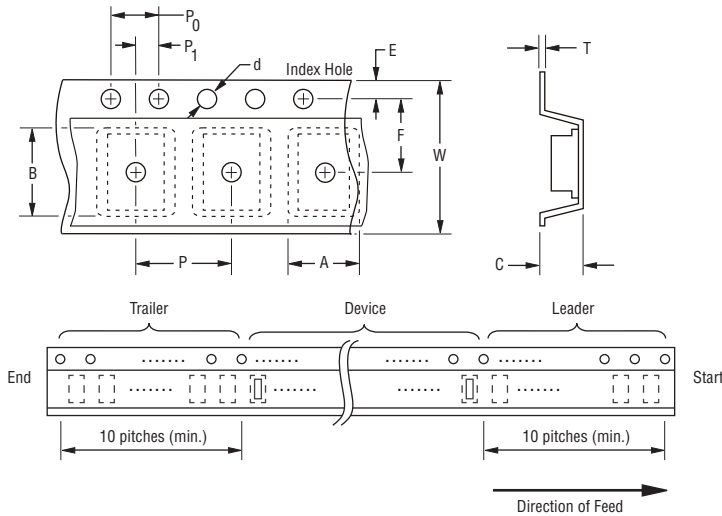
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# CDMSP10-0504M – Surface Mount TVS Diode Array

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## Packaging Information

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



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

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

| Item                   | Symbol         | MSOP-10L                                  |
|------------------------|----------------|---|
| Carrier Width          | A              | $\frac{5.5 \pm 0.10}{(0.216 \pm 0.004)}$  |
| Carrier Length         | B              | $\frac{3.5 \pm 0.10}{(0.138 \pm 0.004)}$  |
| Carrier Depth          | C              | $\frac{1.5 \pm 0.10}{(0.059 \pm 0.004)}$  |
| Sprocket Hole          | d              | $\frac{1.55 \pm 0.05}{(0.061 \pm 0.002)}$ |
| Reel Outside Diameter  | D              | $\frac{178}{(7.008)}$                     |
| Reel Inner Diameter    | D <sub>1</sub> | $\frac{50.0}{(1.969)}$ MIN.               |
| 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              | $\frac{8.00 \pm 0.10}{(0.314 \pm 0.004)}$ |
| 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              | $\frac{0.20 \pm 0.10}{(0.008 \pm 0.004)}$ |
| Tape Width             | W              | $\frac{12.0 \pm 0.20}{(0.470 \pm 0.008)}$ |
| Reel Width             | W <sub>1</sub> | $\frac{14.4}{(0.567)}$                    |
| Quantity per Reel      | --             | 3000                                      |

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[D1213A-01LP4-7B](#) [D1213A-02WL-7](#) [ESDLIN1524BJ-HQ](#) [5KP100A](#) [5KP15A](#)