

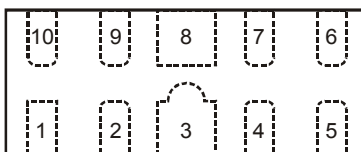
**4 CHANNEL LOW CAPACITANCE TVS DIODE ARRAY**
**Features**

- Clamping Voltage: 9V at 10A 100ns TLP; 9V at 6A 8 $\mu$ s/20 $\mu$ s
- IEC 61000-4-2 (ESD): Air – +20/-18kV, Contact – +20/-16kV
- IEC 61000-4-5 (Lightning):  $\pm$ 6A (8/20 $\mu$ s)
- 4 Channels of ESD protection
- Low Channel Input Capacitance of 0.5pF Typical
- TLP Dynamic Resistance: 0.25 $\Omega$
- Typically Used for High Speed Ports such as USB 2.0, DVI, HDMI, Ethernet Port, IEEE, MDDI, PCI Express, SATA/ eSATA
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)**

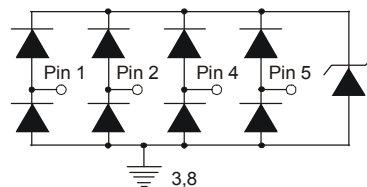
**Mechanical Data**

- Case: U-DFN2510-10
- Case Material: Molded Plastic, "Green" Molding Compound  
UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: NiPdAu over Copper leadframe (Lead Free Plating)
- Solderable per MIL-STD-202, Method 208 
- Weight: 0.038 grams (approximate)

| Pin #       | Description   |
|-------------|---------------|
| 1, 2, 4, 5  | I/O           |
| 6, 7, 9, 10 | No Connection |
| 3, 8        | Vss           |



Pin Description (Top View)



Device Schematic

**Ordering Information** (Note 4)

| Product       | Compliance | Marking | Reel Size (inches) | Tape Width (mm) | Quantity per Reel |
|---------------|------------|---------|--------------------|-----------------|-------------------|
| DT1140-04LP-7 | Standard   | BC2     | 7                  | 8               | 3,000/Tape & Reel |

- Notes:
- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  - See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
  - Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  - For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

**Marking Information**


BC2 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: A = 2013)  
 M = Month (ex: 9 = September)

## Date Code Key

| Year | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|------|------|------|------|------|------|------|
| Code | A    | B    | C    | D    | E    | F    |

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Code  | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | O   | N   | D   |

## Maximum Ratings (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                                        | Symbol                   | Value       | Unit | Conditions                      |
|-------------------------------------------------------|--------------------------|-------------|------|---------------------------------|
| Peak Pulse Current, per IEC 61000-4-5                 | I <sub>PP</sub>          | 6           | A    | I/O to V <sub>SS</sub> , 8/20μs |
| Peak Pulse Power, per IEC 61000-4-5                   | P <sub>PP</sub>          | 60          | W    | I/O to V <sub>SS</sub> , 8/20μs |
| Operating Voltage (DC)                                | V <sub>DC</sub>          | 6           | V    | I/O to V <sub>SS</sub>          |
| ESD Protection – Contact Discharge, per IEC 61000-4-2 | V <sub>ESD_Contact</sub> | +20/-16     | kV   | I/O to V <sub>SS</sub>          |
| ESD Protection – Air Discharge, per IEC 61000-4-2     | V <sub>ESD_Air</sub>     | +20/-18     | kV   | I/O to V <sub>SS</sub>          |
| Operating Temperature                                 | T <sub>OP</sub>          | -55 to +85  | °C   | —                               |
| Storage Temperature                                   | T <sub>STG</sub>         | -55 to +150 | °C   | —                               |

## Thermal Characteristics

| Characteristic                                          | Symbol           | Value | Unit |
|---------------------------------------------------------|------------------|-------|------|
| Power Dissipation Typical(Note 5)                       | P <sub>D</sub>   | 350   | mW   |
| Thermal Resistance, Junction to Ambient Typical(Note 5) | R <sub>θJA</sub> | 360   | °C/W |

## Electrical Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                    | Symbol             | Min  | Typ   | Max  | Unit | Test Conditions                                         |
|-----------------------------------|--------------------|------|-------|------|------|---------------------------------------------------------|
| Reverse Working Voltage           | V <sub>RWM</sub>   | —    | —     | 5.5  | V    | I <sub>R</sub> =1mA, , I/O to V <sub>SS</sub>           |
| Reverse Current (Note 6)          | I <sub>R</sub>     | —    | —     | 0.5  | μA   | V <sub>R</sub> = 5V, I/O to V <sub>SS</sub>             |
| Reverse Breakdown Voltage         | V <sub>BR</sub>    | 6    | —     | —    | V    | I <sub>R</sub> = 1mA, I/O to V <sub>SS</sub>            |
| Forward Clamping Voltage          | V <sub>F</sub>     | -1.0 | -0.85 | —    | V    | I <sub>F</sub> = -15mA, I/O to V <sub>SS</sub>          |
| Holding Voltage                   | V <sub>H</sub>     | 5.5  | —     | —    | V    | —                                                       |
| Reverse Clamping Voltage (Note 7) | V <sub>C</sub>     | —    | 6.4   | —    | V    | I <sub>PP</sub> = 1A, I/O to V <sub>SS</sub> , 8/20μs   |
| Reverse Clamping Voltage (Note 7) | V <sub>C</sub>     | —    | 9     | 10   | V    | I <sub>PP</sub> = 6A, I/O to V <sub>SS</sub> , 8/20μs   |
| Trigger Voltage                   | V <sub>TRIG</sub>  | —    | —     | 9.5  | V    | —                                                       |
| ESD Clamping Voltage              | V <sub>ESD</sub>   | —    | 9     | —    | V    | TLP, 10A, tp = 100 ns, I/O to V <sub>SS</sub>           |
| Dynamic Reverse Resistance        | R <sub>DIF-R</sub> | —    | 0.25  | —    | Ω    | TLP, 10A, tp = 100 ns, I/O to V <sub>SS</sub>           |
| Dynamic Forward Resistance        | R <sub>DIF-F</sub> | —    | 0.25  | —    | Ω    | TLP, 10A, tp = 100 ns, V <sub>SS</sub> to I/O           |
| Channel Input Capacitance         | C <sub>I/O</sub>   | —    | 0.5   | 0.65 | pF   | V <sub>I/O</sub> = 2.5V, V <sub>SS</sub> = 0V, f = 1MHz |

- Notes:
- Device mounted on FR-4 PCB pad layout (2oz copper) as shown on Diodes, Inc. suggested pad layout AP02001, which can be found on our website at <http://www.diodes.com>.
  - Short duration pulse test used to minimize self-heating effect.
  - Clamping voltage value is based on an 8x20μs peak pulse current (I<sub>PP</sub>) waveform.

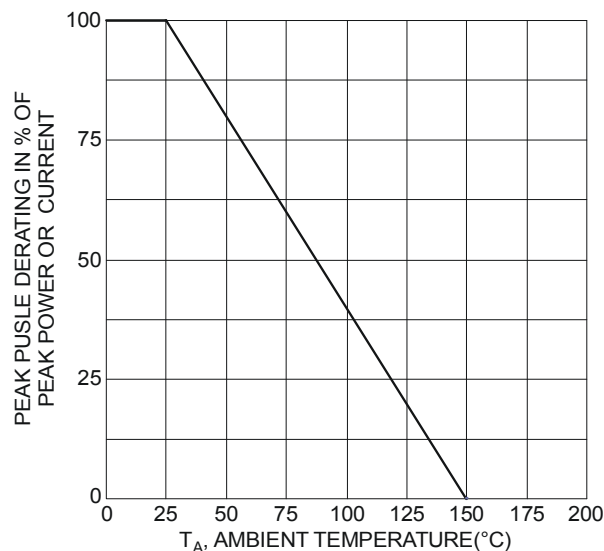


Figure 1 Pulse Derating Curve

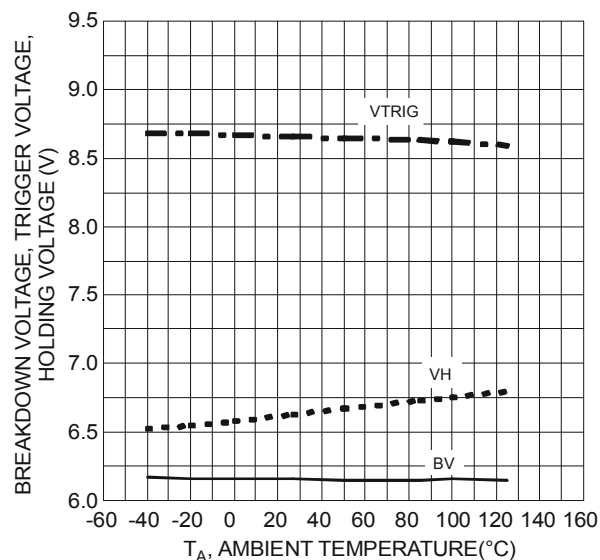


Figure 2 BV, Trigger Voltage, Holding Voltage vs. Ambient Temperature

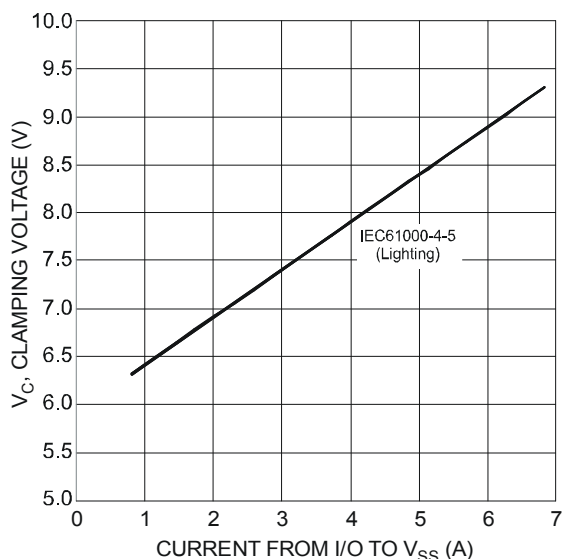


Figure 3 Clamping Voltage Characteristic

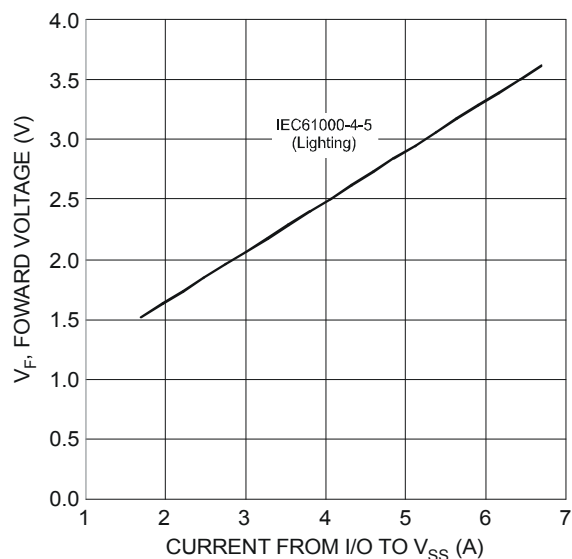


Figure 4 Forward Voltage Characteristic

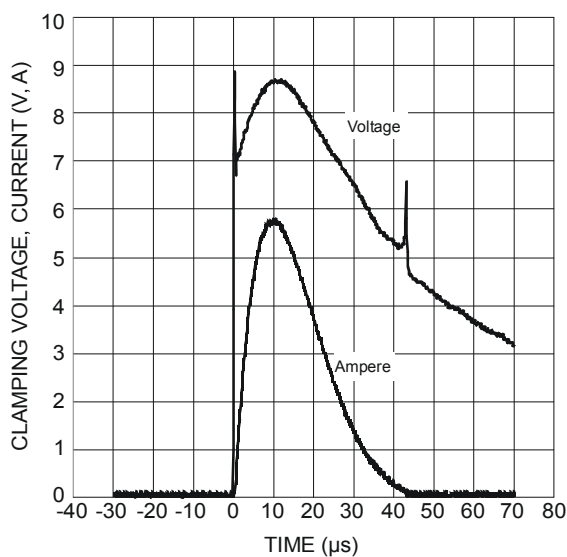


Figure 5 Waveform of Clamping Voltage, Current vs. Time (8/20µs, I/O to  $V_{SS}$ )

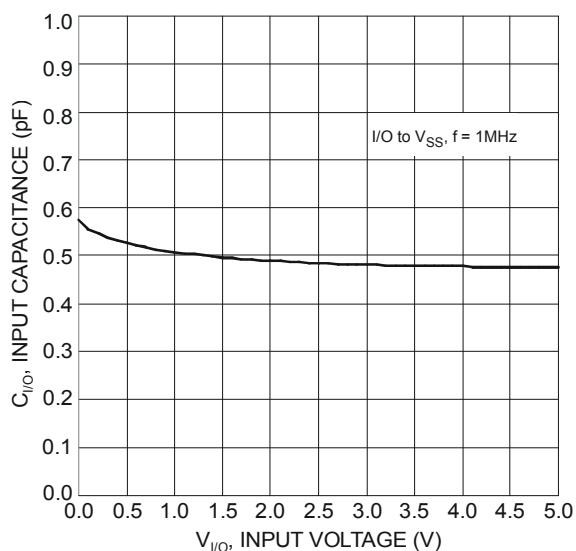


Figure 6 Input Capacitance vs. Input Voltage

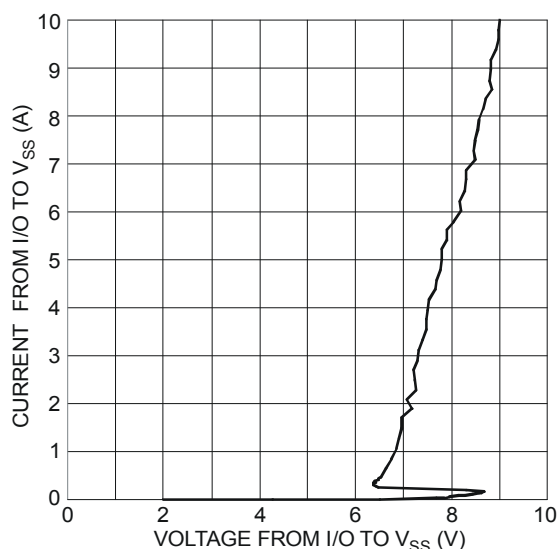
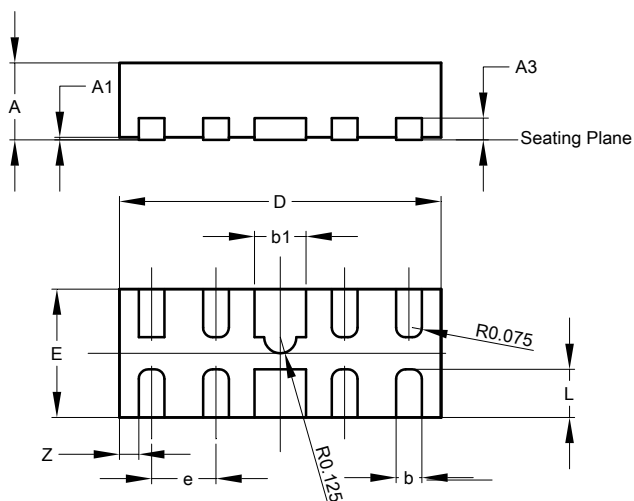


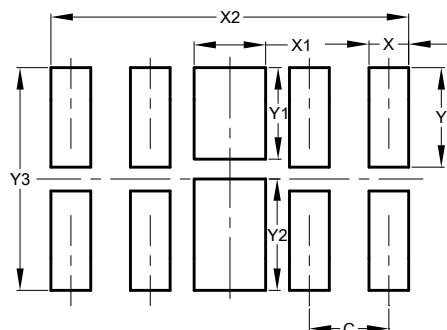
Figure 7 Current vs. Voltage

## Package Outline Dimensions

 Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.


| U-DFN2510-10         |       |       |       |
|----------------------|-------|-------|-------|
| Dim                  | Min   | Max   | Typ   |
| A                    | 0.545 | 0.605 | 0.575 |
| A1                   | 0     | 0.05  | 0.03  |
| A3                   | —     | —     | 0.13  |
| b                    | 0.15  | 0.25  | 0.20  |
| b1                   | 0.35  | 0.45  | 0.40  |
| D                    | 2.450 | 2.575 | 2.500 |
| e                    | —     | —     | 0.50  |
| E                    | 0.950 | 1.075 | 1.000 |
| L                    | 0.325 | 0.425 | 0.375 |
| Z                    | -     | -     | 0.150 |
| All Dimensions in mm |       |       |       |

## Suggested Pad Layout

 Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.


| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 0.500         |
| X          | 0.250         |
| X1         | 0.450         |
| X2         | 2.250         |
| Y          | 0.625         |
| Y1         | 0.575         |
| Y2         | 0.700         |
| Y3         | 1.400         |

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