# 2-CHANNEL LOW-CAPACITANCE UNIDIRECTIONAL TVS ARRAY

## Product Summary

| $V_{BR_Min}$ | $I_{PP_Max}$ | $C_{T_Typ}$ |
|---|---|---|
| 5V | 7A | 0.45pF |

## Features

- Provide Transient Protection for the Protected Line to
  IEC 61000-4-2 (ESD) Air ±15kV, Contact ±15V
  IEC 61000-4-5 (Surge) 7A (8/20μs)
- 2-Channel Unidirectional TVS Array
- Low Capacitance $C_T$ = 0.45pF
- Extremely Low Clamping Voltage to Protect Sensitive I/Os
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative.**
  **https://www.diodes.com/quality/product-definitions/**

## Description

The D3V3F2UD3LP is a low capacitance of 0.45pF ESD protection device designed specifically to protect high-speed differential lines. This device can also be used for surge and lightning protection due to its high peak pulse current capability (7A, $t_P$ = 8/20μs).

It has excellent ESD protection features, highlighted by low peak ESD clamping voltage. The small package X1-DFN1006-3 (1.0mm x 0.60mm x 0.50mm) gives designers the flexibility to protect two-channel data lines in applications.

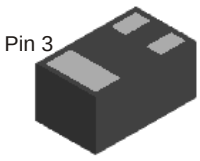
## Applications

- USB 3.0, USB 3.1 and USB 3.2 Gen 2 x 2
- USB Type-C®
- HDMI™ 1.4, HDMI 2.0 and HDMI 2.1
- Thunderbolt™ 2, Thunderbolt 3
- 10G Ethernet
- WiFi-6 AnT

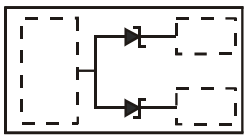
## Mechanical Data

- Package: X1-DFN1006-3
- Package 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. Solderable per MIL-STD-202, Method 208 e4
- Weight: 0.001 grams (Approximate)

X1-DFN1006-3




Bottom View



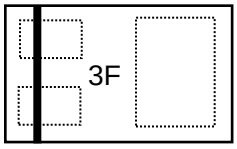
Device Schematic

## Ordering Information (Note 4)

| Orderable Part Number | Package | Marking Code | Reel Size (inches) | Tape Width (mm) | Packing | |
|---|---|---|---|---|---|---|
| | | | | | Qty. | Carrier |
| D3V3F2UD3LP-7B | X1-DFN1006-3 | 3F | 7 | 8 | 10,000 | Tape & Reel |

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

## Marking Information




3F or $3\overline{F}$ = Product Type Marking Code

Bar Denotes Cathode Side


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## Maximum Ratings (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit | Condition |
|---|---|---|---|---|
| Peak Pulse Power Dissipation | $P_{PP}$ | 24.5 | W | 8/20µs, per Figure 3 |
| Peak Pulse Current | $I_{PP}$ | 7 | A | 8/20µs, per Figure 3 |
| ESD Protection – Air Discharge | $V_{ESD_AIR}$ | ±15 | kV | IEC61000-4-2 Standard |
| ESD Protection – Contact Discharge | $V_{ESD_CONTACT}$ | ±15 | kV | IEC61000-4-2 Standard |

## Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Package Power Dissipation (Note 5) | $P_D$ | 250 | mW |
| Thermal Resistance, Junction to Ambient (Note 5) | $R_{\theta JA}$ | 500 | °C/W |
| Operating and Storage Temperature Range | $T_J$, $T_{STG}$ | -55 to +150 | °C |

## Electrical Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| Reverse Standoff Voltage | $V_{RWM}$ | — | — | 3.3 | V | — |
| Channel Leakage Current (Note 6) | $I_{RM}$ | — | — | 0.5 | µA | $V_{RWM}$ = 3.3V |
| Breakdown Voltage | $V_{BR}$ | 5 | — | 10 | V | $I_R$ = 1mA |
| Clamping Voltage (Note 7) | $V_{CL}$ | — | 3.5 | — | V | $I_{PP}$ = 7A, $t_P$ = 8/20µs |
| ESD Clamping Voltage (Note 8) | $V_C$ | — | 4.5 | — | V | $I_{PP}$ = 16A,TLP, $t_P$ = 100ns |
| Dynamic Resistance | $R_{DYN}$ | — | 0.2 | — | Ω | TLP = 1A to 20A, $t_P$ = 100ns |
| Channel Input Capacitance | $C_T$ | — | 0.45 | — | pF | $V_R$ = 2.5V, f = 1MHz, Pin 1/2 to Pin 3 |

Notes:
5. Device mounted on FR-4 PCB pad layout (2oz copper) as shown on Diodes Incorporated's suggested pad layout, which can be found on our website at http://www.diodes.com/package-outlines.html.
6. Short duration pulse test used to minimize self-heating effect.
7. Clamping voltage value is based on an 8x20µs peak pulse current ($I_{PP}$) waveform.
8. Transmission Line Pulse Test (TLP) settings: $t_P$ = 100ns, $t_R$ = 10ns, $I_{TLP}$ and $V_{TLP}$ averaging window is from 70ns to 90ns.


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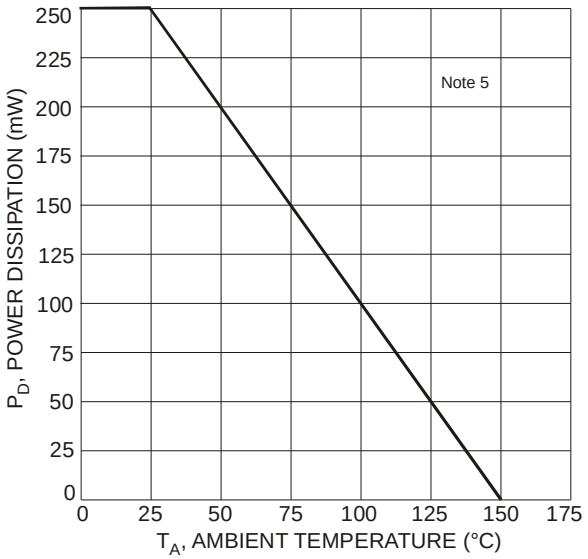


Figure 1 Power Derating Curve

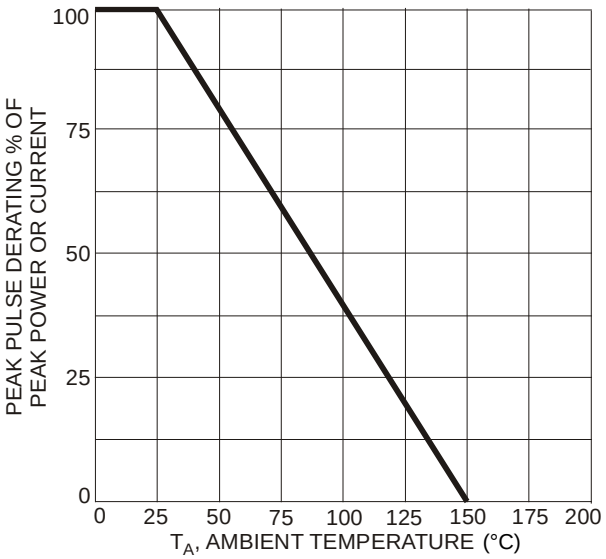


Figure 2 Pulse Derating Curve

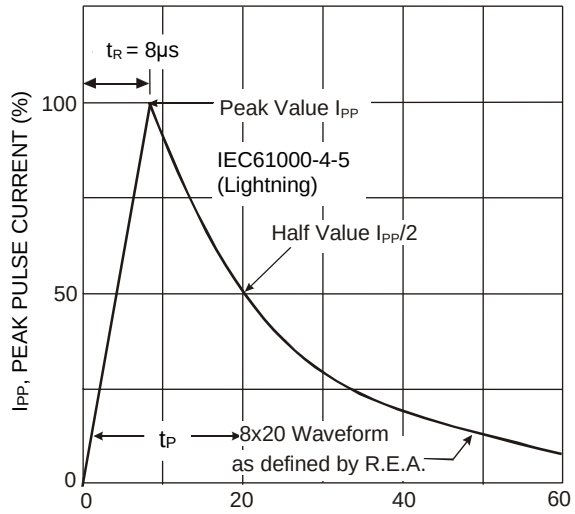


Figure 3 Pulse Waveform

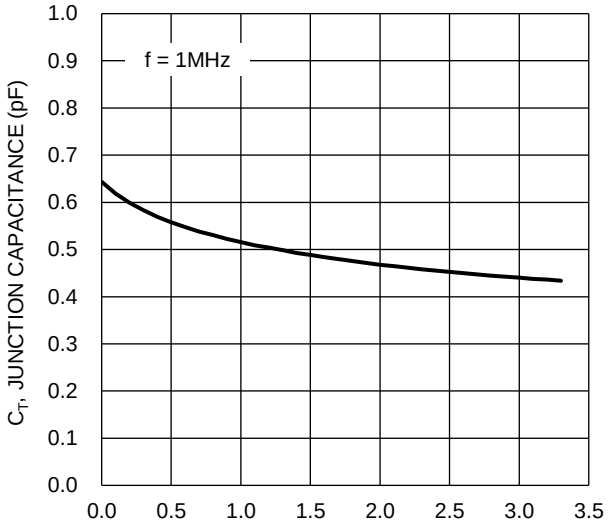


Figure 4 Typical Capacitance, Pin 1/2 to Pin 3

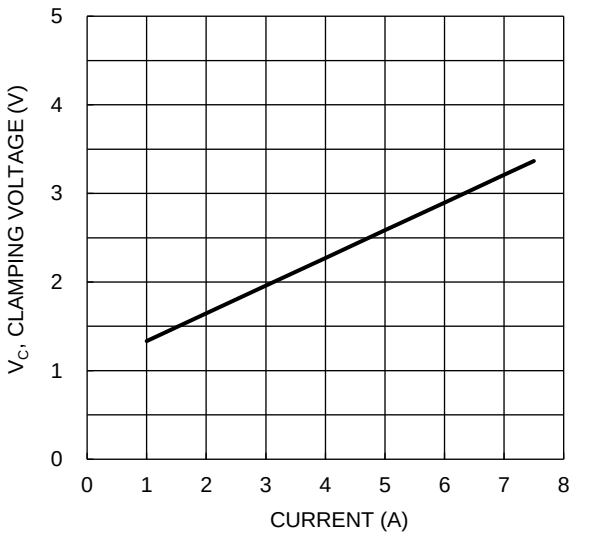


Figure 5 Clamping Voltage Characteristic ($t_P$ = 8/20µs)

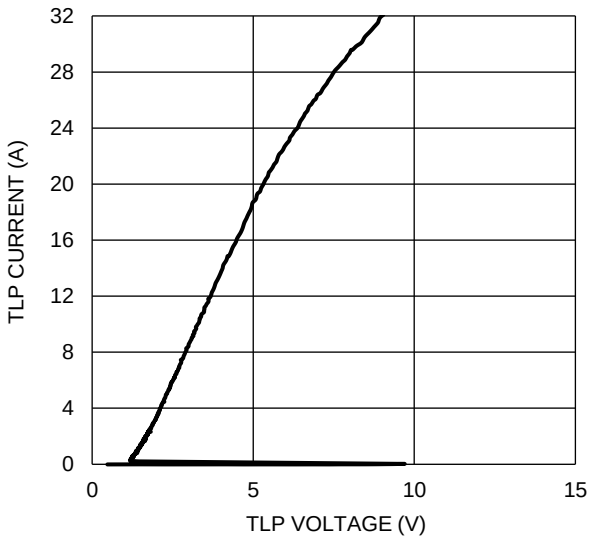


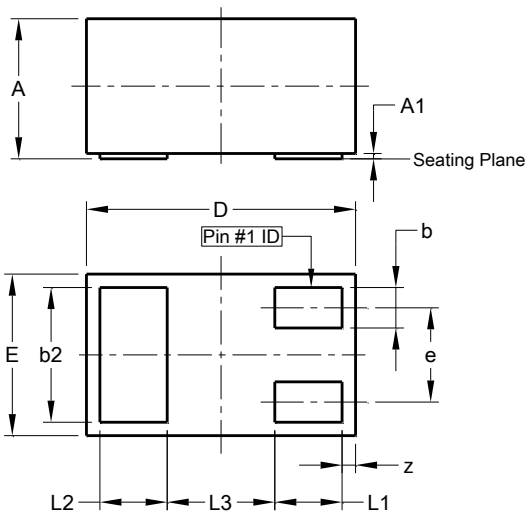
Figure 6 TLP Curve ($t_P$ = 100ns)


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## Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.

**X1-DFN1006-3**

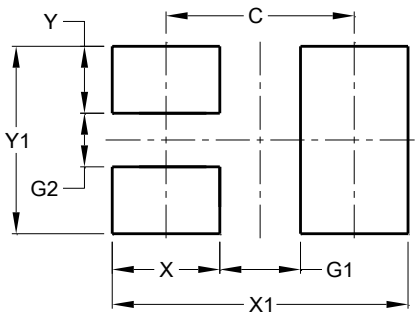



| X1-DFN1006-3 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 0.47 | 0.53 | 0.50 |
| **A1** | 0.00 | 0.05 | 0.03 |
| **b** | 0.10 | 0.20 | 0.15 |
| **b2** | 0.45 | 0.55 | 0.50 |
| **D** | 0.95 | 1.075 | 1.00 |
| **E** | 0.55 | 0.675 | 0.60 |
| **e** | - | - | 0.35 |
| **L1** | 0.20 | 0.30 | 0.25 |
| **L2** | 0.20 | 0.30 | 0.25 |
| **L3** | - | - | 0.40 |
| **z** | 0.02 | 0.08 | 0.05 |
| **All Dimensions in mm** | | | |

## Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

**X1-DFN1006-3**




| Dimensions | Value (in mm) |
|---|---|
| **C** | 0.70 |
| **G1** | 0.30 |
| **G2** | 0.20 |
| **X** | 0.40 |
| **X1** | 1.10 |
| **Y** | 0.25 |
| **Y1** | 0.70 |


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