

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

- IEC 61000-4-2 (ESD): Air  $\pm 15\text{kV}$ , Contact  $\pm 8\text{kV}$
- 1 Channel of ESD Protection
- Low Channel Input Capacitance of 0.85pF Typical
- Typically Used at High Speed Ports such as USB 2.0, IEEE1394, Serial ATA, DVI, HDMI, PCI
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

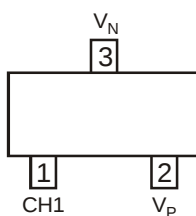
**Mechanical Data**

- Case: SOT323
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish annealed over Alloy 42 leadframe (Lead Free Plating). Solderable per MIL-STD-202, Method 208 
- Weight: 0.006 grams (approximate)

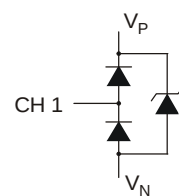
SOT323



Top View



Pin Configuration

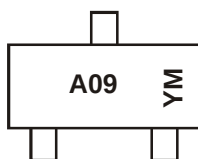


Device Schematic

**Ordering Information** (Note 4)

| Part Number  | Case   | Packaging        |
|--------------|--------|------------------|
| D1213A-01W-7 | SOT323 | 3000/Tape & Reel |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  2. See <http://www.diodes.com> 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 <http://www.diodes.com>.

**Marking Information**


A09 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: Z = 2012)  
 M = Month (ex: 9 = September)

## Date Code Key

| Year | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|------|------|------|------|------|------|------|------|
| Code | Y    | Z    | A    | B    | C    | D    | E    |

| 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             |
|------------------------------------|---------------------------------|--------------------------------------------------|------|------------------------|
| Operating Supply Voltage           | V <sub>P</sub> - V <sub>N</sub> | 6.0                                              | V    | -                      |
| DC Voltage at any Channel Input    | -                               | (V <sub>N</sub> - 0.5) to (V <sub>P</sub> + 0.5) | V    | -                      |
| Peak Pulse Current                 | I <sub>PP</sub>                 | 5                                                | A    | 8/20μs, Per Figure 3   |
| ESD Protection – Contact Discharge | V <sub>ESD_Contact</sub>        | ±8                                               | kV   | Standard IEC 61000-4-2 |
| ESD Protection – Air Discharge     | V <sub>ESD_Air</sub>            | ±15                                              | kV   | Standard IEC 61000-4-2 |

## Thermal Characteristics

| Characteristic                                   | Symbol                            | Value       | Unit |
|--------------------------------------------------|-----------------------------------|-------------|------|
| Power Dissipation (Note 5)                       | P <sub>D</sub>                    | 200         | mW   |
| Thermal Resistance, Junction to Ambient (Note 5) | R <sub>θJA</sub>                  | 625         | °C/W |
| Operating and Storage Temperature Range          | T <sub>J</sub> , T <sub>STG</sub> | -65 to +150 | °C   |

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

| Characteristic                        | Symbol           | Min  | Typ  | Max  | Unit | Test Conditions                                                               |
|---------------------------------------|------------------|------|------|------|------|-------------------------------------------------------------------------------|
| Operating Supply Voltage              | V <sub>P</sub>   | -    | 3.3  | 5.5  | V    | -                                                                             |
| Operating Supply Current (Note 6)     | I <sub>P</sub>   | -    | -    | 8.0  | μA   | (V <sub>P</sub> - V <sub>N</sub> ) = 3.3V                                     |
| Channel Leakage Current (Note 6)      | I <sub>R</sub>   | -    | ±0.1 | ±1.0 | μA   | V <sub>P</sub> = 5V, V <sub>N</sub> = 0V                                      |
| Reverse breakdown voltage             | V <sub>BR</sub>  | 6.0  | -    | -    | V    | I <sub>R</sub> = 1mA                                                          |
| Clamping Voltage, Positive Transients | V <sub>CL1</sub> | -    | 10.0 | -    | V    | I <sub>PP</sub> = 1A, t <sub>p</sub> = 8/20μs                                 |
| Clamping Voltage, Negative Transients | V <sub>CL2</sub> | -    | -1.7 | -    | V    | I <sub>PP</sub> = -1A, t <sub>p</sub> = 8/20μs                                |
| Forward Voltage for Top Diode         | V <sub>FD1</sub> | 0.60 | 0.80 | 0.95 | V    | I <sub>F</sub> = 8mA, CH1 to V <sub>P</sub>                                   |
| Forward Voltage for Bottom Diode      | V <sub>FD2</sub> | 0.60 | 0.80 | 0.95 | V    | I <sub>F</sub> = 8mA, V <sub>N</sub> to CH1                                   |
| Dynamic Resistance                    | R <sub>DYN</sub> | -    | 0.9  | -    | Ω    | I <sub>PP</sub> = 1A, t <sub>p</sub> = 8/20μs                                 |
| Channel Input Capacitance             | C <sub>T</sub>   | -    | 0.85 | 1.2  | pF   | V <sub>IN</sub> = 1.65V, V <sub>P</sub> = 3.3V, V <sub>N</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.
  - Measured from CH1 to V<sub>N</sub>.
  - Measured from V<sub>P</sub> to V<sub>N</sub>.
  - For information on the impact of Diodes' USB 2.0 compatible ESD protectors on signal integrity including eye diagram plots, please refer to AN77 at the following URL: [http://www.diodes.com/destdtools/appnote\\_dnote.html](http://www.diodes.com/destdtools/appnote_dnote.html).

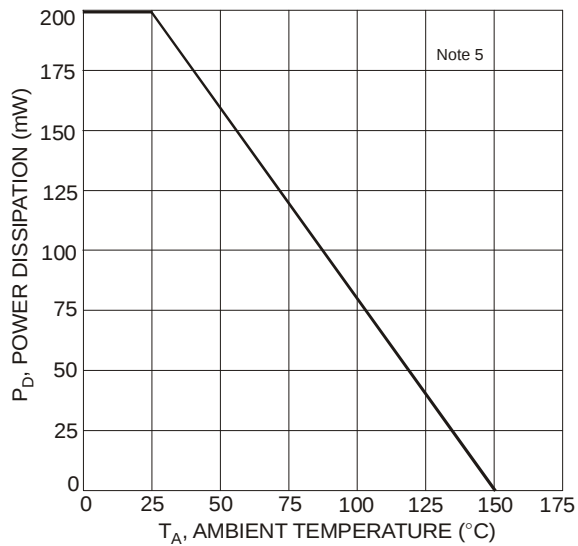


Figure 1 Power Derating Curve

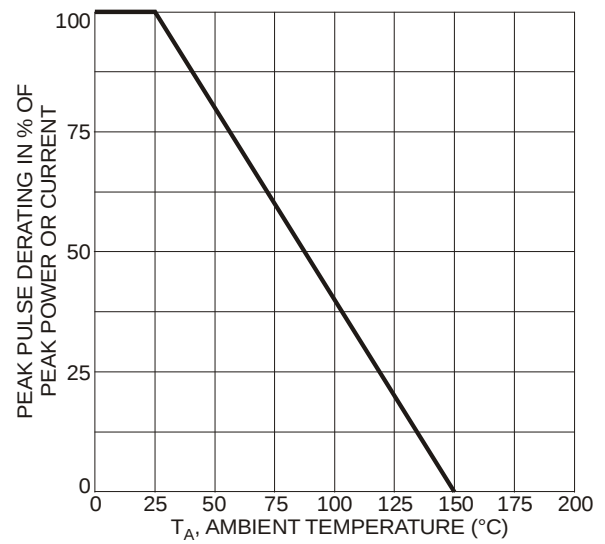


Figure 2 Pulse Derating Curve

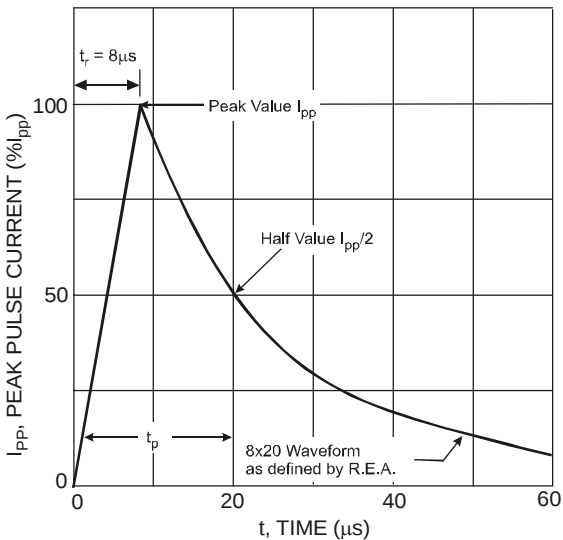


Figure 3 Typical 8 x 20µs Pulse Waveform

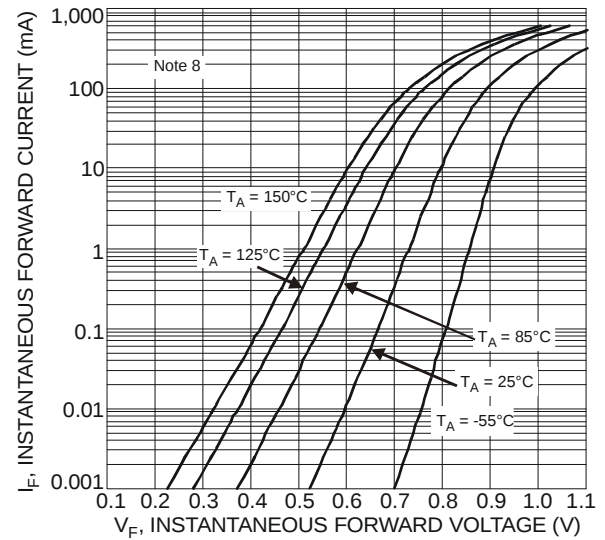


Figure 4 Typical Forward Characteristics

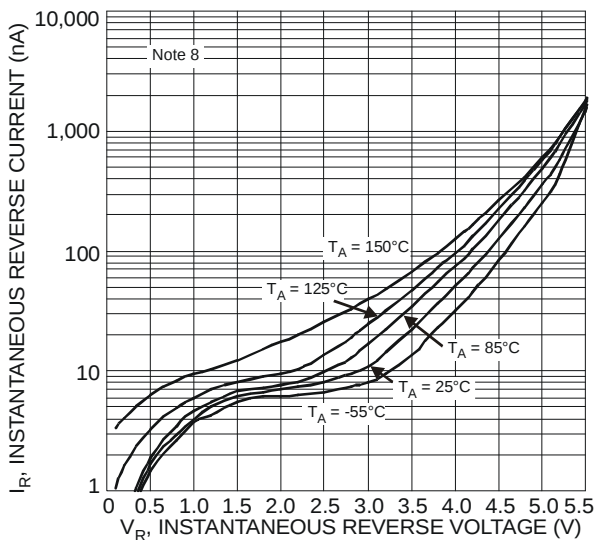


Figure 5 Typical Reverse Characteristics

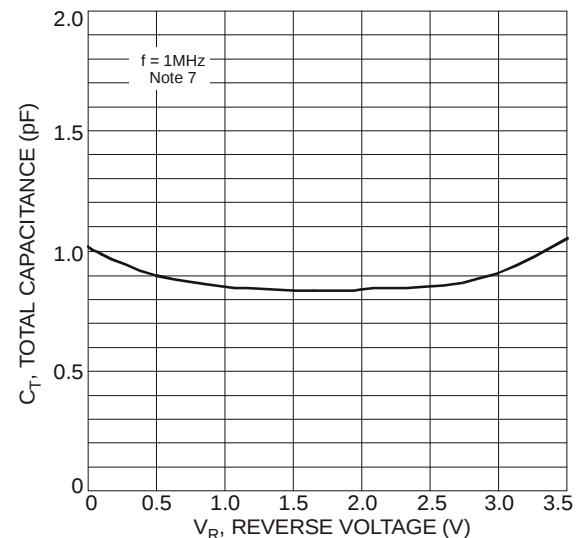
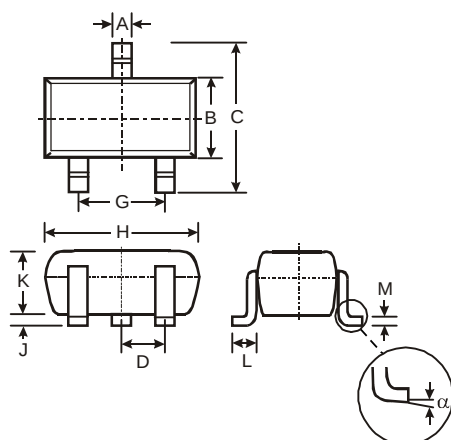


Figure 6 Typical Total Capacitance vs. Reverse Voltage

## Package Outline Dimensions

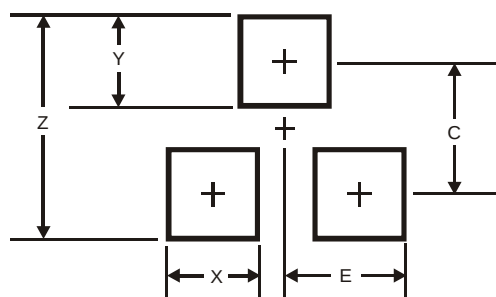
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| SOT323               |      |      |      |
|----------------------|------|------|------|
| Dim                  | Min  | Max  | Typ  |
| A                    | 0.25 | 0.40 | 0.30 |
| B                    | 1.15 | 1.35 | 1.30 |
| C                    | 2.00 | 2.20 | 2.10 |
| D                    | -    | -    | 0.65 |
| G                    | 1.20 | 1.40 | 1.30 |
| H                    | 1.80 | 2.20 | 2.15 |
| J                    | 0.0  | 0.10 | 0.05 |
| K                    | 0.90 | 1.00 | 1.00 |
| L                    | 0.25 | 0.40 | 0.30 |
| M                    | 0.10 | 0.18 | 0.11 |
| $\alpha$             | 0°   | 8°   | -    |
| 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) |
|------------|---------------|
| Z          | 2.8           |
| X          | 0.7           |
| Y          | 0.9           |
| C          | 1.9           |
| E          | 1.0           |

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