# 2 CHANNELS LOW CAPACITANCE TVS DIODE ARRAY

## Product Summary

| $V_{BR\ MIN}$ | $I_{PP\ MAX}$ | $C_{I/O\ TYP}$ |
|---|---|---|
| 7V | 12A | 1.2pF |

## Features And Benefits

- IEC61000-4-2 (ESD): Air – ±16kV, Contact – ±16kV
- IEC61000-4-4 (EFT) Additional Level, 55A (5/50ns)
- IEC61000-4-5 (Lightning): 12A (8/20µs)
- 2 Channels of ESD Protection
- Low Channel Input Capacitance of 1.2pF 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)**
- **The DT1452-02SOQ is suitable for automotive applications requiring specific change control; it is AEC-Q101 qualified, PPAP capable, and manufactured in IATF16949:2016 certified facilities.**
- **https://www.diodes.com/quality/product-definitions/**

## Description And Applications

This new generation TVS is designed to protect sensitive electronics from the damage due to ESD. The combination of small size and high ESD surge capability makes it ideal for use in automotive applications

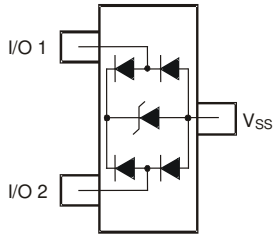
- USB Modules
- HDMI Ports
- LVDS

## Mechanical Data

- Case: SOT23
- 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: 0.009 grams (Approximate)

SOT23

Top View



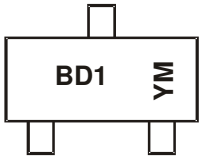

Device Schematic

## Ordering Information (Note 4)

| Part Number | Compliance | Marking | Reel Size (inches) | Tape Width (mm) | Quantity per Reel |
|---|---|---|---|---|---|
| DT1452-02SOQ-7 | Automotive | BD1 | 7 | 8 | 3,000/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




BD1 = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: G = 2019)
M = Month (ex: 5 = May)

Date Code Key

| Year | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|
| Code | G | H | I | J | K | L |

| 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 (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit | Conditions |
|---|---|---|---|---|
| Peak Pulse Current | $I_{PP\_I/O}$ | 12 | A | I/O to $V_{SS}$, 8/20µs |
| ESD Protection – Contact Discharge | $V_{ESD\_I/O\_CONTACT}$ | ±16 | kV | I/O to $V_{SS}$, Per IEC61000-4-2 |
| ESD Protection – Air Discharge | $V_{ESD\_I/O\_AIR}$ | ±16 | kV | I/O to $V_{SS}$, Per IEC61000-4-2 |

## Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Power Dissipation (Note 5) | $P_D$ | 300 | mW |
| Thermal Resistance, Junction to Ambient (Note 5) | $R_{\theta JA}$ | 417 | °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 Working Voltage | $V_{RWM}$ | — | — | 5.5 | V | — |
| Reverse Leakage Current (Note 6) | $I_R$ | — | — | 1.0 | µA | $V_R$ = 5.5V, I/O to $V_{SS}$ |
| Reverse Breakdown Voltage | $V_{BR}$ | 7 | — | 10 | V | $I_R$ = 1mA, I/O to $V_{SS}$ |
| Forward Voltage | $V_F$ | — | 0.85 | 1.1 | V | $I_F$ = 15mA, $V_{SS}$ to I/O |
| Reverse Clamping Voltage (Note 7) | $V_C$ | — | 7.5 | — | V | $I_{PP}$ = 5A, I/O to $V_{SS}$, 8/20µs |
| Reverse Clamping Voltage (Note 7) | $V_C$ | — | 9.5 | — | V | $I_{PP}$ = 12A, I/O to $V_{SS}$, 8/20µs |
| ESD Clamping Voltage | $V_{ESD}$ | — | 11 | — | V | TLP, 20A, $t_P$ = 100ns, I/O to $V_{SS}$, Per Figure 7 |
| Dynamic Resistance | $R_{DIF}$ | — | 0.22 | — | Ω | TLP, 20A, $t_P$ = 100ns, I/O to $V_{SS}$, Per Figure 7 |
| Channel Input Capacitance | $C_{I/O}$ | — | 1.2 | 1.7 | pF | $V_R$ = 2.5V, f = 1MHz |
| Variation of Channel Input Capacitance | $\Delta C_{I/O}$ | — | 0.03 | — | pF | $V_{SS}$ = 0V, I/O = 2.5V, f =1MHz, I/O_x to $V_{SS}$ – I/O_y to $V_{SS}$ |

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.

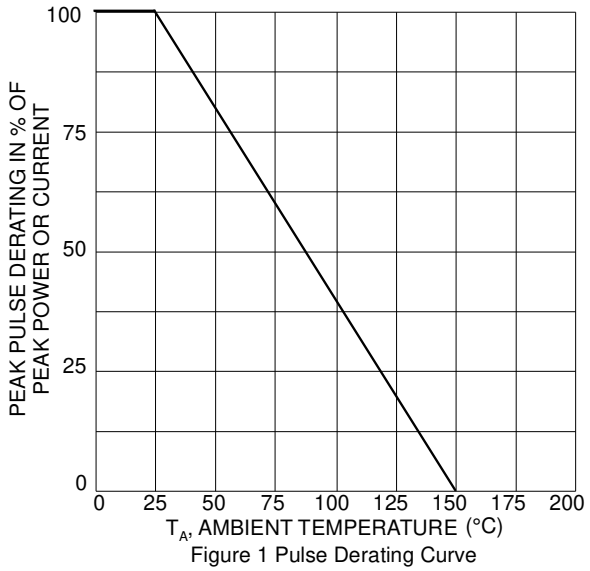


Figure 1 Pulse Derating Curve

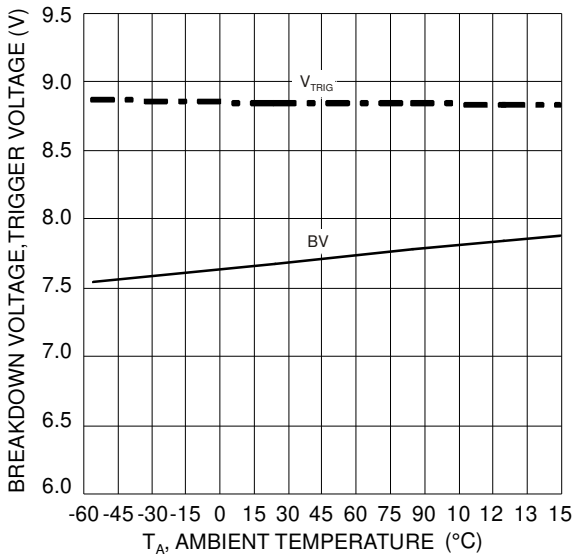


Figure 2 BV, Trigger Voltage vs. Ambient Temperature

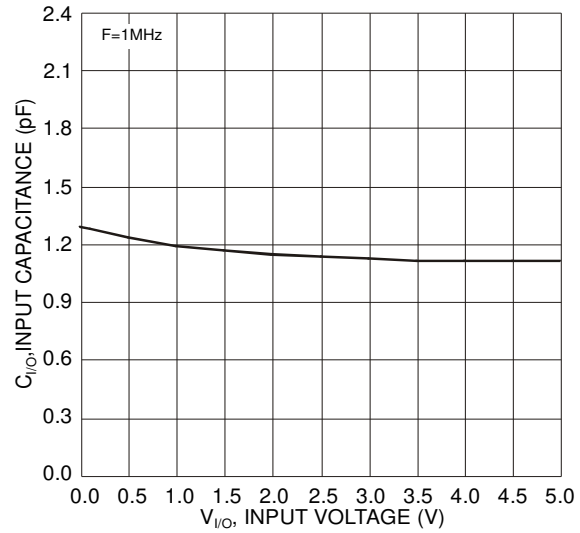


Figure 3 Input Capacitance vs. Input Voltage

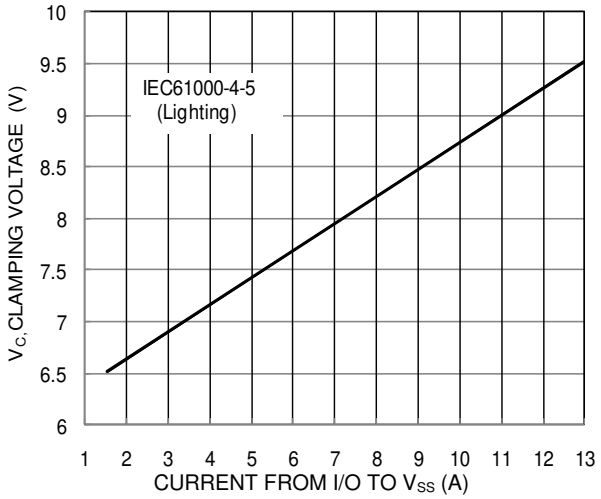


Figure 4. Clamping Voltage Characteristic

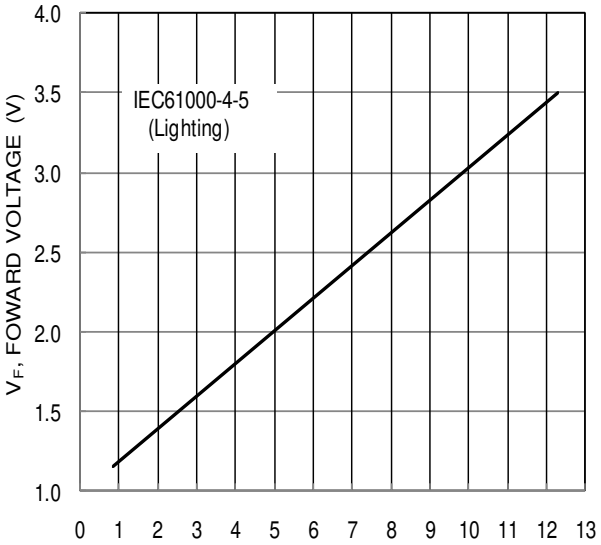


Figure5. Foward Voltage Characteristic

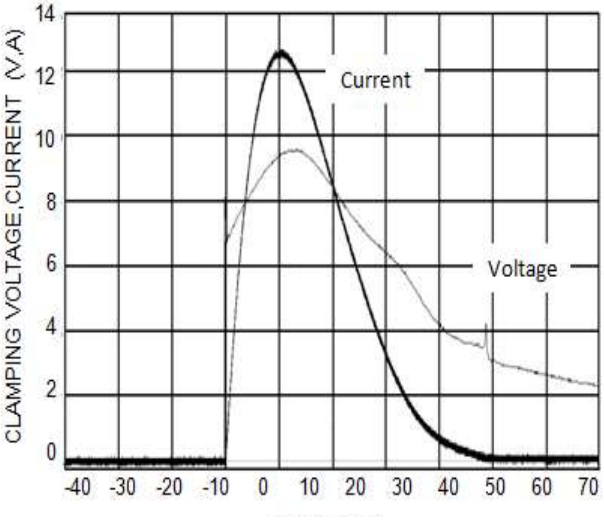


Figure 6. Waveform of Clamping Voltage, Current vs. Time (8/20μs, I/O to $V_{SS}$)

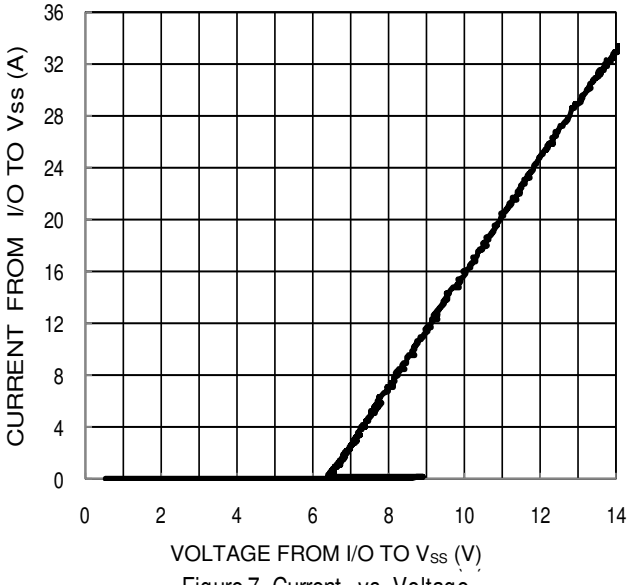
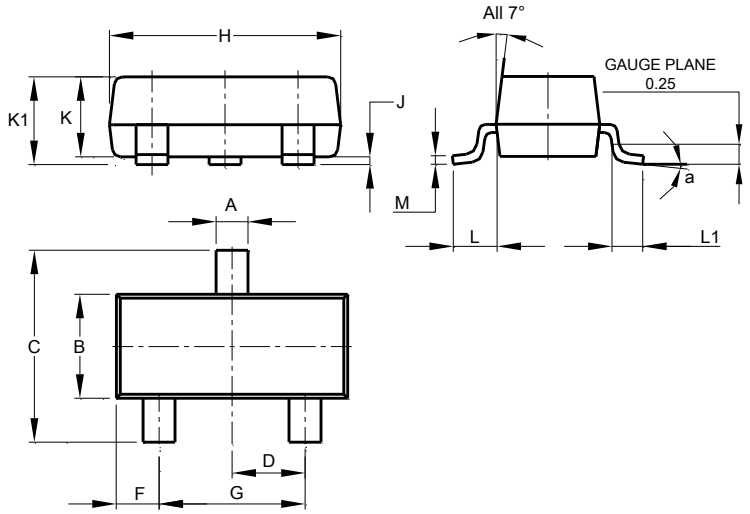


Figure 7. Current vs. Voltage

## Package Outline Dimensions

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

**SOT23**

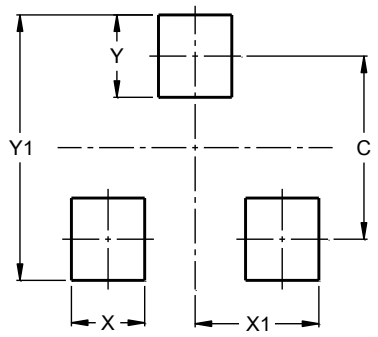



| SOT23 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 0.37 | 0.51 | 0.40 |
| **B** | 1.20 | 1.40 | 1.30 |
| **C** | 2.30 | 2.50 | 2.40 |
| **D** | 0.89 | 1.03 | 0.915 |
| **F** | 0.45 | 0.60 | 0.535 |
| **G** | 1.78 | 2.05 | 1.83 |
| **H** | 2.80 | 3.00 | 2.90 |
| **J** | 0.013 | 0.10 | 0.05 |
| **K** | 0.890 | 1.00 | 0.975 |
| **K1** | 0.903 | 1.10 | 1.025 |
| **L** | 0.45 | 0.61 | 0.55 |
| **L1** | 0.25 | 0.55 | 0.40 |
| **M** | 0.085 | 0.150 | 0.110 |
| **a** | 0° | 8° | -- |
| **All Dimensions in mm** | | | |

## Suggested Pad Layout

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

**SOT23**




| Dimensions | Value (in mm) |
|---|---|
| **C** | 2.0 |
| **X** | 0.8 |
| **X1** | 1.35 |
| **Y** | 0.9 |
| **Y1** | 2.9 |

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