

Features

- IEC 61000-4-2 (ESD): Air – $\pm 15\text{kV}$, Contact – $\pm 8\text{kV}$
- 2 Channels 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**

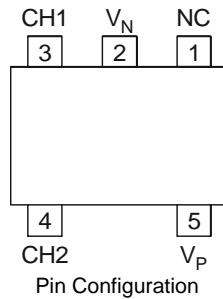
Mechanical Data

- Case: SOT25
- 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 Copper leadframe (Lead Free Plating). Solderable per MIL-STD-202, Method 208
- Weight: 0.016 grams (approximate)

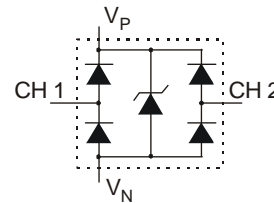
SOT25



Top View



Pin Configuration



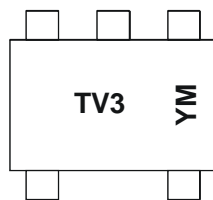
Device Schematic

Ordering Information (Note 4)

| Part Number | Case | Packaging |
|---------------|-------|------------------|
| D1213A-02SM-7 | SOT25 | 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



TV3 = 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_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit | Conditions |
|------------------------------------|---------------------------------|--|------|------------------------|
| Operating Supply Voltage | V _P - V _N | 6.0 | V | — |
| DC Voltage at any Channel Input | — | (V _N - 0.5) to (V _P + 0.5) | V | — |
| Peak Pulse Current | I _{PP} | 5 | A | 8/20μs, Per Figure 3 |
| ESD Protection – Contact Discharge | V _{ESD_Contact} | ±8 | kV | Standard IEC 61000-4-2 |
| ESD Protection – Air Discharge | V _{ESD_Air} | ±15 | kV | Standard IEC 61000-4-2 |

Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|--|-----------------------------------|-------------|------|
| Power Dissipation (Note 5) | P _D | 400 | mW |
| Thermal Resistance, Junction to Ambient (Note 5) | R _{θJA} | 310 | °C/W |
| Operating and Storage Temperature Range | T _J , T _{STG} | -65 to +150 | °C |

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

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Conditions |
|---------------------------------------|------------------|------|------|------|------|---|
| Operating Supply Voltage | V _P | — | 3.3 | 5.5 | V | — |
| Operating Supply Current (Note 6) | I _P | — | — | 8.0 | μA | (V _P - V _N) = 3.3V |
| Channel Leakage Current (Note 6) | I _R | — | ±0.1 | ±1.0 | μA | V _P = 5V, V _N = 0V |
| Reverse breakdown voltage | V _{BR} | 6.0 | — | — | V | I _R = 1mA |
| Clamping Voltage, Positive Transients | V _{CL1} | — | 10.0 | — | V | I _{PP} = 1A, t _p = 8/20μs |
| Clamping Voltage, Negative Transients | V _{CL2} | — | -1.7 | — | V | I _{PP} = -1A, t _p = 8/20μs |
| Forward Voltage for Top Diode | V _{FD1} | 0.60 | 0.80 | 0.95 | V | I _F = 8mA, CH1 to V _P or CH2 to V _P |
| Forward Voltage for Bottom Diode | V _{FD2} | 0.60 | 0.80 | 0.95 | V | I _F = 8mA, V _N to CH1 or V _N to CH2 |
| Dynamic Resistance | R _{DYN} | — | 0.9 | — | Ω | I _{PP} = 1A, t _p = 8/20μs |
| Channel Input Capacitance | C _T | — | 0.85 | 1.2 | pF | V _{IN} = 1.65V, V _P = 3.3V, V _N = 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_N or CH2 to V_N.
 - Measured from V_P to V_N.
 - 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/apnnote_dnote.html.

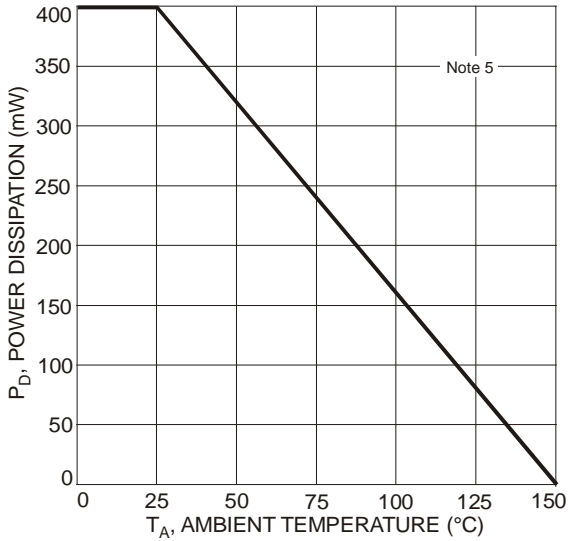


Figure 1 Power Dissipation vs. Ambient Temperature

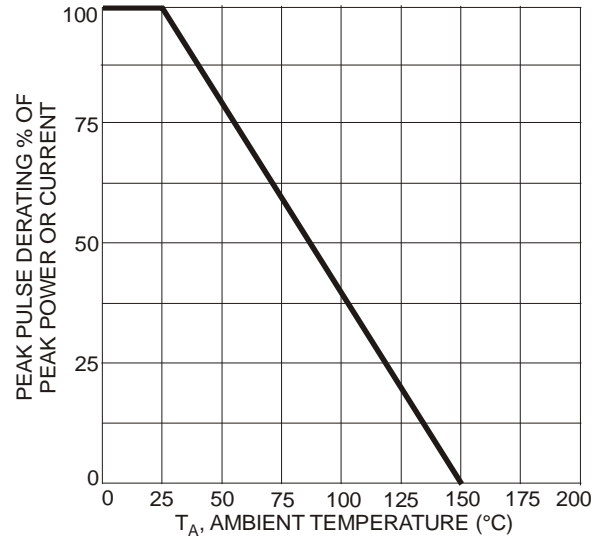


Figure 2 Pulse Derating Curve

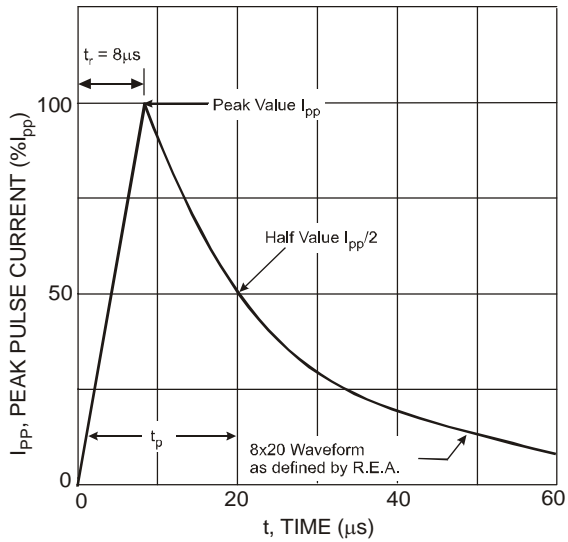


Figure 3 Pulse Waveform

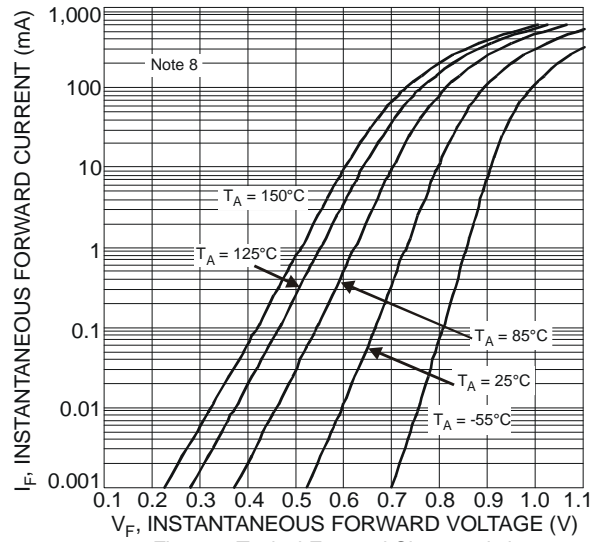


Figure 4 Typical Forward Characteristics

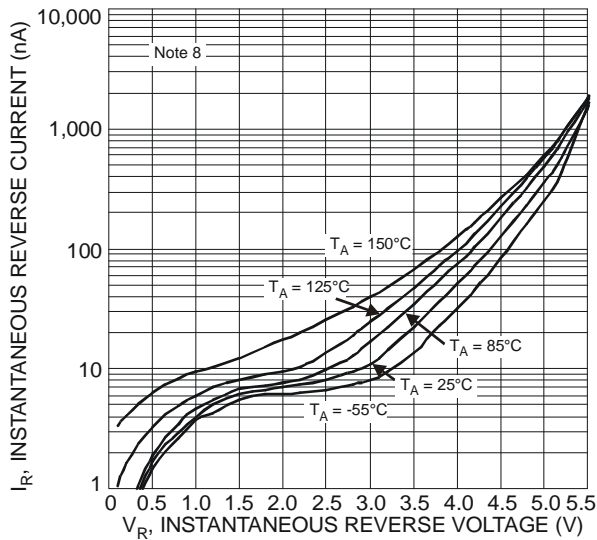


Figure 5 Typical Reverse Characteristics

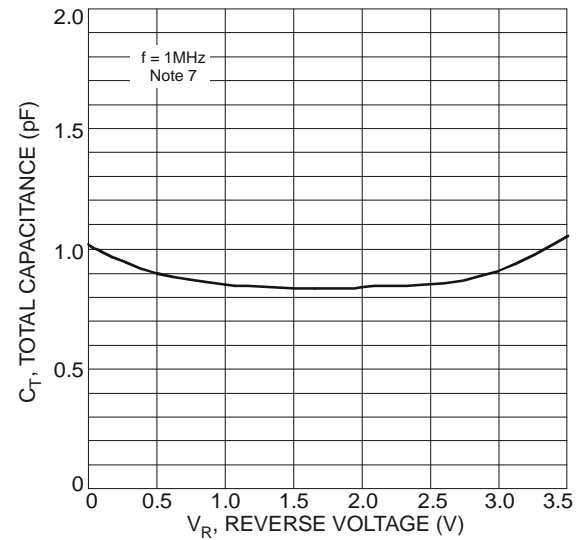
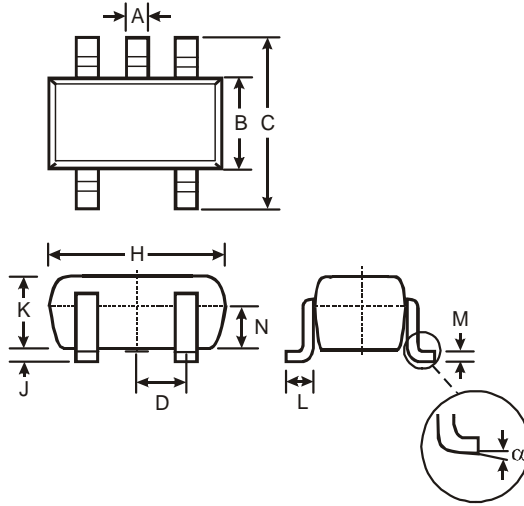


Figure 6 Typical Total Capacitance vs. Reverse Voltage

Package Outline Dimensions

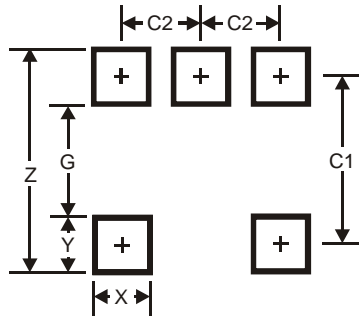
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| SOT25 | | | |
|----------------------|-------|------|------|
| Dim | Min | Max | Typ |
| A | 0.35 | 0.50 | 0.38 |
| B | 1.50 | 1.70 | 1.60 |
| C | 2.70 | 3.00 | 2.80 |
| D | — | — | 0.95 |
| H | 2.90 | 3.10 | 3.00 |
| J | 0.013 | 0.10 | 0.05 |
| K | 1.00 | 1.30 | 1.10 |
| L | 0.35 | 0.55 | 0.40 |
| M | 0.10 | 0.20 | 0.15 |
| N | 0.70 | 0.80 | 0.75 |
| α | 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 | 3.20 |
| G | 1.60 |
| X | 0.55 |
| Y | 0.80 |
| C1 | 2.40 |
| C2 | 0.95 |

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