
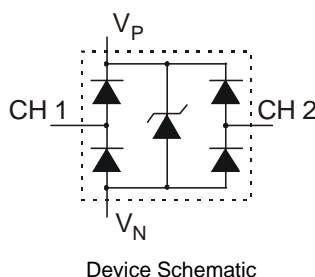
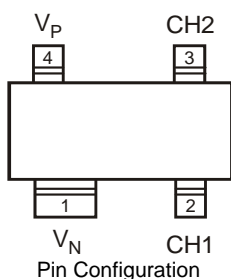


**2 CHANNEL LOW CAPACITANCE TVS DIODE ARRAY**
**Features**

- 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  $0.85\text{pF}$  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**

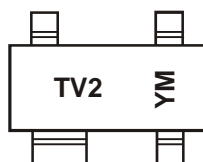
**Mechanical Data**

- Case: SOT143
- 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)


**Ordering Information** (Note 4)

Part Number	Case	Packaging
D1213A-02SR-7	SOT143	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**


TV2 = 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 2
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>	400	mW
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	310	°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> or CH2 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 or V <sub>N</sub> to CH2
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> or CH2 to V<sub>N</sub>.
  - Measured from V<sub>P</sub> to V<sub>N</sub>.
  - For information on the impact of Diodes' USB2.0 compatible ESD protectors on signal integrity including eye diagram plots, please refer to AN77 at the following URL: [http://www.diodes.com/\\_files/products\\_appnote\\_pdfs/AN77.pdf](http://www.diodes.com/_files/products_appnote_pdfs/AN77.pdf).

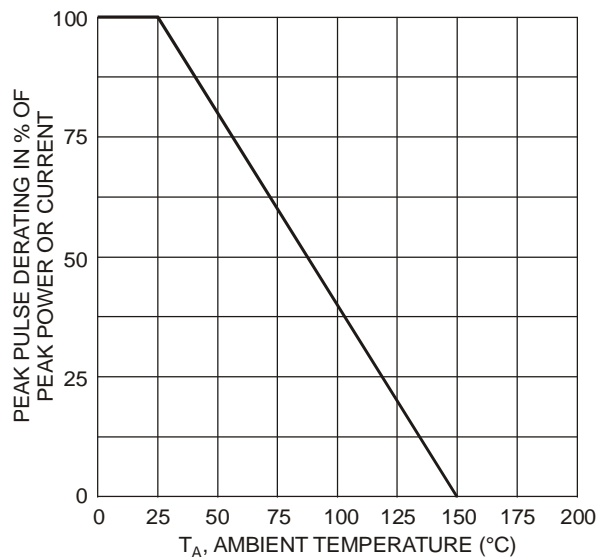


Fig. 1 Pulse Derating Curve

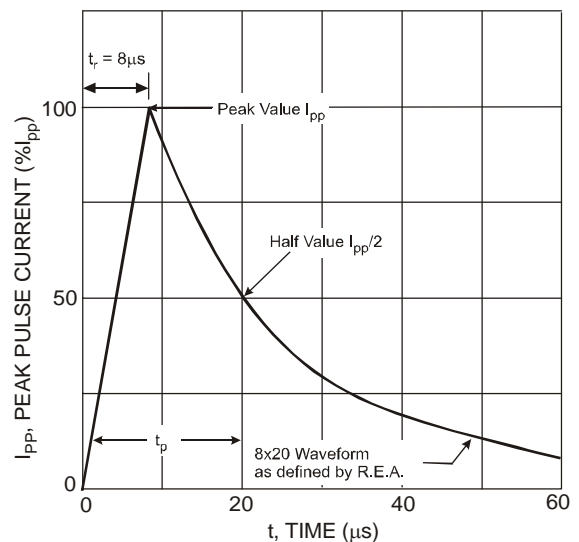


Fig. 2 Pulse Waveform

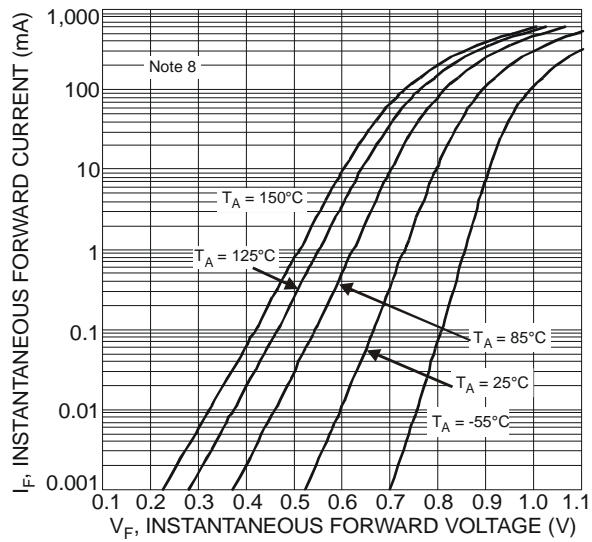


Fig. 3 Typical Forward Characteristics

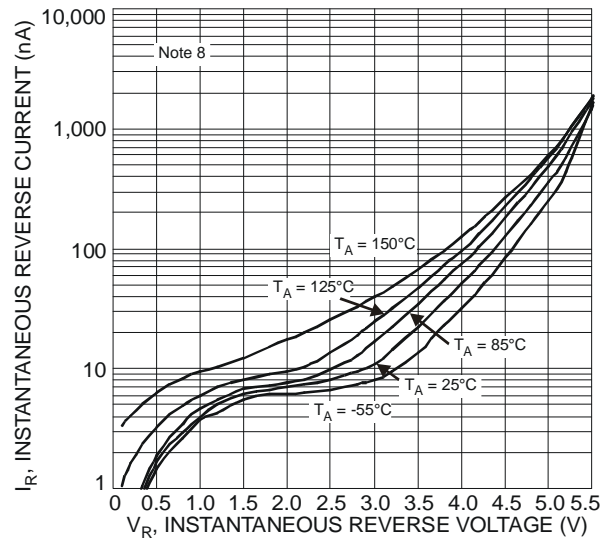


Fig. 4 Typical Reverse Characteristics

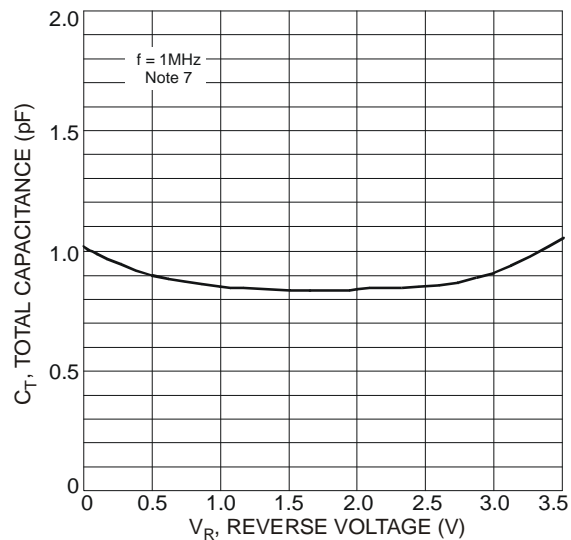
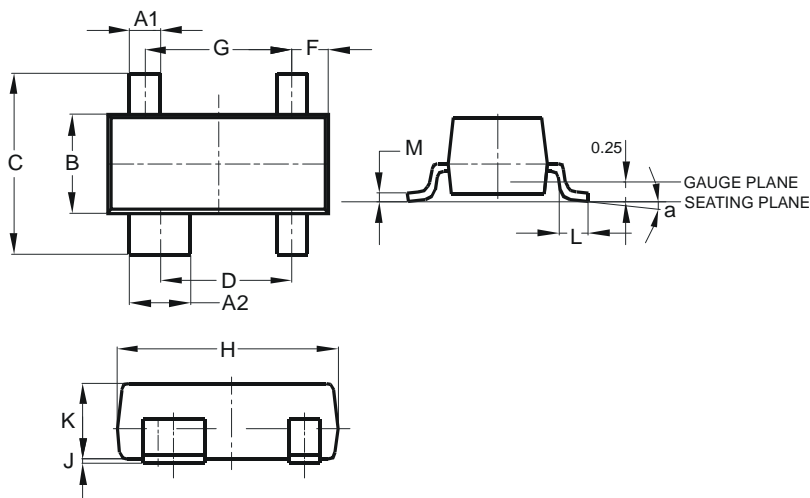


Fig. 5 Typical Total Capacitance vs. Reverse Voltage

## Package Outline Dimensions

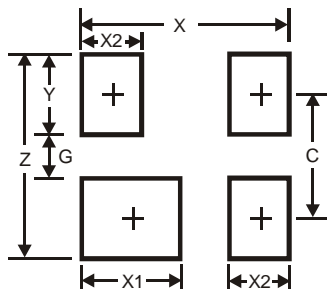
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



SOT143			
Dim	Min	Max	Typ
A1	0.37	0.51	0.400
A2	0.77	0.93	0.800
B	1.20	1.40	1.30
C	2.28	2.48	2.38
D	1.58	1.83	1.72
F	0.45	0.60	0.49
G	1.78	2.03	1.92
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.89	1.00	-
L	0.46	0.60	0.50
M	0.085	0.18	0.11
a	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	2.70
G	1.30
X	2.50
X1	1.0
X2	0.60
Y	0.70
C	2.0

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