4 CHANNEL LOW CAPACITANCE TVS DIODE ARRAY

Features

- IEC 61000-4-2 (ESD): Air ±15kV, Contact ±8kV
- 4 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**

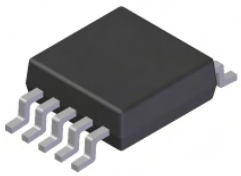
Mechanical Data

- Case: MSOP-10
- 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 e3
- Weight: 0.026 grams (approximate)

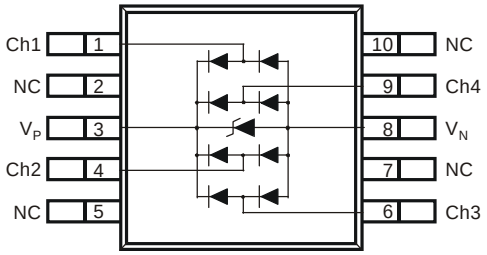
Pin#	Description
1, 4, 6, 9	Inputs
2, 5, 7, 10	No Connection
8	V_N, Ground
3	Vp, Power

Pin Description

MSOP-10



Top View



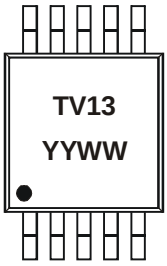
Device Schematic

Ordering Information (Note 4)

Part Number	Case	Packaging
D1213A-04MR-13	MSOP-10	2500/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



TV13 = Product Type Marking Code
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 12 = 2012)
WW = Week Code (01 ~ 53)

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	8/20 μs, Per Fig. 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	500	mW
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	250	°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 (Note 7)
Clamping Voltage, Negative Transients	V_{CL2}	-	-1.7	-	V	I_{PP} = -1A (Note 7)
Forward Voltage for Top Diode	V_{FD1}	0.60	0.80	0.95	V	I_F = 8mA, any channel to V_P
Forward Voltage for Bottom Diode	V_{FD2}	0.60	0.80	0.95	V	I_F = 8mA, V_N to and channel
Dynamic Resistance	R_{DYN}	-	0.9	-	Ω	I_{PP} = 1A (Note 7)
Channel Input Capacitance	C_T	-	0.85	1.2	pF	V_{IN} = 1.65V, V_P = 3.3V, V_N = 0V, f = 1MHz

Notes:
5. 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.
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. Measured from any channel to V_N
9. Measured from V_P to V_N.
10. 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/destools/appnote_dnote.html.

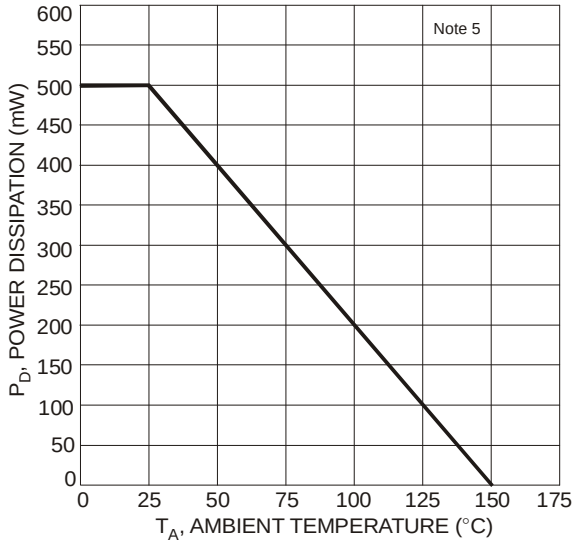


Figure 1 Power Derating Curve

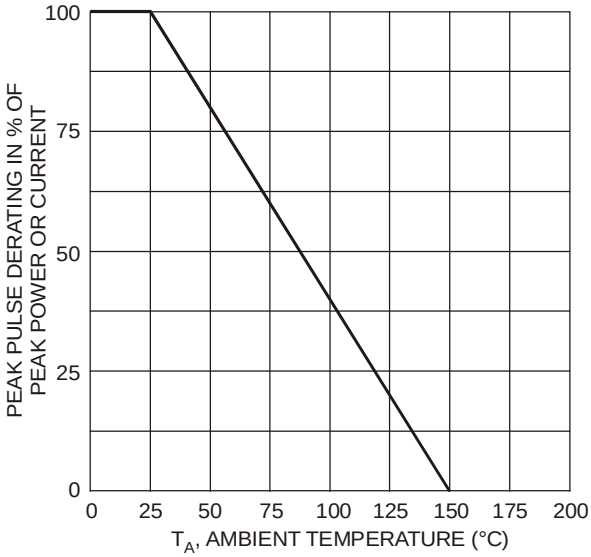


Figure 2 Pulse Derating Curve

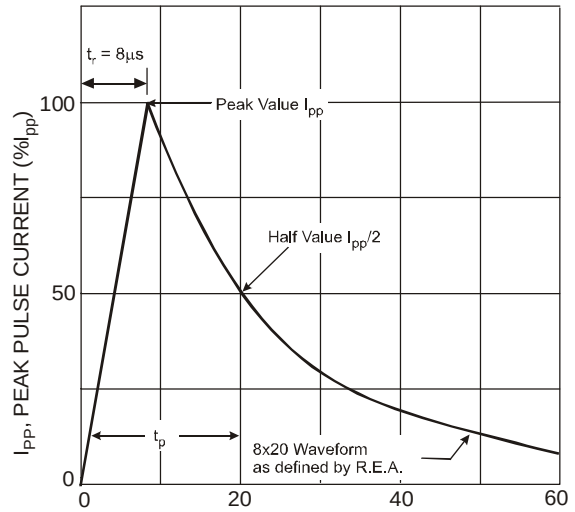


Figure 3 Pulse Waveform

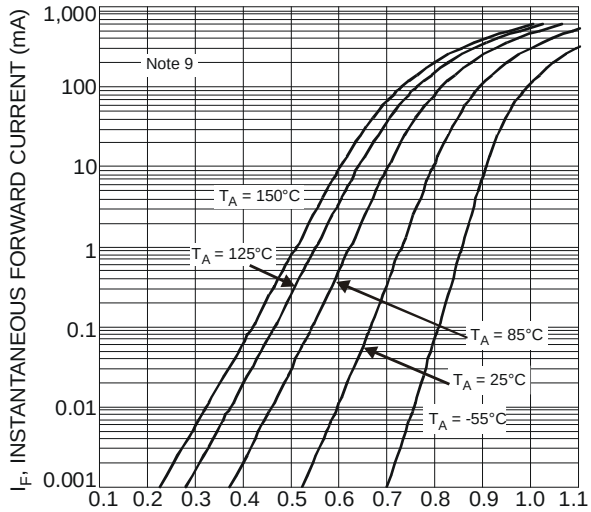


Figure 4 Typical Forward Characteristics

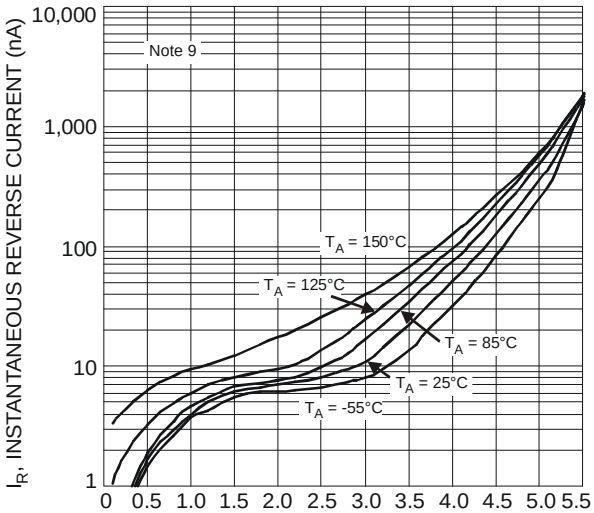


Figure 5 Typical Reverse Characteristics

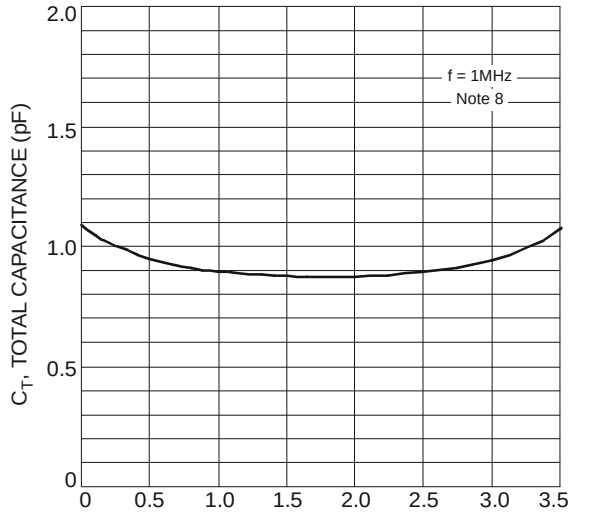
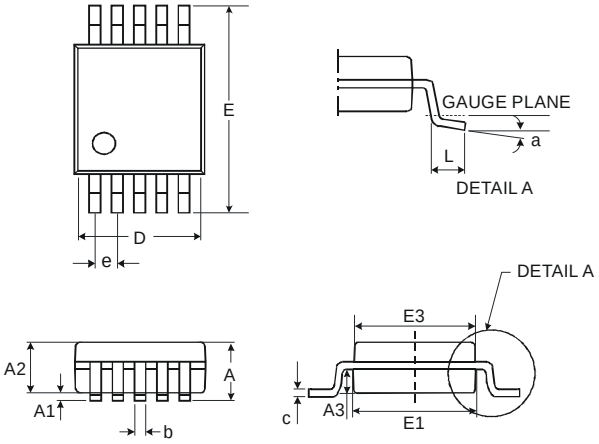


Figure 6 Typical Total Capacitance vs. Reverse Voltage

Package Outline Dimensions

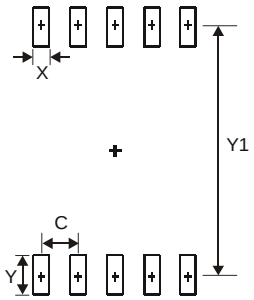
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



MSOP-10			
Dim	**Min**	**Max**	**Typ**
a	0°	8°	4°
A	-	1.10	-
A1	0.05	0.15	0.10
A2	0.75	0.95	0.86
A3	0.29	0.49	0.39
b	0.17	0.33	0.20
c	0.08	0.23	0.15
D	2.90	3.10	3.00
e	-	-	0.50
E	4.70	5.10	4.90
E1	2.90	3.10	3.00
E3	2.85	3.05	2.95
L	0.40	0.80	0.60
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)
C	5.300
X	0.300
Y	1.350
Y1	0.500

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