



**THE DATASHEET OF
D1213A-02SM-7**



2 CHANNEL LOW CAPACITANCE TVS DIODE ARRAY
Features

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

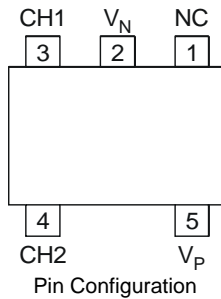
Mechanical Data

- 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)

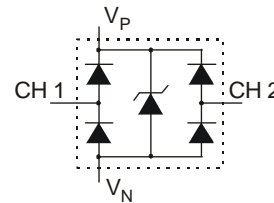
SOT25



Top View



Pin Configuration

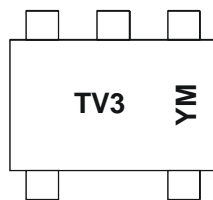


Device Schematic

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 (@ $T_A = +25^\circ\text{C}$, 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 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)	$R_{\theta JA}$	310	$^\circ\text{C/W}$
Operating and Storage Temperature Range	T_J, T_{STG}	-65 to +150	$^\circ\text{C}$

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, 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	$(V_P - V_N) = 3.3\text{V}$
Channel Leakage Current (Note 6)	I_R	—	± 0.1	± 1.0	μA	$V_P = 5\text{V}, V_N = 0\text{V}$
Reverse breakdown voltage	V_{BR}	6.0	—	—	V	$I_R = 1\text{mA}$
Clamping Voltage, Positive Transients	V_{CL1}	—	10.0	—	V	$I_{PP} = 1\text{A}, t_p = 8/20\mu\text{s}$
Clamping Voltage, Negative Transients	V_{CL2}	—	-1.7	—	V	$I_{PP} = -1\text{A}, t_p = 8/20\mu\text{s}$
Forward Voltage for Top Diode	V_{FD1}	0.60	0.80	0.95	V	$I_F = 8\text{mA}$, CH1 to V_P or CH2 to V_P
Forward Voltage for Bottom Diode	V_{FD2}	0.60	0.80	0.95	V	$I_F = 8\text{mA}$, V_N to CH1 or V_N to CH2
Dynamic Resistance	R_{DYN}	—	0.9	—	Ω	$I_{PP} = 1\text{A}, t_p = 8/20\mu\text{s}$
Channel Input Capacitance	C_T	—	0.85	1.2	pF	$V_{IN} = 1.65\text{V}, V_P = 3.3\text{V}, V_N = 0\text{V}, f = 1\text{MHz}$

- 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.

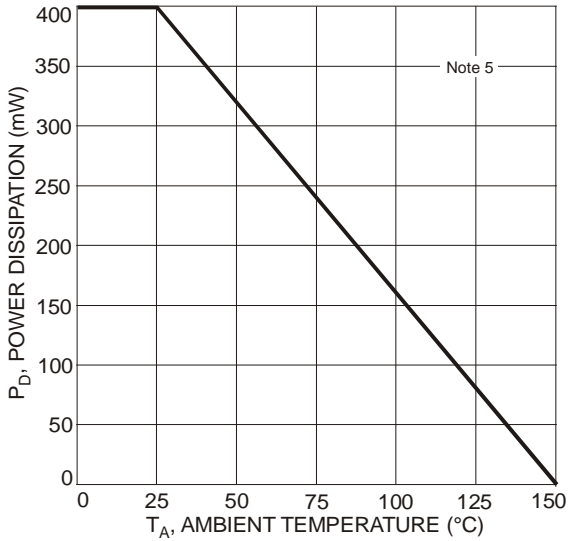


Figure 1 Power Dissipation vs. Ambient Temperature

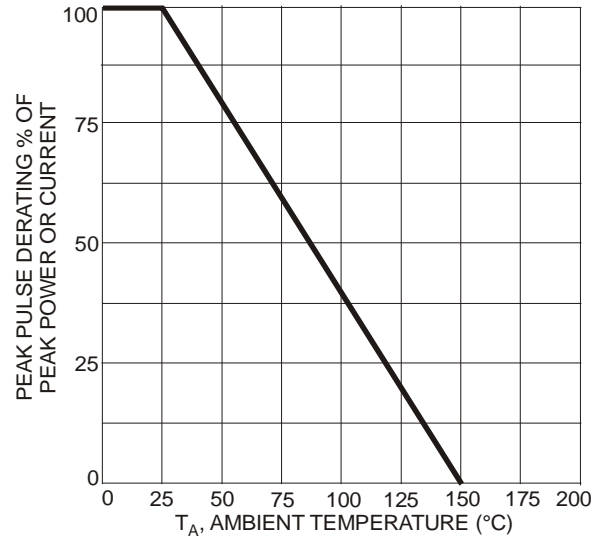


Figure 2 Pulse Derating Curve

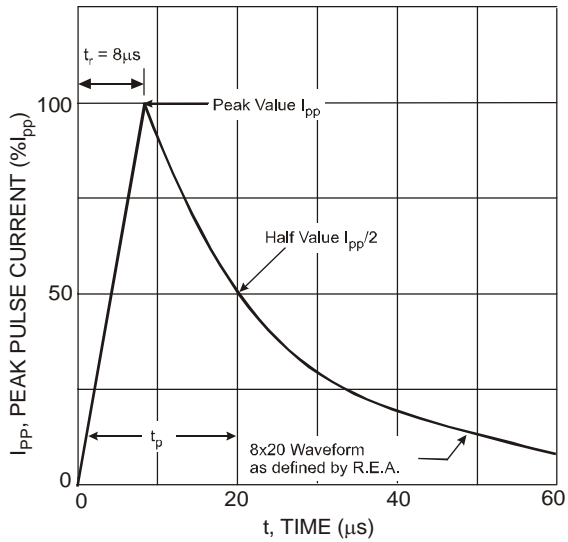


Figure 3 Pulse Waveform

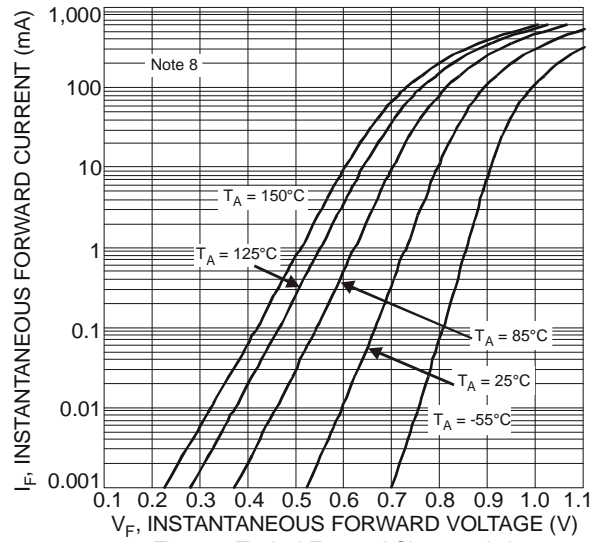


Figure 4 Typical Forward Characteristics

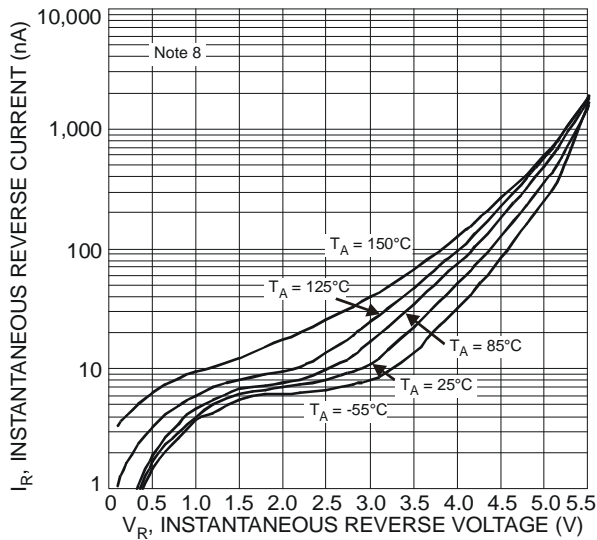


Figure 5 Typical Reverse Characteristics

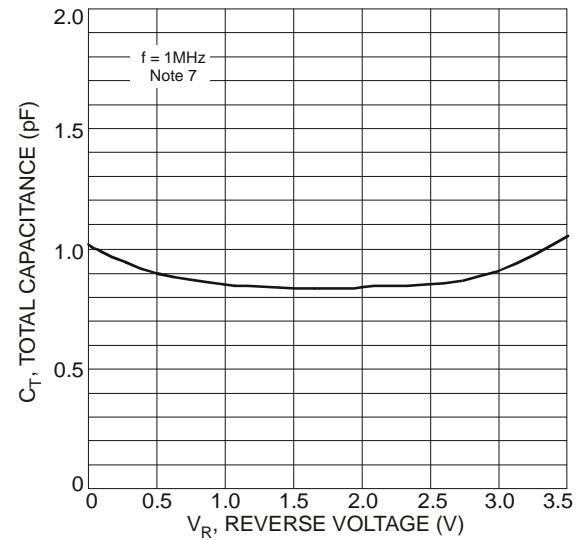
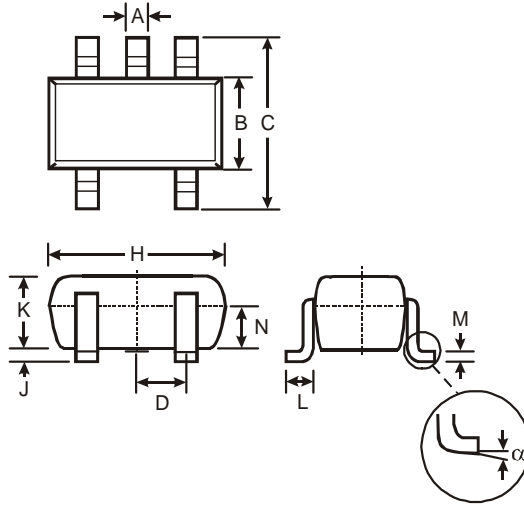


Figure 6 Typical Total Capacitance vs. Reverse Voltage

Package Outline Dimensions

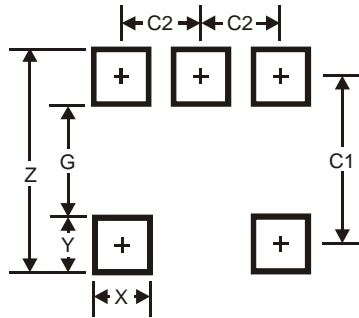
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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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