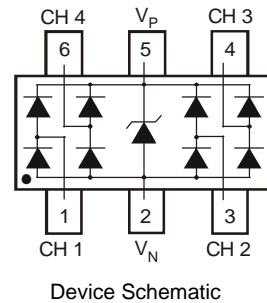


**Features**

- 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: TSOT26
- 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 ③
- Weight: 0.013 grams (approximate)

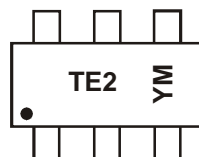


**Ordering Information** (Note 4)

Part Number	Case	Packaging
D1213A-04TS-7	TSOT26	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**



TE2 = 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 $\mu\text{s}$ , Per Figure 3
ESD Protection – Contact Discharge	$V_{ESD\_Contact}$	$\pm 8$	kV	Standard IEC 61000-4-2
ESD Protection – Air Discharge	$V_{ESD\_Air}$	$\pm 15$	kV	Standard IEC 61000-4-2

**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	$^\circ\text{C}/\text{W}$
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	$\mu\text{A}$	$(V_P - V_N) = 3.3\text{V}$
Channel Leakage Current (Note 6)	$I_R$	-	0.1	1.0	$\mu\text{A}$	$V_P = 5\text{V}, V_N = 0\text{V}$
Reverse breakdown voltage	$V_{BR}$	6.0	-	-	V	$I_R = 1\text{mA}$
Clamping Voltage, Positive Transients	$V_{CL1}$	-	10.0	-	V	$I_{PP} = 1\text{A}$ (Note 7)
Clamping Voltage, Negative Transients	$V_{CL2}$	-	-1.7	-	V	$I_{PP} = -1\text{A}$ (Note 7)
Forward Voltage for Top Diode	$V_{FD1}$	0.60	0.80	0.95	V	$I_F = 8\text{mA}$ , any channel 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 and channel
Dynamic Resistance	$R_{DYN}$	-	0.9	-	$\Omega$	$I_{PP} = 1\text{A}$ (Note 7)
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.
  - Clamping voltage value is based on an 8x20 $\mu\text{s}$  peak pulse current ( $I_{PP}$ ) waveform.
  - Measured from any channel 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/destdools/appnote\\_dnote.html](http://www.diodes.com/destdools/appnote_dnote.html).

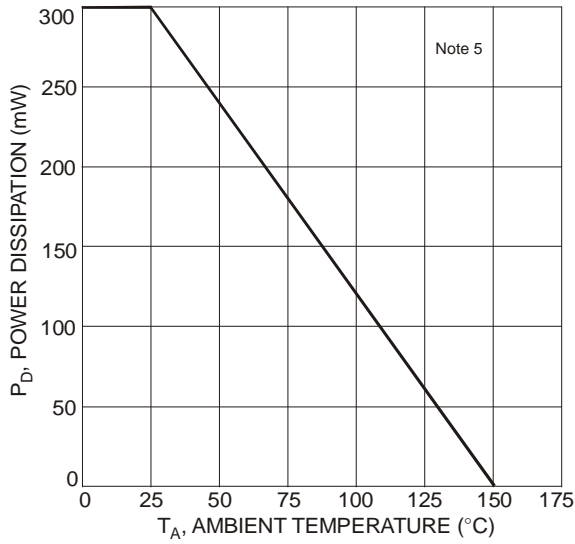


Figure 1 Power Derating Curve

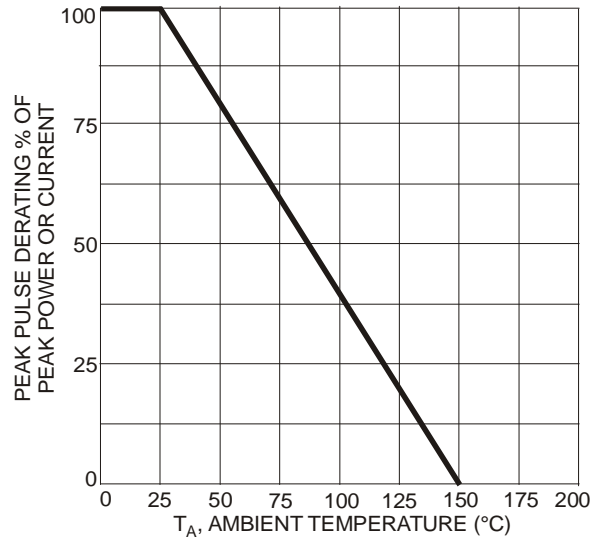


Figure 2 Power Dissipation vs. Ambient Temperature

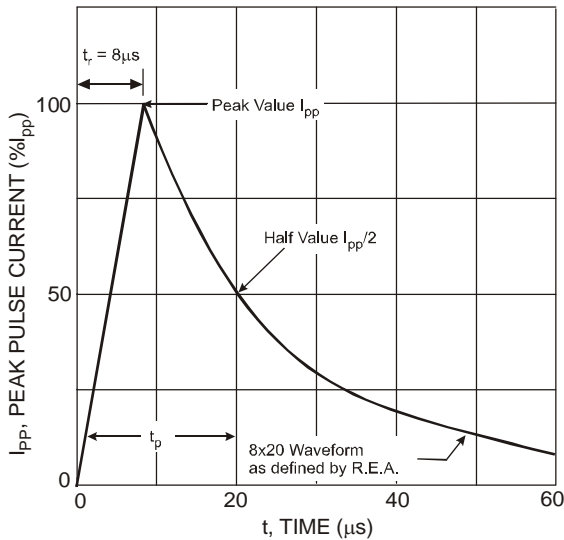


Figure 3 Pulse Waveform

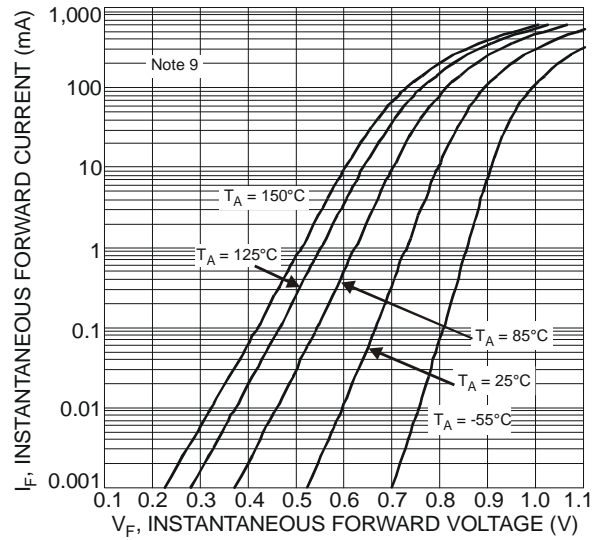


Figure 4 Typical Forward Characteristics

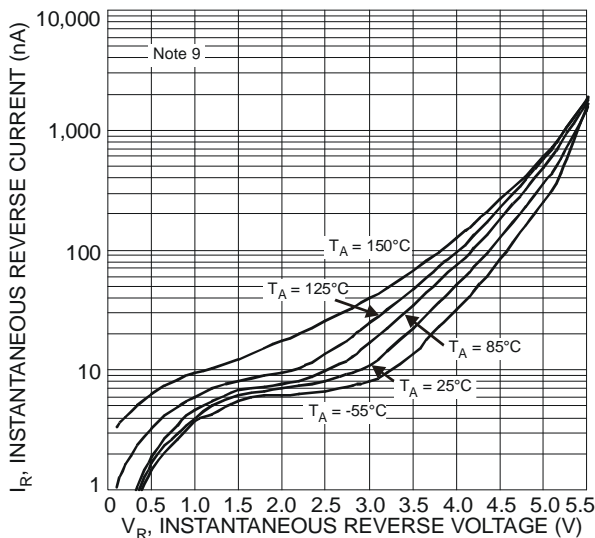


Figure 5 Typical Reverse Characteristics

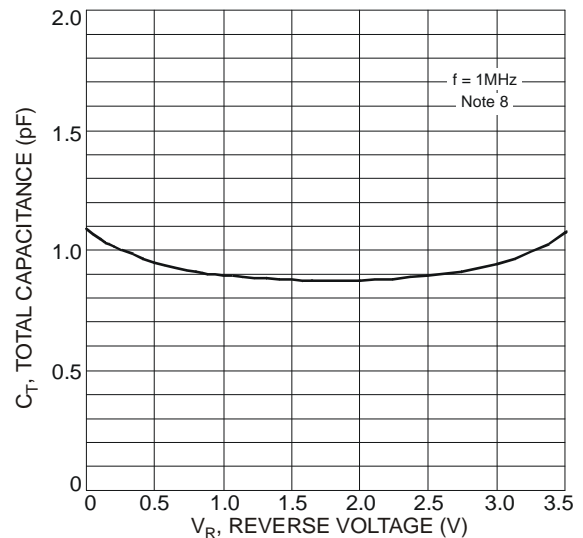
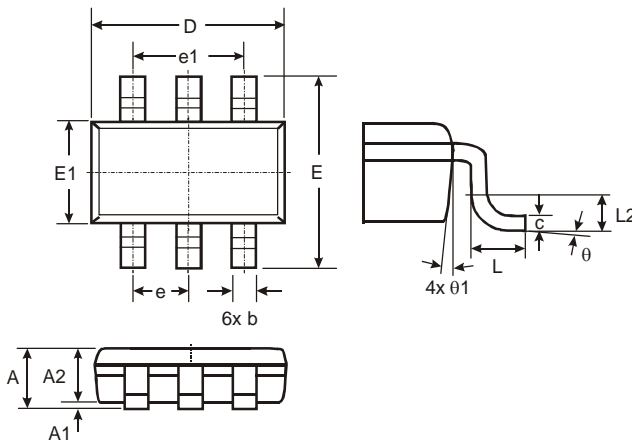


Figure 6 Typical Total Capacitance vs. Reverse Voltage

## Package Outline Dimensions

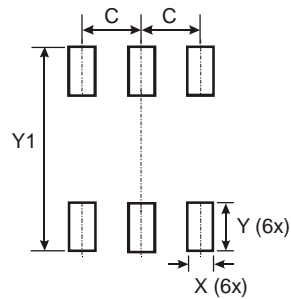
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



TSOT26			
Dim	Min	Max	Typ
A	–	1.00	–
A1	0.01	0.10	–
A2	0.84	0.90	–
D	–	–	2.90
E	–	–	2.80
E1	–	–	1.60
b	0.30	0.45	–
c	0.12	0.20	–
e	–	–	0.95
e1	–	–	1.90
L	0.30	0.50	–
L2	–	–	0.25
θ	0°	8°	4°
θ1	4°	12°	–
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	0.950
X	0.700
Y	1.000
Y1	3.199

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