

## Product Summary

V <sub>BR</sub> (MIN)	I <sub>PP</sub> (MAX)	C <sub>T</sub> (TYP)
6V	5A	0.85pF

## Features and Benefits

- IEC 61000-4-2 (ESD): Air ±25kV, Contact ±25kV
- 4 Channels of ESD Protection
- Low Channel Input Capacitance of 0.85pF Typical
- Typically Used at High Speed Ports such as USB 2.0 (Note 10), IEEE1394, Serial ATA, DVI, HDMI, PCI
- 4 Channels of ESD Protection
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The D1213A-04TSQ range of parts are suitable for automotive applications requiring specific change control; these parts are AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**

<https://www.diodes.com/quality/product-definitions/>

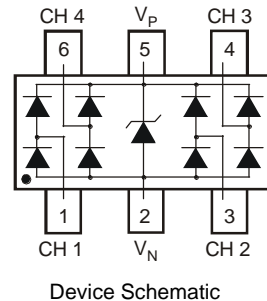
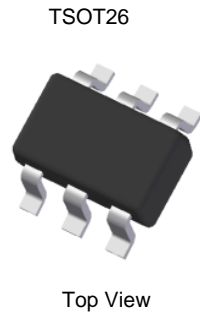
## Description and Applications

This new generation TVS is designed to protect sensitive electronics from the damage due to ESD. The combination of small size and high ESD surge capability makes it ideal for use in portable applications such as:

- USB Modules
- HDMI™ Ports
- LVDs

## Mechanical Data

- Package: TSOT26
- Package 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: 0.013 grams (Approximate)

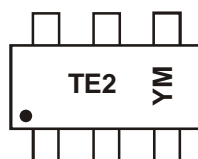


## Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
D1213A-04TSQ-7	TSOT26	3,000	Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  2. See <https://www.diodes.com/quality/lead-free/> 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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information



TE2 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: K = 2023)  
 M = Month (ex: 8 = August)

### Date Code Key

Year	2023	2024	2025	2026	2027	2028	2029
Code	K	L	M	N	P	R	S

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 3
ESD Protection – Contact Discharge	V <sub>ESD_Contact</sub>	±25	kV	Standard IEC 61000-4-2
ESD Protection – Air Discharge	V <sub>ESD_Air</sub>	±25	kV	Standard IEC 61000-4-2

**Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P <sub>D</sub>	300	mW
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	417	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 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 (Notes 7 & 8)
Clamping Voltage, Negative Transients	V <sub>CL2</sub>	-	-1.7	-	V	I <sub>PP</sub> = -1A (Note 7 & 8)
Forward Voltage for Top Diode	V <sub>FD1</sub>	0.60	0.80	0.95	V	I <sub>F</sub> = 8mA, any channel 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 and channel
Dynamic Resistance	R <sub>DYN</sub>	-	0.9	-	Ω	I <sub>PP</sub> = 1A (Notes 7 & 8)
Channel Input Capacitance	C <sub>T</sub>	-	0.85	1.2	pF	V <sub>N</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 Incorporated's (Diodes), suggested pad layout, which can be found on our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/diodes-package-outlines-and-pad-layouts/>.
  - Short duration pulse test used to minimize self-heating effect.
  - Clamping voltage value is based on an 8x20μs peak pulse current (I<sub>pp</sub>) waveform.
  - Measured from any channel to V<sub>N</sub>.
  - Measured from V<sub>P</sub> to V<sub>N</sub>.
  - 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: <https://www.diodes.com/assets/App-Note-Files/AN77.pdf>

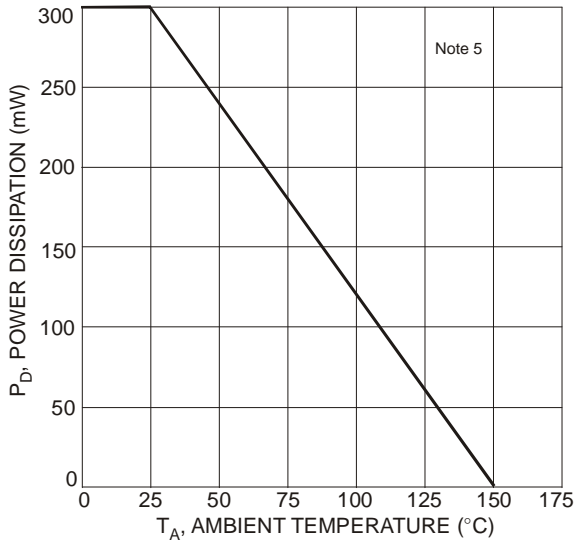


Figure 1 Power Derating Curve

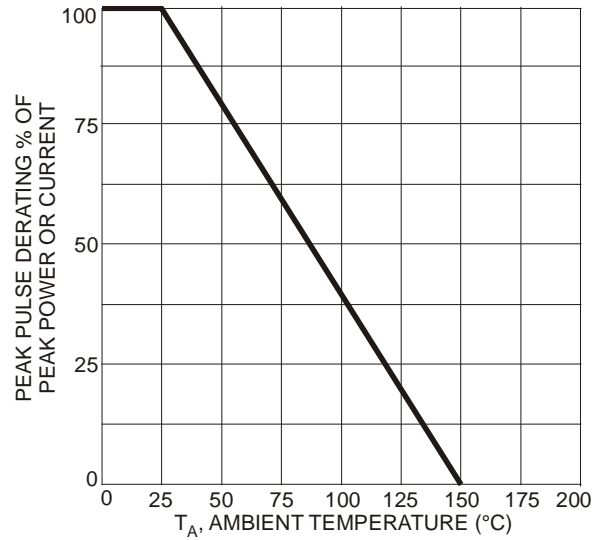


Figure 2 Power Dissipation vs. Ambient Temperature

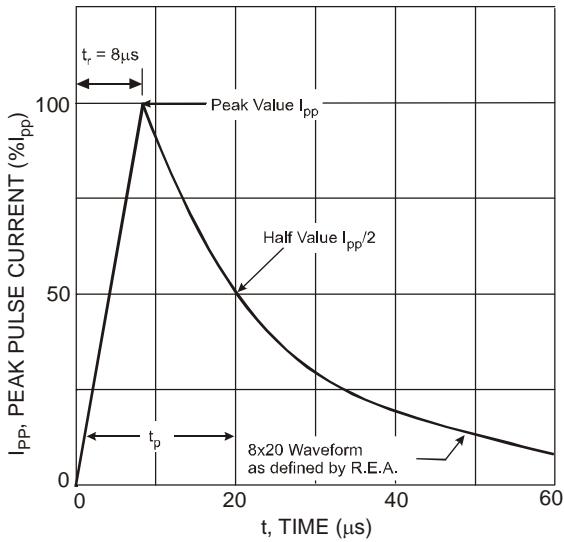


Figure 3 Pulse Waveform

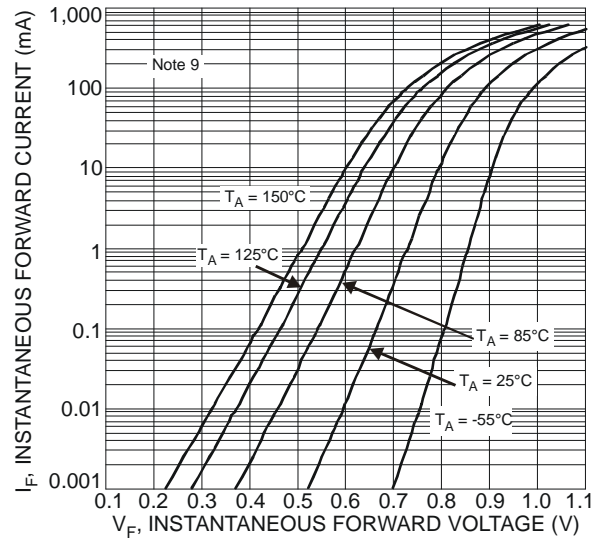


Figure 4 Typical Forward Characteristics

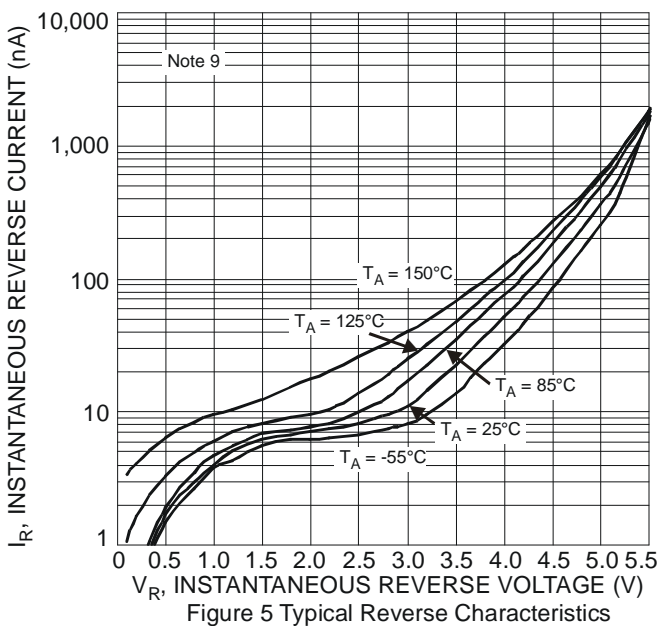


Figure 5 Typical Reverse Characteristics

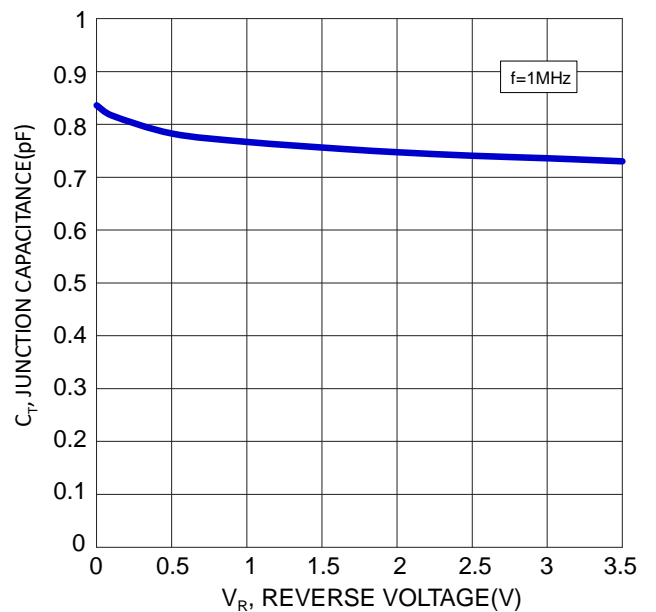


Figure 6 Typical Total Capacitance vs. Reverse Leakage

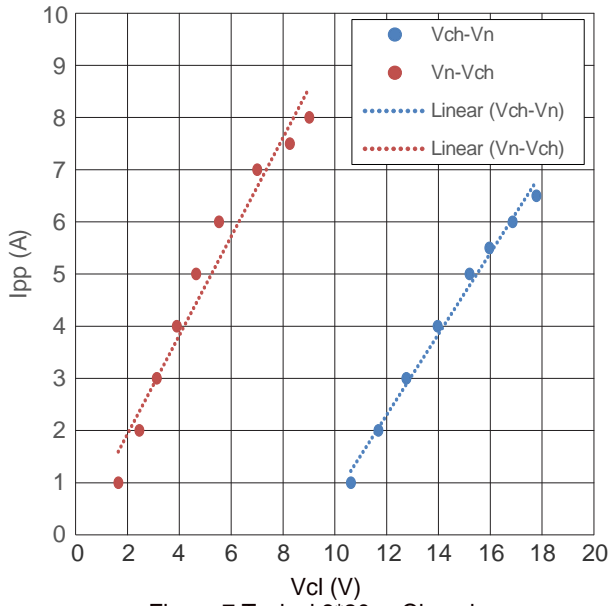
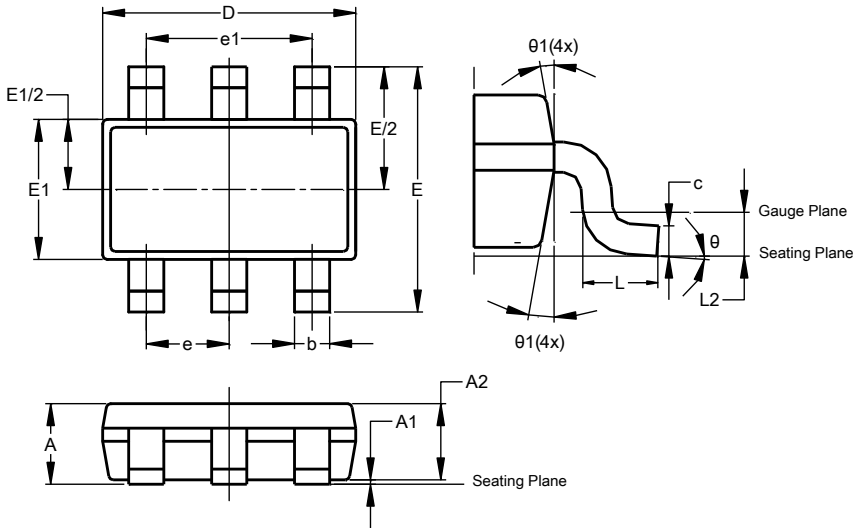


Figure 7 Typical 8\*20 $\mu$ s Clamping Voltage Performance

**Package Outline Dimensions**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

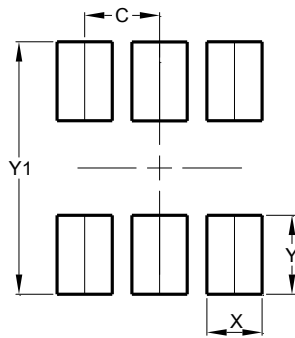


TSOT26			
Dim	Min	Max	Typ
A	-	1.00	-
A1	0.010	0.100	-
A2	0.840	0.900	-
D	2.800	3.000	2.900
E	2.800 BSC		
E1	1.500	1.700	1.600
b	0.300	0.450	-
c	0.120	0.200	-
e	0.950 BSC		
e1	1.900 BSC		
L	0.30	0.50	-
L2	0.250 BSC		
θ	0°	8°	4°
θ1	4°	12°	-
All Dimensions in mm			

**Suggested Pad Layout**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

TSOT26



Dimensions	Value (in mm)
C	0.950
X	0.700
Y	1.000
Y1	3.200

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