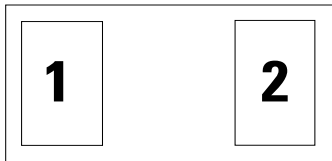


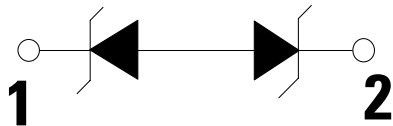
# SP1333 8pF 30kV Bidirectional Discrete TVS



## Pinout



## Functional Block Diagram



## Description

The SP1333 back-to-back diodes are fabricated in a proprietary silicon avalanche technology. These diodes provide a high ESD (electrostatic discharge) protection level for electronic equipment. The SP1333 TVS can safely absorb repetitive ESD strikes above the maximum contact discharge level specified in the IEC 61000-4-2 international standard (Level 4, ±8kV contact discharge) without performance degradation. The back-to-back configuration provides symmetrical ESD protection for data lines. Additionally, the SP1333 offers up to 5A 8/20 surge rating with low clamping voltages.

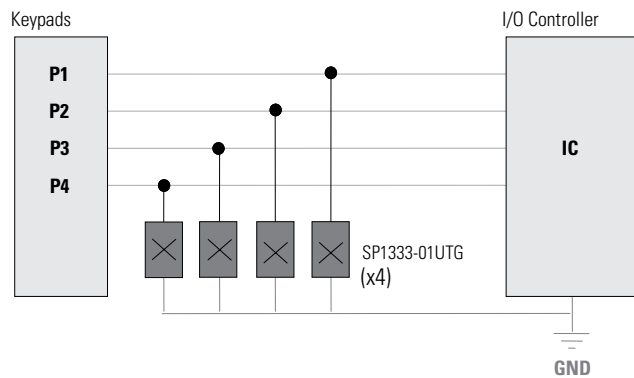
## Features

- ESD, IEC 61000-4-2, ±30kV contact, ±30kV air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, 5A (8/20µs as defined in IEC 61000-4-5 2<sup>nd</sup> edition)
- Low capacitance of 8pF (TYP @ V<sub>R</sub>=0V)
- Low leakage current of 1nA (TYP) at 3.3V
- Space efficient 0201
- Halogen free, Lead free and RoHS compliant
- Moisture Sensitivity Level (MSL -1)
- AEC-Q101 qualified

## Applications

- Mobile Phones
- Smart Phones
- Portable Medical
- MP3/PMP
- Portable Navigation Components
- Tablets
- Small Size Panel
- Point of Sale Terminals

## Application Example



Life Support Note:

**Not Intended for Use in Life Support or Life Saving Applications**

The products shown herein are not designed for use in life sustaining or life saving applications unless otherwise expressly indicated.

**Absolute Maximum Ratings**

Symbol	Parameter	Value	Units
$I_{PP}$	Peak Current ( $t_p=8/20\mu s$ )	5	A
$T_{OP}$	Operating Temperature	-40 to 125	°C
$T_{STOR}$	Storage Temperature	-55 to 150	°C

**CAUTION:** Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the component. This is a stress only rating and operation of the component at these or any other conditions above those indicated in the operational sections of this specification is not implied.

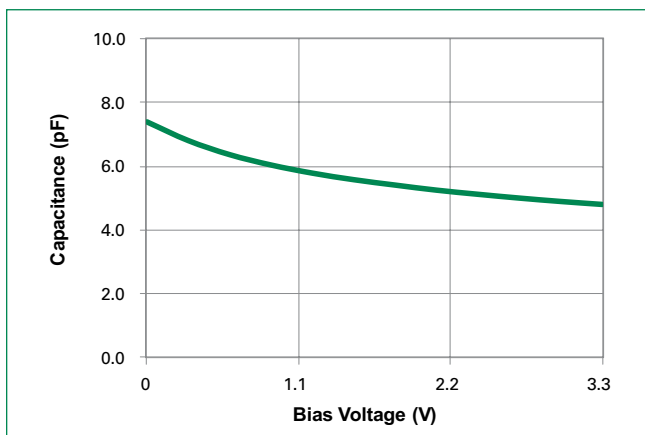
**Electrical Characteristics ( $T_{OP}=25^\circ C$ )**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	$V_{RWM}$	$I_R=1\mu A$			3.3	V
Breakdown Voltage	$V_{BR}$	$I_R=1mA$	3.5	4.5		V
Reverse Leakage Current	$I_{LEAK}$	$V_R=3.3V$		1	50	nA
Clamp Voltage <sup>1</sup>	$V_C$	$I_{PP}=1A, t_p=8/20\mu s, I/O$ to I/O		5	7	V
		$I_{PP}=5A, t_p=8/20\mu s, I/O$ to I/O		7.5	9	V
Dynamic Resistance <sup>2</sup>	$R_{DYN}$	TLP, $t_p=100ns, I/O$ to I/O		0.3		$\Omega$
ESD Withstand Voltage <sup>1</sup>	$V_{ESD}$	IEC 61000-4-2 (Contact Discharge)	$\pm 30$			kV
		IEC 61000-4-2 (Air Discharge)	$\pm 30$			kV
Diode Capacitance <sup>1</sup>	$C_{I/O-I/O}$	Reverse Bias=0V		8	10	pF

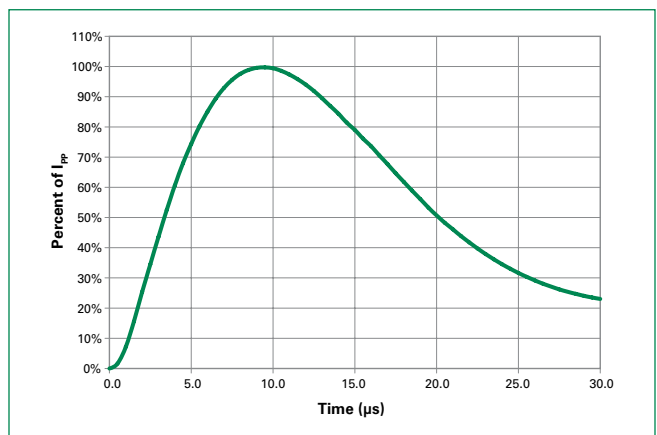
**Note:**

- Parameter is guaranteed by design and/or component characterization.
- Transmission Line Pulse (TLP) with 100ns width, 2ns rise time, and average window  $t_1=70ns$  to  $t_2=90ns$

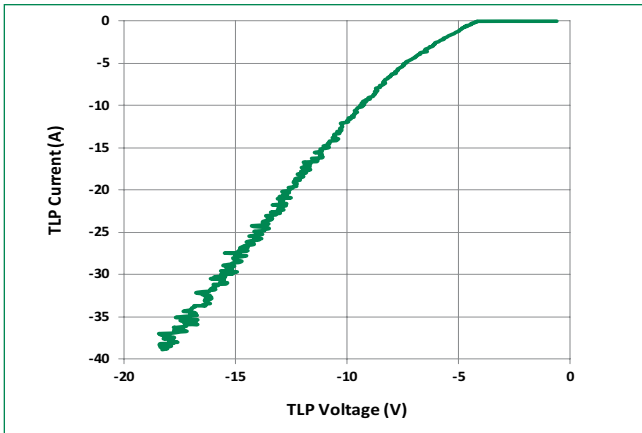
**Capacitance vs. Reverse Bias**



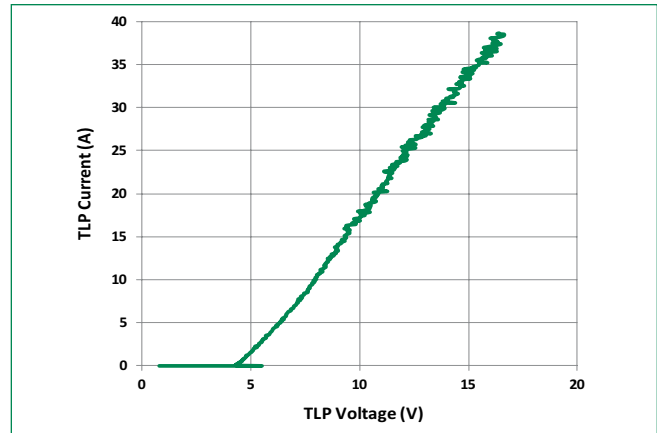
**8/20µs Pulse Waveform**



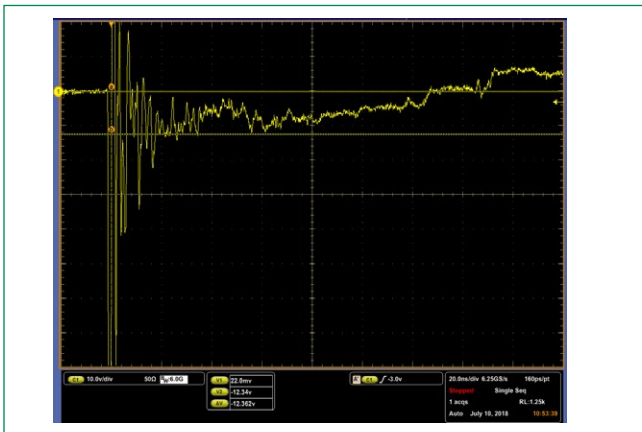
**Negative Transmission Line Pulsing (TLP) Plot**



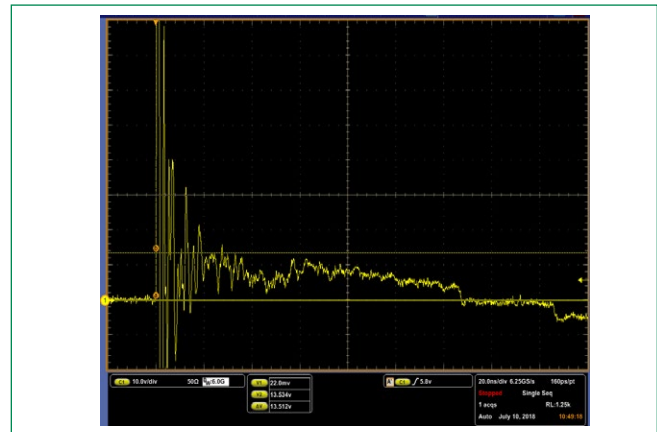
**Positive Transmission Line Pulsing (TLP) Plot**



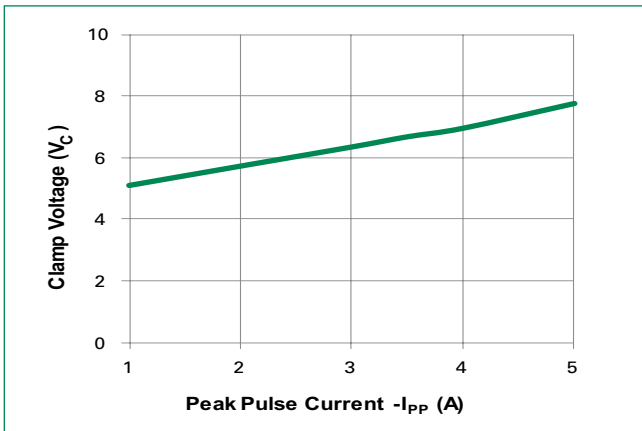
**IEC 61000-4-2 -8 kV Contact ESD Clamping Voltage**



**IEC 61000-4-2 +8 kV Contact ESD Clamping Voltage**

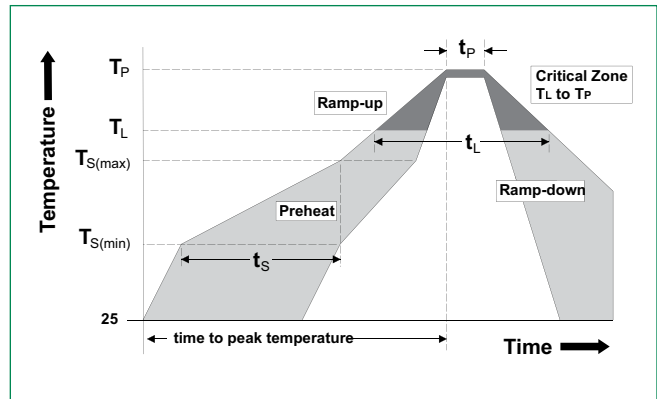


**Clamping voltage vs.  $I_{PP}$  for 8/20μs waveshape**



### Soldering Parameters

<b>Reflow Condition</b>		Pb – Free assembly
<b>Pre Heat</b>	- Temperature Min ( $T_{s(min)}$ )	150°C
	- Temperature Max ( $T_{s(max)}$ )	200°C
	- Time (min to max) ( $t_s$ )	60 – 180 secs
<b>Average ramp up rate (Liquidus) Temp (<math>T_L</math>) to peak</b>		3°C/second max
<b><math>T_{s(max)}</math> to <math>T_L</math> - Ramp-up Rate</b>		3°C/second max
<b>Reflow</b>	- Temperature ( $T_L$ ) (Liquidus)	217°C
	- Temperature ( $t_L$ )	60 – 150 seconds
<b>Peak Temperature (<math>T_p</math>)</b>		260 <sup>+0/-5</sup> °C
<b>Time within 5°C of actual peak Temperature (<math>t_p</math>)</b>		20 – 40 seconds
<b>Ramp-down Rate</b>		6°C/second max
<b>Time 25°C to peak Temperature (<math>T_p</math>)</b>		8 minutes Max.
<b>Do not exceed</b>		260°C



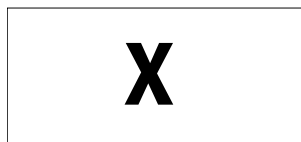
### Ordering Information

Part Number	Package	Min. Order Qty.
SP1333-01UTG	0201 DFN	15,000

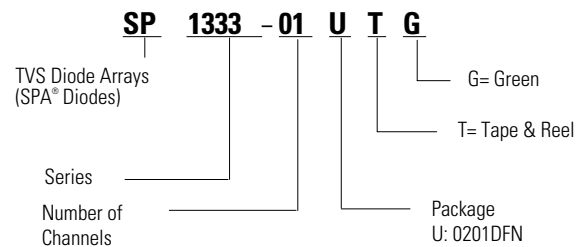
### Product Characteristics

<b>Lead Plating</b>	Pre-Plated Frame
<b>Lead material</b>	Copper Alloy
<b>Substrate Material</b>	Silicon
<b>Body Material</b>	Molded Compound
<b>Flammability</b>	UL Recognized compound meeting flammability rating V-0

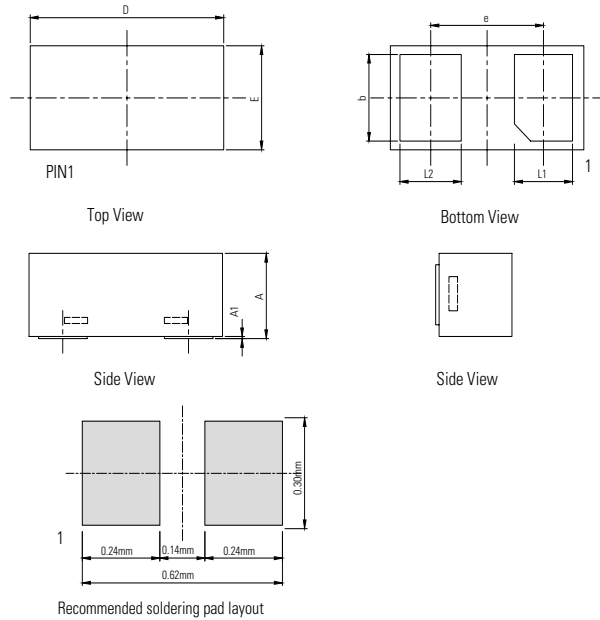
### Part Marking System



### Part Numbering System



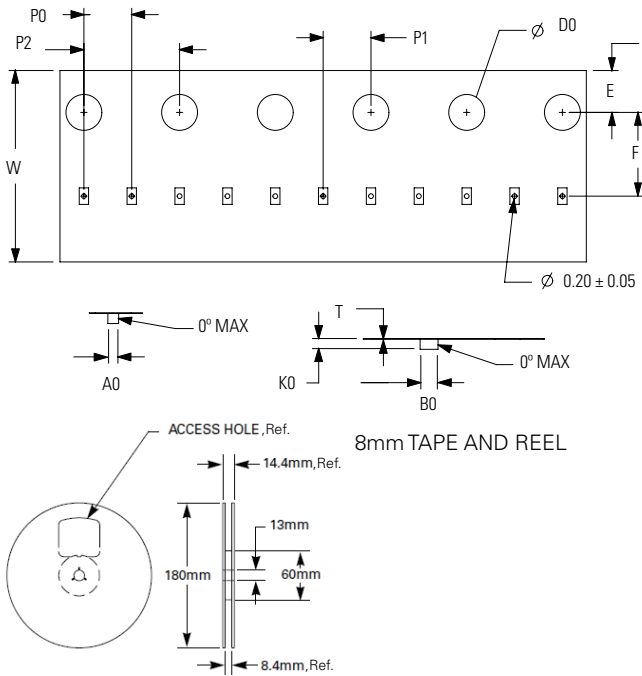
**Package Dimensions — 0201 DFN**



Drawing#: U01-A

Symbol	0201 DFN					
	Millimeters			Inches		
	Min	Typ	Max	Min	Typ	Max
<b>A</b>	0.30	0.31	0.32	0.012	0.012	0.013
<b>A1</b>	0.00	0.02	0.50	0.000	0.001	0.020
<b>b</b>	0.18	0.23	0.28	0.007	0.009	0.011
<b>L1</b>	0.12	0.17	0.22	0.005	0.007	0.009
<b>L2</b>	0.13	0.18	0.23	0.005	0.007	0.009
<b>D</b>	0.55	0.60	0.65	0.022	0.024	0.026
<b>E</b>	0.25	0.30	0.35	0.010	0.012	0.014
<b>e</b>	0.35 BSC			0.014 BSC		

**Embossed Carrier Tape & Reel Specification — 0201 DFN**



Symbol	Millimeters		Inches	
	Min	Max	Min	Max
<b>A0</b>	0.33	0.40	0.013	0.016
<b>B0</b>	0.63	0.70	0.025	0.028
<b>D0</b>	1.40	1.60	0.055	0.063
<b>E</b>	1.65	1.85	0.065	0.073
<b>F</b>	3.45	3.55	0.136	0.140
<b>K0</b>	0.30	0.39	0.012	0.015
<b>P0</b>	1.90	2.10	0.075	0.083
<b>P1</b>	1.95	2.05	0.077	0.081
<b>P2</b>	3.90	4.10	0.154	0.161
<b>T</b>	0.13	0.25	0.005	0.010
<b>W</b>	7.90	8.30	0.311	0.327

**Disclaimer Notice** - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at <http://www.littelfuse.com/disclaimer-electronics>.

## X-ON Electronics

Largest Supplier of Electrical and Electronic Components

*Click to view similar products for [ESD Suppressors / TVS Diodes](#) category:*

*Click to view products by [Littelfuse](#) manufacturer:*

Other Similar products are found below :

[60KS200C](#) [D12V0H1U2WS-7](#) [D18V0L1B2LP-7B](#) [82356050220](#) [D5V0M5U6V-7](#) [NTE4902](#) [P4KE27CA](#) [P6KE11CA](#) [P6KE39CA-TP](#)  
[P6KE8.2A](#) [SA110CA](#) [SA60CA](#) [SA64CA](#) [SMBJ12CATR](#) [SMBJ8.0A](#) [SMLJ30CA-TP](#) [ESD112-B1-02EL](#) [E6327](#)  
[ESD119B1W01005E6327XTSA1](#) [ESD5V0J4-TP](#) [ESD5V0L1B02VH6327XTSA1](#) [ESD7451N2T5G](#) [19180-510](#) [CPDT-5V0USP-HF](#)  
[3.0SMCJ33CA-F](#) [3.0SMCJ36A-F](#) [HSPC16701B02TP](#) [D3V3Q1B2DLP3-7](#) [D55V0M1B2WS-7](#) [DESD5V0U1BL-7B](#) [DRTR5V0U4SL-7](#)  
[SCM1293A-04SO](#) [ESD203-B1-02EL](#) [E6327](#) [SM12-7](#) [SMF8.0A-TP](#) [SMLJ45CA-TP](#) [CEN955 W/DATA](#) [82350120560](#) [82356240030](#)  
[VESD12A1A-HD1-GS08](#) [CPDUR5V0R-HF](#) [CPDUR24V-HF](#) [CPDQC5V0U-HF](#) [CPDQC5V0USP-HF](#) [CPDQC5V0-HF](#) [D1213A-01LP4-7B](#)  
[D1213A-02WL-7](#) [ESDLIN1524BJ-HQ](#) [5KP100A](#) [5KP15A](#) [5KP18A](#)