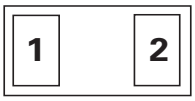
SP1333 8pF 30kV Bidirectional Discrete TVS

HF RoHS Pb GREEN

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.

Pinout



Features

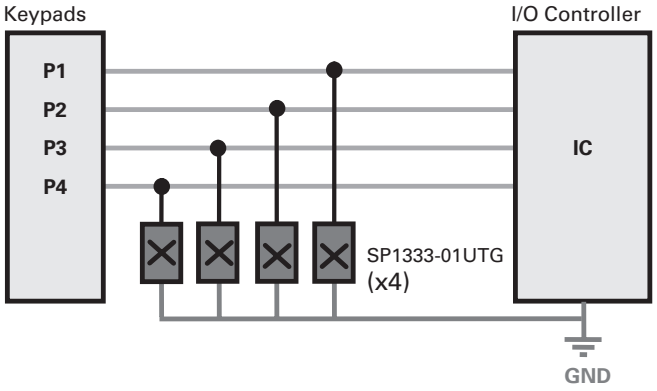
- ESD, IEC 61000-4-2, ±30kV contact, ±30kV air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, 5A (8/20µs as defined in IEC 61000-4-5 2nd edition)
- Low capacitance of 8pF (TYP @ V_R=0V)
- Low leakage current of 1nA (TYP) at 3.3V
- Space efficient 0201
- Halogen free, Lead free and RoHS compliant
- Moisture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

Functional Block Diagram

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.

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TVS Diode Arrays (SPA® Diodes)

General Purpose ESD Protection - SP1333

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
I_{PP}	Peak Current (t_p=8/20µs)	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.

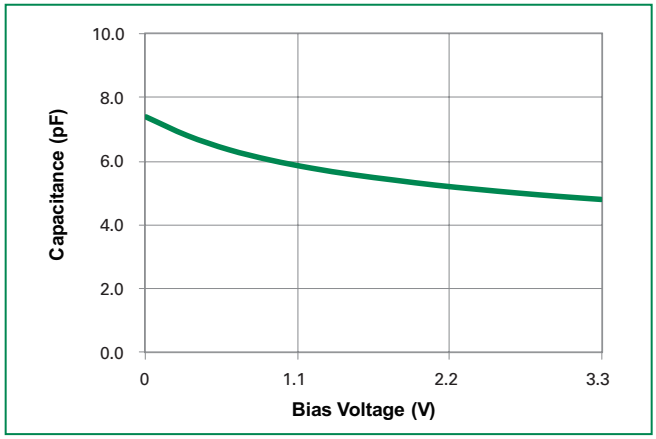
Electrical Characteristics (T_{OP}=25°C)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V_{RWM}	I_R=1µA			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[1]	V_C	I_{PP}=1A, t_p=8/20µs, I/O to I/O		5	7	V
		I_{PP}=5A, t_p=8/20µs, I/O to I/O		7.5	9	V
Dynamic Resistance[2]	R_{DYN}	TLP, t_P=100ns, I/O to I/O		0.3		Ω
ESD Withstand Voltage[1]	V_{ESD}	IEC 61000-4-2 (Contact Discharge)	±30			kV
		IEC 61000-4-2 (Air Discharge)	±30			kV
Diode Capacitance[1]	$C_{IO-I/O}$	Reverse Bias=0V		8	10	pF

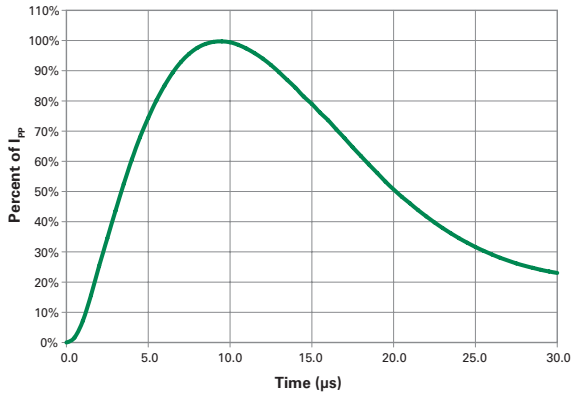
Note:

1. Parameter is guaranteed by design and/or component characterization.
2. Transmission Line Pulse (TLP) with 100ns width, 2ns rise time, and average window t1=70ns to t2= 90ns

Capacitance vs. Reverse Bias



8/20µs Pulse Waveform



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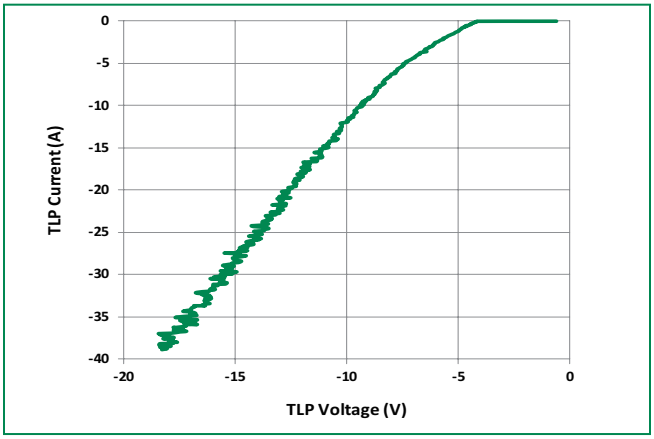
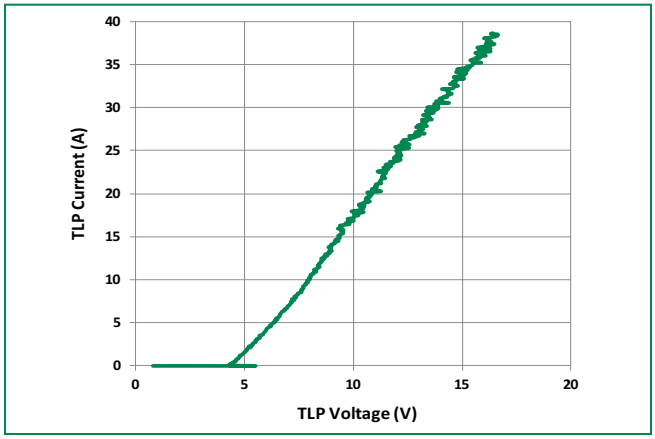
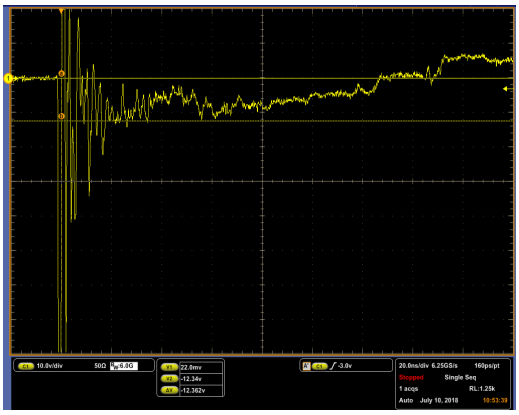
Negative Transmission Line Pulsing (TLP) Plot



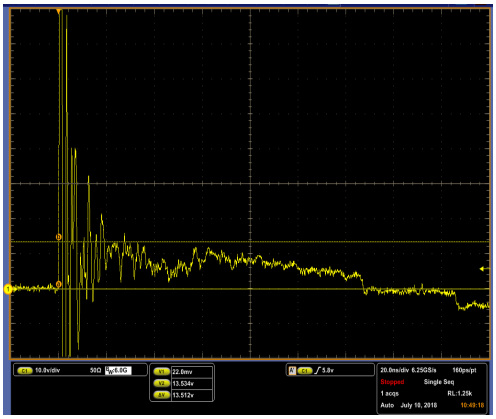
Positive Transmission Line Pulsing (TLP) Plot



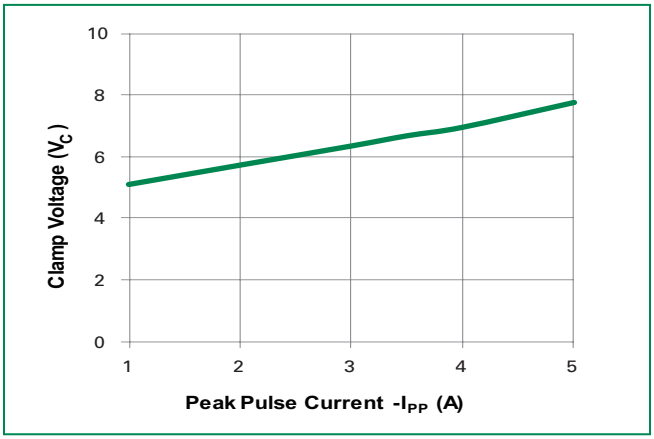
IEC 61000–4–2 -8 kV Contact ESD Clamping Voltage



IEC 61000–4–2 +8 kV Contact ESD Clamping Voltage



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



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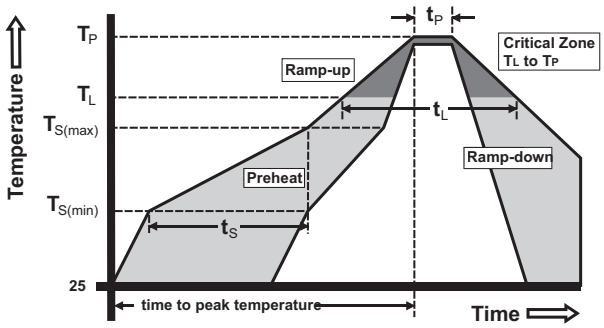
TVS Diode Arrays (SPA® Diodes)

General Purpose ESD Protection - SP1333

Soldering Parameters

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



Product Characteristics

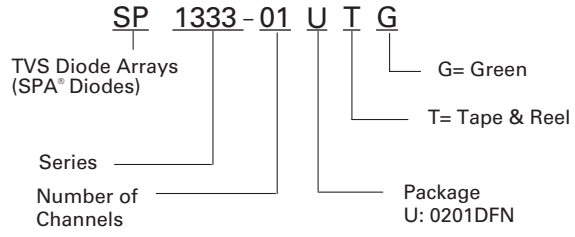
Lead Plating	Pre-Plated Frame
Lead material	Copper Alloy
Substrate Material	Silicon
Body Material	Molded Compound
Flammability	UL Recognized compound meeting flammability rating V-0

Ordering Information

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

Part Marking System

Part Numbering System



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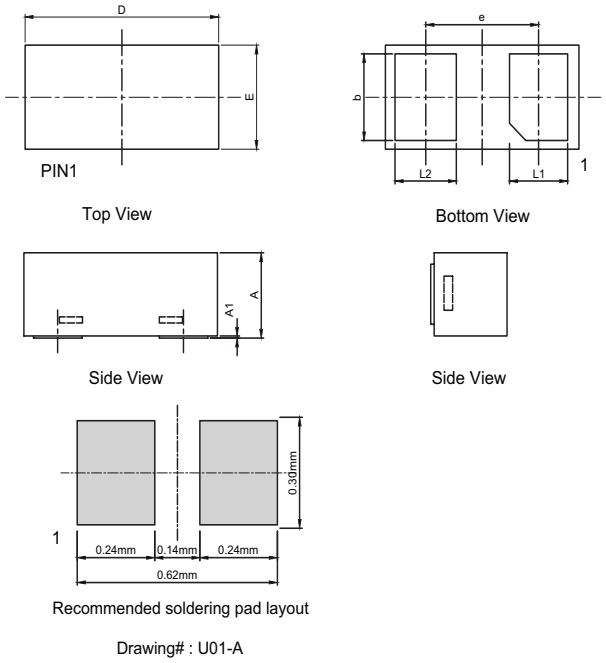
General Purpose ESD Protection - SP1333

Package Dimensions — 0201 DFN

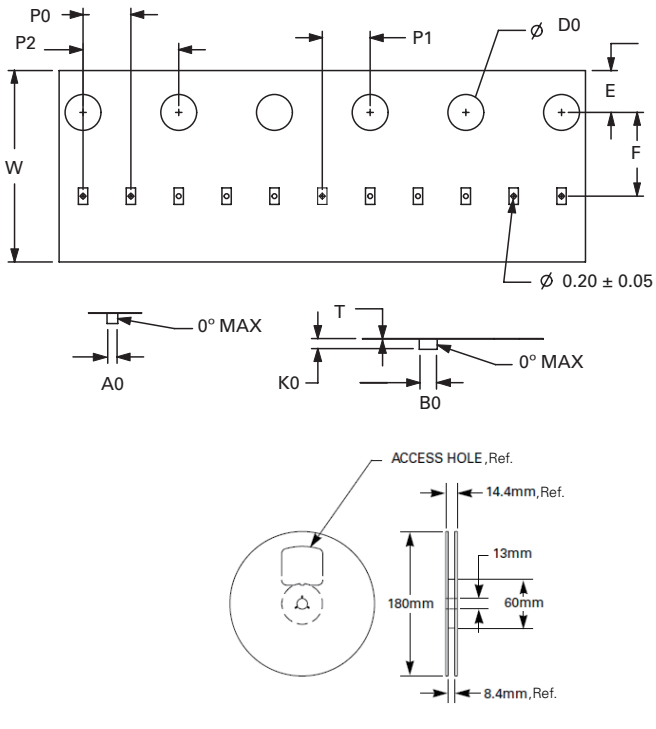


Recommended soldering pad layout

Drawing# : U01-A

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

Embossed Carrier Tape & Reel Specification — 0201 DFN



8mm TAPE AND REEL

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

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