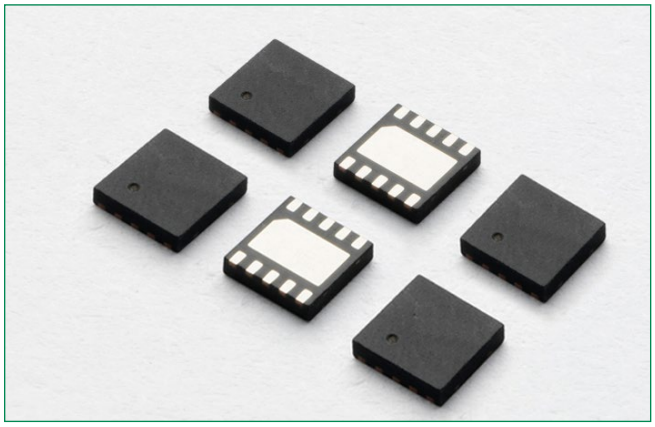
SP3304N Series 3.3V 20A Diode Array

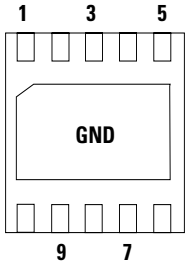
HF RoHS Pb GREEN



Description

The SP3304N integrates 4 channels of low capacitance diodes with an additional zener diode to protect sensitive I/O pins against lightning induced surge events and ESD. This robust device can safely absorb up to 20A per IEC 61000-4-5 2nd Edition (t_P=8/20µs) without performance degradation and a minimum ±30kV ESD per IEC 61000-4-2. The low loading capacitance makes the SP3304N ideal for protecting high-speed signal pins.

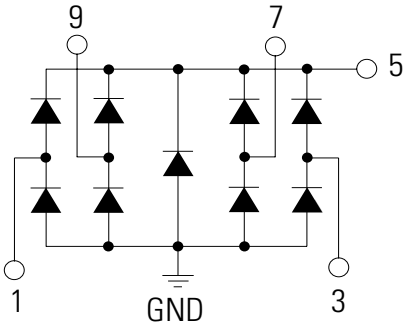
Pinout



Features

- RoHS compliant, lead-free and halogen-free
- ESD, IEC 61000-4-2, ±30kV contact, ±30kV air
- EFT, IEC 61000-4-4, 40A (t_P=5/50ns)
- Lightning, IEC 61000-4-5 2nd Edition, 20A (t_P=8/20µs)
- Low capacitance of 3.5pF (TYP) per I/O
- Low leakage current of 1µA (MAX) at 3.3V
- Moisture Sensitivity Level (MSL Level-1)

Functional Block Diagram



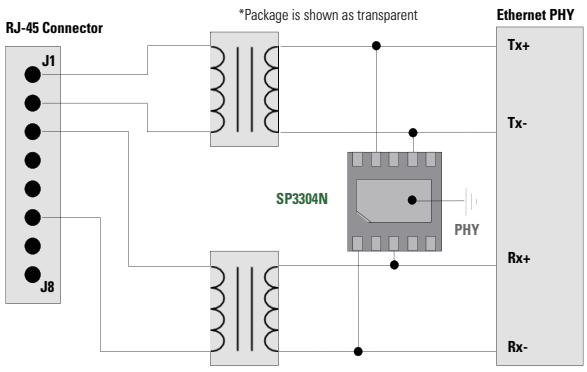
Applications

- 10/100/1000 Ethernet Interfaces
- Customer Premise Equipment (CPE)
- VoIP Phones
- Set Top Boxes
- PBX Systems
- Small Cells

Additional Information

Datasheet | Resources | Samples

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 Array (SPA® Diodes)

Lightning Surge Protection - SP3304N Series

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
I_{PP}	Peak Current (t_p=8/20µs)	20.0	A
P_{PK}	Peak Pulse Power (t_p=8/20µs)	300	W
T_{OP}	Operating Temperature	–40 to 125	°C
T_{STOR}	Storage Temperature	–55 to 150	°C

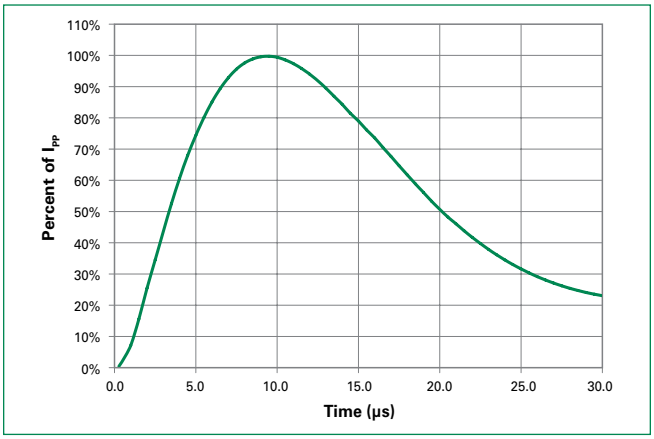
CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

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

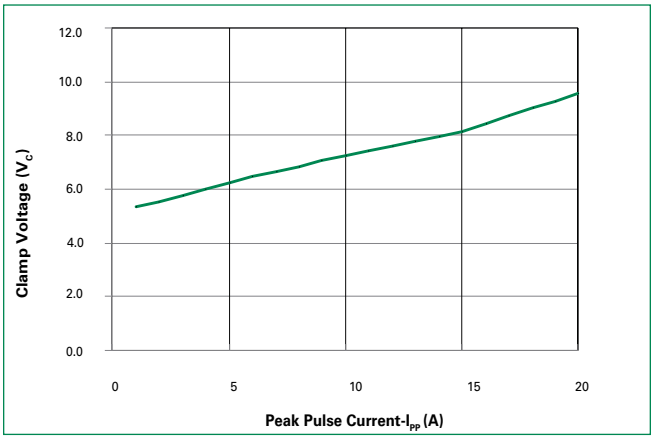
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V_{RWM}				3.3	V
Punch Through Voltage	V_{PT}	I_{PT}=5µA	3.5			V
Snap Back Voltage	V_{SB}	I_{SB}=50mA	2.8			V
Reverse Leakage Current	I_{LEAK}	V_R=3.3V, I/O to GND		0.5	1.0	µA
Clamp Voltage[1]	V_C	I_{PP}=1A, t_p=8/20µs, Fwd			6.0	V
		I_{PP}=5A, t_p=8/20µs, Fwd			7.0	V
		I_{PP}=10A, t_p=8/20µs, Fwd			8.0	V
		I_{PP}=20A, t_p=8/20µs, Fwd			11.5	V
Dynamic Resistance[2]	R_{DYN}	TLP, t_p=100ns, I/O to GND		0.25		W
ESD Withstand Voltage[1]	V_{ESD}	IEC61000-4-2 (Contact)	±30			kV
		IEC61000-4-2 (Air)	±30			kV
Diode Capacitance[1]	$C_{I/O-GND}$	Reverse Bias=0V, f=1MHz		3.5	5.0	pF
Diode Capacitance[1]	$C_{I/O-I/O}$	Reverse Bias=0V, f=1MHz		2.0		pF

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

Pulse Waveform



Clamping Voltage vs. I_{PP}



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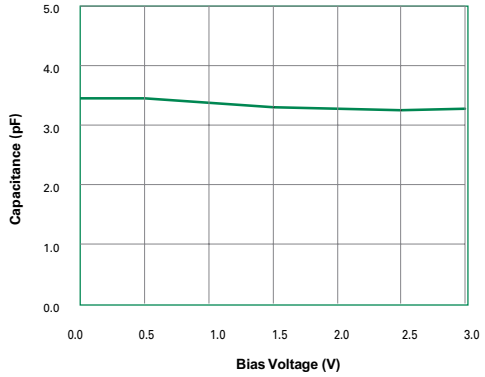
Capacitance vs. Bias

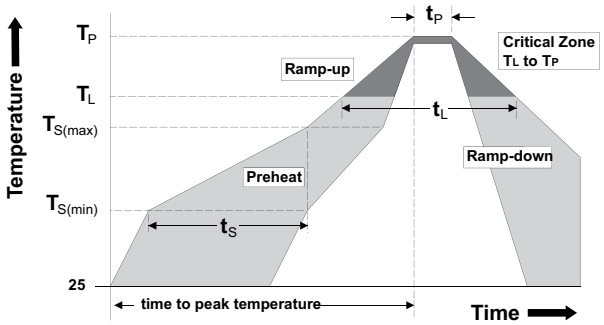


Ordering Information

Part Number	Package	Min. Order Qty.
SP3304NUTG	µDFN-10	3000

Soldering Parameters

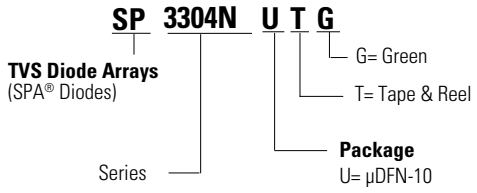
Reflow Condition		Pb – Free assembly
Pre Heat	- Temperature Min ($T_{s(min)}$)	150°C
	- Temperature Max ($T_{s(max)}$)	200°C
	- Time (min to max) (t_s)	60 – 180 secs
Average ramp up rate (Liquidus) Temp (T_L) to peak		3°C/second max
$T_{S(max)}$ to T_L - Ramp-up Rate		3°C/second max
Reflow	- Temperature (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



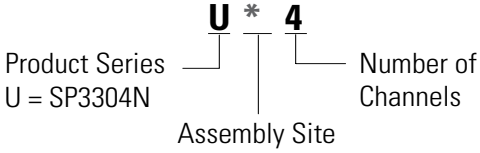
Product Characteristics

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

Part Numbering System



Part Marking System



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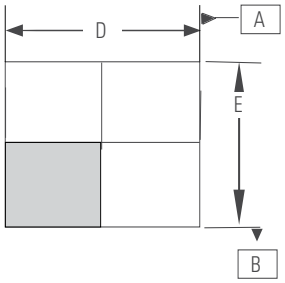
TVS Diode Array (SPA® Diodes)

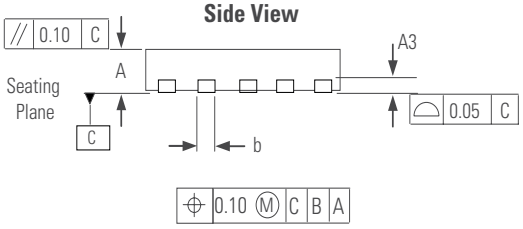
Lightning Surge Protection - SP3304N Series

Package Dimensions — *µDFN-10*

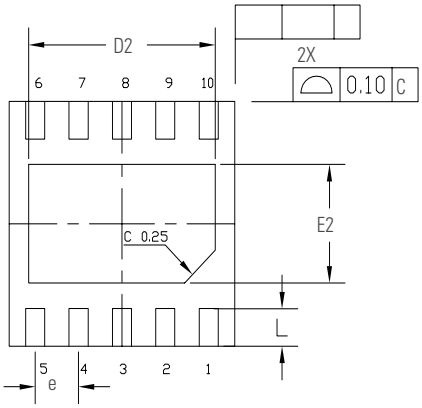
Top View



Side View

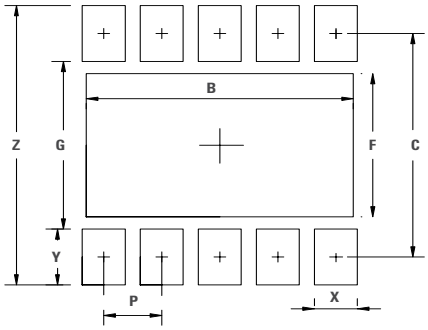


Bottom View



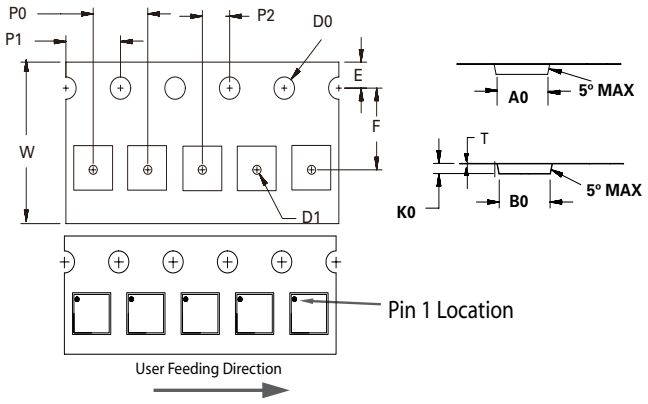
Package	µDFN-10 (2.6x2.6mm)					
JEDEC	MO-229					
Symbol	Millimeters			Inches		
	Min	Nom	Max	Min	Nom	Max
A	0.45	0.50	0.55	0.018	0.020	0.022
A3		0.130 Ref			0.005 Ref	
b	0.17	0.22	0.27	0.006	0.008	0.010
D	2.50	2.60	2.70	0.097	0.101	0.105
D2	2.10	2.15	2.20	0.081	0.083	0.085
E	2.50	2.60	2.70	0.097	0.101	0.105
E2	1.21	1.26	1.31	0.046	0.049	0.051
e		0.50 BSC			0.020 BSC	
L	0.35	0.40	0.45	0.014	0.016	0.018

Recommended Solder Pads µDFN-10L 2.6x2.6mm



Dimension		
Symbol	Millimeters	Inches
B	2.30	0.091
C	2.20	0.087
F	1.41	0.056
G	1.65	0.065
P	0.50	0.020
X	0.37	0.015
Y	0.55	0.022
Z	2.75	0.108

Embossed Carrier Tape & Reel Specification — µDFN-10 (2.6x2.6mm)



Symbol	Millimeters
A0	2.82 ± 0.05
B0	2.82 ± 0.05
D0	Ø1.50 + 0.10
D1	Ø 0.50 + 0.05
E	1.75 ± 0.10
F	3.50 ± 0.05
K0	0.76 ± 0.05
P0	4.00 ± 0.10
P1	4.00 ± 0.10
P2	2.00 ± 0.05
T	0.25 ± 0.02
W	8.00 + 0.30 /- 0.10

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