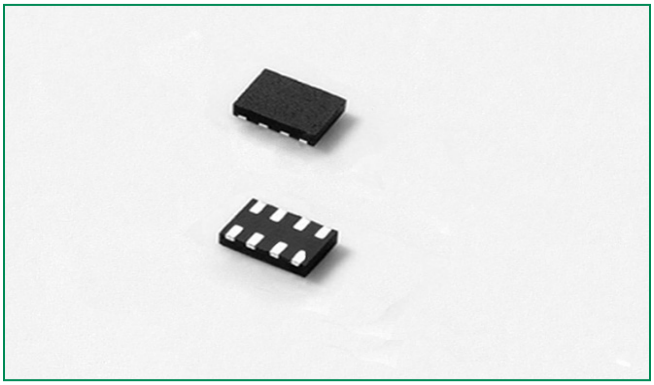
SP3312T Series 3.3V 15A Diode Array

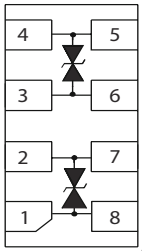
AUTOMOTIVE GRADE | RoHS | Pb | GREEN



Description

The SP3312T integrates 4 channels (2 differential pair) of low capacitance diodes to protect sensitive I/O pins against lightning induced surge events and ESD. This robust device can safely absorb up to 15A per IEC61000-4-5 (t_p=8/20µs) without performance degradation and a minimum ±30kV ESD per IEC61000-4-2 international standard. The low loading capacitance makes the SP3312T ideal for protecting high-speed signal pins.

Pinout



Features

- ESD, IEC61000-4-2, ±30kV contact, ±30kV air
- EFT, IEC61000-4-4, 40A (t_p=5/50ns)
- Lightning, IEC61000-4-5, 15A (t_p=8/20µs)
- Low capacitance of 1.3pF (TYP) per I/O
- Low leakage current of 0.01µA (TYP) at 3.3V
- Low variation in capacitance vs. bias voltage: 0.3pF Typical(V_R=0 to 2.5V)
- AEC-Q101 qualified

Functional Block Diagram

Applications

- 10/100/1000 Ethernet
- Integrated magnetics/ RJ45 connectors
- LAN/WAN Equipment
- Security Cameras
- Industrial Controls
- Notebook & Desktop Computers

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Absolute Maximum Ratings

Symbol	Parameter	Value	Units
I_{PP}	Peak Current (t_p=8/20µs)	15.0	A
P_{PK}	Peak Pulse Power (t_p=8/20µs)	250	W
T_{OP}	Operating Temperature	-40 to 125	ºC
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.

Thermal Information

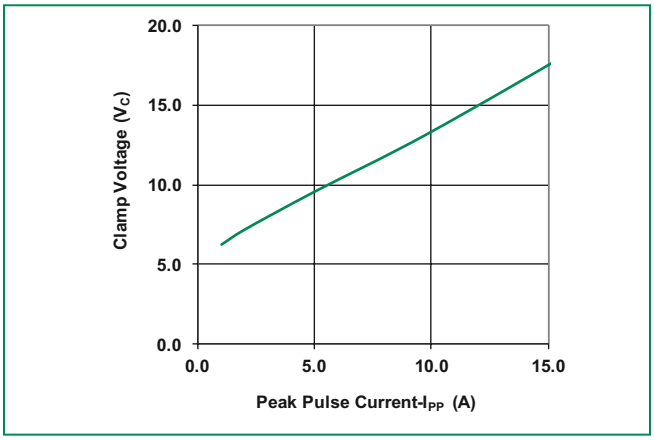
Parameter	Rating	Units
Storage Temperature Range	-55 to 150	°C
Maximum Junction Temperature	150	°C
Maximum Lead Temperature (Soldering 20-40s)	260	°C

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

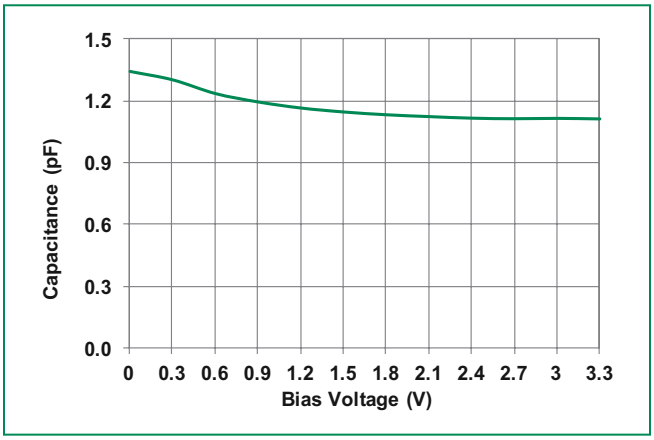
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V_{RWM}				3.3	V
Snap Back Voltage	V_{SB}	I_{SB}=50mA	2.8			V
Reverse Leakage Current	I_{LEAK}	V_R=3.3V, I/O to GND		0.01	0.05	µA
Clamp Voltage[1]	V_C	I_{PP}=1A, t_p=8/20µs, Fwd		6.0		V
		I_{PP}=2A, t_p=8/20µs, Fwd		7.0		V
		I_{PP}=10A, t_p=8/20µs, Fwd		13.0		V
Dynamic Resistance[2]	R_{DYN}	TLP, t_p=100ns, I/O to GND		0.40		Ω
ESD Withstand Voltage[1]	V_{ESD}	IEC61000-4-2 (Contact)	±30			kV
		IEC61000-4-2 (Air)	±30			kV
Variation in Capacitance with Reverse Bias		Pins 1, 8 to 2, 7 and pins 3, 6 to 4, 5 V_R= 0 to 2.5V, f= 1MHz		0.3		pF
Diode Capacitance[1]	$C_{I/O-GND}$	Reverse Bias=0V		1.3		pF

Note:
[1] Parameter is guaranteed by design and/or device characterization.
[2] Transmission Line Pulse (TLP) with 100ns width and 200ps rise time.

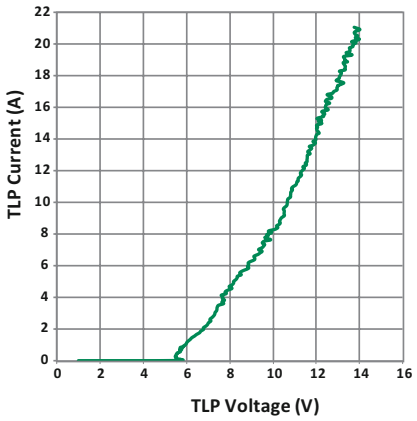
Clamping Voltage vs I_{PP}



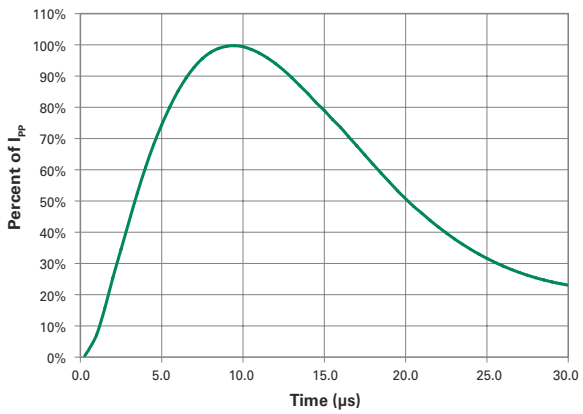
Capacitance vs. Reverse Bias



Transmission Line Pulsing (TLP) Plot

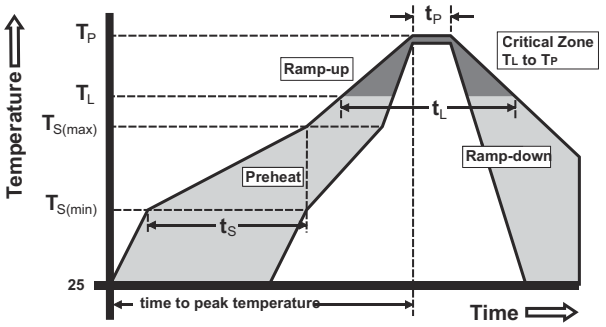


Pulse Waveform



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
Lead Coplanarity	0.0004 inches (0.102mm)
Substrate material	Silicon
Body Material	Molded Epoxy
Flammability	UL 94 V-0

Ordering Information

Part Number	Package	Marking	Min. Order Qty.
SP3312TUTG	µDFN-08	33H	3000

Notes :

1. All dimensions are in millimeters
2. Dimensions include solder plating.
3. Dimensions are exclusive of mold flash & metal burr.
4. Blo is facing up for mold and facing down for trim/form, i.e. reverse trim/form.
5. Package surface matte finish VDI 11-13.

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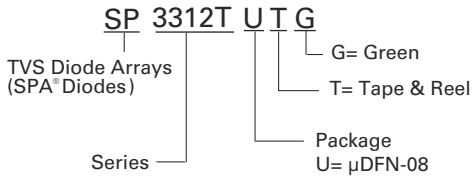
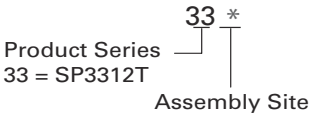
Part Numbering System

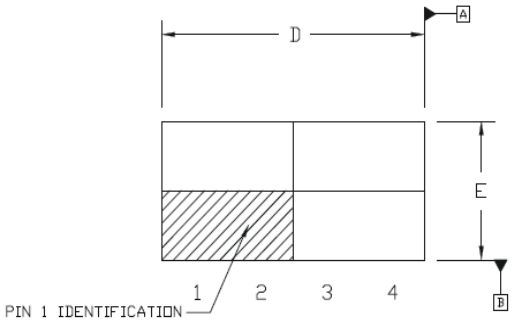


Part Marking System

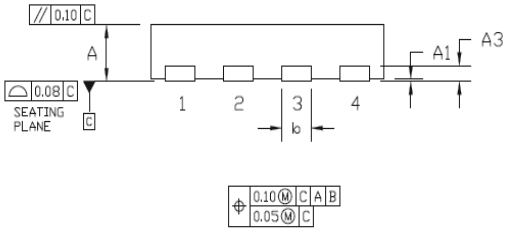


Package Dimensions — µDFN-08

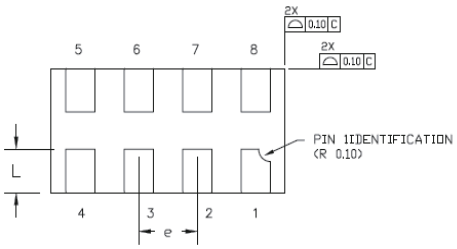
Top View



Side View

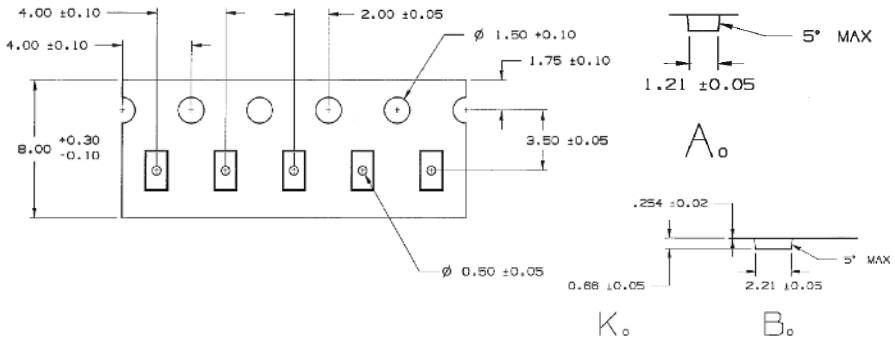


Bottom View



Package	µDFN-08 (2.0x1.0mm)					
JEDEC	MO-229					
Symbol	Millimeters			Inches		
	Min	Nom	Max	Min	Nom	Max
A	0.37	0.40	0.43	0.014	0.016	0.017
A1	0.00	0.02	0.05	0.000	0.001	0.002
A3		0.127 Ref			0.005 Ref	
b	0.20	0.25	0.30	0.008	0.010	0.012
D	2.60	2.00	2.10	0.074	0.079	0.082
E	0.90	1.00	1.10	0.035	0.040	0.043
R	0.05	0.10	0.15	0.002	0.004	0.006
e		0.50 BSC			0.020 BSC	
L	0.30	0.35	0.40	0.012	0.014	0.016

Embossed Carrier Tape & Reel Specification — µDFN-08



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