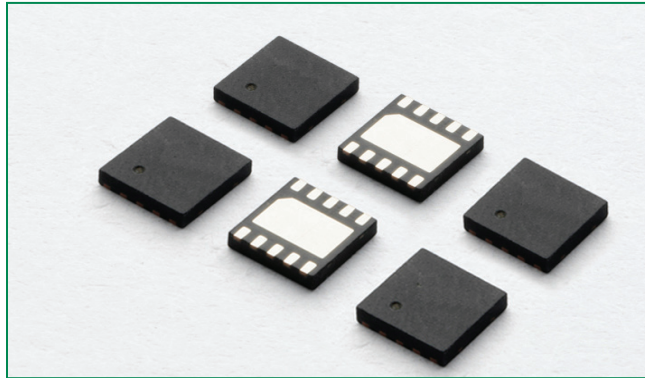
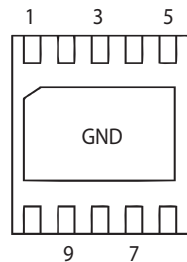


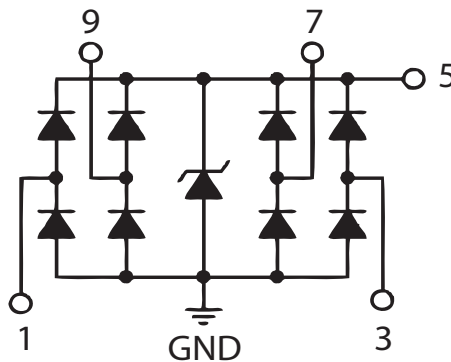
### SP3304N Series 3.3V 20A Diode Array



#### Pinout



#### Functional Block Diagram



#### 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 IEC61000-4-5 ( $t_p=8/20\mu s$ ) without performance degradation and a minimum  $\pm 30kV$  ESD per IEC61000-4-2 international standard. The low loading capacitance makes the SP3304N ideal for protecting high-speed signal pins.

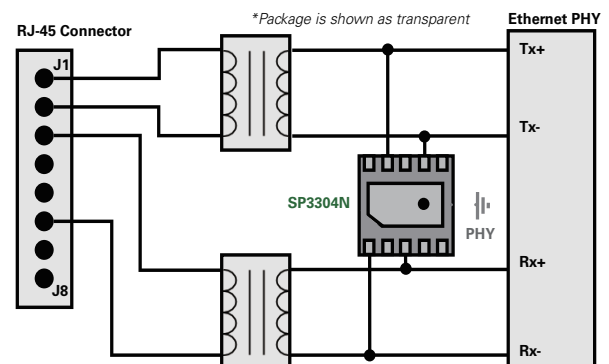
#### Features

- ESD, IEC61000-4-2,  $\pm 30kV$  contact,  $\pm 30kV$  air
- EFT, IEC61000-4-4, 40A ( $t_p=5/50ns$ )
- Lightning, IEC61000-4-5, 20A ( $t_p=8/20\mu s$ )
- Low capacitance of 3.5pF (TYP) per I/O
- Low leakage current of  $1\mu A$  (MAX) at 3.3V

#### Applications

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

#### 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 ( $t_p=8/20\mu s$ )     | 20.0       | A     |
| $P_{PK}$   | Peak Pulse Power ( $t_p=8/20\mu s$ ) | 300        | W     |
| $T_{OP}$   | Operating Temperature                | -40 to 85  | °C    |
| $T_{STOR}$ | Storage Temperature                  | -50 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

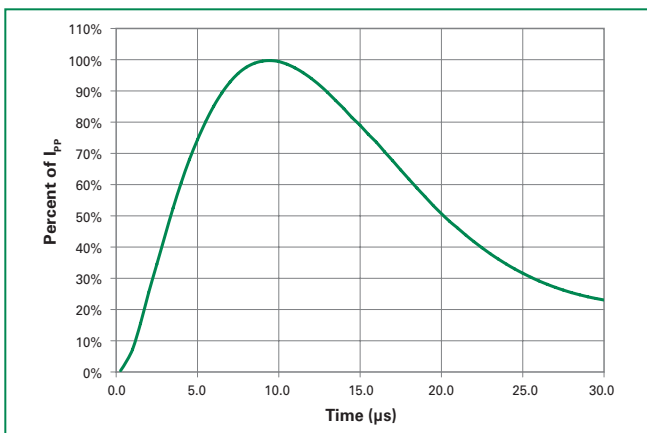
| Parameter                                   | Rating     | Units |
|---------------------------------------------|------------|-------|
| Storage Temperature Range                   | -65 to 150 | °C    |
| Maximum Junction Temperature                | 150        | °C    |
| Maximum Lead Temperature (Soldering 20-40s) | 260        | °C    |

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

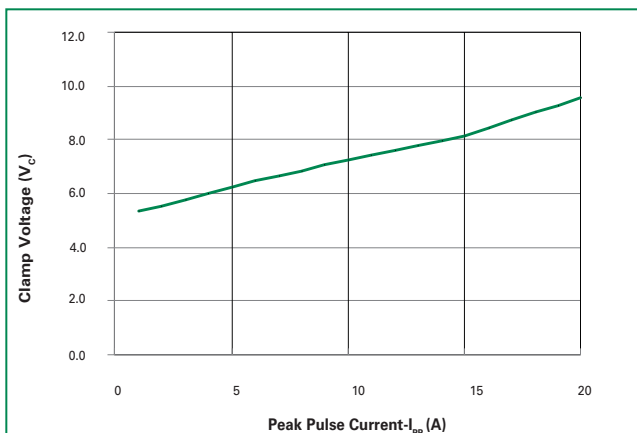
| Parameter                          | Symbol        | Test Conditions                      | Min      | Typ  | Max  | Units    |
|------------------------------------|---------------|--------------------------------------|----------|------|------|----------|
| Reverse Standoff Voltage           | $V_{RWM}$     |                                      |          |      | 3.3  | V        |
| Snap Back Voltage                  | $V_{SB}$      | $I_{SB}=50mA$                        | 2.8      |      |      | V        |
| Reverse Leakage Current            | $I_{LEAK}$    | $V_R=2.5V$ , I/O to GND              |          | 0.5  | 1.0  | $\mu A$  |
| Clamp Voltage <sup>1</sup>         | $V_C$         | $I_{PP}=1A$ , $t_p=8/20\mu s$ , Fwd  |          |      | 6.0  | V        |
|                                    |               | $I_{PP}=5A$ , $t_p=8/20\mu s$ , Fwd  |          |      | 7.0  | V        |
|                                    |               | $I_{PP}=10A$ , $t_p=8/20\mu s$ , Fwd |          |      | 8.0  | V        |
|                                    |               | $I_{PP}=20A$ , $t_p=8/20\mu s$ , Fwd |          |      | 11.5 | V        |
| Dynamic Resistance                 | $R_{DYN}$     | $(V_{C2}-V_{C1})/(I_{PP2}-I_{PP1})$  |          | 0.25 |      | $\Omega$ |
| ESD Withstand Voltage <sup>1</sup> | $V_{ESD}$     | IEC61000-4-2 (Contact)               | $\pm 30$ |      |      | kV       |
|                                    |               | IEC61000-4-2 (Air)                   | $\pm 30$ |      |      | kV       |
| Diode Capacitance <sup>1</sup>     | $C_{I/O-GND}$ | Reverse Bias=0V                      |          | 3.5  | 5.0  | pF       |
| Diode Capacitance <sup>1</sup>     | $C_{I/O-I/O}$ | Reverse Bias=0V                      |          | 2.0  |      | pF       |

Note: <sup>1</sup> Parameter is guaranteed by design and/or device characterization.

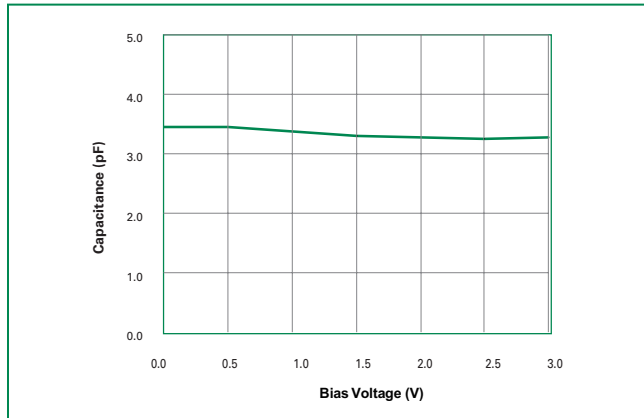
### Pulse Waveform



### Clamping Voltage vs. $I_{PP}$



## Capacitance vs. Bias

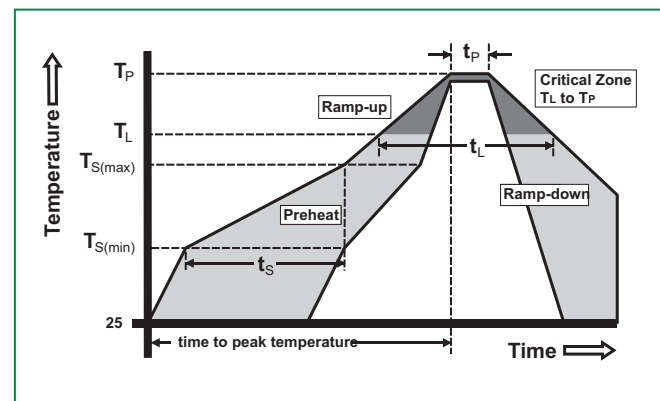


## Ordering Information

| Part Number | Package | Marking | Min. Order Qty. |
|-------------|---------|---------|-----------------|
| SP3304NUTG  | μDFN-10 | UH4     | 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 <sup>+0/-5</sup> °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                   |



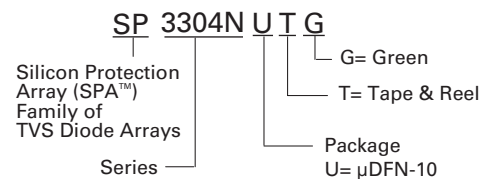
## Product Characteristics

|                     |                         |
|---------------------|-------------------------|
| Lead Plating        | Pre-Plated Frame        |
| Lead Material       | Copper Alloy            |
| Lead Coplanarity    | 0.0004 inches (0.102mm) |
| Substitute Material | Silicon                 |
| Body Material       | Molded Epoxy            |
| Flammability        | UL 94 V-0               |

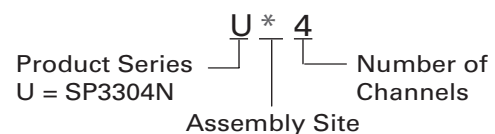
Notes :

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.

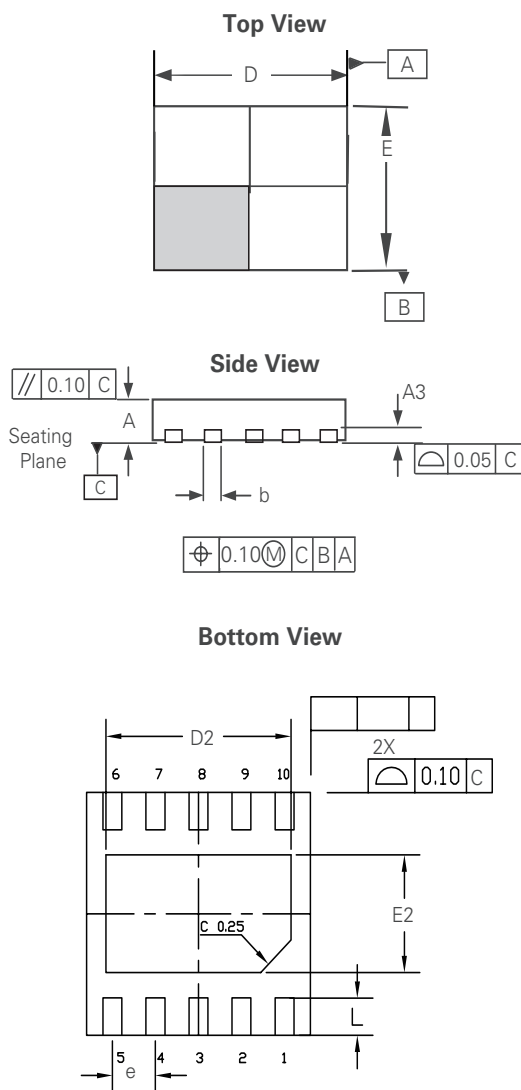
## Part Numbering System



## Part Marking System

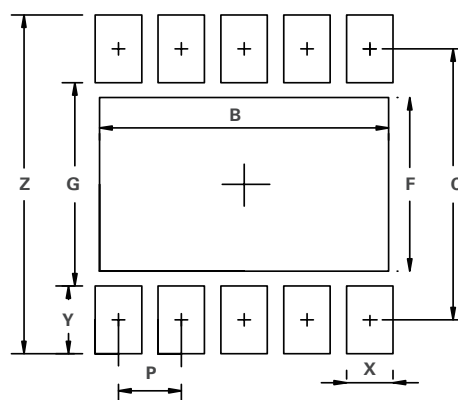


### Package Dimensions — $\mu$ DFN-10



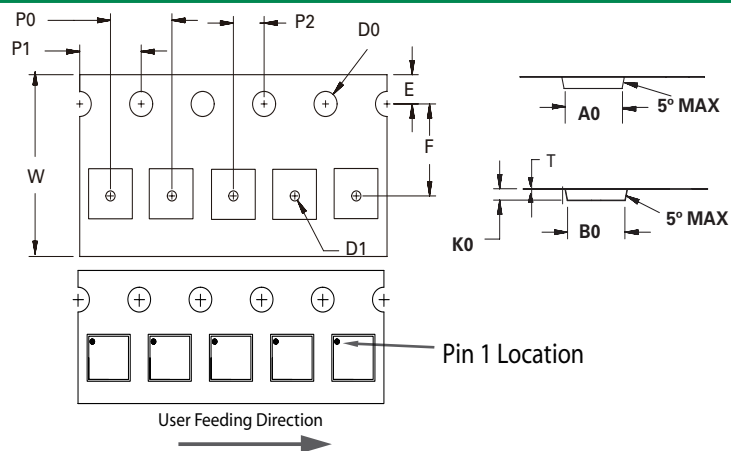
| Package | $\mu$ DFN-10 (2.6x2.6mm) |      |      |           |       |       |
|---------|--------------------------|------|------|-----------|-------|-------|
| JEDEC   | MO-229                   |      |      |           |       |       |
| Symbol  | Millimeters              |      |      | Inches    |       |       |
|         | 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 $\mu$ DFN-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 — $\mu$ DFN-10 (2.6x2.6mm)



| Symbol | Millimeters          |
|--------|----------------------|
| A0     | 2.82 +/- 0.05        |
| B0     | 2.82 +/- 0.05        |
| D0     | Ø1.50 + 0.10         |
| D1     | Ø0.50 + 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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Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

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