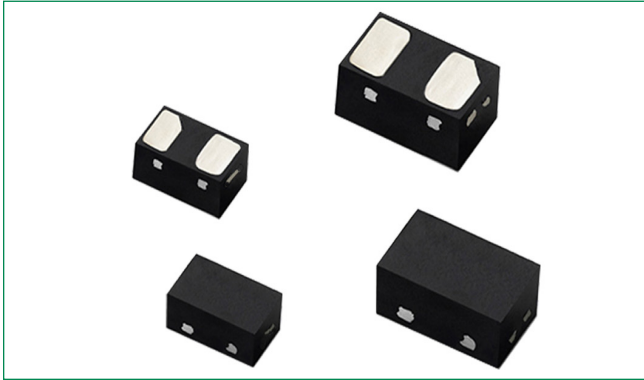


# SP3522

## 0.15pF 22kV ESD Protection diodes

HF RoHS  GREEN ELV

### Additional Information



Resources



Accessories



Samples

### Description

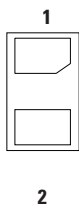
The SP3522 integrates ultra low capacitance diodes to provide protection for electronic equipment that may experience destructive electrostatic discharges (ESD). This robust component can safely absorb repetitive ESD strikes above the maximum level specified in the IEC 61000-4-2 international standard ( $\pm 8\text{kV}$  contact discharge) without performance degradation. The extremely low loading capacitance also makes it ideal for protecting high speed signal pins such as V-By-One®, HDMI, USB3.0, USB2.0, and IEEE 1394.

### Features & Benefits

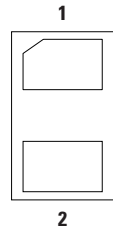
- ESD, IEC 61000-4-2,  $\pm 22\text{kV}$  contact,  $\pm 30\text{kV}$  air
- EFT, IEC 61000-4-4, 40A ( $t_P=5/50\text{ns}$ )
- Lightning, IEC 61000-4-5, 2nd edition, 2.5A ( $t_P=8/20\mu\text{s}$ )
- Low capacitance of 0.15pF (TYP) at 3GHz
- Low profile 0201 DFN packages and SOD882 packages
- Facilitates excellent signal integrity
- ELV Compliant
- AEC-Q101 Qualified
- Halogen free, Lead free and RoHS compliant
- Moisture Sensitivity Level(MSL -1)

### Pinout

0201 DFN



SOD882

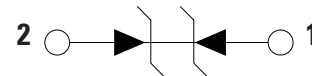


Bottom View

### Applications

- Ultra-high speed data lines
- USB 3.1, 3.0, 2.0
- HDMI 2.0, 1.4a, 1.3
- DisplayPort(TM)
- V-by-One®
- LVDS interfaces
- Consumer, mobile and portable electronics
- Tablet PC and external storage with high speed interfaces
- Applications requiring high ESD performance in small packages

### Functional Block Diagram



### Absolute Maximum Ratings

| Symbol     | Parameter                              | Value      | Units |
|------------|----------------------------------------|------------|-------|
| $I_{PP}$   | Peak Current ( $t_p=8/20\mu\text{s}$ ) | 2.5        | A     |
| $T_{OP}$   | Operating Temperature                  | -45 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.

# SP3522

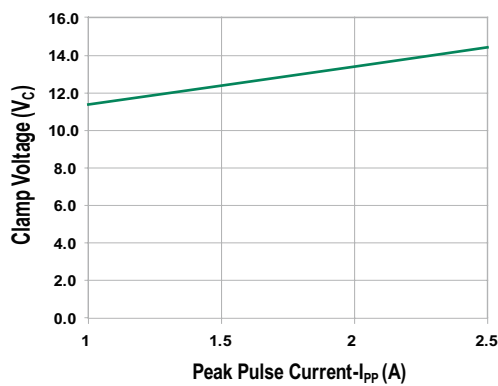
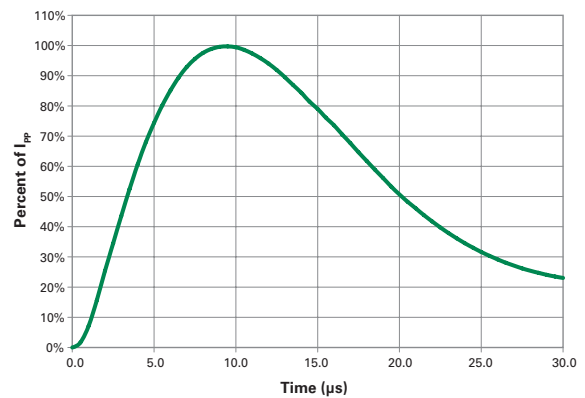
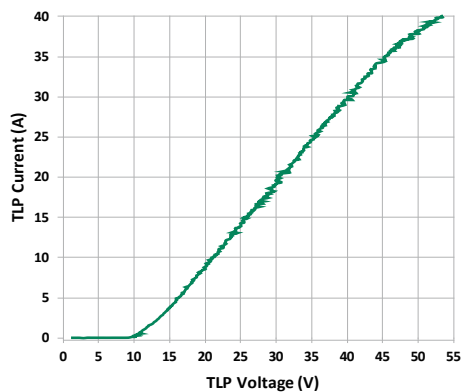
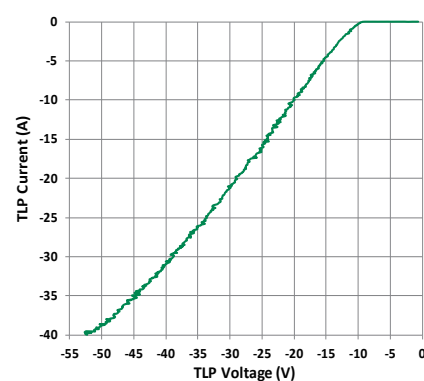
## 0.15pF 22kV ESD Protection diodes

### Electrical Characteristics - (TOP=25°C)

| Parameter                          | Test Conditions                 | Min      | Typ  | Max | Units    |
|------------------------------------|---------------------------------|----------|------|-----|----------|
| Input Capacitance                  | @ $V_R = 0V$ , $f = 3GHz$       |          | 0.15 |     | pF       |
| Breakdown Voltage                  | $V_{BR}$ @ $I_T = 1mA$          |          | 9.2  |     | V        |
| Reverse Working Voltage            | $I_R \leq 1\mu A$               |          |      | 7.0 | V        |
| Reverse Leakage Current            | $I_L$ @ $V_{RWM} = 5.0V$        |          | 0.02 | 1   | $\mu A$  |
| Dynamic Resistance <sup>2</sup>    | TLP, $t_p = 100ns$ , I/O to GND |          | 0.96 |     | $\Omega$ |
| Clamping Voltage <sup>1</sup>      | $V_{CL}$ @ $I_{PP} = 2.5A$      |          | 14.5 |     | V        |
| ESD Withstand Voltage <sup>1</sup> | IEC 61000-4-2 (Contact)         | $\pm 22$ |      |     | kV       |
|                                    | IEC 61000-4-2 (Air)             | $\pm 30$ |      |     |          |

**Note:**

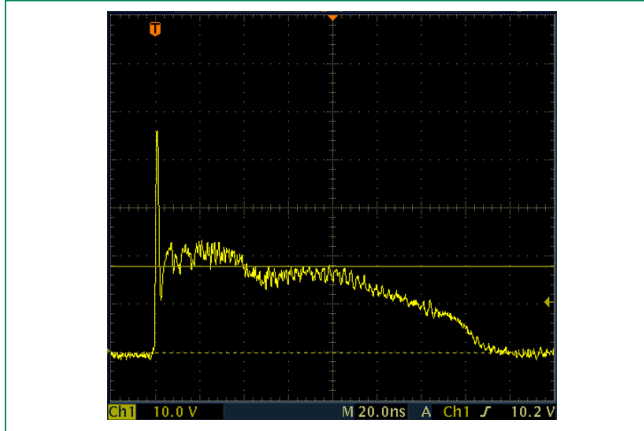
- Parameter is guaranteed by design and/or component characterization.
- Transmission Line Pulse (TLP) with 100ns width, 2ns rise time, and average window  $t_1 = 70ns$  to  $t_2 = 90ns$

**Clamping Voltage vs IPP****8/20 $\mu$ s Pulse Waveform****Positive Transmission Line Pulsing (TLP) Plot****Negative Transmission Line Pulsing (TLP) Plot**

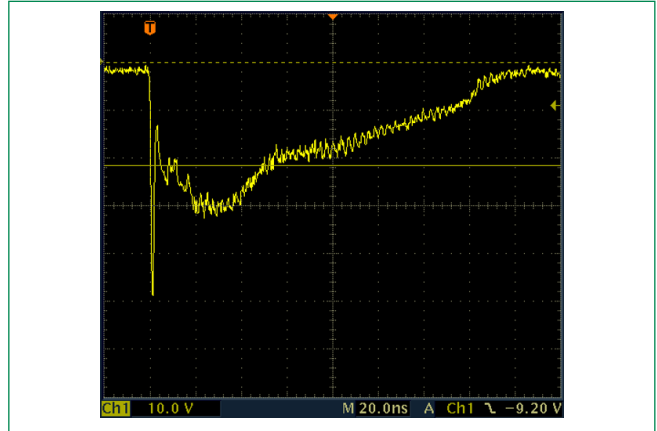
# SP3522

## 0.15pF 22kV ESD Protection diodes

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

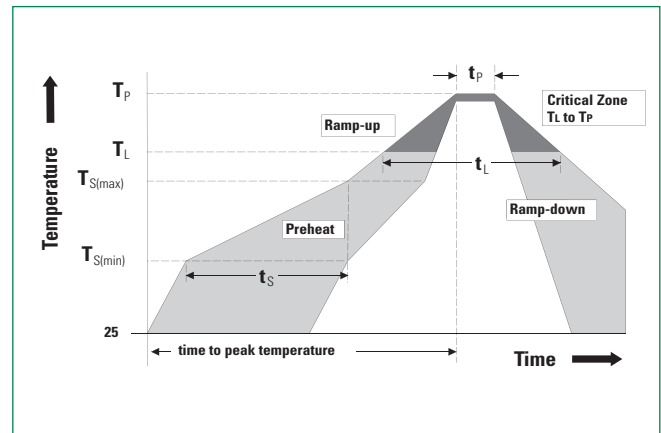


### IEC 61000-4-2 -8 kV Contact ESD Clamping Voltage



### 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 – 120 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 ( $t_p$ )   |                                    | 30 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 of 0201 DFN

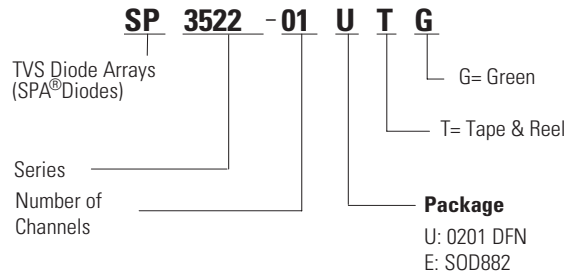
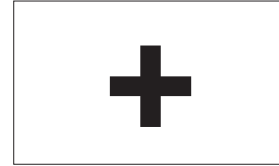
|                     |                                                        |
|---------------------|--------------------------------------------------------|
| Lead Plating        | Pre-Plated Frame                                       |
| Lead Material       | Copper Alloy                     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

### Product Characteristics of SOD882

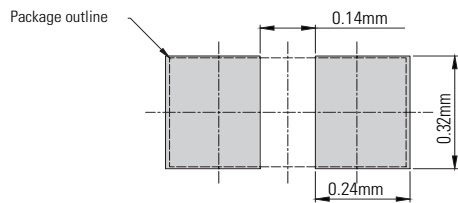
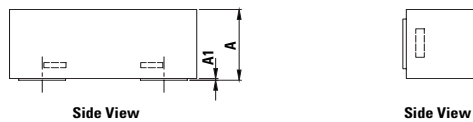
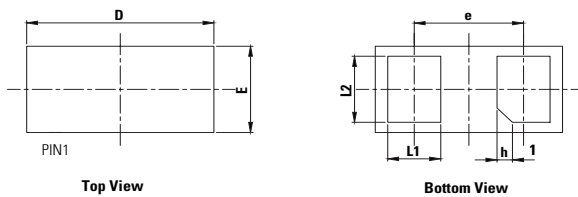
|                     |                                                        |
|---------------------|--------------------------------------------------------|
| Lead Plating        | Tin or Pre-Plated Frame                                |
| Lead Material       | Copper Alloy                                           |
| Substitute Material | Silicon                                                |
| Body Material       | Molded Compound                                        |
| Flammability        | UL Recognized compound meeting flammability rating V-0 |

**SP3522**

0.15pF 22kV ESD Protection diodes

**Part Numbering System****Part Marking System****Ordering Information**

| Part Number  | Package  | Min. Order Qty. |
|--------------|----------|-----------------|
| SP3522-01UTG | 0201 DFN | 15000           |
| SP3522-01ETG | SOD882   | 10000           |

**Package Dimensions — 0201 DFN**

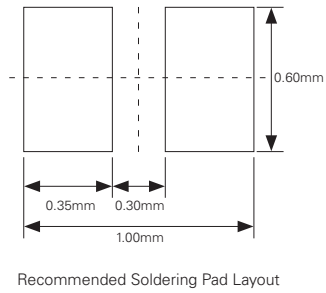
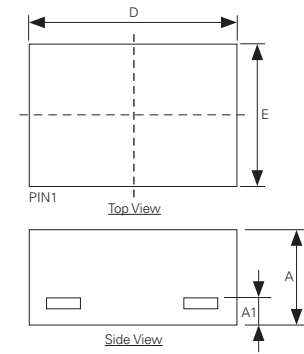
Recommended soldering pad layout

| Symbol    | Millimeters    |      |      | Inches          |       |       |
|-----------|----------------|------|------|-----------------|-------|-------|
|           | Min            | Typ. | Max  | Min             | Typ.  | Max   |
| <b>A</b>  | 0.23           | 0.28 | 0.33 | 0.009           | 0.011 | 0.013 |
| <b>A1</b> | 0.00           | 0.02 | 0.05 | 0.000           | 0.001 | 0.002 |
| <b>L1</b> | 0.12           | 0.18 | 0.24 | 0.005           | 0.007 | 0.009 |
| <b>L2</b> | 0.18           | 0.24 | 0.30 | 0.007           | 0.009 | 0.012 |
| <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)     |       |       |
| <b>h</b>  | 0.05 ( x 45° ) |      |      | 0.002 ( x 45° ) |       |       |

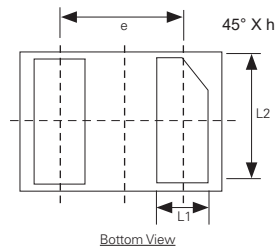
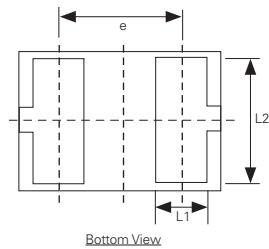
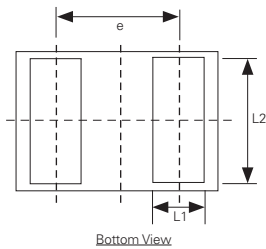
# SP3522

## 0.15pF 22kV ESD Protection diodes

### Package Dimensions — SOD882

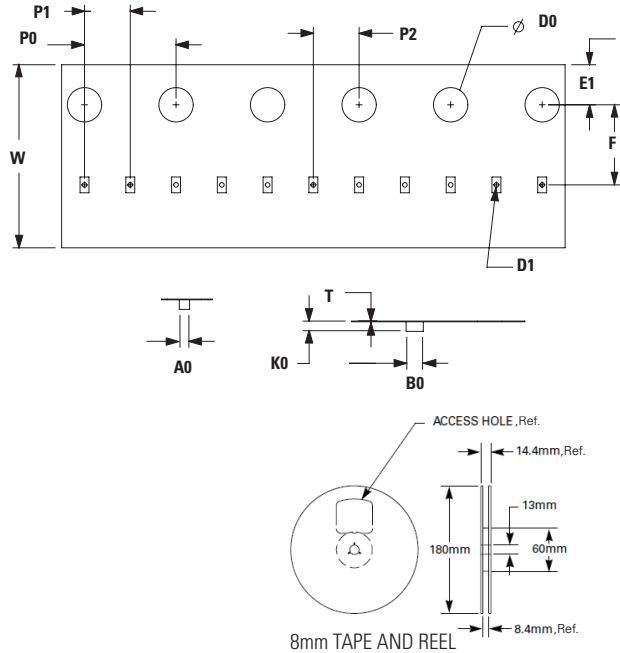


| Symbol    | DIMENSIONS (mm) |      |      |
|-----------|-----------------|------|------|
|           | Min.            | Nor. | Max. |
| <b>A</b>  | 0.36            | 0.45 | 0.55 |
| <b>A1</b> | 0.127 REF       |      |      |
| <b>L1</b> | 0.20            | 0.25 | 0.30 |
| <b>L2</b> | 0.45            | 0.50 | 0.55 |
| <b>D</b>  | 0.93            | 1.00 | 1.07 |
| <b>E</b>  | 0.53            | 0.60 | 0.67 |
| <b>e</b>  | 0.65 BSC        |      |      |
| <b>h</b>  | 0.07            | 0.12 | 0.17 |

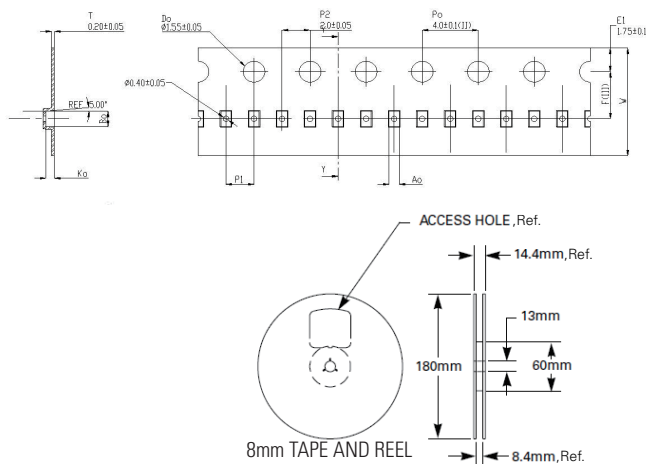


**SP3522**

0.15pF 22kV ESD Protection diodes

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

| Symbol | Millimeters                 |
|--------|-----------------------------|
| A0     | 0.33 min/0.41 max           |
| B0     | 0.63 min/0.71 max           |
| D0     | $\varnothing 1.50 +0.10/-0$ |
| D1     | $\varnothing 0.20 \pm 0.05$ |
| E1     | 1.75+/-0.10                 |
| F      | 3.50+/-0.05                 |
| K0     | 0.30 min/0.39 max           |
| P0     | 4.00+/-0.10                 |
| P1     | 2.00+/-0.10                 |
| P2     | 2.00+/-0.05                 |
| W      | 8.00+0.30/-0.10             |
| T      | 0.13 min/0.25 max           |

**Embossed Carrier Tape & Reel Specification — SOD882**

| Symbol | Millimeters       |
|--------|-------------------|
| A0     | 0.70+/-0.045      |
| B0     | 1.10+/-0.045      |
| K0     | 0.65+/-0.045      |
| F      | 3.50+/-0.05       |
| P1     | 2.00+/-0.10       |
| W      | 8.00 + 0.30 -0.10 |

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