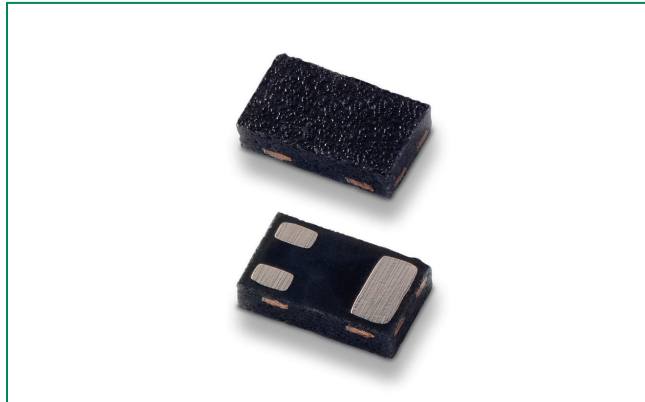
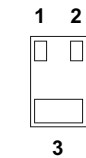


## Enhanced ESD Diode Arrays Series

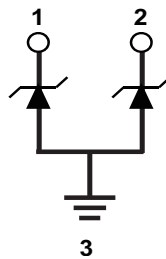


## Pinout



Bottom View

## Functional Block Diagram



## Description

The Enhanced ESD Diode Arrays Series provides higher order ESD protection in signal-integrity-preserving unidirectional arrays for the world's most challenging high speed serial interfaces. The SOD-883 standard packages minimize trace layout complexity, save significant PCB space, and improve reusability of the footprints. The nominal capacitance makes the devices applicable to the world's fastest consumer serial interfaces.

## Features

- 0.30pF TYP capacitance
- ESD, IEC61000-4-2,  $\pm 22\text{kV}$  contact,  $\pm 22\text{kV}$  air
- Low clamping voltage of  $13\text{V}$  @  $I_{PP}=2.2\text{A}$  ( $t_p=8/20\mu\text{s}$ )
- Low profile 0402 DFN array packages
- Facilitates excellent signal integrity
- ELV Compliant
- Halogen free, Lead free and RoHS compliant

## Applications

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

### Absolute Maximum Ratings

| Symbol     | Parameter                        | Value      | Units |
|------------|----------------------------------|------------|-------|
| $I_{PP}$   | Peak Current ( $t_p=8/20\mu s$ ) | 2.2        | A     |
| $T_{OP}$   | Operating Temperature            | -30 to 85  | °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.

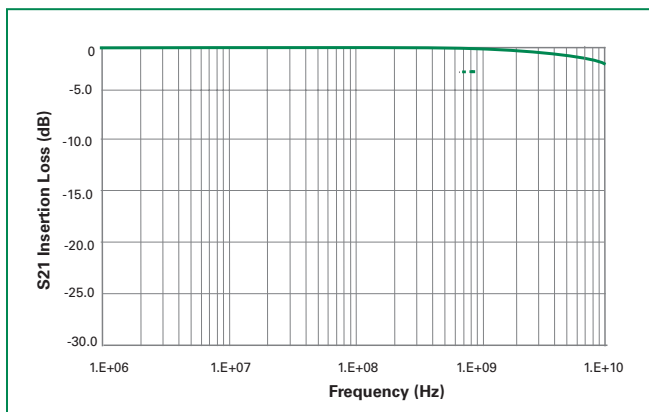
### Thermal Information

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

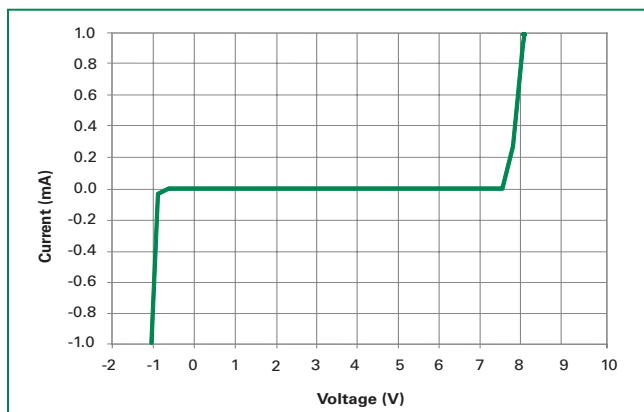
### Electrical Characteristics - ( $T_{OP}=25^{\circ}C$ )

| Parameter               | Test Conditions           | Min | Typ  | Max | Units |
|-------------------------|---------------------------|-----|------|-----|-------|
| Input Capacitance       | @ $V_R = 0V$ , $f = 3GHz$ |     | 0.30 |     | pF    |
| Breakdown Voltage       | $V_{BR}$ @ $I_T=1mA$      |     | 8.80 |     | V     |
| Reverse Working Voltage |                           |     |      | 7.0 | V     |
| Reverse Leakage Current | $I_L$ @ $V_{RWM}=5.0V$    |     | 25   |     | nA    |
| Clamping Voltage        | $V_{CL}$ @ $I_{PP}=2.2A$  |     | 13.0 |     | V     |
| ESD Withstand Voltage   | IEC61000-4-2 (Contact)    | ±22 |      |     | kV    |
|                         | IEC61000-4-2 (Air)        | ±22 |      |     |       |

### Insertion Loss Diagram

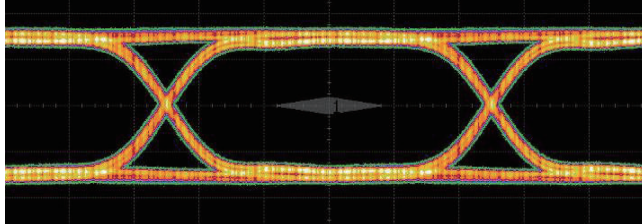


### Device IV Curve

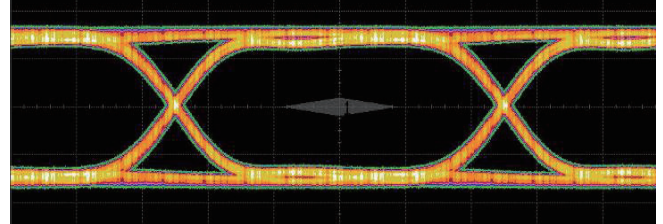


### USB3.0 Eye Diagram

5.0 Gb/s, 1000mV differential, CPO Compliant Test Pattern



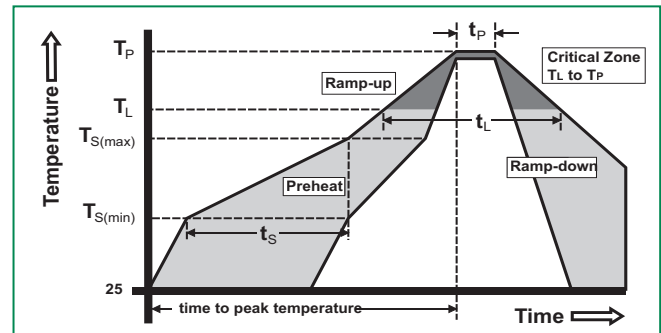
Without Device



With Device

### 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                   |



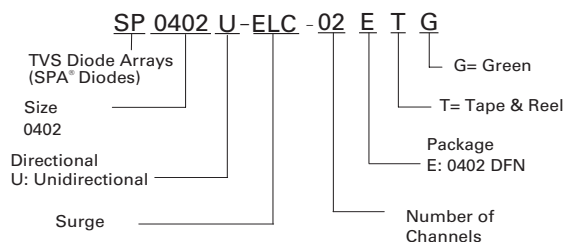
### Product Characteristics

|                           |                       |
|---------------------------|-----------------------|
| <b>Lead Plating</b>       | Pre-Plated Frame      |
| <b>Lead Material</b>      | Copper Alloy          |
| <b>Lead Coplanarity</b>   | 0.004 inches(0.102mm) |
| <b>Substrate material</b> | Silicon               |
| <b>Body Material</b>      | Molded Epoxy          |
| <b>Flammability</b>       | 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

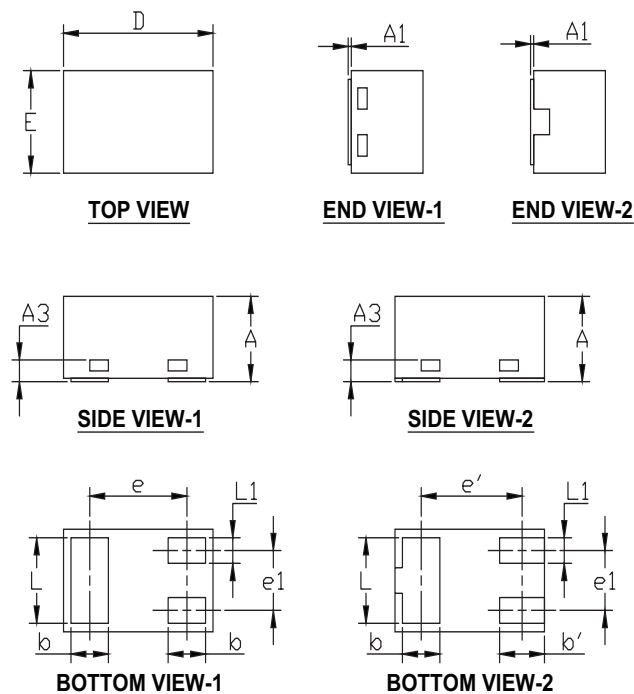


0402

### Ordering Information

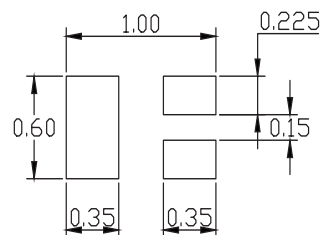
| Part Number       | Package        | Marking | Reel Quantity |
|-------------------|----------------|---------|---------------|
| SP0402U-ELC-02ETG | 0402 DFN Array | I D     | 10000         |

**Package Dimensions — 0402 DFN Array**

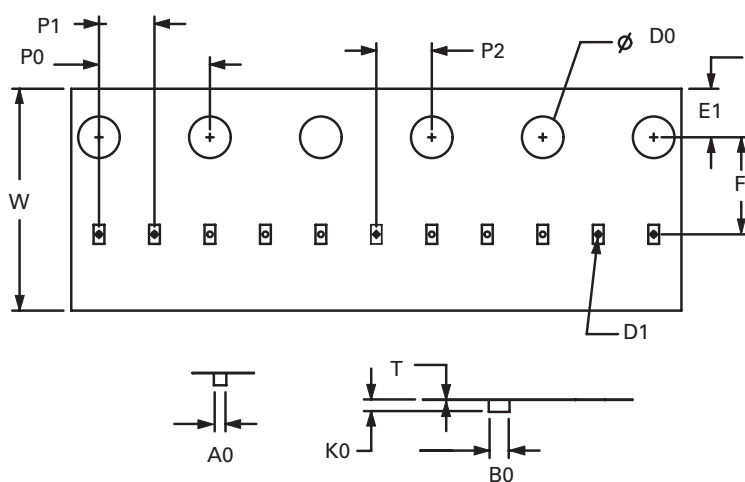


| Symbol | Millimeters |      |      | Inches   |       |       |
|--------|-------------|------|------|----------|-------|-------|
|        | Min         | Typ  | Max  | Min      | Typ   | Max   |
| A      | 0.33        | -    | 0.55 | 0.013    | 0.015 | 0.022 |
| A1     | 0           | -    | 0.05 | 0        | -     | 0.002 |
| A3     | 0.13REF     |      |      | 0.005REF |       |       |
| b      | 0.20        | 0.25 | 0.30 | 0.008    | 0.010 | 0.012 |
| b'     | 0.20        | 0.30 | 0.40 | 0.008    | 0.012 | 0.016 |
| D      | 0.95        | 1.00 | 1.05 | 0.037    | 0.039 | 0.041 |
| E      | 0.55        | 0.60 | 0.65 | 0.022    | 0.024 | 0.026 |
| e      | 0.65BSC     |      |      | 0.026BSC |       |       |
| e'     | 0.675BSC    |      |      | 0.027BSC |       |       |
| L      | 0.40        | 0.50 | 0.60 | 0.016    | 0.020 | 0.024 |
| L1     | 0.10        | 0.15 | 0.20 | 0.004    | 0.006 | 0.008 |

**SOLDERING PATTERN**



**Embossed Carrier Tape & Reel Specification — 0402 DFN Array**



| Symbol | Millimeters     |
|--------|-----------------|
| A0     | 0.70+/-0.05     |
| B0     | 1.15+/-0.05     |
| D0     | ø 1.50+/-0.10   |
| D1     | ø 0.40 +/-0.10  |
| E1     | 1.75+/-0.10     |
| F      | 3.50+/-0.10     |
| K0     | 0.55+/-0.05     |
| P0     | 4.00+/-0.10     |
| P1     | 2.00+/-0.10     |
| P2     | 2.00+/-0.05     |
| W      | 8.00+0.30/-0.10 |
| T      | 0.20+/-0.05     |