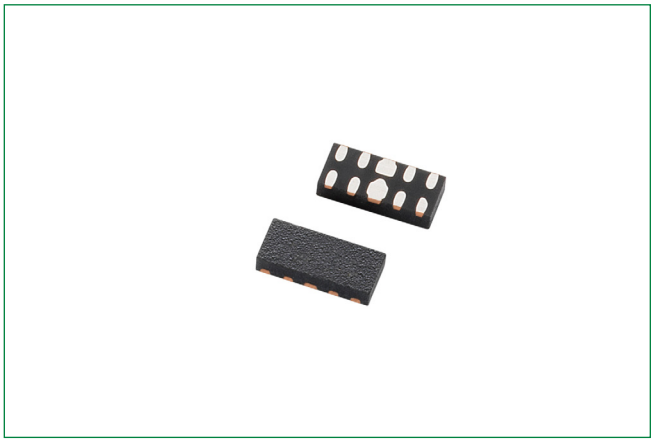
# SP1064E

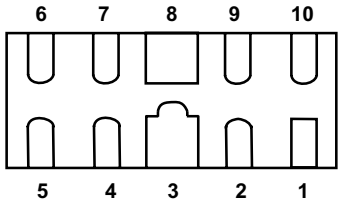
## 14.0pF, 25kV Diode Array, General Purpose ESD Protection

HF RoHS Pb



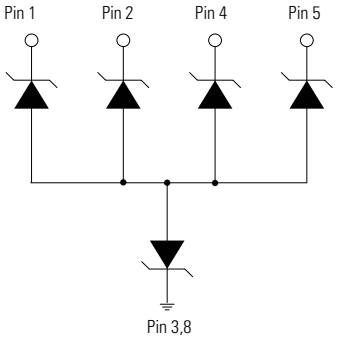
**Note:** This package image is for example and reference only. for detail package drawing, please refer to the package section in this datasheet.

### Pinout




*Pins 6, 7, 9, 10 are not internally connected but should be connected to the trace.

### Functional Block Diagram




## Description

The SP1064E is an avalanche breakdown diode fabricated in a proprietary silicon avalanche technology protect each I/O pin to provide a high level of protection for electronic equipment that may experience destructive electrostatic discharges (ESD). These robust diodes can safely absorb repetitive ESD strikes above the maximum level specified in IEC 61000-4-2 international standard (Level 4, ±8kV contact discharge) without performance degradation.

## Features & Benefits

- ESD, IEC 61000-4-2, ±25kV contact, ±30kV air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Surge tolerance, IEC 61000-4-5 2nd Edition, 3.5A (8/20us)
- Low capacitance of 14.0pF (TYP) per I/O
- Low leakage current of 0.05µA (TYP) at 60V
- Small form factor µDFN( JEDEC MO-229) package saves board space
- Halogen free, Lead free and RoHS compliant
- Moisture Sensitivity Level(MSL -1)

## Applications

- LCD/PDP TVs
- DVD Players
- Desktops
- MP3/PMP
- Set Top Boxes
- Mobile Phones
- Notebooks
- Digital Cameras

**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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# SP1064E

## 14.0pF, 25kV Diode Array, General Purpose ESD Protection

### Absolute Maximum Ratings

| Symbol | Parameter | Value | Units |
|---|---|---|---|
| $I_{PP}$ | Peak Current ($t_p$=8/20µs) | 3.5 | A |
| $T_{OP}$ | 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 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.

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

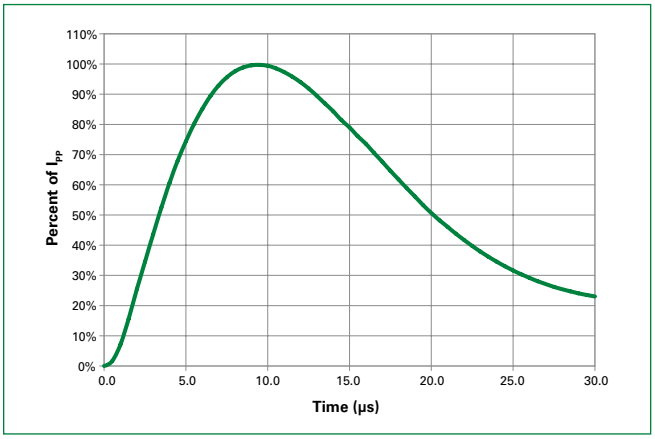
| Parameter | Symbol | Test Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| Reverse Standoff Voltage | $V_{RWM}$ | $I_R$=1µA | | | 60 | V |
| Breakdown Voltage | $V_{BR}$ | $I_R$=1mA | 62 | 68 | 73 | V |
| Reverse Leakage Current | $I_{LEAK}$ | $V_R$=60V, Any I/O to GND | | 0.05 | | µA |
| Clamp Voltage[1] | $V_C$ | $I_{PP}$=1A, $t_p$=8/20µs | | 81 | | V |
| | | $I_{PP}$=3.5A, $t_p$=8/20µs | | 102 | | |
| Dynamic Resistance[3] | $R_{DYN}$ | TLP, $t_P$=100ns | | 2.6 | | Ω |
| ESD Withstand Voltage[1] | $V_{ESD}$ | IEC 61000-4-2 (Contact Discharge) | ±25 | | | kV |
| | | IEC 61000-4-2 (Air Discharge) | ±30 | | | kV |
| Line Capacitance[1, 2] | $C_L$ | Reverse Bias=0V, f=1MHz | | 14.0 | | pF |

**Note 1:** Parameter is guaranteed by design and/or component characterization.

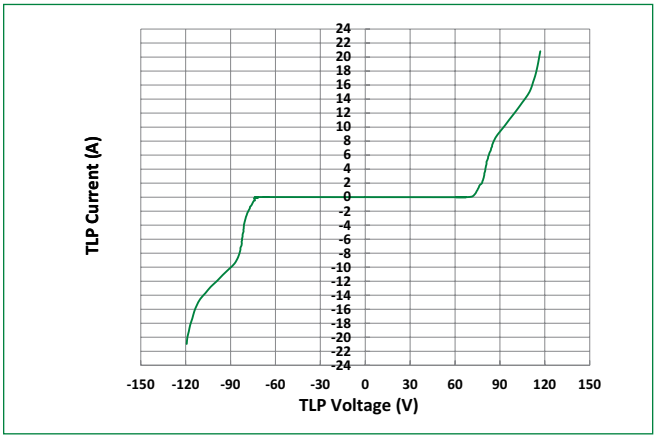
**Note 2:** Test equipment accuracy ±50fF.

**Note 3:** Transmission Line Pulse (TLP) with 100ns width, 2ns rise time, and average window t1=70ns to t2= 90ns

### 8/20µs Pulse Waveform




### Transmission Line Pulsing (TLP) Plot

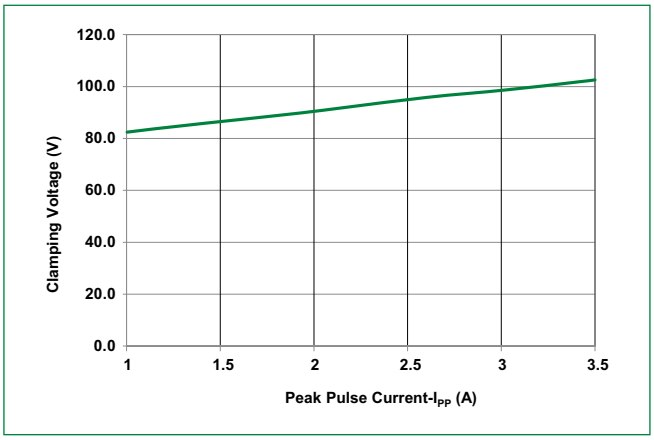



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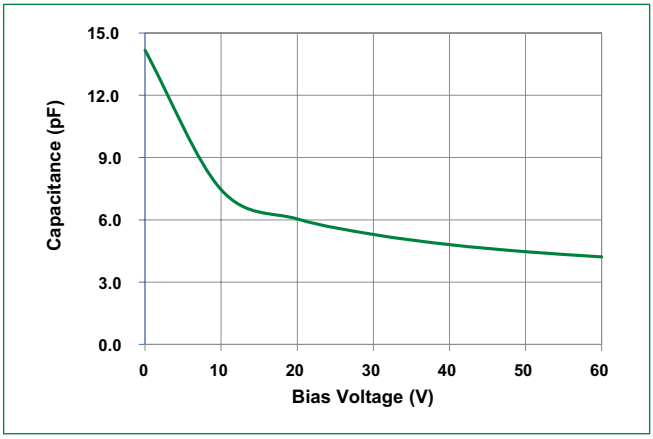
# SP1064E

## 14.0pF, 25kV Diode Array, General Purpose ESD Protection

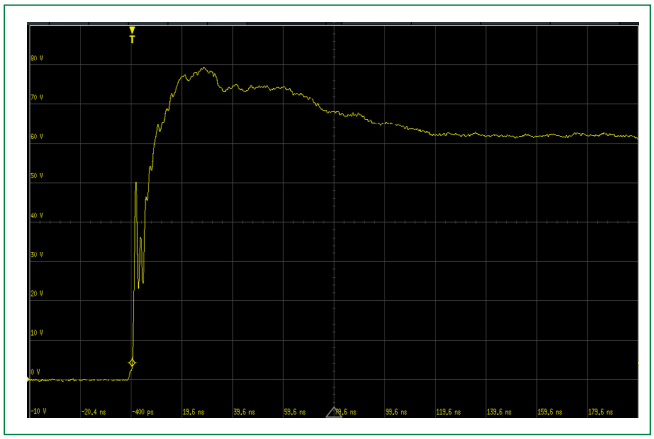
### Clamping Voltage vs. $I_{PP}$



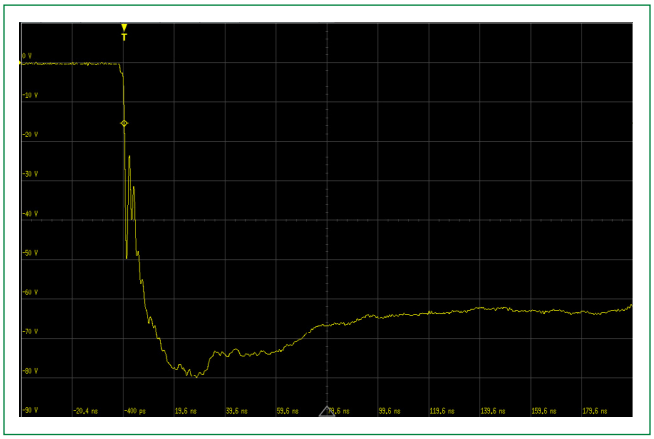

### Capacitance vs. Reverse Bias




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



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





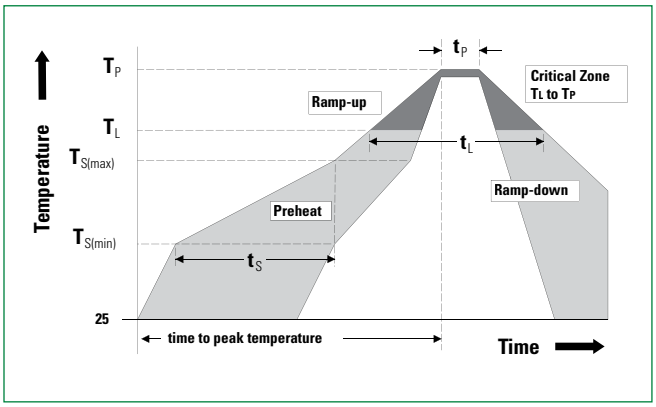
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# SP1064E

## 14.0pF, 25kV Diode Array, General Purpose ESD Protection

## 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 ($T_P$)** | | $260^{+0/-5}$ °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 |



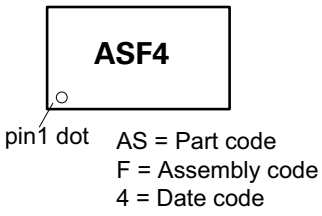

## Ordering Information

| Part Number | Package | Min. Order Qty. |
|---|---|---|
| SP1064E-04UTG | µDFN-10 | 3000 |

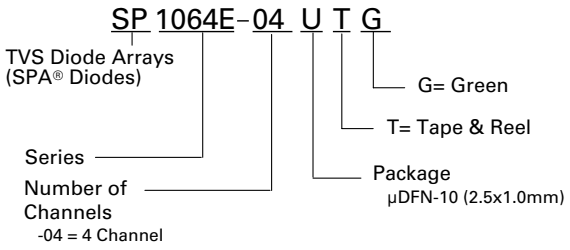
## Product Characteristics

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

## Part Marking System




## Part Numbering System

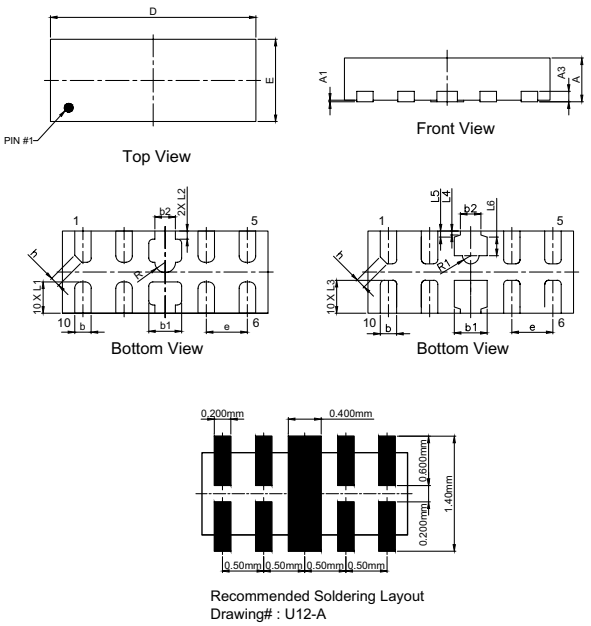



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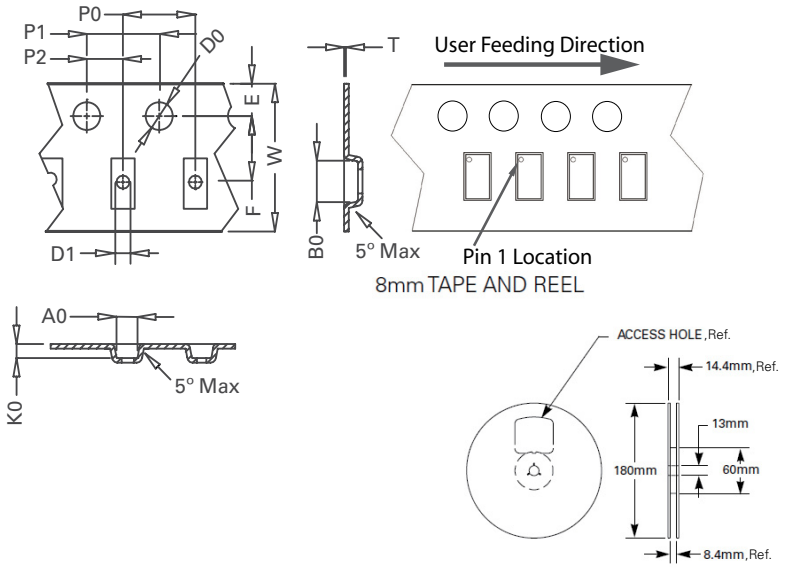
## 14.0pF, 25kV Diode Array, General Purpose ESD Protection

## Package Dimensions — µDFN-10 (2.5x1.0x0.5mm)




| Symbol | Millimeters | | Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 0.45 | 0.60 | 0.018 | 0.024 |
| A1 | 0 | 0.05 | 0.000 | 0.002 |
| A3 | 0.12 | 0.175 | 0.005 | 0.007 |
| b | 0.15 | 0.25 | 0.006 | 0.010 |
| b1 | 0.35 | 0.45 | 0.014 | 0.018 |
| b2 | 0.20 | 0.30 | 0.008 | 0.012 |
| D | 2.40 | 2.60 | 0.094 | 0.102 |
| E | 0.90 | 1.10 | 0.035 | 0.043 |
| L1 | 0.28 | 0.48 | 0.011 | 0.019 |
| L2 | 0.05 | 0.15 | 0.002 | 0.006 |
| L3 | 0.35 | 0.45 | 0.014 | 0.018 |
| L4 | 0.05 REF | | 0.002 REF | |
| L5 | 0.075 REF | | 0.003 REF | |
| L6 | 0.225 REF | | 0.009 REF | |
| e | 0.500 BSC | | 0.020 BSC | |
| R | 0.125 REF | | 0.005 REF | |
| R1 | 0.100 REF | | 0.004 REF | |
| h | 0.08 | 0.16 | 0.003 | 0.006 |

## Embossed Carrier Tape & Reel Specification — µDFN-10




| Package | µDFN-10 (2.5x1.0x0.5mm) |
|---|---|
| **Symbol** | **Millimeters** |
| A0 | 1.30 +/- 0.10 |
| B0 | 2.83 +/- 0.10 |
| D0 | Ø 1.50 + 0.10 |
| D1 | Ø 1.00 + 0.25 |
| E | 1.75 +/- 0.10 |
| F | 3.50 +/- 0.05 |
| K0 | 0.65 +/- 0.10 |
| P0 | 4.00 +/- 0.10 |
| P1 | 4.00 +/- 0.10 |
| P2 | 2.00 +/- 0.05 |
| T | 0.254 +/- 0.02 |
| W | 8.00 + 0.30 /- 0.10 |

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