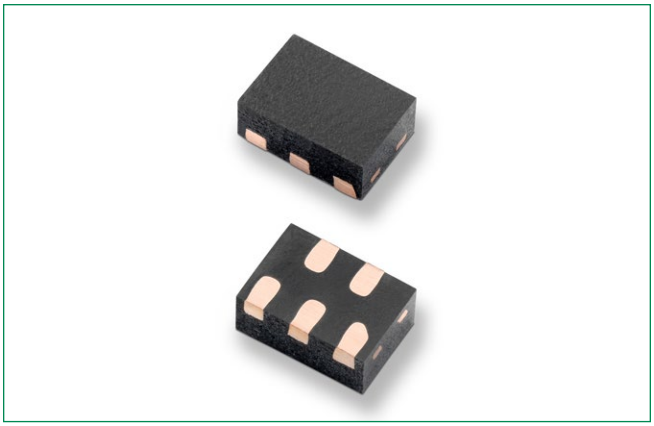
# SP7522T Series 0.15pF 20KV Diode Array

RoHS Pb GREEN

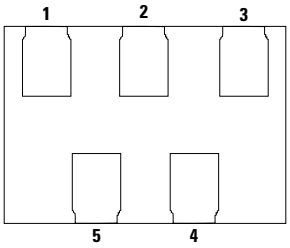
**OBSOLETE** DATE: 6/10/2020 PCN/ECN# ESU270-51
REPLACED BY: N/A



## Description

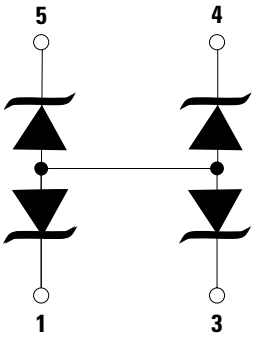
The SP7522T integrates 3 lines of ultra low capacitance diodes to provide protection for electronic equipment that may experience destructive electrostatic discharges (ESD). This robust component can effectively protect against ESD events exceeding the IEC 61000-4-2 contact ESD level of ±8 kV without any 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.

## Pinout




*Any pin(1,3,4, or 5) can be used as GND.

## Functional Block Diagram




## Features

- ESD, IEC 61000-4-2, ±20kV contact, ±30kV air
- EFT, IEC 61000-4-4, 40A ($t_P$=5/50ns)
- Lightning, IEC 61000-4-5 2nd edition, 2A ($t_P$=8/20µs)
- Low capacitance of 0.15pF (TYP) at 3GHz
- Low leakage current of 50nA (MAX) at 5V
- Halogen free, Lead free and RoHS compliant
- Moisture Sensitivity Level(MSL -1)

## Applications

- V-by-One®
- Embedded DisplayPort
- USB 2.0/3.0 Ports
- HDMI
- Serial bus interfaces such as IEEE 1394
- Flat Panel Displays
- LCD/LED TVs
- Smartphones
- Mobile Computing

# TVS Diode Arrays (SPA® Diodes)

## Low Capacitance ESD Protection - SP7522T Series

## Absolute Maximum Ratings

| Symbol | Parameter | Value | Units |
|---|---|---|---|
| $I_{PP}$ | Peak Current ($t_p$=8/20µs) | 2.0 | A |
| $T_{OP}$ | Operating Temperature | -40 to 125 | °C |
| $T_{STOR}$ | Storage Temperature | -55 to 150 | °C |

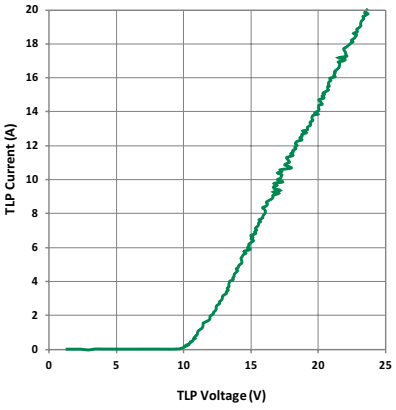
**CAUTION:** Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the component. This is a stress only rating and operation of the component at these or any other conditions above those indicated in the operational sections of this specification is not implied.

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

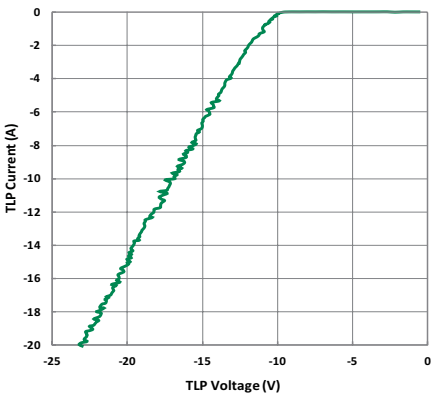
| Parameter | Symbol | Test Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| Reverse Standoff Voltage | $V_{RWM}$ | $I_R \leq 1\mu A$ | - | - | 5.0 | V |
| Reverse Leakage Current | $I_{LEAK}$ | $V_R$=5V, Any I/O to GND | - | - | 50 | nA |
| Clamp Voltage[1] | $V_C$ | $I_{PP}$=1A, $t_p$=8/20µs, Fwd | - | 11.8 | - | V |
| | | $I_{PP}$=2A, $t_p$=8/20µs, Fwd | - | 13.6 | - | V |
| Dynamic Resistance[2] | $R_{DYN}$ | TLP, $t_p$=100ns, I/O to GND | - | 0.65 | - | Ω |
| ESD Withstand Voltage[1] | $V_{ESD}$ | IEC 61000-4-2 (Contact) | ±20 | - | - | kV |
| | | IEC 61000-4-2 (Air) | ±30 | - | - | kV |
| Diode Capacitance[1] | $C_{I/O-GND}$ | Reverse Bias=0V, f=3 GHz | - | 0.15 | - | pF |

**Note:**
**1.** Parameter is guaranteed by design and/or component characterization.
**2.** Transmission Line Pulse (TLP) with 100ns width, 2ns rise time, and average window t1=70ns to t2= 90ns

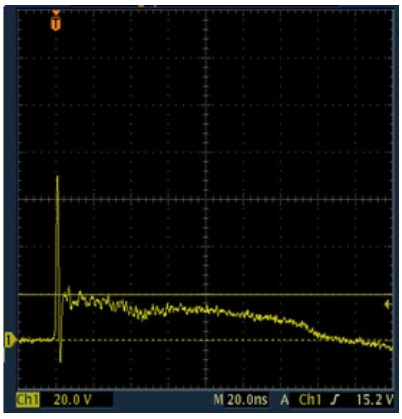
## Positive Transmission Line Pulsing (TLP) Plot



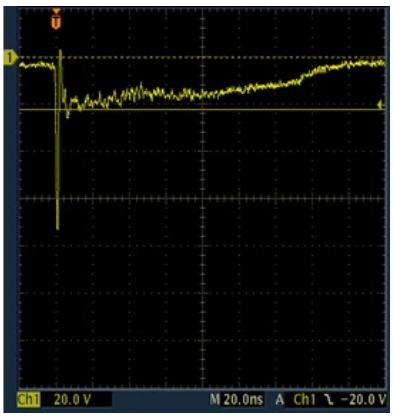

## Negative Transmission Line Pulsing (TLP) Plot




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




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



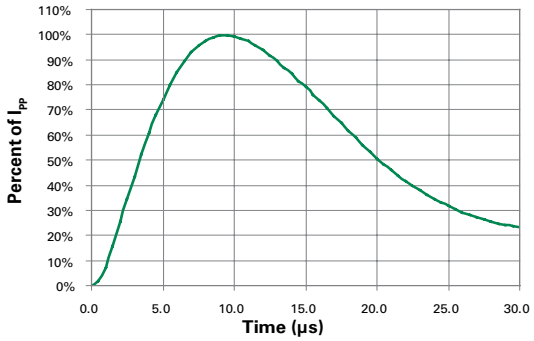


Revised: 09/16/20

# TVS Diode Arrays (SPA® Diodes)

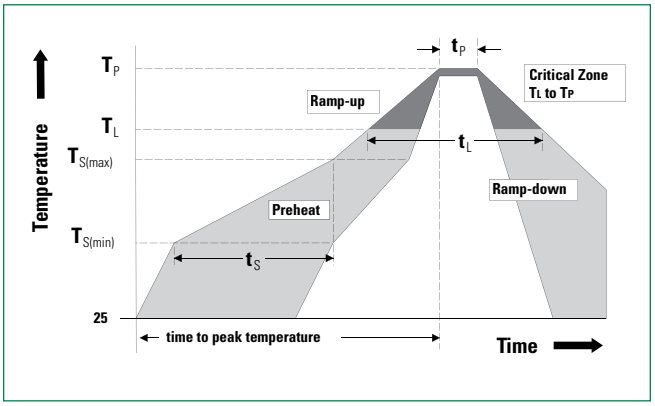
## Low Capacitance ESD Protection - SP7522T Series

## 8/20µs Pulse Waveform




## Soldering Parameters

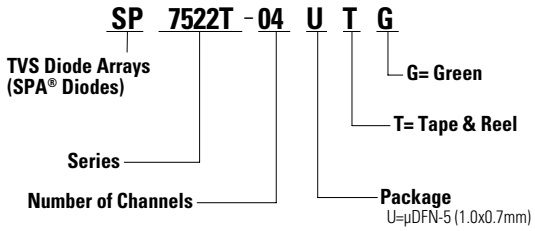
| | | |
|---|---|---|
| **Reflow Condition** | | Pb – Free assembly |
| **Pre Heat** | **-Temperature Min ($T_{s(min)}$)** | 150°C |
| | **-Temperature Max ($T_{s(max)}$)** | 200°C |
| | **-Time (min to max) ($t_s$)** | 60 – 180 secs |
| **Average ramp up rate (Liquidus) Temp ($T_L$) to peak** | | 3°C/second 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 |



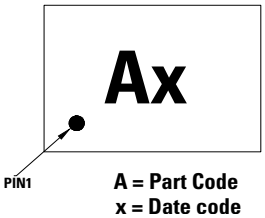

## Ordering Information

| Part Number | Package | Marking | Min. Order Qty. |
|---|---|---|---|
| SP7522T-04UTG | µDFN-5 | Ax | 3000 |

## Part Numbering System




## Part Marking System





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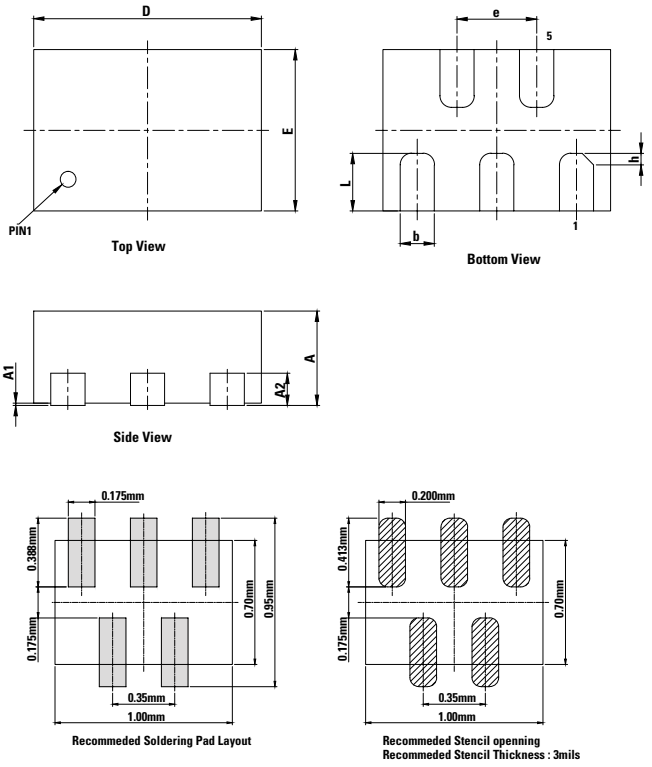
# TVS Diode Arrays (SPA® Diodes)

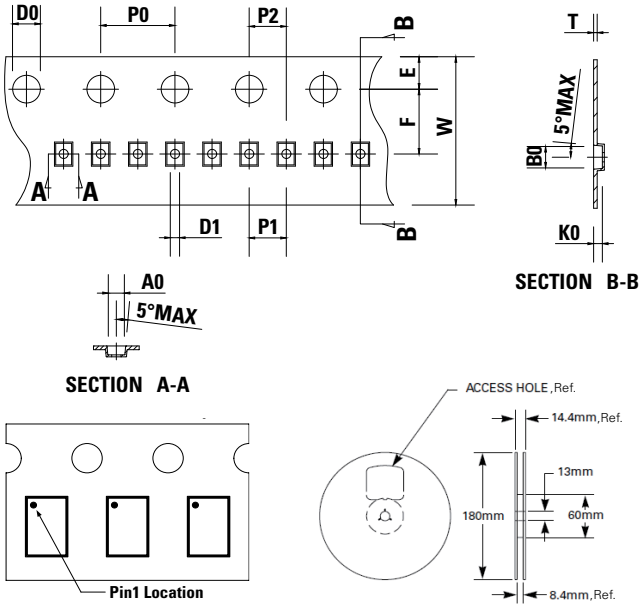
## Low Capacitance ESD Protection - SP7522T Series

## Package Dimensions




| µDFN-5 (1.0x0.7mm) JEDEC MO-229 | | | | | | |
|---|---|---|---|---|---|---|
| Symbol | Millimeters | | | Inches | | |
| | Min | Nom | Max | Min | Nom | Max |
| A | 0.350 | 0.400 | 0.450 | 0.014 | 0.016 | 0.018 |
| A1 | 0 | 0.002 | 0.050 | 0 | 0.000 | 0.002 |
| A2 | | 0.127 REF | | | 0.005 REF | |
| b | 0.125 | 0.150 | 0.175 | 0.005 | 0.006 | 0.007 |
| D | 0.900 | 1.000 | 1.100 | 0.035 | 0.039 | 0.043 |
| E | 0.600 | 0.700 | 0.800 | 0.024 | 0.028 | 0.031 |
| e | | 0.35 REF | | | 0.014 REF | |
| L | 0.200 | 0.250 | 0.300 | 0.008 | 0.010 | 0.012 |
| h | | 0.05 | | | 0.002 | |

## Embossed Carrier Tape & Reel Specification




| Symbol | Millimeters |
|---|---|
| A0 | 0.84 +/- 0.03 |
| B0 | 1.14 +/- 0.03 |
| K0 | 0.48 +/- 0.05 |
| P0 | 4.00 +/- 0.10 |
| P1 | 2.00 +/- 0.05 |
| P2 | 2.00 +/- 0.05 |
| T | 0.20 +/- 0.02 |
| E | 1.75 +/- 0.10 |
| F | 3.50 +/- 0.05 |
| D0 | 1.55 +/- 0.05 |
| D1 | 0.40 +/- 0.05 |
| W | 8.00 +0.3/- 0.10 |