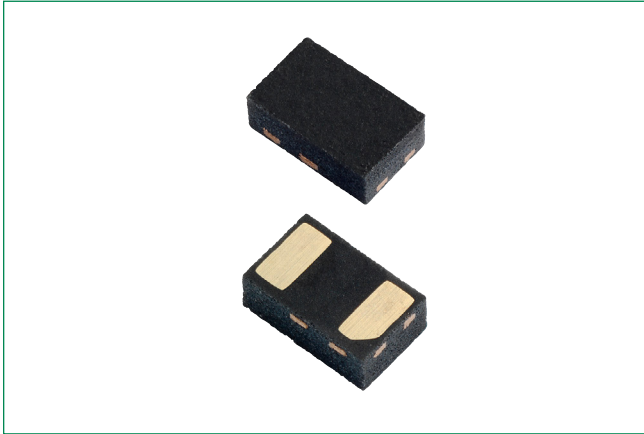
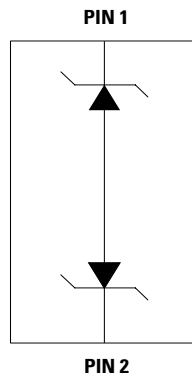


# SP1103C

## 80A Discrete Bidirectional TVS Diode



### Pinout and Functional Block Diagram



### Description

The SP1103C includes TVS diodes 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 at  $\pm 30\text{kV}$  (contact discharge, IEC 61000-4-2) without performance degradation. Additionally, each diode can safely dissipate 80A of 8/20 $\mu\text{s}$  surge current (IEC 61000-4-5, 2nd edition) with very low clamping voltages.

### Features and Benefits

- ESD, IEC 61000-4-2,  $\pm 30\text{kV}$  contact,  $\pm 30\text{kV}$  air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, IEC 61000-4-5 2nd edition, 80A ( $t_P=8/20\mu\text{s}$ )
- Low clamping voltage
- Low leakage current
- AEC-Q101 qualified
- Moisture Sensitivity Level (MSL -1)
- Halogen free, Lead free and RoHS compliant

### Applications

- Switches / Buttons
- Test Equipment / Instrumentation
- Point-of-Sale Terminals
- Medical Equipment
- Notebooks / Desktops / Servers
- Computer Peripherals
- Automotive Electronics

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.

# SP1103C

## 80A Discrete Bidirectional TVS Diode

### Absolute Maximum Ratings

| Symbol     | Parameter                            | Value      | Units |
|------------|--------------------------------------|------------|-------|
| $P_{pk}$   | Peak Pulse Power ( $t_p=8/20\mu s$ ) | 720        | W     |
| $T_{OP}$   | 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.

### SP1103C Electrical Characteristics ( $T_{OP}=25^{\circ}C$ )

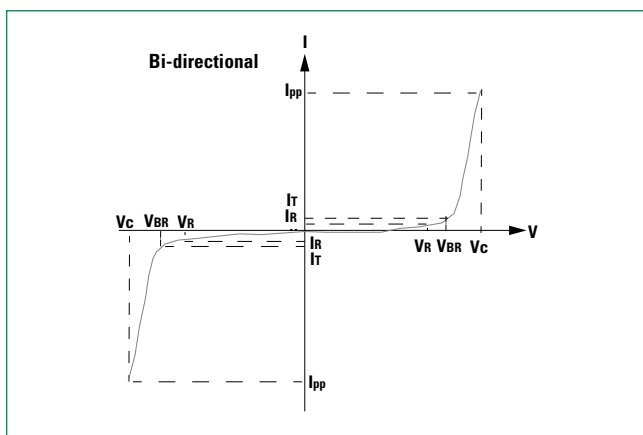
| Parameter                          | Symbol     | Test Conditions                      | Min      | Typ  | Max | Units    |
|------------------------------------|------------|--------------------------------------|----------|------|-----|----------|
| Reverse Standoff Voltage           | $V_{RWM}$  | -                                    | -        | -    | 3.3 | V        |
| Breakdown Voltage                  | $V_{BR}$   | $I_R=1mA$                            | 3.4      | 3.8  | 5.0 | V        |
| Reverse Leakage Current            | $I_{LEAK}$ | $V_R=3.3V$                           | -        | -    | 1.0 | $\mu A$  |
| Clamp Voltage <sup>1</sup>         | $V_C$      | $I_{PP}=40A$ , $t_p=8/20\mu s$ , Fwd | -        | 6    | -   | V        |
|                                    |            | $I_{PP}=80A$ , $t_p=8/20\mu s$ , Fwd | -        | 9    | -   | V        |
| Dynamic Resistance <sup>2</sup>    | $R_{DYN}$  | TLP, $t_p=100ns$ , I/O to GND        | -        | 0.01 | -   | $\Omega$ |
| Peak Pulse Current                 | $I_{PP}$   | $t_p=8/20\mu s$                      | -        | -    | 80  | A        |
| ESD Withstand Voltage <sup>1</sup> | $V_{ESD}$  | IEC 61000-4-2 (Contact Discharge)    | $\pm 30$ | -    | -   | kV       |
|                                    |            | IEC 61000-4-2 (Air Discharge)        | $\pm 30$ | -    | -   | kV       |
| Diode Capacitance <sup>1</sup>     | $C_D$      | Reverse Bias=0V, $f=1MHz$            | -        | 130  | -   | 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  $t_1=70ns$  to  $t_2=90ns$

### I-V Curve Characteristics

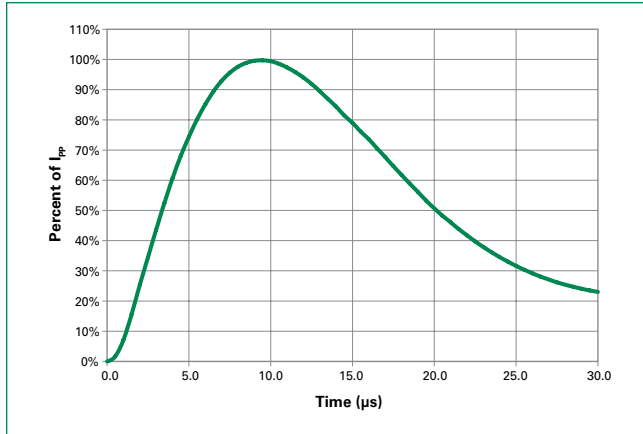
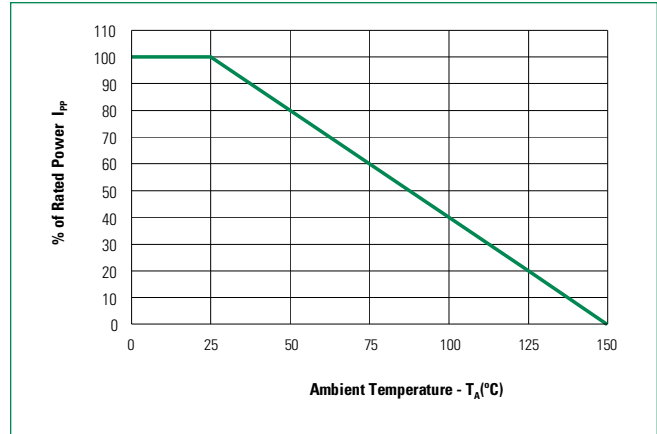
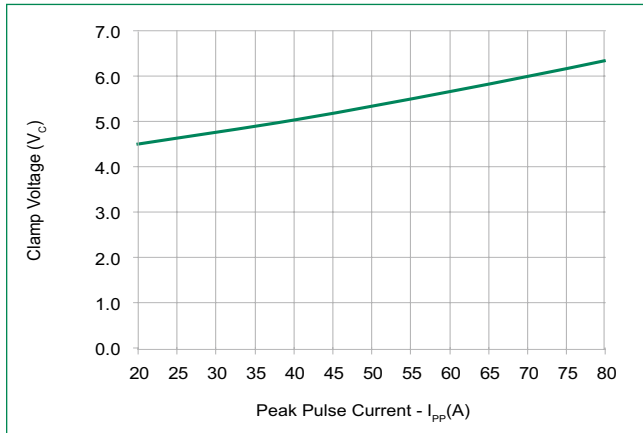
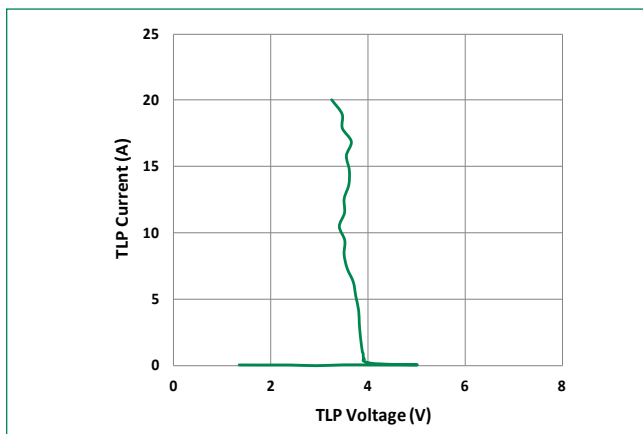
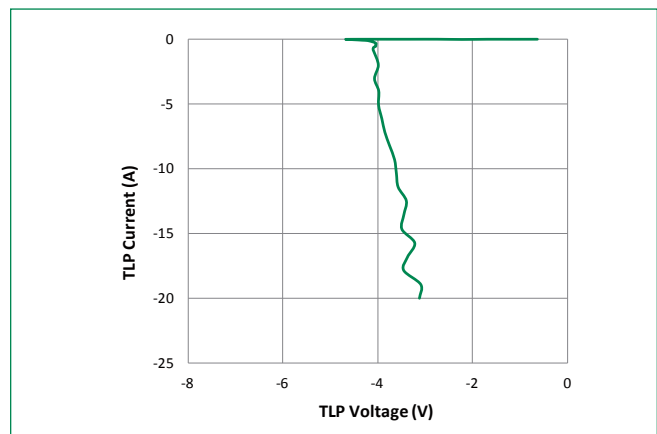


**$V_R$  Stand-off Voltage** – Maximum voltage that can be applied to the TVS without operation

**$V_{BR}$  Breakdown Voltage** – Maximum voltage that flows through the TVS at a specified test current ( $I_R$ )

**$V_C$  Clamping Voltage** – Peak voltage measured across the TVS at a specified  $I_{PP}$  (peak impulse current)

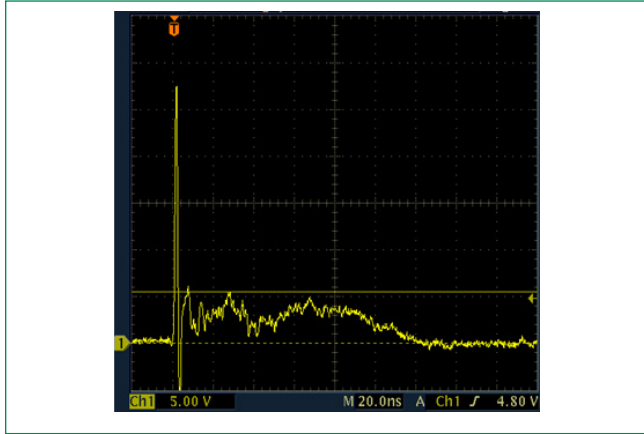
**$I_R$  Reverse Leakage Current** – Current measured at  $V_R$

**SP1103C****80A Discrete Bidirectional TVS Diode****8/20 $\mu$ s Pulse Waveform****Power Derating Curve****Clamping Voltage vs IPP****Non-Repetitive Peak Pulse Power vs. Pulse Time****Positive Transmission Line Pulsing (TLP) Plot****Negative Transmission Line Pulsing (TLP) Plot**

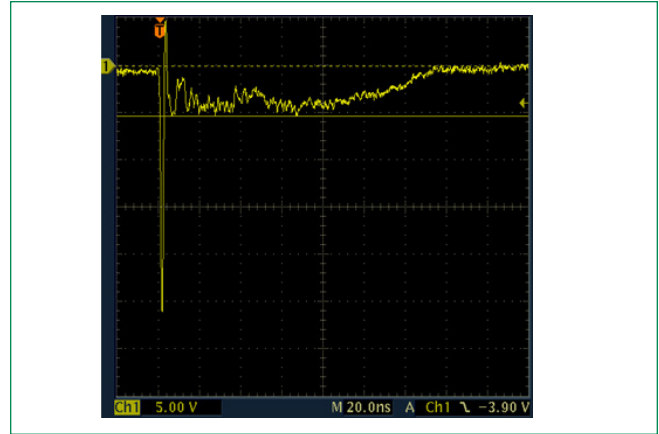
# SP1103C

## 80A Discrete Bidirectional TVS Diode

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

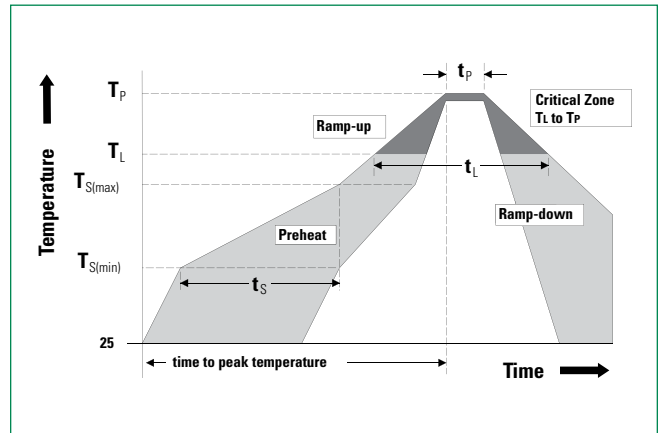


### IEC 61000-4-2 -8 kV Contact ESD Clamping Voltage

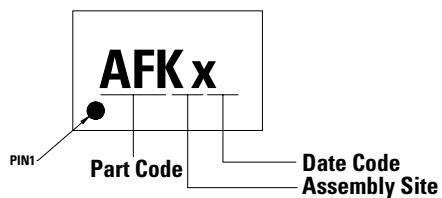


## Soldering Parameters

|                                                        |                                    |                    |
|--------------------------------------------------------|------------------------------------|--------------------|
| 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 $^{+0/-5}$ °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              |



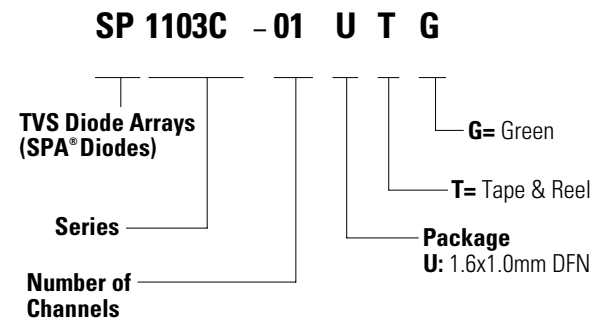
## Part Marking System



## Ordering Information

| Part Number   | Package       | Marking | Min. Order Qty. |
|---------------|---------------|---------|-----------------|
| SP1103C-01UTG | 1.6x1.0mm DFN | AFKx    | 3000            |

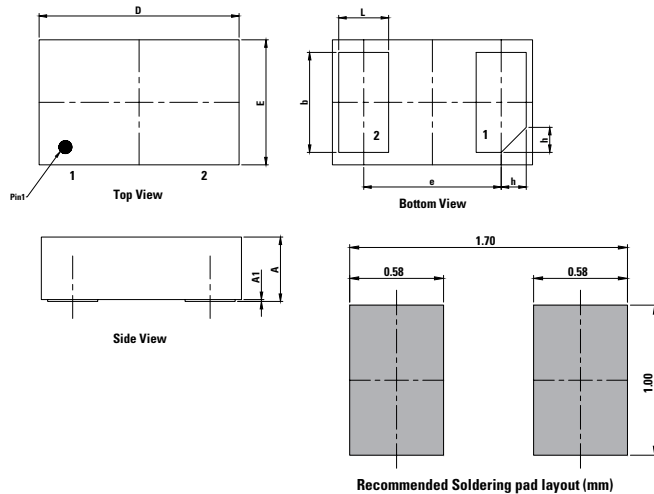
## Part Numbering System



# SP1103C

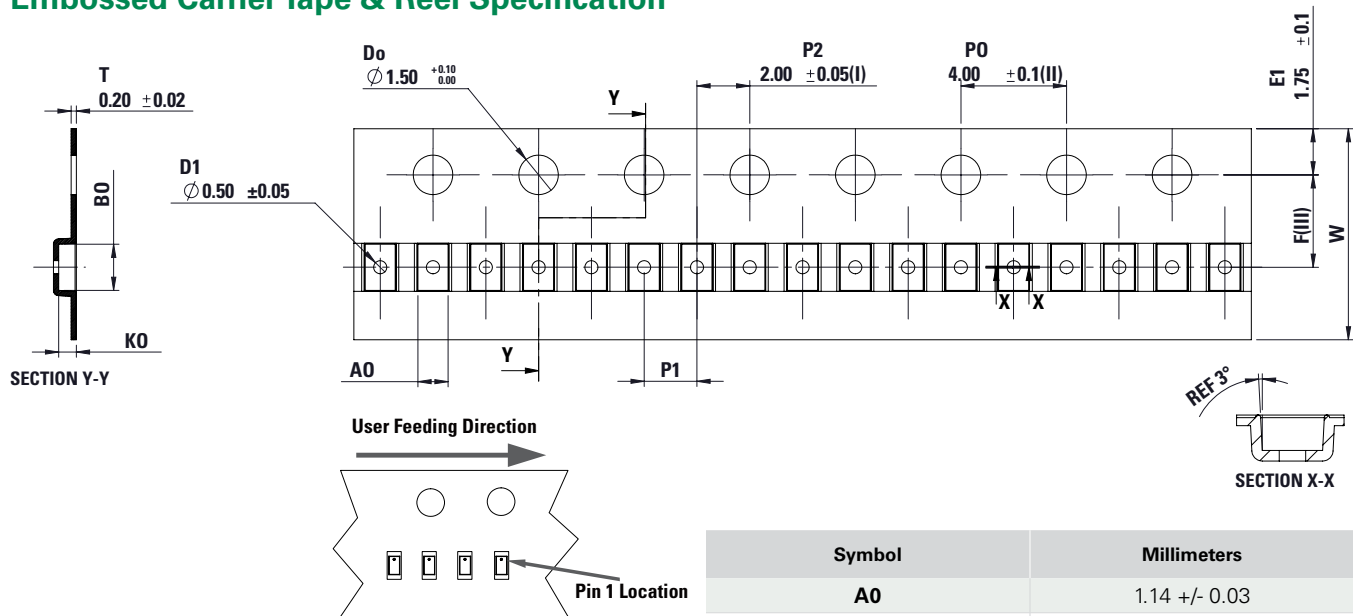
## 80A Discrete Bidirectional TVS Diode

### Package Dimensions



| Symbol | 1.6x1.0mm DFN |      |      |
|--------|---------------|------|------|
|        | Millimeters   |      |      |
|        | Min           | Nor  | Max  |
| A      | 0.45          | 0.50 | 0.55 |
| A1     | -             | 0.02 | 0.05 |
| D      | 1.55          | 1.60 | 1.65 |
| E      | 0.95          | 1.00 | 1.05 |
| b      | 0.75          | 0.80 | 0.85 |
| L      | 0.35          | 0.40 | 0.45 |
| e      | 1.10 BSC      |      |      |
| h      | 0.15          | 0.20 | 0.25 |

### Embossed Carrier Tape & Reel Specification



| Symbol | Millimeters   |
|--------|---------------|
| A0     | 1.14 +/- 0.03 |
| B0     | 1.75 +/- 0.03 |
| K0     | 0.67 +/- 0.05 |
| F      | 3.50 +/- 0.05 |
| P1     | 2.00 +/- 0.10 |
| W      | 8.00 +/- 0.10 |

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