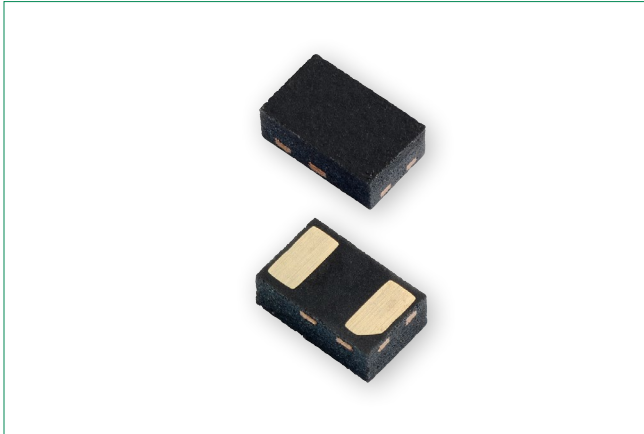
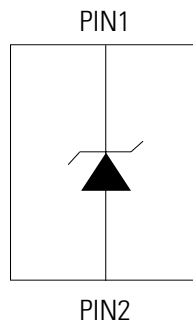


# SC11xx Series

## Discrete Unidirectional TVS Diode



### Pinout and Functional Block Diagram



### Description

Avalanche breakdown 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 and air discharge, IEC 61000-4-2) without performance degradation. Additionally, each diode can safely dissipate 80A (SC1105) of 8/20 $\mu\text{s}$  surge current (IEC 61000-4-5 2nd edition) with very low clamping voltages.

### Features

- 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 ( $t_P=8/20\mu\text{s}$ , SC1105)
- Low clamping voltage
- Low leakage current
- Moisture Sensitivity Level (MSL -1)
- Lead free and RoHS compliant

### Applications

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

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.

# SC11xx Series

## Discrete Unidirectional TVS Diode

### Absolute Maximum Ratings

| Symbol     | Parameter             | Value      | Units |
|------------|-----------------------|------------|-------|
| $T_{OP}$   | 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.

### SC1105 Electrical Characteristics ( $T_{OP}=25^{\circ}\text{C}$ )

| Parameter                          | Symbol        | Test Conditions                                   | Min      | Typ  | Max | Units         |
|------------------------------------|---------------|---|----------|------|-----|---------------|
| Reverse Standoff Voltage           | $V_{RWM}$     | $I_R=1\mu\text{A}$                                |          |      | 5.0 | V             |
| Breakdown Voltage                  | $V_{BR}$      | $I_R=1\text{mA}$                                  | 6.0      |      | 7.5 | V             |
| Reverse Leakage Current            | $I_{LEAK}$    | $V_R=5\text{V}$                                   |          |      | 1.0 | $\mu\text{A}$ |
| Clamp Voltage <sup>1</sup>         | $V_C$         | $I_{PP}=40\text{A}$ , $t_p=8/20\mu\text{s}$ , Fwd |          | 9.3  |     | V             |
|                                    |               | $I_{PP}=80\text{A}$ , $t_p=8/20\mu\text{s}$ , Fwd |          | 11.8 |     | V             |
| Dynamic Resistance <sup>2</sup>    | $R_{DYN}$     | TLP, $t_p=100\text{ns}$ , I/O to GND              |          | 0.04 |     | $\Omega$      |
| Peak Pulse Current                 | $I_{PP}$      | $t_p=8/20\mu\text{s}$                             |          |      | 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>     | $C_{I/O-GND}$ | Reverse Bias=0V, f=1MHz                           |          | 660  |     | pF            |

### SC1115 Electrical Characteristics ( $T_{OP}=25^{\circ}\text{C}$ )

| Parameter                          | Symbol        | Test Conditions                                   | Min      | Typ  | Max  | Units         |
|------------------------------------|---------------|---|----------|------|------|---------------|
| Reverse Standoff Voltage           | $V_{RWM}$     | $I_R=1\mu\text{A}$                                |          |      | 15.0 | V             |
| Breakdown Voltage                  | $V_{BR}$      | $I_R=1\text{mA}$                                  | 16.7     |      |      | V             |
| Reverse Leakage Current            | $I_{LEAK}$    | $V_R=15\text{V}$                                  |          |      | 1.0  | $\mu\text{A}$ |
| Clamp Voltage <sup>1</sup>         | $V_C$         | $I_{PP}=30\text{A}$ , $t_p=8/20\mu\text{s}$ , Fwd |          | 27.4 |      | V             |
| Dynamic Resistance <sup>2</sup>    | $R_{DYN}$     | TLP, $t_p=100\text{ns}$ , I/O to GND              |          | 0.09 |      | $\Omega$      |
| Peak Pulse Current                 | $I_{PP}$      | $t_p=8/20\mu\text{s}$                             |          |      | 30.0 | 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>     | $C_{I/O-GND}$ | Reverse Bias=0V, f=1MHz                           |          | 180  |      | pF            |

# SC11xx Series

## Discrete Unidirectional TVS Diode

### SC1122 Electrical Characteristics ( $T_{OP}=25^{\circ}\text{C}$ )

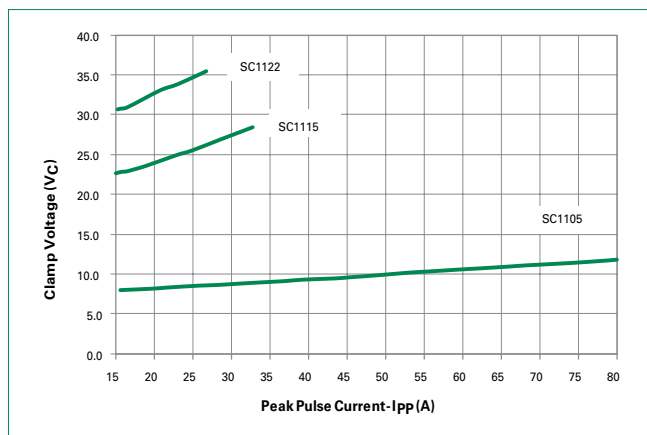
| Parameter                          | Symbol        | Test Conditions                                   | Min      | Typ  | Max  | Units         |
|------------------------------------|---------------|---|----------|------|------|---------------|
| Reverse Standoff Voltage           | $V_{RWM}$     | $I_R=1\mu\text{A}$                                |          |      | 22.0 | V             |
| Breakdown Voltage                  | $V_{BR}$      | $I_R=1\text{mA}$                                  | 23.0     |      |      | V             |
| Reverse Leakage Current            | $I_{LEAK}$    | $V_R=22\text{V}$                                  |          |      | 1.0  | $\mu\text{A}$ |
| Clamp Voltage <sup>1</sup>         | $V_C$         | $I_{PP}=27\text{A}$ , $t_p=8/20\mu\text{s}$ , Fwd |          | 35.5 |      | V             |
| Dynamic Resistance <sup>2</sup>    | $R_{DYN}$     | TLP, $t_p=100\text{ns}$ , I/O to GND              |          | 0.13 |      | $\Omega$      |
| Peak Pulse Current                 | $I_{PP}$      | $t_p=8/20\mu\text{s}$                             |          |      | 27.0 | 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>     | $C_{I/O-GND}$ | Reverse Bias=0V, $f=1\text{MHz}$                  |          | 160  |      | pF            |

**Note:**

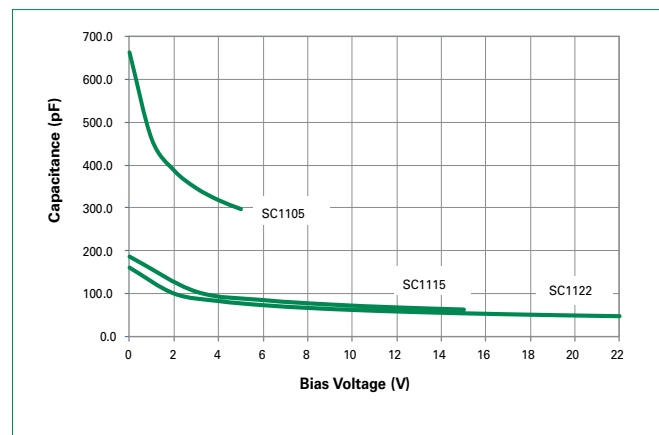
1. Parameter is guaranteed by design and/or component characterization.

2. Transmission Line Pulse (TLP) with 100ns width, 0.2ns rise time, and average window  $t_1=70\text{ns}$  to  $t_2=90\text{ns}$

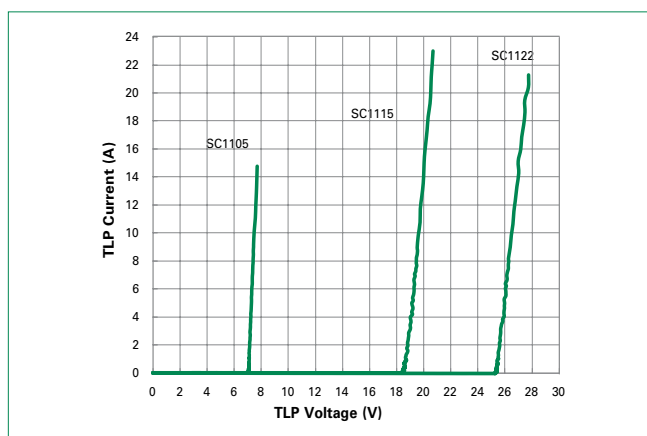
#### Clamping voltage vs. IPP for 8/20 $\mu\text{s}$ waveshape



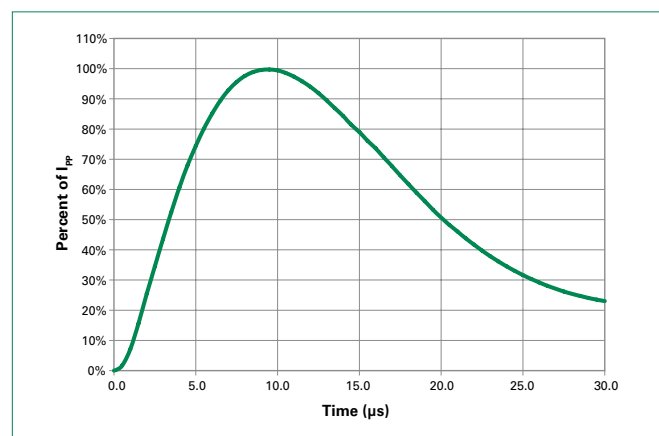
#### Capacitance vs. Bias



#### Transmission Line Pulsing (TLP) Plot



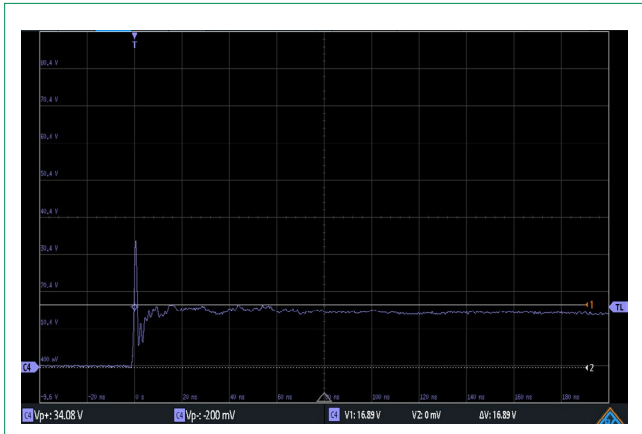
#### 8/20 $\mu\text{s}$ Pulse Waveform



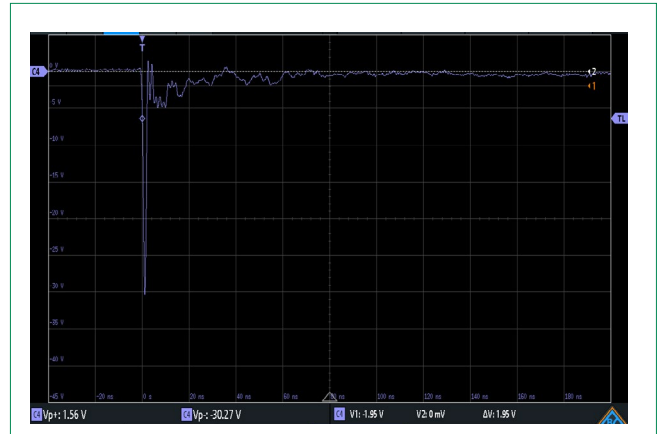
# SC11xx Series

## Discrete Unidirectional TVS Diode

**SC1105 IEC 61000 -4-2 +8 kV Contact ESD Clamping Voltage**



**SC1105 IEC 61000 -4-2 -8 kV Contact ESD Clamping Voltage**



**SC1115 IEC 61000 -4-2 +8 kV Contact ESD Clamping Voltage**



**SC1115 IEC 61000 -4-2 -8 kV Contact ESD Clamping Voltage**



**SC1122 IEC 61000 -4-2 +8 kV Contact ESD Clamping Voltage**



**SC1122 IEC 61000 -4-2 -8 kV Contact ESD Clamping Voltage**

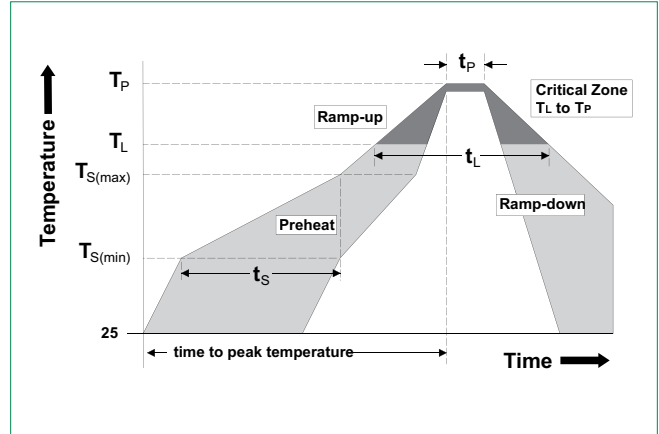


# SC11xx Series

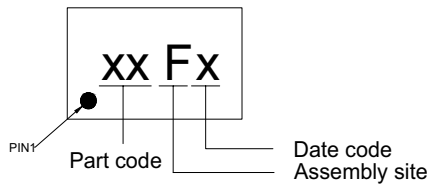
## Discrete Unidirectional TVS Diode

### Soldering Parameters

|  |                                    |                         |
|--|------------------------------------|-------------------------|
| <b>Reflow Condition</b>  |                                    | Pb – Free assembly      |
| <b>Pre Heat</b>  | - Temperature Min ( $T_{s(min)}$ ) | 150°C                   |
|  | - Temperature Max ( $T_{s(max)}$ ) | 200°C                   |
|  | - Time (min to max) ( $t_s$ )      | 60 – 120 secs           |
| <b>Average ramp up rate (Liquidus) Temp (<math>T_L</math>) to peak</b> |                                    | 3°C/second max          |
| <b><math>T_{s(max)}</math> to <math>T_L</math> - Ramp-up Rate</b>      |                                    | 3°C/second max          |
| <b>Reflow</b>  | - Temperature ( $T_L$ ) (Liquidus) | 217°C                   |
|  | - Temperature ( $t_L$ )            | 60 – 150 seconds        |
| <b>Peak Temperature (<math>T_p</math>)</b>                             |                                    | 260 <sup>+0/-5</sup> °C |
| <b>Time within 5°C of actual peak Temperature (<math>t_p</math>)</b>   |                                    | 30 – 40 seconds         |
| <b>Ramp-down Rate</b>  |                                    | 6°C/second max          |
| <b>Time 25°C to peak Temperature (<math>T_p</math>)</b>                |                                    | 8 minutes Max.          |
| <b>Do not exceed</b>   |                                    | 260°C                   |

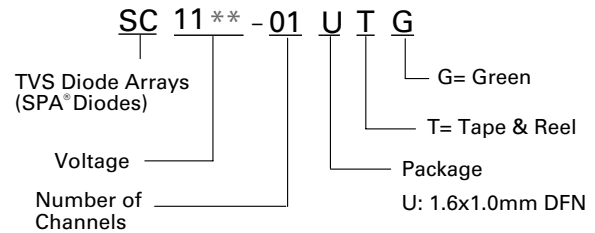


### Part Marking System



Part code :  
 AP = SC1105-01UTG  
 AQ = SC1115-01UTG  
 AO = SC1122-01UTG

### Part Numbering System



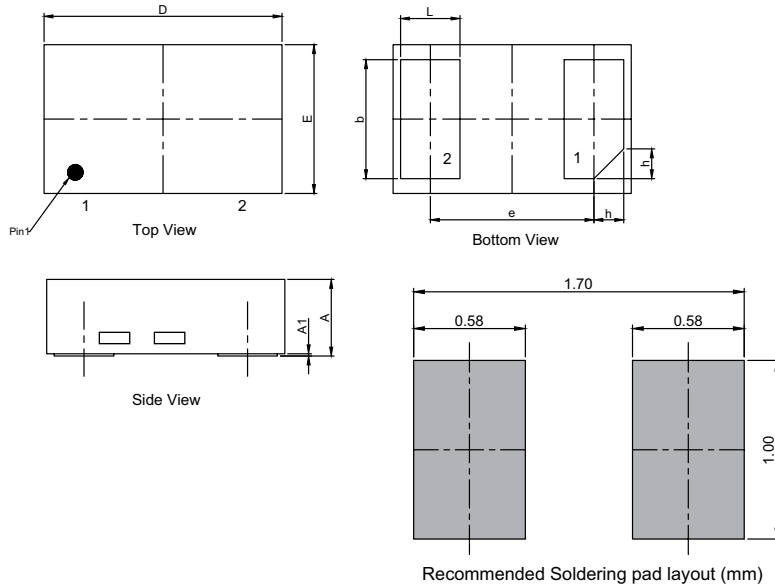
### Ordering Information

| Part Number  | Package       | Marking | Min. Order Qty. |
|--------------|---------------|---------|-----------------|
| SC1105-01UTG | 1.6x1.0mm DFN | APFx    | 3000            |
| SC1115-01UTG | 1.6x1.0mm DFN | AQFx    | 3000            |
| SC1122-01UTG | 1.6x1.0mm DFN | AOFx    | 3000            |

# SC11xx Series

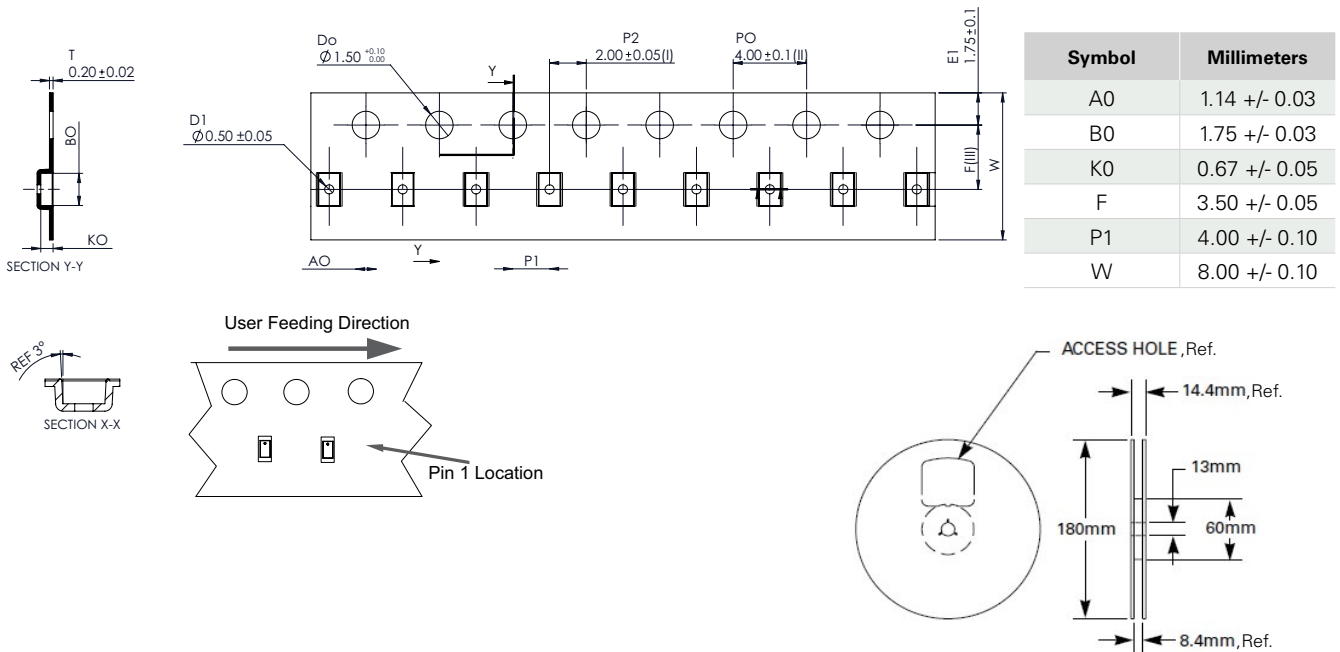
## Discrete Unidirectional TVS Diode

### 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     | 4.00 +/- 0.10 |
| W      | 8.00 +/- 0.10 |

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