



## SSCTXXX22D2 Series

3.3V~24V Ultra Low Capacitance bi-directional TVS Diode

### ● Description

The SSCTXXX22D2 is a bi-directional TVS diode, utilizing leading monolithic silicon technology to provide fast response time and low ESD clamping voltage, making this device an ideal solution for protecting voltage sensitive high-speed data lines. The SSCTXXX22D2 complies with the IEC 61000-4-2 (ESD) standard with  $\pm 30\text{kV}$  air and  $\pm 30\text{kV}$  contact discharge. It is assembled into a leadfree SOD-323 package. The small size, low capacitance and high ESD surge protection make SSCTXXX22D2 an ideal choice to protect cell phone, wireless systems, and communication equipment.

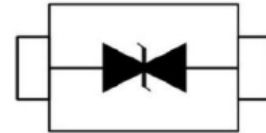
### ● Feature

- ◇ 350W peak pulse power ( $t_P = 8/20\mu\text{s}$ )
- ◇ SOD-323 Package
- ◇ Working voltage: 3.3V, 5V, 12V, 15V, 24V, 36V
- ◇ Low clamping voltage
- ◇ Low capacitance
- ◇ Complies with following standards:
  - IEC 61000-4-2 (ESD) immunity test
    - Air discharge:  $\pm 30\text{kV}$
    - Contact discharge:  $\pm 30\text{kV}$
  - IEC61000-4-4 (EFT) 40A (5/50ns)

### ● Electronic Parameter

| Symbol    | Parameter                           |
|-----------|-------------------------------------|
| $V_{RWM}$ | Peak Reverse Working Voltage        |
| $I_R$     | Reverse Leakage Current @ $V_{RWM}$ |
| $V_{BR}$  | Breakdown Voltage @ $I_T$           |
| $I_T$     | Test Current                        |
| $I_{PP}$  | Maximum Reverse Peak Pulse Current  |
| $V_C$     | Clamping Voltage @ $I_{PP}$         |
| $P_{PP}$  | Peak Pulse Power                    |
| C         | Junction Capacitance                |

### ● PIN configuration



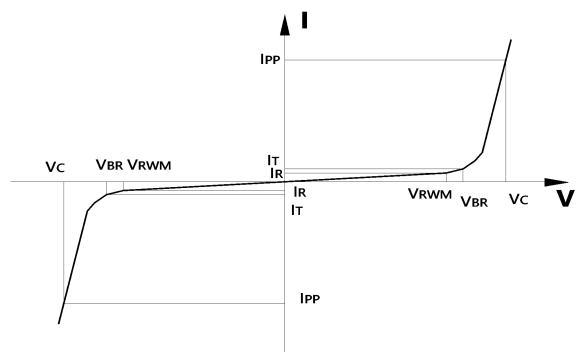
Top view

### ● Applications

- ◇ Cell Phone Handsets and Accessories
- ◇ Microprocessor based equipment
- ◇ Personal Digital Assistants (PDA' s)
- ◇ Notebooks, Desktops, and Servers
- ◇ Portable Instrumentation
- ◇ Networking and Telecom
- ◇ Serial and Parallel Ports.
- ◇ Peripherals

### ● Mechanical data

- ◇ Case Material: “Green” Molding Compound.
- ◇ UL Flammability Classification Rating 94V-0
- ◇ Qualified max reflow temperature: 260°C
- ◇ Device meets MSL 1 requirements
- ◇ Moisture Sensitivity: Level 3 per J-STD-020





# SSCTXXX22D2

● Absolute maximum rating @TA=25°C

| SSCT3V322D2                             |                  |           |      |
|---|------------------|-----------|------|
| Parameter                               | Symbol           | Value     | Unit |
| Peak Pulse Power (tp=8/20μs waveform)   | P <sub>PPP</sub> | 350       | W    |
| Peak Pulse Current (tp=8/20μs waveform) | I <sub>PP</sub>  | 20        | A    |
| ESD Rating per IEC61000-4-2:            | Contact          | 30        | KV   |
|   | Air              | 30        |      |
| Operating Temperature Range             | T <sub>J</sub>   | -55 ~ 125 | °C   |
| Storage Temperature Range               | T <sub>STG</sub> | -55 ~ 150 | °C   |
| SSCT5V022D2                             |                  |           |      |
| Parameter                               | Symbol           | Value     | Unit |
| Peak Pulse Power (tp=8/20μs waveform)   | P <sub>PPP</sub> | 350       | W    |
| Peak Pulse Current (tp=8/20μs waveform) | I <sub>PP</sub>  | 17        | A    |
| ESD Rating per IEC61000-4-2:            | Contact          | 30        | KV   |
|   | Air              | 30        |      |
| Operating Temperature Range             | T <sub>J</sub>   | -55 ~ 125 | °C   |
| Storage Temperature Range               | T <sub>STG</sub> | -55 ~ 150 | °C   |
| SSCT12V22D2                             |                  |           |      |
| Parameter                               | Symbol           | Value     | Unit |
| Peak Pulse Power (tp=8/20μs waveform)   | P <sub>PPP</sub> | 350       | W    |
| Peak Pulse Current (tp=8/20μs waveform) | I <sub>PP</sub>  | 11        | A    |
| ESD Rating per IEC61000-4-2:            | Contact          | 30        | KV   |
|   | Air              | 30        |      |
| Operating Temperature Range             | T <sub>J</sub>   | -55 ~ 125 | °C   |
| Storage Temperature Range               | T <sub>STG</sub> | -55 ~ 150 | °C   |
| SSCT15V22D2                             |                  |           |      |
| Parameter                               | Symbol           | Value     | Unit |
| Peak Pulse Power (tp=8/20μs waveform)   | P <sub>PPP</sub> | 350       | W    |
| Peak Pulse Current (tp=8/20μs waveform) | I <sub>PP</sub>  | 10        | A    |
| ESD Rating per IEC61000-4-2:            | Contact          | 30        | KV   |
|   | Air              | 30        |      |
| Operating Temperature Range             | T <sub>J</sub>   | -55 ~ 125 | °C   |
| Storage Temperature Range               | T <sub>STG</sub> | -55 ~ 150 | °C   |
| SSCT24V22D2                             |                  |           |      |
| Parameter                               | Symbol           | Value     | Unit |
| Peak Pulse Power (tp=8/20μs waveform)   | P <sub>PPP</sub> | 350       | W    |
| Peak Pulse Current (tp=8/20μs waveform) | I <sub>PP</sub>  | 7         | A    |
| ESD Rating per IEC61000-4-2:            | Contact          | 30        | KV   |
|   | Air              | 30        |      |
| Operating Temperature Range             | T <sub>J</sub>   | -55 ~ 125 | °C   |
| Storage Temperature Range               | T <sub>STG</sub> | -55 ~ 150 | °C   |



# SSCTXXX22D2

| SSCT36V22D2                             |                  |           |      |
|---|------------------|-----------|------|
| Parameter                               | Symbol           | Value     | Unit |
| Peak Pulse Power (tp=8/20μs waveform)   | P <sub>PPP</sub> | 350       | W    |
| Peak Pulse Current (tp=8/20μs waveform) | I <sub>PP</sub>  | 5         | A    |
| ESD Rating per IEC61000-4-2:            | Contact          | 30        | KV   |
|   | Air              | 30        |      |
| Operating Temperature Range             | T <sub>J</sub>   | -55 ~ 125 | °C   |
| Storage Temperature Range               | T <sub>STG</sub> | -55 ~ 150 | °C   |

## ● Electrical Characteristics @TA=25°C

| SSCT3V322D2             |        |      |     |     |      |                            |
|-------------------------|--------|------|-----|-----|------|----------------------------|
| Parameter               | Symbol | Min  | Typ | Max | Unit | Test Condition             |
| Reverse Working Voltage | VRWM   |      |     | 3.3 | V    |                            |
| Breakdown Voltage       | VBR    | 4.0  |     |     | V    | IT = 1mA                   |
| Reverse Leakage Current | IR     |      |     | 40  | uA   | VRWM = 3.3V                |
| Clamping Voltage        | IPP    |      | 7   |     | V    | IPP = 1A (8 x 20uS pulse)  |
| Clamping Voltage        | IPP    |      |     | 19  | V    | IPP = 20A (8 x 20uS pulse) |
| Junction Capacitance    | CJ     |      | 450 |     | pF   | VR = 0V, f = 1MHz          |
| SSCT5V022D2             |        |      |     |     |      |                            |
| Parameter               | Symbol | Min  | Typ | Max | Unit | Test Condition             |
| Reverse Working Voltage | VRWM   |      |     | 5   | V    |                            |
| Breakdown Voltage       | VBR    | 6.2  |     |     | V    | IT = 1mA                   |
| Reverse Leakage Current | IR     |      |     | 10  | uA   | VRWM = 5V                  |
| Clamping Voltage        | IPP    |      | 9.8 |     | V    | IPP = 1A (8 x 20uS pulse)  |
| Clamping Voltage        | IPP    |      |     | 21  | V    | IPP = 17A (8 x 20uS pulse) |
| Junction Capacitance    | CJ     |      | 200 |     | pF   | VR = 0V, f = 1MHz          |
| SSCT12V22D2             |        |      |     |     |      |                            |
| Parameter               | Symbol | Min  | Typ | Max | Unit | Test Condition             |
| Reverse Working Voltage | VRWM   |      |     | 12  | V    |                            |
| Breakdown Voltage       | VBR    | 13.3 |     |     | V    | IT = 1mA                   |
| Reverse Leakage Current | IR     |      |     | 1   | uA   | VRWM = 12V                 |
| Clamping Voltage        | IPP    |      | 19  |     | V    | IPP = 1A (8 x 20uS pulse)  |
| Clamping Voltage        | IPP    |      |     | 32  | V    | IPP = 11A (8 x 20uS pulse) |
| Junction Capacitance    | CJ     |      | 75  |     | pF   | VR = 0V, f = 1MHz          |

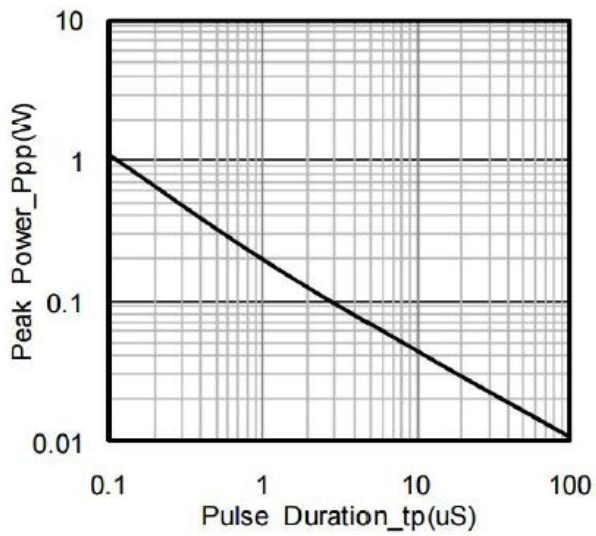


# SSCTXXX22D2

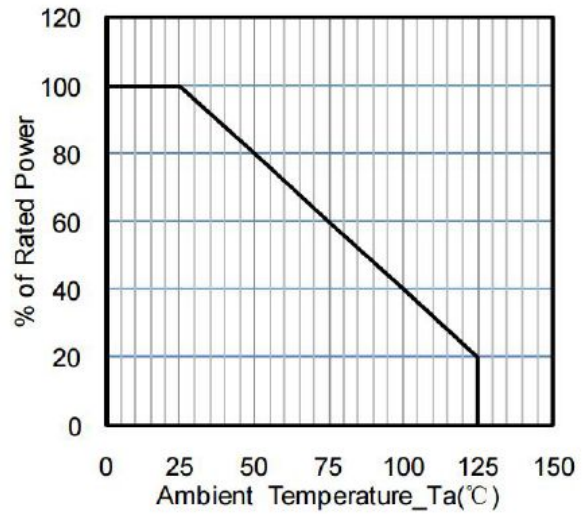
| SSCT15V22D2             |        |      |     |     |      |                            |
|-------------------------|--------|------|-----|-----|------|----------------------------|
| Parameter               | Symbol | Min  | Typ | Max | Unit | Test Condition             |
| Reverse Working Voltage | VRWM   |      |     | 15  | V    |                            |
| Breakdown Voltage       | VBR    | 16.7 |     |     | V    | IT = 1mA                   |
| Reverse Leakage Current | IR     |      |     | 1   | uA   | VRWM = 15V                 |
| Clamping Voltage        | IPP    |      | 24  |     | V    | IPP = 1A (8 x 20uS pulse)  |
| Clamping Voltage        | IPP    |      |     | 38  | V    | IPP = 10A (8 x 20uS pulse) |
| Junction Capacitance    | CJ     |      | 68  |     | pF   | VR = 0V, f = 1MHz          |
| SSCT24V22D2             |        |      |     |     |      |                            |
| Parameter               | Symbol | Min  | Typ | Max | Unit | Test Condition             |
| Reverse Working Voltage | VRWM   |      |     | 24  | V    |                            |
| Breakdown Voltage       | VBR    | 26.7 |     |     | V    | IT = 1mA                   |
| Reverse Leakage Current | IR     |      |     | 1   | uA   | VRWM = 24V                 |
| Clamping Voltage        | IPP    |      | 43  |     | V    | IPP = 1A (8 x 20uS pulse)  |
| Clamping Voltage        | IPP    |      |     | 52  | V    | IPP = 7A (8 x 20uS pulse)  |
| Junction Capacitance    | CJ     |      | 57  |     | pF   | VR = 0V, f = 1MHz          |
| SSCT36V22D2             |        |      |     |     |      |                            |
| Parameter               | Symbol | Min  | Typ | Max | Unit | Test Condition             |
| Reverse Working Voltage | VRWM   |      |     | 36  | V    |                            |
| Breakdown Voltage       | VBR    | 40   |     |     | V    | IT = 1mA                   |
| Reverse Leakage Current | IR     |      |     | 1   | uA   | VRWM = 36V                 |
| Clamping Voltage        | IPP    |      | 63  |     | V    | IPP = 1A (8 x 20uS pulse)  |
| Clamping Voltage        | IPP    |      |     | 80  | V    | IPP = 5A (8 x 20uS pulse)  |
| Junction Capacitance    | CJ     |      | 35  |     | pF   | VR = 0V, f = 1MHz          |



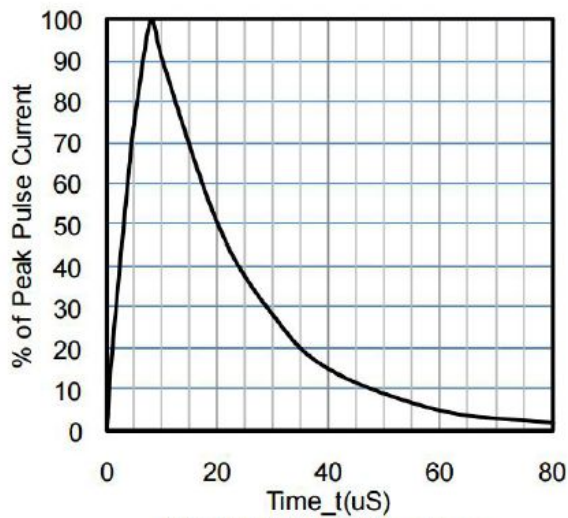
- Typical Performance Characteristics



Peak Pulse Power vs. Pulse Time



Power Derating Curve

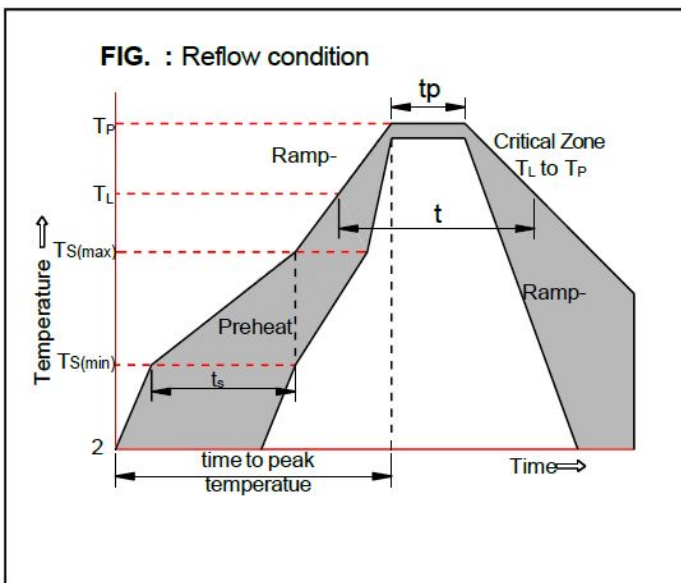


8 X 20uS Pulse Waveform



- Soldering Parameters**

| Reflow Condition                                   |                             | Pb-Free assembly<br>(see as below) |
|--|-----------------------------|------------------------------------|
| Pre Heat   | -Temperature Min (Ts(min))  | +150°C                             |
|  | -Temperature Max(Ts(max))   | +200°C                             |
|  | -Time (Min to Max) (ts)     | 60-180 secs.                       |
| Average ramp up rate (Liquid us Temp (TL) to peak) |                             | 3°C/sec. Max                       |
| Ts(max) to TL - Ramp-up Rate                       |                             | 3°C/sec. Max                       |
| Reflow   | -Temperature(TL)(Liquid us) | +217°C                             |
|  | -Temperature(tL)            | 60-150 secs.                       |
| Peak Temp (Tp)                                     |                             | +260(+0/-5)°C                      |
| Time within 5°C of actual Peak Temp (tp)           |                             | 30 secs. Max                       |
| Ramp-down Rate                                     |                             | 6°C/sec. Max                       |
| Time 25°C to Peak Temp (TP)                        |                             | 8 min. Max                         |
| Do not exceed                                      |                             | +260°C                             |





# SSCTXXX22D2

## ● Package Information

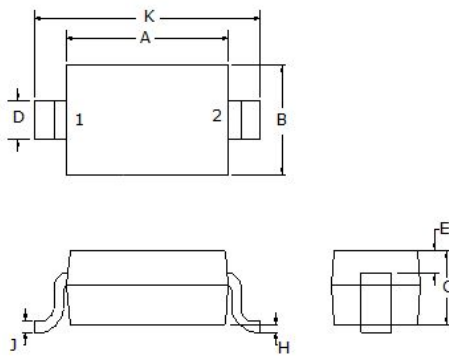
### Ordering Information

| Device      | Package | Qty per Reel | Reel Size |
|-------------|---------|--------------|-----------|
| SSCT3V322D2 | SOD-323 | 3000         | 7 Inch    |
| SSCT5V022D2 | SOD-323 | 3000         | 7 Inch    |
| SSCT12V22D2 | SOD-323 | 3000         | 7 Inch    |
| SSCT15V22D2 | SOD-323 | 3000         | 7 Inch    |
| SSCT24V22D2 | SOD-323 | 3000         | 7 Inch    |
| SSCT36V22D2 | SOD-323 | 3000         | 7 Inch    |

## Mechanical Data

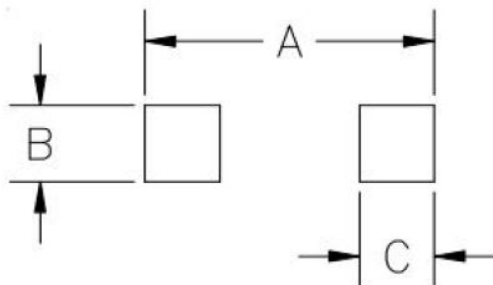
Case: SOD-323

Case Material: Molded Plastic. UL Flammability



| Dim | Dimensions  |      |        |       |
|-----|-------------|------|--------|-------|
|     | Millimeters |      | Inches |       |
|     | Min         | Max  | Min    | Max   |
| A   | 1.50        | 1.80 | 0.060  | 0.071 |
| B   | 1.2         | 1.40 | 0.045  | 0.054 |
| C   | -           | 1.10 | -      | 0.043 |
| D   | 0.30        | 0.40 | 0.012  | 0.016 |
| H   | -           | 0.10 | -      | 0.004 |
| J   | 0.10        | 0.25 | 0.004  | 0.010 |
| K   | 2.30        | 2.70 | 0.090  | 0.107 |

## Recommended Pad outline



| Dim | Dimensions  |        |
|-----|-------------|--------|
|     | Millimeters | Inches |
| A   | 3.15        | 0.120  |
| B   | 0.80        | 0.031  |
| C   | 0.80        | 0.031  |



## DISCLAIMER

AFSEMI RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. AFSEMI DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENCE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

THE GRAPHS PROVIDED IN THIS DOCUMENT ARE STATISTICAL SUMMARIES BASED ON A LIMITED NUMBER OF SAMPLES AND ARE PROVIDED FOR INFORMATIONAL PURPOSE ONLY. THE PERFORMANCE CHARACTERISTICS LISTED IN THEM ARE NOT TESTED OR GUARANTEED. IN SOME GRAPHS, THE DATA PRESENTED MAY BE OUTSIDE THE SPECIFIED OPERATING RANGE (E.G., OUTSIDE SPECIFIED POWER SUPPLY RANGE ) AND THEREFORE OUTSIDE THE WARRANTED RANGE.