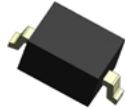


# STS321XXBXX0

## TVS Diode ESD suppressor



### Product features

- Protects one bi-directional I/O line
- Low clamping voltage
- Low leakage current
- Meets moisture sensitivity level (MSL) 3
- Molding compound flammability rating: UL 94V-0
- Termination finish: Tin

### Applications

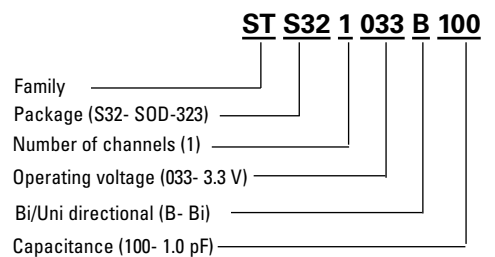
- Cellular handsets and accessories
- Microprocessor based equipment
- Portable electronics
- Notebooks, desktops, and servers
- Portable instrumentation
- Peripherals
- USB interface

### Environmental compliance and general specifications

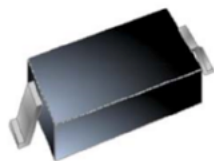
- IEC61000-4-2 (ESD)
  - Up to  $\pm 30$  kV (air)
  - Up to  $\pm 30$  kV (contact)
- IEC61000-4-5 (Lightning) Up to 20 A (8/20  $\mu$ s)



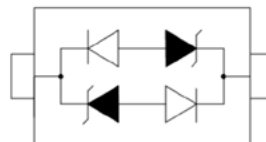
### Ordering part number



### Pin out/functional diagram



SOD-323



Pin Configuration

### Absolute maximum ratings

(+25 °C, RH=45%-75%, unless otherwise noted)

Parameter	Symbol	Value	Unit
Peak pulse power dissipation on 8/20 μs waveform	$P_{PP}$	350	W
ESD per IEC 61000-4-2 (Air)	$V_{ESD}$	+/-30	kV
ESD per IEC 61000-4-2 (Contact)		+/-30	
Lead soldering temperature	$T_L$	+260 (10 seconds)	°C
Operating junction temperature range	$T_J$	-55 to +125	°C
Storage temperature range	$T_{STG}$	-55 to +150	°C

### Electrical characteristics

(+25 °C)

#### STS321033B100

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Reverse working voltage	-	-	-	3.3	$V_{RWM}$ (V)
Reverse breakdown voltage	$I_T = 1$ mA	3.6	-	-	$V_{BR}$ (V)
Reverse leakage current	$V_{RWM} = 3.3$ V	-	-	0.1	$I_R$ (μA)
Clamping voltage	$I_{PP} = 1$ A, $t_p = 8/20$ μs	-	-	6.5	$V_C$ (V)
	$I_{PP} = 10$ A, $t_p = 8/20$ μs	-	-	12	$V_C$ (V)
	$I_{PP} = 20$ A, $t_p = 8/20$ μs	-	-	17.5	$V_C$ (V)
Junction capacitance	$V_{RWM} = 0$ V, $f = 1$ MHz	-	1.0	1.5	$C_J$ (pF)

#### STS321050B100

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Reverse working voltage	-	-	-	5.0	$V_{RWM}$ (V)
Reverse breakdown voltage	$I_T = 1$ mA	6.0	-	-	$V_{BR}$ (V)
Reverse leakage current	$V_{RWM} = 5$ V	-	-	1	$I_R$ (μA)
Clamping voltage	$I_{PP} = 1$ A, $t_p = 8/20$ μs	-	-	9.8	$V_C$ (V)
	$I_{PP} = 18$ A, $t_p = 8/20$ μs	-	-	20	$V_C$ (V)
Junction capacitance	$V_{RWM} = 0$ V, $f = 1$ MHz	-	1.0	1.5	$C_J$ (pF)

#### STS321080B100

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Reverse working voltage	-	-	-	8	$V_{RWM}$ (V)
Reverse breakdown voltage	$I_T = 1$ mA	8.5	-	-	$V_{BR}$ (V)
Reverse leakage current	$V_{RWM} = 8$ V	-	-	1	$I_R$ (μA)
Clamping voltage	$I_{PP} = 1$ A, $t_p = 8/20$ μs	-	-	13.5	$V_C$ (V)
	$I_{PP} = 18$ A, $t_p = 8/20$ μs	-	-	23	$V_C$ (V)
Junction capacitance	$V_{RWM} = 0$ V, $f = 1$ MHz	-	1.0	1.5	$C_J$ (pF)

**STS3210120B100**

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Reverse working voltage	-	-	-	12	$V_{RWM}$ (V)
Reverse breakdown voltage	$I_T = 1$ mA	13.3	-	-	$V_{BR}$ (V)
Reverse leakage current	$V_{RWM} = 12$ V	-	-	1	$I_R$ ( $\mu$ A)
Clamping voltage	$I_{PP} = 1$ A, $t_p = 8/20$ $\mu$ s	-	-	19	$V_C$ (V)
	$I_{PP} = 12$ A, $t_p = 8/20$ $\mu$ s	-	-	30	$V_C$ (V)
Junction capacitance	$V_{RWM} = 0$ V, $f = 1$ MHz	-	1.0	1.5	$C_J$ (pF)

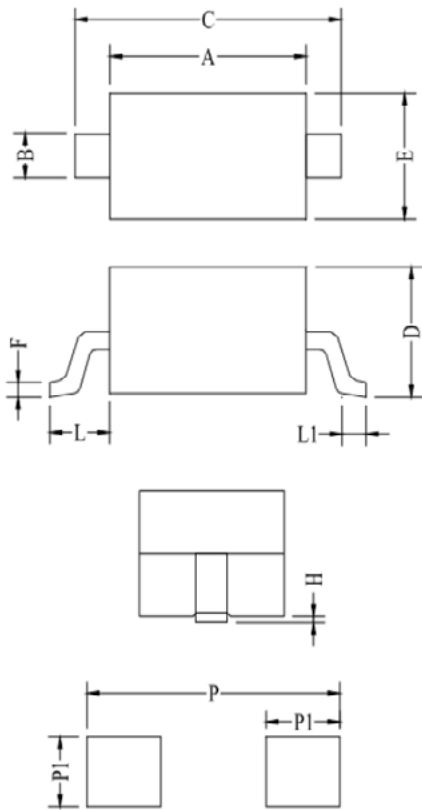
**STS321150B100**

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Reverse working voltage	-	-	-	15	$V_{RWM}$ (V)
Reverse breakdown voltage	$I_T = 1$ mA	16.7	-	-	$V_{BR}$ (V)
Reverse leakage current	$V_{RWM} = 15$ V	-	-	1	$I_R$ ( $\mu$ A)
Clamping voltage	$I_{PP} = 1$ A, $t_p = 8/20$ $\mu$ s	-	-	25	$V_C$ (V)
	$I_{PP} = 10$ A, $t_p = 8/20$ $\mu$ s	-	-	40	$V_C$ (V)
Junction capacitance	$V_{RWM} = 0$ V, $f = 1$ MHz	-	1.0	1.5	$C_J$ (pF)

**STS321240B100**

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Reverse working voltage	-	-	-	24	$V_{RWM}$ (V)
Reverse breakdown voltage	$I_T = 1$ mA	26.7	-	-	$V_{BR}$ (V)
Reverse leakage current	$V_{RWM} = 24$ V	-	-	1	$I_R$ ( $\mu$ A)
Clamping voltage	$I_{PP} = 1$ A, $t_p = 8/20$ $\mu$ s	-	-	38	$V_C$ (V)
	$I_{PP} = 9$ A, $t_p = 8/20$ $\mu$ s	-	-	54	$V_C$ (V)
Junction capacitance	$V_{RWM} = 0$ V, $f = 1$ MHz	-	1.0	1.5	$C_J$ (pF)

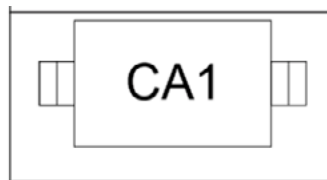
**Mechanical parameters, pad layout- mm/inches**



Dimension	Millimeters		Inches	
	Minimum	Maximum	Minimum	Maximum
A	1.60	1.80	0.063	0.071
B	0.25	0.35	0.010	0.014
C	2.50	2.75	0.098	0.108
D	0.00	1.00	0.000	0.039
E	1.20	1.40	0.047	0.055
F	0.08	0.15	0.003	0.006
L	0.475REF		0.019REF	
L1	0.25	0.40	0.010	0.016
H	0.00	0.10	0.000	0.004
P	3.00		0.118	
P1	0.80		0.031	

**Land Pattern**

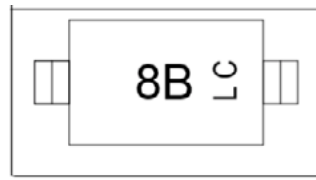
**Part marking**



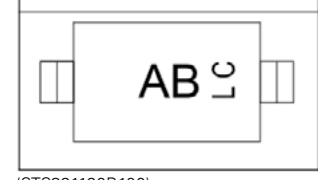
(STS321033B100)



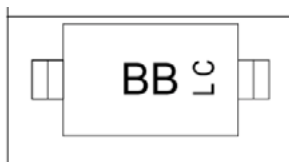
(STS321050B100)



(STS321080B100)



(STS321120B100)



(STS321150B100)

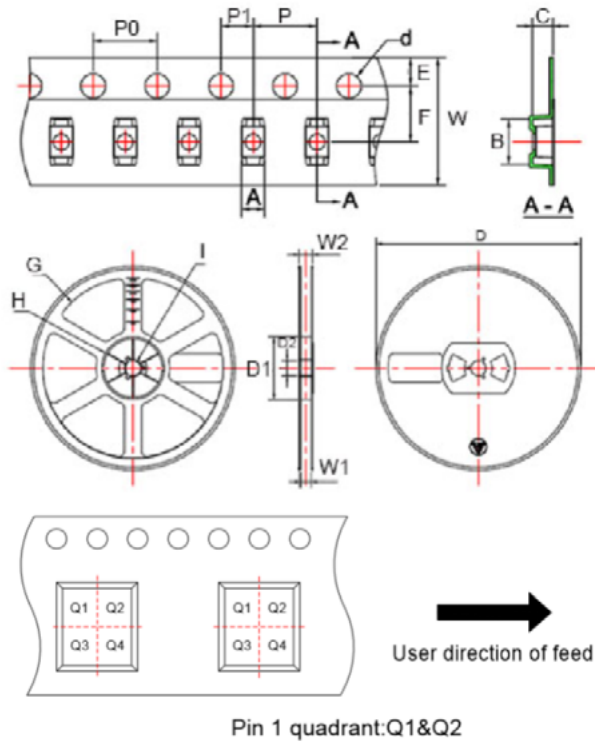


(STS321240B100)

**Packaging information mm/inches**

Drawing not to scale.

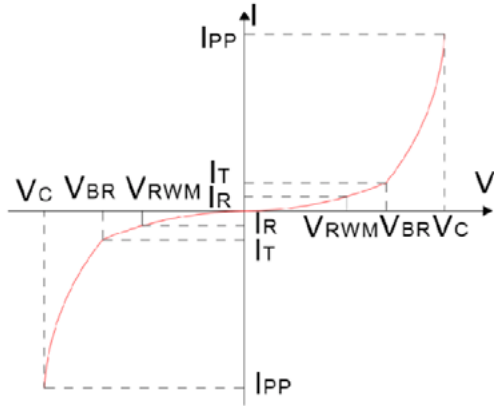
Supplied in tape and reel packaging, 3,000 parts per 7" diameter reel (EIA-481 compliant)



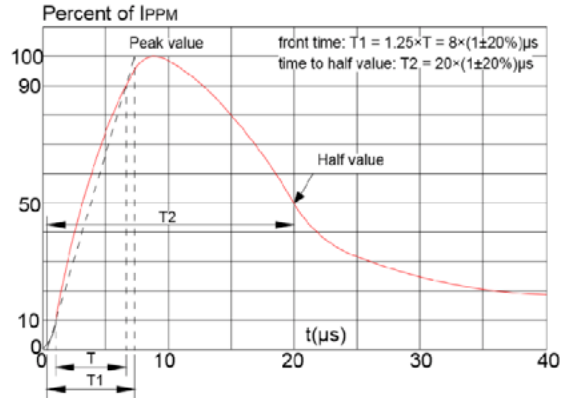
Symbol	Millimeters	Inches
A	1.46±0.05	0.057±0.002
B	2.90±0.05	0.114±0.002
C	1.25±0.05	0.049±0.002
d	±1.50±0.1	±0.059±0.004
E	1.75±0.1	0.069±0.004
F	3.50±0.1	0.138±0.004
P0	4.0±0.1	0.157±0.004
P	4.0±0.1	0.157±0.004
P1	2.0±0.1	0.079±0.004
W	8.00+0.3/-0.1	0.315+0.012/-0.004
D	±178.0±2	±7.008±0.079
D1	54.40±1	2.142±0.039
D2	13.0±1	0.512±0.039
G	R78.0±1	R3.071±0.039
H	R25.60±1	R1.008±0.039
I	R6.50±1	R0.256±0.039
W1	9.50±1	0.374±0.039
W2	12.30±1	0.484±0.039

**Ratings and V-I characteristic curves** (+25 °C unless otherwise noted)

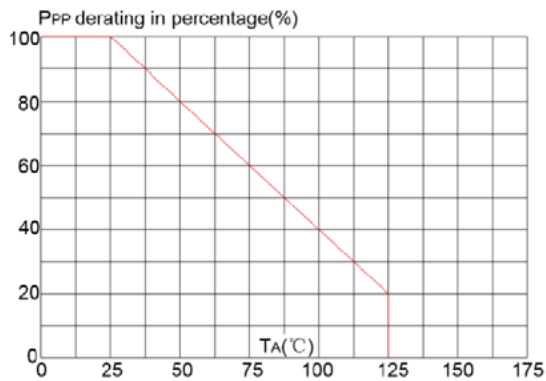
**V- I curve characteristics (Bi-directional)**



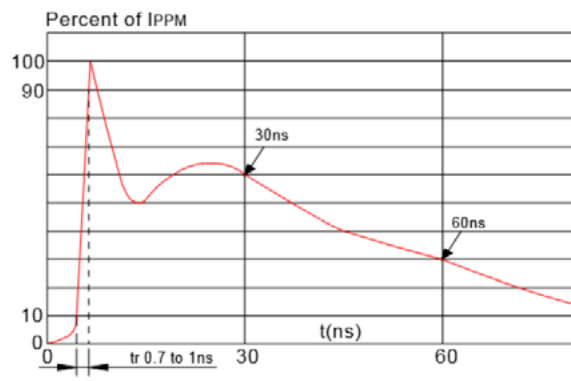
**Pulse waveform (8/20  $\mu$ s)**



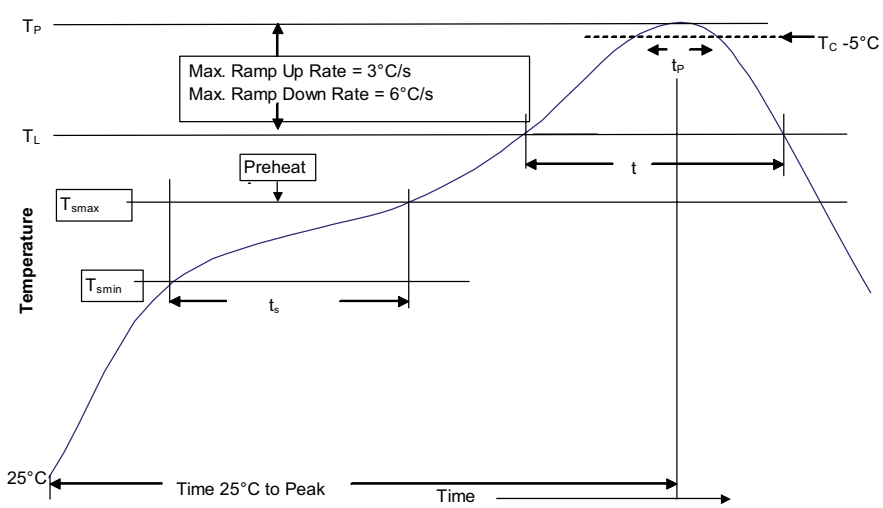
**Pulse derating curve**



**ESD waveform**



**Solder reflow profile**



**Table 1 - Standard SnPb solder (T<sub>C</sub>)**

Package thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> ≥350
<2.5 mm	235 °C	220 °C
≥2.5 mm	220 °C	220 °C

**Table 2 - Lead (Pb) free solder (T<sub>C</sub>)**

Package thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> 350 - 2000	Volume mm <sup>3</sup> >2000
<1.6 mm	260 °C	260 °C	260 °C
1.6 – 2.5 mm	260 °C	250 °C	245 °C
>2.5 mm	250 °C	245 °C	245 °C

**Reference J-STD-020**

Profile feature	Standard SnPb solder	Lead (Pb) free solder
Preheat and soak		
• Temperature min. (T <sub>smin</sub> )	100 °C	150 °C
• Temperature max. (T <sub>smax</sub> )	150 °C	200 °C
• Time (T <sub>smin</sub> to T <sub>smax</sub> ) (t <sub>s</sub> )	60-120 seconds	60-120 seconds
Ramp up rate T <sub>L</sub> to T <sub>p</sub>	3 °C/ second max.	3 °C/ second max.
Liquidous temperature (T <sub>L</sub> )	183 °C	217 °C
Time (t <sub>L</sub> ) maintained above T <sub>L</sub>	60-150 seconds	60-150 seconds
Peak package body temperature (T <sub>p</sub> )*	Table 1	Table 2
Time (t <sub>p</sub> )* within 5 °C of the specified classification temperature (T <sub>C</sub> )	20 seconds*	30 seconds*
Ramp-down rate (T <sub>p</sub> to T <sub>L</sub> )	6 °C/ second max.	6 °C/ second max.
Time 25 °C to peak temperature	6 minutes max.	8 minutes max.

\* Tolerance for peak profile temperature (T<sub>p</sub>) is defined as a supplier minimum and a user maximum.

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