

STS321XXXUXXX

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

Environmental compliance and general specifications

- IEC61000-4-2 (ESD)
 - Up to ± 30 kV (air)
 - Up to ± 30 kV (contact)
- IEC61000-4-5 (Lightning) Up to 25 A (8/20 μ s)



Ordering part number

	<u>ST</u>	<u>S32</u>	<u>1</u>	<u>033</u>	<u>U</u>	<u>202</u>
Family						
Package (S32- SOD-323)						
Number of channels (1-1)						
Operating voltage (033- 3.3 V)						
Bi/Uni directional (U- Uni)						
Capacitance (202- 200 pF)						

Pin out/functional diagram



SOD-323



Pin Configuration

Absolute maximum ratings

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

Parameter	Symbol	Value	STS321150U751	STS321360U351	Unit
		STS321033U202 STS321050U182 STS321070U162 STS321120U901 STS321240U401			
Peak pulse power dissipation on 8/20 μs waveform	P _{PP}	350	350	500	W
ESD per IEC 61000-4-2 (Air)	V _{ESD}	+/-30	+/-30	+/-15	kV
ESD per IEC 61000-4-2 (Contact)		+/-30	+/-25	+/-8	
Lead soldering temperature	T _L	+260 (10 seconds)	+260 (10 seconds)	+260 (10 seconds)	°C
Operating junction temperature range	T _J	-55 to +125	-55 to +125	-55 to +125	°C
Storage temperature range	T _{STG}	-55 to +150	-55 to +150	-55 to +150	°C

Electrical characteristics

(+25 °C)

STS321033U202

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Reverse working voltage	-	-	-	3.3	V _{RWM} (V)
Reverse breakdown voltage	I _r = 1 mA	4	-	-	V _{BR} (V)
Reverse leakage current	V _{RWM} = 3.3 V	-	1	5	I _R (μA)
Peak pulse current	t _p = 8/20 μs	-	-	25	I _{PP} (A)
Clamping voltage	I _{PP} = 1 A, t _p = 8/20 μs	-	5.5	6.5	V _C (V)
	I _{PP} = 25 A, t _p = 8/20 μs	-	10	15	V _C (V)
Junction capacitance	V _{RWM} = 0 V, f = 1 MHz	-	200	250	C _J (pF)

STS321050U182

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Reverse working voltage	-	-	-	5.0	V _{RWM} (V)
Reverse breakdown voltage	I _r = 1 mA	6.0	-	-	V _{BR} (V)
Reverse leakage current	V _{RWM} = 5.0 V	-	-	1	I _R (μA)
Clamping voltage	I _{PP} = 1 A, t _p = 8/20 μs	-	-	9.0	V _C (V)
	I _{PP} = 22 A, t _p = 8/20 μs	-	12	15	V _C (V)
Junction capacitance	V _{RWM} = 0 V, f = 1 MHz	-	180	-	C _J (pF)

STS321070U162

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Reverse working voltage	-	-	-	7	V _{RWM} (V)
Reverse breakdown voltage	I _r = 1 mA	7.5	8.5	9	V _{BR} (V)
Reverse leakage current	V _{RWM} = 7 V	-	0.1	0.5	I _R (μA)
Clamping voltage	I _{PP} = 1 A, t _p = 8/20 μs	-	11.5	15	V _C (V)
	I _{PP} = 25 A, t _p = 8/20 μs	-	15.5	20	V _C (V)
Junction capacitance	V _{RWM} = 0 V, f = 1 MHz	-	165	200	C _J (pF)

STS321120U901

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Reverse working voltage	-	-	-	12	V_{RWM} (V)
Reverse breakdown voltage	$I_T = 1$ mA	13.3	13.5	16	V_{BR} (V)
Reverse leakage current	$V_{RWM} = 12$ V	-	0.01	0.1	I_R (μ A)
Clamping voltage	$I_{PP} = 1$ A, $t_p = 8/20$ μ s	-	15	18	V_c (V)
	$I_{PP} = 15$ A, $t_p = 8/20$ μ s	-	21	24	V_c (V)
Junction capacitance	$V_{RWM} = 0$ V, $f = 1$ MHz	-	90	100	C_J (pF)

STS321150U751

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Reverse working voltage	-	-	-	15	V_{RWM} (V)
Reverse breakdown voltage	$I_T = 1$ mA	16	17	19	V_{BR} (V)
Reverse leakage current	$V_{RWM} = 15$ V	-	0.1	0.2	I_R (μ A)
Clamping voltage	$I_{PP} = 1$ A, $t_p = 8/20$ μ s	-	20	23	V_c (V)
	$I_{PP} = 13$ A, $t_p = 8/20$ μ s	-	27	30	V_c (V)
Junction capacitance	$V_{RWM} = 0$ V, $f = 1$ MHz	-	75	90	C_J (pF)

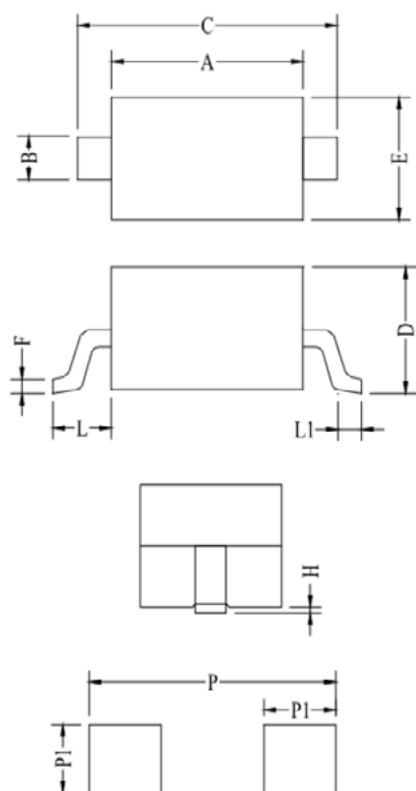
STS321240U401

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Reverse working voltage	-	-	-	24	V_{RWM} (V)
Reverse breakdown voltage	$I_T = 1$ mA	26.4	28	32	V_{BR} (V)
Reverse leakage current	$V_{RWM} = 24$ V	-	-	0.1	I_R (μ A)
Clamping voltage	$I_{PP} = 1$ A, $t_p = 8/20$ μ s	-	-	32	V_c (V)
	$I_{PP} = 8$ A, $t_p = 8/20$ μ s	-	-	45	V_c (V)
Junction capacitance	$V_{RWM} = 0$ V, $f = 1$ MHz	-	40	70	C_J (pF)

STS321360U351

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Reverse working voltage	-	-	-	36	V_{RWM} (V)
Reverse breakdown voltage	$I_T = 1$ mA	39	-	-	V_{BR} (V)
Reverse leakage current	$V_{RWM} = 36$ V	-	-	0.1	I_R (μ A)
Clamping voltage	$I_{PP} = 1$ A, $t_p = 8/20$ μ s	-	45	55	V_c (V)
	$I_{PP} = 6$ A, $t_p = 8/20$ μ s	-	60	65	V_c (V)
Junction capacitance	$V_{RWM} = 0$ V, $f = 1$ MHz	-	35	45	C_J (pF)

Mechanical parameters, pad layout- mm



Land Pattern

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	0.475 REF		0.019 REF	
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	

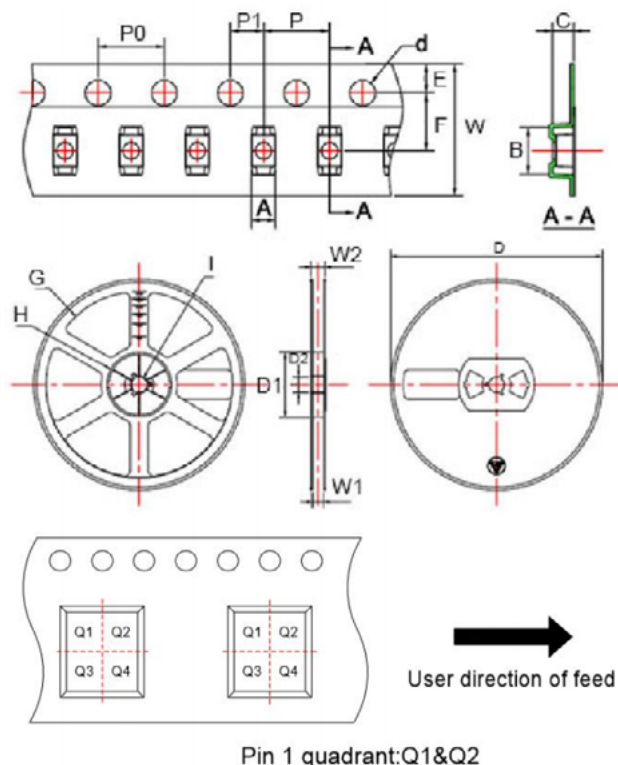
Part marking

 (STS321033U202)	 (STS321050U182)	 (STS321070U162)	 (STS321120U901)
 (STS321150U751)	 (STS321240U401)	 (STS321360U351)	

Packaging information mm/inches

Drawing not to scale.

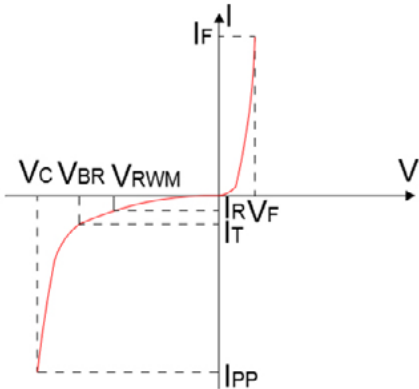
Supplied in tape and reel packaging, 3,000 parts per 7" diameter reel (EIA-481 compliant)



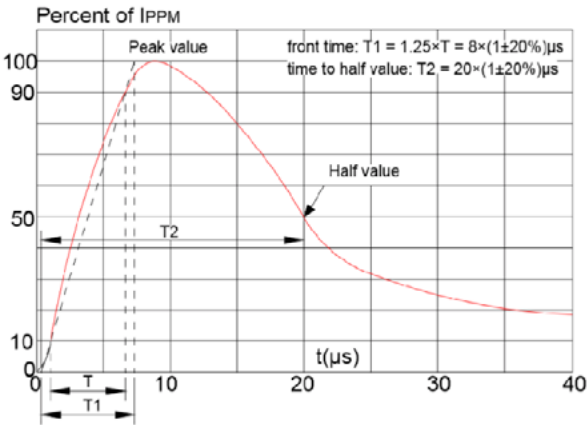
Symbol	Millimeters	Inches
A	1.46±0.05	0.057±0.002
B	2.90±0.05	0.114±0.002
C	1.25±0.05	0.049±0.002
d	±1.50±0.1	±0.059±0.004
E	1.75±0.1	0.069±0.004
F	3.50±0.1	0.138±0.004
P0	4.0±0.1	0.157±0.004
P	4.0±0.1	0.157±0.004
P1	2.0±0.1	0.079±0.004
W	8.00+0.3/-0.1	0.315+0.012/-0.004
D	±178.0±2	±7.008±0.079
D1	54.40±1	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)

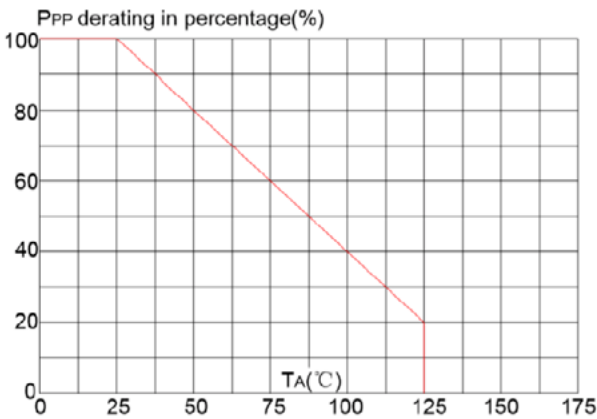
V- I curve characteristics (Uni-directional)



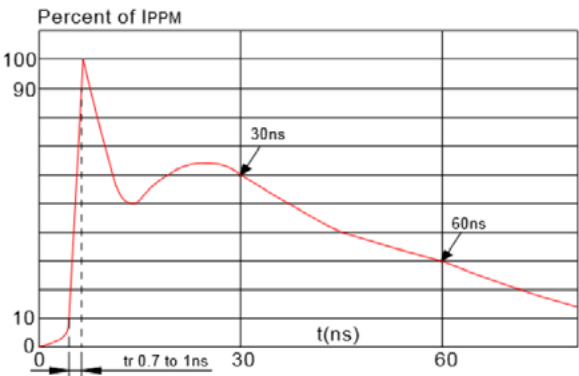
Pulse waveform (8/20 μs)



Pulse derating curve



ESD waveform



Solder reflow profile

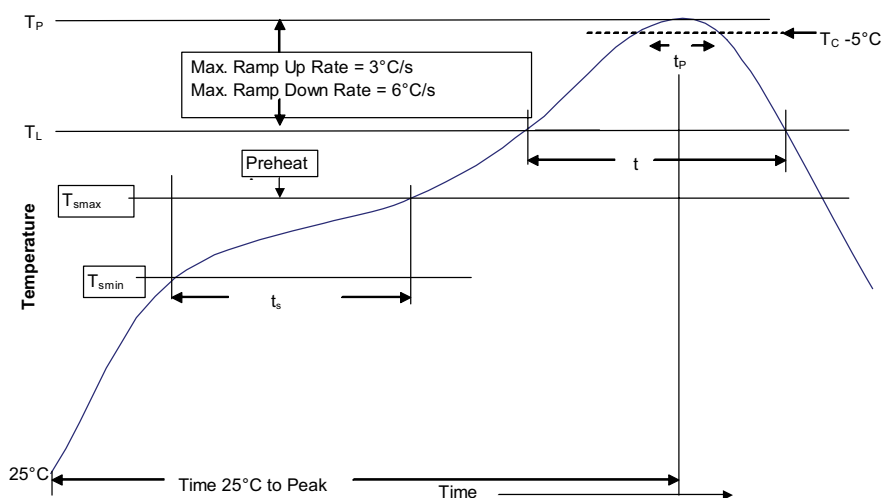


Table 1 - Standard SnPb solder (T_C)

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

Table 2 - Lead (Pb) free solder (T_C)

Package thickness	Volume mm ³ <350	Volume mm ³ 350 - 2000	Volume mm ³ >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_{smin})	100 °C	150 °C
• Temperature max. (T_{smax})	150 °C	200 °C
• Time (T_{smin} to T_{smax}) (t_s)	60-120 seconds	60-120 seconds
Ramp up rate T_L to T_p	3 °C/ second max.	3 °C/ second max.
Liquidous temperature (T_L)	183 °C	217 °C
Time (t_L) maintained above T_L	60-150 seconds	60-150 seconds
Peak package body temperature (T_p)*	Table 1	Table 2
Time (t_p)* within 5 °C of the specified classification temperature (T_C)	20 seconds*	30 seconds*
Ramp-down rate (T_p to T_L)	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_p) is defined as a supplier minimum and a user maximum.

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Printed in USA
Publication No. 11152 BU-MC20134
September 2020

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