

STS321XXBXX1

TVS Diode ESD suppressor



Product features

- 400 Watts peak pulse power per line ($t_p = 8/20 \mu s$)
- 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

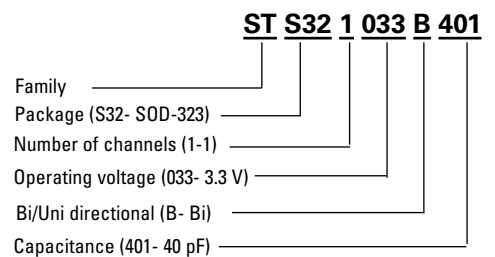
- Cellular handsets and accessories
- Microprocessor based equipment
- Portable electronics
- Notebooks, desktops, and servers
- Portable instrumentation
- Peripherals
- Pagers

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 22 A (8/20 μs)



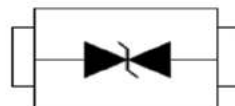
Ordering part number



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}	400	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)

STS321033B401

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	-	-	1	I_R (μA)
Clamping voltage	$I_{PP} = 30$ A, $t_p = 8/20$ μs	-	-	15	V_C (V)
Junction capacitance	$V_{RWM} = 0$ V, $f = 1$ MHz	-	40	60	C_J (pF)

STS321050B331

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Reverse working voltage	-	-	-	5	V_{RWM} (V)
Reverse breakdown voltage	$I_T = 1$ mA	5.5	-	-	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	V_C (V)
	$I_{PP} = 22$ A, $t_p = 8/20$ μs	-	-	18	V_C (V)
Junction capacitance	$V_{RWM} = 0$ V, $f = 1$ MHz	-	33	75	C_J (pF)

STS321120B301

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 (μA)
Clamping voltage	$I_{PP} = 1$ A, $t_p = 8/20$ μs	-	-	19	V_C (V)
	$I_{PP} = 12$ A, $t_p = 8/20$ μs	-	-	33	V_C (V)
Junction capacitance	$V_{RWM} = 0$ V, $f = 1$ MHz	-	30	45	C_J (pF)

STS321150B351

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 (μ A)
Clamping voltage	$I_{PP} = 1$ A, $t_D = 8/20$ μ s	-	-	23	V_C (V)
	$I_{PP} = 10$ A, $t_D = 8/20$ μ s	-	-	33	V_C (V)
Junction capacitance	$V_{RWM} = 0$ V, $f = 1$ MHz	-	35	40	C_J (pF)

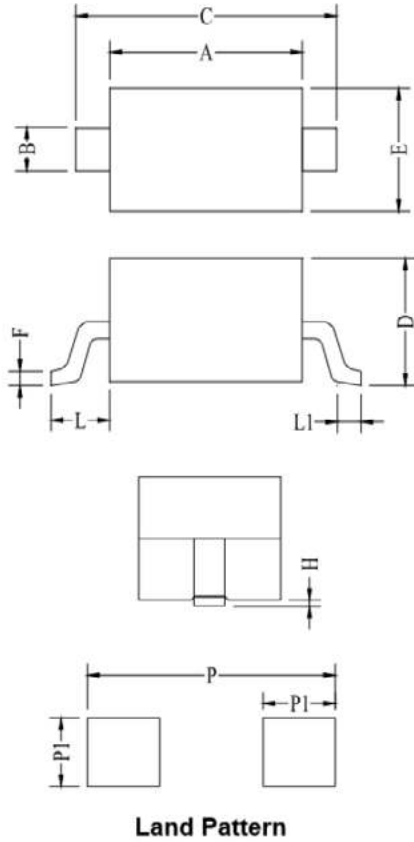
STS321240B301

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 (μ A)
Clamping voltage	$I_{PP} = 1$ A, $t_D = 8/20$ μ s	-	-	40	V_C (V)
	$I_{PP} = 8$ A, $t_D = 8/20$ μ s	-	-	50	V_C (V)
Junction capacitance	$V_{RWM} = 0$ V, $f = 1$ MHz	-	30	35	C_J (pF)

STS321360B141

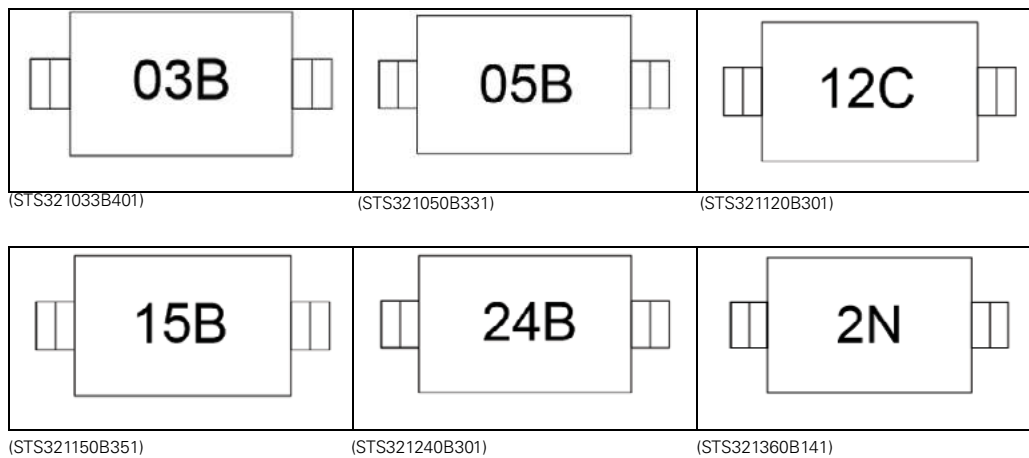
Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Reverse working voltage	-	-	-	36	V_{RWM} (V)
Reverse breakdown voltage	$I_T = 1$ mA	40	42	47.6	V_{BR} (V)
Reverse leakage current	$V_{RWM} = 36$ V	-	-	0.2	I_R (μ A)
Clamping voltage	$I_{PP} = 1$ A, $t_D = 8/20$ μ s	-	45	60	V_C (V)
	$I_{PP} = 6$ A, $t_D = 8/20$ μ s	-	60	70	V_C (V)
Junction capacitance	$V_{RWM} = 0$ V, $f = 1$ MHz	-	14	25	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	0.475 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	

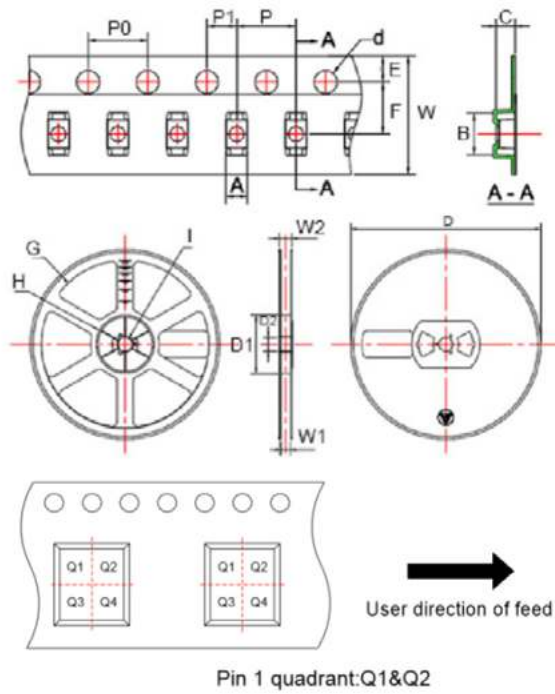
Part marking



Packaging information mm/inches

Drawing not to scale.

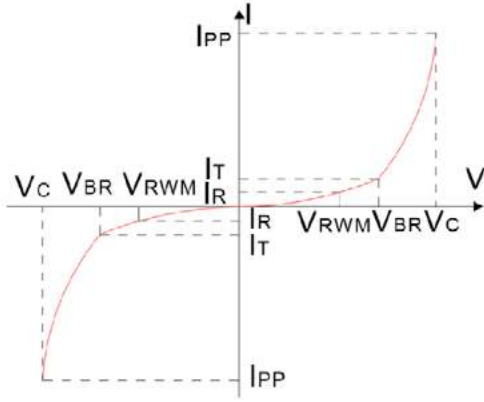
Supplied in tape and reel packaging, 3,000 parts per 7" diameter reel (EIA-481 compliant)



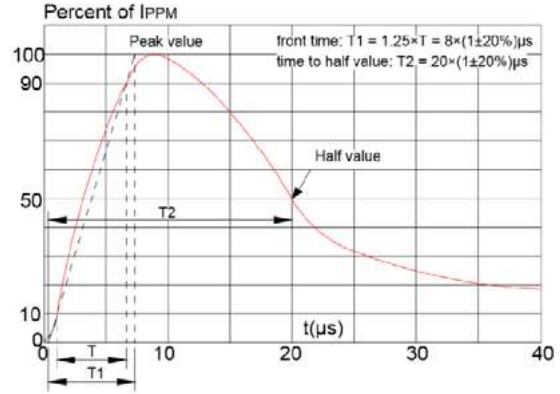
Symbol	Millimeters	Inches
A	1.46±0.05	0.057±0.002
B	2.90±0.05	0.114±0.002
C	1.25±0.05	0.049±0.002
d	∅1.50±0.1	∅0.059±0.004
E	1.75±0.1	0.069±0.004
F	3.50±0.1	0.138±0.004
P0	4.0±0.1	0.157±0.004
P	4.0±0.1	0.157±0.004
P1	2.0±0.1	0.079±0.004
W	8.00+0.3/-0.1	0.315+0.012/-0.004
D	∅178.0±2	∅7.008±0.079
D1	54.40±1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

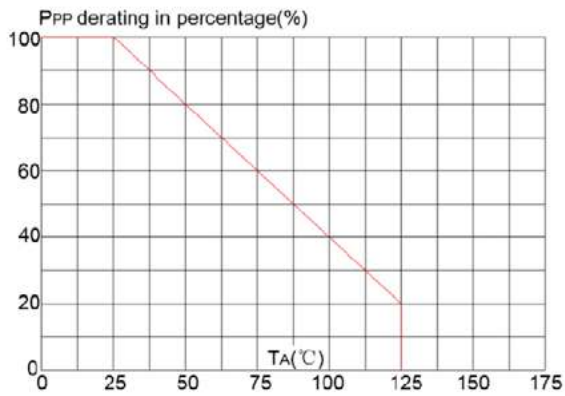
V- I curve characteristics (Bi-directional)



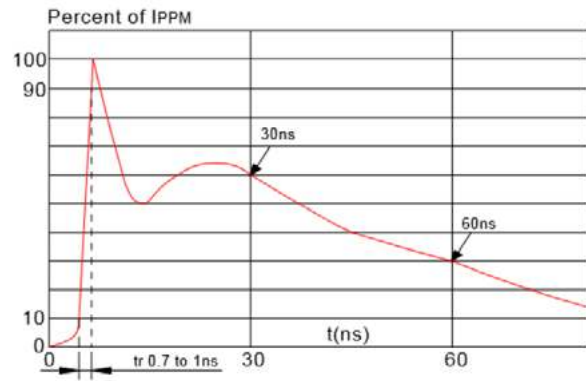
Pulse waveform (8/20 μ s)



Pulse derating curve



ESD waveform



Solder reflow profile

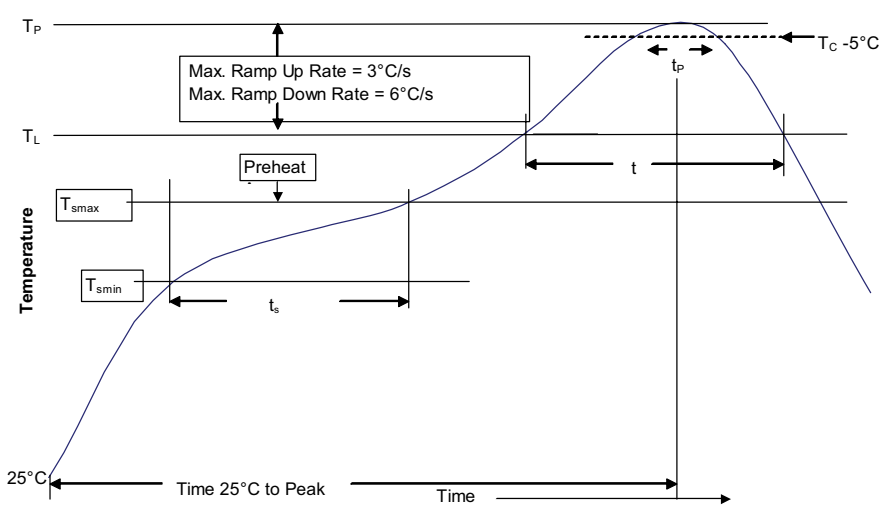


Table 1 - Standard SnPb solder (T_C)

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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