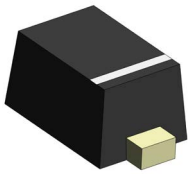
STS521XXXXXXXAH

Automotive TVS diode ESD suppressor



Product features

- AEC-Q101
- Uni-directional and bi-directional options
- Protects one I/O line
- Meets moisture sensitivity level (MSL) 1
- Molding compound flammability rating: UL 94V-0

Applications

- Automotive chassis and safety systems
- Advanced driver assistance systems (ADAS)
- Communication and infotainment systems
- CAN-bus, LIN and Ethernet communication modules
- Network systems and body electronics
- Power train controls
- Automotive lighting

Environmental compliance and general specifications

- IEC61000-4-2 (ESD) Up to ±30 kV (air), ±30 kV (contact)
- IEC61000-4-4 (EFT) 40 A (5/50 ns)
- IEC61000-4-5 (Lightning) up to 20 A (8/20 µs)

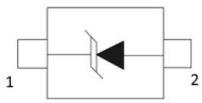
Ordering part number

ST S52 1 360 U 221 AH

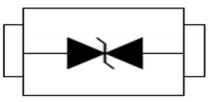
- Family
- Package (S52-SOD-523)
- Number of channels
- Operating voltage (360 - 36 V)
- Bi/Uni directional (B = Bi, U = Uni)
- Capacitance (221 - 22 pF)
- Automotive grade

SOD-523

Pin configuration Uni-directional



Pin configuration Bi-directional



Powering Business Worldwide

Product specifications

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

STS521033B101AH

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Peak pulse power dissipation	8/20 µs waveform	-	80	-	P_{pp} (W)
ESD per IEC 61000-4-2 (Air)	-	-	+/-30	-	V_{ESD} (kV)
ESD per IEC 61000-4-2 (Contact)			+/-25		V_{ESD} (kV)
Lead soldering temperature	-	-	+260 (10 seconds)	-	T_L (° C)
Operating junction temperature range	-	-55	-	+150	T_J (° C)
Storage temperature range	-	-55	-	+150	T_{STG} (° C)
Reverse working voltage	-	-	-	3.3	V_{RWM} (V)
Reverse breakdown voltage	I_T = 1 mA	3.6	-	-	V_{BR} (V)
Reverse holding voltage	I_H = 50 mA	3.5			V_H (V)
Reverse leakage current	V_{RWM} = 3.3 V	-	-	1	I_R (µA)
Clamping voltage	I_{PP} = 1 A, t_p = 8/20 µs	-	6	8	V_C (V)
	I_{PP} = 7 A, t_p = 8/20 µs	-	9	12	
Junction capacitance	V_{RWM} = 0 V, f = 1 MHz	-	10	20	C_J (pF)

STS521050B181AH

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Peak pulse power dissipation	8/20 µs waveform	-	100	-	P_{pp} (W)
ESD per IEC 61000-4-2 (Air)	-	-	+/-30	-	V_{ESD} (kV)
ESD per IEC 61000-4-2 (Contact)			+/-30		V_{ESD} (kV)
Lead soldering temperature	-	-	+260 (10 seconds)	-	T_L (° C)
Operating junction temperature range	-	-55	-	+150	T_J (° C)
Storage temperature range	-	-55	-	+150	T_{STG} (° C)
Reverse working voltage	-	-	-	5	V_{RWM} (V)
Reverse breakdown voltage	I_T = 1 mA	5.5	7	8.5	V_{BR} (V)
Reverse holding voltage	I_H = 50 mA	5.5			V_H (V)
Reverse leakage current	V_{RWM} = 5 V	-	-	0.1	I_R (µA)
Clamping voltage	I_{PP} = 1 A, t_p = 8/20 µs	-	7	10	V_C (V)
	I_{PP} = 7 A, t_p = 8/20 µs	-	11	13	V_C (V)
Junction capacitance	V_{RWM} = 0 V, f = 1 MHz	-	18	20	C_J (pF)

STS521050B331AH

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Peak pulse power dissipation	8/20 µs waveform	-	300	-	P_{pp} (W)
ESD per IEC 61000-4-2 (Air)	-	-	+/-25	-	V_{ESD} (kV)
ESD per IEC 61000-4-2 (Contact)			+/-20		V_{ESD} (kV)
Lead soldering temperature	-	-	+260 (10 seconds)	-	T_L (° C)
Operating junction temperature range	-	-55	-	+150	T_J (° C)
Storage temperature range	-	-55	-	+150	T_{STG} (° C)
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	-	6.5	9	V_C (V)
	I_{PP} = 20 A, t_p = 8/20 µs	-	10.5	14	V_C (V)
Junction capacitance	V_{RWM} = 0 V, f = 1 MHz	-	-	80	C_J (pF)

STS521050U751AH

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Peak pulse power dissipation	8/20 µs waveform	-	150	-	P_{pp} (W)
ESD per IEC 61000-4-2 (Air)	-	-	+/-30	-	V_{ESD} (kV)
ESD per IEC 61000-4-2 (Contact)			+/-30		V_{ESD} (kV)
Lead soldering temperature	-	-	+260 (10 seconds)	-	T_L (° C)
Operating junction temperature range	-	-55	-	+150	T_J (° C)
Storage temperature range	-	-55	-	+150	T_{STG} (° C)
Reverse working voltage	-	-	-	5	V_{RWM} (V)
Reverse breakdown voltage	I_T = 1 mA	6	-	8	V_{BR} (V)
Forward voltage	I_F = 15 mA	-	0.8	1.1	V_F (V)
Reverse leakage current	V_{RWM} = 5 V	-	0.01	0.1	I_R (µA)
Clamping voltage	I_{PP} = 1 A, t_p = 8/20 µs	-	8.5	10	V_C (V)
	I_{PP} = 10 A, t_p = 8/20 µs	-	12	15	V_C (V)
Junction capacitance	V_{RWM} = 0 V, f = 1 MHz	-	75	100	C_J (pF)

STS521070U701AH

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Peak pulse power dissipation	8/20 µs waveform	-	120	-	P_{pp} (W)
ESD per IEC 61000-4-2 (Air)	-	-	+/-30	-	V_{ESD} (kV)
ESD per IEC 61000-4-2 (Contact)			+/-30		V_{ESD} (kV)
Lead soldering temperature	-	-	+260 (10 seconds)	-	T_L (° C)
Operating junction temperature range	-	-55	-	+150	T_J (° C)
Storage temperature range	-	-55	-	+150	T_{STG} (° C)
Reverse working voltage	-	-	-	7	V_{RWM} (V)
Reverse breakdown voltage	I_T = 1 mA	7.5	8.5	9.5	V_{BR} (V)
Reverse leakage current	V_{RWM} = 7 V	-	-	0.1	I_R (µA)
Clamping voltage	I_{PP} = 1 A, t_p = 8/20 µs	-	-	13	V_C (V)
	I_{PP} = 9 A, t_p = 8/20 µs	-	-	16	V_C (V)
Junction capacitance	V_{RWM} = 0 V, f = 1 MHz	-	70	85	C_J (pF)

STS521120U351AH

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Peak pulse power dissipation	8/20 µs waveform	-	120	-	P_{pp} (W)
ESD per IEC 61000-4-2 (Air)	-	-	+/-15	-	V_{ESD} (kV)
ESD per IEC 61000-4-2 (Contact)			+/-8		V_{ESD} (kV)
Lead soldering temperature	-	-	+260 (10 seconds)	-	T_L (° C)
Operating junction temperature range	-	-55	-	+150	T_J (° C)
Storage temperature range	-	-55	-	+150	T_{STG} (° C)
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	-	16	18	V_C (V)
	I_{PP} = 6 A, t_p = 8/20 µs	-	21	25	V_C (V)
Junction capacitance	V_{RWM} = 0 V, f = 1 MHz	-	35	40	C_J (pF)

STS521240U161AH

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Peak pulse power dissipation	8/20 µs waveform	-	200	-	P_{pp} (W)
ESD per IEC 61000-4-2 (Air)	-	-	+/-22	-	V_{ESD} (kV)
ESD per IEC 61000-4-2 (Contact)			+/-22		V_{ESD} (kV)
Lead soldering temperature	-	-	+260 (10 seconds)	-	T_L (° C)
Operating junction temperature range	-	-55	-	+150	T_J (° C)
Storage temperature range	-	-55	-	+150	T_{STG} (° C)
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	-	-	0.1	I_R (µA)
Clamping voltage	I_{PP} = 1 A, t_p = 8/20 µs	-	35	40	V_C (V)
	I_{PP} = 4 A, t_p = 8/20 µs	-	42	48	V_C (V)
Junction capacitance	V_{RWM} = 0 V, f = 1 MHz	-	16	25	C_J (pF)

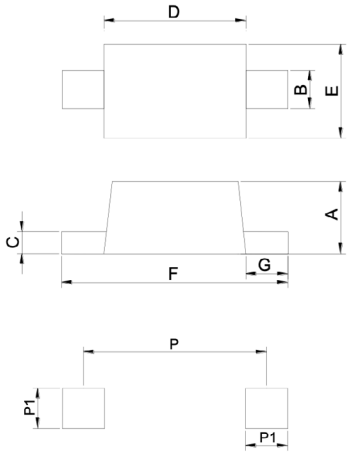
STS521360U201AH

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Peak pulse power dissipation	8/20 µs waveform	-	120	-	P_{pp} (W)
ESD per IEC 61000-4-2 (Air)	-	-	+/-22	-	V_{ESD} (kV)
ESD per IEC 61000-4-2 (Contact)			+/-22		V_{ESD} (kV)
Lead soldering temperature	-	-	+260 (10 seconds)	-	T_L (° C)
Operating junction temperature range	-	-55	-	+150	T_J (° C)
Storage temperature range	-	-55	-	+150	T_{STG} (° C)
Reverse working voltage	-	-	-	36	V_{RWM} (V)
Reverse breakdown voltage	I_T = 1 mA	40	-	-	V_{BR} (V)
Reverse leakage current	V_{RWM} = 36 V	-	-	5	I_R (µA)
Clamping voltage	I_{PP} = 1 A, t_p = 8/20 µs	-	-	55	V_C (V)
Junction capacitance	V_{RWM} = 0 V, f = 1 MHz	-	-	20	C_J (pF)

STS521360U221AH

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Peak pulse power dissipation	8/20 µs waveform	-	300	-	P_{pp} (W)
ESD per IEC 61000-4-2 (Air)	-	-	+/-30	-	V_{ESD} (kV)
ESD per IEC 61000-4-2 (Contact)			+/-30		V_{ESD} (kV)
Lead soldering temperature	-	-	+260 (10 seconds)	-	T_L (° C)
Operating junction temperature range	-	-55	-	+150	T_J (° C)
Storage temperature range	-	-55	-	+150	T_{STG} (° C)
Reverse working voltage	-	-	-	36	V_{RWM} (V)
Reverse breakdown voltage	I_T = 1 mA	40	-	-	V_{BR} (V)
Reverse leakage current	V_{RWM} = 36 V		0.01	1.0	I_R (µA)
Clamping voltage	I_{PP} = 1 A, t_p = 8/20 µs	-	45	60	V_C (V)
	I_{PP} = 4 A, t_p = 8/20 µs	-	58	70	V_C (V)
Junction capacitance	V_{RWM} = 0 V, f = 1 MHz	-	22	-	C_J (pF)

Mechanical parameters, pad layout- mm/inches



	Millimeters			Inches		
Dimension	**Minimum**	**Typical**	**Maximum**	**Minimum**	**Typical**	**Maximum**
A	0.5	0.61	0.77	0.020	0.024	0.03
B	0.25	0.3	0.4	0.010	0.012	0.016
C	0.07	0.13	0.2	0.003	0.005	0.008
D	1.1	1.2	1.3	0.043	0047	0.051
E	0.7	0.8	0.9	0.028	0.031	0.035
F	1.5	1.6	1.7	0.059	0.063	0.067
G	0.15	0.2	0.25	0.006	0.008	0.01
P1	-	0.60	-	-	0.024	-
P	-	1.42	-	-	0.056	-

Marking code

STS521033B101AH

STS521050B181AH

STS521050B331AH

STS521050U751AH

STS521070U701AH

STS521120U351AH

STS521240U161AH

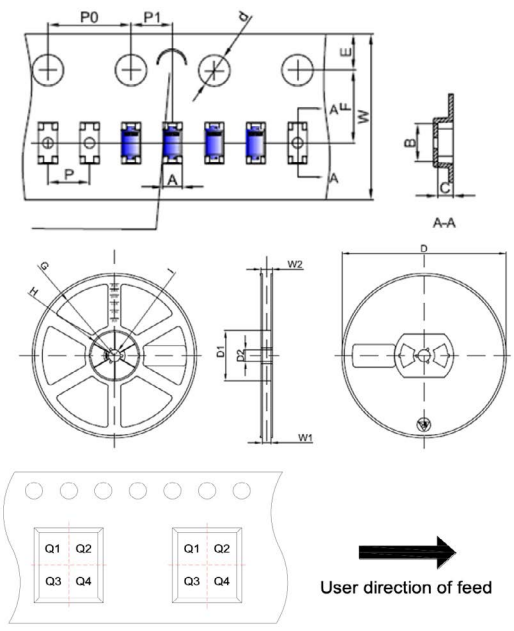
STS521360U201AH

STS521360U221AH

Packaging information mm/inches

Drawing not to scale.

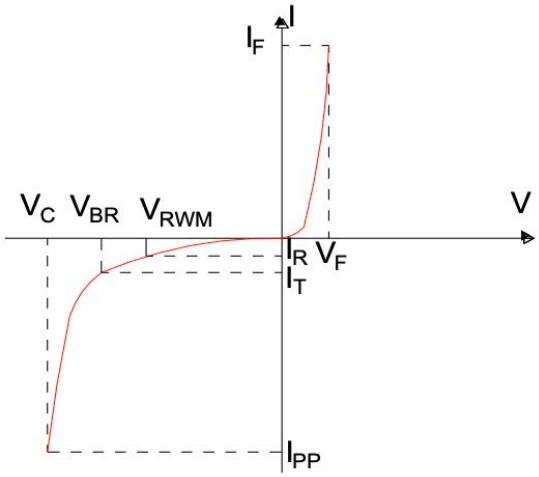
Supplied in tape and reel packaging, 8,000 parts per 7" diameter reel (EIA-481 compliant)



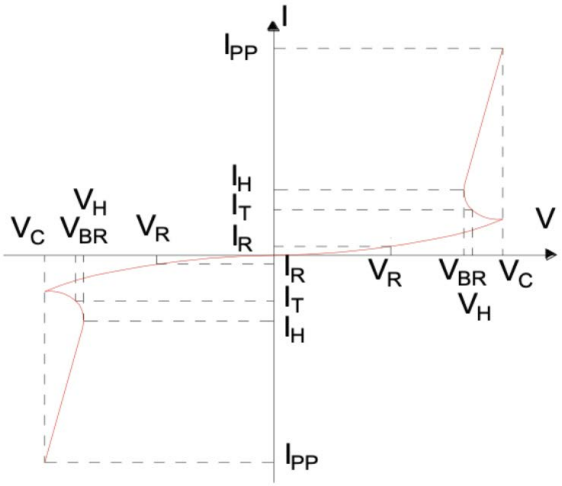
Dimension	Millimeter (typical)	Inches (typical)
A	0.95	0.037
B	1.92	0.076
C	0.73	0.029
d	1.50	0.059
E	1.75	0.069
F	3.5	0.138
P0	4	0.157
P	2	0.079
P1	2	0.079
W	8	0.315
D	178	7.008
D1	54.4	2.142
D2	13	0.512
G	R78.00	R3.071
H	R25.60	R1.008
I	R6.50	R0.256
W1	9.5	0.374
W2	12.3	0.484

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

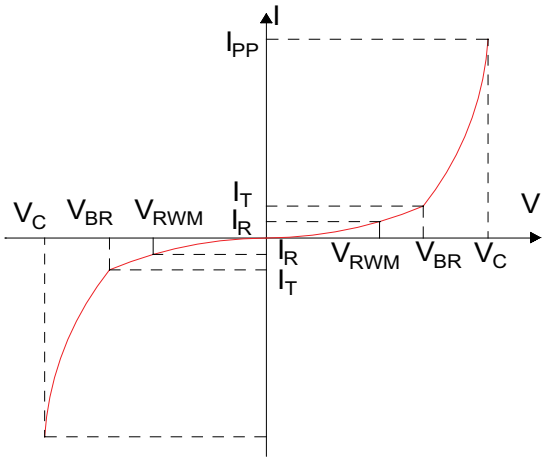
V- I curve characteristics (Uni-directional)



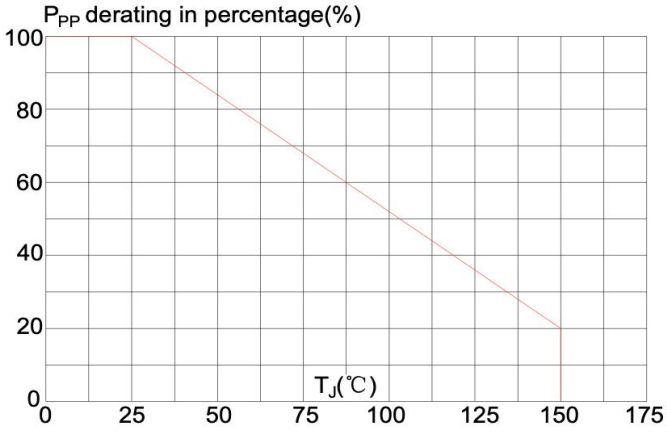
V- I curve characteristics (Bi-directional)
STS521033B101AH & STS521050B181AH



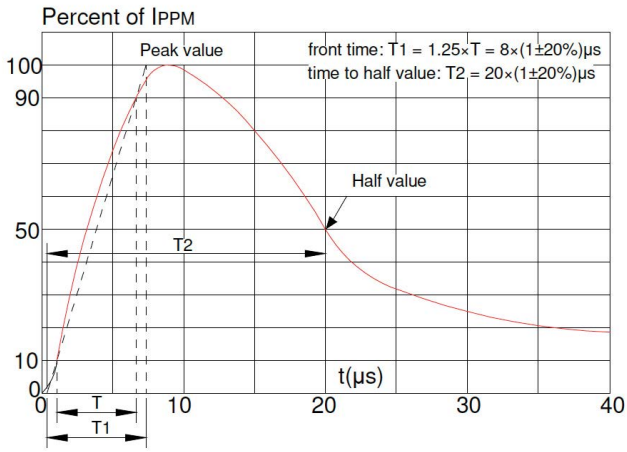
V- I curve characteristics (Bi-directional)
STS521050B331AH



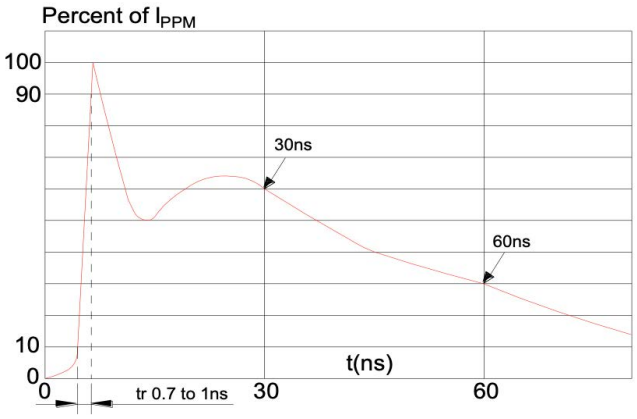
Pulse derating curve



Pulse waveform (8/20 µs)



ESD waveform (30 kV contact)



Solder reflow profile

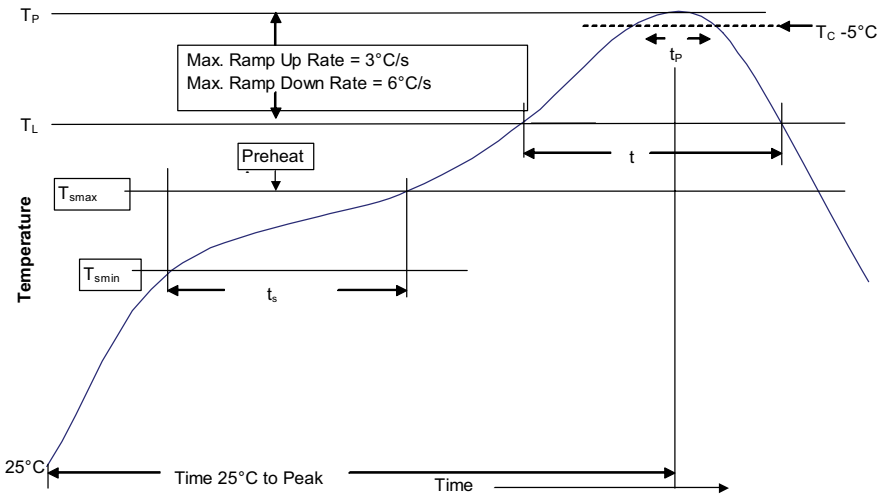


Table 1 - Standard SnPb solder (T_C)

Package thickness	Volume mm3 <350	Volume mm3 ≥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 mm³ <350	Volume mm³ 350 - 2000	Volume mm³ >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) Time (t_L) maintained above T_L		183 °C 60-150 seconds	217 °C 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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