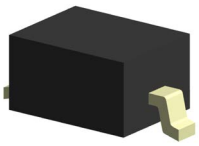
STS321XXXXXXXAH

Automotive TVS diode ESD suppressor



Product features

- AEC-Q101
- Uni-directional and bi-directional options
- Protects one I/O line
- Low capacitance
- 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 35 A (8/20 µs)

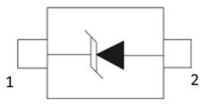
Ordering part number

ST S32 1 033 B 401 AH

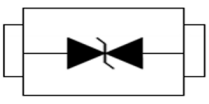
- Family
- Package (S32-SOD-323)
- Number of channels
- Operating voltage (033- 3.3 V)
- Bi/Uni directional (B = Bi, U = Uni)
- Capacitance (401- 40 pF)
- Automotive grade

SOD-323

Pin configuration Uni-directional



Pin configuration Bi-directional



Powering Business Worldwide

Product specifications

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

STS321033B401AH

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Peak pulse power dissipation	8/20 µs waveform	-	350	-	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	-	-	-	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	80	C_J (pF)

STS321033U202AH

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Peak pulse power dissipation	8/20 µs waveform	-	350	-	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	-	-	-	3.3	V_{RWM} (V)
Reverse breakdown voltage	I_T = 1 mA	4	-	-	V_{BR} (V)
Reverse leakage current	V_{RWM} = 3.3 V	-	1	5	I_R (µA)
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)

STS321050B331AH

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Peak pulse power dissipation	8/20 µs waveform	-	400	-	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	-	-	-	5.0	V_{RWM} (V)
Reverse breakdown voltage	I_T = 1 mA	5.5	-	-	V_{BR} (V)
Reverse leakage current	V_{RWM} = 5 V	-	-	1.0	I_R (µA)
Clamping voltage	I_{PP} = 1 A, t_p = 8/20 µs	-	6.5	9	V_C (V)
	I_{PP} = 35 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)

STS321050U182AH

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Peak pulse power dissipation	8/20 µs waveform	-	350	-	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	-	-	V_{BR} (V)
Reverse leakage current	V_{RWM} = 5 V	-	-	1.0	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	-	12	15	V_C (V)
Junction capacitance	V_{RWM} = 0 V, f = 1 MHz	-	180	-	C_J (pF)

STS321070U162AH

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Peak pulse power dissipation	8/20 µs waveform	-	350	-	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	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)

STS321120B301AH

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Peak pulse power dissipation	8/20 µs waveform	-	400	-	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	-	-	-	12	V_{RWM} (V)
Reverse breakdown voltage	I_T = 1 mA	13.3	-	-	V_{BR} (V)
Reverse leakage current	V_{RWM} = 12 V	-	-	1.0	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)

STS321120U901AH

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Peak pulse power dissipation	8/20 µs waveform	-	350	-	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	-	-	-	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 (µA)
Clamping voltage	I_{PP} = 1 A, t_p = 8/20 µs	-	15	18	V_C (V)
	I_{PP} = 15 A, t_p = 8/20 µs	-	21	24	V_C (V)
Junction capacitance	V_{RWM} = 0 V, f = 1 MHz	-	90	100	C_J (pF)

STS321150B351AH

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Peak pulse power dissipation	8/20 µs waveform	-	400	-	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	-	-	-	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 (µA)
Clamping voltage	I_{PP} = 1 A, t_p = 8/20 µs	-	-	23	V_C (V)
	I_{PP} = 10 A, t_p = 8/20 µs	-	-	33	V_C (V)
Junction capacitance	V_{RWM} = 0 V, f = 1 MHz	-	35	40	C_J (pF)

STS321150U751AH

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Peak pulse power dissipation	8/20 µs waveform	-	350	-	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	-	-	-	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 (µA)
Clamping voltage	I_{PP} = 1 A, t_p = 8/20 µs	-	20	23	V_C (V)
	I_{PP} = 13 A, t_p = 8/20 µs	-	27	30	V_C (V)
Junction capacitance	V_{RWM} = 0 V, f = 1 MHz	-	75	90	C_J (pF)

STS321240B301AH

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Peak pulse power dissipation	8/20 µs waveform	-	400	-	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	-	-	-	24	V_{RWM} (V)
Reverse breakdown voltage	I_T = 1 mA	26.7	-	-	V_{BR} (V)
Reverse leakage current	V_{RWM} = 24 V	-	-	1.0	I_R (µA)
Clamping voltage	I_{PP} = 1 A, t_p = 8/20 µs	-	-	40	V_C (V)
	I_{PP} = 8 A, t_p = 8/20 µs	-	-	50	V_C (V)
Junction capacitance	V_{RWM} = 0 V, f = 1 MHz	-	30	35	C_J (pF)

STS321240U401AH

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Peak pulse power dissipation	8/20 µs waveform	-	350	-	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	-	-	-	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 (µA)
Clamping voltage	I_{PP} = 1 A, t_p = 8/20 µs	-	-	36	V_C (V)
	I_{PP} = 8 A, t_p = 8/20 µs	-	-	45	V_C (V)
Junction capacitance	V_{RWM} = 0 V, f = 1 MHz	-	40	70	C_J (pF)

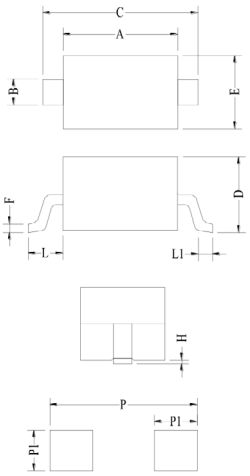
STS321360B141AH

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Peak pulse power dissipation	8/20 µs waveform	-	400	-	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	42	47.5	V_{BR} (V)
Reverse leakage current	V_{RWM} = 36 V	-	-	0.2	I_R (µA)
Clamping voltage	I_{PP} = 1 A, t_p = 8/20 µs	-	45	60	V_C (V)
	I_{PP} = 6 A, t_p = 8/20 µs	-	60	70	V_C (V)
Junction capacitance	V_{RWM} = 0 V, f = 1 MHz	-	14	25	C_J (pF)

STS321360U351AH

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Peak pulse power dissipation	8/20 µs waveform	-	500	-	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	-	-	-	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 (µA)
Clamping voltage	I_{PP} = 1 A, t_p = 8/20 µs	-	45	55	V_C (V)
	I_{PP} = 6 A, t_p = 8/20 µs	-	60	65	V_C (V)
Junction capacitance	V_{RWM} = 0 V, f = 1 MHz	-	35	45	C_J (pF)

Mechanical parameters, pad layout- mm/inches



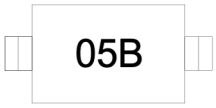
	Millimeters			Inches		
Dimension	**Minimum**	**Typical**	**Maximum**	**Minimum**	**Typical**	**Maximum**
A	1.6	1.7	1.8	0.063	0.067	0.071
B	0.25	0.32	0.4	0.010	0.013	0.016
C	2.3	2.6	2.8	0.091	0.102	0.11
D	0.8	0.95	1.1	0.031	0.037	0.043
E	1.2	1.3	1.4	0.047	0.051	0.055
F	0.08	0.13	0.18	0.003	0.005	0.007
L	-	0.475 ref	-	-	0.019 ref	
L1	0.25	0.33	0.4	0.01	0.013	0.016
H	-	0.06	0.14	-	0.002	0.006
P	-	3.00	-	-	0.118	-
P1	-	0.80	-	-	0.031	-

Marking code

STS321033B401AH

STS321033U202AH

STS321050B331AH



STS321050U182AH

STS321070U162AH

STS321120B301AH

STS321120U901AH

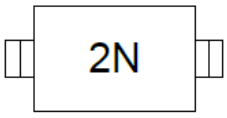
STS321150B351AH

STS321150U751AH

STS321240B301AH

STS321240U401AH

STS321360B141AH

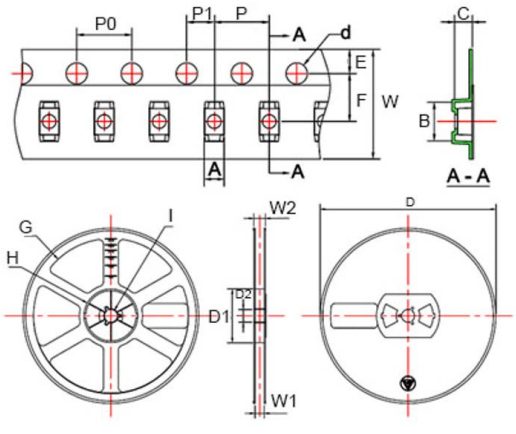


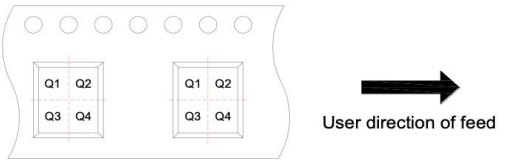
STS321360U351AH

Packaging information mm/inches

Drawing not to scale.

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

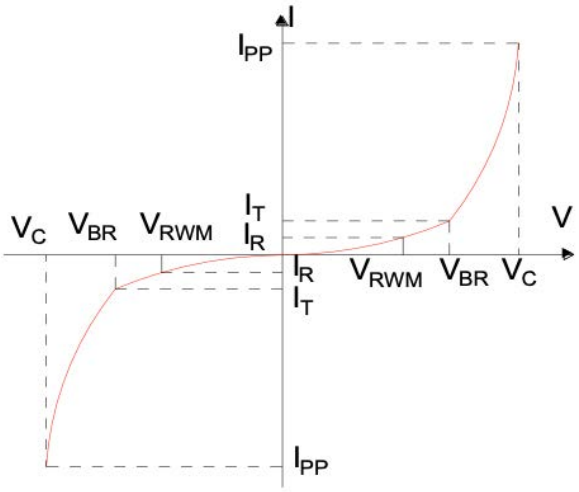




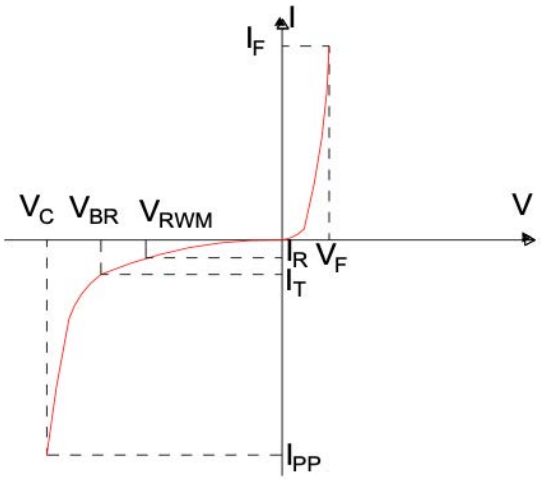
Dimension	Millimeter (typical)	Inches (typical)
A	1.46	0.057
B	2.9	0.114
C	1.25	0.049
d	1.50	0.059
E	1.75	0.069
F	3.5	0.138
P0	4	0.157
P	4	0.157
P1	2	0.079
W	8	0.315
D	178.0	7.008
D1	54.4	2.142
D2	13	0.512
G	R78.0	R3.071
H	R25.60	R1.008
I	R6.50	R0.256
W1	9.5	0.374
W2	12.3	0.484

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

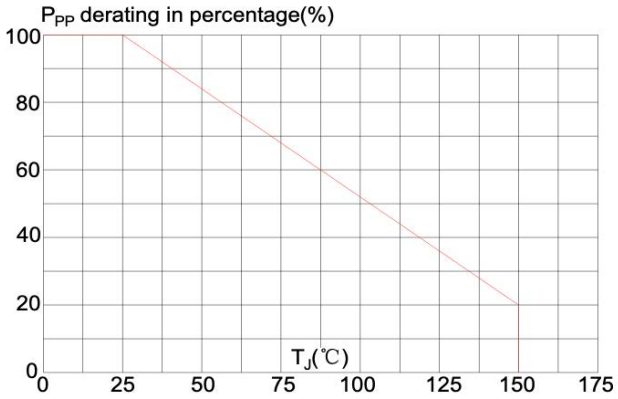
V- I curve characteristics (Bi-directional)



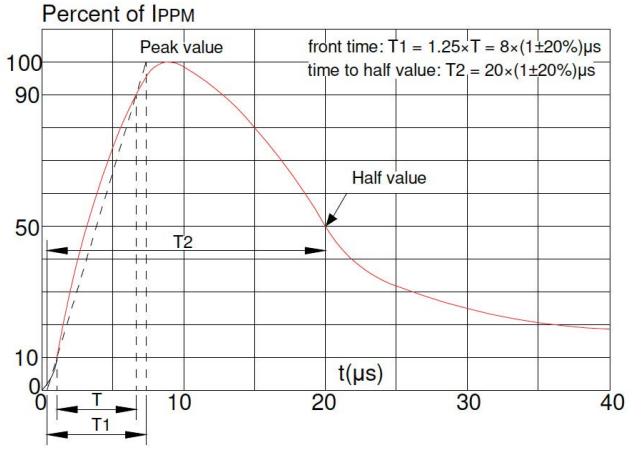
V- I curve characteristics (Uni-directional)



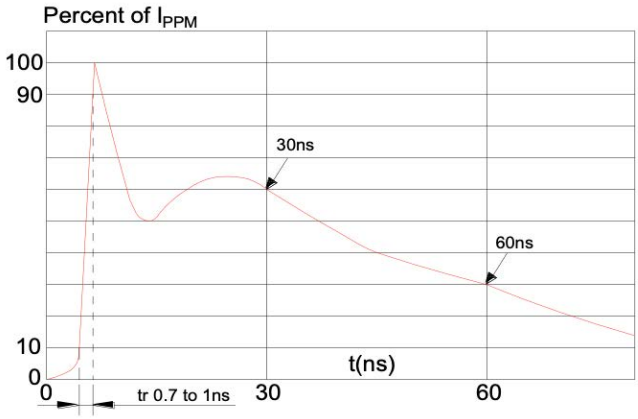
Pulse derating curve



Pulse waveform (8/20 µs)



ESD waveform (30 kV contact)



Solder reflow profile

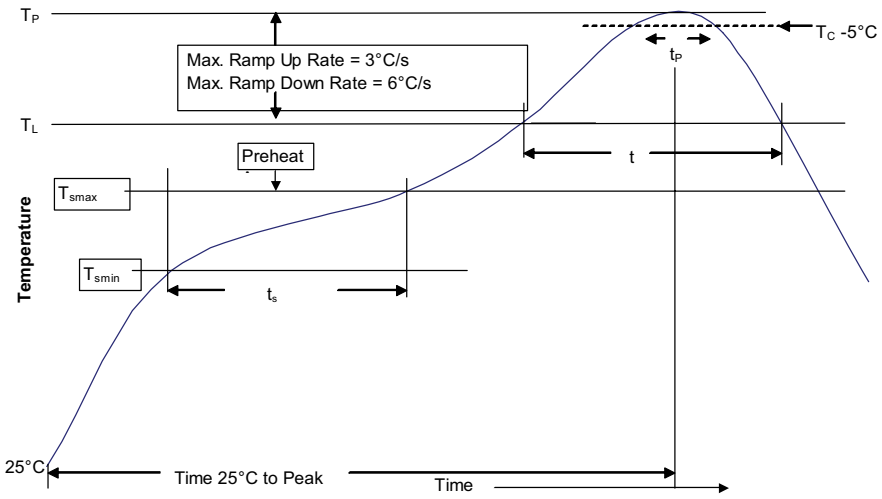


Table 1 - Standard SnPb solder (T_C)

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.

Eaton
Electronics Division
1000 Eaton Boulevard
Cleveland, OH 44122
United States
Eaton.com/electronics

Publication No. ELX1279 BU-ELX22142
January 2023