

SM4NT22(C)A-Q1 THRU SM4NT440(C)A-Q1

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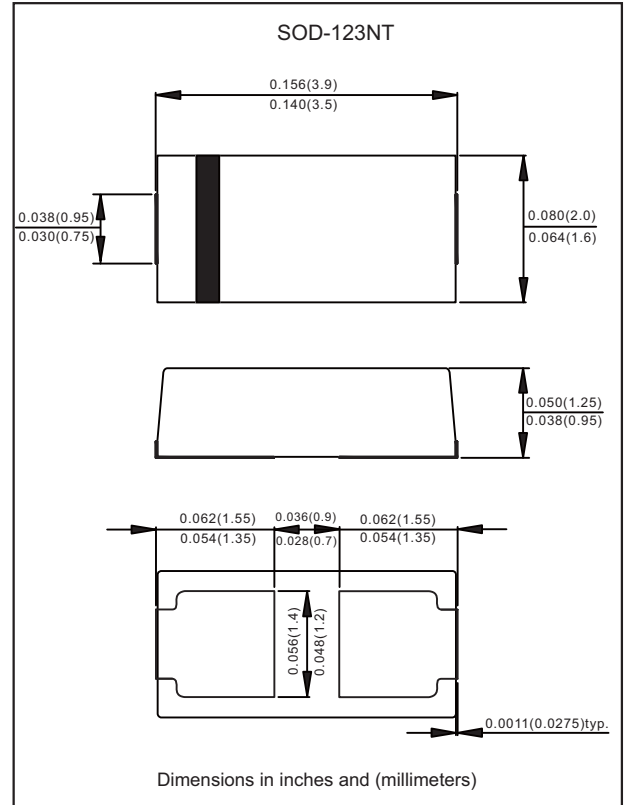
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SM4NT22(C)A-Q1 THRU SM4NT440(C)A-Q1**400W Dual Flat No-Lead Unidirectional and Bidirectional Transient Voltage Suppressors 22V-440V****Features**

- Well package design with solder pad on the bottom for best thermal performance
- Leads on two opposing sides of the body
- Tiny plastic DFN package
- 400W peak pulse power capability with a 10/1000 μ s waveform, repetition rate (duty cycle): 0.01%
- Uni and Bidirectional unit
- Glass passivated chip junction
- Excellent clamping capability
- Low incremental surge resistance
- Lead-free parts meet RoHS requirements
- Qualified to AEC-Q101 standards for high reliability
- Suffix "-H" indicates Halogen-free part, ex. SM4NT22A-Q1-H

Mechanical data

- Epoxy: UL94-V0 rated flame retardant
- Case : Molded plastic, SOD-123NT
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
- Polarity : Indicated by cathode band(Uni-directional types only)
- Mounting Position : Any
- Weight : Approximated 0.022 gram

Package outline**Maximum ratings** (AT $T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Conditions	Symbol	Value	Unit
Peak power dissipation	with a 10/1000 μ s waveform, Note 1, 2 & Fig. 1	PPPM	400	W
Peak pulse current	with a 10/1000 μ s waveform	IPPM	See Table	A
Steady state power dissipation	at $T_L=75^\circ\text{C}$, Note 2	$P_{M(AV)}$	1.0	W
Operating junction temperature range		T_J	-55 to +150	$^\circ\text{C}$
Storage temperature range		T_{STG}	-65 to +175	$^\circ\text{C}$

Notes 1: Non-repetitive current pulse, per Fig. 3 and derated above $T_A=25^\circ\text{C}$ per Fig. 2
 2: Mounted on copper pad area of 0.2"x0.2" (5.0x5.0 mm) per Fig 5

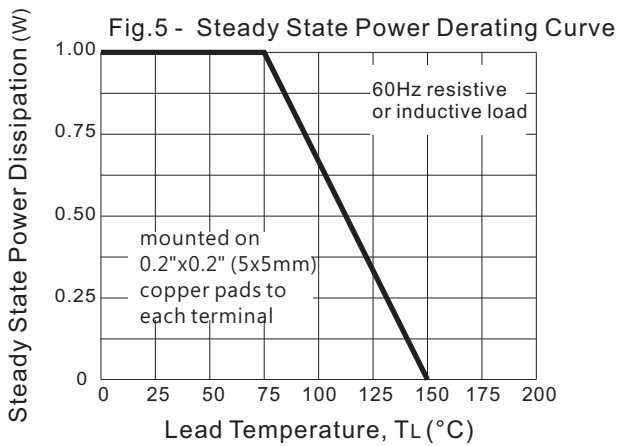
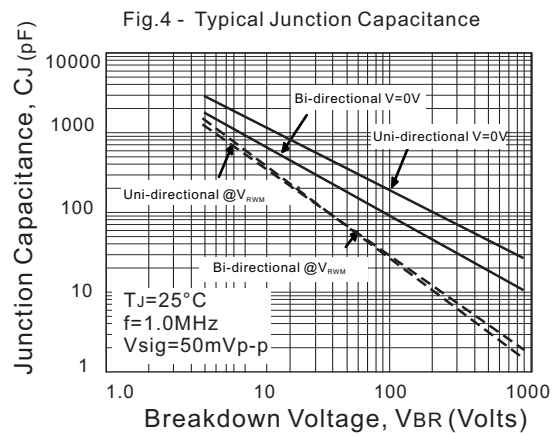
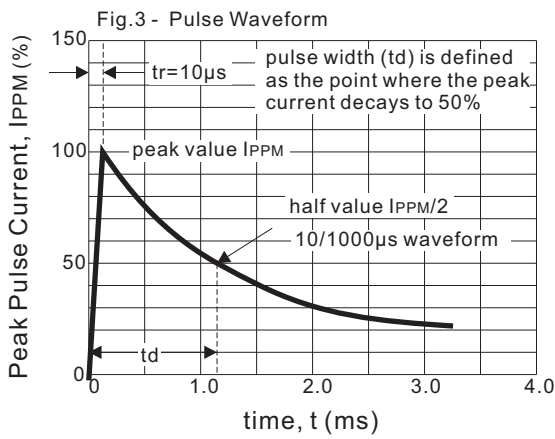
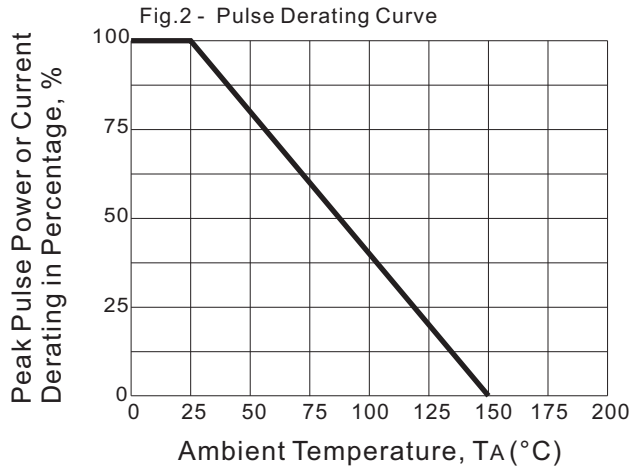
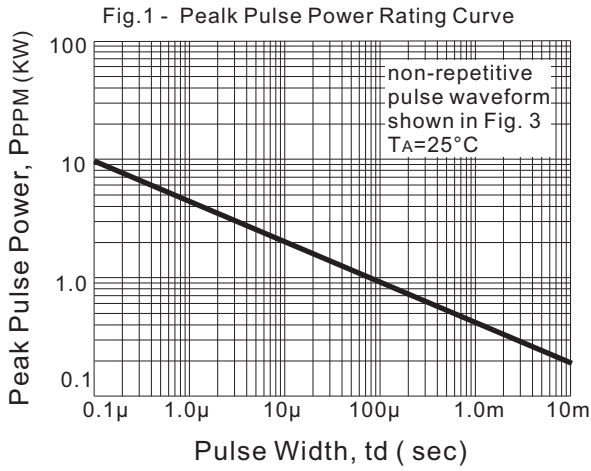
Electrical characteristics (at $T_A=25^\circ\text{C}$ unless otherwise noted)

Part No. (Uni)	Part No. (Bi)	Reverse Stand-off Voltage	Breakdown Voltage @ I_T		Test Current	Maximum Clamping Voltage @ I_{PP}		Maximum Reverse Leakage Current	Marking Code	
		V_{RWM}	V_{BRMin}	V_{BRMax}	I_T	V_C	I_{PP}	$I_R@V_{RWM}$	Uni	Bi
		Volts	Volts	Volts	mA	Volts	A	μA		
SM4NT22A-Q1	SM4NT22CA-Q1	22	24.4	26.9	1.0	35.5	11.27	5	4LX	4BX
SM4NT24A-Q1	SM4NT24CA-Q1	24	26.7	29.5	1.0	38.9	10.29	5	4LZ	4BZ
SM4NT26A-Q1	SM4NT26CA-Q1	26	28.9	31.9	1.0	42.1	9.51	5	4ME	4CE
SM4NT28A-Q1	SM4NT28CA-Q1	28	31.1	34.4	1.0	45.4	8.82	5	4MG	4CG
SM4NT30A-Q1	SM4NT30CA-Q1	30	33.3	36.8	1.0	48.4	8.27	5	4MK	4CK
SM4NT33A-Q1	SM4NT33CA-Q1	33	36.7	40.6	1.0	53.3	7.51	5	4MM	4CM
SM4NT36A-Q1	SM4NT36CA-Q1	36	40.0	44.2	1.0	58.1	6.89	5	4MP	4CP
SM4NT40A-Q1	SM4NT40CA-Q1	40	44.4	49.1	1.0	64.5	6.21	5	4MR	4CR
SM4NT43A-Q1	SM4NT43CA-Q1	43	47.8	52.8	1.0	69.4	5.77	5	4MT	4CT
SM4NT45A-Q1	SM4NT45CA-Q1	45	50.0	55.3	1.0	72.7	5.51	5	4MV	4CV
SM4NT48A-Q1	SM4NT48CA-Q1	48	53.3	58.9	1.0	77.4	5.17	5	4MX	4CX
SM4NT51A-Q1	SM4NT51CA-Q1	51	56.7	62.7	1.0	82.4	4.86	5	4MZ	4CZ
SM4NT54A-Q1	SM4NT54CA-Q1	54	60.0	66.3	1.0	87.1	4.60	5	4NE	4DE
SM4NT58A-Q1	SM4NT58CA-Q1	58	64.4	71.2	1.0	93.6	4.28	5	4NG	4DG
SM4NT60A-Q1	SM4NT60CA-Q1	60	66.7	73.7	1.0	96.8	4.14	5	4NK	4DK
SM4NT64A-Q1	SM4NT64CA-Q1	64	71.1	78.6	1.0	103	3.89	5	4NM	4DM
SM4NT70A-Q1	SM4NT70CA-Q1	70	77.8	86.0	1.0	113	3.54	5	4NP	4DP
SM4NT75A-Q1	SM4NT75CA-Q1	75	83.3	92.1	1.0	121	3.31	5	4NR	4DR
SM4NT78A-Q1	SM4NT78CA-Q1	78	86.7	95.8	1.0	126	3.18	5	4NT	4DT
SM4NT85A-Q1	SM4NT85CA-Q1	85	94.4	104	1.0	137	2.92	5	4NV	4DV
SM4NT90A-Q1	SM4NT90CA-Q1	90	100	111	1.0	146	2.74	5	4NX	4DX
SM4NT100A-Q1	SM4NT100CA-Q1	100	111	123	1.0	162	2.47	5	4NZ	4DZ
SM4NT110A-Q1	SM4NT110CA-Q1	110	122	135	1.0	177	2.26	5	4PE	4EE
SM4NT120A-Q1	SM4NT120CA-Q1	120	133	147	1.0	193	2.08	5	4PG	4EG
SM4NT130A-Q1	SM4NT130CA-Q1	130	144	159	1.0	209	1.92	5	4PK	4EK
SM4NT150A-Q1	SM4NT150CA-Q1	150	167	185	1.0	243	1.65	5	4PM	4EM
SM4NT160A-Q1	SM4NT160CA-Q1	160	178	197	1.0	259	1.55	5	4PP	4EP
SM4NT170A-Q1	SM4NT170CA-Q1	170	189	209	1.0	275	1.46	5	4PR	4ER
SM4NT180A-Q1	SM4NT180CA-Q1	180	201	222	1.0	292	1.37	5	4PT	4ET
SM4NT200A-Q1	SM4NT200CA-Q1	200	224	247	1.0	324	1.24	5	4PV	4EV
SM4NT220A-Q1	SM4NT220CA-Q1	220	246	272	1.0	356	1.13	5	4PX	4EX
SM4NT240A-Q1	SM4NT240CA-Q1	240	269	296	1.0	387	1.04	5	4PY	4EY
SM4NT250A-Q1	SM4NT250CA-Q1	250	279	309	1.0	405	0.99	5	4PZ	4EZ
SM4NT300A-Q1	SM4NT300CA-Q1	300	335	371	1.0	486	0.83	5	4QE	4FE
SM4NT330A-Q1	SM4NT330CA-Q1	330	369	408	1.0	534	0.75	5	4QF	4FF
SM4NT350A-Q1	SM4NT350CA-Q1	350	391	432	1.0	567	0.71	5	4QG	4FG
SM4NT360A-Q1	SM4NT360CA-Q1	360	403	444	1.0	582	0.69	5	4QH	4FH
SM4NT400A-Q1	SM4NT400CA-Q1	400	447	494	1.0	648	0.62	5	4QK	4FK
SM4NT440A-Q1	SM4NT440CA-Q1	440	492	544	1.0	713	0.57	5	4QM	4FM

Notes 1: Suffix 'C' denotes bi-directional devices. Suffix 'A' denotes 5% tolerance devices

2: Transient Voltage Suppressors (TVS) are devices used to protect vulnerable circuits from electrical overstress such as that caused by electrostatic discharge, inductive load switching and induced lightning. Within the TVS, damaging voltage spikes are limited by clamping or avalanche action of a rugged silicon pn junction which reduces the amplitude of the transient to a nondestructive level. See Fig. 6 & Fig. 7

Rating and characteristic curves



Rating and characteristic curves

Fig. 6 - Transients of several thousand volts can be clamped to a safe level by the TVS

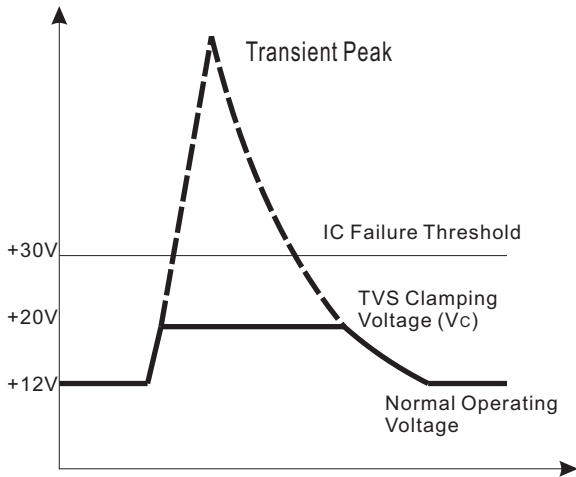
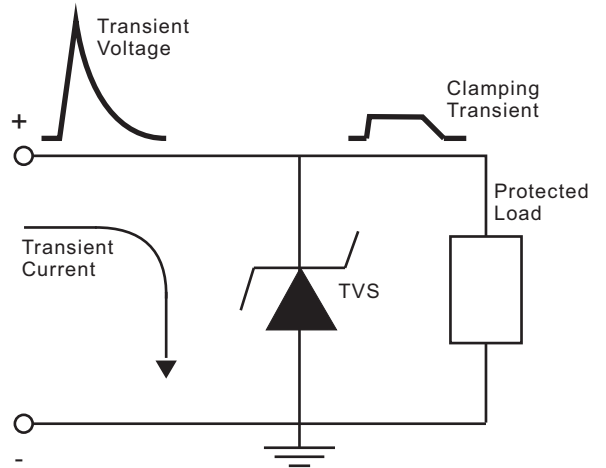






Fig. 7 - Transient current is diverted to ground thru TVS; the voltage seen by the protected load is limited to the clamping voltage level

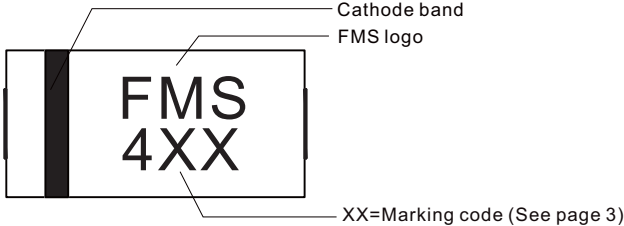
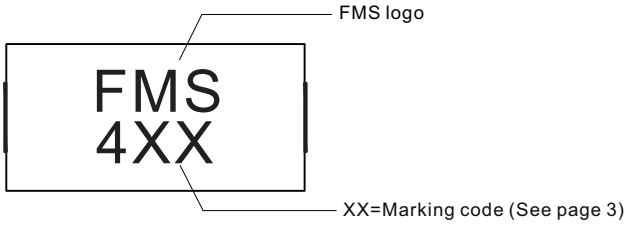


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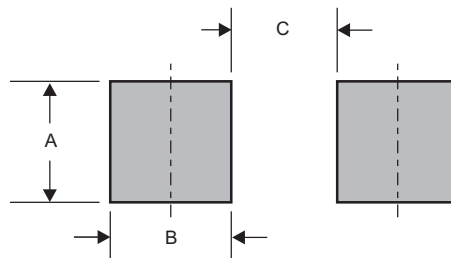
Pinning information

Pin	Simplified outline	Symbol
Uni-Directional Pin1 cathode Pin2 anode		
Bi-Directional		

Marking

Type number	Example
Uni-Directional	 <p>Cathode band FMS logo XX=Marking code (See page 3)</p>
Bi-Directional	 <p>FMS logo XX=Marking code (See page 3)</p>

Suggested solder pad layout

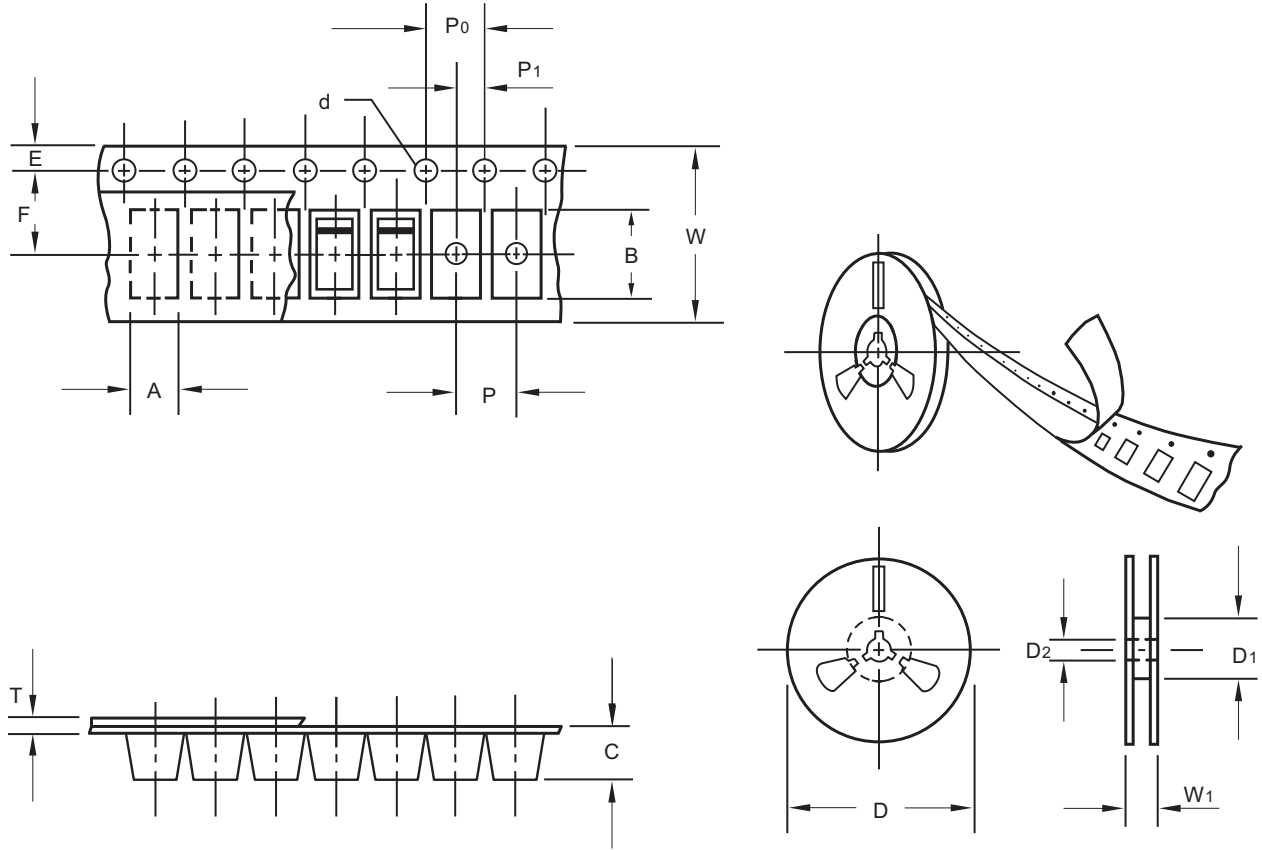


Dimensions in inches and (millimeters)

PACKAGE	A	B	C
SOD-123NT	0.056 (1.40)	0.062(1.55)	0.028 (0.70)

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Packing information



unit:mm

Item	Symbol	Tolerance	SOD-123NT
Carrier width	A	0.1	2.00
Carrier length	B	0.1	3.85
Carrier depth	C	0.1	1.10
Sprocket hole	d	0.1	1.50
13" Reel outside diameter	D	2.0	-
13" Reel inner diameter	D1	min	-
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D1	min	62.00
Feed hole diameter	D2	0.5	13.00
Sprocket hole position	E	0.1	1.75
Punch hole position	F	0.1	3.50
Punch hole pitch	P	0.1	4.00
Sprocket hole pitch	P0	0.1	4.00
Embossment center	P1	0.1	2.00
Overall tape thickness	T	0.1	0.23
Tape width	W	0.3	8.00
Reel width	W1	1.0	11.40

Note: Devices are packed in accordance with EIA standard RS-481-A and specifications listed above.

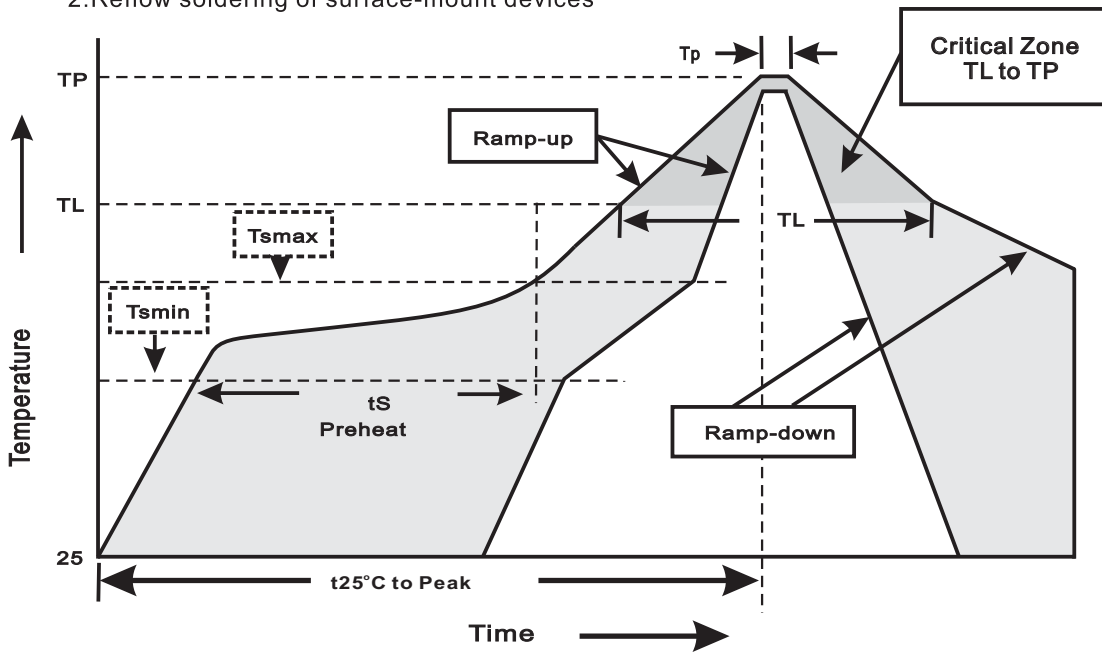
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Reel packing

PACKAGE	REEL SIZE	REEL (pcs)	COMPONENT SPACING (m/m)	BOX (pcs)	INNER BOX (m/m)	REEL DIA, (m/m)	CARTON SIZE (m/m)	CARTON (pcs)	APPROX. GROSS WEIGHT (kg)
SOD-123NT	7"	3,000	4.0	30,000	183*123*183	178	382*257*387	240,000	9.5

Suggested thermal profiles for soldering processes

- 1.Storage environment: Temperature=5°C~40°C Humidity=55%±25%
- 2.Reflow soldering of surface-mount devices



3.Reflow soldering

Profile Feature	Soldering Condition
Average ramp-up rate(T _L to T _P)	<3°C/sec
Preheat -Temperature Min(T _{smmin}) -Temperature Max(T _{smmax}) -Time(min to max)(t _s)	150°C 200°C 60~120sec
T _{smmax} to T _L -Ramp-upRate	<3°C/sec
Time maintained above: -Temperature(T _L) -Time(t _L)	217°C 60~260sec
Peak Temperature(T _P)	255°C-0/+5°C
Time within 5°C of actual Peak Temperature(t _P)	10~30sec
Ramp-down Rate	<3°C/sec
Time 25°C to Peak Temperature	<6minutes

High reliability test capabilities

Item Test	Conditions	Reference
1. MSL Preconditioning	24hr bake@125°C+168hrs@85°C /85%RH+3xIR@260°C+1flux immersion+alcohol+DI H2O rinse	JESD22-A113
2. High Temperature Reverse Bias	$V_{BR}=V_{BR\ NOM} * 80\%$ ($T_j=150^\circ\text{C}$) Test Duration:1000hrs	JESD22-A108
3. High Temperature Storage Life	$T_a=125^\circ\text{C}$ Test Duration:1000hrs	JESD22 A-103
4. Temperature Cycle	-55°C (15min) to 150°C (15min) Test Cycles:1000cycles	JESD22 A-104
5. Autoclave	$P=2\text{atm}$ $T_a=121^\circ\text{C}$ $\text{RH}=100\%$ Test Duration:96hrs	JESD22 A-102
6. Solderability	$245\pm 5^\circ\text{C}$ for 5sec	J-STD-002
7. Moisture Resistance	$T_a=85^\circ\text{C}/85\%$ Relative humidity Test Duration:1000hrs	MIL-STD-750E METHOD 1021.2
8. Resistance To Solder Heat	$260\pm 5^\circ\text{C}$ for 10sec	JESD22 B-106
9. High Temperature High Humidity Reverse Bias	$T_a=85^\circ\text{C}$, 85%RH, with device reverse biased at 80% of rated breakdown voltage up to a maximum of 100V or limit of chamber Test Duration:1000hrs	JESD22-A101