

SM6NT22(C)A-Q1 THRU SM6NT220(C)A-Q1

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SM6NT22(C)A-Q1 THRU SM6NT220(C)A-Q1

600W Dual Flat No-Lead Unidirectional and Bidirectional Transient Voltage Suppressors 22V-220V

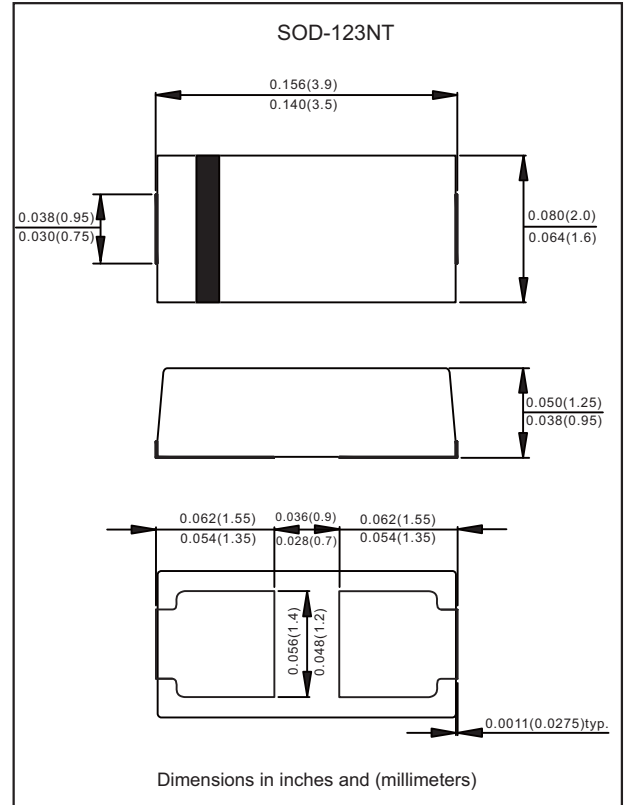
Features

- 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
- 600W 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. SM6NT22A-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	600	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	$P_{M(AV)}$	1.5	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

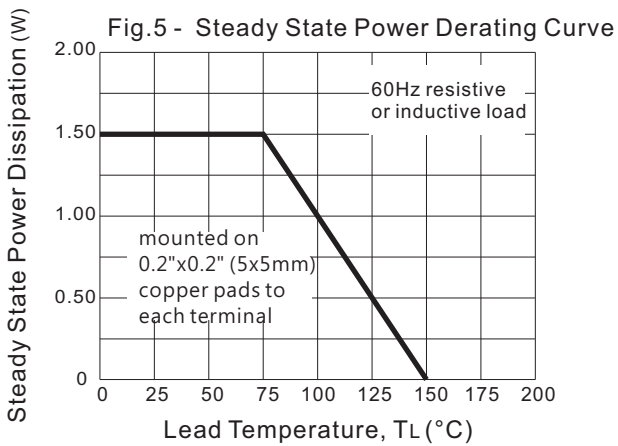
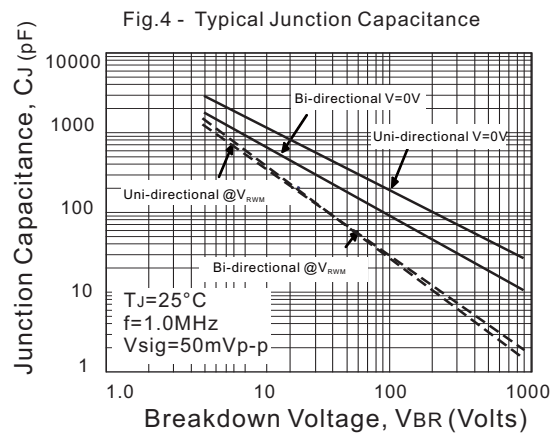
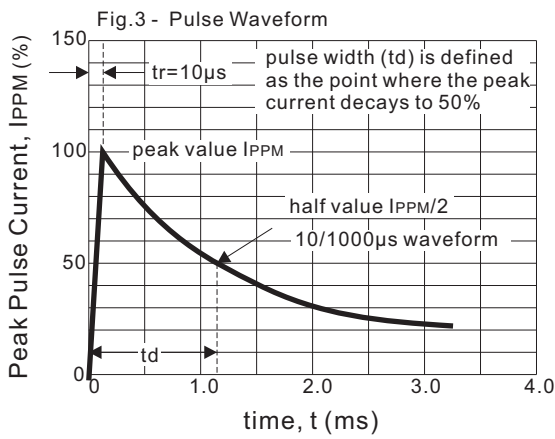
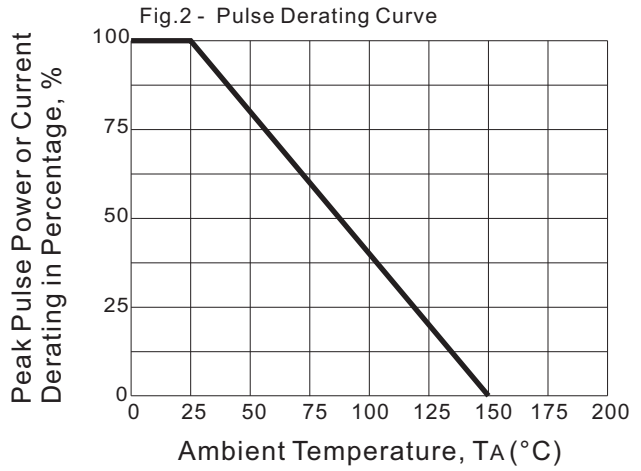
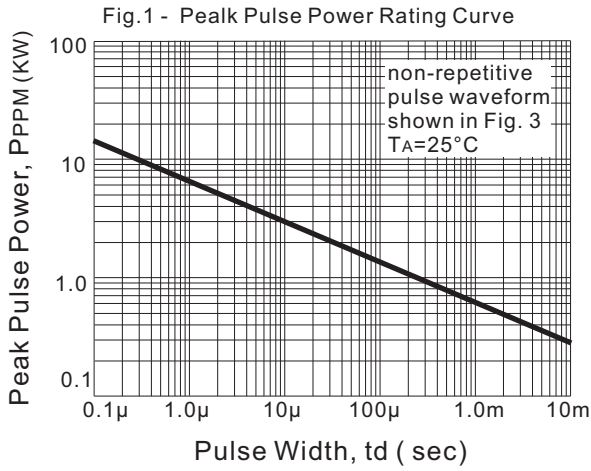
Electrical characteristics (at $T_A=25^\circ\text{C}$ unless otherwise noted)

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		
SM6NT22A-Q1	SM6NT22CA-Q1	22	24.4	26.9	1.0	35.5	16.91	5	6LX	6BX
SM6NT24A-Q1	SM6NT24CA-Q1	24	26.7	29.5	1.0	38.9	15.43	5	6LZ	6BZ
SM6NT26A-Q1	SM6NT26CA-Q1	26	28.9	31.9	1.0	42.1	14.26	5	6ME	6CE
SM6NT28A-Q1	SM6NT28CA-Q1	28	31.1	34.4	1.0	45.4	13.22	5	6MG	6CG
SM6NT30A-Q1	SM6NT30CA-Q1	30	33.3	36.8	1.0	48.4	12.40	5	6MK	6CK
SM6NT33A-Q1	SM6NT33CA-Q1	33	36.7	40.6	1.0	53.3	11.26	5	6MM	6CM
SM6NT36A-Q1	SM6NT36CA-Q1	36	40.0	44.2	1.0	58.1	10.33	5	6MP	6CP
SM6NT40A-Q1	SM6NT40CA-Q1	40	44.4	49.1	1.0	64.5	9.31	5	6MR	6CR
SM6NT43A-Q1	SM6NT43CA-Q1	43	47.8	52.8	1.0	69.4	8.65	5	6MT	6CT
SM6NT45A-Q1	SM6NT45CA-Q1	45	50.0	55.3	1.0	72.7	8.26	5	6MV	6CV
SM6NT48A-Q1	SM6NT48CA-Q1	48	53.3	58.9	1.0	77.4	7.76	5	6MX	6CX
SM6NT51A-Q1	SM6NT51CA-Q1	51	56.7	62.7	1.0	82.4	7.29	5	6MZ	6CZ
SM6NT54A-Q1	SM6NT54CA-Q1	54	60.0	66.3	1.0	87.1	6.89	5	6NE	6DE
SM6NT58A-Q1	SM6NT58CA-Q1	58	64.4	71.2	1.0	93.6	6.42	5	6NG	6DG
SM6NT60A-Q1	SM6NT60CA-Q1	60	66.7	73.7	1.0	96.8	6.20	5	6NK	6DK
SM6NT64A-Q1	SM6NT64CA-Q1	64	71.1	78.6	1.0	103	5.83	5	6NM	6DM
SM6NT70A-Q1	SM6NT70CA-Q1	70	77.8	86.0	1.0	113	5.31	5	6NP	6DP
SM6NT75A-Q1	SM6NT75CA-Q1	75	83.3	92.1	1.0	121	4.96	5	6NR	6DR
SM6NT78A-Q1	SM6NT78CA-Q1	78	86.7	95.8	1.0	126	4.77	5	6NT	6DT
SM6NT85A-Q1	SM6NT85CA-Q1	85	94.4	104	1.0	137	4.38	5	6NV	6DV
SM6NT90A-Q1	SM6NT90CA-Q1	90	100	111	1.0	146	4.11	5	6NX	6DX
SM6NT100A-Q1	SM6NT100CA-Q1	100	111	123	1.0	162	3.71	5	6NZ	6DZ
SM6NT110A-Q1	SM6NT110CA-Q1	110	122	135	1.0	177	3.39	5	6PE	6EE
SM6NT120A-Q1	SM6NT120CA-Q1	120	133	147	1.0	193	3.11	5	6PG	6EG
SM6NT130A-Q1	SM6NT130CA-Q1	130	144	159	1.0	209	2.88	5	6PK	6EK
SM6NT150A-Q1	SM6NT150CA-Q1	150	167	185	1.0	243	2.47	5	6PM	6EM
SM6NT160A-Q1	SM6NT160CA-Q1	160	178	197	1.0	259	2.32	5	6PP	6EP
SM6NT170A-Q1	SM6NT170CA-Q1	170	189	209	1.0	275	2.19	5	6PR	6ER
SM6NT180A-Q1	SM6NT180CA-Q1	180	201	222	1.0	292	2.06	5	6PT	6ET
SM6NT200A-Q1	SM6NT200CA-Q1	200	224	247	1.0	324	1.86	5	6PV	6EV
SM6NT220A-Q1	SM6NT220CA-Q1	220	246	272	1.0	356	1.69	5	6PX	6EX

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

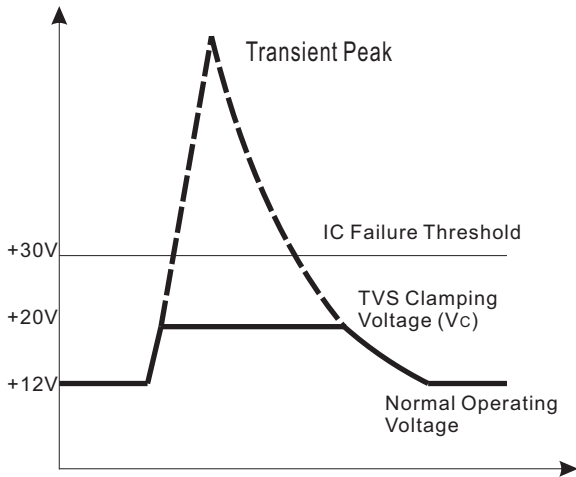
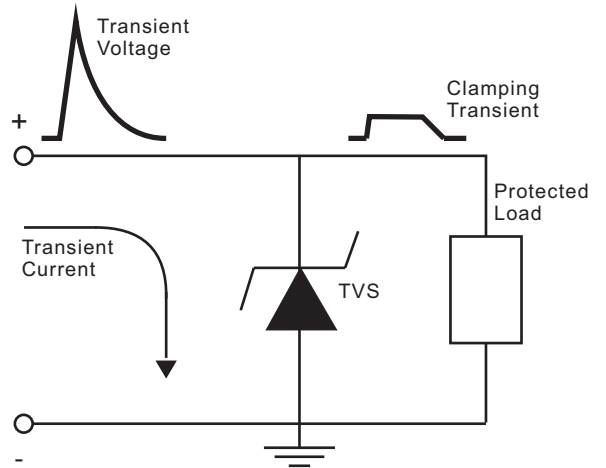






Fig. 7 - Transient current is diverted to ground thru TVS; the voltage seen by the protected load is limited to the clamping voltage level

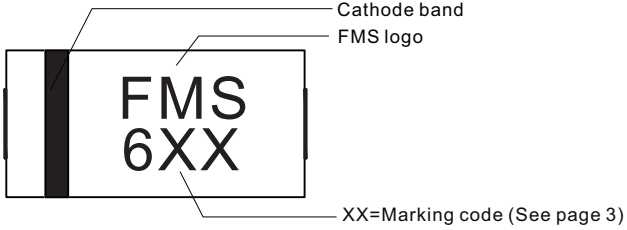
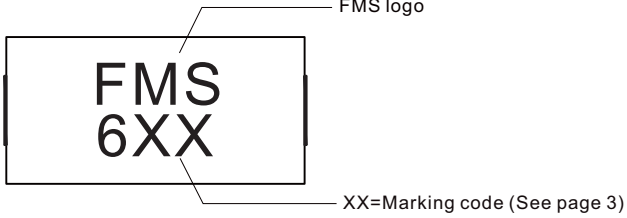


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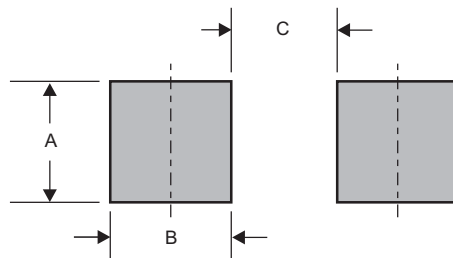
Pinning information

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

Marking

Type number	Example
Uni-Directional	
Bi-Directional	

Suggested solder pad layout

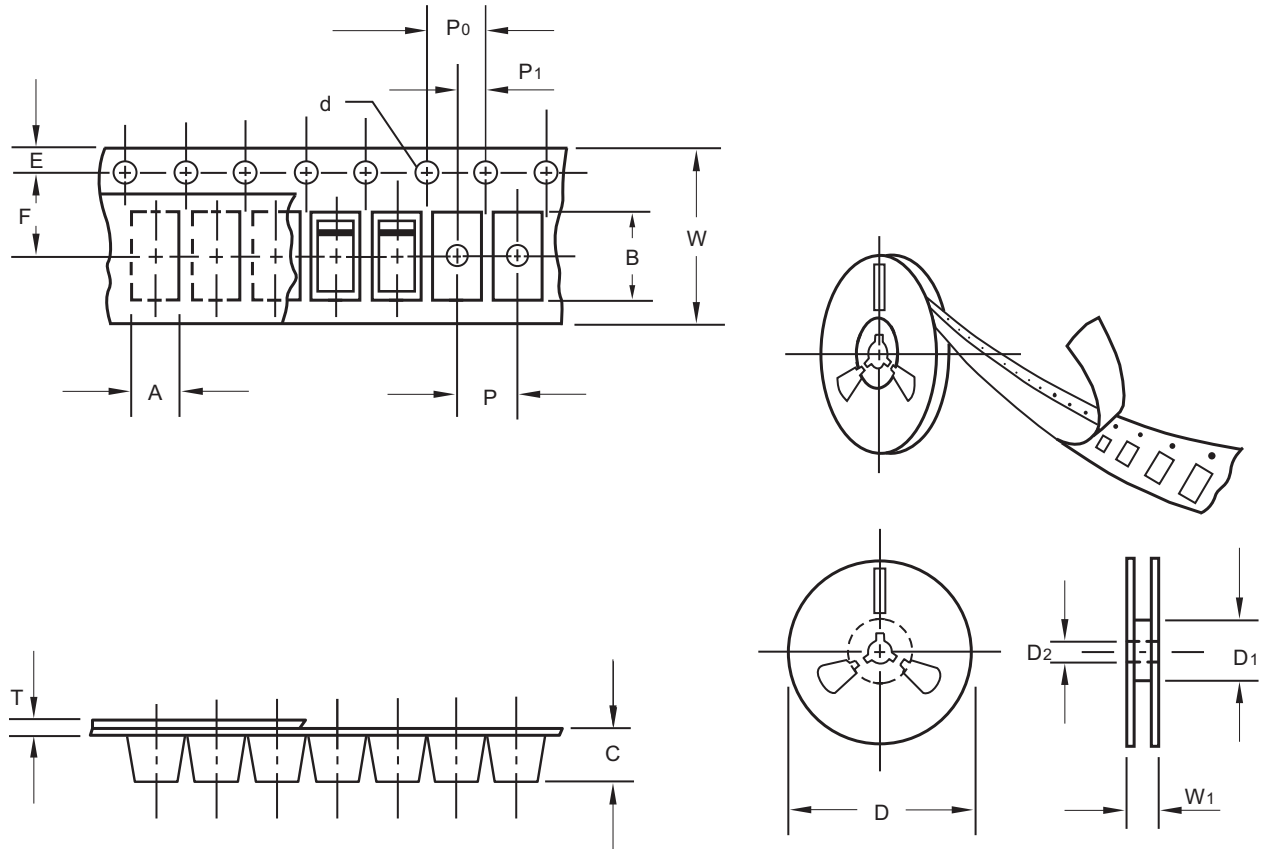


Dimensions in inches and (millimeters)

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	D ₁	min	-
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D ₁	min	62.00
Feed hole diameter	D ₂	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	P ₀	0.1	4.00
Embossment center	P ₁	0.1	2.00
Overall tape thickness	T	0.1	0.23
Tape width	W	0.3	8.00
Reel width	W ₁	1.0	11.40

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

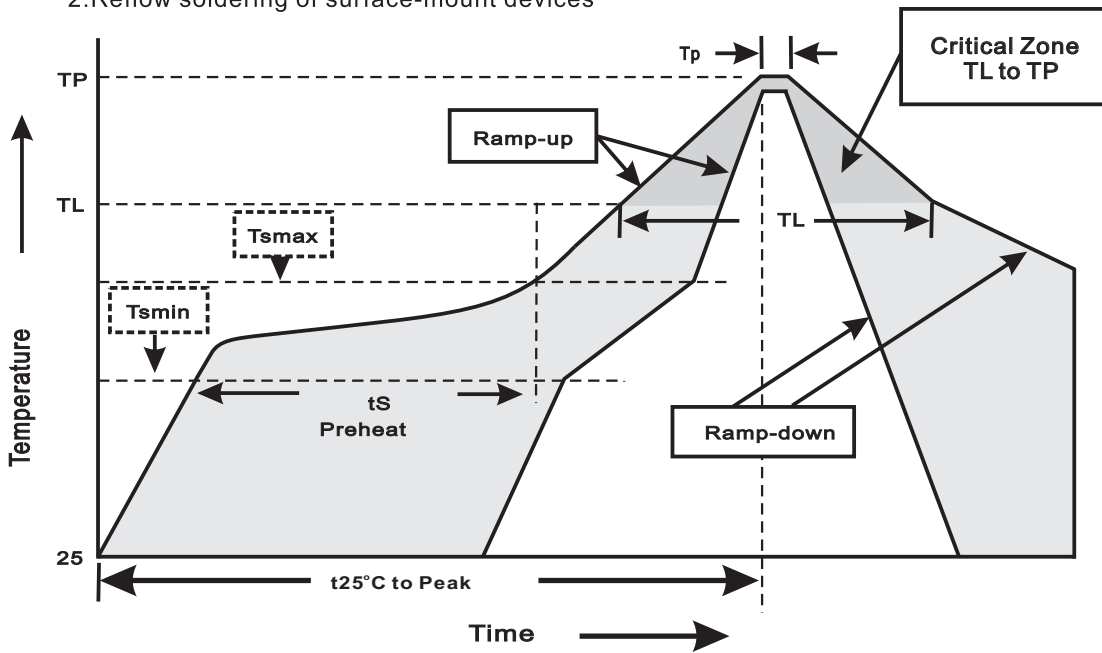
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Reel packing

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(TL to TP)	<3°C/sec
Preheat -Temperature Min(Tsmin) -Temperature Max(Tsmax) -Time(min to max)(ts)	150°C 200°C 60~120sec
Tsmax to TL -Ramp-upRate	<3°C/sec
Time maintained above: -Temperature(TL) -Time(tL)	217°C 60~260sec
Peak Temperature(TP)	255°C-0/+5°C
Time within 5°C of actual Peak Temperature(tp)	10~30sec
Ramp-down Rate	<3°C/sec
Time 25°C to Peak Temperature	<6minutes

SM6NT22(C)A-Q1 THRU SM6NT220(C)A-Q1**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