

# SMAKNT20(C)A THRU SMAKNT800(C)A

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# SMAKNT20(C)A THRU SMAKNT800(C)A

## 1000W Dual Flat No-Lead Unidirectional and Bidirectional Transient Voltage Suppressors 20V-800V

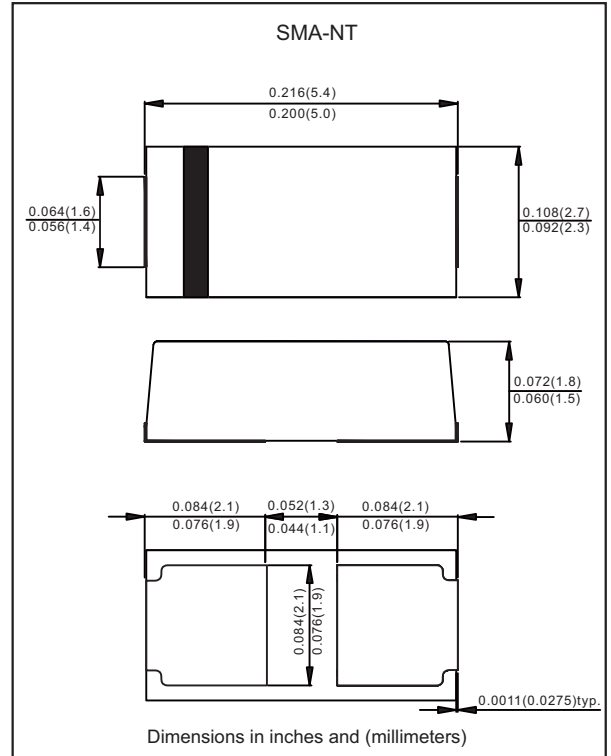
### Features

- Well package design with solder pad on the bottom for best thermal performance
- Leads on two opposing sides of the body
- 1000W peak pulse power capability with a 10/1000µs 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
- Suffix "-H" indicates Halogen-free part, ex. SMAKNT20A-H

### Mechanical data

- Epoxy: UL94-V0 rated flame retardant
- Case : Molded plastic, SMA-NT
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
- Polarity : Indicated by cathode band(Uni-directional types only)
- Mounting Position : Any
- Weight : Approximated 0.069 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 10/1000µs waveform, Note 1, 2 & Fig. 1	PPPM	1000	W
Peak pulse current	with a 10/1000µs waveform	I <sub>PPM</sub>	See Table	A
Steady state power dissipation	at $T_L=75^\circ\text{C}$ , Note 2	P <sub>M(AV)</sub>	3.0	W
Operating junction temperature range		T <sub>J</sub>	-55 to +150	°C
Storage temperature range		T <sub>STG</sub>	-65 to +175	°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

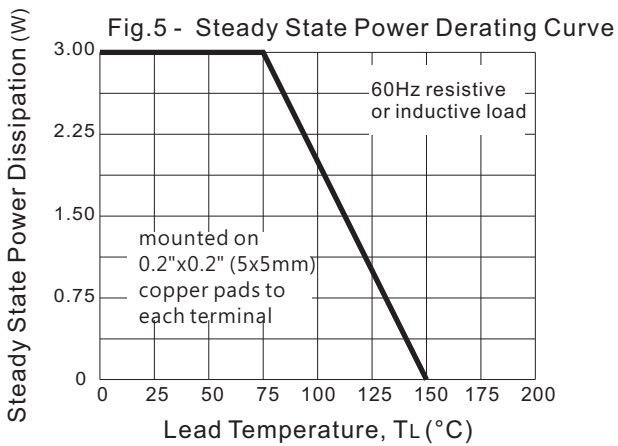
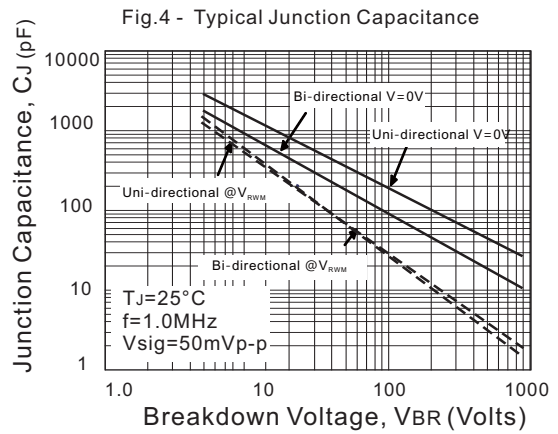
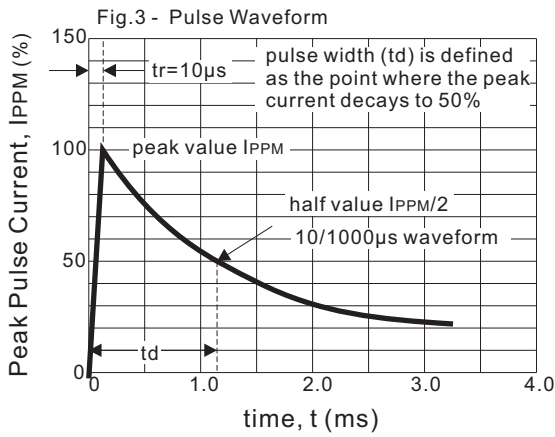
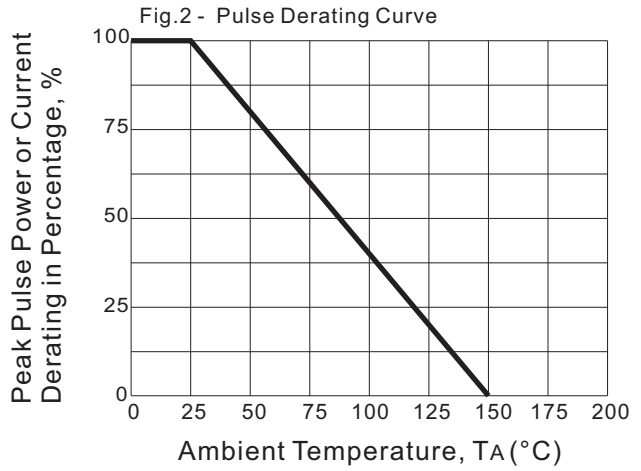
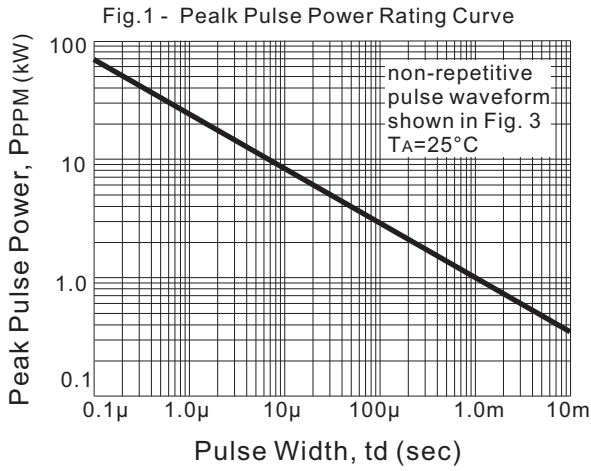
**Electrical characteristics** (at  $T_A=25^\circ\text{C}$  unless otherwise noted)

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	
		$V_{RWM}$	$V_{BRMin}$	$V_{BRMax}$	$I_T$	$V_C$	$I_{PP}$	$I_R@V_{RWM}$		
		Volts	Volts	Volts	mA	Volts	A	$\mu\text{A}$	Uni	Bi
SMAKNT20A	SMAKNT20CA	20	22.2	24.5	1.0	32.4	30.9	5	KBV	KXV
SMAKNT22A	SMAKNT22CA	22	24.4	26.9	1.0	35.5	28.2	5	KBX	KXX
SMAKNT24A	SMAKNT24CA	24	26.7	29.5	1.0	38.9	25.7	5	KBZ	KXZ
SMAKNT26A	SMAKNT26CA	26	28.9	31.9	1.0	42.1	23.8	5	KCE	KYE
SMAKNT28A	SMAKNT28CA	28	31.1	34.4	1.0	45.4	22.0	5	KCG	KYG
SMAKNT30A	SMAKNT30CA	30	33.3	36.8	1.0	48.4	20.7	5	KCK	KYK
SMAKNT33A	SMAKNT33CA	33	36.7	40.6	1.0	53.3	18.8	5	KCM	KYM
SMAKNT36A	SMAKNT36CA	36	40.0	44.2	1.0	58.1	17.2	5	KCP	KYP
SMAKNT40A	SMAKNT40CA	40	44.4	49.1	1.0	64.5	15.5	5	KCR	KYR
SMAKNT43A	SMAKNT43CA	43	47.8	52.8	1.0	69.4	14.4	5	KCT	KYT
SMAKNT45A	SMAKNT45CA	45	50.0	55.3	1.0	72.7	13.8	5	KCV	KYV
SMAKNT48A	SMAKNT48CA	48	53.3	58.9	1.0	77.4	12.9	5	KCX	KYX
SMAKNT51A	SMAKNT51CA	51	56.7	62.7	1.0	82.4	12.1	5	KCZ	KYZ
SMAKNT54A	SMAKNT54CA	54	60.0	66.3	1.0	87.1	11.5	5	KRE	KZE
SMAKNT58A	SMAKNT58CA	58	64.4	71.2	1.0	93.6	10.7	5	KRG	KZG
SMAKNT60A	SMAKNT60CA	60	66.7	73.7	1.0	96.8	10.3	5	KRK	KZK
SMAKNT64A	SMAKNT64CA	64	71.1	78.6	1.0	103	9.7	5	KRM	KZM
SMAKNT70A	SMAKNT70CA	70	77.8	86.0	1.0	113	8.9	5	KRP	KZP
SMAKNT75A	SMAKNT75CA	75	83.3	92.1	1.0	121	8.3	5	KRR	KZR
SMAKNT78A	SMAKNT78CA	78	86.7	95.8	1.0	126	7.9	5	KRT	KZT
SMAKNT85A	SMAKNT85CA	85	94.4	104	1.0	137	7.3	5	KRV	KZV
SMAKNT90A	SMAKNT90CA	90	100	111	1.0	146	6.9	5	KRX	KZX
SMAKNT100A	SMAKNT100CA	100	111	123	1.0	162	6.2	5	KRZ	KZZ
SMAKNT110A	SMAKNT110CA	110	122	135	1.0	177	5.7	5	KSE	KVE
SMAKNT120A	SMAKNT120CA	120	133	147	1.0	193	5.2	5	KSG	KVG
SMAKNT130A	SMAKNT130CA	130	144	159	1.0	209	4.8	5	KSK	KVK
SMAKNT150A	SMAKNT150CA	150	167	185	1.0	243	4.1	5	KSM	KVM
SMAKNT160A	SMAKNT160CA	160	178	197	1.0	259	3.9	5	KSP	KVP
SMAKNT170A	SMAKNT170CA	170	189	209	1.0	275	3.6	5	KSR	KVR
SMAKNT180A	SMAKNT180CA	180	201	222	1.0	292	3.4	5	KST	KVT
SMAKNT200A	SMAKNT200CA	200	224	247	1.0	324	3.1	5	KSV	KVV
SMAKNT220A	SMAKNT220CA	220	246	272	1.0	356	2.8	5	KSX	KVX
SMAKNT250A	SMAKNT250CA	250	279	309	1.0	405	2.47	5	KSZ	KVZ
SMAKNT300A	SMAKNT300CA	300	335	371	1.0	486	2.06	5	KTE	KUE
SMAKNT350A	SMAKNT350CA	350	391	432	1.0	567	1.77	5	KTG	KUG
SMAKNT400A	SMAKNT400CA	400	447	494	1.0	648	1.55	5	KTK	KUK
SMAKNT440A	SMAKNT440CA	440	492	544	1.0	713	1.41	5	KTM	KUM
SMAKNT500A	SMAKNT500CA	500	558	618	1.0	810	1.24	5	KTP	KUP
SMAKNT550A	SMAKNT550CA	550	614	680	1.0	891	1.13	5	KTR	KUR
SMAKNT600A	SMAKNT600CA	600	670	741	1.0	971	1.03	5	KTT	KUT
SMAKNT650A	SMAKNT650CA	650	726	803	1.0	1052	0.96	5	KTV	KUV
SMAKNT700A	SMAKNT700CA	700	782	865	1.0	1133	0.89	5	KTX	KUX
SMAKNT750A	SMAKNT750CA	750	837	927	1.0	1213	0.83	5	KTZ	KUZ
SMAKNT800A	SMAKNT800CA	800	893	989	1.0	1298	0.78	5	KXE	KYE

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 &amp; 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

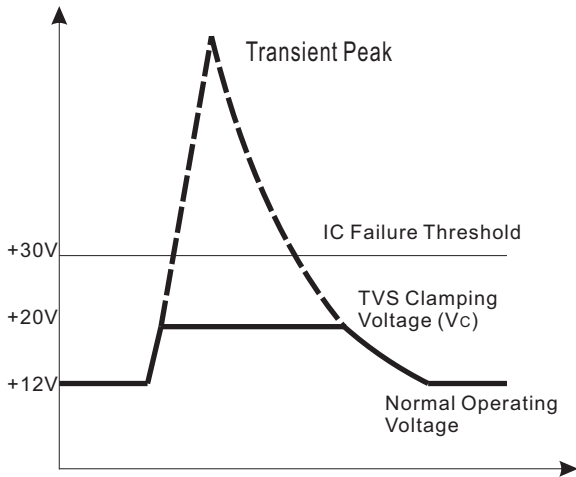
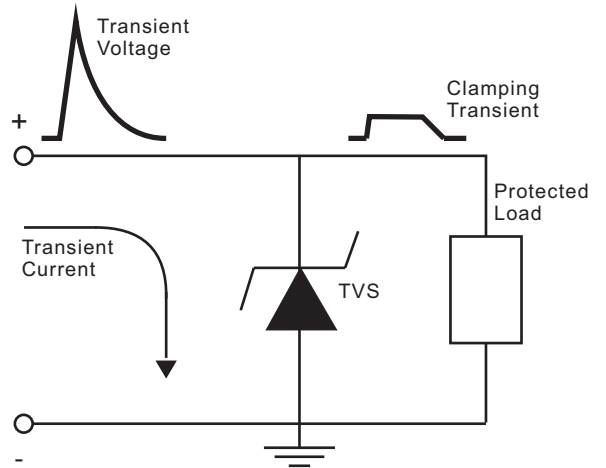
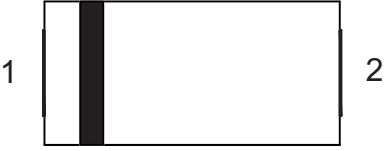





Fig. 7 - Transient current is diverted to ground thru TVS; the voltage seen by the protected load is limited to the clamping voltage level

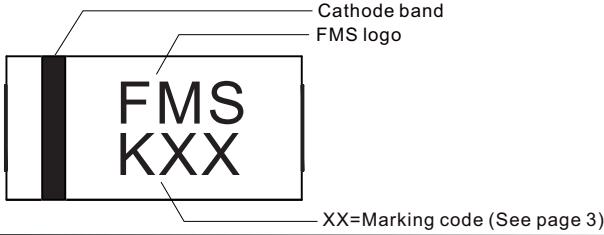
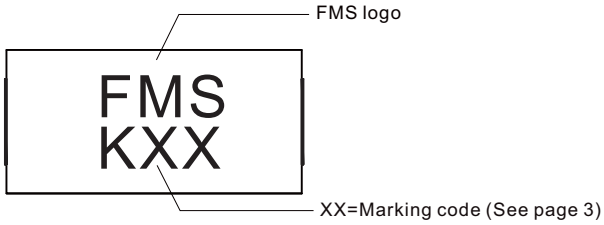


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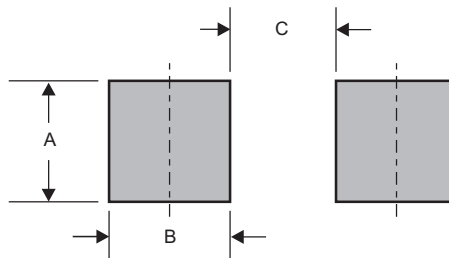
## Pinning information

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

## Marking

Type number	Example
Uni-Directional	
Bi-Directional	

## Suggested solder pad layout

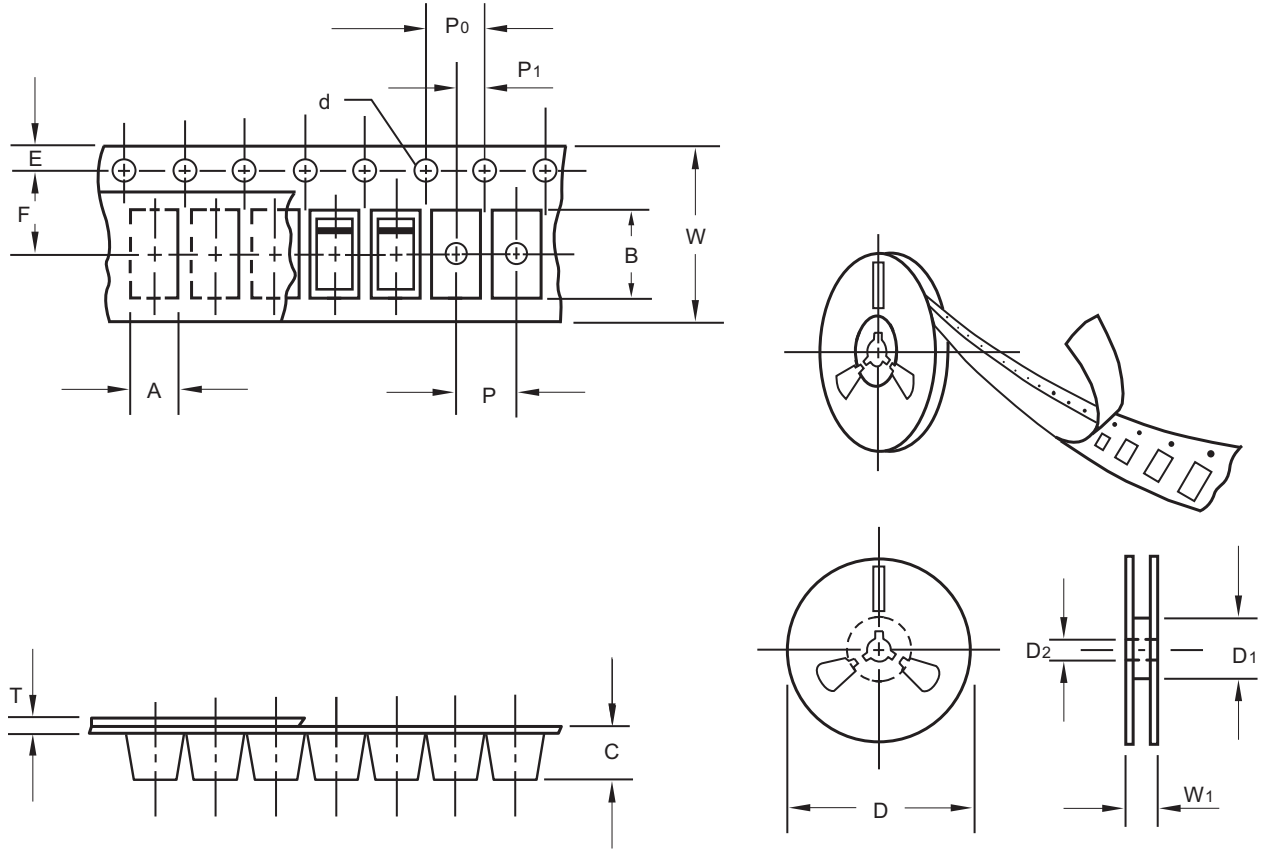


Dimensions in inches and (millimeters)

PACKAGE	A	B	C
SMA-NT	0.084 (2.10)	0.084 (2.10)	0.044 (1.10)

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## Packing information



unit:mm

Item	Symbol	Tolerance	SMA-NT
Carrier width	A	0.1	2.90
Carrier length	B	0.1	5.50
Carrier depth	C	0.1	2.10
Sprocket hole	d	0.1	1.50
13" Reel outside diameter	D	2.0	330.00
13" Reel inner diameter	D1	min	50.00
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	5.50
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	12.00
Reel width	W1	1.0	18.00

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

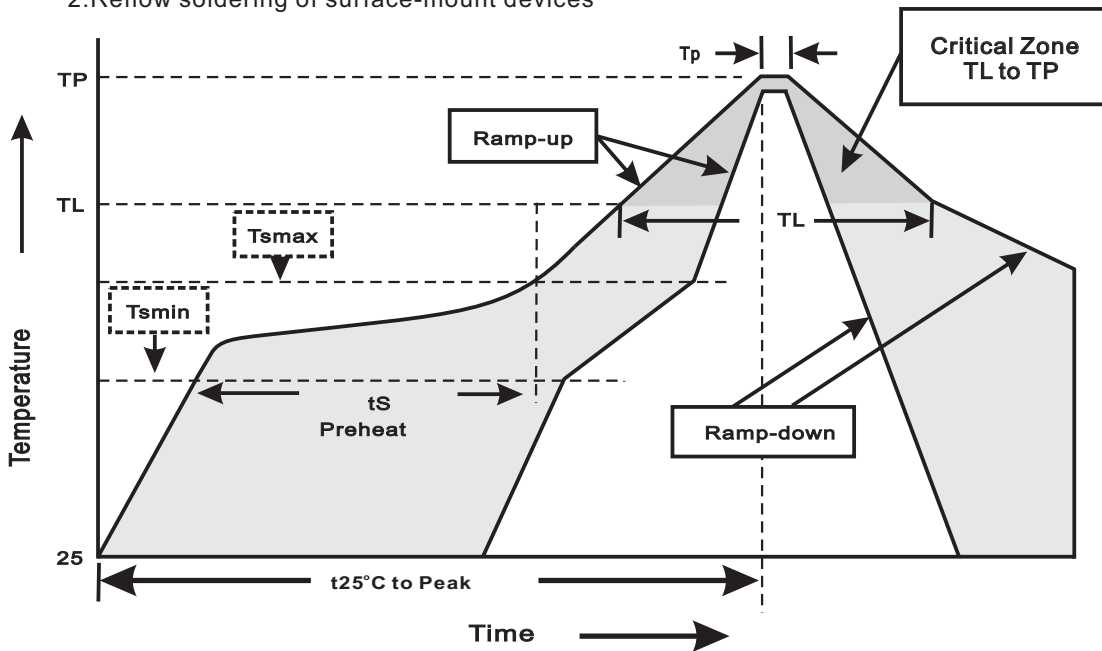
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## Reel packing

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)
SMA-NT	7"	2,000	4.0	20,000	183*155*183	178	382*356*392	160,000	15.5
	13"	7,500	4.0	15,000	335*335*38	330	350*330*360	120,000	14.5

## 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



**SMAKNT20(C)A THRU SMAKNT800(C)A****High reliability test capabilities**

Item Test	Conditions	Reference
1. Solder Resistance	at 260±5°C for 10±2sec.	MIL-STD-750D METHOD-2031
2. Solderability	at 245±5°C for 5 sec.	MIL-STD-202F METHOD-208
3. High Temperature Reverse Bias	$V_{BR}=V_{BR} N_{OM} * 80\%$ at $T_J=150^\circ\text{C}$ for 168 hrs.	MIL-STD-750D METHOD-1038
4. Pressure Cooker	15P <sub>SIG</sub> at $T_A=121^\circ\text{C}$ for 4 hrs.	JESD22-A102
5. Temperature Cycling	-55°C to +125°C dwelled for 30 min. and transferred for 5min. total 10 cycles.	MIL-STD-750D METHOD-1051
6. Humidity	at $T_A=85^\circ\text{C}$ , RH=85% for 1000hrs.	MIL-STD-750D METHOD-1021
7. High Temperature Storage Life	at 175°C for 1000 hrs.	MIL-STD-750D METHOD-1031