

SMAK5NT40(C)A-Q1 THRU SMAK5NT800(C)A-Q1

List

List..... 1

Package outline..... 2

Features..... 2

Mechanical data..... 2

Maximum ratings 2

Electrical characteristics 3

Rating and characteristic curves..... 4~5

Pinning information..... 6

Marking..... 6

Suggested solder pad layout..... 6

Packing information..... 7

Reel packing..... 8

Suggested thermal profiles for soldering processes..... 8

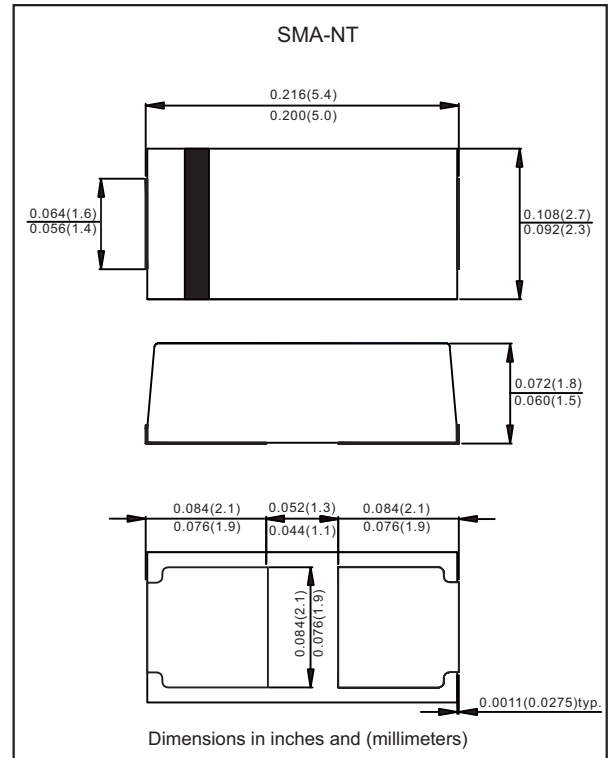
High reliability test capabilities..... 9

SMAK5NT40(C)A-Q1 THRU SMAK5NT800(C)A-Q1**1500W Dual Flat No-Lead Unidirectional and Bidirectional Transient Voltage Suppressors 40V-800V****Features**

- Well package design with solder pad on the bottom for best thermal performance
- Leads on two opposing sides of the body
- 1500W 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. SMAK5NT40A-Q1-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 10/1000 μ s waveform, Note 1, 2 & Fig. 1	PPPM	1500	W
Peak pulse current	with a 10/1000 μ s waveform	I _{PPM}	See Table	A
Steady state power dissipation	at $T_L=75^\circ\text{C}$, Note 2	P _{M(AV)}	3.5	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

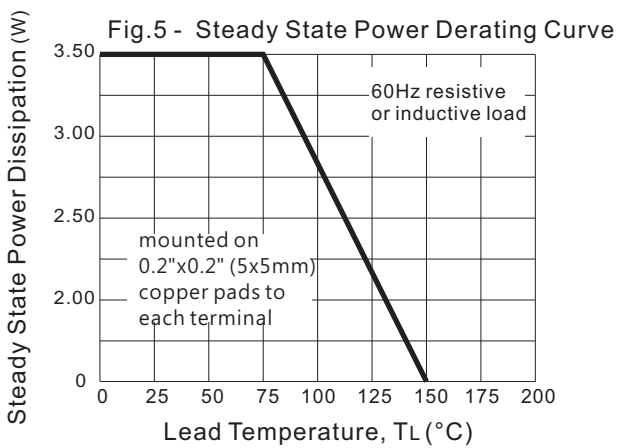
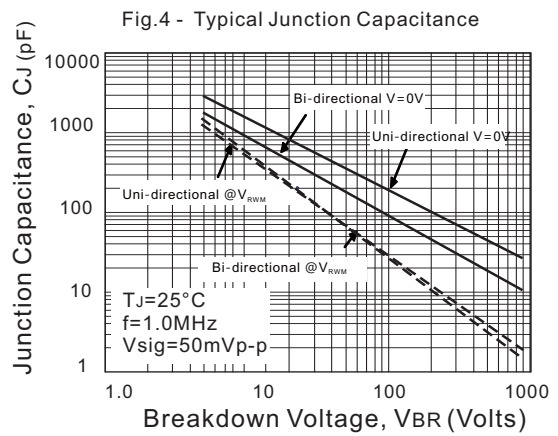
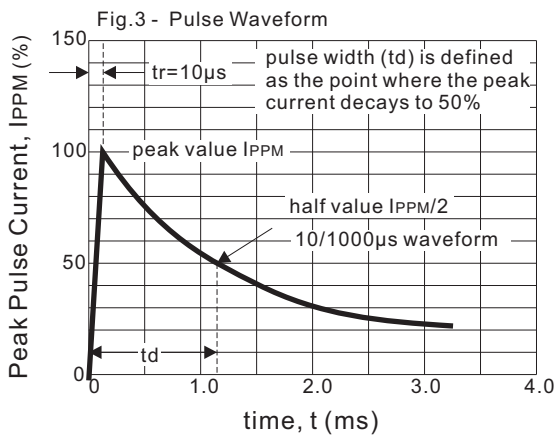
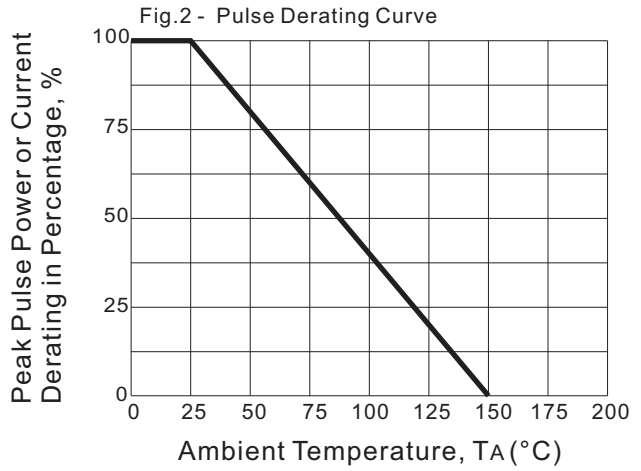
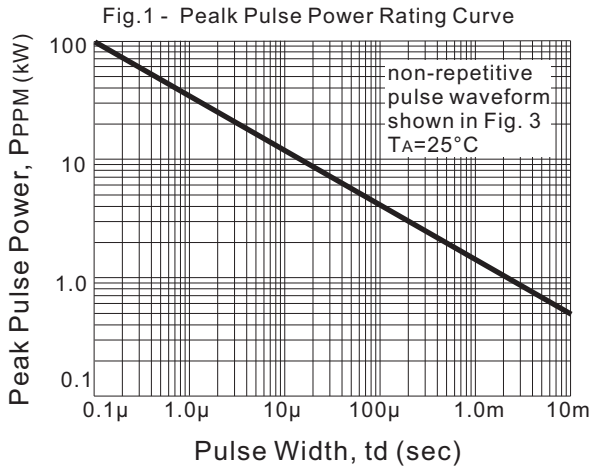
Electrical characteristics (at $T_A = 25^\circ\text{C}$ unless otherwise noted)

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		
SMAK5NT40A-Q1	SMAK5NT40CA-Q1	40	44.4	49.1	1.0	64.5	23.2	5	K5CR	K5YR
SMAK5NT43A-Q1	SMAK5NT43CA-Q1	43	47.8	52.8	1.0	69.4	21.6	5	K5CT	K5YT
SMAK5NT45A-Q1	SMAK5NT45CA-Q1	45	50.0	55.3	1.0	72.7	20.4	5	K5CV	K5YV
SMAK5NT48A-Q1	SMAK5NT48CA-Q1	48	53.3	58.9	1.0	77.4	19.4	5	K5CX	K5YX
SMAK5NT51A-Q1	SMAK5NT51CA-Q1	51	56.7	62.7	1.0	82.4	18.2	5	K5CZ	K5YZ
SMAK5NT54A-Q1	SMAK5NT54CA-Q1	54	60.0	66.3	1.0	87.1	17.2	5	K5RE	K5ZE
SMAK5NT58A-Q1	SMAK5NT58CA-Q1	58	64.4	71.2	1.0	93.6	16.0	5	K5RG	K5ZG
SMAK5NT60A-Q1	SMAK5NT60CA-Q1	60	66.7	73.7	1.0	96.8	15.5	5	K5RK	K5ZK
SMAK5NT64A-Q1	SMAK5NT64CA-Q1	64	71.1	78.6	1.0	103	14.5	5	K5RM	K5ZM
SMAK5NT70A-Q1	SMAK5NT70CA-Q1	70	77.8	86.0	1.0	113	13.2	5	K5RP	K5ZP
SMAK5NT75A-Q1	SMAK5NT75CA-Q1	75	83.3	92.1	1.0	121	12.4	5	K5RR	K5ZR
SMAK5NT78A-Q1	SMAK5NT78CA-Q1	78	86.7	95.8	1.0	126	11.9	5	K5RT	K5ZT
SMAK5NT85A-Q1	SMAK5NT85CA-Q1	85	94.4	104	1.0	137	10.9	5	K5RV	K5ZV
SMAK5NT90A-Q1	SMAK5NT90CA-Q1	90	100	111	1.0	146	10.2	5	K5RX	K5ZX
SMAK5NT100A-Q1	SMAK5NT100CA-Q1	100	111	123	1.0	162	9.3	5	K5RZ	K5ZZ
SMAK5NT110A-Q1	SMAK5NT110CA-Q1	110	122	135	1.0	177	8.4	5	K5SE	K5VE
SMAK5NT120A-Q1	SMAK5NT120CA-Q1	120	133	147	1.0	193	7.7	5	K5SG	K5VG
SMAK5NT130A-Q1	SMAK5NT130CA-Q1	130	144	159	1.0	209	7.1	5	K5SK	K5VK
SMAK5NT150A-Q1	SMAK5NT150CA-Q1	150	167	185	1.0	243	6.2	5	K5SM	K5VM
SMAK5NT160A-Q1	SMAK5NT160CA-Q1	160	178	197	1.0	259	5.7	5	K5SP	K5VP
SMAK5NT170A-Q1	SMAK5NT170CA-Q1	170	189	209	1.0	275	5.4	5	K5SR	K5VR
SMAK5NT180A-Q1	SMAK5NT180CA-Q1	180	201	222	1.0	292	5.1	5	K5ST	K5VT
SMAK5NT200A-Q1	SMAK5NT200CA-Q1	200	224	247	1.0	324	4.6	5	K5SV	K5VV
SMAK5NT220A-Q1	SMAK5NT220CA-Q1	220	246	272	1.0	356	4.2	5	K5SX	K5VX
SMAK5NT250A-Q1	SMAK5NT250CA-Q1	250	279	309	1.0	405	3.71	5	K5SZ	K5VZ
SMAK5NT300A-Q1	SMAK5NT300CA-Q1	300	335	371	1.0	486	3.09	5	K5TE	K5UE
SMAK5NT350A-Q1	SMAK5NT350CA-Q1	350	391	432	1.0	567	2.65	5	K5TG	K5UG
SMAK5NT400A-Q1	SMAK5NT400CA-Q1	400	447	494	1.0	648	2.32	5	K5TK	K5UK
SMAK5NT440A-Q1	SMAK5NT440CA-Q1	440	492	544	1.0	713	2.11	5	K5TM	K5UM
SMAK5NT500A-Q1	SMAK5NT500CA-Q1	500	558	618	1.0	810	1.86	5	K5TP	K5UP
SMAK5NT550A-Q1	SMAK5NT550CA-Q1	550	614	680	1.0	891	1.69	5	K5TR	K5UR
SMAK5NT600A-Q1	SMAK5NT600CA-Q1	600	670	741	1.0	971	1.55	5	K5TT	K5UT
SMAK5NT650A-Q1	SMAK5NT650CA-Q1	650	726	803	1.0	1052	1.43	5	K5TV	K5UV
SMAK5NT700A-Q1	SMAK5NT700CA-Q1	700	782	865	1.0	1133	1.33	5	K5TX	K5UX
SMAK5NT750A-Q1	SMAK5NT750CA-Q1	750	837	927	1.0	1213	1.24	5	K5TZ	K5UZ
SMAK5NT800A-Q1	SMAK5NT800CA-Q1	800	893	989	1.0	1298	1.16	5	K5XE	K5YE

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

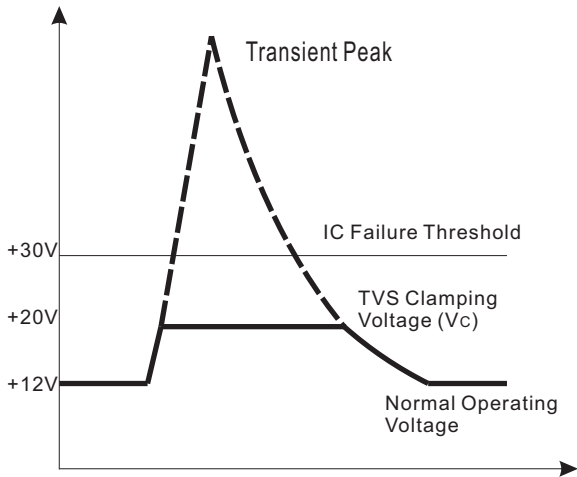
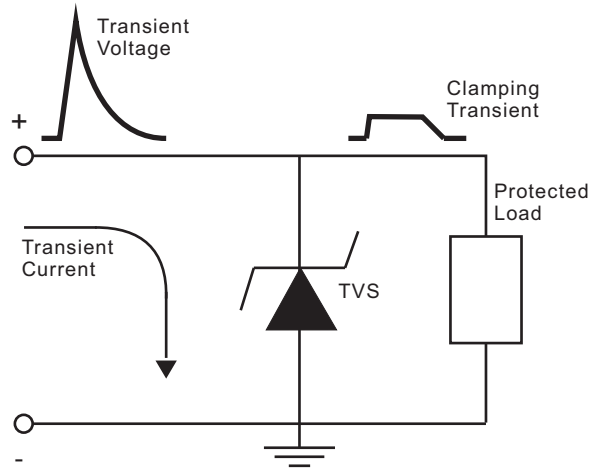
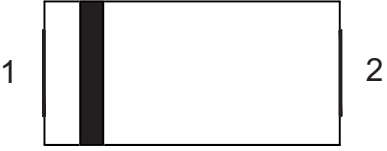





Fig. 7 - Transient current is diverted to ground thru TVS; the voltage seen by the protected load is limited to the clamping voltage level

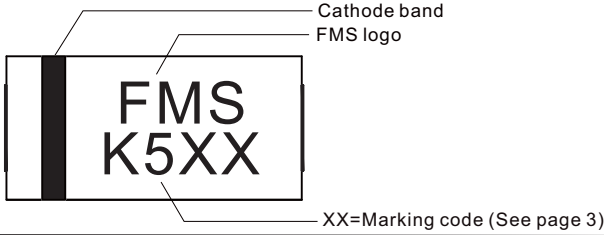
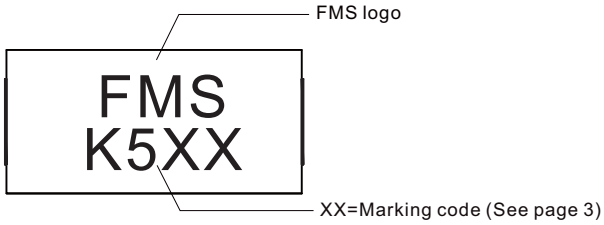


SMAK5NT40(C)A-Q1 THRU SMAK5NT800(C)A-Q1

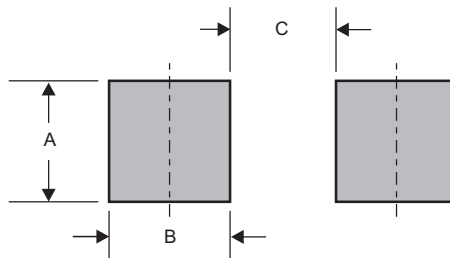
Pinning information

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

Marking

Type number	Example
Uni-Directional	
Bi-Directional	

Suggested solder pad layout

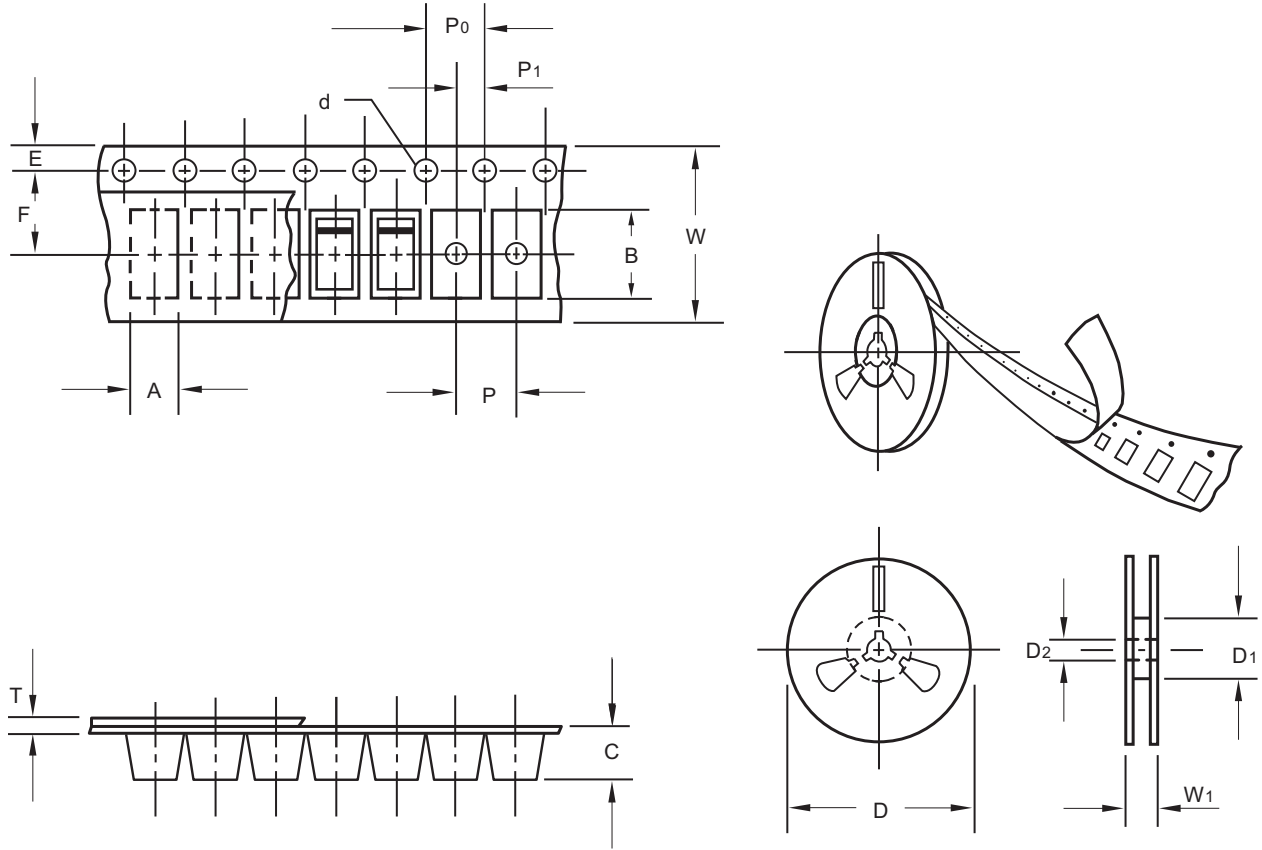


Dimensions in inches and (millimeters)

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

SMAK5NT40(C)A-Q1 THRU SMAK5NT800(C)A-Q1

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.

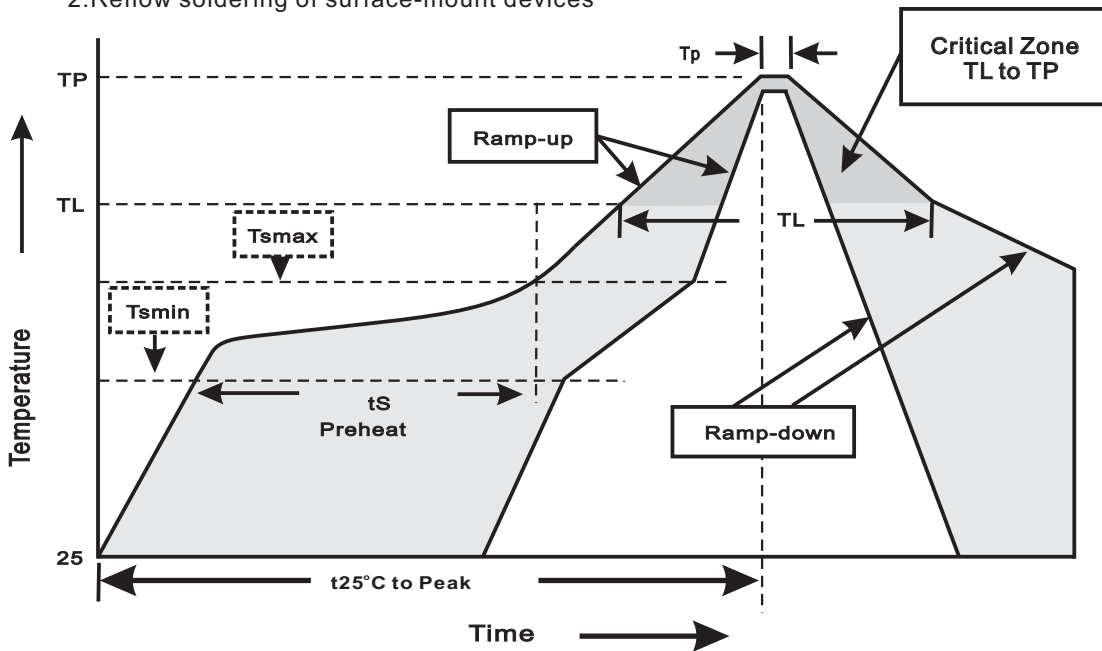
SMAK5NT40(C)A-Q1 THRU SMAK5NT800(C)A-Q1

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

SMAK5NT40(C)A-Q1 THRU SMAK5NT800(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	$V_{BR}=V_{BR\ NOM} * 80\%$ ($T_J=T_{Jmax}$) 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