

# SMAK5NT40(C)A THRU SMAK5NT800(C)A

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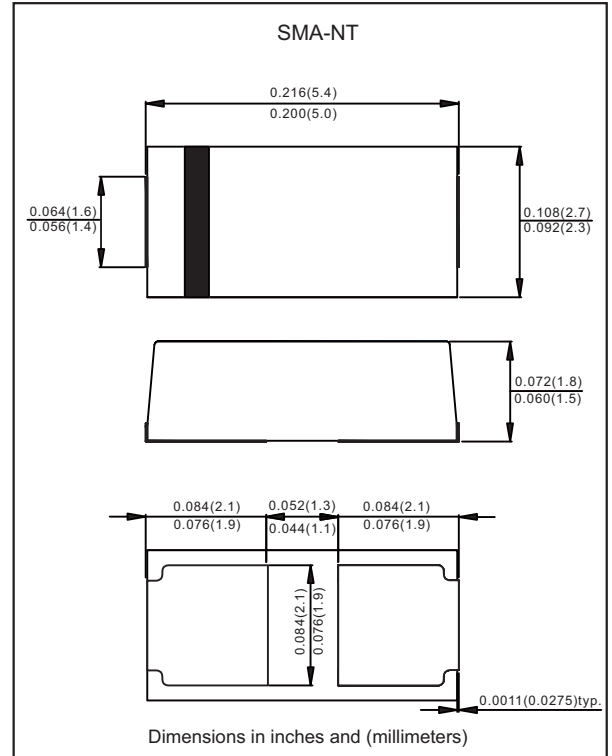
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**SMAK5NT40(C)A THRU SMAK5NT800(C)A****1500W Dual Flat No-Lead Unidirectional and Bidirectional Transient Voltage Suppressors 40V-800V****Features**

- 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 $\mu$ 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
- Suffix "-H" indicates Halogen-free part, ex. SMAK5NT40A-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 $\mu$ s waveform, Note 1, 2 & Fig. 1	PPPM	1500	W
Peak pulse current	with a 10/1000 $\mu$ s 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>	3.5	W
Operating junction temperature range		T <sub>J</sub>	-55 to +150	$^\circ\text{C}$
Storage temperature range		T <sub>STG</sub>	-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

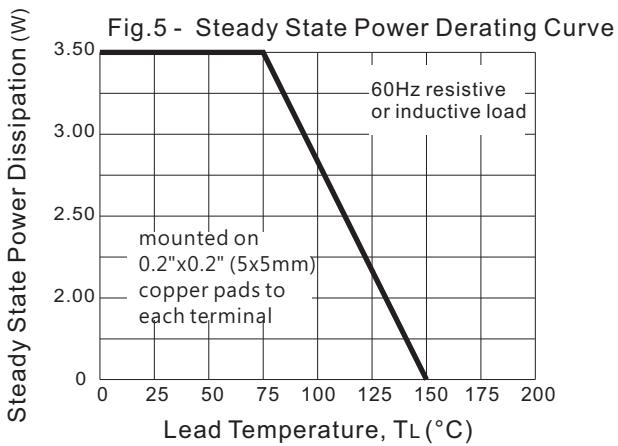
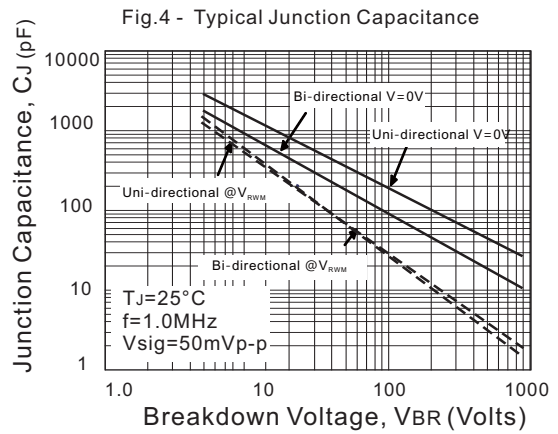
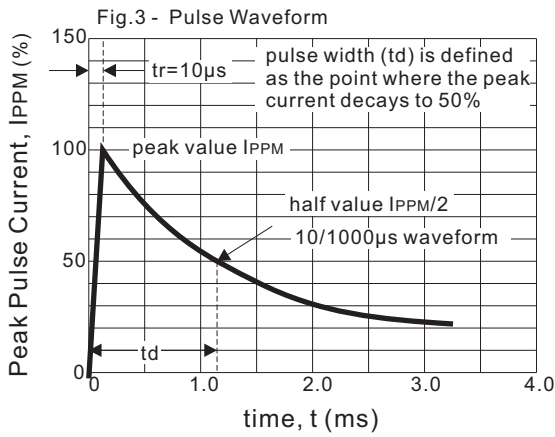
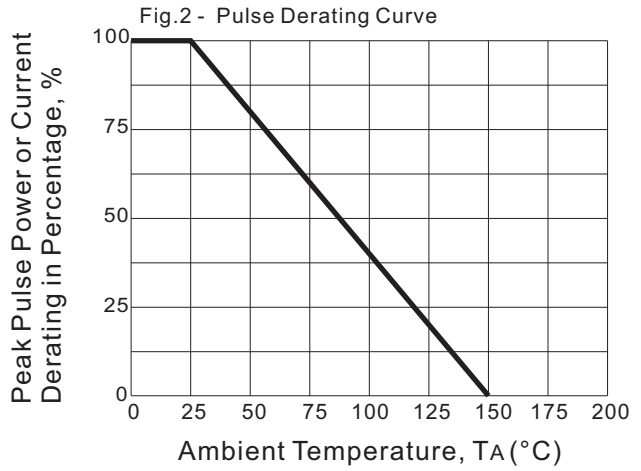
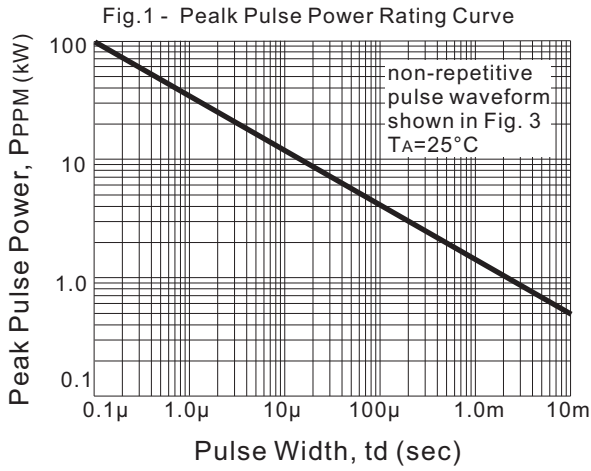
**Electrical characteristics** (at  $T_A=25^\circ\text{C}$  unless otherwise noted)

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

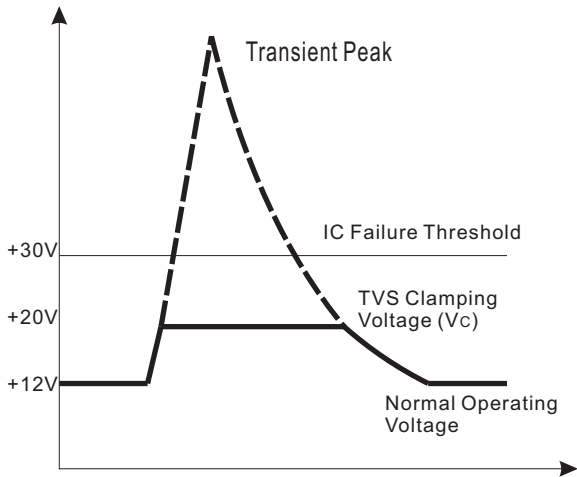
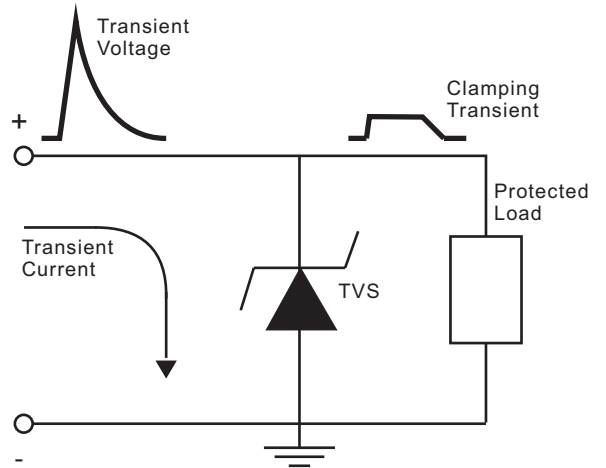


Fig. 7 - Transient current is diverted to ground thru TVS; the voltage seen by the protected load is limited to the clamping voltage level



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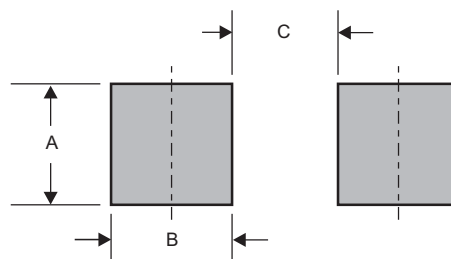
## Pinning information

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

## Marking

Type number	Example
Uni-Directional	
Bi-Directional	

## Suggested solder pad layout

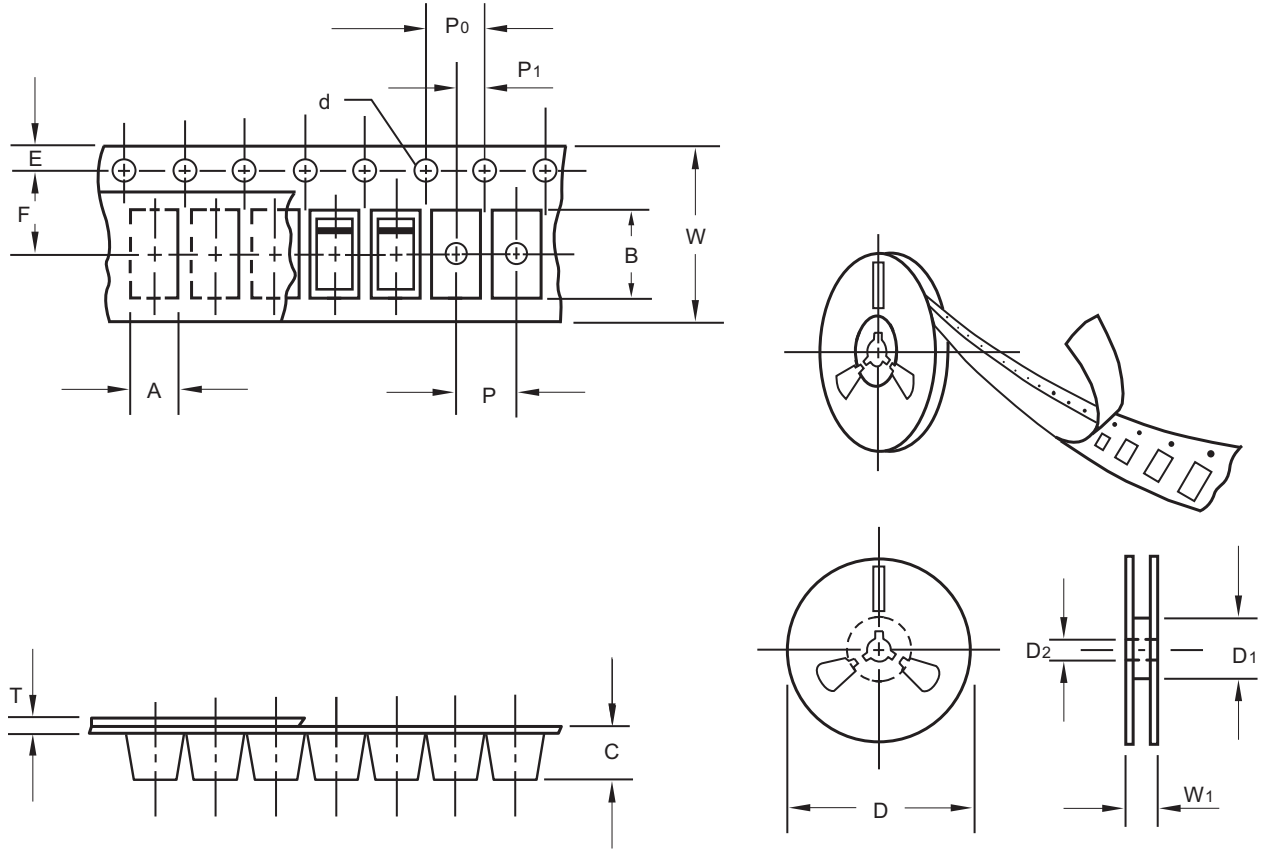


Dimensions in inches and (millimeters)

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.

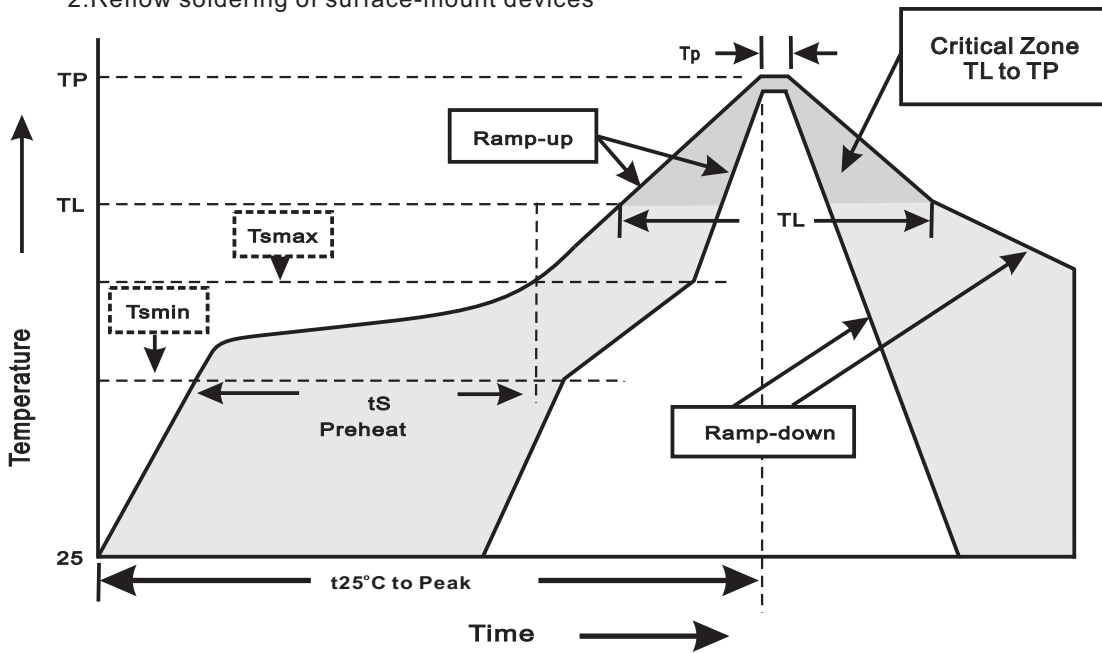
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## Reel packing

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



# Formosa MS SMAK5NT40(C)A THRU SMAK5NT800(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