

SMA6HS5.0A-Q1 THRU SMA6HS85A-Q1

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SMA6HS5.0A-Q1 THRU SMA6HS85A-Q1

600W Surface Mount Unidirectional Transient Voltage Suppressors Diodes 5.0V-85V

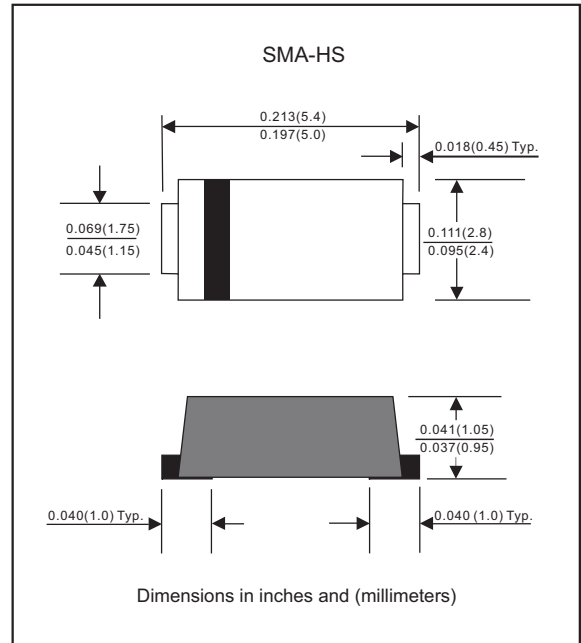
Features

- Uni-directional
- Very low profile - typical height of 1.0 mm
- 600W peak pulse power capability with a 10/1000µs waveform, repetition rate (duty cycle): 0.01%
- Low profile surface mounted application in order to optimize board space
- Excellent clamping capability
- Low incremental surge resistance
- Glass passivated chip junction
- Lead-free parts meet RoHS requirements
- Qualified to AEC-Q101 standards for high reliability
- Suffix "-H" indicates Halogen free parts, ex. SMA6HS5.0A-Q1-H

Mechanical data

- Epoxy:UL94-V0 rated flame retardant
- Case : Molded plastic,DO-221AC / SMA-HS
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
- Polarity : Indicated by cathode band
- Mounting Position : Any
- Weight : Approximated 0.037 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	600	W
Peak pulse current	with a 10/1000µs waveform	IPPM	See Table 1	A
Steady state power dissipation	at $T_L=75^{\circ}\text{C}$, Note 2	PM(AV)	4.5	W
Peak forward surge current	8.3ms single half sine-wave, Note 3	IFSM	60	A
Maximum instantaneous forward voltage	at $I_F=25\text{A}$ For uni-directional types only, Note 4	V_F	3.5	V
Typical thermal resistance	Junction to case Junction to ambient	$R_{\theta JC}$ $R_{\theta JA}$	32 52	$^{\circ}\text{C}/\text{W}$
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
 3. Measured on 8.3 ms single half sine-wave or equivalent square wave, duty cycle=4 pulses per minute maximum
 4. $V_F < 3.5\text{V}$ for $V_{BR} < 200\text{V}$

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

Part No. (Uni)	Reverse Stand-off Voltage		Breakdown Voltage @ I_T		Test Current	Maximum Clamping Voltage @ I_{PP}		Maximum Reverse Leakage Current	Marking Code Uni
	V_{RWM}	$V_{BR\text{ Min}}$	$V_{BR\text{ Max}}$	I_T	V_c	I_{PP}	$I_R@V_{RWM}$		
	Volts	Volts	Volts	mA	Volts	A	μA		
SMA6HS5.0A-Q1	5.0	6.40	7.00	10	9.2	65.2	800	6AE	
SMA6HS6.0A-Q1	6.0	6.67	7.37	10	10.3	58.3	800	6AG	
SMA6HS6.5A-Q1	6.5	7.22	7.98	10	11.2	53.6	500	6AK	
SMA6HS7.0A-Q1	7.0	7.78	8.60	10	12.0	50.0	200	6AM	
SMA6HS7.5A-Q1	7.5	8.33	9.21	1.0	12.9	46.5	100	6AP	
SMA6HS8.0A-Q1	8.0	8.89	9.83	1.0	13.6	44.1	50	6AR	
SMA6HS8.5A-Q1	8.5	9.44	10.4	1.0	14.4	41.7	20	6AT	
SMA6HS9.0A-Q1	9.0	10.0	11.1	1.0	15.4	39.0	10	6AV	
SMA6HS10A-Q1	10	11.1	12.3	1.0	17.0	35.3	5	6AX	
SMA6HS11A-Q1	11	12.2	13.5	1.0	18.2	33.0	5	6AZ	
SMA6HS12A-Q1	12	13.3	14.7	1.0	19.9	30.2	5	6BE	
SMA6HS13A-Q1	13	14.4	15.9	1.0	21.5	27.9	5	6BG	
SMA6HS14A-Q1	14	15.6	17.2	1.0	23.2	25.9	5	6BK	
SMA6HS15A-Q1	15	16.7	18.5	1.0	24.4	24.6	5	6BM	
SMA6HS16A-Q1	16	17.8	19.7	1.0	26.0	23.0	5	6BP	
SMA6HS17A-Q1	17	18.9	20.9	1.0	27.6	21.7	5	6BR	
SMA6HS18A-Q1	18	20.0	22.1	1.0	29.2	20.5	5	6BT	
SMA6HS20A-Q1	20	22.2	24.5	1.0	32.4	18.5	5	6BV	
SMA6HS22A-Q1	22	24.4	26.9	1.0	35.5	16.9	5	6BX	
SMA6HS24A-Q1	24	26.7	29.5	1.0	38.9	15.4	5	6BZ	
SMA6HS26A-Q1	26	28.9	31.9	1.0	42.1	14.2	5	6CE	
SMA6HS28A-Q1	28	31.1	34.4	1.0	45.4	13.2	5	6CG	
SMA6HS30A-Q1	30	33.3	36.8	1.0	48.4	12.4	5	6CK	
SMA6HS33A-Q1	33	36.7	40.6	1.0	53.3	11.2	5	6CM	
SMA6HS36A-Q1	36	40.0	44.2	1.0	58.1	10.3	5	6CP	
SMA6HS40A-Q1	40	44.4	49.1	1.0	64.5	9.3	5	6CR	
SMA6HS43A-Q1	43	47.8	52.8	1.0	69.4	8.6	5	6CT	
SMA6HS45A-Q1	45	50.0	55.3	1.0	72.7	8.2	5	6CV	
SMA6HS48A-Q1	48	53.3	58.9	1.0	77.4	7.7	5	6CX	
SMA6HS51A-Q1	51	56.7	62.7	1.0	82.4	7.2	5	6CZ	
SMA6HS54A-Q1	54	60.0	66.3	1.0	87.1	6.9	5	6RE	
SMA6HS58A-Q1	58	64.4	71.2	1.0	93.6	6.4	5	6RG	
SMA6HS60A-Q1	60	66.7	73.7	1.0	96.8	6.2	5	6RK	
SMA6HS64A-Q1	64	71.1	78.6	1.0	103.0	5.8	5	6RM	
SMA6HS70A-Q1	70	77.8	86.0	1.0	113.0	5.3	5	6RP	
SMA6HS75A-Q1	75	83.3	92.1	1.0	121.0	4.9	5	6RR	
SMA6HS78A-Q1	78	86.7	95.8	1.0	126.0	4.7	5	6RT	
SMA6HS85A-Q1	85	94.4	104	1.0	137.0	4.3	5	6RV	

Notes 1. V_{BR} measured after I_T applied for 300 μs , I_T =square wave pulse or equivalent

2. Surge current waveform per Fig. 3 and derated per Fig. 2

3. Suffix 'A' denotes 5% tolerance devices

4. All terms and symbols are consistent with ANS/IEEE C62.35

5. 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. 7 & Fig. 8

Rating and characteristic curves (SMA6HS-Q1 SERIES)

Fig.1 - Peak Pulse Power Rating Curve

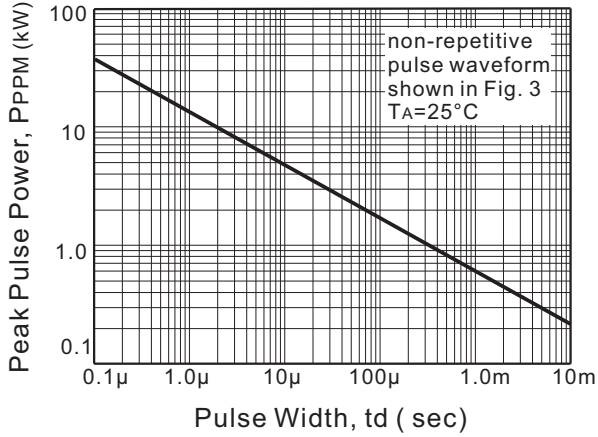


Fig.2 - Pulse Derating Curve

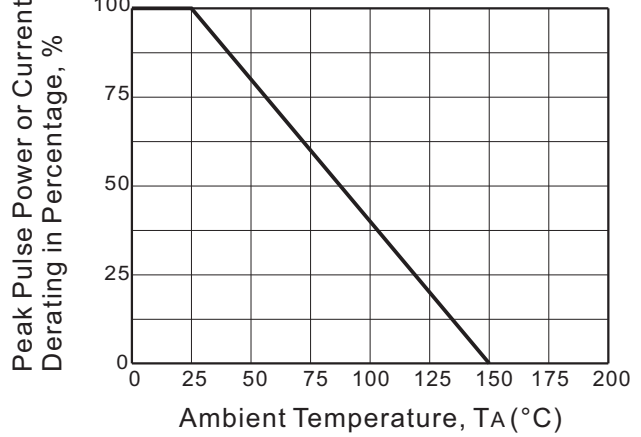


Fig.3 - Pulse Waveform

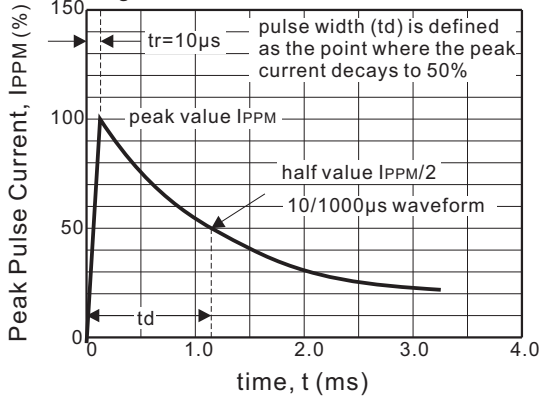


Fig.4 - Typical Junction Capacitance

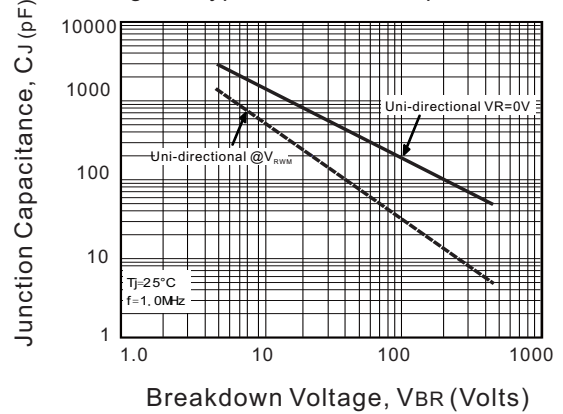


Fig.5 - Steady State Power Derating Curve

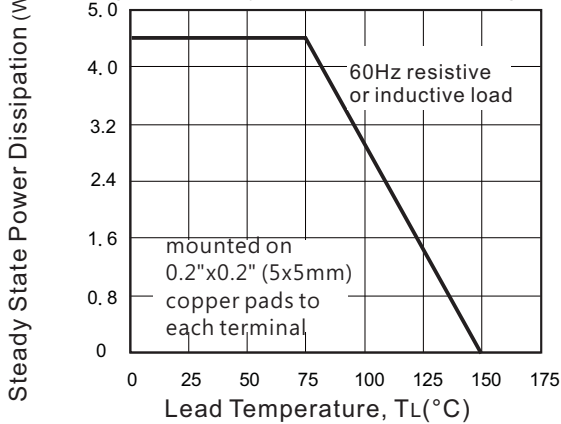
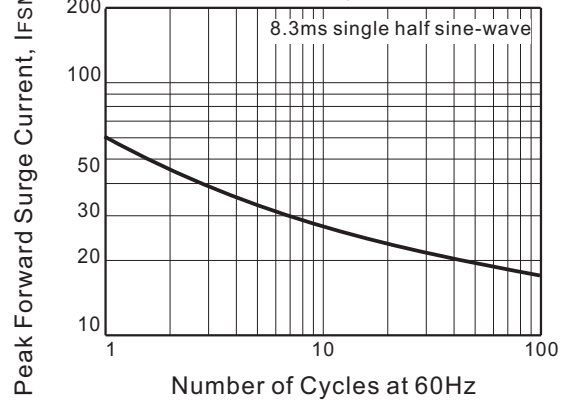


Fig.6 - Maximum Non-Repetitive Forward Surge Current



Rating and characteristic curves (SMA6HS-Q1 SERIES)

Fig. 7 - Transients of several thousand volts can be clamped to a safe level by the TVS

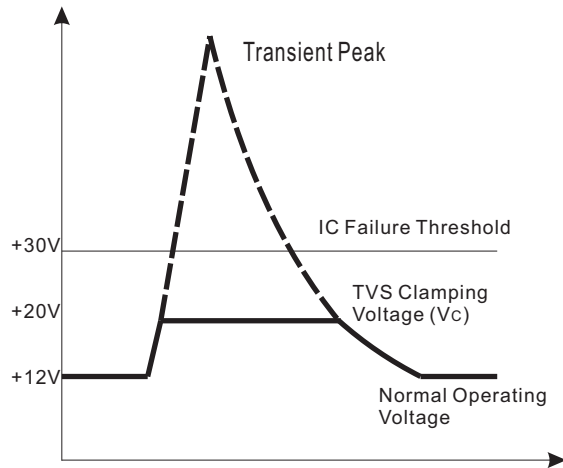
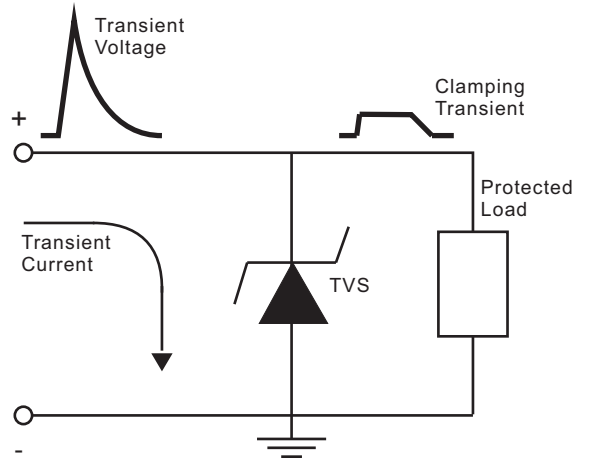




Fig. 8 - Transient current is diverted to ground thru TVS; the voltage seen by the protected load is limited to the clamping voltage level

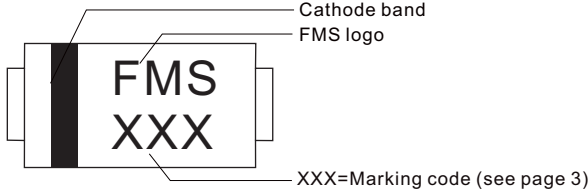


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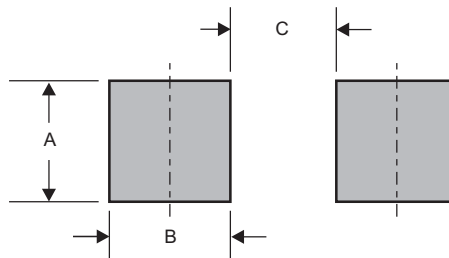
Pinning information

Pin	Simplified outline	Symbol
Uni-Directional Pin1 cathode Pin2 anode		

Marking

Type number	Example
Uni-Directional	

Suggested solder pad layout

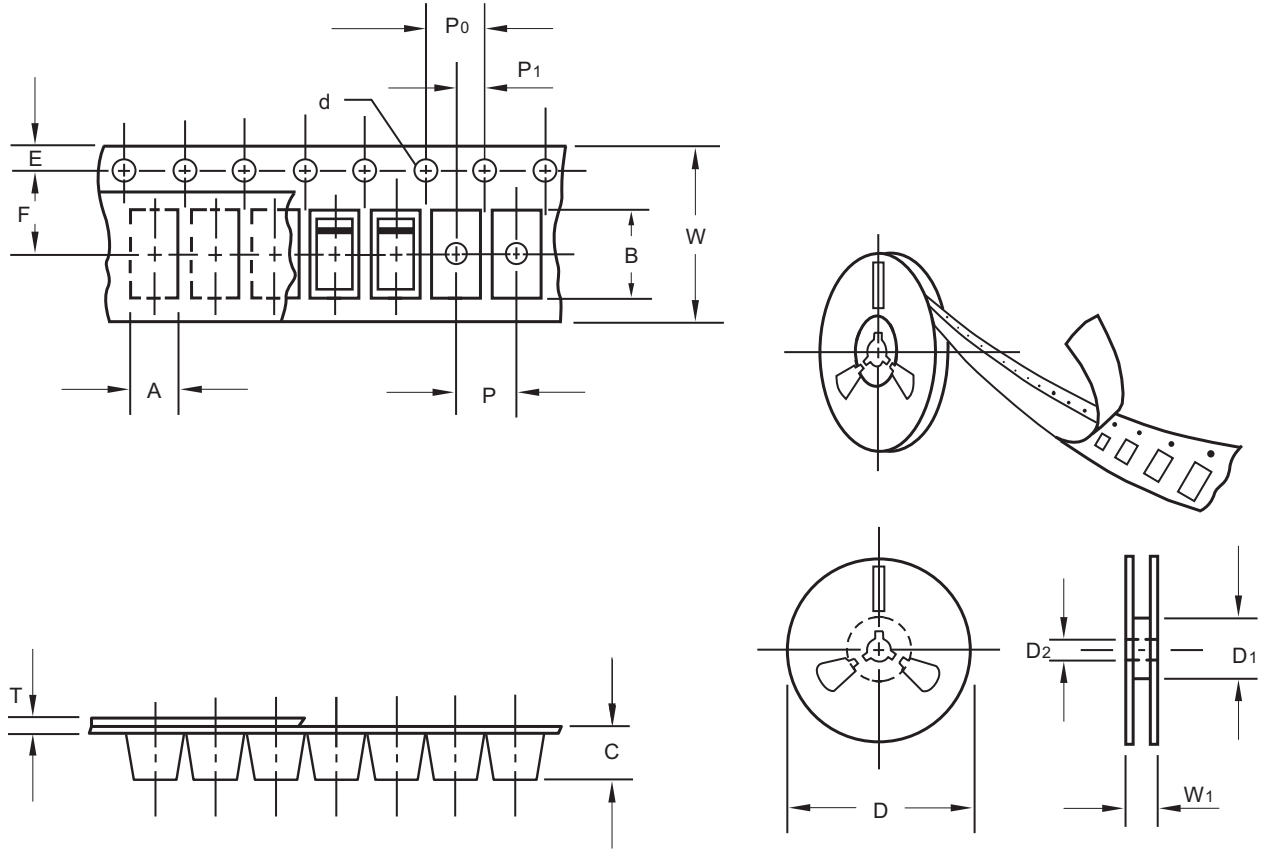


Dimensions in inches and (millimeters)

PACKAGE	A	B	C
SMA-HS	0.060 (1.52)	0.048 (1.20)	0.123 (3.12)

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Packing information



unit:mm

Item	Symbol	Tolerance	SMA-HS
Carrier width	A	0.1	3.00
Carrier length	B	0.1	5.50
Carrier depth	C	0.1	1.20
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	0.25
Tape width	W	0.3	12.00
Reel width	W1	1.0	11.40

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

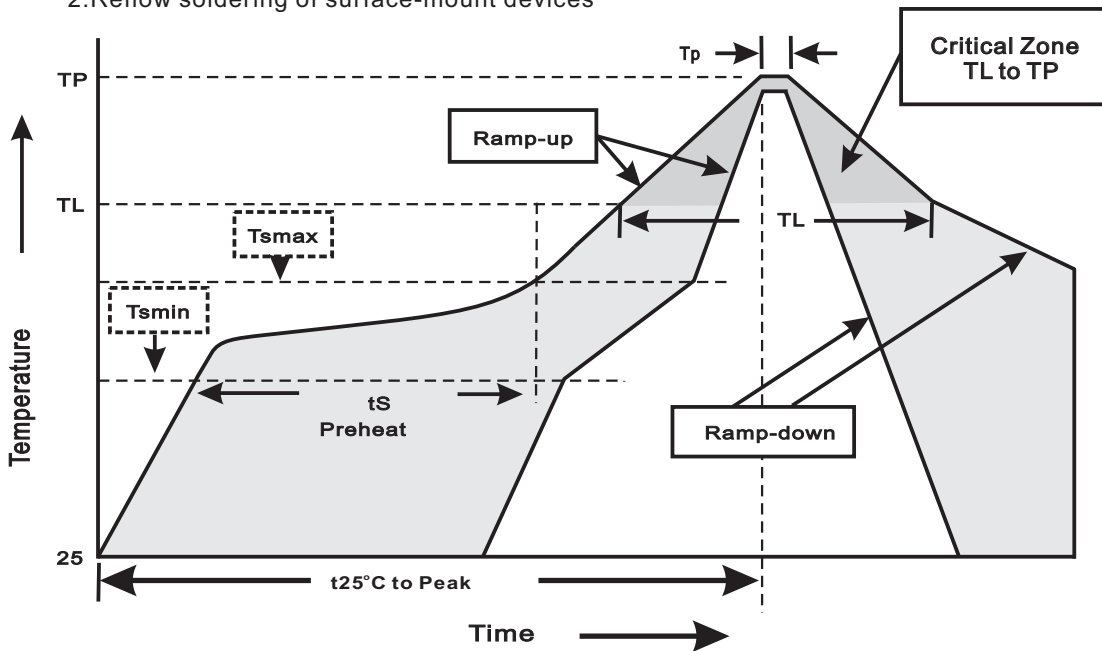
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Reel packing

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)
SMA-HS	7"	3,000	4.0	30,000	183*155*183	178	382*356*392	240,000	18.0
	13"	10,000	4.0	20,000	335*335*38	330	350*330*360	160,000	15.5

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 _{smín}) -Temperature Max(T _{smáx}) -Time(min to max)(t _s)	150°C 200°C 60~120sec
T _{smáx} 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	<6°C/sec
Time 25°C to Peak Temperature	<6minutes

SMA6HS5.0A-Q1 THRU SMA6HS85A-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	$V_{BR}=V_{BR\ NOM} * 80\%$ ($T_j=150^\circ C$) Test Duration:1000hrs	JESD22-A108
3. High Temperature Storage Life	$T_a=125^\circ C$ Test Duration:1000hrs	JESD22 A-103
4. Temperature Cycle	$-55^\circ C(15min)$ to $150^\circ C(15min)$ Test Cycles:1000cycles	JESD22 A-104
5. Autoclave	$P=2atm$ $T_a=121^\circ C$ $RH=100\%$ Test Duration:96hrs	JESD22 A-102
6. Solderability	$245\pm 5^\circ C$ for 5sec	J-STD-002
7. Moisture Resistance	$T_a=85^\circ C/85\%$ Relative humidity Test Duration:1000hrs	MIL-STD-750E METHOD 1021.2
8. Resistance To Solder Heat	$260\pm 5^\circ C$ for 10sec	JESD22 B-106
9. High Temperature High Humidity Reverse Bias	$T_a=85^\circ C$, 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