

SMB10J5.0(C)A-Q1 THRU SMB10J480(C)A-Q1

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1000W Surface Mount Transient Voltage Suppressors 5.0V-480V

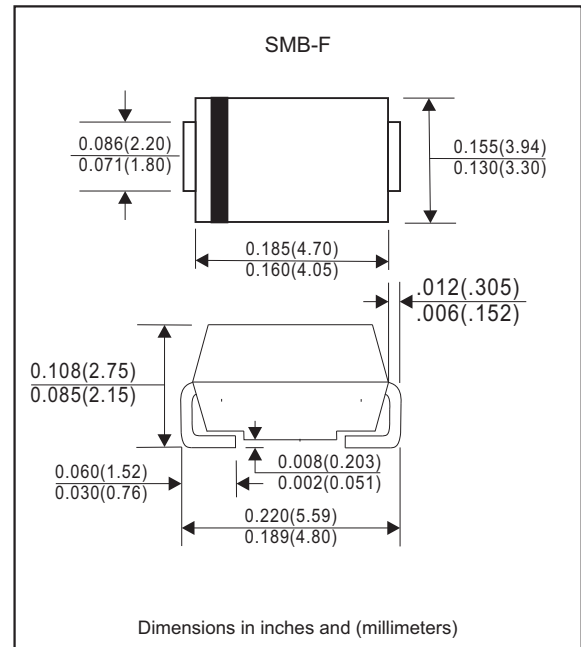
Features

- 1000W peak pulse power capability with a 10/1000µs waveform, repetition rate (duty cycle): 0.01%
- Excellent clamping capability
- Low incremental surge resistance
- Very fast response time
- 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. SMB10J5.0A-Q1-H

Mechanical data

- Epoxy:UL94-V0 rated flame retardant
- Case : Molded plastic, DO-214AA / SMB-F
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
- Polarity : Color band denoted cathode except bidirectional
- Mounting Position : Any
- Weight : Approximated 0.11 gram

Package outline



Maximum ratings (AT T_A=25°C unless otherwise noted)

Parameter	Conditions	Symbol	Value	Unit
Peak power dissipation	with a 10/1000µs waveform (Note 1)	P _{PPM}	1000	W
Peak pulse current	with a 10/1000µs waveform	I _{PPM}	See Next Table	A
Power dissipation	on infinite heat sink at T _L =75°C	P _D	5.0	W
Peak forward surge current	8.3ms single half sine-wave uni-directional only (Note 2)	I _{FSM}	100	A
Maximum instantaneous forward voltage	at 50A for uni-directional types only (Note 3)	V _F	3.5/6.5	V
Operating junction temperature range		T _J	-55 to +150	°C
Storage temperature range		T _{STG}	-55 to +150	°C

Notes 1: Non-repetitive current pulse, per Fig. 3 and derated above T_A=25°C per Fig. 5

2: Measured on 8.3 ms single half sine-wave or equivalent square wave, duty cycle=4 pulses per minute maximum

3: V_F<3.5V for V_{BR}< 200V and V_F<6.5V for V_{BR}>201V

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}	$V_{BR\ Min}$	$V_{BR\ Max}$	I_T	V_C	I_{PP}	$I_R@V_{RWM}$	Uni	Bi
		Volts	Volts	Volts	mA	Volts	A	μA		
SMB10J5.0A-Q1	SMB10J5.0CA-Q1	5.0	6.40	7.00	10	9.2	108.83	800	KKE	KAE
SMB10J6.0A-Q1	SMB10J6.0CA-Q1	6.0	6.67	7.37	10	10.3	97.17	800	KKG	KAG
SMB10J6.5A-Q1	SMB10J6.5CA-Q1	6.5	7.22	7.98	10	11.2	89.33	500	KKK	KAK
SMB10J7.0A-Q1	SMB10J7.0CA-Q1	7.0	7.78	8.60	10	12.0	83.33	200	KKM	KAM
SMB10J7.5A-Q1	SMB10J7.5CA-Q1	7.5	8.33	9.21	1.0	12.9	77.67	100	KKP	KAP
SMB10J8.0A-Q1	SMB10J8.0CA-Q1	8.0	8.89	9.83	1.0	13.6	73.67	50	KKR	KAR
SMB10J8.5A-Q1	SMB10J8.5CA-Q1	8.5	9.44	10.4	1.0	14.4	69.50	20	KKT	KAT
SMB10J9.0A-Q1	SMB10J9.0CA-Q1	9.0	10.0	11.1	1.0	15.4	65.00	10	KKV	KAV
SMB10J10A-Q1	SMB10J10CA-Q1	10	11.1	12.3	1.0	17.0	58.83	5	KKX	KAX
SMB10J11A-Q1	SMB10J11CA-Q1	11	12.2	13.5	1.0	18.2	55.00	1	KKZ	KAZ
SMB10J12A-Q1	SMB10J12CA-Q1	12	13.3	14.7	1.0	19.9	50.33	1	KLE	KBE
SMB10J13A-Q1	SMB10J13CA-Q1	13	14.4	15.9	1.0	21.5	46.67	1	KLG	KBG
SMB10J14A-Q1	SMB10J14CA-Q1	14	15.6	17.2	1.0	23.2	43.17	1	KLK	KBK
SMB10J15A-Q1	SMB10J15CA-Q1	15	16.7	18.5	1.0	24.4	41.00	1	KLM	KBM
SMB10J16A-Q1	SMB10J16CA-Q1	16	17.8	19.7	1.0	26.0	38.50	1	KLP	KBP
SMB10J17A-Q1	SMB10J17CA-Q1	17	18.9	20.9	1.0	27.6	36.33	1	KLR	KBR
SMB10J18A-Q1	SMB10J18CA-Q1	18	20.0	22.1	1.0	29.2	34.33	1	KLT	KBT
SMB10J20A-Q1	SMB10J20CA-Q1	20	22.2	24.5	1.0	32.4	31.00	1	KLV	KBV
SMB10J22A-Q1	SMB10J22CA-Q1	22	24.4	26.9	1.0	35.5	28.17	1	KLX	KBX
SMB10J24A-Q1	SMB10J24CA-Q1	24	26.7	29.5	1.0	38.9	25.83	1	KLZ	KBZ
SMB10J26A-Q1	SMB10J26CA-Q1	26	28.9	31.9	1.0	42.1	23.83	1	KME	KCE
SMB10J28A-Q1	SMB10J28CA-Q1	28	31.1	34.4	1.0	45.4	22.17	1	KMG	KCG
SMB10J30A-Q1	SMB10J30CA-Q1	30	33.5	36.8	1.0	48.4	20.67	1	KMK	KCK
SMB10J33A-Q1	SMB10J33CA-Q1	33	36.7	40.6	1.0	53.3	18.83	1	KMM	KCM
SMB10J36A-Q1	SMB10J36CA-Q1	36	40.0	44.2	1.0	58.1	17.33	1	KMP	KCP
SMB10J40A-Q1	SMB10J40CA-Q1	40	44.4	49.1	1.0	64.5	15.50	1	KMR	KCR
SMB10J43A-Q1	SMB10J43CA-Q1	43	47.8	52.8	1.0	69.4	14.50	1	KMT	KCT
SMB10J45A-Q1	SMB10J45CA-Q1	45	50.0	55.3	1.0	72.7	13.83	1	KMV	KCV
SMB10J48A-Q1	SMB10J48CA-Q1	48	53.3	58.9	1.0	77.4	13.00	1	KMX	KCX
SMB10J51A-Q1	SMB10J51CA-Q1	51	56.7	62.7	1.0	82.4	12.17	1	KMZ	KCZ
SMB10J54A-Q1	SMB10J54CA-Q1	54	60.0	66.3	1.0	87.1	11.50	1	KNE	KDE
SMB10J58A-Q1	SMB10J58CA-Q1	58	64.4	71.2	1.0	93.6	10.83	1	KNG	KDG
SMB10J60A-Q1	SMB10J60CA-Q1	60	66.7	73.7	1.0	96.8	10.33	1	KNK	KDK
SMB10J64A-Q1	SMB10J64CA-Q1	64	71.1	78.6	1.0	103.0	9.83	1	KNM	KDM
SMB10J70A-Q1	SMB10J70CA-Q1	70	77.8	86.6	1.0	113.0	8.83	1	KNP	KDP
SMB10J75A-Q1	SMB10J75CA-Q1	75	83.3	92.1	1.0	121.0	8.33	1	KNR	KDR
SMB10J78A-Q1	SMB10J78CA-Q1	78	86.7	95.8	1.0	126.0	8.00	1	KNT	KDT
SMB10J85A-Q1	SMB10J85CA-Q1	85	94.4	104	1.0	137.0	7.33	1	KNV	KDV

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}	$V_{BR\ Min}$	$V_{BR\ Max}$	I_T	V_C	I_{PP}	$I_R@V_{RWM}$		
		Volts	Volts	Volts	mA	Volts	A	μA	Uni	Bi
SMB10J90A-Q1	SMB10J90CA-Q1	90	100	111	1.0	146.0	6.83	1	KNX	KDX
SMB10J100A-Q1	SMB10J100CA-Q1	100	111	123	1.0	162.0	6.17	1	KNZ	KDZ
SMB10J110A-Q1	SMB10J110CA-Q1	110	122	135	1.0	177.0	5.67	1	KPE	KEE
SMB10J120A-Q1	SMB10J120CA-Q1	120	133	147	1.0	193.0	5.17	1	KPG	KEG
SMB10J130A-Q1	SMB10J130CA-Q1	130	144	159	1.0	209.0	4.83	1	KPK	KEK
SMB10J150A-Q1	SMB10J150CA-Q1	150	167	185	1.0	243.0	4.17	1	KPM	KEM
SMB10J160A-Q1	SMB10J160CA-Q1	160	178	197	1.0	259.0	3.83	1	KPP	KEP
SMB10J170A-Q1	SMB10J170CA-Q1	170	189	209	1.0	275.0	3.67	1	KPR	KER
SMB10J180A-Q1	SMB10J180CA-Q1	180	201	222	1.0	292.0	3.50	1	KPT	KET
SMB10J190A-Q1	SMB10J190CA-Q1	190	209	243	1.0	308.0	3.33	1	KPA	KEC
SMB10J200A-Q1	SMB10J200CA-Q1	200	224	247	1.0	324.0	3.17	1	KPV	KEV
SMB10J210A-Q1	SMB10J210CA-Q1	210	231	268	1.0	340.0	3.00	1	KPB	KED
SMB10J220A-Q1	SMB10J220CA-Q1	220	246	272	1.0	356.0	2.83	1	KPX	KEX
SMB10J250A-Q1	SMB10J250CA-Q1	250	279	309	1.0	405.0	2.50	1	KPZ	KEZ
SMB10J300A-Q1	SMB10J300CA-Q1	300	335	371	1.0	486.0	2.17	1	KQE	KFE
SMB10J350A-Q1	SMB10J350CA-Q1	350	391	432	1.0	567.0	1.83	1	KQG	KFG
SMB10J400A-Q1	SMB10J400CA-Q1	400	447	494	1.0	648.0	1.50	1	KQK	KFK
SMB10J440A-Q1	SMB10J440CA-Q1	440	492	543	1.0	713.0	1.50	1	KQM	KFM
SMB10J480A-Q1	SMB10J480CA-Q1	480	536	593	1.0	750.0	1.33	1	KQP	KFP

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

2: For bi-directional types having V_{RWM} of 10 volts and less, the I_R limit is doubled

3: Suffix 'C' denotes bi-directional devices. Suffix 'A' denotes 5% tolerance devices, no suffix denotes 10% tolerance devices

Rating and characteristic curves (SMB10J5.0(C)A-Q1 THRU SMB10J480(C)A-Q1)

Fig.1 - Peak Pulse Power Rating Curve

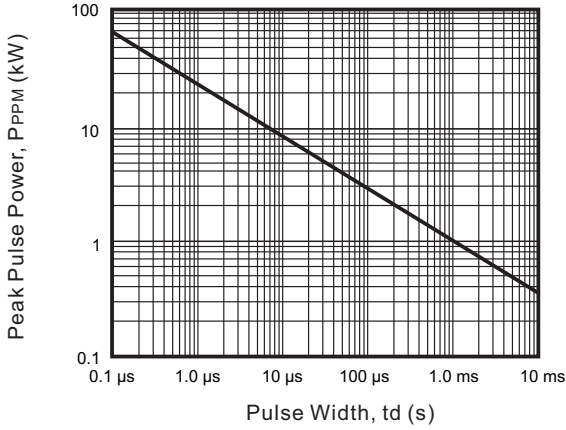


Fig.2 - Maximum Non-Repetitive Forward Surge Current

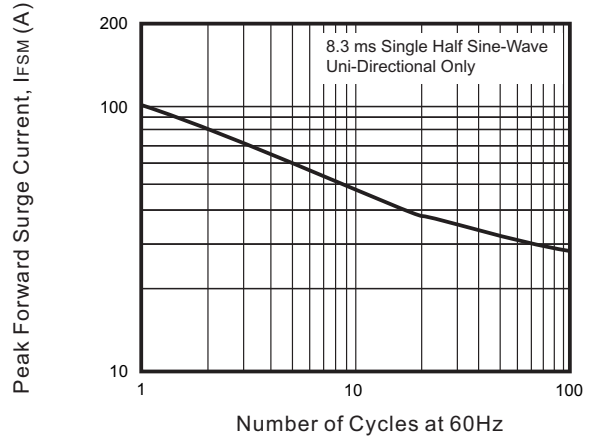


Fig.3 - Pulse Waveform

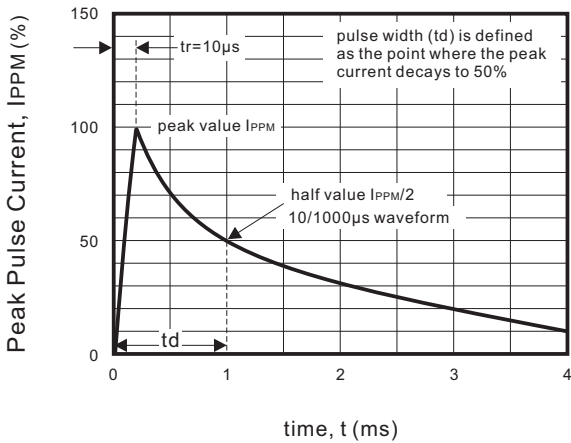


Fig.4 - Typical Junction Capacitance

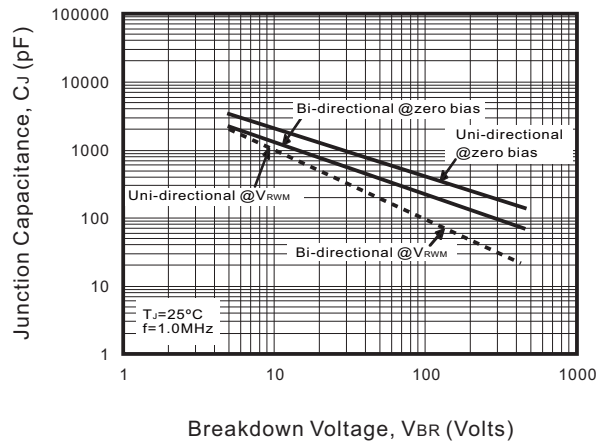


Fig.5 - Pulse Derating Curve

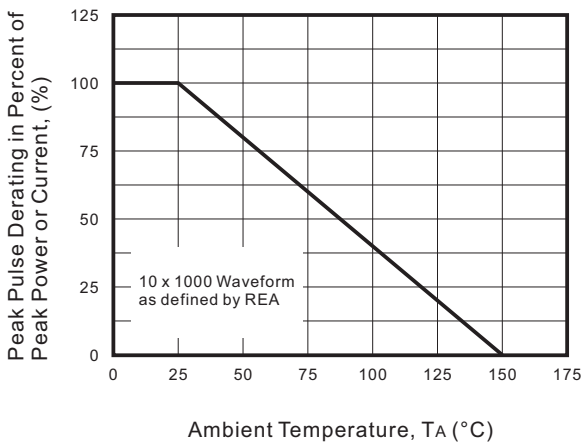
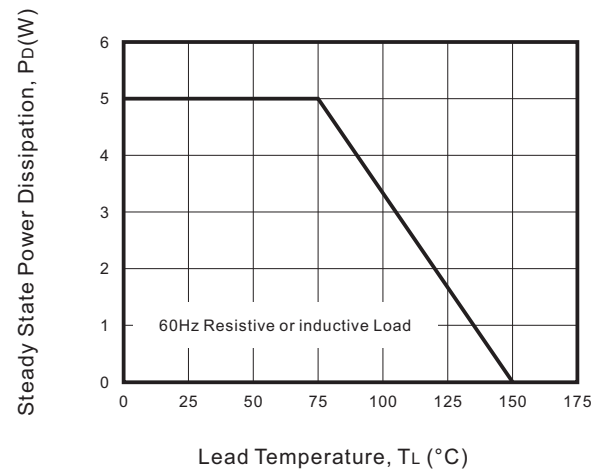


Fig.6 - Steady State Power Derating Curve

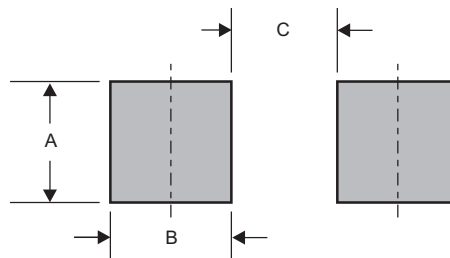


SMB10J5.0(C)A-Q1 THRU SMB10J480(C)A-Q1

Pinning information

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

Suggested solder pad layout

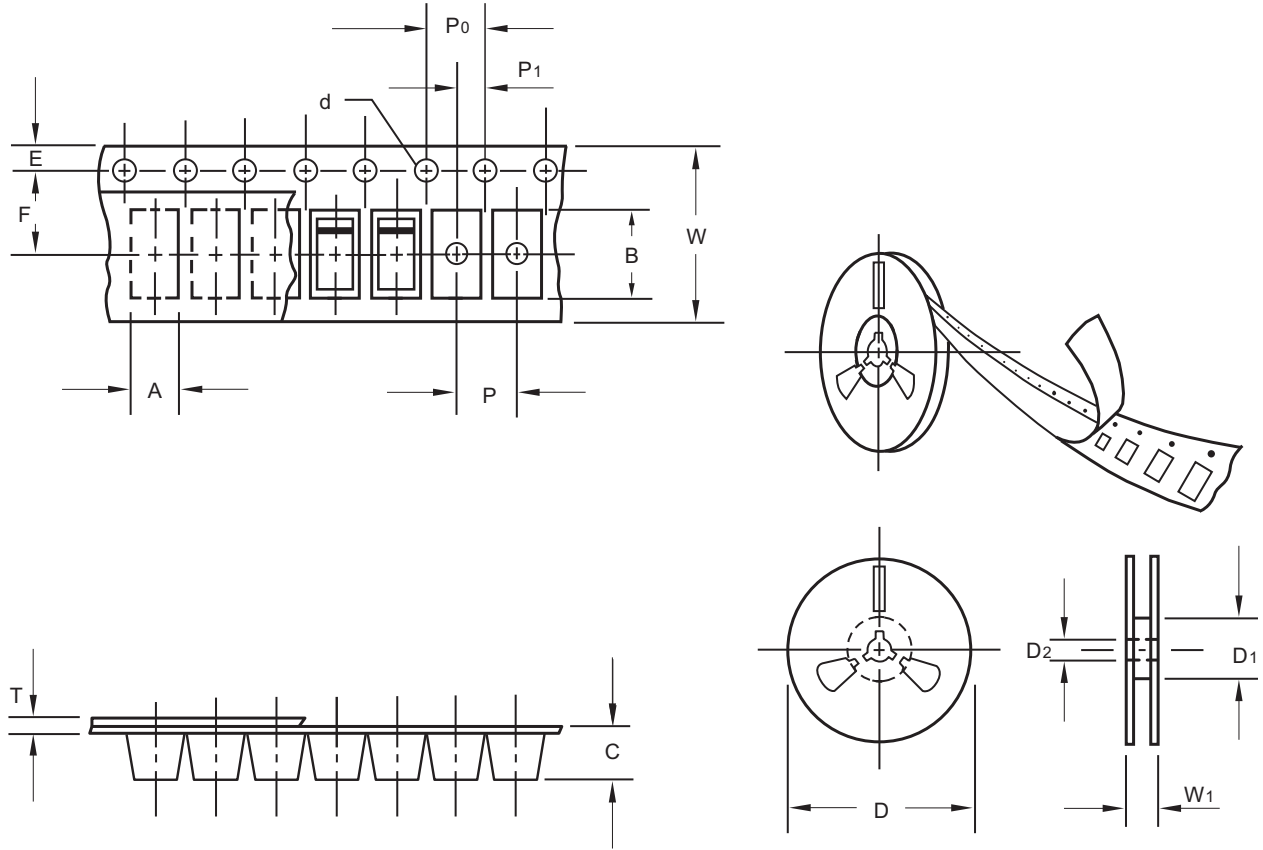


Dimensions in inches and (millimeters)

PACKAGE	A	B	C
SMB-F	0.091 (2.30)	0.098 (2.50)	0.071 (1.80)

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Packing information



unit:mm

Item	Symbol	Tolerance	SMB-F
Carrier width	A	0.1	3.77
Carrier length	B	0.1	5.70
Carrier depth	C	0.1	2.45 / 2.67
Sprocket hole	d	0.1	1.55
13" Reel outside diameter	D	2.0	330.00
13" Reel inner diameter	D1	min	75.00
7" Reel outside diameter	D	2.0	-
7" Reel inner diameter	D1	min	-
Feed hole diameter	D2	1.0	13.50
Sprocket hole position	E	0.1	1.75
Punch hole position	F	0.05	5.50
Punch hole pitch	P	0.1	8.00
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	0.15	12.00
Reel width	W1	1.5	18.10

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

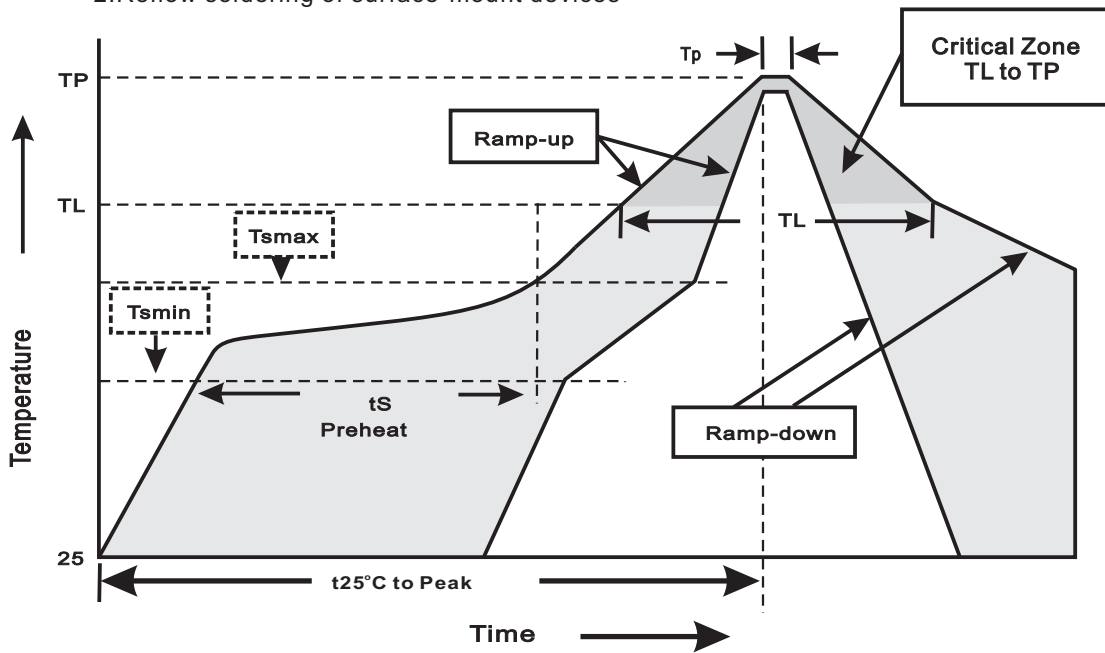
SMB10J5.0(C)A-Q1 THRU SMB10J480(C)A-Q1

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)
SMB-F	13"	3,000	8.0	6,000	335*335*38	330	350*330*360	48,000	12.40

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	<6°C/sec
Time 25°C to Peak Temperature	<6minutes

SMB10J5.0(C)A-Q1 THRU SMB10J480(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