

5.0SMCJ Series

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
Suggested solder pad layout.....	6
Packing information.....	7
Reel packing.....	8
Suggested thermal profiles for soldering processes.....	8
High reliability test capabilities.....	9

5.0SMCJ Series

5000W Surface Mount Transient Voltage Suppressors - 11.0V-170V

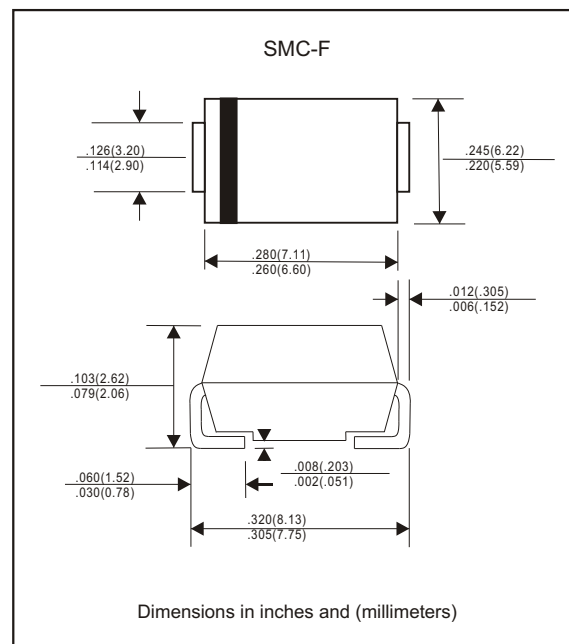
Features

- 5000W peak pulse power capability with a 10/1000 μ S waveform, repetition rate (duty cycle): 0.01%.
- Excellent clamping capability.
- Low incremental surge resistance.
- Fast response time from 0V to V_{BR} , typically less than 1 pS for uni-directional & 5 nS for bi-directional types.
- Glass passivated chip junction.
- Suffix "-H" indicates Halogen-free part, ex. 5.0SMCJ11(C)A-H.
- Lead-free parts meet RoHS requirements.

Mechanical data

- Epoxy: UL94-V0 rated flame retardant
- Case : Molded plastic, DO-214AB / SMC-F
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
- Polarity : Indicated by cathode band
- Mounting Position : Any
- Weight : Approximated 0.21 gram

Package outline



Maximum ratings (AT $T_A=25^\circ\text{C}$ unless otherwise noted)

PARAMETER	CONDITIONS	Symbol	SMCJ Series	UNIT
Peak Power Dissipation	with a 10/1000 μ S waveform, Note 1, 2 & Fig. 1	P_{PPM}	5000	W
Peak Pulse current	with a 10/1000 μ S waveform	I_{PPM}	See Table 1	A
Steady State Power Dissipation	at $T_A=75^\circ\text{C}$, Note 2	$P_{M(AV)}$	6.5	W
Peak Forward Surge Current	8.3mS Single Half Sine-Wave, Note 3	I_{FSM}	400	A
Maximum Instantaneous Forward Voltage	at 100A For Uni-Directional Types Only	V_F	3.5/5.0	V
Operating Temperature		T_J	-55 ~ +150	$^\circ\text{C}$
Storage temperature		T_{STG}	-65 ~ +175	$^\circ\text{C}$

Note 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

5.0SMCJ Series

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

Part No.	Reverse Stand-off Voltage	Breakdown Voltage		Test Current	Peak Forward Surge Current	Maximum Clamping Voltage @ I_{PP}		Maximum Leakage Current	Marking Code	
	V_{RWM}	$V_{BR\ Min}$	$V_{BR\ Max}$	I_T	I_{FSM}	V_c	I_{PP}	$I_R@V_{RWM}$		
	Volts	Volts	Volts	mA	A	Volts	A	μA	UNI	BI
5.0SMCJ11(C)A	11	12.2	13.5	10	400	18.2	275.0	800	5PEN	5BEN
5.0SMCJ12(C)A	12	13.3	14.7	10	400	19.9	252.0	800	5PEP	5BEP
5.0SMCJ13(C)A	13	14.4	15.9	10	400	21.5	233.0	500	5PEQ	5BEQ
5.0SMCJ14(C)A	14	15.6	17.2	10	400	23.2	216.0	200	5PER	5BER
5.0SMCJ15(C)A	15	16.7	18.5	1.0	400	24.4	205.0	100	5PES	5BES
5.0SMCJ16(C)A	16	17.8	19.7	1.0	400	26.0	193.0	50	5PET	5BET
5.0SMCJ17(C)A	17	18.9	20.9	1.0	400	27.6	181.0	20	5PEU	5BEU
5.0SMCJ18(C)A	18	20.0	22.1	1.0	400	29.2	172.0	10	5PEV	5BEV
5.0SMCJ20(C)A	20	22.2	24.5	1.0	400	32.4	155.0	5	5PEW	5BEW
5.0SMCJ22(C)A	22	24.4	26.9	1.0	400	35.5	141.0	5	5PEX	5BEX
5.0SMCJ24(C)A	24	26.7	29.5	1.0	400	38.9	129.0	5	5PEZ	5BEZ
5.0SMCJ26(C)A	26	28.9	31.9	1.0	400	42.1	119.0	5	5PFE	5BFE
5.0SMCJ28(C)A	28	31.1	34.4	1.0	400	45.4	110.0	5	5PFG	5BFG
5.0SMCJ30(C)A	30	33.3	36.8	1.0	400	48.4	103.0	5	5PFK	5BFK
5.0SMCJ33(C)A	33	36.7	40.6	1.0	400	53.3	93.9	5	5PFM	5BFM
5.0SMCJ36(C)A	36	40.0	44.2	1.0	400	58.1	86.1	5	5PFP	5BFP
5.0SMCJ40(C)A	40	44.4	49.1	1.0	400	64.5	77.6	5	5PFR	5BFR
5.0SMCJ43(C)A	43	47.8	52.8	1.0	400	69.4	72.1	5	5PFT	5BFT
5.0SMCJ45(C)A	45	50.0	55.3	1.0	400	72.7	68.8	5	5PFV	5BFV
5.0SMCJ48(C)A	48	53.3	58.9	1.0	400	77.4	64.7	5	5PFX	5BFX
5.0SMCJ51(C)A	51	56.7	62.7	1.0	400	82.4	60.7	5	5PFZ	5BFZ
5.0SMCJ54(C)A	54	60.0	66.3	1.0	400	87.1	57.5	5	5PGE	5BGE
5.0SMCJ58(C)A	58	64.4	71.2	1.0	400	93.6	53.5	5	5PGG	5BGG
5.0SMCJ60(C)A	60	66.7	73.7	1.0	400	96.8	51.7	5	5PGK	5BGK
5.0SMCJ64(C)A	64	71.1	78.6	1.0	400	103.0	48.6	5	5PGM	5BGM
5.0SMCJ70(C)A	70	77.8	86.6	1.0	400	113.0	44.3	5	5PGP	5BGP
5.0SMCJ75(C)A	75	83.3	92.1	1.0	400	121.0	41.4	5	5PGR	5BGR
5.0SMCJ78(C)A	78	86.7	95.8	1.0	400	126.0	39.7	5	5PGT	5BGT
5.0SMCJ85(C)A	85	94.4	104	1.0	400	137.0	36.5	5	5PGV	5BGV
5.0SMCJ90(C)A	90	100	111	1.0	400	146.0	34.3	5	5PGX	5BGX
5.0SMCJ100(C)A	100	111	123	1.0	400	162.0	30.9	5	5PGZ	5BGZ
5.0SMCJ110(C)A	110	122	135	1.0	400	177.0	28.3	5	5PHE	5BHE
5.0SMCJ120(C)A	120	133	147	1.0	400	193.0	26.0	5	5PHG	5BHG
5.0SMCJ130(C)A	130	144	159	1.0	400	209.0	24.0	5	5PHK	5BHK
5.0SMCJ150(C)A	150	167	185	1.0	400	243.0	20.6	5	5PHM	5BHM
5.0SMCJ160(C)A	160	178	197	1.0	400	259.0	19.3	5	5PHP	5BHP
5.0SMCJ170(C)A	170	189	209	1.0	400	275.0	18.2	5	5PHR	5BHR

Note 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. For bi-directional types having V_{RWM} of 10 volts and less, the I_{FSM} limit is doubled

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

5. All terms and symbols are consistent with ANSI/IEEE C62.35

6. 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

5.0SMCJ Series

Rating and characteristic curves (5.0SMCJ SERIES)

Fig.1 - Peak Pulse Power Rating Curve

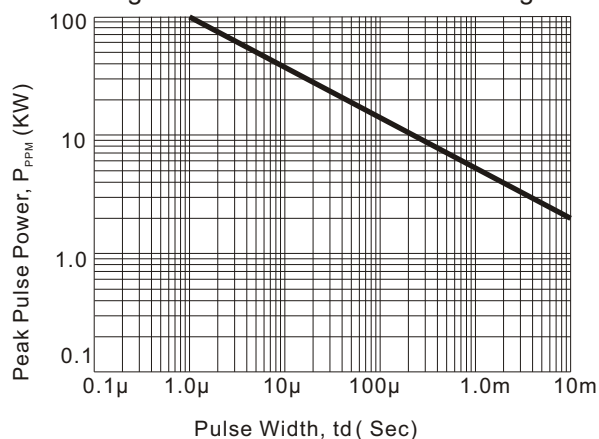


Fig.2 - Pulse Derating Curve

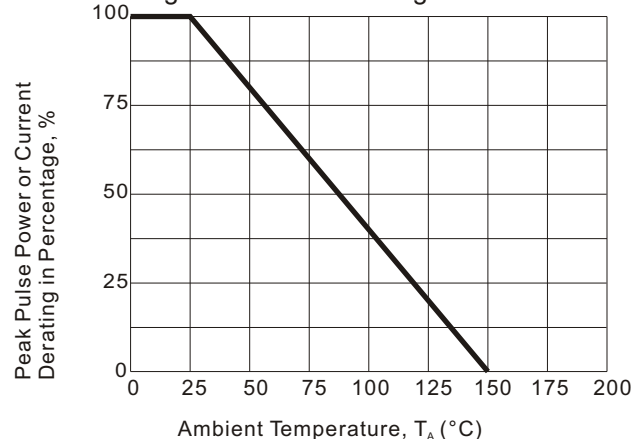


Fig.3 - Pulse Waveform

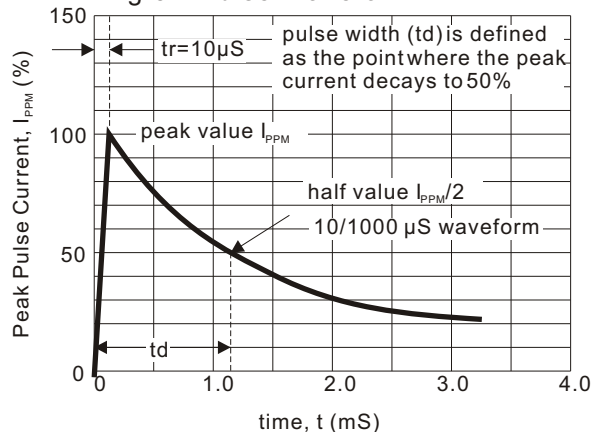
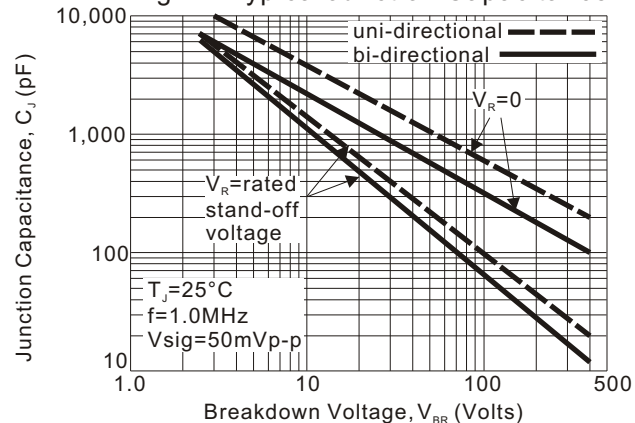


Fig.4 - Typical Junction Capacitance



5.0SMCJ Series

Rating and characteristic curves (5.0SMCJ SERIES)

Fig.5 - Steady State Power Derating Curve

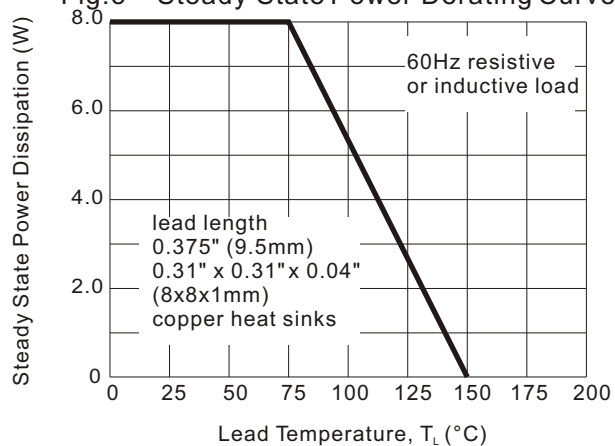


Fig.6 - Maximum Non-Repetitive Forward Surge Current

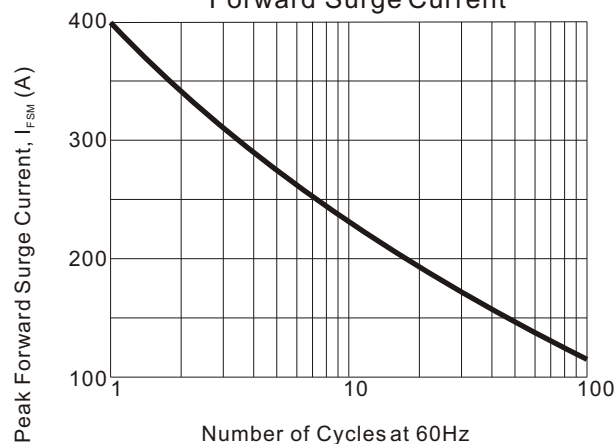


Fig. 7 - Transients of several thousand volts can be clamped to a safe level by the TVS

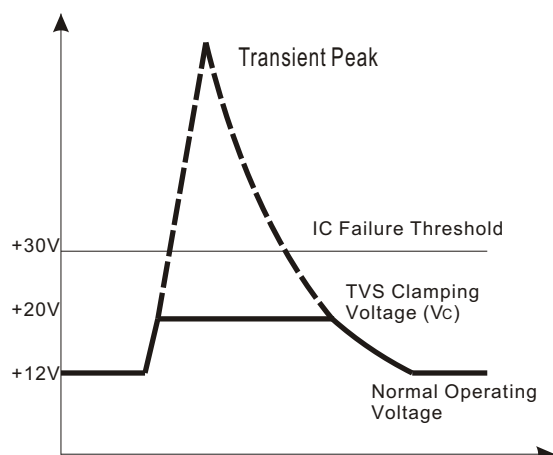
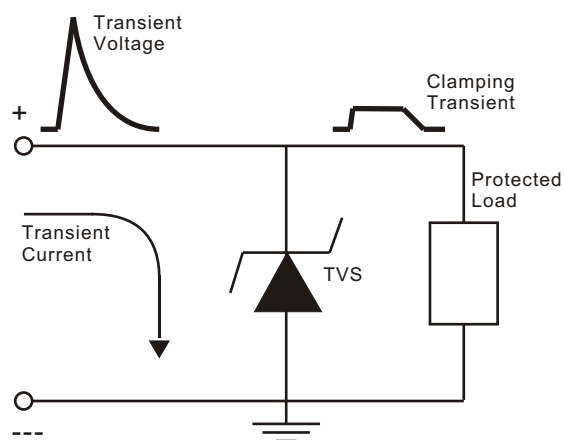






Fig. 8 - Transient current is diverted to ground thru TVS; the voltage seen by the protected load is limited to the clamping voltage level

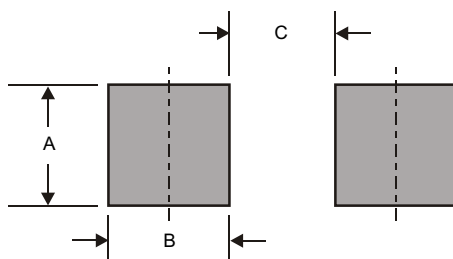


5.0SMCJ Series

Pinning information

Pin	Simplified outline	Symbol
Uni-Directional Pin1 cathode Pin2 anode		
Bi-Directional Pin1 cathode 1 Pin2 cathode 2		

Suggested solder pad layout

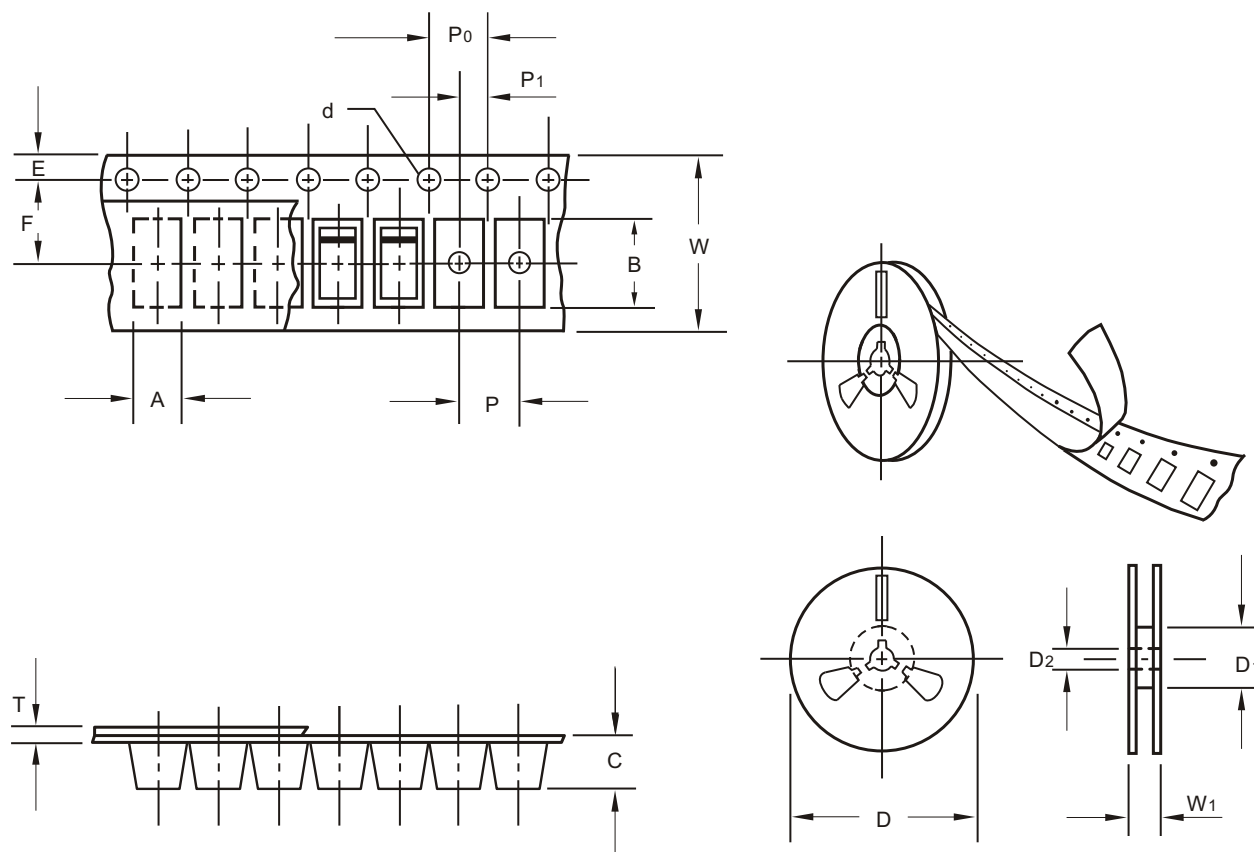


Dimensions in inches and (millimeters)

PACKAGE	A	B	C
SMC-F	0.132 (3.30)	0.100 (2.50)	0.176(4.40)

5.0SMCJ Series

Packing information



unit:mm

Item	Symbol	Tolerance	SMC-F
Carrier width	A	0.15	6.00
Carrier length	B	0.2	8.25
Carrier depth	C	0.1	2.36
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.

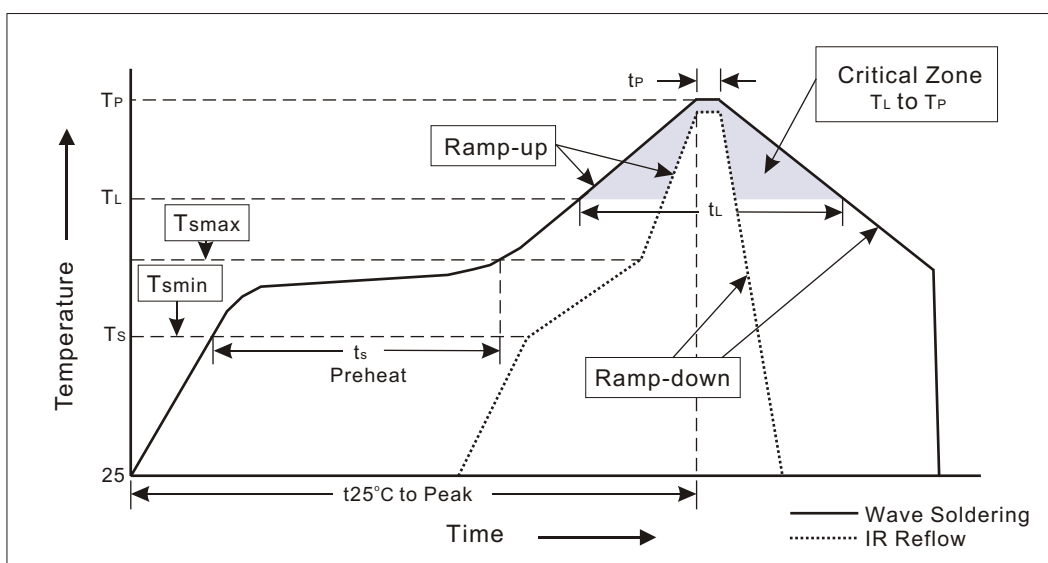
5.0SMCJ Series

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)
SMC-F	13"	3000	8.0	6000	337*337*37	330	360*340*370	48,000	17.2

Suggested thermal profiles for soldering processes

- 1.Storage environment: Temperature=10°C~35°C Humidity=65%±15%
- 2.Reflow soldering of surface-mount devices



3.Flow (wave)soldering (solder dipping)

Profile Feature	Soldering Condition
Average ramp-up rate(T_L to T_P)	<3°C/sec
Preheat -Temperature Min(T_{min}) -Temperature Max(T_{max}) -Time(min to max)(t_S)	100°C 150°C 60~120sec
T_{max} to T_L -Ramp-upRate	<3°C/sec
Time maintained above: -Temperature(T_L) -Time(t_L)	183°C 60~150sec
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

5.0SMCJ Series

High reliability test capabilities

Item Test	Conditions	Reference
1. Solder Resistance	at $260 \pm 5^\circ\text{C}$ for $10 \pm 2\text{sec.}$ immerse body into solder $1/16" \pm 1/32"$	MIL-STD-750D METHOD-2031
2. Solderability	at $245 \pm 5^\circ\text{C}$ for 5 sec.	MIL-STD-202F METHOD-208
3. High Temperature Reverse Bias	$V_R = V_{RWM}$ rate at $T_A = 150^\circ\text{C}$ for 168 hrs.	MIL-STD-750D METHOD-1026
4. Forward Operation Life	Rated average rectifier current at $T = 25^\circ\text{C}$ for 500hrs.	MIL-STD-750D METHOD-1027
5. Intermittent Operation Life	$T_A = 25^\circ\text{C}$, $I_F = I_T$ On state: power on for 5 min. off state: power off for 5 min. on and off for 500 cycles.	MIL-STD-750D METHOD-1036
6. Pressure Cooker	$15P_{SIG}$ at $T_A = 121^\circ\text{C}$ for 4 hrs.	
7. Temperature Cycling	-55°C to $+125^\circ\text{C}$ dwelled for 30 min. and transferred for 5 min. total 10 cycles.	MIL-STD-750D METHOD-1051
8. Thermal Shock	0°C for 5 min. rise to 100°C for 5 min. total 10 cycles.	MIL-STD-750D METHOD-1056
9. Forward Surge	8.3ms single half sine-wave superimposed on rated load, one surge.	MIL-STD-750D METHOD-4066-2
10. Humidity	at $T_A = 65^\circ\text{C}$, RH=98% for 1000hrs.	MIL-STD-750D METHOD-1038
11. High Temperature Storage Life	at 175°C for 1000hrs.	MIL-STD-750D METHOD-1031
12. Solvent Resistance	Dip into Freon at 25°C for 1 min.	MIL-STD-202F METHOD-215