

SMF5.0(C)A-MS THRU SMF170(C)A-MS

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SMF5.0(C)A-MS THRU SMF170(C)A-MS

200W Surface Mount Unidirectional and Bidirectional Transient Voltage Suppressors- 5.0V- 170V

Features

- For surface mounted applications in order to optimize board space.
- Low profile package.
- Excellent clamping capability.
- IEC61000-4-2 ESD 15kV Air, 8kV contact compliance
- Protects one I/O line
- Lead-free parts meet RoHS requirements.
- Suffix "-H" indicates Halogen-free part, ex. SMF5.0A-MS-H.

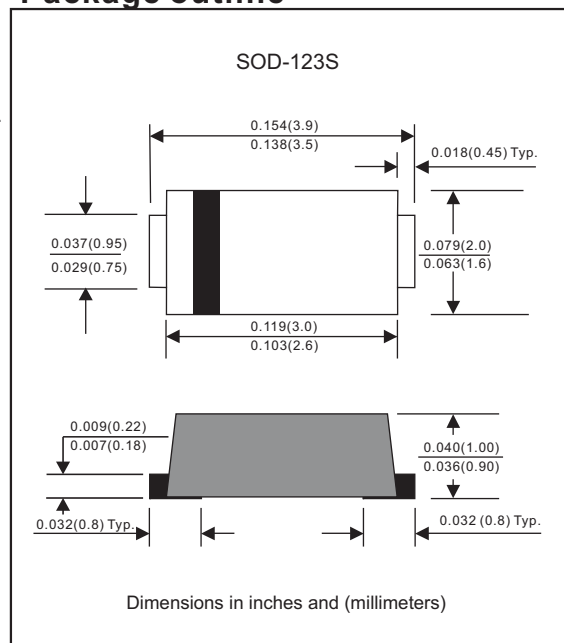
Applications

- Personal digital assistants (PDA)
- Cellular handsets & Accessories
- Portable devices
- Portable instrumentation
- Handhelds and notebooks
- Digital cameras

Mechanical data

- Epoxy : UL94-V0 rated flame retardant
- Case : Molded plastic, SOD-123S/MINI SMA
- Terminals : Plated terminals, solderable per MIL-STD-750, Method 2026
- Polarity : Indicated by cathode band
- Mounting Position : Any
- Weight : Approximated 0.0155 gram

Package outline



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

PARAMETER	CONDITIONS	Symbol	Value	UNIT
Peak Power Dissipation	Peak Pulse Power Dissipation at $T_A=25^{\circ}\text{C}$ by $10 \times 1000\mu\text{s}$ (Note 1)	P_{PPM}	200	W
Peak Power Dissipation	Peak Pulse Power Dissipation at $T_A=25^{\circ}\text{C}$ by $8 \times 20\mu\text{s}$ (Note 2)	P_{PPM}	1000	W
Thermal Resistance	Junction to ambient	$R_{\theta JA}$	70	$^{\circ}\text{C/W}$
Thermal Resistance	Junction to case	$R_{\theta JC}$	37	$^{\circ}\text{C/W}$
Thermal Resistance	Junction to lead	$R_{\theta JL}$	26	$^{\circ}\text{C/W}$
Operating junction temperature range		T_J	-55 ~ +150	$^{\circ}\text{C}$
Storage temperature range		T_{STG}	-55 ~ +150	$^{\circ}\text{C}$

Note: 1. Non-repetitive current pulse, per Fig. 2 and derated above $T_A=25^{\circ}\text{C}$ per Fig. 1

2. Non-repetitive current pulse per Fig. 3 and derated above $T_A=25^{\circ}\text{C}$ per Fig. 1

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

Part No. (Uni)	Part No. (Bi)	Reverse Stand-off Voltage	Breakdown Voltage $V_{BR} @ I_T$		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	uA	Uni	Bi
SMF5.0A-MS	SMF5.0CA-MS	5.0	6.40	7.00	10	9.2	21.7	400	KE	AE
SMF6.0A-MS	SMF6.0CA-MS	6.0	6.67	7.37	10	10.3	19.4	400	KG	AG
SMF6.5A-MS	SMF6.5CA-MS	6.5	7.22	7.98	10	11.2	17.9	250	KK	AK
SMF7.0A-MS	SMF7.0CA-MS	7.0	7.78	8.60	10	12.0	16.7	100	KM	AM
SMF7.5A-MS	SMF7.5CA-MS	7.5	8.33	9.21	1.0	12.9	15.5	50	KP	AP
SMF8.0A-MS	SMF8.0CA-MS	8.0	8.89	9.83	1.0	13.6	14.7	25	KR	AR
SMF8.5A-MS	SMF8.5CA-MS	8.5	9.44	10.4	1.0	14.4	13.9	10	KT	AT
SMF9.0A-MS	SMF9.0CA-MS	9.0	10.0	11.1	1.0	15.4	13.0	5.0	KV	AV
SMF10A-MS	SMF10CA-MS	10	11.1	12.3	1.0	17.0	11.8	2.5	KX	AX
SMF11A-MS	SMF11CA-MS	11	12.2	13.5	1.0	18.2	11.0	2.5	KZ	AZ
SMF12A-MS	SMF12CA-MS	12	13.3	14.7	1.0	19.9	10.1	2.5	LE	BE
SMF13A-MS	SMF13CA-MS	13	14.4	15.9	1.0	21.5	9.3	1	LG	BG
SMF14A-MS	SMF14CA-MS	14	15.6	17.2	1.0	23.2	8.6	1	LK	BK
SMF15A-MS	SMF15CA-MS	15	16.7	18.5	1.0	24.4	8.2	1	LM	BM
SMF16A-MS	SMF16CA-MS	16	17.8	19.7	1.0	26.0	7.7	1	LP	BP
SMF17A-MS	SMF17CA-MS	17	18.9	20.9	1.0	27.6	7.2	1	LR	BR
SMF18A-MS	SMF18CA-MS	18	20.0	22.1	1.0	29.2	6.8	1	LT	BT
SMF20A-MS	SMF20CA-MS	20	22.2	24.5	1.0	32.4	6.2	1	LV	BV
SMF22A-MS	SMF22CA-MS	22	24.4	26.9	1.0	35.5	5.6	1	LX	BX
SMF24A-MS	SMF24CA-MS	24	26.7	29.5	1.0	38.9	5.1	1	LZ	BZ
SMF26A-MS	SMF26CA-MS	26	28.9	31.9	1.0	42.1	4.8	1	ME	CE
SMF28A-MS	SMF28CA-MS	28	31.1	34.4	1.0	45.4	4.4	1	MG	CG
SMF30A-MS	SMF30CA-MS	30	33.3	36.8	1.0	48.4	4.1	1	MK	CK
SMF33A-MS	SMF33CA-MS	33	36.7	40.6	1.0	53.3	3.8	1	MM	CM
SMF36A-MS	SMF36CA-MS	36	40.0	44.2	1.0	58.1	3.4	1	MP	CP
SMF40A-MS	SMF40CA-MS	40	44.4	49.1	1.0	64.5	3.1	1	MR	CR
SMF43A-MS	SMF43CA-MS	43	47.8	52.8	1.0	69.4	2.9	1	MT	CT
SMF45A-MS	SMF45CA-MS	45	50.0	55.3	1.0	72.7	2.8	1	MV	CV
SMF48A-MS	SMF48CA-MS	48	53.3	58.9	1.0	77.4	2.6	1	MX	CX
SMF51A-MS	SMF51CA-MS	51	56.7	62.7	1.0	82.4	2.4	1	MZ	CZ
SMF54A-MS	SMF54CA-MS	54	60.0	66.3	1.0	87.1	2.3	1	NE	DE
SMF58A-MS	SMF58CA-MS	58	64.4	71.2	1.0	93.6	2.2	1	NG	DG
SMF60A-MS	SMF60CA-MS	60	66.7	73.7	1.0	96.8	2.1	1	NK	DK
SMF64A-MS	SMF64CA-MS	64	71.1	78.6	1.0	103.0	2.0	1	NM	DM
SMF70A-MS	SMF70CA-MS	70	77.8	86.0	1.0	113.0	1.8	1	NP	DP
SMF75A-MS	SMF75CA-MS	75	83.3	92.1	1.0	121.0	1.7	1	NR	DR
SMF78A-MS	SMF78CA-MS	78	86.7	95.8	1.0	126.0	1.6	1	NT	DT
SMF85A-MS	SMF85CA-MS	85	94.4	104.0	1.0	137.0	1.5	1	NV	DV
SMF90A-MS	SMF90CA-MS	90	100.0	111.0	1.0	146.0	1.4	1	NX	DX
SMF100A-MS	SMF100CA-MS	100	111.0	123.0	1.0	162.0	1.3	1	NZ	DZ
SMF110A-MS	SMF110CA-MS	110	122.0	135.0	1.0	177.0	1.2	1	PE	EE
SMF120A-MS	SMF120CA-MS	120	133.0	147.0	1.0	193.0	1.1	1	PG	EG
SMF130A-MS	SMF130CA-MS	130	144.0	159.0	1.0	209.0	1.0	1	PK	EK
SMF150A-MS	SMF150CA-MS	150	167.0	185.0	1.0	243.0	0.8	1	PM	EM
SMF160A-MS	SMF160CA-MS	160	178.0	197.0	1.0	259.0	0.8	1	PP	EP
SMF170A-MS	SMF170CA-MS	170	189.0	209.0	1.0	275.0	0.8	1	PR	ER

Notes:

1. VBR measured after I_T applied for 300us, I_T = square wave pulse or equivalent.
2. Surge current waveform per 10 x 1000us exponential wave and derated per Fig.2.
3. All terms and symbols are consistent with ANSI/IEEE C62.35.
4. For bi-directional types having V_{RWM} of 10 volts and less, the I_R limit is doubled



Rating and characteristic curves (SMF SERIES)

FIG.1 - PULSE DERATING CURVE

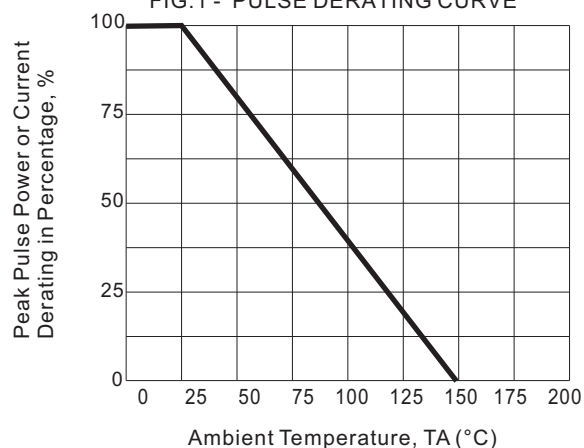


FIG.2 - 10X1000us PULSE WAVEFORM

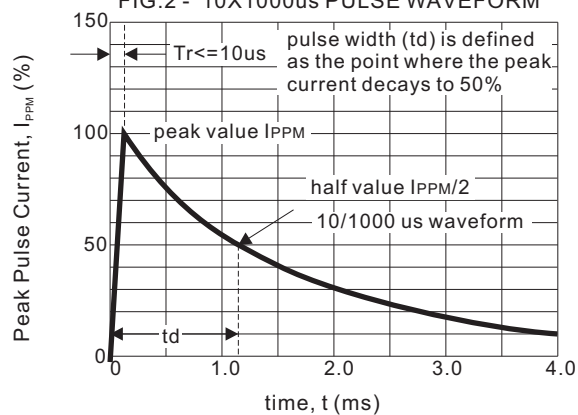


FIG.3 - 8X20us PULSE WAVEFORM

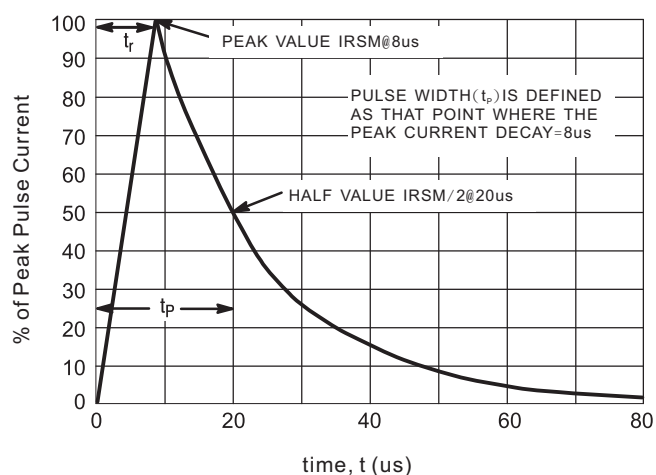


FIG.4 - PEAK PULSE POWER RATING CURVE

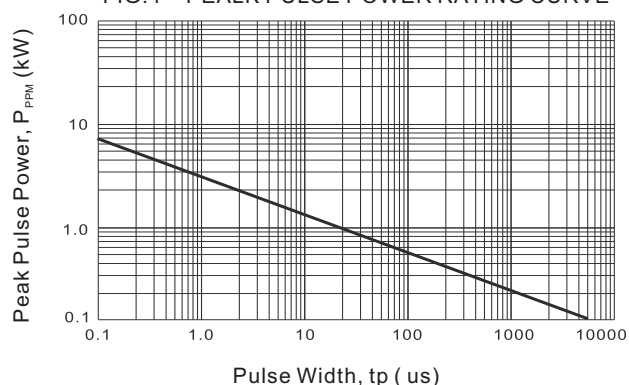
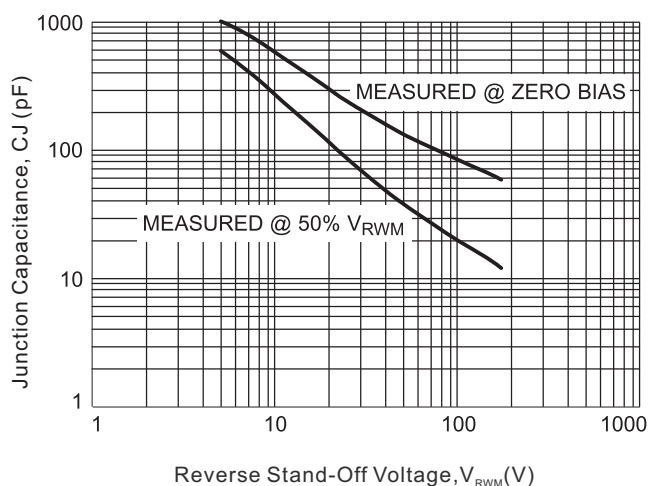
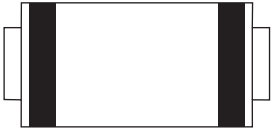


FIG.5 - TYPICAL JUNCTION CAPACITANCE

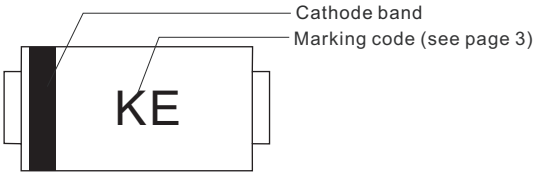
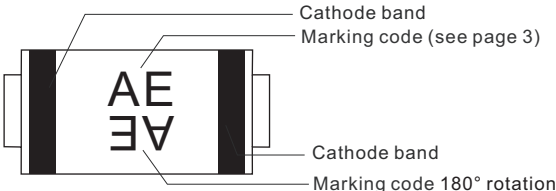


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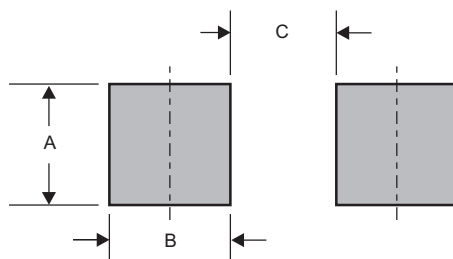
Pinning information

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

Marking

Type number	Example
Uni-Directional	
Bi-Directional	

Suggested solder pad layout

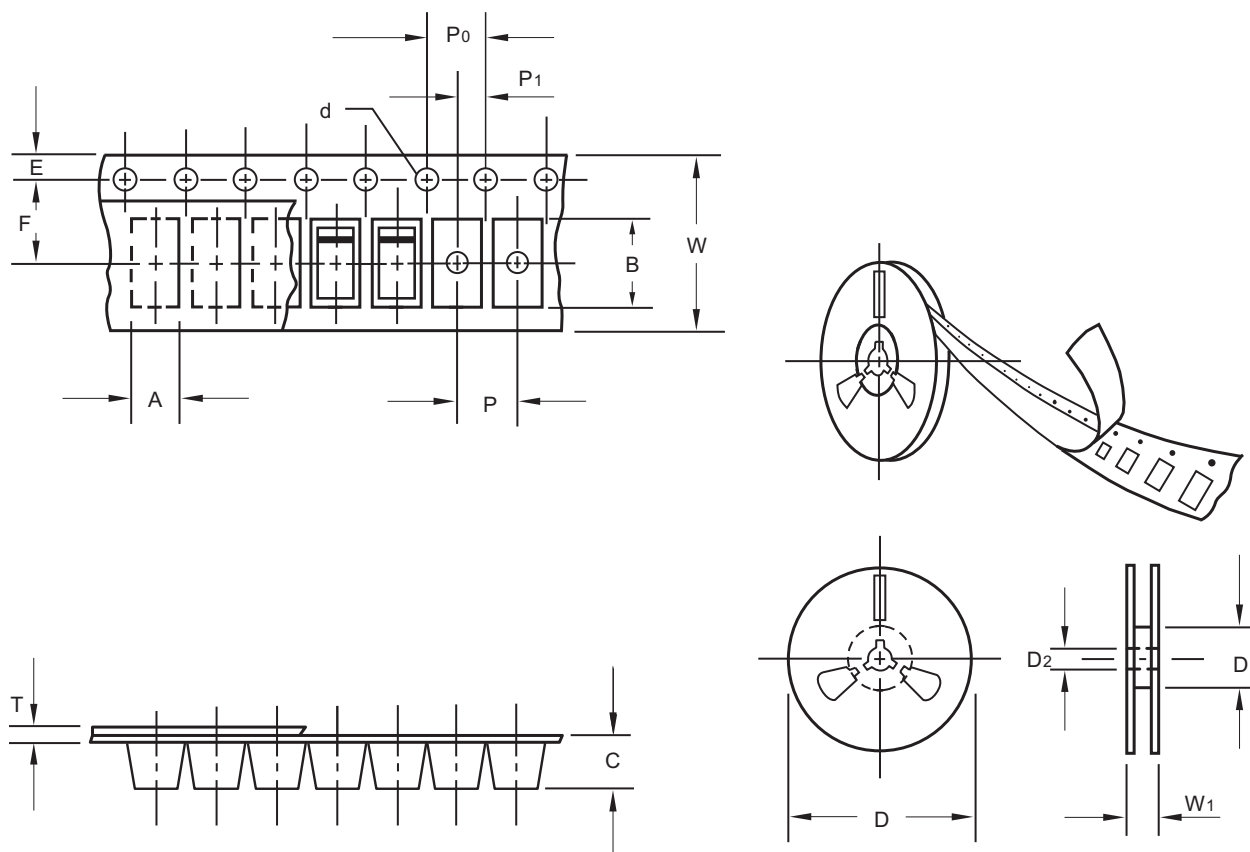


Dimensions in inches and (millimeters)

PACKAGE	A	B	C
SOD-123S	0.044 (1.10)	0.040 (1.00)	0.079 (2.00)

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Packing information



unit:mm

Item	Symbol	Tolerance	SOD-123S
Carrier width	A	0.1	2.00
Carrier length	B	0.1	3.85
Carrier depth	C	0.1	1.10
Sprocket hole	d	0.1	1.50
13" Reel outside diameter	D	2.0	-
13" Reel inner diameter	D1	min	-
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	3.50
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	8.00
Reel width	W1	1.0	11.40

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

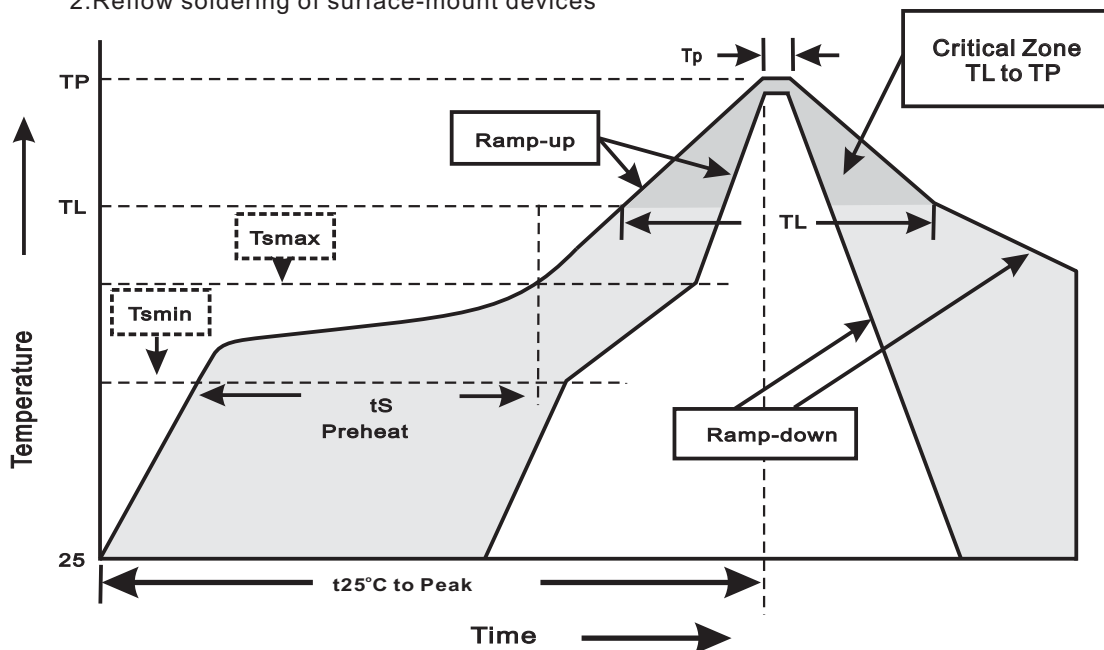
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Reel packing

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)
SOD-123S	7"	3,000	4.0	30,000	183*183*123	178	382*262*387	240,000	8.7

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 _{smmin}) -Temperature Max(T _{smmax}) -Time(min to max)(t _s)	150°C 200°C 60~120sec
T _{smmax} 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

SMF5.0(C)A-MS THRU SMF170(C)A-MS**High reliability test capabilities**

Item Test	Conditions	Reference
1. Solder Resistance	at $260\pm5^{\circ}\text{C}$ for $10\pm2\text{sec.}$ immerse body into solder $1/16''\pm1/32''$	MIL-STD-750D METHOD-2031
2. Solderability	at $245\pm5^{\circ}\text{C}$ for 5 sec.	MIL-STD-202F METHOD-208
3. High Temperature Reverse Bias	$V_{\text{RWM}}=80\%$ rate at $T_{\text{J}}=150^{\circ}\text{C}$ for 168 hrs.	MIL-STD-750D METHOD-1038
4. Pressure Cooker	$15P_{\text{SIG}}$ at $T_{\text{A}}=121^{\circ}\text{C}$ for 4 hrs.	JESD22-A102
5. Temperature Cycling	-55°C to $+125^{\circ}\text{C}$ dwelled for 30 min. and transferred for 5min. total 10 cycles.	MIL-STD-750D METHOD-1051
6. Thermal Shock	0°C for 5 min. rise to 100°C for 5 min. total 10 cycles.	MIL-STD-750D METHOD-1056
7. Humidity	at $T_{\text{A}}=85^{\circ}\text{C}$, RH=85% for 1000hrs.	MIL-STD-750D METHOD-1021
8. High Temperature Storage Life	at 175°C for 1000 hrs.	MIL-STD-750D METHOD-1031