

MMSZ5221B-Q1 THRU MMSZ5267B-Q1**List**

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MMSZ5221B-Q1 THRU MMSZ5267B-Q1

500mW Surface Mount
Zener Diodes - 2.4V-75V

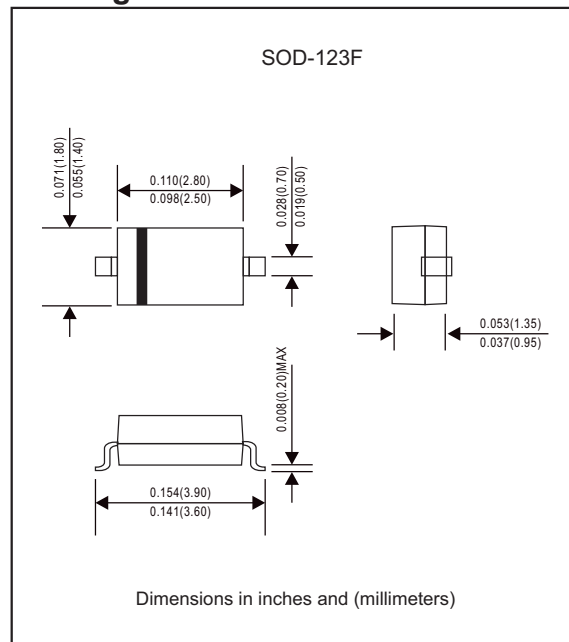
Features

- Up to 500mW power dissipation.
- Silicon epitaxial planar chip structure.
- Wide zener voltage range selection, 2.4V to 75V.
- 5% tolerance of zener voltage for suffix "B" ex: MMSZ5221B
- Small package size for high density applications.
- Ideally suited for automated assembly processes.
- Lead-free parts meet RoHS requirements.
- Qualified to AEC-Q101 standards for high reliability.
- Suffix "-H" indicates Halogen free parts, ex. MMSZ5221B-Q1-H.

Mechanical data

- Epoxy:UL94-VO rated flame retardant
- Case : Molded plastic, SOD-123F
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
- Polarity : Indicated by cathode band
- Mounting Position : Any
- Weight : Approximated 0.010 gram

Package outline



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

Parameter	Conditions	Symbol	MIN.	TYP.	MAX.	Unit
Forward voltage	$I_F = 10 \text{ mA}$	V_F			0.9	V
Power dissipation (Note 1)	On FR-5 Board @ $T_L=75^{\circ}\text{C}$	P_D			500	mW
Thermal resistance (Note 2)	Junction to ambient	$R_{\theta JA}$		340		$^{\circ}\text{C/W}$
	Junction to lead	$R_{\theta JL}$		150		
	Junction to case	$R_{\theta JC}$		200		
Operating junction temperature range		T_J	-55		+150	$^{\circ}\text{C}$
Storage temperature range		T_{STG}	-55		+150	$^{\circ}\text{C}$

1. FR-5 = 3.5 x 1.5 inches, using the minimum recommended footprint.
2. Thermal resistance measurement obtained via infrared scan method.

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

Part No.	Marking code	Zener voltage			Test current	Zener impedance			Leakage current	
		V _Z @ I _{ZT} (Volts)			I _{ZT}	Z _{ZT} @ I _{ZT}	Z _{ZK} @ I _{ZK}	I _{ZK}	I _R	V _R
		Min	Nom	Max	mA	Max(Ω)	Max(Ω)	mA	Max(μA)	Volts
MMSZ5221B-Q1	C 1	2.28	2.4	2.52	20.0	30	1200	0.25	100	1.0
MMSZ5222B-Q1	C2	2.38	2.5	2.63	20.0	30	1250	0.25	100	1.0
MMSZ5223B-Q1	C3	2.57	2.7	2.84	20.0	30	1300	0.25	75	1.0
MMSZ5224B-Q1	C4	2.66	2.8	2.94	20.0	30	1400	0.25	75	1.0
MMSZ5225B-Q1	C5	2.85	3.0	3.15	20.0	29	1600	0.25	50	1.0
MMSZ5226B-Q1	G1	3.14	3.3	3.47	20.0	28	1600	0.25	25	1.0
MMSZ5227B-Q1	G2	3.42	3.6	3.78	20.0	24	1700	0.25	15	1.0
MMSZ5228B-Q1	G3	3.71	3.9	4.10	20.0	23	1900	0.25	10	1.0
MMSZ5229B-Q1	G4	4.09	4.3	4.52	20.0	22	2000	0.25	5.0	1.0
MMSZ5230B-Q1	G5	4.47	4.7	4.94	20.0	19	1900	0.25	5.0	2.0
MMSZ5231B-Q1	E1	4.85	5.1	5.36	20.0	17	1600	0.25	5.0	2.0
MMSZ5232B-Q1	E2	5.32	5.6	5.88	20.0	11	1600	0.25	5.0	3.0
MMSZ5233B-Q1	E3	5.70	6.0	6.30	20.0	7	1600	0.25	5.0	3.5
MMSZ5234B-Q1	E4	5.89	6.2	6.51	20.0	7	1000	0.25	5.0	4.0
MMSZ5235B-Q1	E5	6.46	6.8	7.14	20.0	5	750	0.25	3.0	5.0
MMSZ5236B-Q1	F1	7.13	7.5	7.88	20.0	6	500	0.25	3.0	6.0
MMSZ5237B-Q1	F2	7.79	8.2	8.61	20.0	8	500	0.25	3.0	6.5
MMSZ5238B-Q1	F3	8.27	8.7	9.14	20.0	8	600	0.25	3.0	6.5
MMSZ5239B-Q1	F4	8.65	9.1	9.56	20.0	10	600	0.25	3.0	7.0
MMSZ5240B-Q1	F5	9.50	10	10.50	20.0	17	600	0.25	3.0	8.0
MMSZ5241B-Q1	H1	10.45	11	11.55	20.0	22	600	0.25	2.0	8.4
MMSZ5242B-Q1	H2	11.40	12	12.60	20.0	30	600	0.25	1.0	9.1
MMSZ5243B-Q1	H3	12.35	13	13.65	9.5	13	600	0.25	0.5	9.9
MMSZ5244B-Q1	H4	13.30	14	14.70	9.0	15	600	0.25	0.1	10
MMSZ5245B-Q1	H5	14.25	15	15.75	8.5	16	600	0.25	0.1	11
MMSZ5246B-Q1	J1	15.20	16	16.80	7.8	17	600	0.25	0.1	12
MMSZ5247B-Q1	J2	16.15	17	17.85	7.4	19	600	0.25	0.1	13
MMSZ5248B-Q1	J3	17.10	18	18.90	7.0	21	600	0.25	0.1	14
MMSZ5250B-Q1	J5	19.00	20	21.00	6.2	25	600	0.25	0.1	15
MMSZ5251B-Q1	K1	20.90	22	23.10	5.6	29	600	0.25	0.1	17
MMSZ5252B-Q1	K2	22.80	24	25.20	5.2	33	600	0.25	0.1	18
MMSZ5253B-Q1	K3	23.75	25	26.25	5.0	35	600	0.25	0.1	19
MMSZ5254B-Q1	K4	25.65	27	28.35	4.6	41	600	0.25	0.1	21
MMSZ5255B-Q1	K5	26.60	28	29.40	4.5	44	600	0.25	0.1	21
MMSZ5256B-Q1	M1	28.50	30	31.50	4.2	49	600	0.25	0.1	23
MMSZ5257B-Q1	M2	31.35	33	34.65	3.8	58	700	0.25	0.1	25
MMSZ5258B-Q1	M3	34.20	36	37.80	3.4	70	700	0.25	0.1	27
MMSZ5259B-Q1	M4	37.05	39	40.95	3.2	80	800	0.25	0.1	30
MMSZ5260B-Q1	M5	40.85	43	45.15	3.0	93	900	0.25	0.1	33
MMSZ5261B-Q1	N1	44.65	47	49.35	2.7	105	1000	0.25	0.1	36
MMSZ5262B-Q1	N2	48.45	51	53.55	2.5	125	1100	0.25	0.1	39
MMSZ5263B-Q1	N3	53.20	56	58.80	2.2	150	1300	0.25	0.1	43
MMSZ5264B-Q1	N4	57.00	60	63.00	2.1	170	1400	0.25	0.1	46
MMSZ5265B-Q1	N5	58.90	62	65.10	2.0	185	1400	0.25	0.1	47
MMSZ5266B-Q1	P1	64.60	68	71.40	1.8	230	1600	0.25	0.1	52
MMSZ5267B-Q1	P2	71.25	75	78.75	1.7	270	1700	0.25	0.1	56

Note : 5% tolerance of Zener voltage



Rating and characteristic curves (MMSZ5221B-Q1 THRU MMSZ5267B-Q1)

FIG1. TEMPERATURE COEFFICIENTS
(TEMPERATURE RANGE -55°C TO +150°C)

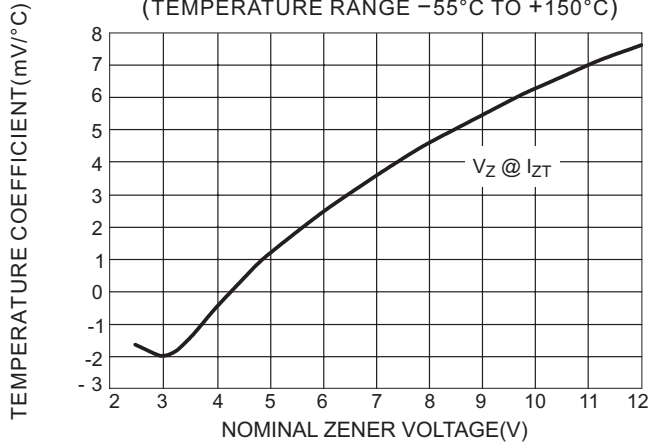


FIG 2. TEMPERATURE COEFFICIENTS
(TEMPERATURE RANGE -55°C TO +150°C)

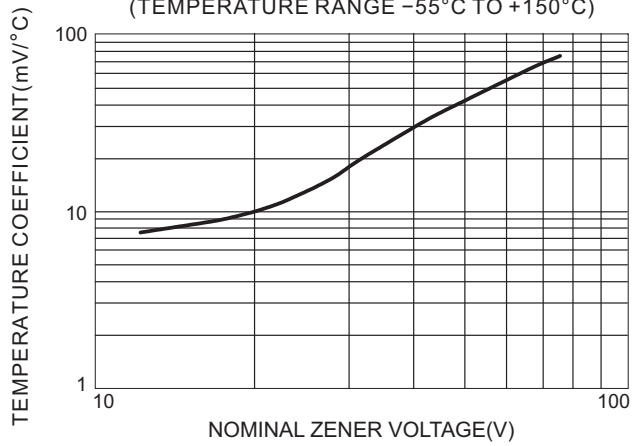


FIG3. TYPICAL LEAKAGE CURRENT

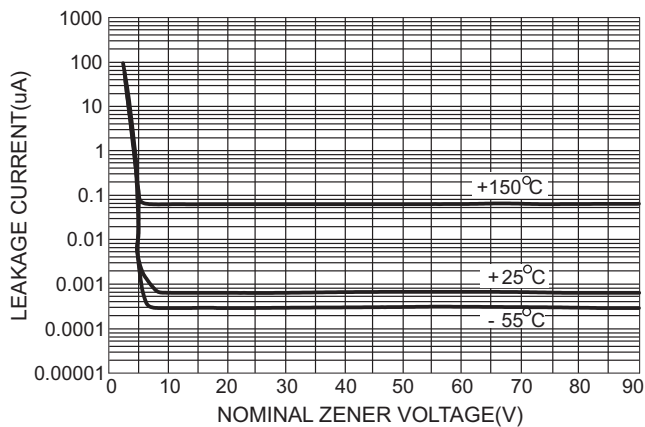


FIG4. TYPICAL FORWARD VOLTAGE

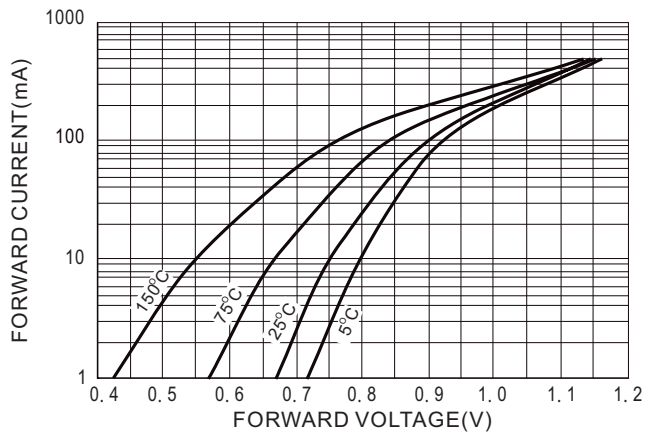


FIG5. STEADY STATE POWER DERATING

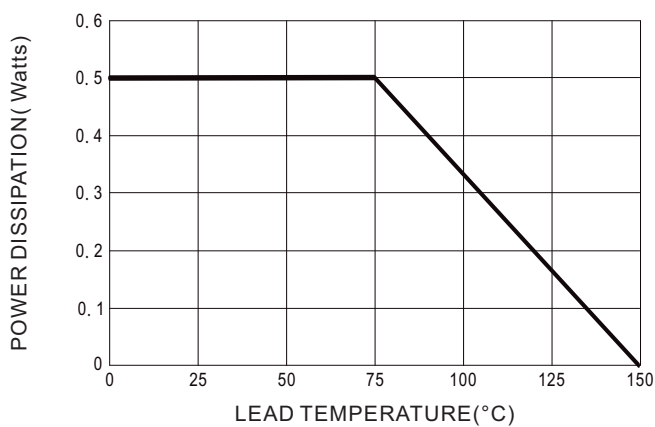
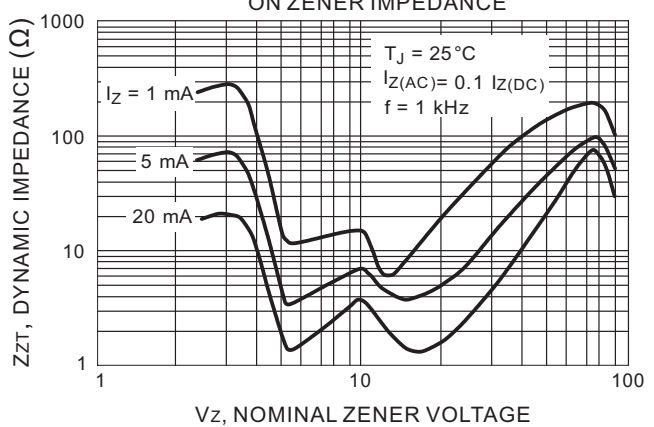


FIG6. EFFECT OF ZENER VOLTAGE
ON ZENER IMPEDANCE



Rating and characteristic curves (MMSZ5221B-Q1 THRU MMSZ5267B-Q1)

FIG7. TYPICAL CAPACITANCE

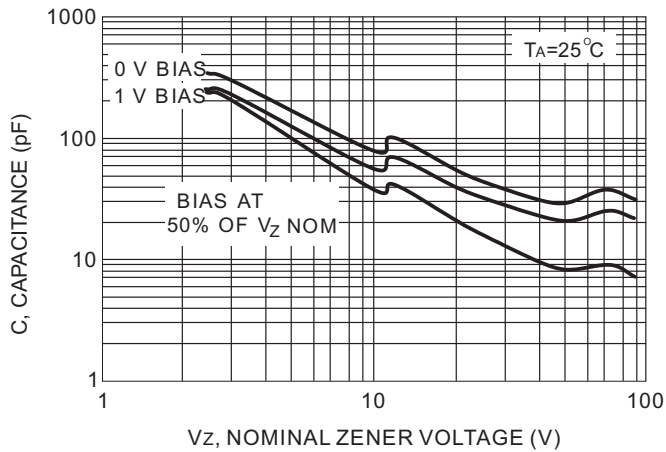


FIG8. ZENER VOLTAGE VERSUS ZENER CURRENT (VZ UP TO 12 V)

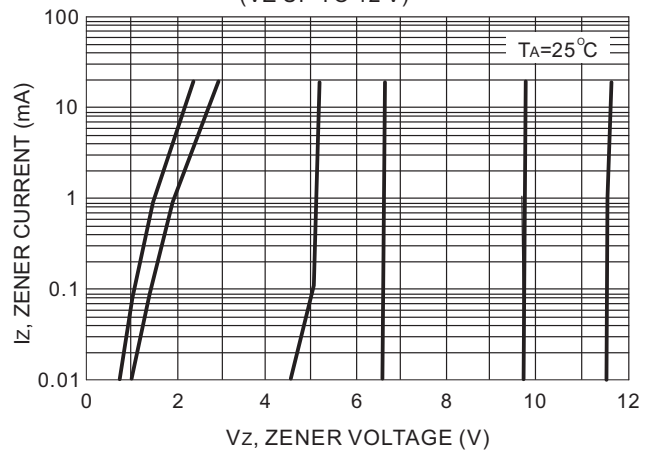
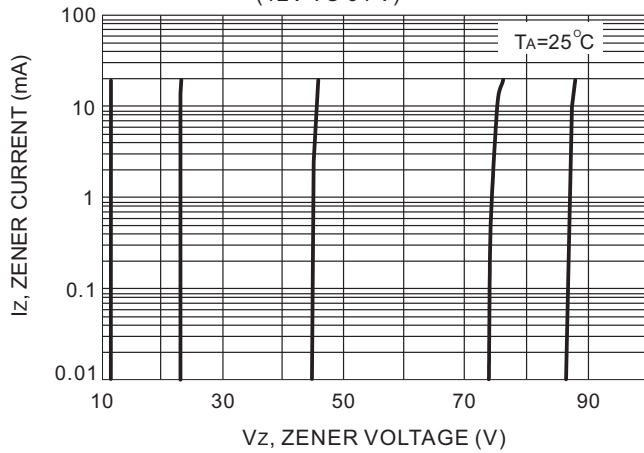


FIG9. ZENER VOLTAGE VERSUS ZENER CURRENT (12V TO 91 V)

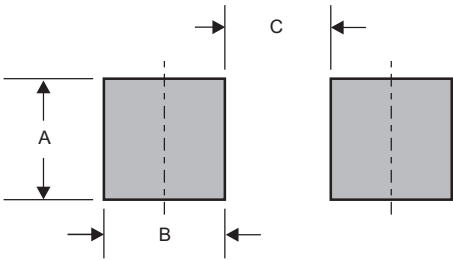


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Pinning information

Pin	Simplified outline	Symbol
Pin1 cathode Pin2 anode		

Suggested solder pad layout

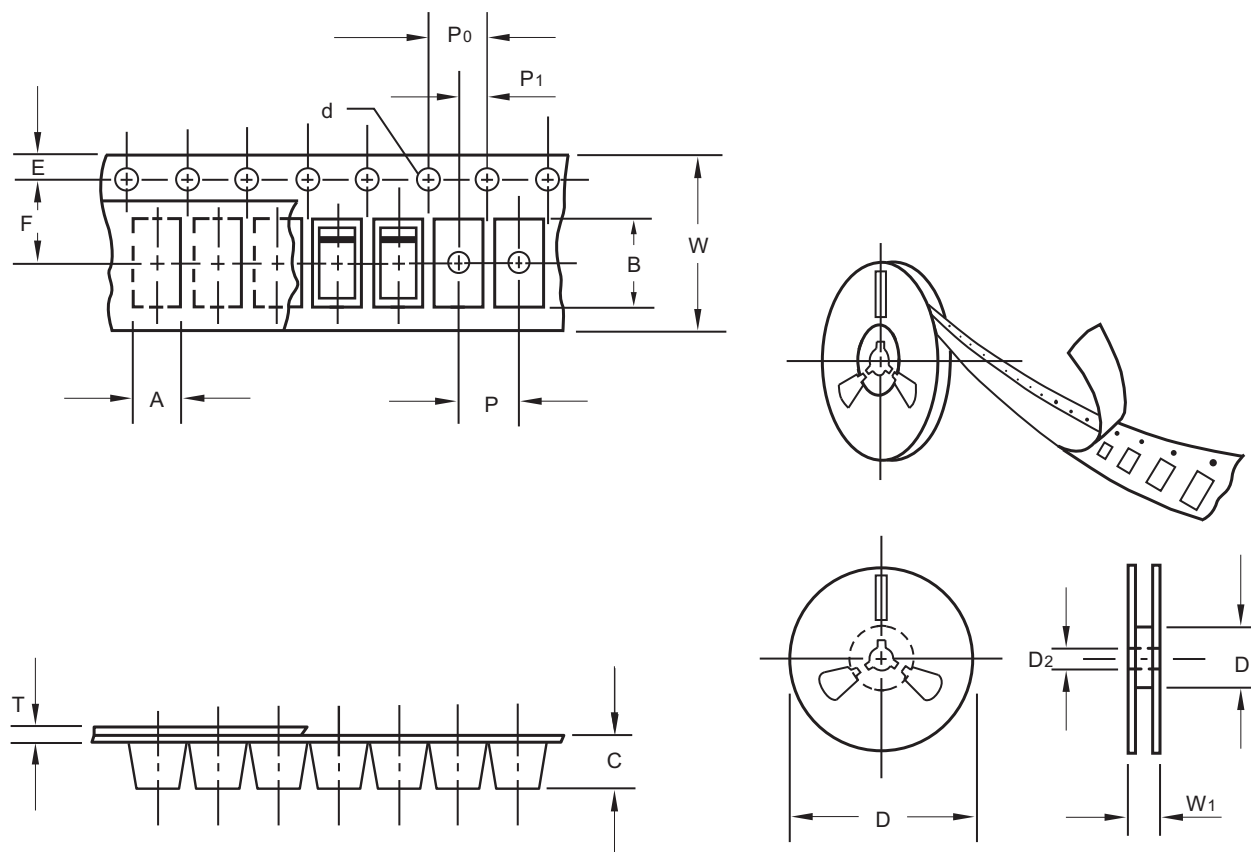


Dimensions in inches and (millimeters)

PACKAGE	A	B	C
SOD-123F	0.048 (1.22)	0.036 (0.91)	0.093 (2.36)

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Packing information



unit:mm

Item	Symbol	Tolerance	SOD-123F
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.

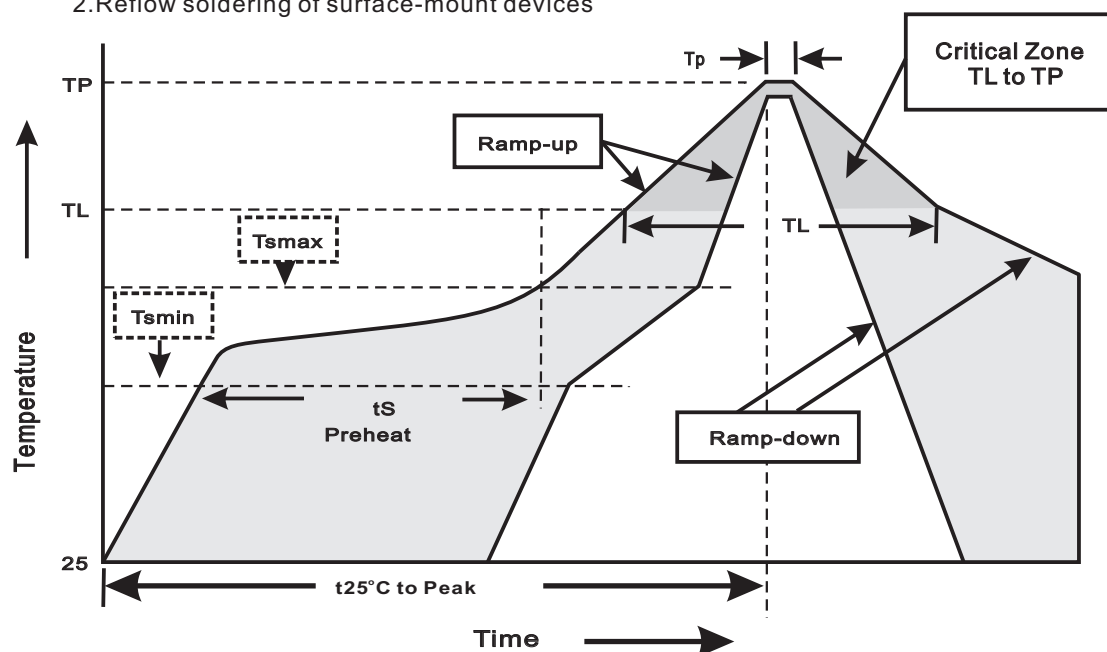
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Reel packing

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-123F	7"	3,000	4.0	30,000	183*123*183	178	382*257*387	240,000	9.5

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 _{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

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High reliability test capabilities

Item Test	Conditions	Reference
1. Solder Resistance	at $260 \pm 5^\circ\text{C}$ for 10 ± 2 sec.	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	$V_z = V_{z=N_{OM}} * 80\%$ at $T_j = 150^\circ\text{C}$ for 168 hrs.	MIL-STD-750D METHOD-1038
4. Pressure Cooker	$15P_{SIG}$ at $T_A = 121^\circ\text{C}$ 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. 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