

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

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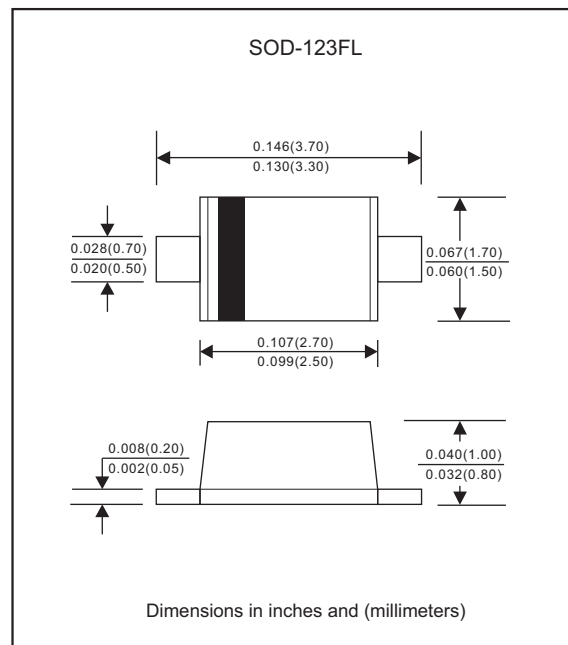
**500mW Surface Mount Zener
Diodes - 2.4V- 75V**

Package outline**Features**

- Wide Zener Voltage Range Selection, 2.4V to 75V.
- VZ Tolerance Selection of $\pm 5\%$.
- Flat Lead SOD-123FL Plastic Package.
- Surface Device Type Mounting.
- Lead-free parts meet environmental standards of MIL-STD-19500 /228
- Qualified to AEC-Q101 standards for high reliability.
- Suffix "-H" indicates Halogen free parts, ex. MMSZ5221B-FL-Q1-H.

Mechanical data

- Epoxy:UL94-VO rated flame retardant
- Case : Molded plastic, SOD-123FL
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
- Polarity : Indicated by cathode band
- Mounting Position : Any
- Weight : Approximated 0.009 gram

**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			0.90	V
Power Dissipation		P_D			500	mW
Operating temperature		T_J	-65		+150	$^\circ\text{C}$
Storage temperature		T_{STG}	-65		+150	$^\circ\text{C}$

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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
		Min	Nom	Max	mA	Max(Ω)	Max(Ω)	mA	Max(uA)	Volts
MMSZ5221B-FL-Q1	Z2V4,C1	2.28	2.4	2.52	20.0	30	1200	0.25	100	1.0
MMSZ5222B-FL-Q1	Z2V5,C2	2.38	2.5	2.63	20.0	30	1250	0.25	100	1.0
MMSZ5223B-FL-Q1	Z2V7,C3	2.57	2.7	2.84	20.0	30	1300	0.25	75	1.0
MMSZ5224B-FL-Q1	Z2V8,C4	2.66	2.8	2.94	20.0	30	1400	0.25	75	1.0
MMSZ5225B-FL-Q1	Z3V0,C5	2.85	3.0	3.15	20.0	29	1600	0.25	50	1.0
MMSZ5226B-FL-Q1	Z3V3,G1	3.14	3.3	3.47	20.0	28	1600	0.25	25	1.0
MMSZ5227B-FL-Q1	Z3V6,G2	3.42	3.6	3.78	20.0	24	1700	0.25	15	1.0
MMSZ5228B-FL-Q1	Z3V9,G3	3.71	3.9	4.10	20.0	23	1900	0.25	10	1.0
MMSZ5229B-FL-Q1	Z4V3,G4	4.09	4.3	4.52	20.0	22	2000	0.25	5.0	1.0
MMSZ5230B-FL-Q1	Z4V7,G5	4.47	4.7	4.94	20.0	19	1900	0.25	5.0	2.0
MMSZ5231B-FL-Q1	Z5V1,E1	4.85	5.1	5.36	20.0	17	1600	0.25	5.0	2.0
MMSZ5232B-FL-Q1	Z5V6,E2	5.32	5.6	5.88	20.0	11	1600	0.25	5.0	3.0
MMSZ5233B-FL-Q1	Z6V0,E3	5.70	6.0	6.30	20.0	7	1600	0.25	5.0	3.5
MMSZ5234B-FL-Q1	Z6V2,E4	5.89	6.2	6.51	20.0	7	1000	0.25	5.0	4.0
MMSZ5235B-FL-Q1	Z6V8,E5	6.46	6.8	7.14	20.0	5	750	0.25	3.0	5.0
MMSZ5236B-FL-Q1	Z7V5,F1	7.13	7.5	7.88	20.0	6	500	0.25	3.0	6.0
MMSZ5237B-FL-Q1	Z8V2,F2	7.79	8.2	8.61	20.0	8	500	0.25	3.0	6.5
MMSZ5238B-FL-Q1	Z8V7,F3	8.27	8.7	9.14	20.0	8	600	0.25	3.0	6.5
MMSZ5239B-FL-Q1	Z9V1,F4	8.65	9.1	9.56	20.0	10	600	0.25	3.0	7.0
MMSZ5240B-FL-Q1	Z10V,F5	9.50	10	10.50	20.0	17	600	0.25	3.0	8.0
MMSZ5241B-FL-Q1	Z11V,H1	10.45	11	11.55	20.0	22	600	0.25	2.0	8.4
MMSZ5242B-FL-Q1	Z12V,H2	11.40	12	12.60	20.0	30	600	0.25	1.0	9.1
MMSZ5243B-FL-Q1	Z13V,H3	12.35	13	13.65	9.5	13	600	0.25	0.5	9.9
MMSZ5244B-FL-Q1	Z14V,H4	13.30	14	14.70	9.0	15	600	0.25	0.1	10
MMSZ5245B-FL-Q1	Z15V,H5	14.25	15	15.75	8.5	16	600	0.25	0.1	11
MMSZ5246B-FL-Q1	Z16V,J1	15.20	16	16.80	7.8	17	600	0.25	0.1	12
MMSZ5247B-FL-Q1	Z17V,J2	16.15	17	17.85	7.4	19	600	0.25	0.1	13
MMSZ5248B-FL-Q1	Z18V,J3	17.10	18	18.90	7.0	21	600	0.25	0.1	14
MMSZ5249B-FL-Q1	Z19V,J4	18.05	19	19.95	6.6	23	600	0.25	0.1	14
MMSZ5250B-FL-Q1	Z20V,J5	19.00	20	21.00	6.2	25	600	0.25	0.1	15
MMSZ5251B-FL-Q1	Z22V,K1	20.90	22	23.10	5.6	29	600	0.25	0.1	17
MMSZ5252B-FL-Q1	Z24V,K2	22.80	24	25.20	5.2	33	600	0.25	0.1	18
MMSZ5253B-FL-Q1	Z25V,K3	23.75	25	26.25	5.0	35	600	0.25	0.1	19
MMSZ5254B-FL-Q1	Z27V,K4	25.65	27	28.35	4.6	41	600	0.25	0.1	21
MMSZ5255B-FL-Q1	Z28V,K5	26.60	28	29.40	4.5	44	600	0.25	0.1	21
MMSZ5256B-FL-Q1	Z30V,M1	28.50	30	31.50	4.2	49	600	0.25	0.1	23
MMSZ5257B-FL-Q1	Z33V,M2	31.35	33	34.65	3.8	58	700	0.25	0.1	25
MMSZ5258B-FL-Q1	Z36V,M3	34.20	36	37.80	3.4	70	700	0.25	0.1	27
MMSZ5259B-FL-Q1	Z39V,M4	37.05	39	40.95	3.2	80	800	0.25	0.1	30
MMSZ5260B-FL-Q1	Z43V,M5	40.85	43	45.15	3.0	93	900	0.25	0.1	33
MMSZ5261B-FL-Q1	Z47V,N1	44.65	47	49.35	2.7	105	1000	0.25	0.1	36
MMSZ5262B-FL-Q1	Z51V,N2	48.45	51	53.55	2.5	125	1100	0.25	0.1	39

MMSZ5221B-FL-Q1 THRU MMSZ5267B-FL-Q1

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
MMSZ5263B-FL-Q1	Z56V,N3	53.20	56	58.80	2.2	150	1300	0.25	0.1	43
MMSZ5264B-FL-Q1	Z60V,N4	57.00	60	63.00	2.1	170	1400	0.25	0.1	46
MMSZ5265B-FL-Q1	Z62V,N5	58.90	62	65.10	2.0	185	1400	0.25	0.1	47
MMSZ5266B-FL-Q1	Z68V,P1	64.60	68	71.40	1.8	230	1600	0.25	0.1	52
MMSZ5267B-FL-Q1	Z75V,P2	71.25	75	75.75	1.7	270	1700	0.25	0.1	56

Notes:

1. The zener voltage (V_Z) is tested under pulse condition of 1ms.
2. The device numCers listed have a standard tolerance on the nominal zener voltage of $\pm 5\%$.
3. The zener impedance is derived from the 60-cycle ac voltage, which results when an ac current having an rms value equal to 10% of the dc zener current (I_{ZT} or I_{ZK}) is superimposed to I_{ZT} or I_{ZK} .

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

FIG. 1-POWER DISSIPATION VS. AMBIENT TEMP.

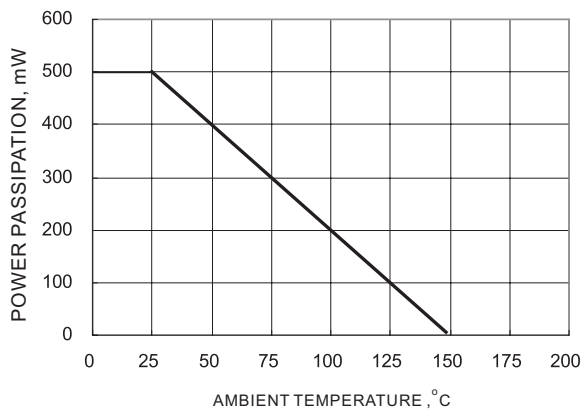


FIG. 2-EFFECT OF ZENER VOLTAGE ON ZENER IMPEDANCE

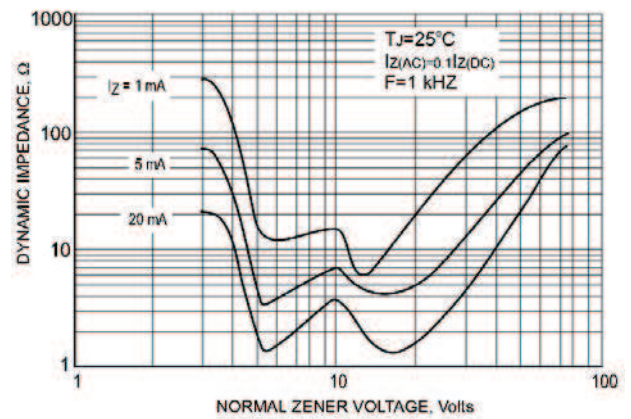


FIG. 3-TYPICAL FORWARD VOLTAGE

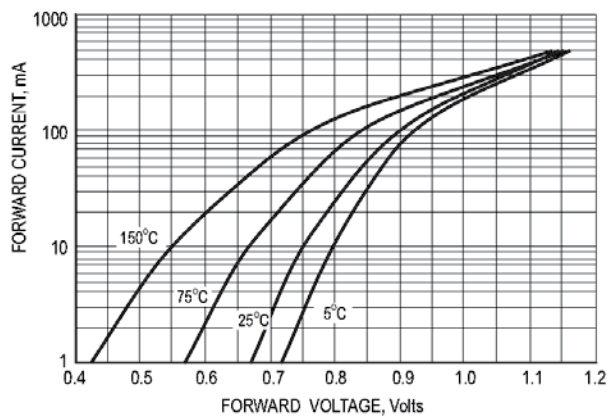


FIG. 4-TYPICAL CAPACITANCE

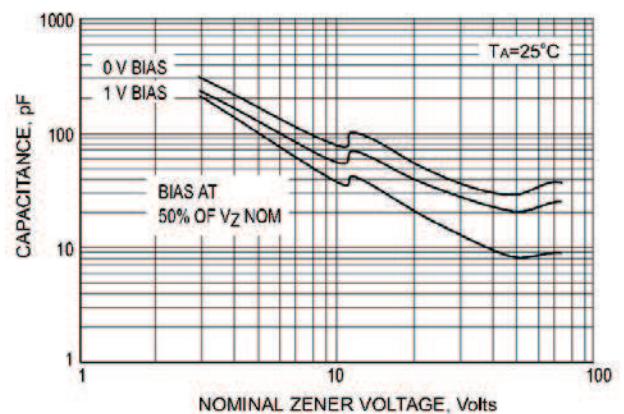


FIG. 5-ZENER BREAKDOWN CHARACTERISTICS

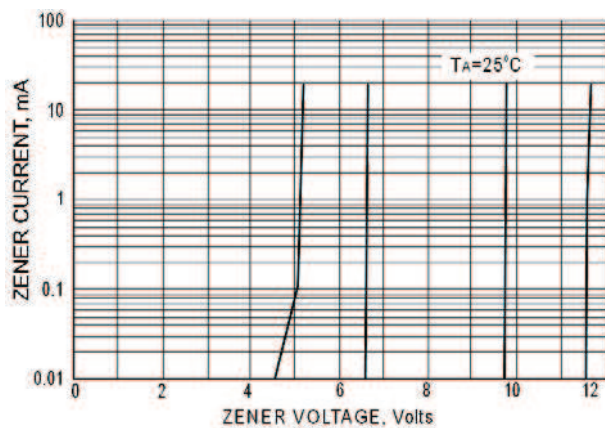
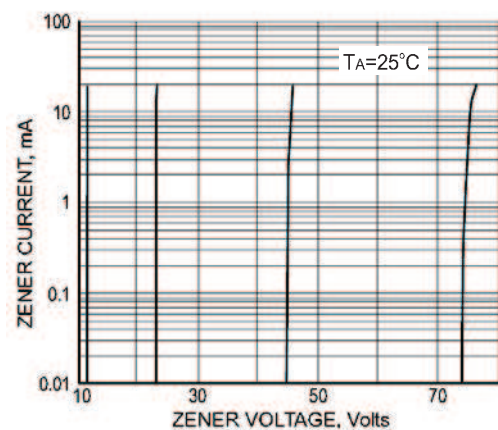
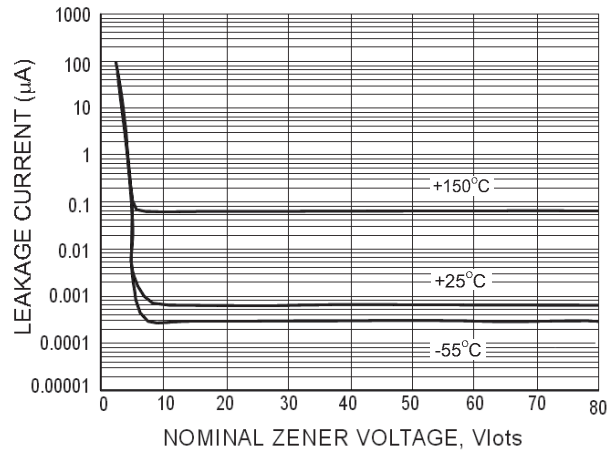


FIG. 6-ZENER BREAKDOWN CHARACTERISTICS



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

FIG. 7-TYPICAL LEAKGE CURRENT

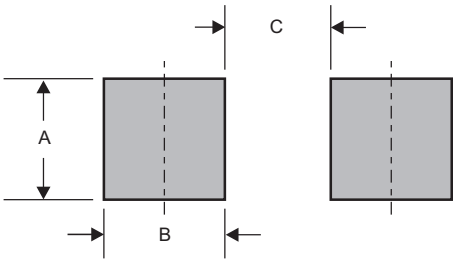


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Pinning information

Pin	Simplified outline	Symbol
Pin1 cathode Pin2 anode		

Suggested solder pad layout

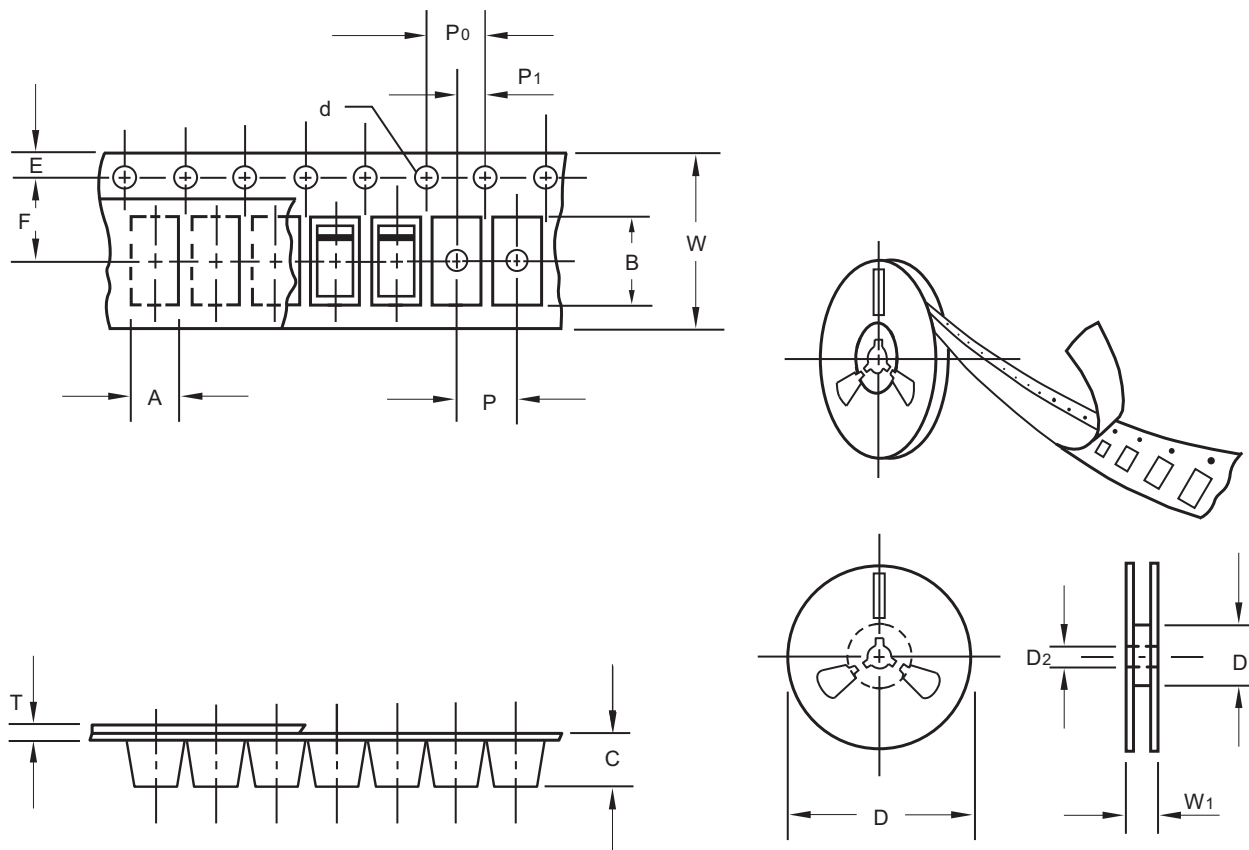


Dimensions in inches and (millimeters)

PACKAGE	A	B	C
SOD-123FL	0.028 (0.70)	0.028 (0.70)	0.091 (2.30)

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Packing information



unit:mm

Item	Symbol	Tolerance	SOD-123FL
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.

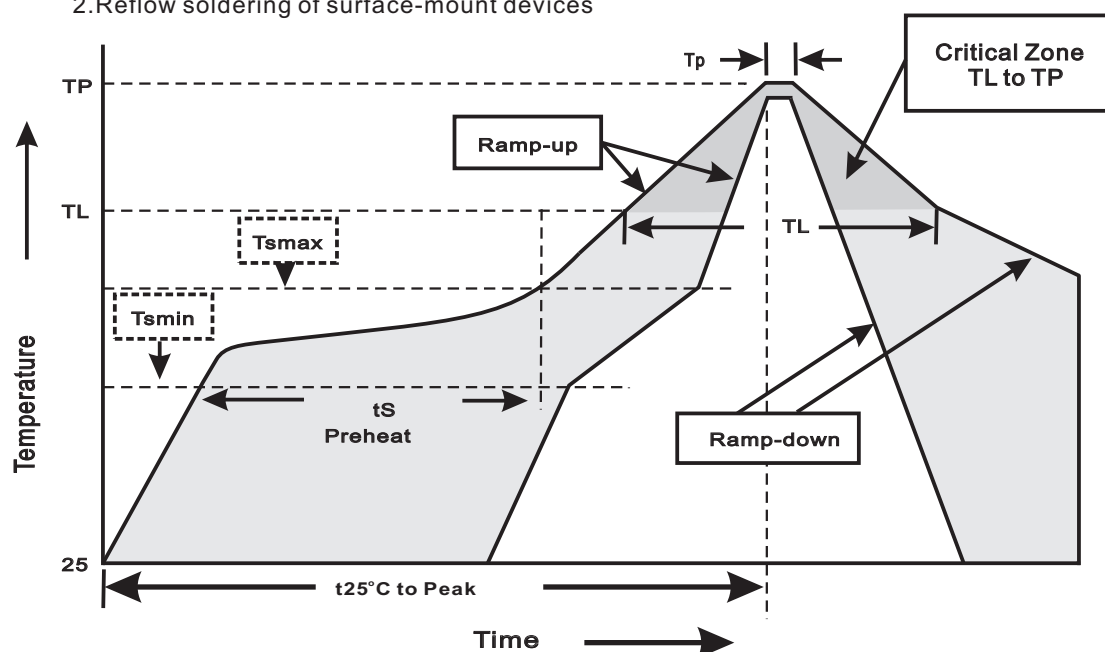
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Reel packing

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-123FL	7"	3,000	4.0	30,000	183*183*123	178	382*262*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(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

MMSZ5221B-FL-Q1 THRU MMSZ5267B-FL-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. Intermittent Operating Life	Ta=25°C, $\Delta T_j \geq 100^\circ\text{C}$ On/Off=2min Test Duration:1000hrs	MIL-STD-750E METHOD 1037
3. High Temperature Gate Bias	Vgs=100% rated Vgs (Tj=150°C)Test Duration:1000hrs	JESD22-A108
4. High Temperature Storage Life	Ta=125°C Test Duration: 1000hrs	JESD22 A-103
5. Temperature Cycle	-55°C (15min) to 150°C (15min)Test Cycles: 1000cycles	JESD22 A-104
6. Autoclave	P=2atm Ta=121°C RH=100% Test Duration:96hrs	JESD22 A-102
7. Solderability	245±5°C for 5sec	J-STD-002
8. Moisture Resistance	Ta=85°C/85% Relative humidity Test Duration:1000hrs	MIL-STD-750E METHOD 1021.2
9. Resistance To Solder Heat	260±5°C for 10sec	JESD22 B-106
10. High Temperature High Humidity Reverse Bias	Ta=85°C, 85%RH,Vds=80% ratedVds Test Duration:1000hrs	JESD22-A101