

MMSZ5221BS THRU MMSZ5272BS

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MMSZ5221BS THRU MMSZ5272BS

200mW Surface Mount Zener
Diodes 2.4V-110V

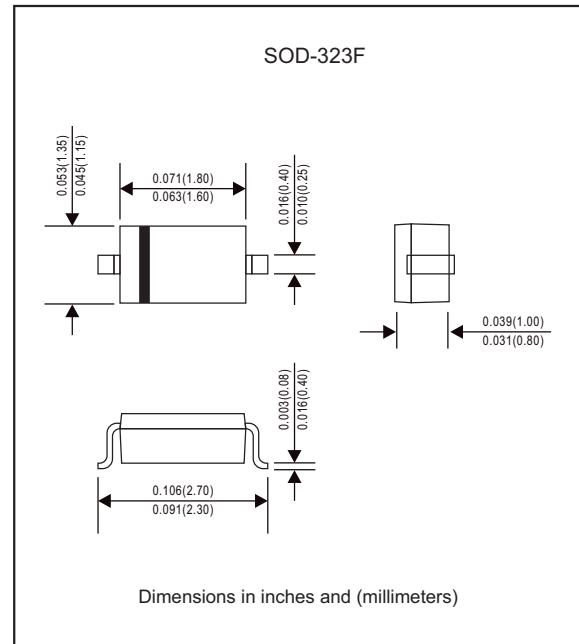
Features

- 200 mW rating on FR-4 or FR-5 board
- VZ Tolerance selection of $\pm 5\%$
- Wide zener reverse voltage range – 2.4 V to 110 V
- Package designed for optimal automated board assembly
- Small package size for high density applications
- General purpose, medium current
- ESD rating of class 3 (>16 kV) per human body model
- We declare that the material of product compliance with RoHS requirements
- Suffix "-H" indicates Halogen free parts, ex. MMSZ5221BS-H

Mechanical data

- Epoxy: UL94-V0 rated flame retardant
- Case : Molded plastic, SOD-323F
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
- Mounting Position : Any
- Weight : Approximated 0.005 gram

Package outline



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

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Forward voltage@ $I_F=10\text{ mA}$	V_F			0.9	V
Power dissipation (Note 1) @ $T_L=75^\circ\text{C}$	P_D			200	mW
Thermal resistance, junction-to-ambient	$R_{\theta JA}$		625		$^\circ\text{C/W}$
Operating junction temperature range	T_J	-55		+150	$^\circ\text{C}$
Storage temperature range	T_{STG}	-55		+150	$^\circ\text{C}$

Note 1: FR-5 = 3.5 X 1.5 inches, using the minimum recommended footprint.

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	(Ω)Max	(Ω)Max	mA	(μA)Max	Volts
MMSZ5221BS	C1	2.28	2.4	2.52	20.0	30	1200	0.25	100	1.0
MMSZ5222BS	C2	2.38	2.5	2.63	20.0	30	1250	0.25	100	1.0
MMSZ5223BS	C3	2.57	2.7	2.84	20.0	30	1300	0.25	75	1.0
MMSZ5224BS	C4	2.66	2.8	2.94	20.0	30	1400	0.25	75	1.0
MMSZ5225BS	C5	2.85	3.0	3.15	20.0	29	1600	0.25	50	1.0
MMSZ5226BS	D1,G1	3.14	3.3	3.47	20.0	28	1600	0.25	25	1.0
MMSZ5227BS	D2,G2	3.42	3.6	3.78	20.0	24	1700	0.25	15	1.0
MMSZ5228BS	D3,G3	3.71	3.9	4.10	20.0	23	1900	0.25	10	1.0
MMSZ5229BS	D4,G4	4.09	4.3	4.52	20.0	22	2000	0.25	5.0	1.0
MMSZ5230BS	D5,G5	4.47	4.7	4.94	20.0	19	1900	0.25	5.0	2.0
MMSZ5231BS	E1	4.85	5.1	5.36	20.0	17	1600	0.25	5.0	2.0
MMSZ5232BS	E2	5.32	5.6	5.88	20.0	11	1600	0.25	5.0	3.0
MMSZ5233BS	E3	5.70	6.0	6.30	20.0	7	1600	0.25	5.0	3.5
MMSZ5234BS	E4	5.89	6.2	6.51	20.0	7	1000	0.25	5.0	4.0
MMSZ5235BS	E5	6.46	6.8	7.14	20.0	5	750	0.25	3.0	5.0
MMSZ5236BS	F1	7.13	7.5	7.88	20.0	6	500	0.25	3.0	6.0
MMSZ5237BS	F2	7.79	8.2	8.61	20.0	8	500	0.25	3.0	6.5
MMSZ5238BS	F3	8.27	8.7	9.14	20.0	8	600	0.25	3.0	6.5
MMSZ5239BS	F4	8.65	9.1	9.56	20.0	10	600	0.25	3.0	7.0
MMSZ5240BS	F5	9.50	10	10.50	20.0	17	600	0.25	3.0	8.0
MMSZ5241BS	H1	10.45	11	11.55	20.0	22	600	0.25	2.0	8.4
MMSZ5242BS	H2	11.40	12	12.60	20.0	30	600	0.25	1.0	9.1
MMSZ5243BS	H3	12.35	13	13.65	9.5	13	600	0.25	0.5	9.9
MMSZ5244BS	H4	13.30	14	14.70	9.0	15	600	0.25	0.1	10
MMSZ5245BS	H5	14.25	15	15.75	8.5	16	600	0.25	0.1	11
MMSZ5246BS	J1	15.20	16	16.80	7.8	17	600	0.25	0.1	12
MMSZ5247BS	J2	16.15	17	17.85	7.4	19	600	0.25	0.1	13
MMSZ5248BS	J3	17.10	18	18.90	7.0	21	600	0.25	0.1	14
MMSZ5250BS	J5	19.00	20	21.00	6.2	25	600	0.25	0.1	15
MMSZ5251BS	K1	20.90	22	23.10	5.6	29	600	0.25	0.1	17
MMSZ5252BS	K2	22.80	24	25.20	5.2	33	600	0.25	0.1	18
MMSZ5253BS	K3	23.75	25	26.25	5.0	35	600	0.25	0.1	19
MMSZ5254BS	K4	25.65	27	28.35	4.6	41	600	0.25	0.1	21
MMSZ5255BS	K5	26.60	28	29.40	4.5	44	600	0.25	0.1	21
MMSZ5256BS	M1	28.50	30	31.50	4.2	49	600	0.25	0.1	23
MMSZ5257BS	M2	31.35	33	34.65	3.8	58	700	0.25	0.1	25
MMSZ5258BS	M3	34.20	36	37.80	3.4	70	700	0.25	0.1	27
MMSZ5259BS	M4	37.05	39	40.95	3.2	80	800	0.25	0.1	30
MMSZ5260BS	M5	40.85	43	45.15	3.0	93	900	0.25	0.1	33
MMSZ5261BS	N1	44.65	47	49.35	2.7	105	1000	0.25	0.1	36
MMSZ5262BS	N2	48.45	51	53.55	2.5	125	1100	0.25	0.1	39
MMSZ5263BS	N3	53.20	56	58.80	2.2	150	1300	0.25	0.1	43
MMSZ5264BS	N4	57.00	60	63.00	2.1	170	1400	0.25	0.1	46
MMSZ5265BS	N5	58.90	62	65.10	2.0	185	1400	0.25	0.1	47
MMSZ5266BS	P1	64.60	68	71.40	1.8	230	1600	0.25	0.1	52
MMSZ5267BS	P2	71.25	75	78.75	1.7	270	1700	0.25	0.1	56
MMSZ5268BS	P3	77.90	82	86.10	1.5	330	2000	0.25	0.1	62
MMSZ5269BS	P4	82.65	87	91.35	1.4	370	2200	0.25	0.1	68
MMSZ5270BS	P5	86.45	91	95.55	1.4	400	2300	0.25	0.1	69
MMSZ5272BS	R2	104.5	110	115.5	1.1	750	3000	0.25	0.1	84

3. The type numbers shown have a standard tolerance of $\pm 5\%$ on the nominal Zener voltage.

4. Nominal Zener voltage is measured with the device junction in thermal equilibrium at $T_L = 30^{\circ}\text{C} \pm 1^{\circ}\text{C}$.

5. Z_{TT} and Z_{ZK} are measured by dividing the AC voltage drop across the device by the ac current applied.

The specified limits are for $I_Z(\text{AC}) = 0.1 I_Z(\text{dc})$ with the AC frequency = 1 KHz.

Rating and characteristic curves (MMSZ5221BS THRU MMSZ5272BS)

Figure 1. Temperature Coefficients
(Temperature Range -55°C to +150°C)

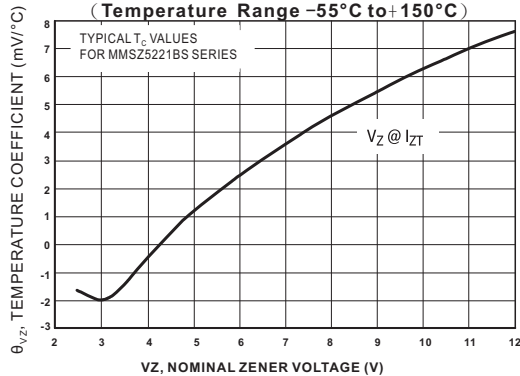


Figure 2. Temperature Coefficients
(Temperature Range -55°C to +150°C)

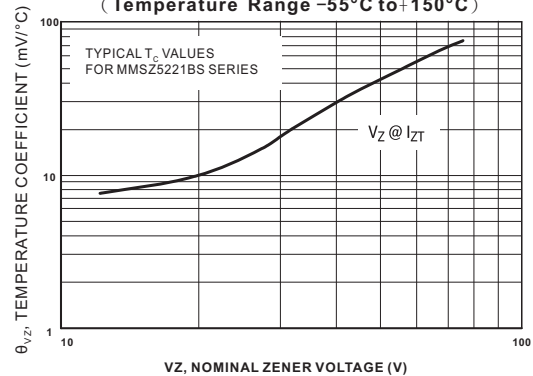


Figure 3. Effect of Zener Voltage on Zener Impedance

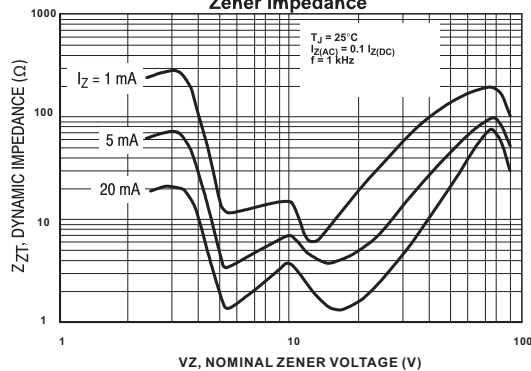


Figure 4. Typical Forward Voltage

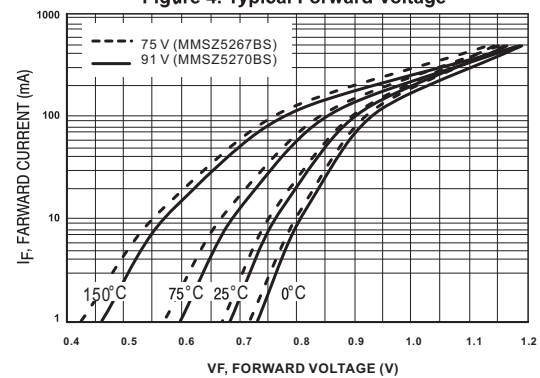


Figure 5. Typical Capacitance

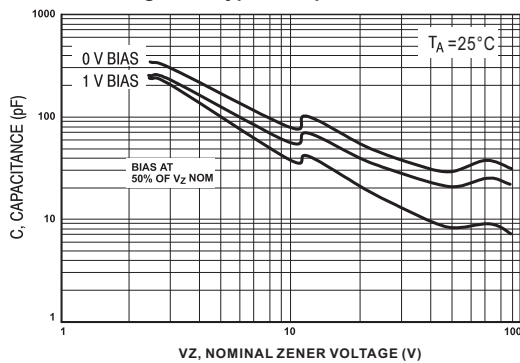


Figure 6. Typical Leakage Current

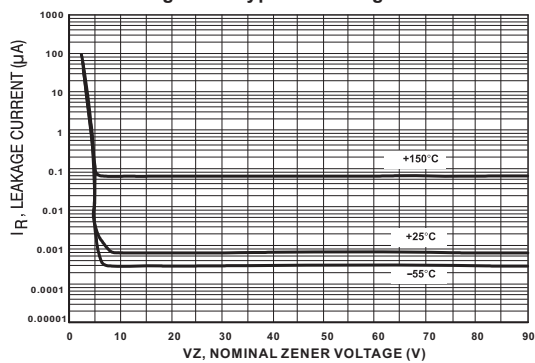


Figure 7. Zener Voltage versus Zener Current
(V_Z Up to 12 V)

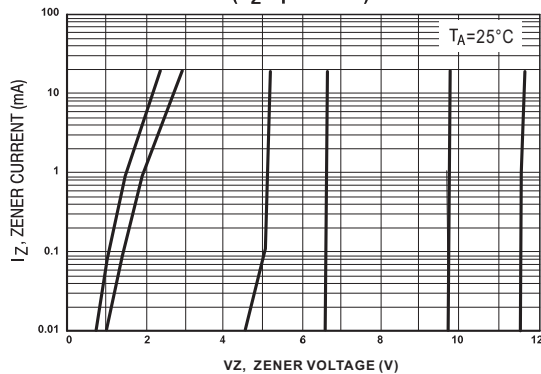
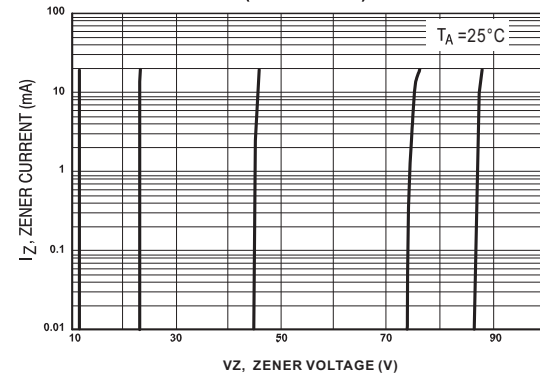


Figure 8. Zener Voltage versus Zener Current
(12 V to 91 V)



Rating and characteristic curves (MMSZ5221BS THRU MMSZ5272BS)

Figure 9. Steady State Power Derating

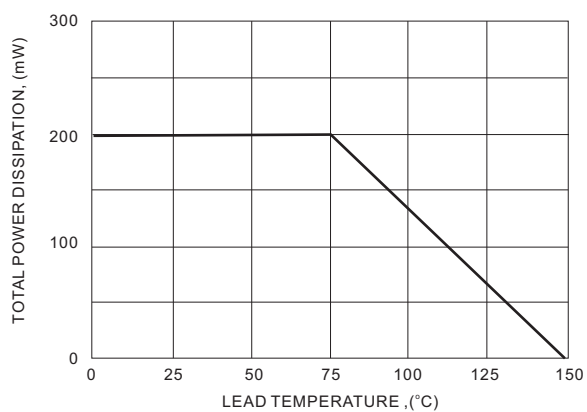
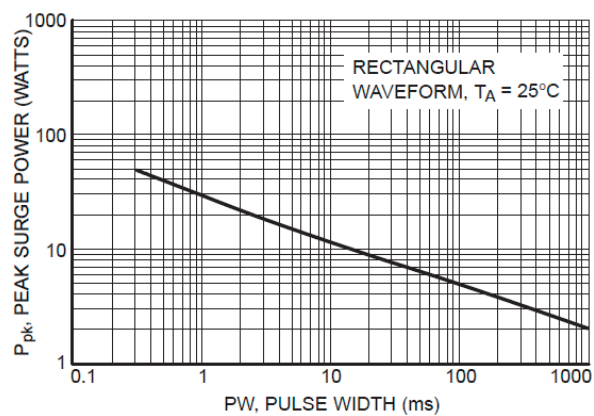


Figure 10. Maximum Nonrepetitive Surge Power

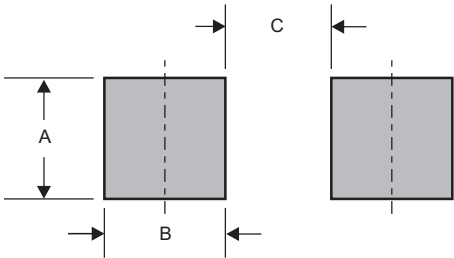


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Pinning information

Pin	Simplified outline	Symbol
Pin1 cathode Pin2 anode		

Suggested solder pad layout

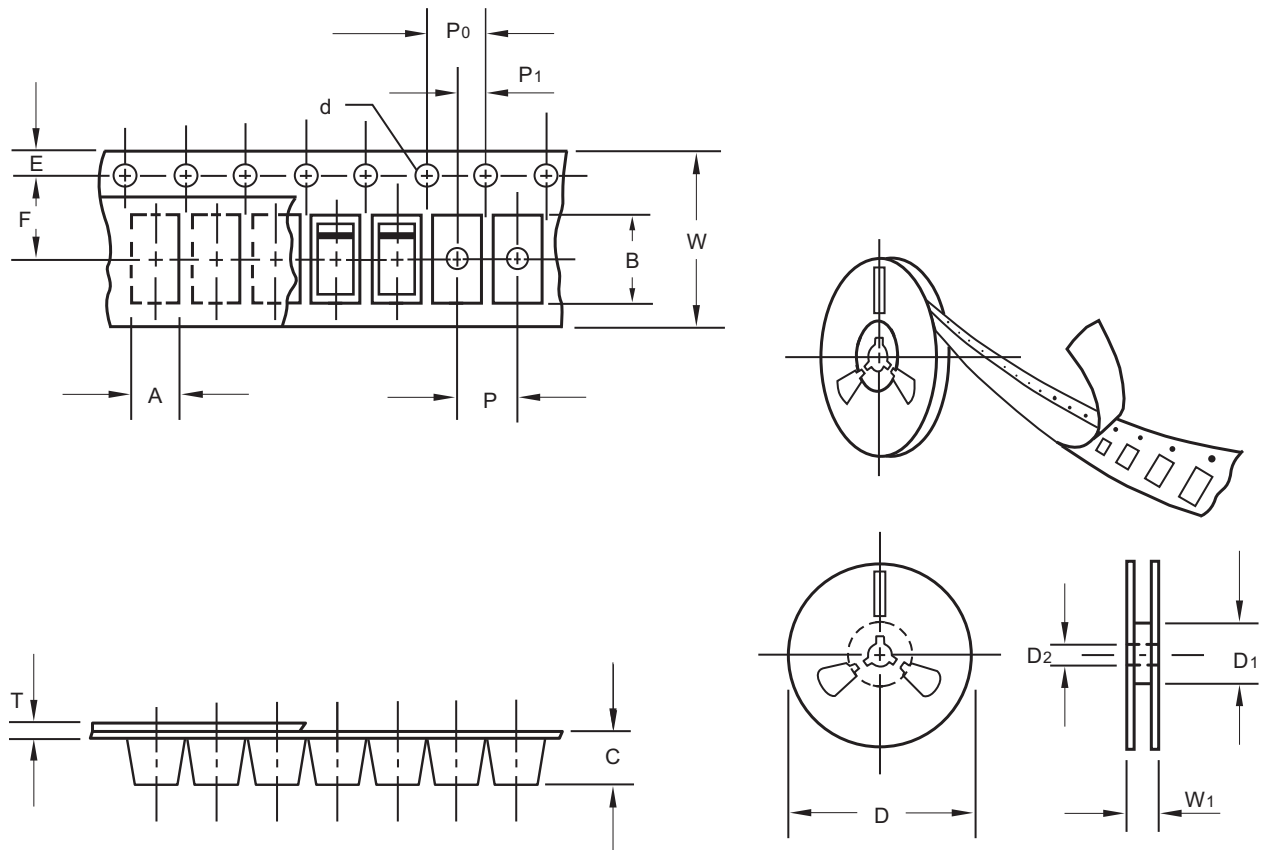


Dimensions in inches and (millimeters)

PACKAGE	A	B	C
SOD-323F	0.033 (0.83)	0.025 (0.63)	0.063 (1.60)

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Packing information



unit:mm

Item	Symbol	Tolerance	SOD-323F
Carrier width	A	0.1	1.46
Carrier length	B	0.1	2.95
Carrier depth	C	0.1	1.25
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.

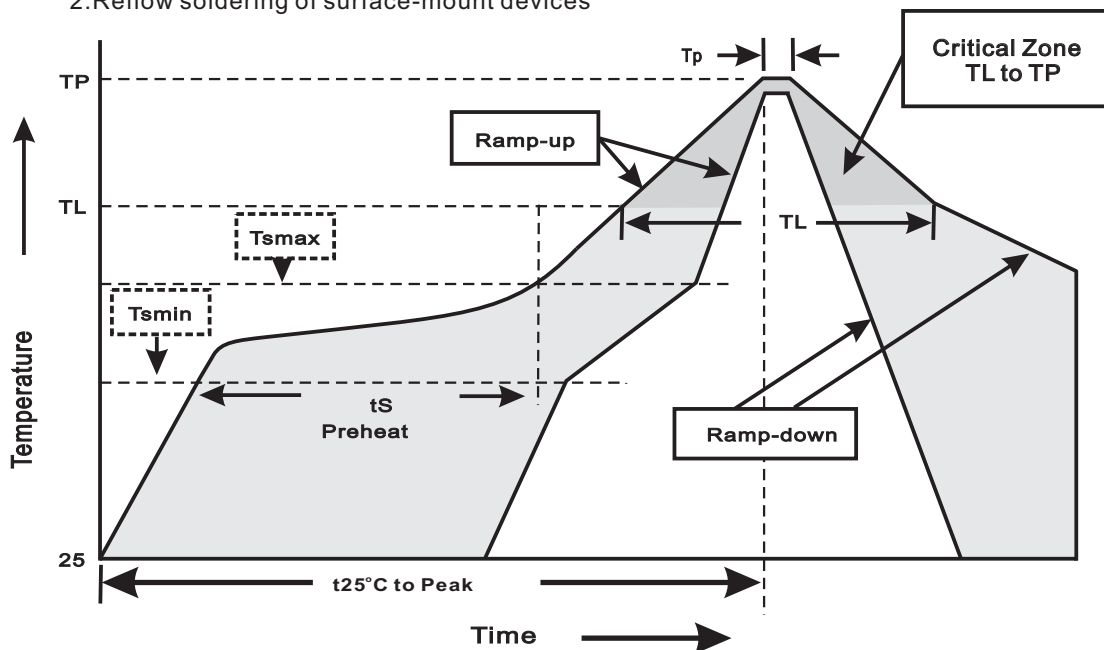
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Reel packing

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-323F	7"	3,000	4.0	30,000	183*123*183	178	382*257*387	240,000	8.0

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_{smin}) -Temperature Max(T_{smax}) -Time(min to max)(t_s)	150°C 200°C 60~120sec
T_{smax} 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 $10 \pm 2\text{sec.}$	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