

MM5Z2V4-Q1 THRU MM5Z75V-Q1

200mW Surface Mount
Zener Diodes 2.4V-75V

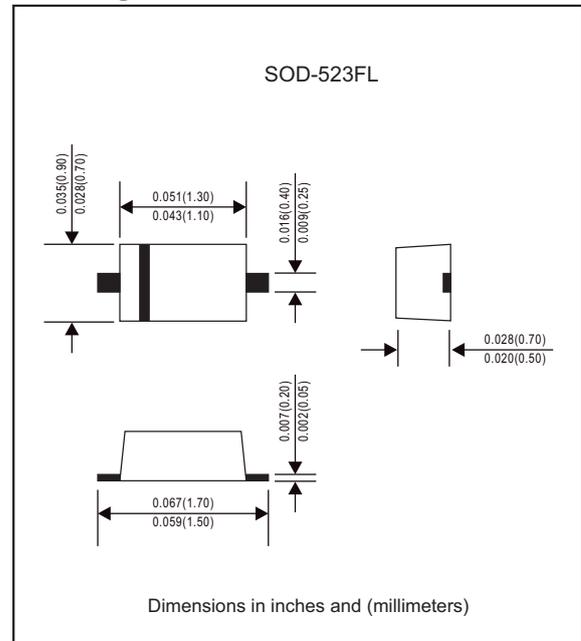
Features

- Silicon epitaxial planar chip structure
- Wide zener reverse voltage range 2.4V to 75V
- Tiny package size for high density applications
- Ideally suited for automated assembly processes
- ESD Rating of Class 3(>16kV)per human body model
- Lead-free parts meet RoHS requirements
- Qualified to AEC-Q101 standards for high reliability
- Suffix "-H" indicates Halogen-free parts, ex. MM5Z2V4-Q1-H

Mechanical data

- Epoxy : UL94-V0 rated flame retardant
- Case : Molded plastic, SOD-523FL
- Terminals :Plated terminals, solderable per MIL-STD-750, Method 2026
- Polarity : Indicated by cathode band
- Mounting Position : Any
- Weight : Approximated 0.002 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
Total device dissipation	on FR-5 Board, $T_A=25^\circ\text{C}$	P_D			200	mW
Thermal resistance	Junction to ambient Junction to case	$R_{\theta JA}$ $R_{\theta JC}$		625 350		$^\circ\text{C}/\text{W}$ $^\circ\text{C}/\text{W}$
Operating junction temperature range		T_J	-65		+150	$^\circ\text{C}$
Storage temperature range		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		θ_{Vz} (mV/k) @ I_{ZT}		C_j @ $V_R=0V$ $f=1\text{MHz}$ (pF)Max
		$V_Z @ I_{ZT}$				I_{ZT}	$Z_{ZT} @ I_{ZT}$	$Z_{ZK} @ I_{ZK}$	I_{ZK}	I_R	V_R	Min.	
		Min.(V)	Nom.(V)	Max.(V)	mA	Max.(Ω)	Max.(Ω)	mA	Max.(μA)	Volts			
MM5Z2V4-Q1	00,Z7	2.2	2.4	2.6	5	100	1000	1.0	50	1.0	-3.5	0	450
MM5Z2V7-Q1	01,A8	2.5	2.7	2.9	5	100	1000	1.0	20	1.0	-3.5	0	450
MM5Z3V0-Q1	02,B8	2.8	3.0	3.2	5	100	1000	1.0	10	1.0	-3.5	0	450
MM5Z3V3-Q1	05,C8	3.1	3.3	3.5	5	95	1000	1.0	5	1.0	-3.5	0	450
MM5Z3V6-Q1	06,D8	3.4	3.6	3.8	5	90	1000	1.0	5	1.0	-3.5	0	450
MM5Z3V9-Q1	07,E8	3.7	3.9	4.1	5	90	1000	1.0	3	1.0	-3.5	-2.5	450
MM5Z4V3-Q1	08,F8	4.0	4.3	4.6	5	90	1000	1.0	3	1.0	-3.5	0	450
MM5Z4V7-Q1	09,G8	4.4	4.7	5.0	5	80	800	1.0	3	2.0	-3.5	0.2	260
MM5Z5V1-Q1	0A,H8	4.8	5.1	5.4	5	60	500	1.0	2	2.0	-2.7	1.2	225
MM5Z5V6-Q1	0C,I8	5.2	5.6	6.0	5	40	400	1.0	1	2.0	-2.0	2.5	200
MM5Z6V2-Q1	0E,J8	5.8	6.2	6.6	5	10	100	1.0	3	4.0	0.4	3.7	185
MM5Z6V8-Q1	0F,K8	6.4	6.8	7.2	5	15	160	1.0	2	4.0	1.2	4.5	155
MM5Z7V5-Q1	0G,L8	7.0	7.5	7.9	5	15	160	1.0	1	5.0	2.5	5.3	140
MM5Z8V2-Q1	0H,M8	7.7	8.2	8.7	5	15	160	1.0	0.7	5.0	3.2	6.2	135
MM5Z9V1-Q1	0K,N8	8.5	9.1	9.6	5	15	160	1.0	0.2	7.0	3.8	7.0	130
MM5Z10V-Q1	0L,O8	9.4	10	10.6	5	20	160	1.0	0.1	8.0	4.5	8.0	130
MM5Z11V-Q1	0M,P8	10.4	11	11.6	5	20	160	1.0	0.1	8.0	5.4	9.0	130
MM5Z12V-Q1	0N,Q8	11.4	12	12.7	5	25	80	1.0	0.1	8.0	6.0	10	130
MM5Z13V-Q1	0P,R8	12.4	13	14.1	5	30	80	1.0	0.1	8.0	7.0	11	120
MM5Z15V-Q1	0T,S8	14.3	15	15.8	5	30	200	1.0	0.05	10.5	9.2	13	110
MM5Z16V-Q1	0U,T8	15.3	16	17.1	2	40	200	1.0	0.05	11.2	10.4	14	105
MM5Z18V-Q1	0W,U8	16.8	18	19.1	2	45	225	1.0	0.05	12.6	12.4	16	100
MM5Z20V-Q1	0Z,V8	18.8	20	21.2	2	55	225	1.0	0.05	14.0	14.4	18	85
MM5Z22V-Q1	10,W8	20.8	22	23.3	2	55	250	1.0	0.05	15.4	16.4	20	85
MM5Z24V-Q1	11,X8	22.8	24	25.6	2	70	120	1.0	0.05	16.8	18.4	22	80
MM5Z27V-Q1	12,Y8	25.1	27	28.9	2	80	300	1.0	0.05	18.9	21.4	25.3	70
MM5Z30V-Q1	14,Z8	28.0	30	32.0	2	80	300	1.0	0.05	21.0	24.4	29.4	70
MM5Z33V-Q1	18,A9	31.0	33	35.0	2	80	300	1.0	0.05	23.2	27.4	33.4	70
MM5Z36V-Q1	19,B9	34.0	36	38.0	2	90	500	1.0	0.05	25.2	30.4	37.4	70
MM5Z39V-Q1	20,C9	37.0	39	41.0	2	130	500	1.0	0.05	27.3	33.4	41.2	45
MM5Z43V-Q1	21,D9	40.0	43	46.0	2	150	500	1.0	0.05	30.1	37.6	46.6	40
MM5Z47V-Q1	1A,E9	44.0	47	50.0	2	170	500	1.0	0.05	32.9	42.0	51.8	40
MM5Z51V-Q1	1C,F9	48.0	51	54.0	2	180	500	1.0	0.05	35.7	46.6	57.2	40
MM5Z56V-Q1	1D,G9	52.0	56	60.0	2	200	500	1.0	0.05	39.2	52.2	63.8	40
MM5Z62V-Q1	1E,H9	58.0	62	66.0	2	215	500	1.0	0.05	43.4	58.8	71.6	35
MM5Z68V-Q1	1F,I9	64.0	68	72.0	2	240	500	1.0	0.05	47.6	65.6	79.8	35
MM5Z75V-Q1	1G,J9	70.0	75	79.0	2	255	500	1.0	0.05	52.5	73.4	88.6	35

Rating and characteristic curves (MM5Z2V4-Q1 thru MM5Z75V-Q1)

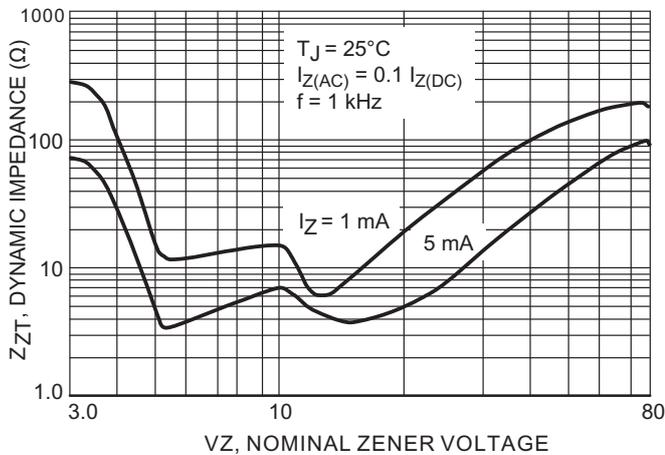


Figure 1. Effect of Zener Voltage on Zener Impedance

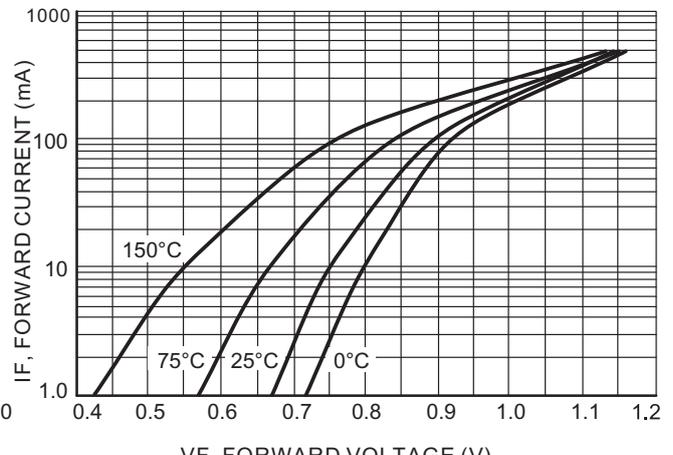


Figure 2. Typical Forward Voltage

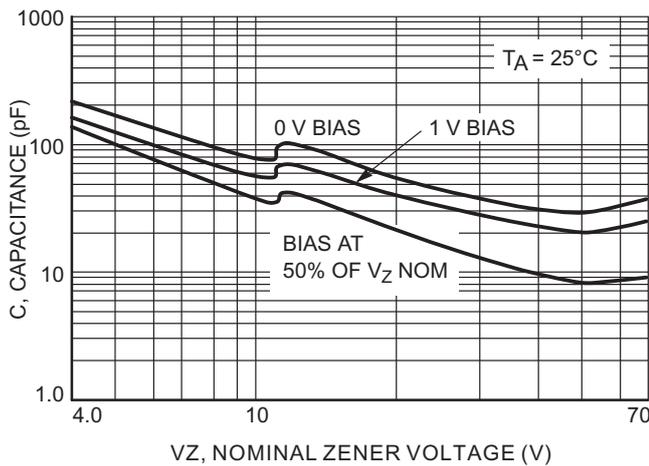


Figure 3. Typical Capacitance

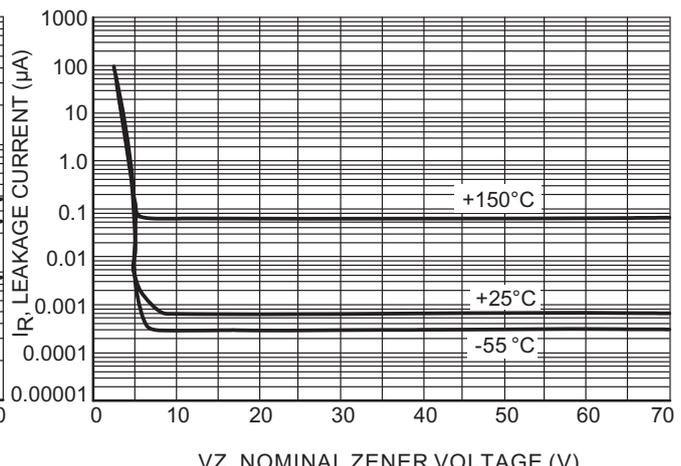


Figure 4. Typical Leakage Current

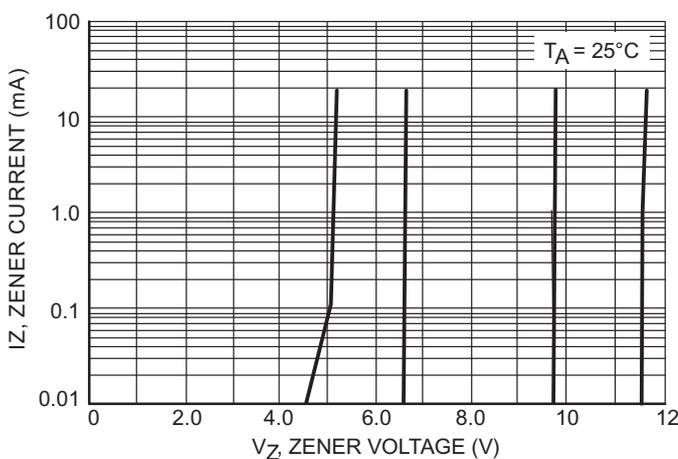


Figure 5. Zener Voltage versus Zener Current (V_Z Up to 12 V)

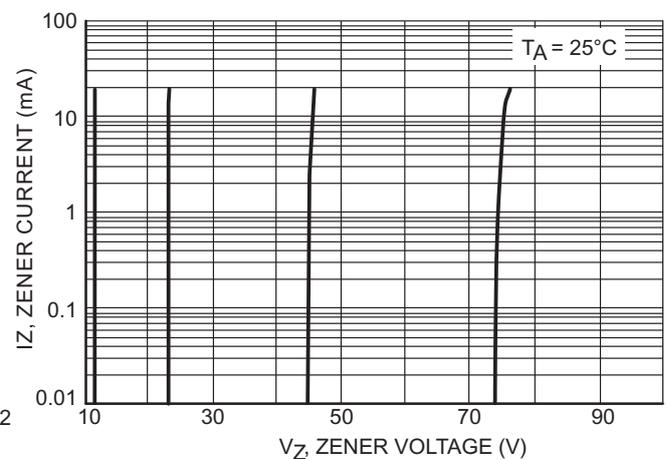


Figure 6. Zener Voltage versus Zener Current (12 V to 75 V)

Rating and characteristic curves (MM5Z2V4-Q1 thru MM5Z75V-Q1)

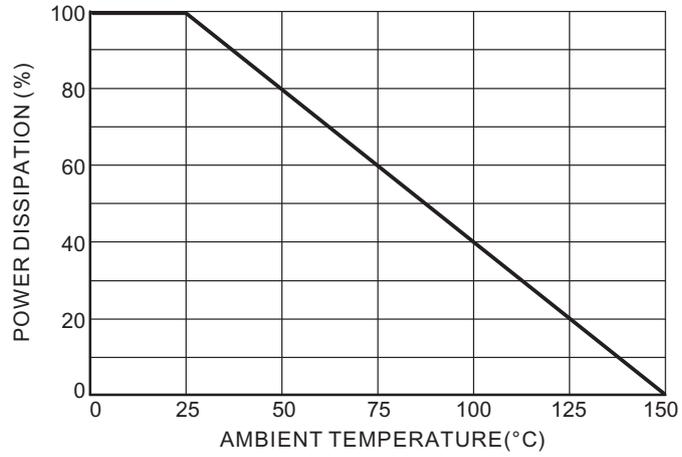


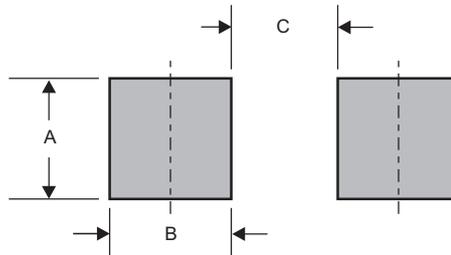
Figure 7. Steady State Power Derating

MM5Z2V4-Q1 THRU MM5Z75V-Q1

Pinning information

Pin	Simplified outline	Symbol
Pin1 cathode Pin2 anode		

Suggested solder pad layout

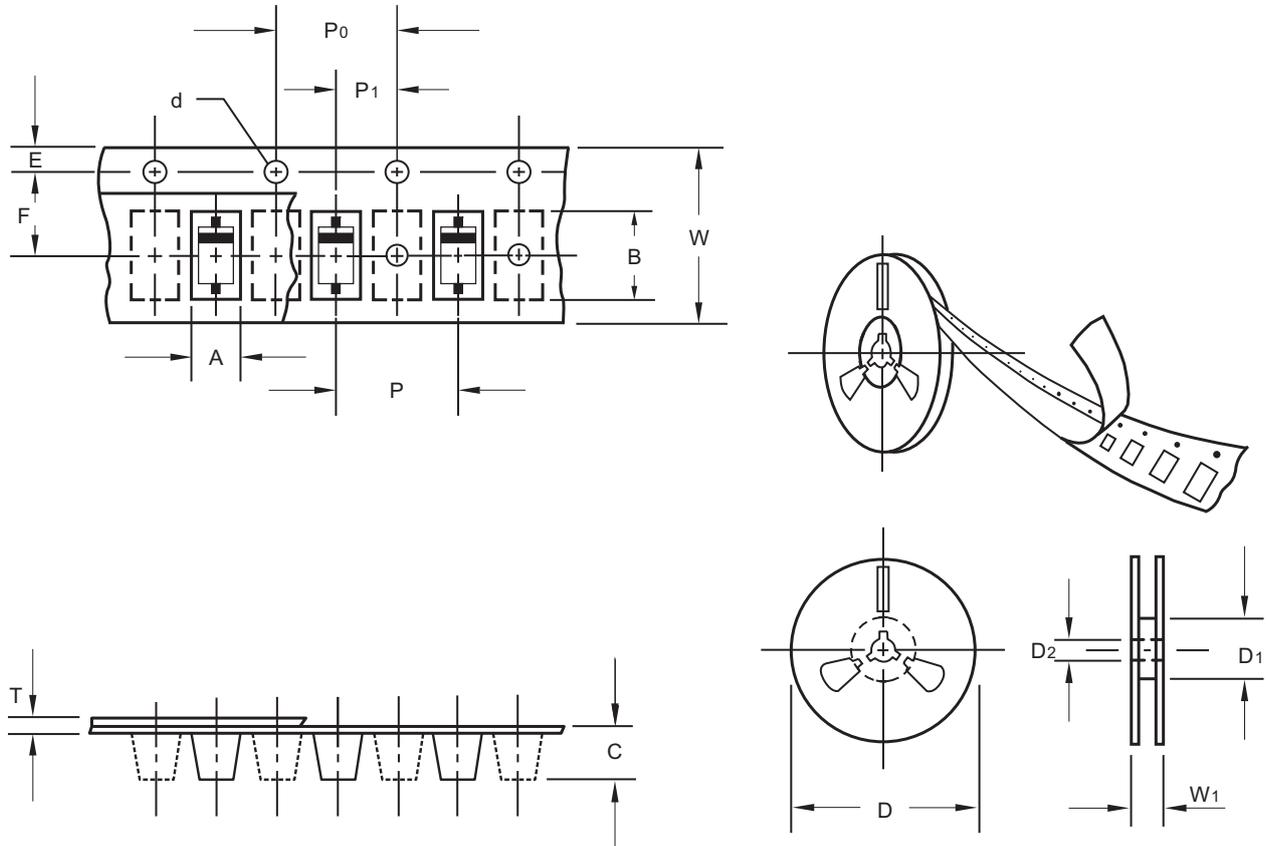


Dimensions in inches and (millimeters)

PACKAGE	A	B	C
SOD-523FL	0.032 (0.80)	0.024 (0.60)	0.044 (1.10)

MM5Z2V4-Q1 THRU MM5Z75V-Q1

Packing information



unit:mm

Item	Symbol	Tolerance	SOD-523FL
Carrier width	A	0.1	0.90
Carrier length	B	0.1	1.94
Carrier depth	C	0.1	0.76
Sprocket hole	d	0.1	1.50
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D1	min	50.00
Feed hole diameter	D2	0.2	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	9.50

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

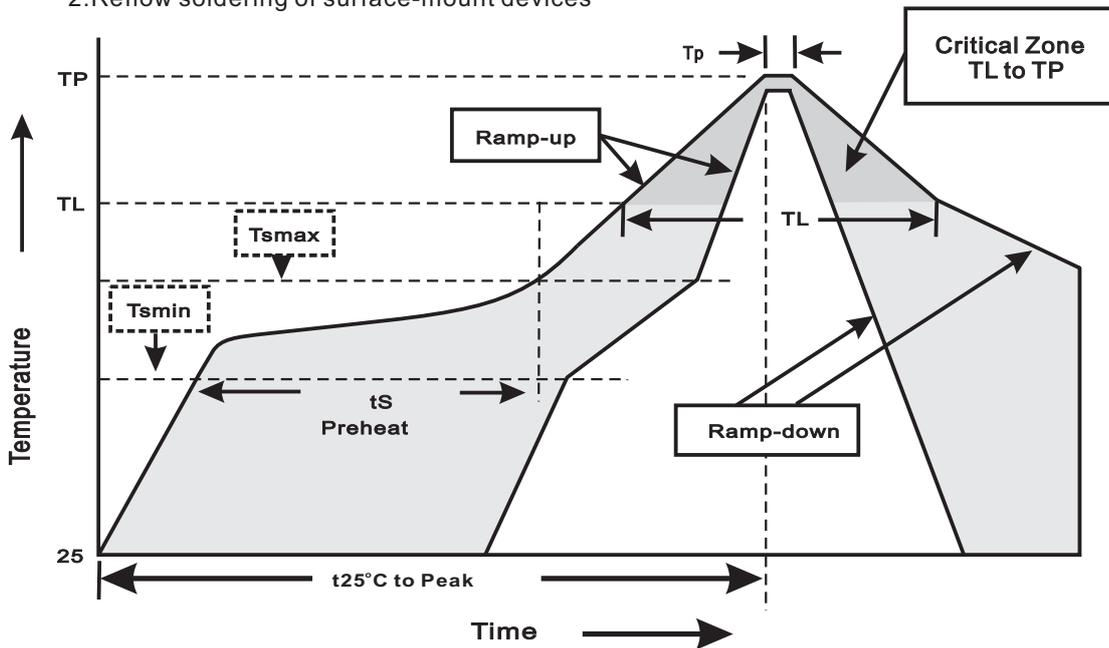
MM5Z2V4-Q1 THRU MM5Z75V-Q1

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-523FL	7"	3,000	2.0	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(TL to TP)	<3°C/sec
Preheat -Temperature Min(T Amin) -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

MM5Z2V4-Q1 THRU MM5Z75V-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. High Temperature Reverse Bias	Vz=Vz Nom*80% (Tj=150°C)Test Duration:1000hrs	JESD22-A108
3. High Temperature Storage Life	Ta=125°C Test Duration: 1000hrs	JESD22 A-103
4. Temperature Cycle	-55°C (15min) to 150°C (15min)Test Cycles: 1000cycles	JESD22 A-104
5. Autoclave	P=2atm Ta=121°C RH=100% Test Duration:96hrs	JESD22 A-102
6. Solderability	245±5°C for 5sec	J-STD-002
7. Moisture Resistance	Ta=85°C/85% Relative humidity Test Duration:1000hrs	MIL-STD-750E METHOD 1021.2
8. Resistance To Solder Heat	260±5°C for 10sec	JESD22 B-106
9. High Temperature High Humidity Reverse Bias	Ta=85°C, 85%RH, with device reverse biased at 80% of rated breakdown voltage up to a maximum of 100V or limit of chamber Test Duration:1000hrs	JESD22-A101