SHARP

No. RD-98Y08

RELIABILITY TEST REPORT

Product Type : Smart voltage 32Mbit Flash Memory

Model No. : LH28F320S3NS

Package : 56Pin SSOP (SSOP056-P-0600)

Date : NOV. 10 , 1998

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1. Quality Assurance And Reliability Test During New Product Development

New product development begins with establishing reliability targets during the planning stage. During this stage the end applications functions and requirements are also considered in addition to the reliability targets.

Quality and reliability are built into the product from the start by having design and reliability review sessions in the development and design stages.

This insures that quality and reliability levels are maintained at the preproduction and mass production stages.

2. Reliability Test Methods

Reliability tests should always have good reproducibility. Thus, reliability tests for IC devices are based upon standardized test methods. Such uniform testing standards include those established by JIS(Japanese Industrial Standard) MIL-STD(U.S.MILitary Standard), EIAJ(Electronic Industries Association of Japan) and IEC(International Electrotechnical Commission). Sharp has based its own testing methods on these standards.

3. Evaluation Results

The results attached show that Sharp has met the high quality and reliability targets which are required by the above standards.

Note ; This evaluation has been performed upon a representative product which is selected from a series of related products with the same basic design, all packaged in the same package type.

Therefore, these evaluation results are applicable for the following Sharp models:

LH28F320S3NS

4. Other Considerations

Please confirm that the specifications of this product meet the requirements of the applications.

1-1. ENDURANCE TEST-1

No.	Test	Conditions	Reference Standards	Number of Samples	Number of Failures /Test Time			LTPD
					240h	500h	1000h	
1	High Temperature Operation	Ta=125℃ Vpp/Vcc=4.0V 1000h	JIS C 7022:B-1 MIL-STD-883C 1005.6	153	0	0	0	1.5%
					240h	500h	1000h	
2	High Temperature Storage	Ta=140℃ 1000 h	JIS C 7022:B-3 MIL-STD-883C 1008.2	45	0	0	0	5%
					240h	500h	1000h	
3	Low Temperature Storage	Ta=-65℃ 1000h	JIS C 7022:B-4	11	0	0	0	20%
					240h	500h	1000h	
4	High Temp. High Humi. Storage	Ta=60℃,90%RH 1000h	JIS C 7022:B-5	22	0	0	0	10%
					240h	500h	1000h	
5	High Temp. High Humi. Bias	Ta=85℃,85%RH Vpp/Vcc=3.6V 1000h	JIS C 7022:B-5	76	0	0	0	3%

1-2. ENDURANCE TEST-2

No.	Test	Conditions	Reference Standards	Number of Samples	Number Of Failures	LTPD
6	Thermal Shock	Ta=-65℃(5min)～150℃(5min) 100cyc.	JIS C 7022:A-3 MIL-STD-883C 1011.7	45	0	5%
7	Temperature Cycling	Ta=-65℃(30min)～150℃(30min) 500cyc.	JIS C 7022:A-4 MIL-STD-883C 1010.7	76	0	3%
8	Temperature & Humidity Cycling	Ta=-10℃～65℃,90～95%RH 1cyc./24h 10cyc.	JIS C 7022:A-5 MIL-STD-883C 1004.7	22	0	10%
9	Salt Atmosphere	Salt Concentration=5wt% Salt Fog Temp.=35℃ Spray Rate=10～50g/m^2/d 24h	MIL-STD-883C 1009.7	22	0	10%

CRITERIA

No.1 ～ 8 : To maintain electrical characteristics within the limits established in the specifications of each device.

No.9 : To maintain electrical characteristics within the limits established in the specifications of each device. There is no evidence of damage to the body material or lead finish of each device. All package marking is remain visible to the naked eye.

1-3. ENDURANCE TEST-3

No.	Test	Conditions	Reference Standards	Number of Samples	Number of Failures	LTPD
10	[Series Test] Baking ↓ Moisture Absorption ↓ I.R Soldering ↓ PCT	Ta=150℃ 20h Ta=30℃,70% 96h Highest Temp.=240℃ 230℃~240℃, 15s Ta=121℃, 100%RH, No Bias 2×10^5Pa{2atm} 100h	EIAJ ED-4701:B-101	22	0 0	10%

CRITERIA

No.10 : To maintain electrical characteristics within the limits established in the specifications of each device. There is no evidence of damage to the body material(i.e. Package cracking).

2. Erase/Write Cycling Test

No.	Test	Conditions	Number of Cycles	Number of Samples	Number Of Failures	Failure Rate	Note
1	Erase/ Write Cycling	Ta=0,70℃	10k	520	0	28 DPM/Block	Confidence Level=60%
			100k		0	110 DPM/Block	

CRITERIA

No.1 : To maintain electrical characteristics within the limits established in the specifications of each device.

3. MECHANICAL TEST

No.	Test	Conditions	Reference Standards	Number of Samples	Number of Failures	LTPD
1	Vibration	100～2000～100Hz, 4min 200m/s^2{20G} X,Y,Z each 4times, total 48min.	JIS C 7022:A-10 MIL-STD-883C 2007.1	11	0	20%
2	Shock	15000m/s^2{1500G} 0.5ms, ±X,±Y,±Z each 3 times	JIS C 7022:A-7 MIL-STD-883C 2002.3	11	0	20%
3	Acceleration	200000m/s^2{20000G} ±X,±Y,±Z each 1 min.	JIS C 7022:A-9 MIL-STD-883C 2001.2	11	0	20%
4	Terminal Strength (Bending)	A specified load ※ is applied to the tip of each lead is bent once through a 90° arc and back. ~~0.125, 0.25~~, 0.5, ~~1.25~~N 1time	JIS C 7022:A-11 MIL-STD-883C 2004.5	5	0	50%
5	Terminal Strength (Tension)	A specified load ※ is applied in a direction parallel to the lead axis. ~~0.25, 0.5~~, 1, ~~2.5~~N 10s	JIS C 7022:A-11 MIL-STD-883C 2004.5	5	0	50%
6	Solderability	230℃ 5s Used with rosin flux	JIS C 7022:A-2 MIL-STD-883C 2003.5	11	0	20%

※ The specified load is determined by nominal cross section.

CRITERIA

No.1,2,3 :To maintain electrical characteristics within the limits established in the specifications of each device.

No.4,5 :There is no evidence of damage to the body. There is no broken or cracked lead (terminals).

No.6 :Lead coverage of at least 95% with a continuous solder coating. Pinholes and voids are not concentrated in one area and exceed 5% of the total area.

3. MISCELLANEOUS

No.	Test	Conditions	Reference Standards	Number of Samples	Number of Failures	LTPD
1	Permanence of Marking	20～25℃, Brushing 5 times after dipping 10 minutes	EIAJ ED-4701:C-121 (Solvent):Acetone, Butyl acetate, Isopropyl alcohol, Ethyl alcohol	11(each)	0	20%

No.	Test	Conditions	Reference Standards	Number Of Samples	Conditions	ESD/Latch-up Strength			
						≧0.5kV	≧1.0kV	≧1.5kV	≧2.0kV
2	Electrostatic discharges	C=100pF R=1.5kΩ	MIL-STD 883C Method 3015	3(each)	GND+				○
					GND−				○
					VCC+				○
					VCC−				○
						≧40mA	≧60mA	≧80mA	≧100mA
3	Latch-up	Current application test tp=10ms, toff=500ms VccMAX	EIAJ ED-4701-1 C-113	3(each)	+				○
					−				○

"○" Pass, "×" NG, "−" No measurement

CRITERIA

No.1 : There is no evidence of damage to the device and package marking which are no missing in whole or in part.

No.2 : To maintain electrical characteristics within the limits established in the specifications of each device.

No.3 : No latch-up occurs.

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