QRFL9902
QUALIFICATION REPORT

M29W800A T6X-U35:
8 Mbit (x8/x16) Single Supply Flash Memory

INTRODUCTION

The M29W800A is an 8 Mbit Single Supply (3V) Flash memory organized as 1 MByte of 8 bits each or 512 KWord of 16 bits each. It can be programmed and erased in-system or in standard EPROM programmers.

The M29W800A is manufactured with the STMicroelectronics advanced CMOS 0.35 micron T6X-U35 process, especially developed for Flash memory products. The memory features a fast access time, low power consumption in all operations (Standby, Read, Erase and Program) and an endurance of 100,000 Program/Erase cycles per block.

Qualification Report History

- February 1999: Catania M5 Diffusion Line, TSOP48 (12 x 20mm) package
- February 1999: Agrate R1 Diffusion Line, TSOP48 (12 x 20mm) package
- July 1999: M5 & R1 Diffusion Lines, FBGA48 (9 x 6mm) package
- August 1999: M5 & R1 Diffusion Lines, SO44 package

ST recognises that the quality of a product must be built-in during the design, material procurement, manufacturing and testing. Also that the reliability must be demonstrated before the product is released to full mass production. The qualification of new products and the certification of new processes is a rigorous task undertaken by Quality and Reliability professionals, to ensure stable products and processes capable of fully meeting customer requirements.

A key step of this activity is the Design Review where we assure that,

- adequate and realistic product specifications have been developed;
- design and layout rules, as documented in the Design Rules Manual, have been respected;
- critical performance parameters and process variables have been identified;
- previously untested design techniques or manufacturing processes are recognised;
- manufacturability concerns are identified;
- comprehensive and efficient qualification programs are defined.

Product Qualification is made on all new products and on new packages. Qualification is also remade on existing products when there are major changes to the design or manufacturing. The tests performed are tailored to the parameters affected by the major change or the combinations of new die or new package to be evaluated.

The results of the tests for this Flash memory are on the attached pages of this qualification report.

Director of
Memory Products Group
Quality Control & Reliability

Attilio PANCHIERI

Table 1. Revision History

Date	Revision Details
May 1999	First Issue
11/16/99	Added FBGA Package Qualification Data. Added SO Package Qualification Data.

Table 2. TSOP48 (12 x 20mm) Plastic Package Related Tests, Catania M5 Diffusion Line

Sub-group	Test Procedure	MIL-STD-883 Procedure	Test Conditions	Result			Note
				Lots	Samp.	Fail	
1	Phisical Dimensions Coplanarity TSOP48 Package	2016	Published Data Published Data				2 2
2	Bond Strenght	2011					2
3	Die Attach Strength	2019 or 2027					2
4	Radiography	2012		1	45	0	
5	Internal Visual and Mechanical	2014		1	5	0	
6	Solderability TSOP48 Package	2003	215°C, 3 sec, Precondition, 8 hrs, Steam aging				2
7	Resistance to Solvents	2015	4 Solvent Solutions				2
8	Solder Coating Thickness and Compositions	(Note 1)	5 µm min Sn/Pb 85/15				2
9	Resistance to Surface Mounting TSOP48 Package: 1. Drying 2. Temperature, Humidity Exposure 3. 3 IR Cycles Exposure 4. Visual Inspection 5. Delamination Inspection by Acustic Microscopy (SAM) 6. Electrical Test	(Note 1)	 125°C, 24 hrs 30°C, RH = 60%, 192 hrs T_{PEAK} = 235°C ± 5°C 40 x	1	15	0	

Note: 1. According to ST specification.
2. Results for similarity, from standard production monitor.

Table 3. TSOP48 (12 x 20mm) Plastic Package - Die Related Tests, Catania M5 Diffusion Line

Sub-group	Test Procedure	MIL-STD-883 Procedure	Test Conditions	Results			Note
				Lots	Samp.	Fail	
1	Operating Life Test	1005	140°C, V_{CC} = 4.7V, – 168 hrs – 500 hrs – 1000 hrs	1	 76 76 76	 0 0 0	1
2	Low Temperature Operating Life Test	1005	–40°C, V_{CC} = 4.7V, – 168 hrs – 500 hrs – 1000 hrs	1	 32 32 32	 0 0 0	
3	Retention Bake	1008	250°C – 168 hrs – 500 hrs – 1000 hrs – 2000 hrs	3	 154 154 154 154	 0 0 0 0	2,3
4	Write/Erase Cycling		10,000 cycles 50,000 cycles 100,000 cycles	1	111 111 111	0 0 0	2
5	Retention Bake (after 100k cycles)		250°C – 168 hrs – 500 hrs – 1000 hrs	1	 32 32 32	 0 0 0	2,3
6	Temperature, Humidity, Bias	CECC 90,000	85°C, RH = 85%, V_{CC} = 3.6V, – 168 hrs – 500 hrs – 1000 hrs	1	 60 60 60	 0 0 0	1,3
7	Temperature Cycling	1010C	–65 to 150°C, – 100 cycles – 500 cycles – 1000 cycles	1	 60 60 60	 0 0 0	1,3
8	Pressure Pot		121°C, 2 Atm, RH = 100%, – 96 hrs – 168 hrs – 240 hrs	1	 60 60 60	 0 0 0	1
9	HAST	CECC 90,000	130°C, RH = 85%, V_{CC} = 3.6V, – 96 hrs – 168 hrs – 240 hrs	1	 25 25 25	 0 0 0	1,3

Note: 1. Samples previously submitted to preconditioning flow for Surface Mounting devices according to the Package Related tests (previous page).
2. Test performed on CDIP48 package.
3. Data applies by similarity from the M29W008A. Results come from the relevant Qualification Report.

Table 4. TSOP48 (12 x 20mm) Plastic Package Related Tests, Agrate R1 Diffusion Line

Sub-group	Test Procedure	MIL-STD-883 Procedure	Test Conditions	Result			Note
				Lots	Samp.	Fail	
1	Phisical Dimensions Coplanarity TSOP48 Package	2016	Published Data Published Data				2 2
2	Bond Strenght	2011					2
3	Die Attach Strength	2019 or 2027					2
4	Radiography	2012		1	45	0	3
5	Internal Visual and Mechanical	2014		1	5	0	3
6	Solderability TSOP48 Package	2003	215°C, 3 sec, Precondition, 8 hrs, Steam aging				2
7	Resistance to Solvents	2015	4 Solvent Solutions				2
8	Solder Coating Thickness and Compositions	(Note 1)	5 µm min Sn/Pb 85/15				2
9	Resistance to Surface Mounting TSOP48 Package: 1. Drying 2. Temperature, Humidity Exposure 3. 3 IR Cycles Exposure 4. Visual Inspection 5. Delamination Inspection by Acustic Microscopy (SAM) 6. Electrical Test	(Note 1)	 125°C, 24 hrs 30°C, RH = 60%, 192 hrs T_{PEAK} = 235°C ± 5°C 40 x	1	15	0	3

Note: 1. According to ST specification.
2. Results for similarity, from standard production monitor.
3. Results for similarity, from M29W800A M5 diffusion line.

Table 5. TSOP48 (12 x 20mm) Plastic Package - Die Related Tests, Agrate R1 Diffusion Line

Sub-group	Test Procedure	MIL-STD-883 Procedure	Test Conditions	Results			Note
				Lots	Samp.	Fail	
1	Operating Life Test	1005	140°C, V_{CC} = 4.7V, – 168 hrs – 500 hrs – 1000 hrs	1	 64 64 64	 0 0 0	1
2	Low Temperature Operating Life Test	1005	–40°C, V_{CC} = 4.7V, – 168 hrs – 500 hrs – 1000 hrs	1	 32 32 32	 0 0 0	4
3	Retention Bake	1008	150°C – 168 hrs – 500 hrs – 1000 hrs	1	 60 60 60	 0 0 0	3
4	Retention Bake	1008	250°C – 168 hrs – 500 hrs – 1000 hrs	3	 180 180 180	 0 0 0	3
5	Write/Erase Cycling		10,000 cycles 50,000 cycles 100,000 cycles	1	56 56 56	0 0 0	2
6	Retention Bake (after 100k cycles)		250°C – 168 hrs – 500 hrs – 1000 hrs	3	 135 135 135	 0 0 0	3
7	Temperature, Humidity, Bias	CECC 90,000	85°C, RH = 85%, V_{CC} = 3.6V, – 168 hrs – 500 hrs – 1000 hrs – 2000 hrs	1	 40 40 40 40	 0 0 0 0	1,3
8	Temperature Cycling	1010C	–65 to 150°C, – 100 cycles – 500 cycles – 1000 cycles	1	 100 100 100	 0 0 0	1,3
9	Pressure Pot		121°C, 2 Atm, RH = 100%, – 96 hrs – 168 hrs – 240 hrs	1	 60 60 60	 0 0 0	1,4
10	HAST	CECC 90,000	130°C, RH = 85%, V_{CC} = 3.6V, – 96 hrs – 168 hrs	1	 15 15	 0 0	1,3

Note: 1. Samples previously submitted to preconditioning flow for Surface Mounting devices according to the Package Related tests (previous page).
2. Test performed on CDIP48 package.
3. Data applies by similarity from the M29W008A. Results come from the relevant Qualification Report.
4. Data applies by similarity from the M29W800A M5 diffusion line.

Table 6. SO44 Plastic Package Related Tests, R1 and M5 Diffusion Lines

Sub-group	Test Procedure	MIL-STD-883 Procedure	Test Conditions	Result			Note
				Lots	Samp.	Fail	
1	Phisical Dimensions Coplanarity SO44 Package	2016	Published Data Published Data				2 2
2	Bond Strenght	2011					2
3	Die Attach Strength	2019 or 2027		2	10	0	
4	Radiography	2012		2	90	0	
5	Internal Visual and Mechanical	2014		2	10	0	
6	Solderability SO44 Package	2003	215°C, 3 sec, Precondition, 8 hrs, Steam aging				2
7	Resistance to Solvents	2015	4 Solvent Solutions				2
8	Solder Coating Thickness and Compositions	(Note 1)	5 µm min Sn/Pb 85/15				2
9	Resistance to Surface Mounting SO44 Package: 1. Drying 2. Temperature, Humidity Exposure 3. 3 IR Cycles Exposure 4. Visual Inspection 5. Delamination Inspection by Acustic Microscopy (SAM) 6. Electrical Test	(Note 1)	 125°C, 24 hrs 30°C, RH = 60%, 192 hrs T_{PEAK} = 235°C ± 5°C 40 x	2	30	0	

Note: 1. According to ST specification.
2. Results for similarity, from standard production monitor.

Table 7. SO44 Plastic Package - Die Related Tests, R1 and M5 Diffusion Lines

Sub-group	Test Procedure	MIL-STD-883 Procedure	Test Conditions	Results			Note
				Lots	Samp.	Fail	
1	Operating Life Test	1005	140°C, V_{CC} = 4.7V, – 168 hrs – 500 hrs – 1000 hrs	1	 64 64 64	 0 0 0	1,3
2	Low Temperature Operating Life Test	1005	–40°C, V_{CC} = 4.7V, – 168 hrs – 500 hrs – 1000 hrs	1	 32 32 32	 0 0 0	3
3	Retention Bake	1008	150°C – 168 hrs – 500 hrs – 1000 hrs	1	 60 60 60	 0 0 0	2
4	Retention Bake	1008	250°C – 168 hrs – 500 hrs – 1000 hrs	3	 180 180 180	 0 0 0	2
5	Write/Erase Cycling		10,000 cycles 50,000 cycles 100,000 cycles	1	56 56 56	0 0 0	3
6	Retention Bake (after 100k cycles)		250°C – 168 hrs – 500 hrs – 1000 hrs	3	 135 135 135	 0 0 0	2
7	Temperature, Humidity, Bias	CECC 90,000	85°C, RH = 85%, V_{CC} = 3.6V, – 168 hrs – 500 hrs – 1000 hrs – 2000 hrs	1	 40 40 40 40	 0 0 0 0	1,2
8	Temperature Cycling	1010C	–65 to 150°C, – 100 cycles – 500 cycles – 1000 cycles	1	 60 60 60	 0 0 0	1
9	Pressure Pot		121°C, 2 Atm, RH = 100%, – 96 hrs – 168 hrs – 240 hrs	1	 60 60 60	 0 0 0	1
10	HAST	CECC 90,000	130°C, RH = 85%, V_{CC} = 3.6V, – 96 hrs – 168 hrs	1	 15 15	 0 0	1,2

Note: 1. Samples previously submitted to preconditioning flow for Surface Mounting devices according to the Package Related tests (previous page).
2. Data applies by similarity from the M29W008A. Results come from the relevant Qualification Report.
3. Data applies by similarity from the M29W800A M5 diffusion line.

Table 8. FBGA48 (9 x 6mm) Package Related Tests, Asat Assembly Line

Sub-group	Test Procedure	MIL-STD-883 Procedure	Test Conditions	Result			Note
				Lots	Samp.	Fail	
1	Phisical Dimensions Coplanarity FBGA48 Package	2016	Published Data Published Data	1 1	5 5	0 0	
2	Bond Strenght	2011		1	10	0	
3	Die Attach Strength	2019 or 2027		1	2	0	
4	Radiography	2012		1	45	0	
5	Internal Visual and Mechanical	2014		1	5	0	
6	Solderability Package	2003					1
7	Resistance to Solvents	2015					2
8	Solder Coating Thickness and Compositions						3
9	Resistance to Surface Mounting FBGA48 Package: 1. Drying 2. Temperature, Humidity Exposure 3. 3 IR Cycles Exposure 4. Visual Inspection 5. Delamination Inspection by Acustic Microscopy (SAM) 6. Electrical Test		 125°C, 24 hrs 85°C, RH = 85%, 169 hrs T_{PEAK} = 235°C ± 5°C 40 x	1	15	0	

Note: 1. Not applicable, as lead frame do not exist.
2. Not applicable because of laser marking.
3. Not applicable, as ball composition is: Sn/Pb/Ag 62/36/2.

Table 9. FBGA48 (9 x 6mm) Package Related Tests, Asat Assembly Line

Sub-group	Test Procedure	MIL-STD-883 Procedure	Test Conditions	Results			Note
				Lots	Samp.	Fail	
1	Operating Life Test	1005	140°C, V_{CC} = 4.7V, – 168 hrs – 500 hrs – 1000 hrs	1	 64 64 64	 0 0 0	1,3
2	Low Temperature Operating Life Test	1005	–40°C, V_{CC} = 4.7V, – 168 hrs – 500 hrs – 1000 hrs	1	 32 32 32	 0 0 0	3
3	Retention Bake	1008	150°C – 168 hrs – 500 hrs – 1000 hrs	2	 100 100 100	 0 0 0	1
4	Retention Bake	1008	250°C – 168 hrs – 500 hrs – 1000 hrs	3	 180 180 180	 0 0 0	2
5	Write/Erase Cycling		10,000 cycles 50,000 cycles 100,000 cycles	1	56 56 56	0 0 0	3
6	Retention Bake (after 100k cycles)		250°C – 168 hrs – 500 hrs – 1000 hrs	3	 135 135 135	 0 0 0	2
7	Temperature, Humidity, Bias	CECC 90,000	85°C, RH = 85%, V_{CC} = 3.6V, – 168 hrs – 500 hrs	2	 120 120	 0 0	1
8	Temperature Cycling	1010C	–40 to 125°C, – 500 cycles – 1000 cycles	2	 120 120	 0 0	1
9	Pressure Pot		121°C, 2 Atm, RH = 100%, – 96 hrs – 168 hrs – 240 hrs	3	 180 180 180	 0 0 0	1
10	HAST	CECC 90,000	130°C, RH = 85%, V_{CC} = 3.6V, – 96 hrs – 168 hrs	1	 15 15	 0 0	1,2

Note: 1. Samples previously submitted to preconditioning flow for Surface Mounting devices according to the Package Related tests (previous page).
2. Data applies by similarity from the M29W008A. Results come from the relevant Qualification Report.
3. Data applies by similarity from the M29W800A M5 diffusion line.

If you have any questions or suggestion concerning the matters raised in this document please send them to the following electronic mail address:

ask.memory@st.com (for general enquiries)

Please remember to include your name, company, location, telephone number and fax number.