AMS (Analog, MEMS & Sensor Group)

General Purpose Analog & RF Division

Power Management

Quality and Reliability

REL.6088-869-2019

Reliability Evaluation Report

New Assembly Plant

SO 16 Narrow in ST SHENZHEN-CHINA

TV1: M41T94MQ6F (B6AA61)
TV2: M40SZ100WMQ6F (B6AA61)

General Information	
Product Lines	B6AA61
Product Description	Serial real-time clock (RTC)
P/N	*M41T94MQ6F* *M40SZ100WMQ6F*
Product Group	*AMS (Analog MEMS & Sensor Group)*
Product division	*General Purpose Analog & RF Division* *POWER MANAGEMENT*
Package	*SO 16 Narrow*
Silicon Process technology	*HCMOS4*

Locations	
Wafer fab	*Singapore 6*
Assembly plant	*ST SHENZHEN -CHINA 3068*
Reliability Lab	*Catania Reliability LAB*

Version	Date	Pages	Created by	Comment
1.0	November 2019	7	Antonio Russo	Intermediate Report

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1 APPLICABLE AND REFERENCE DOCUMENTS

Document reference	Short description
JESD47	Stress-Test-Driven Qualification of Integrated Circuits

2 RELIABILITY EVALUATION OVERVIEW

2.1 OBJECTIVES

In order to qualify the SO16 narrow in the new assembly plant ST SHENZHEN-CHINA, we have requested three different assy lots of B6AA61 as requested by JEDEC JESD47 for these changes

2.1 CONCLUSION

Qualification Plan requirements will be fulfilled without exception. Up to now, we have completed the reliability trials on the 1st assy lot. It is stressed that intermediate reliability tests have shown that the devices behave correctly against environmental tests (no failure). Moreover, the stability of electrical parameters during the accelerated tests demonstrates the ruggedness of the products and safe operation, which is consequently expected during their lifetime.
The reliability trials on the 2nd and 3rd lot are running. More details are available below in test and results summary.

3 CHANGE DESCRIPTION

Qualification of new Assembly Plant ST SHENZHEN-CHINA for SO 16 Narrow

4 CONSTRUCTION NOTE

	B6AA61
Wafer/Die fab. Information	
Wafer fab manufacturing location	Singapore 6
Technology	HCMOS4
Die finishing back side	POLISHED SILICON
Die size	2010 x 4770 um
Passivation type	PSG + NITRIDE + PIX
Assembly information	
Assembly site	**ST SHENZHEN -CHINA**
Package description	SO 16 Narrow
Mold Compound	Epoxy
Frame	FRAME SO 16L 94x200 SHD
Die attach	GLUE LOCTITE ABLESTIK
Bond Wire	1.0mil Cu

5 TESTS RESULTS SUMMARY

5.1 Test vehicle

Lot #	Commercial product	Rawline	Package	Product Line
1	M41T94MQ6F8	9KQ7*B6AA94Z	SO 16	B6AA61
2	M41T94MQ6F8	9KQ7*B6AA94Z		
3	M40SZ100WMQ6F	9KQ7*B6AAZ1W		

5.2 Test plan and results summary

Test	PC	Std ref.	Conditions	ss	Steps	SS			Note
						Lot 1	Lot 2	Lot 3	
Die Oriented Reliability trials									
HTSL	N	JESD22 A-103	Ta = 150°C	270	168 H	0/90	0/90	Running	
					500 H	0/90	Running		
					1000 H	0/90			
Package Oriented Reliability trials									
PC	-	JESD22 A-113	Drying 24 H @ 125°C Store 168 H @ Ta=85°C Rh=85% Oven Reflow @ Tpeak=260°C 3 times	540	Final	Pass	Pass	Pass	
AC	Y	JESD22 A-102	Pa=2Atm / Ta=121°C		96 H	0/90	Running	Running	
					168 H	0/90			
TC	Y	JESD22 A-104	Ta = -65°C to 150°C		100cy	0/90	Running	Running	
					500 cy	0/90			
					1000 cy	0/90			
Package Assembly Integrity trials									
WBP	-	M2011	30 wires, characterization	15	Final	Pass CPK>1.66	Pass CPK>1.66	Pass CPK>1.66	
WBS	-	JESD22-B116	30 balls, characterization	15	Final	Pass CPK>1.66	Pass CPK>1.66	Pass CPK>1.66	
Solderability	-	JESD22-B102	>95% lead coverage	5	Final	Pass	Running	Running	

6 ANNEXES

6.1 Pin connections

Please refer to product datasheet

6.2 Package Mechanical data

Please refer to product datasheet

7 TEST DESCRIPTION

Test name	Description	Purpose
Die Oriented		
HTSL High Temperature Storage Life	The device is stored in unbiased condition at the max. temperature allowed by the package materials, sometimes higher than the max. operative temperature.	To investigate the failure mechanisms activated by high temperature, typically wire-bonds solder joint ageing, data retention faults, metal stress-voiding.
Package Oriented		
PC Preconditioning	The device is submitted to a typical temperature profile used for surface mounting devices, after a controlled moisture absorption.	As stand-alone test: to investigate the moisture sensitivity level. As preconditioning before other reliability tests: to verify that the surface mounting stress does not impact on the subsequent reliability performance. The typical failure modes are "pop corn" effect and delamination.
AC Auto Clave (Pressure Pot)	The device is stored in saturated steam, at fixed and controlled conditions of pressure and temperature.	To investigate corrosion phenomena affecting die or package materials, related to chemical contamination and package hermeticity.
TC Temperature Cycling	The device is submitted to cycled temperature excursions, between a hot and a cold chamber in air atmosphere.	To investigate failure modes related to the thermo-mechanical stress induced by the different thermal expansion of the materials interacting in the die-package system. Typical failure modes are linked to metal displacement, dielectric cracking, molding compound delamination, wire-bonds failure, die-attach layer degradation.
THB Temperature Humidity Bias	The device is biased in static configuration minimizing its internal power dissipation, and stored at controlled conditions of ambient temperature and relative humidity.	To evaluate the package moisture resistance with electrical field applied, both electrolytic and galvanic corrosion are put in evidence.
Other		
WBS Wire Bond Shear	A process in which an instrument uses a chisel shaped tool to shear or push a ball or wedge/stitch bond off the bonding surface. The force required to cause this separation is recorded and is referred to as the bond shear strength. The bond shear strength of a ball bond, when correlated to the diameter of the ball bond, is an indicator of the quality of the metallurgical bond between the ball bond and the die bonding surface metallization.	This test establishes a procedure for determining the strength of the interface between a ball bond and a package bonding surface. This strength measurement is extremely important in determining the integrity of the metallurgical bond which has been formed.
WBP Wire Bond Pull	The apparatus for this test shall consist of suitable equipment for applying the specified stress to lead wire or terminal as required in the specified test condition. A calibrated measurement and indication of the applied stress in grams force (gf) shall be provided by equipment capable of measuring stresses.	The purpose of this test is to measure bond strengths, evaluate bond strength distributions, or determine compliance with specified bond strength requirements of the applicable acquisition document.