Reliability Evaluation Report

New Assembly Plant

SC-Tianshui Huatian-China (TSHT)
SO 8 Narrow

TV: L4931ABD33 (LW33)

General Information	
Product Lines	LW3301
Product Description	Linear Voltage Regulator
P/N	*L4931ABD33*
Product Group	*AMS (Analog MEMS & Sensor Group)*
Product division	*General Purpose Analog & RF Division* *POWER MANAGEMENT*
Package	*SO 8 Narrow*
Silicon Process technology	*Bipolar*

Locations	
Wafer fab	*Singapore 6*
Assembly plant	*SC-Tianshui Huatian-China (TSHT)*
Reliability Trials	*PASS*

Version	Date	Pages	Created by	Approved by	Comment
1.0	November 2020	7	Antonio Russo	Giuseppe Lisi	Final 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

This report contains the reliability evaluation of L4931ABD33(LW33) SO 8 narrow in the new assembly plant SC-Tianshui Huatian-China (TSHT). The reliability evaluation has been performed on three different assy lots as requested by JEDEC JESD47 for this type of change (new assembly plant).

2.1 CONCLUSION

Qualification Plan requirements have been defined accordingly to JESD47. We have completed the reliability trials on all 3 assy lots and 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. More details are available below in test and results summary.

3 CHANGE DESCRIPTION

Qualification of new Assembly Plant SC-Tianshui Huatian-China (TSHT) for SO 8 Narrow

4 CONSTRUCTION NOTE

	B6AA61
Wafer/Die fab. Information	
Wafer fab manufacturing location	Singapore 6
Technology	Bipolar
Die finishing back side	CHROMIUM/NICKEL/GOLD
Die size	1770 x 1850 um
Passivation type	SiN (nitride)
Assembly information	
Assembly site	**SC-Tianshui Huatian-China (TSHT)**
Package description	SO 8 Narrow
Mold Compound	Epoxy
Frame	Pure Tin Plating Sn 100%
Bond Wire	1.3 mil Cu

5 TESTS RESULTS SUMMARY

5.1 Test vehicle

Lot #	Commercial product	Rawline	Package	Product Line
1	L4931ABD33	RPO7*LW33FC1	SO 8	LW3301
2				
3				

5.2 Test plan and results summary

Test	PC	Std ref.	Conditions	ss	Steps	SS Lot 1	SS Lot 2	SS Lot 3	Note
Die Oriented Reliability trials									
HTSL	N	JESD22 A-103	Ta = 150°C	240	168 H	0/80	0/80	0/80	2
					500 H	0/80	0/80	0/80	
					1000 H	0/80	0/80	0/80	
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	555	Final	Pass	Pass	Pass	
AC	Y	JESD22 A-102	Pa=2Atm / Ta=121°C	240	96 H	0/80	0/80	0/80	1
					168 H	0/80	0/80	0/80	
TC	Y	JESD22 A-104	Ta = -65°C to 150°C	240	100cy	0/80	0/80	0/80	1
					500 cy	0/80	0/80	0/80	
					1000 cy	0/80	0/80	0/80	
THB	Y	JESD22-A101	85 °C, 85 % RH, Vcc max	75	100cy	0/25	0/25	0/25	1
					500 cy	0/25	0/25	0/25	
					1000 cy	0/25	0/25	0/25	
Package Assembly Integrity trials									
WBP	-	M2011	30 wires, characterization	30	Final	Pass CPK>1.66	Pass CPK>1.66	Pass CPK>1.66	
WBS	-	JESD22-B116	30 balls, characterization	30	Final	Pass CPK>1.66	Pass CPK>1.66	Pass CPK>1.66	
Solderability	-	JESD22-B102	>95% lead coverage	15	Final	Pass	Pass	Pass	

Notes:
1. Preconditioning with soak per J-STD-020 at rated moisture sensitivity level prior to acceleration stress testing
2. Preconditioning without soak

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.

Test name	Description	Purpose
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.

Reliability Evaluation Report

HF4CMOS qualification in SO 8 assembled in TSHT TV: TS4990IDT (Q990)

General Information	
Product Lines	Q99001
Product Description	*Audio power amplifier*
P/N	*TS4990IDT*
Product Group	*AMS (Analog MEMS & Sensor Group)*
Product division	*CONDITIONING & INTERFACES*
Package	O7 SO 8
Silicon Process technology	*HF4CMOS*

Locations	
Wafer fab	*AM6F*
Assembly plant	*TSHT*
Reliability Lab	*TSHT Reliability lab* *Grenoble Reliability lab*

Version	Date	Pages	Created by	Approved by	Comment
1.0	Nov 2020	6	Claudine Larato	Jean-francois Sauty	Final Report

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1 APPLICABLE AND REFERENCE DOCUMENTS

Document reference	Short description
JESD47	Stress-Test-Driven Qualification of Integrated Circuits
AEC-Q100	Failure mechanism based stress test qualification for IC

2 RELIABILITY EVALUATION OVERVIEW

2.1 OBJECTIVES

This report contains the reliability evaluation of Q990 in SOT 8 assembled in TSHT. This report is a part of the overall reliability qualification plan of the following change:

- PCP : AMG_AGR_073488

2.1 CONCLUSION

All reliability tests have been completed with positive results. Neither functional nor parametric rejects were detected at final electrical testing. Based on the overall results obtained, Q990 product assembled in SO 8 in TSHT, has positively passed reliability evaluation.

3 CHANGE DESCRIPTION

HF4CMOS qualification in SO 8 assembled in TSHT.

	B6AA61
Wafer/Die fab. Information	
Wafer fab manufacturing location	AM6F
Technology	HF4CMOS
Die finishing back side	RAW SILICON
Die size	1460 x 2120 um
Assembly information	
Assembly site	**TSHT**
Package description	O7 SO8
Mold Compound	CEL-9220HF10TS(LS)
Frame	FRAME SO 8L 95x130 (A) Mtx HD SpAg
Bond Wire	1 mil PdCu MKE

4 TESTS RESULTS SUMMARY

4.1 Test vehicle

Lot #	Commercial product	Rawline	Package	Product Line
1	TS4990IDT	ASO7*Q990AR6	SO 8	Q99001
2				
3				

4.2 Test plan and results summary

Test	PC	Std ref.	Conditions	ss	Steps	SS	Note
						Lot 1	
Die Oriented Reliability trials							
HTSL	N	JESD22 A-103	Ta = 150°C	80	168 H	0/80	
					500 H	0/80	
					1000 H	0/80	
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	160	Final	Pass	
AC	Y	JESD22 A-102	Pa=2Atm / Ta=121°C	80	96 H	0/80	
TC	Y	JESD22 A-104	Ta = -65°C to 150°C	80	100cy	0/80	
					500 cy	0/80	

5 ANNEXES

5.1 Pin connections

Please refer to product datasheet

5.2 Package Mechanical data

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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.
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