

REL.6088-943-W-20

Quality and Reliability

# **Reliability Evaluation Report**

**QUALIFICATION of Plating outsourcing on TO220** 

### Shenzhen

General In	formation	[	Locations		
Product Lines	TV1: XL05 TV2: L317		Wafer fab	Singapore 6	
P/N Positive voltage regulators	TV1: L7805 TV2: LM217		Assembly plant	SHENZHEN	
Product Group	AMG		Reliability Lab	Catania Reliability LAB	
Product division	General Purpose Analog & RF Division				
Package	TO220DG / TO220SG				
Silicon Process technology	TV1: HBIP40V TV2: BIPOLAR				

#### **DOCUMENT INFORMATION**

Version	Date	Pages	Handled by	Comment
1	January 2020	8	Antonio Russo	Final Report



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#### **1 APPLICABLE AND REFERENCE DOCUMENTS**

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

### 2 GLOSSARY

DUT	Device Under Test
SS	Sample Size

### 3 RELIABILITY EVALUATION OVERVIEW OBJECTIVES

Purpose of activity to qualify new plating outsourcing for TO220DG and TO220SG assembled in SHENZHEN. Qualification activity have been performed on three assy lots of TO220SG and three assy lots of TO220DG as requested by JEDEC JESD47 for these types of changes.

# 4 CONCLUSION

Qualification plan has been fulfilled without exception. Reliability tests have shown that those devices behave correctly against environmental tests (no failure). Moreover, the stability of electrical parameters during the accelerated tests demonstrates the robustness of those products and safe operation, which is consequently expected during their lifetime.



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# 5 DEVICE CHARACTERISTIC

# 5.1 Change description

Qualification of new plating outsourcing for TO220 package in SHENZHEN.

# 5.2 Construction note

P/N	L7805	LM217				
Wafer/Die fab. information		-				
Wafer fab manufacturing location	Ang Mo I	Ang Mo Kio 6"				
Technology	HBIP40V	BIPOLAR				
Die finishing back side	Lapped S	Silicon				
Die size	1.320 X 1.630	2.410 X 1.920				
Passivation type	SiN (nit	SiN (nitride)				
Assembly information						
Assemby Site	SHENZ	SHENZHEN				
Package description	TO22	TO220				
Molding compound	Epox	Ероху				
Die attach material	Ерох	y				
Wires bonding materials/diameters	Cu 2r	Cu 2mil				



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### 6 TEST VEHICLE & TEST PLAN

Lot #	т.v.	Process/ Package	Product Line	Comments
3	L7805	TODDO	XL05	
3	LM217	10220	L317	



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					Steps		Failur	e/SS	
Test	PC	Std ref.	Conditions	SS	h=hours cy=cycles	L7805 TO220DG	LM217 TO220DG	L7805 TO220SG	LM217 TO220SG
Die Orientee	d Rel	iability Tr	ials		-				
					168 h	0/25	0/50	0/25	0/50
HTSL	Ν	JESD22 A-103	Ta=150°C	150	500 h	0/25	0/50	0/25	0/50
					1000 h	0/25	0/50	0/25	0/50
Package Or	riente	ed Reliabi	lity Trials		-				
		IESD33	Ta = 85°C,		168 h	0/25	0/50	0/25	0/50
THB	Y	A-101	RH=85%, BIAS +24V	150	500 h	0/25	0/50	0/25	0/50
					1000 h	0/25	0/50	0/25	0/50
		IECDOO			100 cy	0/25	0/50	0/25	0/50
TC	Υ	A-104	+150°C	150	500 cy	0/25	0/50	0/25	0/50
					1000 cy	0/25	0/50	0/25	0/50
AC	Y	JESD22 A-102	Pa=2Atm / Ta=121°C	150	96h	0/25	0/50	0/25	0/50
Package Assembly Integrity Trialss									
Solderability	-	JESD22- B102	>95% lead coverage	90	Final	Pass	Pass	Pass	Pass



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# 7 ANNEXES

# 7.1 Devices details

# 7.1.1 Pin connections

Refer to products datasheet

### 7.1.2 Package Mechanical data

Refer to products datasheet



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# 8 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				
<b>AC</b> 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.		
<b>TC</b> 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.		
<b>THB</b> 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.		