Reliability Report

QUALIFICATION PROCESS CHANGE FE

New DIE IN HBIP40,
Capacity Change from Oxide to junction

***TV:* LX0501 – L7805CV – TO220 SINGLE GAUGE**

General Information	
Product Line	LX0501
Product Description	Positive Voltage Regulator Ics
P/N	L7805CV
Product Group	IPD IPC
Product division	IND.& POWER CONV. Voltage Vregulator & Vref
Package	TO220 SG
Silicon Process technology	HBIP40

Locations	
Wafer fab	Ang Mo Kio (Singapore)
Assembly plant	ST Shenzhen
Reliability Lab	IPD Catania Reliability Lab
Reliability assessment	Pass

DOCUMENT INFORMATION

Version	Date	Pages	Prepared by	Approved by	Comment
1.0	MAY-2015	7	Vito Gisabella Giuseppe Giacopello	Giovanni Presti	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

3.1 Objectives

Following Divisional Commitments towards a continuous improvement philosophy, we have replaced the old Oxide Capacitor structure with the new integrated Junction Capacitor, as a consequence of an improved product quality.

TV: L7805CV, TO220 SG, HBIP40 (new integrated Junction Capacitor).

3.2 Conclusion

Qualification Plan requirements have been fulfilled without exception. It is stressed that 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.

4 DEVICE CHARACTERISTICS

4.1 Device description

The L78xx series of three-terminal positive regulators is available in several fixed output voltages, making it useful in a wide range of applications. These regulators can provide local on-card regulation, eliminating the distribution problems associated with single point regulation. Each type employs internal current limiting, thermal shutdown and safe area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 1 A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable

4.1 Construction note

	L7805CV-LX0501
Wafer/Die fab. information	
Wafer fab manufacturing location	Singapore Ang Mo Kio
Technology	HBIP40V
Die finishing back side	Cr/NiV/Au
Die size	1320, 1630 micron
Passivation type	P-Vapox/Nitride
Wafer Testing (EWS) information	
Electrical testing manufacturing location	Ang Mo Kio EWS
Tester	ETS 300
Assembly information	
Assembly site	Shenzhen B/E
Package description	TO220 SG
Molding compound	Epoxy
Frame material	Bare copper
Die attach material	PREFORM
Wires bonding materials/diameters	WIRE Cu D2
Final testing information	
Testing location	Shenzhen B/E

5 TESTS RESULTS SUMMARY

5.1 Test vehicle

Lot #	Package	Product Line	Comments
1	TO220 SG	LX0501	

5.2 Test plan and results summary

Test		Std ref.	Conditions	SS	Steps	Failure/SS 1°LOTTO	Note
Die Oriented Tests							
HTOL		JESD22 A-108	Tj = 125°C Vcc= +35V		168 H	0/77	
					500 H	0/77	
					1000 H	0/77	
HTSL		JESD22 A-103	Ta = 150°C		168 H	0/45	Engineering Evaluation
					500 H	0/45	
					1000 H	0/45	
Package Oriented Tests							
AC		JESD22 A-102	Pa=2Atm / Ta=121°C		96 H	0/77	
					168 H	0/77	Engineering Evaluation
TC		JESD22 A-104	Ta = -65°C to 150°C		100 CY	0/77	.
					200 CY	0/77	
					500 CY	0/77	
THB		JESD22 A-101	Ta = 85°C, RH = 85%, Vcc1= +24V		168 H	0/77	
					500 H	0/77	
					1000 H	0/77	
Other Tests							
ESD		ANSI/ESDA/JEDEC JS001	HBM +/- 2000V	3	Pass		
		ANSI/ESD S5.3.1	CDM 500V	3	Pass		

6 ANNEXES

6.1 Tests Description

Test name	Description	Purpose
Die Oriented		
HTOL High Temperature Bias	The device is stressed in static or dynamic configuration, approaching the operative max. absolute ratings in terms of junction temperature and bias condition.	To determine the effects of bias conditions and temperature on solid state devices over time. It simulates the devices' operating condition in an accelerated way. The typical failure modes are related to, silicon degradation, wire-bonds degradation, oxide faults.
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		
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 Test		
ESD Electro Static Discharge	The device is submitted to a high voltage peak on all his pins simulating ESD stress according to different simulation models. CDM: Charged Device Model HBM: Human Body Model	To classify the device according to his susceptibility to damage or degradation by exposure to electrostatic discharge.