Reliability Report

New product qualification

LQ1201_L7912CV

General Information	
Product Line	QL12
Product Description	Negative voltage regulators
P/N	L7912CV
Product Group	IPG IND.& POWER CONV
Product division	Linear Voltage Regulators & Vref
Packages	TO220 - SINGLE GAUGE
Silicon Process technology	HBIP40V

Locations	
Wafer fab	*SINGAPORE Ang Mo Kio*
Assembly plant	*SHENZHEN B/E*
Reliability Lab	*CATANIA*
Reliability assessment	*Pass*

DOCUMENT INFORMATION

Version	Date	Pages	Prepared by	Approved by	Comment
1.0	July-15	7	Giuseppe Failla	Giovanni Presti	Final Report

Note: This report is a summary of the reliability trials performed in good faith by STMicroelectronics in order to evaluate the potential reliability risks during the product life using a set of defined test methods.
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1 APPLICABLE AND REFERENCE DOCUMENTS

Document reference	Short description
0061692	Reliability tests and criteria for qualifications

2 GLOSSARY

DUT	Device Under Test
SS	Sample Size

3 RELIABILITY EVALUATION OVERVIEW

3.1 Objectives

New product qualification

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 L79xxC series of three-terminal negative regulators is available in TO-220, TO-220FP and D²PAK packages and 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; furthermore, having the same voltage option as the L78xx positive standard series, they are particularly suited for split power supplies. If adequate heat sinking is provided, they can deliver over 1.5 A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.

4.2 Construction note

P/N	L7912CV
Wafer/Die fab. information	
Wafer fab manufacturing location	SINGAPORE Ang Mo Kio
Technology	BiP HF
Process family	HBIP40V
Die finishing back side	CHROMIUM/NICKEL/GOLD
Die size	1290, 1610 micron
Passivation type	P-VAPOX/NITRIDE/POLYIMIDE (PIQ)
Wafer Testing (EWS) information	
Electrical testing manufacturing location	Ang Mo Kio EWS
Tester	QT200
Assembly information	
Assembly site	SHENZHEN B/E
Package description	TO220 - SINGLE GAUGE
Molding compound	Epoxy
Frame material	FRAME TO220 SG Ve1 OptD Bare copper
Die attach material	GLUE
Wires bonding materials/diameters	WIRE Cu D2
Lead finishing/bump solder material	PREFORM Pb/Ag/Sn 95.5/2.5/2 D.
Final testing information	
Testing location	SHENZHEN B/E
Tester	QT200
Test program	LQXXFC12.CTS

5 TESTS RESULTS SUMMARY

5.1 Test vehicle

Lot #	Process/ Package	Product Line	Comments
1	HBIP40V /TO220 - SINGLE GAUGE	QL12	Final

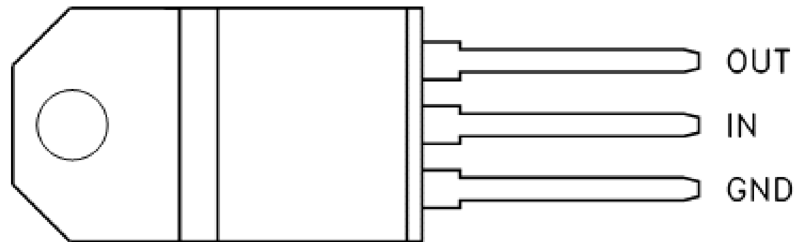
5.2 Test plan and results summary

Test		Std ref.	Conditions	SS	Steps	Failure/SS	Note
Die Oriented Tests							
HTSL		JESD22 A-103	Ta = 150°C	45	168h	0/45	
					500h	0/45	
					1000h	0/45	
HTOL		JESD22 A-108	Ta = 125°C, BIAS -35V	77	168h	0/77	
					500h	0/77	
					1000h	0/77	
Package Oriented Tests							
AC		JESD22 A-102	Pa=2Atm / Ta=121°C	77	96h	0/77	
					168h	0/77	Eng. Evaluation
TC		JESD22 A-104	Ta = -65°C to 150°C	77	100cy	0/77	
					200cy	0/77	
					500cy	0/77	
THB		JESD22 A-101	Ta = 85°C, RH = 85% BIAS: -28V	77	168h	0/77	
					500h	0/77	
					1000h	0/77	

6 ANNEXES

6.1 Device details

6.1.1 Pin connection



TO-220

6.2 Tests 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.
HTOL High Temperature Operating Life **HTB** 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.
Package Oriented		
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.
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.
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.