


PRODUCT / PROCESS CHANGE NOTIFICATION

1. PCN basic data

1.1 Company		STMicroelectronics International N.V
1.2 PCN No.	IPG/14/9008	
1.3 Title of PCN	Linear Voltage Regulator and Reference BU: New Enhanced TO220 Single Gauge Frame	
1.4 Product Category	Linear Voltage Regulator	
1.5 Issue date	2014-12-11	

2. PCN Team

2.1 Contact supplier	
2.1.1 Name	SCHIFANO FRANK
2.1.2 Phone	+1 4506283883
2.1.3 Email	frank.schifano@st.com
2.2 Change responsibility	
2.2.1 Product Manager	Lorenzo NASO
2.1.2 Marketing Manager	Antonio RIVIERA
2.1.3 Quality Manager	Paolo MORETTI

3. Change

3.1 Category	3.2 Type of change	3.3 Manufacturing Location
Materials	New direct material part number (same supplier, different supplier or new supplier), lead frame, resin, wire, ...)	Shenzhen

4. Description of change

	Old	New
4.1 Description	TO220 Single Gauge Frame vers.2	Following Divisional Commitments towards a continuous improvement philosophy an enhanced frame has been introduced for the TO220 Single Gauge Frame package vers. 3. Some mechanical parameters related to the frame have been changed compared to the version currently in production. The changes are related to the back Holes of the frame, Grooves and Downset characteristics (see attached slide for better understanding).
4.2 Anticipated Impact on form,fit, function, quality, reliability or processability?	no impact	

5. Reason / motivation for change

5.1 Motivation	To optimize the overall package robustness and in particular to improve the crimping resin / frame
5.2 Customer Benefit	QUALITY IMPROVEMENT

6. Marking of parts / traceability of change

6.1 Description	Adding "3" at the end of first row marking.. See attached examples This special marking will be valid for 6months only during the transition time. Once the production will be 100% switched to the new frame version (ver3) the marking will come back to the STD one.
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7. Timing / schedule

7.1 Date of qualification results	2014-11-20
7.2 Intended start of delivery	2015-03-12
7.3 Qualification sample available?	Upon Request

8. Qualification / Validation			
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8.1 Description	REL 6088-306-W-14_TO220 SG.pdf		
8.2 Qualification report and qualification results	Available (see attachment)	Issue Date	2014-12-11

9. Attachments (additional documentations)			
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9008PpPrdtLst.pdf REL 6088-306-W-14_TO220 SG.pdf TO220 Single Gauge ver3.pdf			
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10. Affected parts		
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10. 1 Current		10.2 New (if applicable)
10.1.1 Customer Part No	10.1.2 Supplier Part No	10.1.2 Supplier Part No
L7805ACV	L7805ACV	
L7905CV	L7905CV	
L7824CV	L7824CV	
	LD1117AV33	

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Reliability Report

BE Change

New frame TO220 SG

T.V: L7805

General Information		Locations	
Product Line	<i>LX05</i>	Wafer fab	<i>SINGAPORE Ang Mo Kio</i>
Product Description	<i>POSITIVE VR 1.5A 5V</i>	Assembly plant	<i>SHENZHEN B/E</i>
P/N	<i>L7805</i>	Reliability Lab	<i>IPG CATANIA</i>
Product Group	<i>IPG IND.& POWER CONV</i>	Reliability assessment	<i>Pass</i>
Product division	<i>Linear Voltage Regulators & Vref</i>		
Packages	<i>TO220 SG</i>		
Silicon Process technology	<i>HBiP40</i>		

DOCUMENT INFORMATION

Version	Date	Pages	Prepared by	Approved by	Comment
1.0	Nov.2014	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
JESD47I	Stress Test Driven Qualification of Integrated Circuit

2 GLOSSARY

DUT	Device Under Test
SS	Sample Size
PC	Preconditioning

3 RELIABILITY EVALUATION OVERVIEW

3.1 Objectives

New Enhanced TO220 Single Gauge Frame.

To optimize the overall package robustness and in particular to improve the crimping resin / frame.

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 L78 series of three-terminal positive regulators is available in TO-220, TO-220FP, D²PAK and DPAK 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. Each type embeds internal current limiting, thermal shut-down 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 voltage and currents.

4.2 Construction note

P/N	L7805CV / L7805ABV		
	1 st Lot	2 nd Lot	3 rd Lot
Wafer/Die fab. information			
Wafer fab manufacturing location	SINGAPORE Ang Mo Kio		
Technology	HBiP40		
Die finishing back side	Cr/Ni/Au		
Die size	1320, 1630 micron		
Passivation type	P-VAPOX/NITRIDE		
Wafer Testing (EWS) information			
Electrical testing manufacturing location	Ang Mo Kio EWS		
Tester	ETS300		
Test program	LX05B6D01		
Assembly information			
Assembly site	SHENZHEN B/E		
Package description	TO220 - SINGLE GAUGE		
Molding compound	Epoxy		
Frame material	FRAME TO220 SG Ve3 OptD Bare copper		
Die attach material	Epoxy		
Wires bonding materials/diameters	WIRE Cu D2		
Final testing information			
Testing location	SHENZHEN B/E		
Tester	QT200		
Test program	L78FA05.CTS		

5 TESTS RESULTS SUMMARY

5.1 Test vehicle

Lot #	Process/ Package	Product	Comments
1	TO220 SG	L7805CV - L7805ABV	
2			
3			

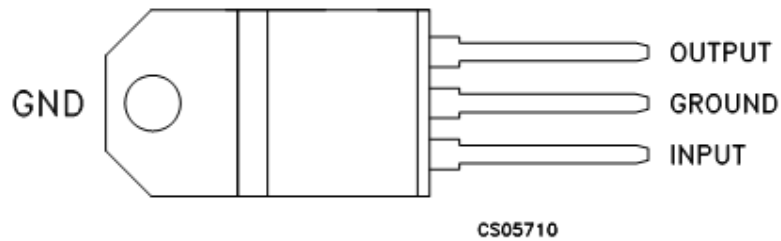
5.2 Test plan and results summary

Test	PC	Std ref.	Conditions	Steps	Failure/SS			Note
					1 st Lot	2 nd Lot	3 rd Lot	
Die Oriented Tests								
HTSL	N	JESD22 A-103	Ta = 150°C	168h	0/45	0/45	0/45	
				500h	0/45	0/45	0/45	
				1000h	0/45	0/45	0/45	
HTSL	N	JESD22 A-103	Ta = 175°C	168h	0/45	0/45	0/45	Engineering evaluation
				500h	0/45	0/45	0/45	
				1000h	0/45	0/45	0/45	
Package Oriented Tests								
AC	N	JESD22 A-102	Pa=2Atm / Ta=121°C	96h	0/77	0/77	0/77	Engineering evaluation
				168h	0/77	0/77	0/77	
TC	N	JESD22 A-104	Ta = -65°C to 150°C	100cy	0/77	0/77	0/77	
				200cy	0/77	0/77	0/77	
				500cy	0/77	0/77	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.
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.



Public Products List

PCN Title : Linear Voltage Regulator and Reference BU:

New Enhanced TO220 Single Gauge Frame

PCN Reference : IPG/14/9008

PCN Created on : 19-Nov-2014

Subject : Public Product List

Dear Customer,

Please find below the Standard Public Products List impacted by the change.

L7912CV	L78M05CV	L78S15CV
LD1117V50	L7908CV	L7806ABV
L7805ACV	L7812CV	L7812ACV
LF50ABV	L7809CV	L7824ABV
LF33CV	L7805CV	LD1117V50C
LD1117V33	L7809ABV	L7912ACV
L7808ACV	LD1117V18	L7915CV
LF50CV	L7824CV	L7808CV
L78M09CV	L7815CV	L78S75CV
L7905CV	L78S09CV	L7815ACV
L78S18CV	L78M05ABV	L7812ABV
L7805ABV	L78M08CV	LF60CV
L78M15CV	LD1117AV33	L7815ABV
L78S24CV	L7809ACV	L7808ABV
LF90CV	L78M24CV	LF60ABV
LD1117V33C	L7915ACV	LD1117V
L7824ACV	L78S12CV	L78M12CV
L78S10CV	L7818CV	L7905ACV
L78S05CV	L7806ACV	L7806CV



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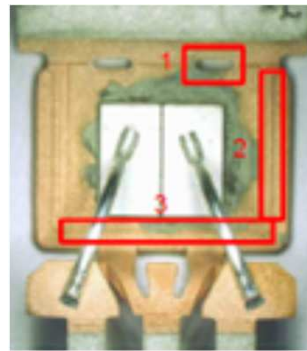
PACKAGE ROBUSTNESS

With the aim to improve the Package Robustness, **in particular the crimping resin/frame**, we changed some mechanical parameter related to the frame. In particular we worked on the Holes, Grooves and Downset characteristics implementing:

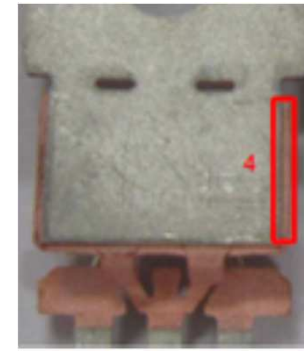
- ❖ Larger Ovoid Holes (1)
- ❖ Deeper Grooves (2)
- ❖ Deeper Downset (3)



(1)

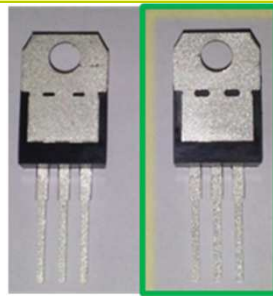


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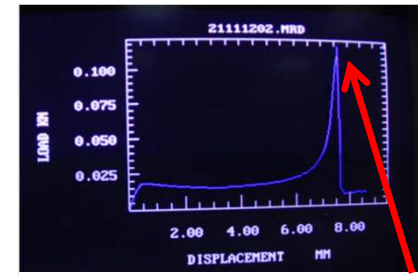


(3)

In order to verify the effectiveness of the above changes we performed, in collaboration with the CCR (Research Center at the Catania University), the **Body Crack Test**. According to the test results we found out a significant improvement vs the first version **(60N vs. 28N)**



First and Last Version



Max Load=60N

PART NUMBER	STD MARKING	TEMPORARY MARKING
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L7805CV	L7805CV	L7805CV3
L7805ABV	L7805ABV	L7805ABV3
L7905CV	L7905CV	L7905CV3
LF50ABV	LF50ABV	LF50ABV3
L78M05ABV	L78M05ABV	L78M05ABV3