PRODUCT/PROCESS CHANGE NOTIFICATION

PCN APM-SLI/09/4857
Notification Date 08/14/2009

Conversion to ECOPACK 2 grade and introduction of the

Single Gauge Heat-Sink for Voltage Regulators housed in TO-220 package

Table 1. Change Implementation Schedule

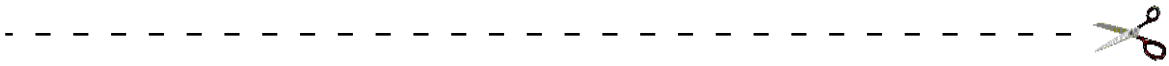
Forecasted implementation date for change	07-Aug-2009
Forecasted availabillity date of samples for customer	07-Aug-2009
Forecasted date for **STMicroelectronics** change Qualification Plan results availability	07-Aug-2009
Estimated date of changed product first shipment	13-Nov-2009

Table 2. Change Identification

Product Identification (Product Family/Commercial Product)	See attached list
Type of change	Multiple types of changes
Reason for change	To implement massive ECOPACK 2 grade production
Description of the change	The ECOPACK program is the cornerstone of our effort of being a leader in the change toward envi-ronmentally friendly packaging. In the context of this program, ST develops world class technical solutions designed to progressively remove banned substances from manufacturing. Continuing in the program to introduce ECOPACK 2 grade products (also known in the market as "Halogen Free") and in the aim of a constant process improvement, a new TO-220 package version, is going to be available for our Voltage Regulators devices. This renewed TO-220 package s version, will be used to house Voltage Regulators products, minimizing environment impact, both by introducing ECOPACK 2 grade and single gauge heat sink. This innovative package version is fully compliant with current JEDEC spec
Product Line(s) and/or Part Number(s)	See attached
Description of the Qualification Plan	See attached
Change Product Identification	See attached document
Manufacturing Location(s)	

Table 3. List of Attachments

Customer Part numbers list	
Qualification Plan results	



Customer Acknowledgement of Receipt	**PCN APM-SLI/09/4857**
Please sign and return to STMicroelectronics Sales Office	**Notification Date 08/14/2009**

☐ Qualification Plan Denied	Name:
☐ Qualification Plan Approved	Title:
	Company:
☐ Change Denied	Date:
☐ Change Approved	Signature:

Remark

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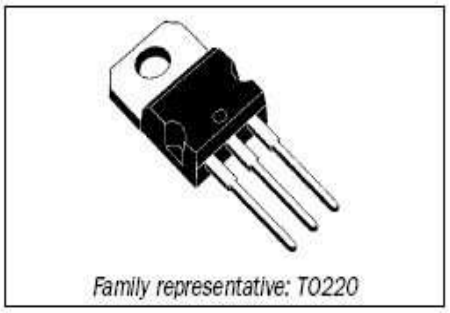
DOCUMENT APPROVAL

Name	Function
Naso, Lorenzo	Division Marketing Manager
Ruggirello, Vito	Division Product Manager
Lisi, Giuseppe	Division Q.A. Manager

Analog, Power and MEMS Group

Voltage Regulator and Interface Business Unit

Conversion to ECOPACK®2_grade (also called Halogen_Free)
and introduction of the Single Gauge Heat-Sink
for Voltage Regulators products
housed in TO-220 package .



Premise

The ECOPACK® program is the cornerstone of our effort of being a leader in the change toward environmentally friendly packaging. In the context of this program, ST develops world class technical solutions designed to progressively remove banned substances from manufacturing.

Continuing in the program to introduce ECOPACK®2 grade products (also known in the market as "Halogen Free") and in the aim of a constant process improvement, a new TO-220 package version, is going to be available for our Voltage Regulators devices.

This renewed TO-220 package's version, will be used to house Voltage Regulators products, minimizing environment impact, both by introducing ECOPACK®2 grade and single gauge heat sink.

This innovative package version is fully compliant with current JEDEC specifications.

WHY THIS CHANGE:

To implement massive **ECOPACK®2** grade production and a more efficient assembly technology for TO-220. This new package version, will be entirely manufactured in the ST's premises.

The involved product series are listed in the attached list:

Product Family	Product PN or Series
Voltage Regulators	L78MxxxV L78SxxCV L78xxxV L79xxxV LD1117V/LD1117AV LFxxxV LM2/317T LD1086V PB137

WHAT IS THE CHANGE:

For the products listed in the attached document, will be used the ECOPACK®2 grade moulding compound as well as a single gauge heat sink. The production of our Voltage Regulators product range in this new package, will not affect the electrical parameters.

Thermal analysis comparing difference between the two thicknesses heat sink indicates negligible difference in performance.

There is also no change in the packing modes and the standard delivery quantities.

The new heat sink dimensions are in compliance with the standard JEDEC specification.

WHEN:

Samples availability:

Qualification samples are available as per below table.

Part Numbers	Samples availability
L7805CV	Now

Other samples will be available on request for delivery within notice period if ordered within 30 days from notification.

Change implementation schedule:

Conversion to ECOPACK®2 grade and single gauge heat- sink, will initiate from week37 09 and due to the huge quantities are affected by this change, the transition time till full conversion, will take several months. During this transition phase, unless specific Customer-related instructions, ST's is willing to ship either the current or the new package versions.

Marking and traceability:

Unless otherwise stated by customer specific requirement, ECOPACK®2 grade parts assembled in the TO-220 Single Gauge heat sink, will be identified by the relevant data code and the related ECOPACK®2 grade identification. Furthermore, ECOPACK®2 identification will be printed on the inner and external box labels.

No packaging mixing of the two thicknesses will be granted to Customer, by creating a dedicated internal codification (finished good / raw line)

Qualification Data:

Full qualification report and drawing data are enclosed as attachments.

Please note that ST Team is doing all the best for providing you full visibility about these announced changes and to minimize any negative impact it may occur.
While our Marketing and Sales teams are available for additional information when required, we are looking forward to your renewed confidence in STMicroelectronics as the strategic partner of your choice.

Sincerely Yours.

Internal Reliability Evaluation Report

To qualify TO220 SINGLE GAUGE L/F in STS, EME210 Resin(GREEN)

Test Vehicle: LX05EW2- L7805CV

- Voltage Regulator -

General Information	
Product Line	LX05
Product Description	Positive voltage regulators
P/N	L7805CV$Z10
Product Group	IMS-APM
Product division	Voltage Regulator
Package	- TO220 Single gauge Cu
Silicon Process technology	LAAT180
Production mask set rev.	NLX05B

Locations	
Wafer fab	AMK 5"
Assembly plant	**SHENZHEN**
Reliability Lab	*Catania*
Reliability assessment	*Pass*

DOCUMENT INFORMATION

Version	Date	Pages	Prepared by	Approved by	Comment
1.0	July 2009	8	Alfio Rao	Giovanni Presti	Final

TABLE OF CONTENTS

1 APPLICABLE AND REFERENCE DOCUMENTS

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

2 GLOSSARY

SS	Sample Size

3 RELIABILITY EVALUATION OVERVIEW

3.1 Objectives

To qualify TO220 SINGLE GAUGE L/F in STS.

3.2 Conclusion

The final reliability results on Voltage Regulator Product are positive for LX05 line.

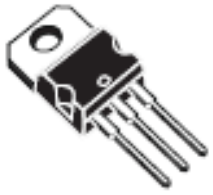
4 DEVICE CHARACTERISTIC

4.1 Device description

POSITIVE VR 1.5A 5V
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 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.

Features

Output current to 1.5 A
Output voltages of 5; 6; 8; 8.5; 9; 12; 15; 18; 24 V
Thermal overload protection
Short circuit protection
Output transition SOA protection



TO-220

4.2 Construction note

L7805CV$Z10 – LX05 line	***EME210 Resin(GREEN)***		
	Cu frame Single Gauge		
	Lot 1 **GK9160CG01**	**Lot 2** **GK9160CGZY**	**Lot 3** ***GK9160CG03***
Wafer/Die fab. information			
Wafer fab manufacturing location	AMK 5"		
Technology	LAAT180 -		
Process family	BIPOLAR		
Die finishing back side	CHROMIUM/NICKEL/GOLD		
Die size	1990, 1520um		
Bond pad metallization layers	1		
Passivation type	NITRIDE		
Wafer Testing (EWS) information			
Electrical testing manufacturing location	APEE Asia Pac EWS 0899		
Tester	QT100		
Test program	0040943		
Assembly information			
Assembly site	STS		
Package description	**TO220 Single Gauge** **Cu frame**		
Molding compound	**EME210**		
Frame material	Single gauge Cu		
Die attach process	Soft solder		
Die attach material	Pb95.5Ag2.5Sn2 (5XP92057)		
Die pad size	5.385 x 7.112mm		
Wire bonding process	Thermosonic Bonding		
Wires bonding materials/diameters	2.0mils Cu wire		
Lead finishing process	Pure tin plating		
Final testing information			
Testing location	STS 3068		
Tester	QT200		
Test program	7487676		

5 TESTS RESULTS SUMMARY

5.1 Test vehicle

P.N.: L7805CV$Z10 – LX05 line

Lot #	Diffusion Lot	Assy Lot	Package	Product Line
1° Lot. CU L/F+GREEN (EME210)	W9015PT	GK9160CG01	TO220 Single gauge	**LX05**
2° Lot. CU L/F+GREEN (EME210)	W9015PT	GK9160CGZY	TO220 Single gauge	**LX05**
3° Lot. CU L/F+GREEN (EME210)	W9015PT	GK9160CG03	TO220 Single gauge	**LX05**

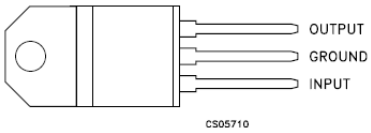
5.2 Test plan and results summary

P.N.: L7805CV$Z10 – LX05 line						*EME210 Resin(GREEN) – TO220 SG* *Cu frame Single Gauge*			
						Lot 1 GK9160CG01	**Lot 2 GK9160CGZY**	**Lot 3 *GK9160CG03***	
Test	**PC**	**Std ref.**	**Conditions**	**SS**	**Steps**	**Failure/SS**			**Note**
Die Oriented Tests									
HTSL	N	JESD22 A-103	Ta = 150℃	40	168 h	0/77	0/77	0/77	
					500 h	0/77	0/77	0/77	
					1000 h	0/77	0/77	0/77	
HTSL	N	JESD22 A-103	Ta = 175℃	40	168 h	0/77	0/77	0/77	Engin. Eval.
					500 h	0/77	0/77	0/77	
					1000 h	0/77	0/77	0/77	
Package Oriented Tests									
AC (1)	N	JESD22 A-102	Pa=2Atm / Ta=121℃	40	168 h	0/77	0/77	0/77	
TC	N	JESD22 A-104	Ta = -65℃ to 150℃	40	100 cy	0/77	0/77	0/77	
					200 cy	0/77	0/77	0/77	
					500 cy	0/77	0/77	0/77	
THB	N	JESD22 A-101	Ta = 85℃ / RH = 85%, BIAS= 24V	40	168 h	0/77	0/77	0/77	
					500 h	0/77	0/77	0/77	
					1000 h	0/77	0/77	0/77	

6 ANNEXES

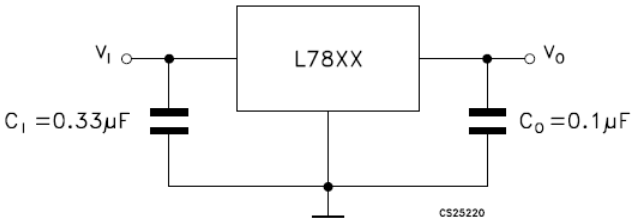
6.1 Device details

Pin connection (top view)

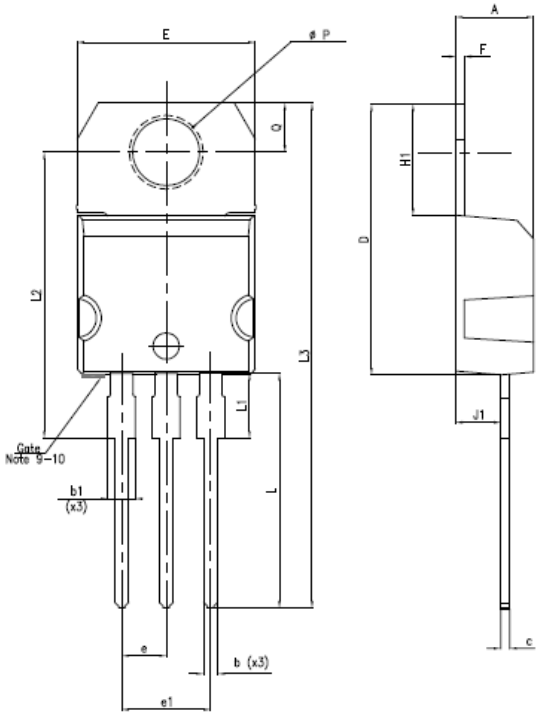


TO-220

Application circuits



Package outline/Mechanical data



ST				
REF.DIM	DATA BOOK mm			NOTES
	TYP	MIN	MAX	
A		4.40	4.60	
b		0.61	0.88	
b1		1.14	1.70	
c		0.48	0.70	
D		15.25	15.75	
E		10	10.40	
e		2.40	2.70	
e1		4.95	5.15	
F		0.51	0.60	
H1		6.20	6.60	
J1		2.40	2.72	
L		13	14	
L1		3.50	3.93	
L2	16.40			
L3	28.90			
øP		3.75	3.85	
Q		2.65	2.95	

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.
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.

6.3 Drift Analysis on different Split Lots

Drift Analysis performed on stressed parts didn’t show any remarkable variation

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