PRODUCT/PROCESS CHANGE NOTIFICATION

PCN APM-SLI/09/4411
Notification Date 03/25/2009

Halogen Free Resin for SOT23 and TSOT23 coming from Carsem

Table 1. Change Implementation Schedule

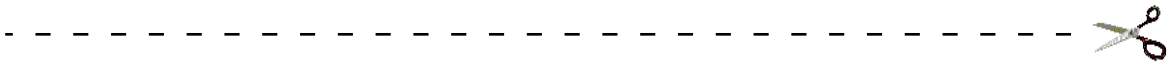
Forecasted implementation date for change	16-Jun-2009
Forecasted availabillity date of samples for customer	18-Mar-2009
Forecasted date for **STMicroelectronics** change Qualification Plan results availability	18-Mar-2009
Estimated date of changed product first shipment	24-Jun-2009

Table 2. Change Identification

Product Identification (Product Family/Commercial Product)	See attached list
Type of change	Package assembly material change
Reason for change	Extension of ECOPACK Program to "Halogen Free"
Description of the change	The change described in this document is the introduction of a new Halogen Free molding compound, the Hitachi CEL9220HF13, which will be used from wk 20 2009 onwards, in the production of SOT23 and TSOT23 packages at the Carsem plant in Malaysia. This change does not impact the electrical, dimensional and thermal parameters of the products, so the information currently published in the relevant datasheets will remain unchanged. There are also no changes in the packing modes and the standard delivery quantities. All test results required to qualify the CEL9220HF13 resin, are included in the attached qualification report
Product Line(s) and/or Part Number(s)	See attached
Description of the Qualification Plan	See attached
Change Product Identification	The new product will be identified by the "ECOPACK 2" showed on the box label
Manufacturing Location(s)	

Table 3. List of Attachments

Customer Part numbers list	
Qualification Plan results	



Customer Acknowledgement of Receipt	**PCN APM-SLI/09/4411**
Please sign and return to STMicroelectronics Sales Office	**Notification Date 03/25/2009**

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

Remark

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DOCUMENT APPROVAL

Name	Function
Riviera, Antonio	Division Marketing Manager
Naso, Lorenzo	Division Product Manager
Calderoni, Michele	Division Q.A. Manager

Reliability Report

Halogen Free Resin for SOT23 - Carsem
Hitachi CEL9220HF13

General Information	
Product Line	*KR33*
Product Description	*Ultra low drop voltage regulators with inhibit low ESR output capacitors compatible*
P/N	*LD2981CM33*
Product Group	*Voltage Regulator*
Product division	*Voltage Regulator & Interface*
Package	*SOT23*
Silicon Process technology	*BI20II*
Production mask set rev.	*NKR0326*

Locations	
Wafer fab	*AMK 6”*
Assembly plant	*Carsem*
Reliability Lab	*IMS-APM* *Catania Reliability Lab.*

DOCUMENT INFORMATION

Version	Date	Pages	Prepared by	Approved by	Comment
1.0	July 2008	8	Alfio Rao Giuseppe Giacopello	Giovanni Presti	First issue

TABLE OF CONTENTS

1 APPLICABLE AND REFERENCE DOCUMENTS

Document reference	Short description
AEC-Q100	Stress test qualification for automotive grade integrated circuits
JESD47	Stress-Test-Driven Qualification of Integrated Circuits

2 GLOSSARY

DUT	Device Under Test
SS	Sample Size

3 RELIABILITY EVALUATION OVERVIEW

3.1 Objectives

Reliability qualification on CEL9220HF13 - halogen Free Resin for SOT23 package. Assembly location Carsem

3.2 Conclusion

Qualification Plan requirements have been fulfilled without exception. 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 LD2981AB/C series are 100 mA fixed-output voltage regulator. The low drop-voltage and the ultra low quiescent current make them suitable for low noise, low power applications and in battery powered systems. The quiescent current in sleep mode is less than 1 µA when INHIBIT pin is pulled low.

4.2 Construction note

	P/N LD2981CM33
Wafer/Die fab. information	
Wafer fab manufacturing location	AMK 6”
Technology	BI20II
Die finishing back side	Lapped Silicon
Die size	1.47*0.99mm
Passivation type	PVAPOX/NITRIDE/POLYIMIDE
Wafer Testing (EWS) information	
Electrical testing manufacturing location	ASIA PAC SINGAPORE EWS
Tester	QT100
Test program	RRXXSQ**.CTS
Assembly information	
Assembly site	CARSEM
Package description	Sot23
Molding compound	Hitachi CEL9220HF13
Frame material	Cu+Ag spot
Die attach process	Soft solder
Die attach material	Ablestik 84-1LMISR4
Wire bonding process	Thermo sonic ball bonding
Wires bonding materials/diameters	Au - 1.0mils
Lead finishing process	Electroplating
Lead finishing/bump solder material	Pure tin
Final testing information	
Testing location	Carsem M
Tester	QT200
Test program	KRXFSL33.CTS

5 TESTS RESULTS SUMMARY

5.1 Test vehicle

Lot #	Assy Lot	Process/ Package	Product Line	Comments
1	ENG2207AR	SOT23	KR33	LD2981CM33
2	ENG2207BR	SOT23	KR33	LD2981CM33
3	ENG2207CR	SOT23	KR33	LD2981CM33

Detailed results in below chapter will refer to P/N and Lot #.

5.2 Test plan and results summary

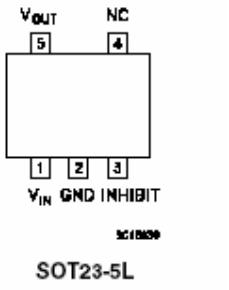
P/N LD2981CM33

Test	PC	Std ref.	Conditions	SS	Steps	Failure/SS			Note
						Lot 1	Lot 2	Lot 3	
Die Oriented Tests									
HTSL	N	JESD22 A-103	Ta = 150℃	45	168 H	0/45	0/45	0/45	
					500 H	0/45	0/45	0/45	
					1000 H	0/45	0/45	0/45	
Package Oriented Tests									
PC		JESD22 A-113	Drying 24 H @ 125℃ Store 168 H @ Ta=85℃ Rh=85% Over Reflow @ Tpeak=260℃ 3 times		Final	Pass	Pass	Pass	
AC	Y	JESD22 A-102	Pa=2Atm / Ta=121℃	231	96 H	0/77	0/77	0/77	
					168 H	0/77	0/77	0/77	
TC	Y	JESD22 A-104	Ta = -65℃ to 150℃	231	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	Y	JESD22 A-101	Ta = 85℃, RH = 85%, BIAS= 15V	231	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

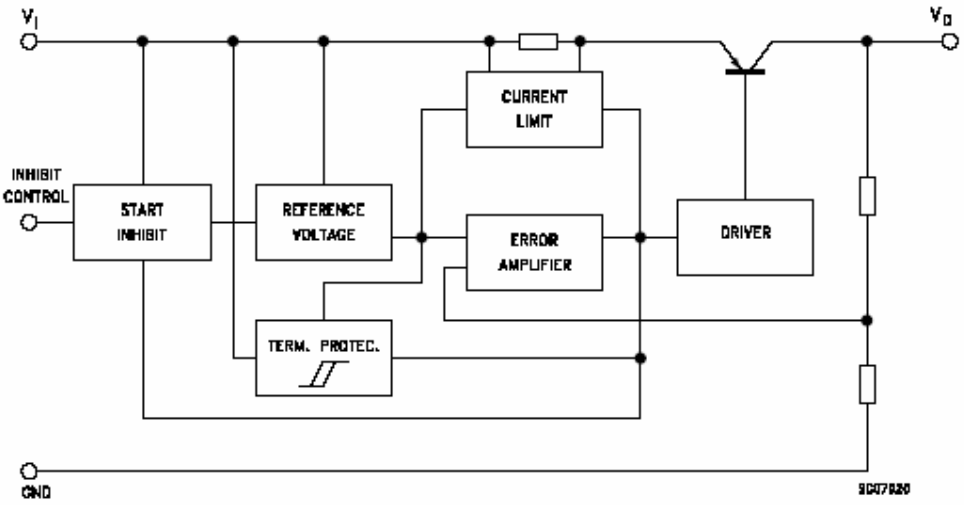
6.1 Device details

6.1.1 Pin connection



SOT23-5L

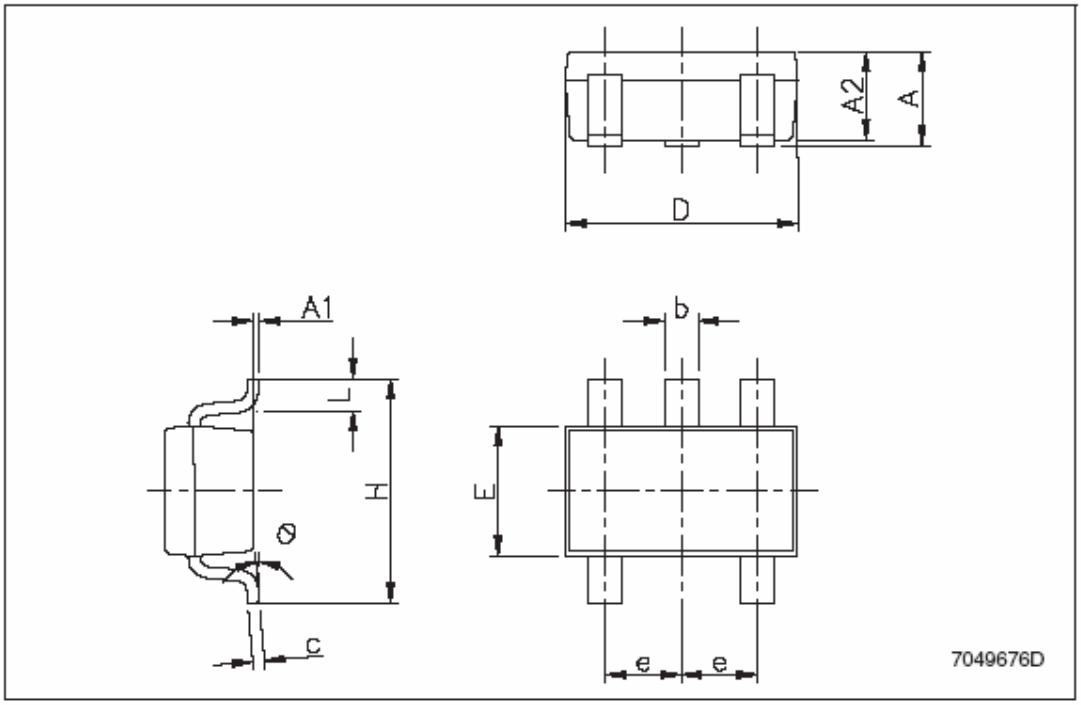
6.1.2 Block diagram



6.1.3 Package outline/Mechanical data

SOT23-5L mechanical data

Dim.	mm.			mils.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.90		1.45	35.4		57.1
A1	0.00		0.10	0.0		3.9
A2	0.90		1.30	35.4		51.2
b	0.35		0.50	13.7		19.7
C	0.09		0.20	3.5		7.8
D	2.80		3.00	110.2		118.1
E	1.50		1.75	59.0		68.8
e		0.95			37.4	
H	2.60		3.00	102.3		118.1
L	0.10		0.60	3.9		23.6



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		
PC Preconditioning	The device is submitted to a typical temperature profile used for surface mounting devices, after a controlled moisture absorption.	As stand-alone test: to investigate the moisture sensitivity level. As preconditioning before other reliability tests: to verify that the surface mounting stress does not impact on the subsequent reliability performance. The typical failure modes are "pop corn" effect and delamination.
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.

Reliability Report

Halogen Free Resin for TSOT23 - Carsem Hitachi CEL9220HF13

General Information	
Product Line	*UT92*
Product Description	*Ultra low drop-low noise BiCMOS voltage regulators low ESR capacitors compatible*
P/N	*LD3985G18R*
Product Group	*Voltage Regulator*
Product division	*Voltage Regulator & Interface*
Package	*TSOT23*
Silicon Process technology	*BCD5*
Production mask set rev.	*CUT90A*

Locations	
Wafer fab	*AGRATE 8”*
Assembly plant	*Carsem M*
Reliability Lab	*IMS-APM Catania Reliability Lab.*

DOCUMENT INFORMATION

Version	Date	Pages	Prepared by	Approved by	Comment
1.0	July 2008	8	Giuseppe Giacopello Alfio Rao	Giovanni Presti	First issue

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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JESD47	Stress-Test-Driven Qualification of Integrated Circuits

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DUT	Device Under Test
SS	Sample Size

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3.1 Objectives

Reliability qualification on CEL9220HF13 - halogen Free Resin for TSOT23 package. Assembly location Carsem

3.2 Conclusion

Qualification Plan requirements have been fulfilled without exception. 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 LD3985xx provides up to 150 mA, from 2.5 V to 6 V input voltage. The ultra low drop-voltage, low quiescent current and low noise make it suitable for low power applications and in battery powered systems.

4.2 Construction note

	P/N LD3985G18R
Wafer/Die fab. information	
Wafer fab manufacturing location	AGRATE 8”
Technology	BCD5
Die finishing back side	Raw Silicon
Die size	1.33*0.96mm
Passivation type	PVAPOX/NITRIDE/PIX
Wafer Testing (EWS) information	
Electrical testing manufacturing location	No Test
Tester	No Test
Test program	No Test
Assembly information	
Assembly site	CARSEM M
Package description	TSOT23
Molding compound	Hitachi CEL9220HF13
Frame material	Cu+Ag spot
Die attach process	Soft solder
Die attach material	Ablestik 84-1LMISR4
Wire bonding process	Thermo sonic ball bonding
Wires bonding materials/diameters	Au - 1.0mils
Lead finishing process	Electroplating
Lead finishing/bump solder material	Pure tin
Final testing information	
Testing location	Carsem M
Tester	QT200
Test program	UTX2QT92.CTS

5 TESTS RESULTS SUMMARY

5.1 Test vehicle

Lot #	Assy Lot	Process/ Package	Product Line	Comments
1	ENG2208AR	TSOT23	UT92	LD3985G18R
2	ENG2208BR	TSOT23	UT92	LD3985G18R
3	ENG2208CR	TSOT23	UT92	LD3985G18R

Detailed results in below chapter will refer to P/N and Lot #.

5.2 Test plan and results summary

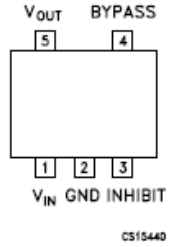
P/N LD3985G18R

Test	PC	Std ref.	Conditions	SS	Steps	Failure/SS			Note
						Lot 1	Lot 2	Lot 3	
Die Oriented Tests									
HTSL	N	JESD22 A-103	Ta = 150℃	45	168 H	0/45	0/45	0/45	
					500 H	0/45	0/45	0/45	
					1000 H	0/45	0/45	0/45	
Package Oriented Tests									
PC		JESD22 A-113	Drying 24 H @ 125℃ Store 168 H @ Ta=85℃ Rh=85% Over Reflow @ Tpeak=260℃ 3 times		Final	Pass	Pass	Pass	
AC	Y	JESD22 A-102	Pa=2Atm / Ta=121℃	231	96 H	0/77	0/77	0/77	
					168 H	0/77	0/77	0/77	
TC	Y	JESD22 A-104	Ta = -65℃ to 150℃	231	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	Y	JESD22 A-101	Ta = 85℃, RH = 85%, BIAS=5V	231	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

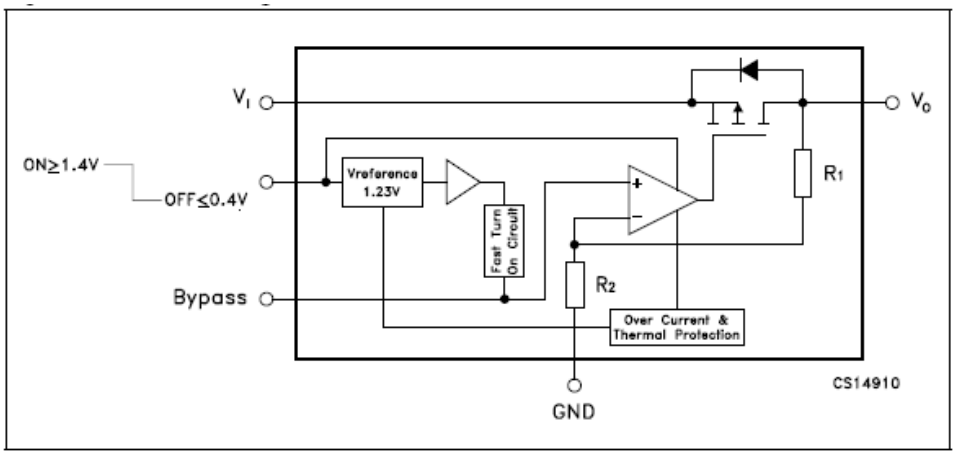
6.1 Device details

6.1.1 Pin connection



SOT23-5L/TSOT23-5L

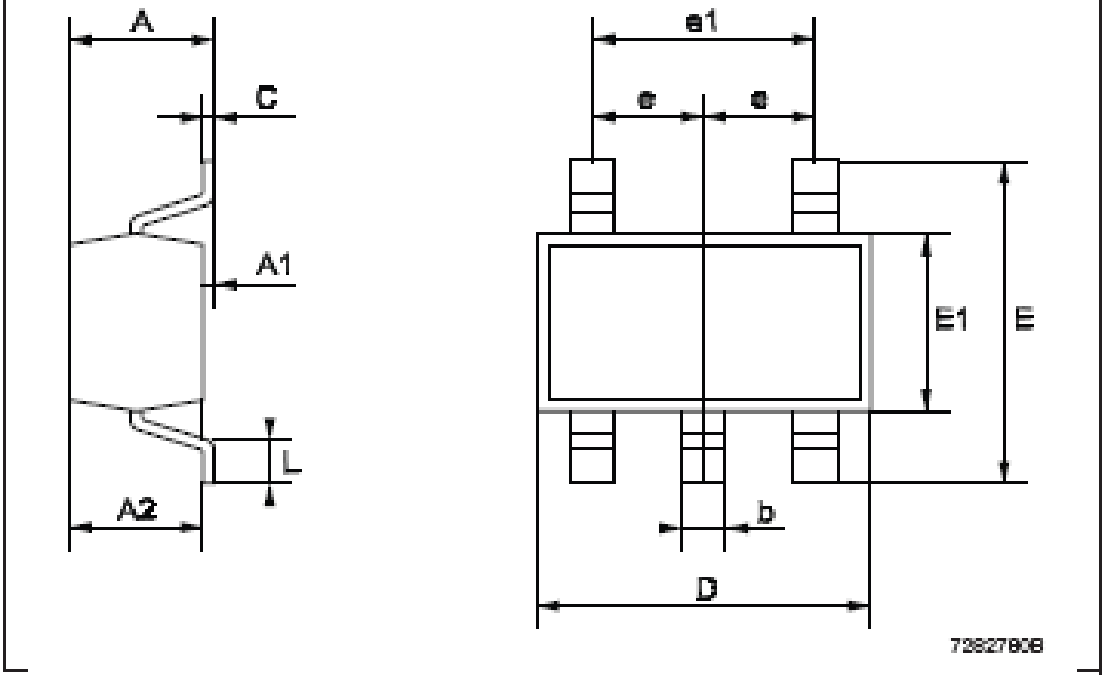
6.1.2 Block diagram



6.1.3 Package outline/Mechanical data

TSOT23-5L mechanical data

Dim.	mm.			mils.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.1			43.3
A1	0		0.1			3.9
A2	0.7		1.0	27.6		39.4
b	0.3		0.5	11.8		19.7
C	0.08		0.2	3.1		7.9
D		2.9			114.2	
E		2.8			110.2	
E1		1.6			63.0	
e		0.95			37.4	
e1		1.9			74.8	
L	0.3		0.6	11.8		23.6



6.2 Tests Description

Test name	Description	Purpose
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Package Oriented		
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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.

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