PRODUCT/PROCESS CHANGE NOTIFICATION

PCN IPG-IPC/14/8322
Dated 10 Feb 2014

Qualification of a new HD lead frame and new resin SUMITOMO G630AY for SO 8 package in ST Bouskoura (Morocco)

Table 1. Change Implementation Schedule

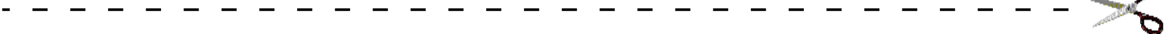
Forecasted implementation date for change	01-Mar-2014
Forecasted availability date of samples for customer	01-Mar-2014
Forecasted date for **STMicroelectronics** change Qualification Plan results availability	03-Feb-2014
Estimated date of changed product first shipment	12-May-2014

Table 2. Change Identification

Product Identification (Product Family/Commercial Product)	See attached
Type of change	Package assembly material change
Reason for change	Capacity increase
Description of the change	Introduction of a new HD lead frame and new resin SIMITOMO G630AY for the assembly of products housed in SO 08 package, in ST Bouskoura (Morocco).
Change Product Identification	By date code and relevant traceability
Manufacturing Location(s)	

Table 3. List of Attachments

Customer Part numbers list	
Qualification Plan results	



Customer Acknowledgement of Receipt Please sign and return to STMicroelectronics Sales Office	**PCN IPG-IPC/14/8322** **Dated 10 Feb 2014**
☐ Qualification Plan Denied	Name:
☐ Qualification Plan Approved	Title:
	Company:
☐ Change Denied	Date:
☐ Change Approved	Signature:

Remark

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DOCUMENT APPROVAL

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ATTACHMENT TO PCN IPG-IPC/14/8322

WHAT:
We have qualified a new HD lead frame for the assembly of products housed in SO 08 package in ST Bouskoura (Morocco). In addition we have introduced a new halogen free resin SUMITOMO G630AY to replace the current SUMITOMO G700K.

WHY:
To rationalize manufacturing and to increase our production capacity.

HOW:
As per the attached Reliability Qualification plan, we have evaluated and qualified the a.m. new material through trials performed on 3 test vehicles (UE27BD6, 0303AC6 and U093ADZ).

WHEN:
The new HD lead frame and resin will be implemented from March, 2014.

Samples of the a.m. test vehicles are available. For all the other involved products, they can be provided on request, in 4 weeks A.R.O.

Reliability Report Qualification of new HD LF and new resin SUMITOMO G630AY for SO8 package in BOUSKOURA

General Information	
Product Line	*UE27*
Product division	*I&PC*
Package	*SO8*
Silicon process technology	*BCD2S*

Locations	
Wafer fab location	*ANG MO KIO 6"*
Assembly plant location	*BOUSKOURA (Morocco)*
Reliability assessment	*Pass*

General Information	
Product Line	*0303*
Product division	*I&PC*
Package	*SO8*
Silicon process technology	*BIPOLAR*

Locations	
Wafer fab location	*ANG MO KIO 6"*
Assembly plant location	*BOUSKOURA (Morocco)*
Reliability assessment	*Pass*

General Information	
Product Line	*U093*
Product division	*I&PC*
Package	*SO8*
Silicon process technology	*BCD1*

Locations	
Wafer fab location	*ANG MO KIO 6"*
Assembly plant location	*BOUSKOURA (Morocco)*
Reliability assessment	*Pass*

DOCUMENT HISTORY

Version	Date	Pages	Author	Comment
1.0	23-Jan-14	9	S. Regini	Original document

Issued by
Samantha Regini

Approved by
Antonino Motta

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1 APPLICABLE AND REFERENCE DOCUMENTS

Document reference	Short description
AEC-Q100	: Stress test qualification for integrated circuits
8161393	: General Specification For Product Development

2 RELIABILITY EVALUATION OVERVIEW

2.1 Objectives

This report contains all the reliability activities in order to evaluate the new HD lead frame (320 units/strip vs 120 units/strip) used for the assembly of SO8 package in BOUSKOURA (Morocco) assy plant.
With respect the current pre-plated lead frame, the new HD LF is a Cu - Ag spot lead frame; a pure tin lead plating process step will be introduced in the process flow after post mold curing step and before cropping.

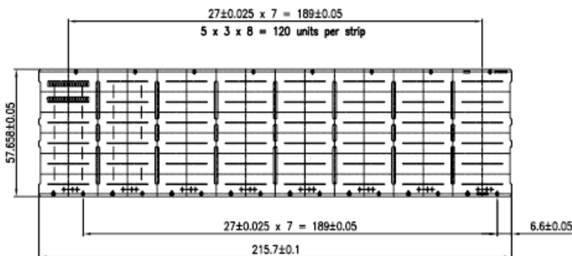

Fig1: Current SO8 LF *(5x3x8=120 units /strip; 57.7x215.7 mm)*

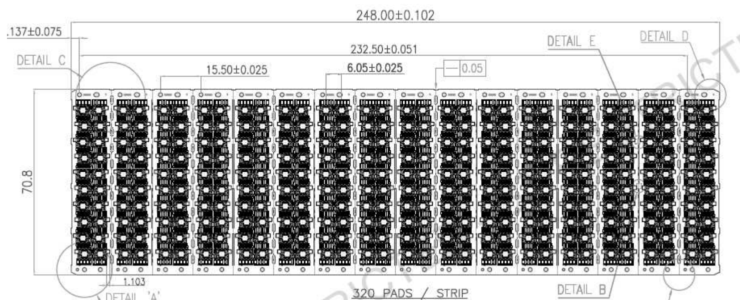

Fig2: New HD SO8 LF *(10x2x16=320 units /strip; 70.8x248 mm)*

In addiction a new resin halogen free SUMITOMO G630AY will be introduced to substitute the current SUMITOMO G700K resin.

The reliability evaluations have been performed 3 test vehicles: UE27BD6, 0303AC6 and U093ADZ devices diffused in AMK6" and assembled in SO8 package in Bouskoura.

According to Reliability Qualification Plan, below is the list of the trials performed:

Package Oriented Tests

- Preconditioning
- Temperature Cycling
- Autoclave
- High Temperature Storage Life
- Temperature Humidity Bias

2.2 Conclusion

Taking in account the results of the trials performed **the new HD LF and the new resin halogen free SUMITOMO G630AY used in SO8 package assembled in BOUSKOURA (Morocco) ASSY PLANT can be qualified from reliability viewpoint.**

3 DEVICE CHARACTERISTICS

3.1 Traceability

3.1.1 TV1 - UE27BD6

Wafer fab information	
Wafer fab manufacturing location	*ANG MO KIO*
Wafer diameter	*6”*
Wafer thickness	*375 µm*
Silicon process technology	*BCD2S*
Die finishing back side	*CHROMIUM / NIKEL/ GOLD*
Die size	*1790 *1870 µm*
Bond pad metallization layers	*AlSiCu*
Passivation	*SiN/POLYIMIDE*
Metal levels	*2*

Assembly Information	
Assembly plant location	*BOUSKOURA (Morocco)*
Package description	*SO 8*
Die pad size	*94 x125 mils*
Frame material	*SO 8L 94x125 HD OpA 320u SpAg - Sumitomo*
Molding compound	*SUMITOMO EME-G630AY*
Wires bonding materials/diameters	*Cu 1 mil*
Die attach material	*ABLEBOND 8601S-25*
Lead solder material	*Sn*

3.1.2 TV2 - 0303AC6

Wafer fab information	
Wafer fab manufacturing location	*ANG MO KIO*
Wafer diameter	*6”*
Wafer thickness	*375 µm*
Silicon process technology	*BIPOLAR*
Die finishing back side	*RAW SILICON*
Die size	*1890*2120 µm*
Bond pad metallization layers	*AlSiCu*
Passivation	*SiN*
Metal levels	*1*

Assembly Information	
Assembly plant location	*BOUSKOURA (Morocco)*
Package description	*SO 8*
Die pad size	*94 x125 mils*
Frame material	*SO 8L 94x125 HD OpA 320u SpAg / Supplier Sumitomo*
Molding compound	*SUMITOMO EME-G630AY*
Wires bonding materials/diameters	*Cu 1mils*
Die attach material	*GLUE ABLEBOND 8601S-25*
Lead solder material	*Sn*

3.1.3 TV3 - U093ADZ

Wafer fab information	
Wafer fab manufacturing location	*ANG MO KIO*
Wafer diameter	*6”*
Wafer thickness	*375 µm*
Silicon process technology	*BCD1*
Die finishing back side	*CHROMIUM / NIKEL/ GOLD*
Die size	*2590,2060 µm*
Bond pad metallization layers	*AlSi*
Passivation	*SiN*
Metal levels	*1*

Assembly Information	
Assembly plant location	*BOUSKOURA (Morocco)*
Package description	*SO 8*
Die pad size	*94 x125 mils*
Frame Material	*SO 8L 94x125 HD OpA 320u SpAg / Supplier Sumitomo*
Molding compound	*SUMITOMO EME-G630AY*
Wires bonding materials/diameters	*Cu 1 mil*
Die attach material	*ABLEBOND 8601S-25*
Lead solder material	*Sn*

4 TESTS RESULTS SUMMARY

4.1 Test plan and results summary

4.1.1 TV1 - UE27BD6

Package Oriented Tests							
Test	**Method**	**Conditions**	**Failure/SS**			**Duration**	**Note**
			Lot 1	**Lot 2**	**Lot 3**		
PC	Pre-Conditioning: Moisture sensitivity level 1						
		168h 85°C/85% - 3 reflow PBT 260°C	**0/154**				**no delamination**
AC	Autoclave						
	PC before	**121°C 2atm**	**0/77**			**168h**	
TC	Temperature Cycling						
	PC before	**Temp. range: -65/+150°C**	**0/77**			**1000cy**	
HTSL	High Temperature Storage						
	No bias	**Tamb=150°C**	**0/77**			**1000h**	

4.1.2 TV2 - 0303AC6

Package Oriented Tests							
Test	**Method**	**Conditions**	**Failure/SS**			**Duration**	**Note**
			Lot 1	**Lot 2**	**Lot 3**		
PC	Pre-Conditioning: Moisture sensitivity level 1						
		168h 85°C/85% - 3 reflow PBT 260°C	**0/231**				**No delamination**
AC	Autoclave						
	PC before	**121°C 2atm**	**0/77**			**96h**	
TC	Temperature Cycling						
	PC before	**Temp. range: -65/+150°C**	**0/77**			**1000cy**	
HTSL	High Temperature Storage						
	No bias	**Tamb=150°C**	**0/77**			**1000h**	
THB	Temperature Humidity Bias						
	PC before	***Ta=85°C, 85%R.H, Vcc=+25V***	**0/77**			**1000h**	

4.1.3 TV3 - U093ADZ

Package Oriented Tests							
Test	**Method**	**Conditions**	**Failure/SS**			**Duration**	**Note**
			Lot 1	**Lot 2**	**Lot 3**		
PC	Pre-Conditioning: Moisture sensitivity level 1						
		168h 85°C/85% - 3 reflow PBT 260°C	**0/154**				**No delamination**
AC	Autoclave						
	PC before	**121°C 2atm**	**0/77**			**168h**	
TC	Temperature Cycling						
	PC before	**Temp. range: -65/+150°C**	**0/77**			**1000cy**	
HTSL	High Temperature Storage						
	No bias	**Tamb=150°C**	**0/77**			**1000h**	

5 TESTS DESCRIPTION & DETAILED RESULTS

5.1 Package oriented tests

5.1.1 Pre-Conditioning

The device is submitted to a typical temperature profile used for surface mounting, after a controlled moisture absorption.
The scope is 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.

5.1.2 High Temperature Storage

The device is stored in unbiased condition at the max. temperature allowed by the package materials, sometimes higher than the max. operative temperature.
The scope is to investigate the failure mechanisms activated by high temperature, typically wire-bonds solder joint ageing, data retention faults, metal stress-voiding

5.1.3 Thermal Cycles

The purpose of this test is to evaluate the thermo mechanical behavior under moderate thermal gradient stress.
Test flow chart is the following:

- Initial testing @ Ta=25°C.
- Readout @ 500 cycles.
- Final Testing @ 1000 cycles @ Ta=25°C.

TEST CONDITIONS:

- Ta= -50°C to +150°C(air)
- 15 min. at temperature extremes
- 1 min. transfer time

5.1.4 Autoclave

The purpose of this test is to point out critical water entry path with consequent corrosion phenomena related to chemical contamination and package hermeticity.
Test flow chart is the following:

- Initial testing @ Ta=25°C.
- Final Testing (168hrs) @ Ta=25°C.

TEST CONDITIONS:

- P=2.08 atm
- Ta=121°C
- test time= 168 hrs

5.1.5 Temperature Humidity Bias

The test is addressed to put in evidence problems of the die-package compatibility related to phenomena activated in wet conditions such as electro-chemical corrosion.
The device is stressed in static configuration approaching some field status like power down. Temperature, Humidity and Bias are applied to the device in the following environmental conditions => Ta=85°C / RH=85%.
Input pins to Low / High Voltage (alternate) to maximize voltage contrast.
Test Duration 1000 h.

The flow chart is the following:

- Initial testing @ Ta=25°C, 85°C
- Check @ 168 and 500hrs
- Final Testing (1000 hr.) @ Ta=25°C, 85°

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