PRODUCT/PROCESS CHANGE NOTIFICATION

PCN IPD-DIS/13/8107
Dated 07 Oct 2013

Protection Arrays in SO-8 Package housed in Morocco plant (BSK) / ECOPACK2 / Cu wire bonding / NiPdAgAu plating conversion

Table 1. Change Implementation Schedule

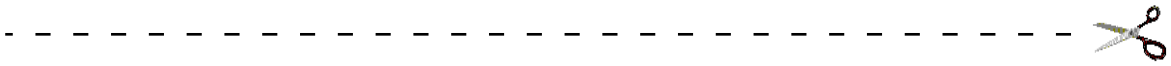
Forecasted implementation date for change	01-Oct-2013
Forecasted availability date of samples for customer	30-Sep-2013
Forecasted date for **STMicroelectronics** change Qualification Plan results availability	30-Sep-2013
Estimated date of changed product first shipment	06-Jan-2014

Table 2. Change Identification

Product Identification (Product Family/Commercial Product)	Protection Arrays in SO-8 Package
Type of change	Package assembly material change
Reason for change	package industrial optimization
Description of the change	Change 1 : ECOPACK2 conversion ("Halogen free") Change 2 : Implementation of copper wire bonding and related leadframe NiPdAu pre-plating
Change Product Identification	internal codification, marking, labelling and QA number
Manufacturing Location(s)	

Table 3. List of Attachments

Customer Part numbers list	
Qualification Plan results	



Customer Acknowledgement of Receipt	**PCN IPD-DIS/13/8107**
Please sign and return to STMicroelectronics Sales Office	**Dated 07 Oct 2013**

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

Remark

.....

.....

.....

.....

.....

.....

.....

.....

DOCUMENT APPROVAL

Name	Function
Paris, Eric	Marketing Manager
Nopper, Christian	Product Manager
Cazaubon, Guy	Q.A. Manager

PCN
Product/Process Change Notification

Protection Arrays in SO-8 Package housed in Morocco plant (BSK):

ECOPACK®2 / Cu wire bonding / NiPdAgAu plating conversion

Notification number:	IPD-DIS/13/8107	**Issue Date**	30/09/2013
Issued by	Aline AUGIS		
Product series affected by the change		USB6B1RLY USB6B1RLY USB6B1RLY DA108S1 DA108S1RL DA112S1 DA112S1RL DALC112S1 DALC112S1RL ESDA25B1 ESDA25B1RL ESDA6V1U1 ESDA6V1U1RL ITA10B1 ITA18B1 ITA18B1RL ITA25B1 ITA25B1RL ITA6V1U1 ITA6V1U1RL ITA6V5B1 ITA6V5B1RL ITA6V5C1RL USB6B1 USB6B1 USB6B1 USB6B1RL USB6B1RL USB6B1RL	
Type of change		Package assembly material change	

Description of the change

Change 1 : **ECOPACK®2** conversion (“Halogen free”)
Change 2 : Implementation of copper wire bonding and related leadframe NiPdAu pre-plating

	BEFORE CHANGE	AFTER CHANGE
Leadframe	NiPdAu	NiPdAgAu
Glue	EN4900ST10	Ablestik 8601
Molding compound	ECOPACK1	ECOPACK2
Wire	Au 2 mils/0.8mils	Cu 2 mils/ 1 mils

Reason for change

Change 1 : ST is converting **products** housed in **SO8 package** from the standard molding compound to the ECOPACK®2 grade compound (so called Halogen free)
Change 2 : ST’s SO8 package industrial optimization.

Former versus changed product:	The changed products do not present modified electrical, dimensional or thermal parameters, leaving unchanged the current information published in the product datasheet The Moisture Sensitivity Level of the part (according to the IPC/JEDEC JSTD-020D standard) remains unchanged. The footprint recommended by ST remain the same. There is no change in the packing modes and the standard delivery quantities either.

Disposition of former products

Deliveries of former product versions will continue while the conversion is brought to completion and as long as former product stocks last.

Marking and traceability

New **internal codification**, product **marking/labeling** and **QA number**.
An additional letter **“G”** is printed to the right of the “e4” symbol for the ECOPACK®2 conversion.

Qualification complete date	8th of April, 2013

Forecasted sample availability

Product family	Package	Commercial part Number	Availability date
Protection	SO8	USB6B1	Week 40-2013
Protection	SO8	ESDA25B1	Week 40-2013
Protection	SO8	DA112S1	Week 40-2013

Change implementation schedule

Sales types	Estimated production start	Estimated first shipments
All	**Week 40-2013**	**Week 02-2014**

Comments:	

Customer's feedback

Please contact your local ST sales representative or quality contact for requests concerning this change notification.
Absence of acknowledgement of this PCN within 30 days of receipt will constitute acceptance of the change
Absence of additional response within 90 days of receipt of this PCN will constitute acceptance of the change

Qualification program and results	N°1288QRP-Rev 2 Attached

Reliability Report
Protection Arrays in SO-8 Package
ECOPACK®2 / Cu wire / NiPdAgAu plating conversion

General Information	
Product Line	*Protection*
Part-number	*Refer to the table below*
Product Group	*IPD*
Product division	*ASD&IPAD*
Package	*SO8*
Maturity level step	*Qualification*

Locations	
Wafer fab	*STMicroelectronics Tours (France)*
Assembly plant	*STMicroelectronics Bouskoura (Morocco)*
Reliability Lab	*STMicroelectronics Tours*

The **involved product** series are listed below:

Package	Product Family	Involved Series or Product
SO-8	**Protection**	DA1xxS1(RL) DALC112S1(RL) ESDA25B1(RL) ESDA6V1U1(RL) ITAxxB1(RL) USB6B1(RL) USB6B1RLY

DOCUMENT INFORMATION

Version	Date	Pages	Prepared by	Approved by	Comment
1	26-November-2012	8	J. MICHELON	J.P. REBRASSE	First issue (Reference document: Product Change Notification PCN IPD-DIS/12/7253)

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.
This report does not imply for STMicroelectronics expressly or implicitly any contractual obligations other than as set forth in STMicroelectronics general terms and conditions of Sale. This report and its contents shall not be disclosed to a third party without previous written agreement from STMicroelectronics.

TABLE OF CONTENTS

1 APPLICABLE AND REFERENCE DOCUMENTS

Document reference	Short description
AEC-Q100	Stress test qualification for automotive grade integrated circuits
AEC-Q101	Stress test qualification for automotive grade discrete semiconductors
JESD47H	Stress-Test-Driven Qualification of Integrated Circuits

2 GLOSSARY

DUT	Device Under Test
PCB	Printed Circuit Board
SS	Sample Size

3 RELIABILITY EVALUATION OVERVIEW

3.1 Objectives

The ECOPACK® program is the cornerstone of our efforts for being leader in offering **environmentally friendly packaging**. Progressing in this program, ST is implementing technical solutions designed to progressively remove banned substances from manufacturing.

To meet the so called **"Halogen-Free"** requirements of the market, ST is converting its **Protection Arrays** in **SO-8 package** to the **ECOPACK®2** grade.

The permanent evolution of our technology leads us to implement at the same time the **copper wire bonding process** instead of gold and the NiPdAgAu plating, for the considered parts.

3.2 Product reliability description

The qualification methodology is failure mechanisms driven (JESD94). All potential failure mechanisms have been identified. Reliability trials follow automotive standard AEC-Q101, JESD47 and 0061692 ST specifications.

3.3 Conclusion

Based on the reliability results, plan requirements have been fulfilled without exception and are compliant to AEC-Q101 requirements. It shows that the devices behave correctly against environmental tests (no failure). Moreover, the stability of electrical parameters during the accelerated tests demonstrates the robustness of the products and safe operation, which is consequently expected during their lifetime.

4 DEVICE CHARACTERISTICS

4.1 Device description

The assembly **Bill of Material** status is summarized in the table below.

Material	SO-8 package	
	Current	New
Lead frame finishing	NiPdAu (Pd thickness = 30nm)	NiPdAgAu (Pd thickness = 10nm)
Die attach glue material	ECOPACK®1	ECOPACK®2
Wire bonding	Au 0.8-2 mils	Cu 1-2 mils
Molding compound	ECOPACK®1	ECOPACK®2

5 TESTS RESULTS SUMMARY

5.1 Test vehicle

Lot #	Part Number	Die manufacturing plant	Package	Assembly Plant	Comments
Lot 1	USB6B1RLY	STMicroelectronics Tours (France)	SO8	STMicroelectronics Bouskoura (Morocco)	Qualification lot
Lot 2	DALC112S1				Qualification lot
Lot 3	ITA25B1				Qualification lot
Lot 4	ITA25B1				Qualification lot

5.2 Test plan and results summary

USB6B1RLY

Test	PC	Std ref.	Conditions	SS	Steps	Failure/SS Lot 1	Note
package Oriented Tests							
Precond	Y	JESD22 A-113	MSL 1: Ta = 85°C; RH = 85%	25	168h	0/25	MSL 1 compliant
THB	Y	JESD22 A-101	Ta = 85°C; RH = 85% VR = 5,25V	77	168h	0/77	DPA after THB compliant to AEC-Q101
					504h	0/77	
					1000h	0/77	
TC	Y	JESD22 A-104	[-65°C +150C]; 2 cycles/hour	77	100 cycles	0/77	DPA after TC compliant to AEC-Q101
					500 cycles	0/77	
					1000 cycles	0/77	
AC	Y	JESD22 A-102	Ta = 121°C / RH = 100% / P=2 Bars	77	96h	0/77	
die Oriented Tests							
HTRB	N	JESD22 A-108	Tj = 150°C; VR = 5,25V	77	168h	0/77	
					504h	0/77	
					1000h	0/77	

DALC112S1

Test	PC	Std ref.	Conditions	SS	Steps	Failure/SS Lot 2	Note
Package Oriented Tests							
Precond	Y	JESD22 A-113	MSL 1: Ta = 85°C; RH = 85%	25	168h	0/25	MSL 1 compliant
THB	Y	JESD22 A-101	Ta = 85°C / RH = 85% / VR = 18V	77	168h	0/77	DPA after THB compliant to AEC-Q101
					504h	0/77	
					1000h	0/77	
TC	Y	JESD22 A-104	[-65°C +150C]; 2 cycles/hour	77	100 cycles	0/77	DPA after TC compliant to AEC-Q101
					500 cycles	0/77	
					1000 cycles	0/77	
AC	Y	JESD22 A-102	Ta = 121°C / RH = 100% / P=2 Bars	77	96h	0/77	
Die Oriented Tests							
HTRB	N	JESD22 A-108	Tj = 150°C / VR = 18V	77	168h	0/77	
					504h	0/77	
					1000h	0/77	

ITA25B1

Test	PC	Std ref.	Conditions	SS	Steps	Failure/SS		Note
						Lot 3	Lot 4	
Package Oriented Tests								
Precond	Y	JESD22 A-113	MSL 1: Ta = 85°C; RH = 85%	25	168h	0/25	N/A	MSL1 compliant
THB	Y	JESD22 A-101	Ta = 85°C / RH = 85% / VR = 24V	77	168h	0/77	N/A	DPA after THB compliant to AEC-Q101
					504h	0/77	N/A	
					1000h	0/77	N/A	
TC	Y	JESD22 A-104	[-65°C +150C]; 2 Cycles/hour	154	100 cycles	0/77	0/77	DPA after TC compliant to AEC-Q101
					500 cycles	0/77	0/77	
					1000 cycles	0/77	0/77	
AC	Y	JESD22 A-102	Ta = 121°C / RH = 100% / P=2 Bars	77	96h	0/77	N/A	
Die Oriented Tests								
HTRB	N	JESD22 A-108	Tj = 125°C; VR = 24V	77	168h	0/77	N/A	
					504h	0/77	N/A	
					1000h	0/77	N/A	

6 ANNEXES

6.1 Tests Description

Test name	Description	Purpose
Die Oriented		
HTRB High Temperature Reverse Bias	The device is stressed in static configuration, trying to satisfy as much as possible the following conditions: low power dissipation; max. supply voltage compatible with diffusion process and internal circuitry limitations;	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. To maximize the electrical field across either reverse-biased junctions or dielectric layers, in order to investigate the failure modes linked to mobile contamination, oxide ageing, layout sensitivity to surface effects.
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.
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.
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.

Please Read Carefully:

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries(‘‘ST’’) reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST’s terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

UNLESS OTHERWISE SET FORTH IN ST’S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND / OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

UNLESS EXPRESSLY APPROVED IN WRITING BY TWO AUTHORIZED ST REPRESENTATIVES, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS ‘‘AUTOMOTIVE GRADE’’ MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER’S OWN RISK.

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com