PRODUCT/PROCESS CHANGE NOTIFICATION

PCN IPD-DIS/12/7507
Dated 19 Oct 2012

IPD - ASD & IPAD Division

Data Protection in uQFN packages

Extension of the manufacturing in China to all product range

Table 1. Change Implementation Schedule

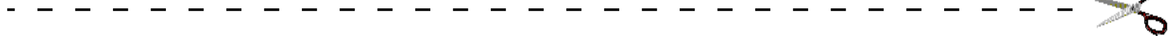
Forecasted implementation date for change	12-Oct-2012
Forecasted availability date of samples for customer	12-Oct-2012
Forecasted date for **STMicroelectronics** change Qualification Plan results availability	12-Oct-2012
Estimated date of changed product first shipment	18-Jan-2013

Table 2. Change Identification

Product Identification (Product Family/Commercial Product)	Data Protection in uQFN packages
Type of change	Assembly additional location
Reason for change	capacity increase
Description of the change	In complement to PCNs MPA-DIS/06/1798 and APM-DIS/06/3891 announcing the manufacturing extension in China of most Data Protection Devices in uQFN, 2 through 12 lead packages, we have decided to expand this manufacture in China to all Data Protection products in similar uQFN packages, to meet the fast growing market demand.
Change Product Identification	marking, trace code, internal codification 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/12/7507**
Please sign and return to STMicroelectronics Sales Office	**Dated 19 Oct 2012**

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

Remark

....

....

....

....

....

....

....

....

DOCUMENT APPROVAL

Name	Function
Paris, Eric	Marketing Manager
Duclos, Franck	Product Manager
Cazaubon, Guy	Q.A. Manager

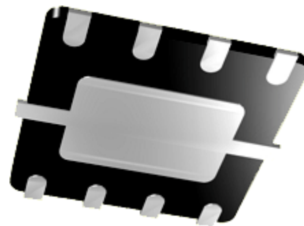
PRODUCT/PROCESS
CHANGE NOTIFICATION

PCN IPD-DIS/12/7507

IPD - ASD & IPAD Division[1]

Data Protection in µQFN packages:

Extension of the manufacturing in China to all product range



(1) IPD: Industrial & Power Discretes - ASD: Application Specific Device - IPAD: Integrated Passive and Active Devices

WHY THIS CHANGE?

In complement to **PCNs MPA-DIS/06/1798** and **APM-DIS/06/3891** announcing the manufacturing extension in China of most **Data Protection Devices in µQFN**, 2 through 12 lead packages, we have decided to expand this manufacture in China to **all Data Protection products** in similar **µQFN packages,** to meet the fast growing market demand.

The additional **assembly and test for µQFN packages** is located **in China** and is part of the same manufacturing Company as the current production site in Malaysia.

Packages	Assembly and Test Location	
	Current	New
µQFN	CHINA* MALAYSIA	CHINA MALAYSIA

** Currently used for most Protection Devices in µQFN 2 through 12 leads*

The implementation of this additional assembly and test line in China will result in a **capacity increase** for the manufacturing of our products assembled in µQFN technology packages.

The involved product series at this stage are listed in the below table.

Product Family	Involved Product series
Data Protection Devices	ESDAXLC6-1MY2
	DVIULC6-2M6
	HDMIULC6-2M6
	SATAULC6-2M6
	USBULC6-2M6

WHAT IS THE CHANGE?

The **China line**, located in a plant of the Shanghai area, is the **replication** of the **Malaysia line** currently producing our products in µQFN packages.

The **Bill of Material** remains **the same** as for the Malaysia line.

The products assembled on the new line do not present modified **electrical**, **dimensional** or **thermal** parameters, leaving **unchanged** the current information published in the product datasheet. The verification is included in the **qualification program**.

The parts also pass **MSL 1** (Moisture Sensitivity Level 1) according to the IPC/JEDEC J-STD-020D standard. The **footprints** recommended by ST remain the same.

There is **no change** in the **packing modes** and the standard **delivery quantities** either. The products remain in full compliance with the **ST ECOPACK®2** grade ("halogen-free").

HOW AND WHEN?

Qualification and test results:

The **reliability test plan** supporting the qualification program for the new assembly line is annexed to the present document. The production ramp-up will be monitored with a **pre-launch control plan** implemented on selected parameters.

Sampling:

Qualification samples of **devices** produced in **China** are **available on request**.

Change implementation schedule:

The **production start** and **first shipments** will be implemented according to our work in progress and materials availability as indicated in the schedule below:

Sales types	Production Start	1st Shipments
All	From **week 39-2012**	From **week 02-2013**

Absence of acknowledgement of this PCN within **30 days** of receipt will constitute acceptance of the change. After an acknowledgement, unless otherwise previously agreed to in writing for a specific process change requirement or for device specific requirements, absence of additional response within **90 days** of receipt of this PCN will constitute acceptance of the change. **Shipments** may in any case start earlier with the customer's **written agreement**.

Marking and Traceability:

Parts assembled in the new line will have their product marking rotated versus the parts assembled in **Malaysia**, as indicated in the table below.

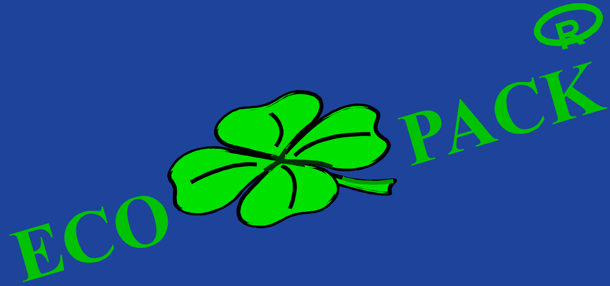
Sales types	Rotation angle vs Malaysia*
ESDAXLC6-1MY2	90° anticlockwise
SATAULC6-2M6	
DVIULC6-2M6	
HDMIULC6-2M6	
USBULC6-2M6	

NOTE:	In no case the product marking should be used to orient the component for its placement on a PCB. Only pin 1 mark is to be used for this purpose.

The **traceability** of the new assembly plant will be ensured by the **trace code** printed on the box labelling, by an **internal codification** and by the **Q.A. number**.

Annex: reliability report for qualification program

- Reliability report **12226QRP-revA** for Data Protection in µQFN packages.



QUALIFICATION REPORT
Data Protection in µQFN packages :

Extension of the manufacturing in China to all product range

Author : J.MICHELON Quality Assurance ST TOURS

REVISION TRACKING

Revision	Date	Description of revision	Name
A	26-September-2012	Linked to PCN IPD-DIS/12/7507	Julien MICHELON

CONTENTS

- Change description
- Product range
- Vehicles tests
- Qualification plan : guidelines and description / Stress tests selection
- Reliability : abbreviations and meanings
- Reliability : die oriented tests / results
- Reliability : package oriented tests / results
- Assessment

Protection in µQFN packages:
Extension of the manufacturing in China to all product range

CHANGE DESCRIPTION AND PRODUCT RANGE

The **China line**, located in a plant of the Shanghai area, is the **replication** of the **Malaysia line** currently producing our products in µQFN packages.

Product Family	Involved Product series
Data Protection Devices	ESDAXLC6-1MY2
	DVIULC6-2M6
	HDMIULC6-2M6
	SATAULC6-2M6
	USBULC6-2M6

Protection in µQFN packages:
Extension of the manufacturing in China to all product range

Vehicles tests

Part numbers given as example in below tables have been chosen as test vehicle for this qualification.

Part number	Package	Diffusion plant	Assembly Plant
ESDALC6V1-5M6	µQFN 6 leads 1.45x1.0mm²	ST Tours	Subcon China
ESDA8V2-1MX2	µQFN 2 leads 1.45x1.0mm²		
EMIF04-1005M8	µQFN 8 leads 1.7x1.5mm²		
EMIF06-1502M12	µQFN 12 leads 2.5x1.5mm²		
EMIF08-1502M16	µQFN 16 leads 3.3x1.5mm²		
USBULC6-2M6	µQFN 6 leads 1.45x1.0mm²		

QUALIFICATION PLAN : GUIDELINES AND DESCRIPTION

* Applicable documents : general procedure SOP2610 (STMicroelectronics).
  Detail specification : 0061692 (STMicroelectronics)

* Guidelines : a product or a family of products is considered qualified when it fulfils the requirements of a qualification plan which covers various aspects such as : development, reliability and manufacturing.

RELIABILITY EVALUATION : TEST SELECTION GUIDELINES

Specific emphasis is put on electrical, thermo mechanical and environmental tests which are intended to accelerate failure mechanisms in order to define the limits of the products when they are submitted to industrial conditions.

The reliability tests performed are split into 2 main families called die oriented tests and package oriented tests. Tests are selected according to the knowledge of application conditions of the products, failure mode effect analysis performed at design / development, and to the history of the manufacturing process.

The attached sheets provide relevant information on applicable tests, international standards, failure point, failure process, sample size as well as acceptance numbers.

RELIABILITY: ABBREVIATIONS AND MEANINGS

* Failure point : Physical localization of failure.

* Failure process : Physical or chemical or other mechanism resulting in a failure.

* F I T : Failure unit ; 1 fit = 1 failure in 10^9 devices - Hours.

* Failure rate : Also called "Lambda - λ" ; it is the incremental change in the number of failures per associated incremental change with time. The failure rate is expressed in fits. Note : MTBF (Mean Time Between Failure) = $1/\lambda$. Currently "λ" is provided in the life-time of the device (constant λ ; exponential modelisation of the population reliability : $R(t) = \frac{N(t)}{N(to)} = e^{-\lambda t}$)

* Accelerating factor :The physical or chemical factor increasing the failure rate.

•Confidence level : A 60% confidence level means there is a 60% possibility that the sample came from a population whose failure rate does not exceed the given failure rate.

* Ea : Activation energy (eV : electron volt). Activation energy is introduced in Arrhenius law It is representative of the failure mechanism involved. Ex : 1eV is used to modelize failure rate when surface charges are involved.

Protection in µQFN packages:
Extension of the manufacturing in China to all product range

RELIABILITY: DIE ORIENTED TESTS

TEST DESCRIPTIONS	FAILURE POINT	FAILURE PROCESS	ACCELERATING FACTORS / ACTIV. ENERGY
HIGH TEMPERATURE REVERSE BIAS (HTRB) JESD22-A108 Tj, Reverse biasing at rated Vr ; 1000Hrs	PASSIVATION LAYERS	SURFACE CHARGES ACCUMULATION	TEMPERATURE ELECTRICAL FIELD Ea = 1.0 eV
TEMPERATURE HUMIDITY BIAS (THB) JESD22-A101 85°C, 85% RH, Reverse biasing at rated Vr, 1000 Hrs	DIE PERIPHERY PASSIVATION LAYER METALLIZATION	POOR HERMETICITY CONTAMINATION CORROSION	HUMIDITY TEMPEARTURE VOLTAGE Ea=0.8V

Protection in µQFN packages:
Extension of the manufacturing in China to all product range

RELIABILITY: DIE ORIENTED TESTS CONDITIONS / RESULTS

All test vehicles used for this qualification have been manufactured in China plant of subcontractor

RELIABILITY TEST	TEST CONDITIONS	RUNNER(*)	RESULTS
HIGH TEMPERATURE REVERSE BIAS (HTRB) JESD22-A108	Tj = 150°C V = 5V 1000h	ESDALC6V1-M3 (*) ESDALC6V1-1BM2 (*)	0/79 0/79
TEMPERATUE HUMIDITY BIAS (THB) (**) JESD22-A101	Ta=85°C, 85% RH V = 5V 1000h	ESDALC6V1-1BM2 (*)	0/80 0/80 0/80

Notes :

-failure criteria : electrical parameter as defined in product datasheet
-failure criteria : resistance value evolution <5%
(*) selected as per structural similarities procedures for CECC90000 –Issue 4-Para.3.2
(**) : all devices for the THB reliability test were assembled on Printed Circuit Boards

Protection in µQFN packages:
Extension of the manufacturing in China to all product range

RELIABILITY : PACKAGE ORIENTED TESTS

TEST DESCRIPTIONS	FAILURE POINT	FAILURE PROCESS	ACCELERATING FACTORS / ACTIV. ENERGY
THERMAL CYCLING (TCT) JESD22-A104 -55°C/+150°C ; Air / Air ; 1000Cycles	DIE VOLUME DIE ATTACH INTERFACE PASSIVATION LAYERS	SILICON / PACKAGE THERMAL EXPANSION COEFFICIENT MISMATCH	T EXTREMES IN CYCLING.
PRECONDITIONING (MSL 1) J-STD-020C - Bake : 24hrs / 125°C - THB : 168hrs / 85%RH / 85°C (3 IR reflow in oven with recommended T° profile)	PACKAGE HERMETICITY AND DIE VOLUME	POOR HERMETICITY SILICON / PACKAGE	TEMPERATURE AND HUMIDITY SOLDERING SIMULATION
U-HAST JSTD22A-110B 130℃, 85%RH, 96hrs	DIE PERIPHERY PASSIVATION	POOR HERMETICITY CONTAMINATION	TEMPERATURE / PRESSURE

Protection in µQFN packages:
Extension of the manufacturing in China to all product range

RELIABILITY : PACKAGE ORIENTED TESTS

TEST DESCRIPTIONS	FAILURE POINT	FAILURE PROCESS	ACCELERATING FACTORS / ACTIV. ENERGY
SOLDERABILITY J-STD-002 - Dry aging (150°C, 16Hrs) solderability test 220°C / PbSn - Dry aging (150°C, 16Hrs) solderability test 245°C / SnAgCu - Steam aging (100°C, 8Hrs) solderability test 220°C / PbSn - Steam aging (100°C, 8Hrs) solderability test 245°C / SnAgCu	LEAD SURFACE	PLATING OR DIPPING PROCESS MATERIAL	AGING HUMIDITY TEMPERATURE
REPEATED IR REFLOWS J-STD-020C (assembly on board)	DIE VOLUME	SILICON / PACKAGE	SOLDERING SIMULATION ON BOARD

RELIABILITY : PACKAGE ORIENTED TESTS / RESULTS

All test vehicles used for this qualification have been manufactured in China plant of subcontractor

RELIABILITY TEST	TEST CONDITIONS	VEHICLE PACKAGE (*)	RESULTS
THERMAL CYCLING (TCT) JESD22-A104	-65℃/+150℃ 2 cy/h 500 cycles	ESDALC6V1-5M6	0/25
		ESDA8V2-1MX2	0/25
		EMIF06-1502M12	0/77
		EMIF08-1502M16	0/25
		USBULC6-2M6	0/25
		USBULC6-2M6	0/25
		USBULC6-2M6	0/25
THERMAL CYCLING (TCT) Assembled on board JESD22-A104	-65℃/+150℃ 2 cy/h 500 cycles	ESDALC6V1-5M6	0./25
		EMIF06-1502M12	0/25
		EMIF08-1502M16	0/25
PRECONDITIONING (MSL 1) J-STD-020C	Bake : 24hrs / 125°C THB : 168hrs / 85%RH / 85°C (3 IR reflow in oven with recommended T° profile)	ESDALC6V1-5M6	0/22
		EMIF04-1005M8	0/22
		EMIF06-1502M12	0/22
		EMIF08-1502M16	0/22

Protection in µQFN packages:
Extension of the manufacturing in China to all product range

RELIABILITY : PACKAGE ORIENTED TESTS / RESULTS

All test vehicles used for this qualification have been manufactured in China plant of subcontractor

RELIABILITY TEST	TEST CONDITIONS	VEHICLE PACKAGE (*)	RESULTS
U-HAST	130°C / 100%RH / 96 hours	ESDALC6V1-5M6	0./25
		EMIF06-1502M12	0/77
		EMIF08-1502M16	0/25

Note : failure criteria :electrical parameter as defined in product data sheet
(*) selected as per structural similarities procedures for CECC 90000 - Issue 4 - Para 3.2.

Protection in µQFN packages:
Extension of the manufacturing in China to all product range

RELIABILITY : PACKAGE ORIENTED TESTS / RESULTS

All test vehicles used for this qualification have been manufactured in China plant of subcontractor

RELIABILITY TEST	TEST CONDITIONS	VEHICLE PACKAGE (*)	RESULTS
SOLDERABILITY	Aging / Solder bath 150°C – 16 Hrs / SnPb 220°C 150°C – 16 Hrs / SnAgCu 245°C 100°C – 8Hrs / SnPb 220°C 100°C – 8Hrs / SnAgCu 245°C	EMIF04-1005M8	0/15 0/15 0/15 0/15
		EMIF06-1502M12	0/15 0/15 0/15 0/15
		EMIF08-1502M16 (same lead finishing as M6 products)	0/15 0/15 0/15 0/15
IR REFLOW J-STD-020C	3 Leadfree Reflow profiles	ESDALC6V1-5M6	0 / 800
		EMIF06-1502M12	0 / 800
		EMIF08-1502M16	0 / 800

Note : failure criteria :electrical parameter as defined in product data sheet
(*) selected as per structural similarities procedures for CECC 90000 - Issue 4 - Para 3.2.

ASSESSMENT

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).
On the other hand, the observed stability of electrical parameters along the accelerated tests proves with confidence the ruggedness of the products and safe operation during their lifetime is consequently expected.

Completion date	Location	Department	Name
September 26th, 2012	STMicroelectronics 16 rue Pierre et Marie Curie BP7155 37071 TOURS Cedex 2, France	Product Quality Assurance	Julien MICHELON Quality Assurance Engineer E-mail : Julien.Michelon@st.com

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 AN AUTHORIZED ST REPRESENTATIVE, 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

ⓒ2012 STMicroelectronics - All rights reserved.

STMicroelectronics group of companies

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

www.st.com