



PRODUCT/PROCESS CHANGE NOTIFICATION

PCN APM-DIS/10/5985
Notification Date 10/22/2010

APM - ASD & IPAD Division
Protection Devices and IPAD in Flip-Chip
Additional sawing & test locations in China and Philippines

Table 1. Change Implementation Schedule

Forecasted implementation date for change	15-Oct-2010
Forecasted availability date of samples for customer	15-Oct-2010
Forecasted date for STMicroelectronics change Qualification Plan results availability	15-Oct-2010
Estimated date of changed product first shipment	21-Jan-2011

Table 2. Change Identification

Product Identification (Product Family/Commercial Product)	Protection Devices and IPAD in Flip-Chip
Type of change	Multiple locations change
Reason for change	increase manufacturing capacity
Description of the change	In order to better meet the market demand, we have decided to expand our sawing and test capacities for our Protection Devices and IPADs in Flip-Chip packaging, with two additional plants in China and Philippines.
Product Line(s) and/or Part Number(s)	See attached
Description of the Qualification Plan	See attached
Change Product Identification	marking, internal codification, QA number
Manufacturing Location(s)	

Table 3. List of Attachments

Customer Part numbers list	
Qualification Plan results	

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Customer Acknowledgement of Receipt		PCN APM-DIS/10/5985
Please sign and return to STMicroelectronics Sales Office		Notification Date 10/22/2010
☐ Qualification Plan Denied ☐ Qualification Plan Approved ☐ Change Denied ☐ Change Approved	Name:	
	Title:	
	Company:	
	Date:	
	Signature:	
Remark		

DOCUMENT APPROVAL

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



APM - ASD & IPAD Division¹

Protection Devices and IPAD™ in Flip-Chip:

Additional sawing & test locations in China and Philippines



Flip-Chip

(1) APM: Analog, Power & MEMS Group - ASD: Application Specific Device - IPAD: Integrated Passive and Active Devices

WHY THIS CHANGE?

In order to better meet the market demand, we have decided to expand our **sawing and test capacities** for our **Protection Devices and IPADs in Flip-Chip** packaging, with **two additional plants** in **China and Philippines**.

Multi-sourcing	Current	New
Test & sawing	ST China ST France	ST China ST France Subcon in China ST Philippines

Bumping operations remain located in ST China and ST France, before test and sawing.

This sawing and test multi-sourcing will increase our **manufacturing capacity** for a better service on our products in Flip-Chip.

All Products in Flip-Chip except some Protection Devices in ultra low capacitance technology will progressively be involved in this capacity extension, as indicated in the table below.

Product Family	Product series
IPADs	All devices in Flip-Chip except IPDs (Integrated Passive Devices on glass)
Protection Devices	All other devices in Flip-Chip than: ESDARF03-1BF3, ESDAULC6-8F3, ESDAXLC4-1BF3 HDMIULC6-4F3, USBULC6-2F3, USBULC6-2F3A, USBULC6-3F3

WHAT IS THE CHANGE?

The process flow with the additional sawing and test locations is summarized in the table below.

Operation	Current plants	Subcon in China	ST Philippines
UBM (under ball metallization)	Diffusion plant		
Back grinding	Diffusion plant		
Bumping	ST China or ST France		
Laser Marking/Sawing & Test/Finishing	Product marking/ Wafer mounting	Visual sorting	Product marking/ Wafer mounting
	Sawing	Electrical test	Sawing
	Visual sorting	Product marking/ Wafer mounting	Visual sorting
	Electrical test	Sawing + Inspection	Electrical test
	Finishing	Finishing	Finishing
Shipment to customers	ST warehouses		

Test programs and sawing specification remain **unchanged**. This sawing and test multi-sourcing has no effect on the **electrical, dimensional and thermal** parameters of the products. The verification is included in the **qualification program**.

There is **no change** in the **packing modes** and the standard **delivery quantities**. All products involved in the change will remain in full compliance with **ST ECOPACK®2** grade often referred to as "halogen-free".

HOW AND WHEN?**Qualification and test results:**

According to the **risk analysis** performed on the additional sawing and test facility in China, no major risk has been evidenced whether it would be at **product electrical parameter** level or at **product reliability** level. The same qualification process is also being performed for ST site in Philippines.

The qualification plan is based on the validation of the **assembly reports**, **assembly yields** and **electrical yields** collected for different lots of each site.

Additionally, a **PLCP** (Pre Launch Control Plan) will be implemented in each new location from production start, focusing on main assembly and electrical parameters to closely monitor the production ramp-up.

Sampling:

For the concerned product families, samples of **selected devices** are available on request as indicated below.

Site	Product Family	Sales types	Availability
Subcon in China	Protection Devices	ESDA18-1F2	Now
		ESDA14V2-2BF3	
	IPAD	EMIF07-LCD02F3	
		EMIF10-LCD02F3	
ST Philippines	Protection Devices	LFTVS10	From Week 48-2010
		LFTVS18	
	IPAD	EMIF03-SIM02F2	

Other samples will be available on request, with delivery according to **deployment schedule**.

Change implementation schedule:

The additional sawing and test capacity will be deployed **from Q4-2010** and **along 2011** according to market requirements.

The **production start** and **first shipments** will be implemented according to the following schedule:

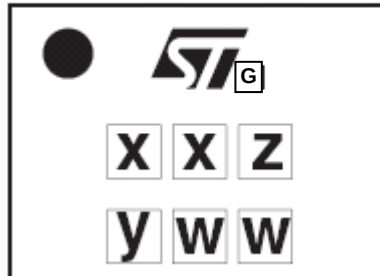
Salestypes	New S & T site	Production Start	1st Shipments
All involved parts	Subcon in China	From Week 37-2010	From Week 03-2011
	ST Philippines	From Week 48-2010	From Week 10-2011

Following Jedec Standard No. 46-C, lack of acknowledgement of the PCN within **30 days** will constitute acceptance of the change. After acknowledgement, lack of additional response within the **90 day** period from PCN notification will constitute acceptance of the change. In any case, **first shipments** may start earlier with customer's **written agreement**.

Marking and Traceability:

The marking of the components will be differentiated by a **specific "Z" digit** for each location as indicated in the table below.

Dot, ST logo
 xx = marking
 z = manufacturing location
 yww = datecode
 (y = year
 ww = week)



UBM plant	Subcon in China	ST Philippines
ST France	2	5
ST Singapore	6	7

Besides the product marking, the traceability of the devices will be ensured by an **internal codification** and by the **QA number**.

Annex: Related qualification report

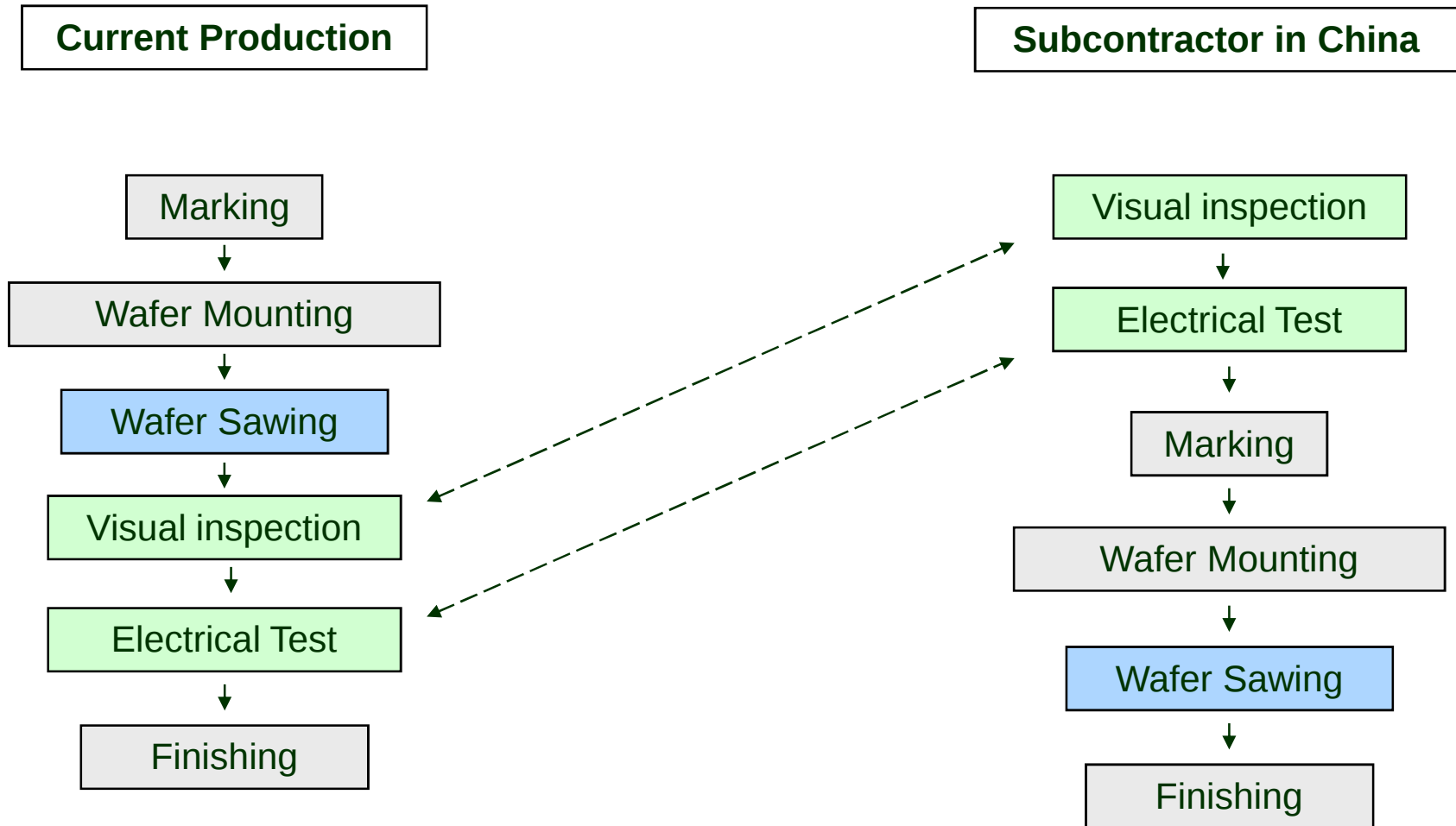
- **Comparative operation flows for new sawing & test subcontractor in China.**



Comparative operation flows for new sawing & test subcontractor in China

*ASD & IPAD Division
Product QA - Oct. 2010*

Sawing and test flow chart comparison



- The risk analysis conducted by ST covered the following main criteria:
 - Impact on electrical and visual parameters,
 - Impact on traceability,
 - Impact on sawing quality,
 - Impact on the robustness of the device.

- The FMEA (Failure Mode and Effect Analysis) conducted by ST Engineers did not identify potential causes of failure in the subcontractor sawing and test process, which could affect product reliability and which should not be detected during production.

Electrical and visual results of tests performed



- 4 test vehicles were selected in the qualification plan, 1 lot of 25 wafers was processed for each test vehicle by the subcontractor in China, and the results on these lots have been compared to those of ST current production from Jan 2010 until Oct 2010.
- Comparative assembly and electrical yields are presented below:

Yield difference at assembly between Subcontractor in China and Current STMicroelectronics production	
Test Vehicle	Delta Yield
EMIF10-LCD02F3	-0.20 %
EMIF07-LCD02F3	0.70%
ESDA18-1F2	0.13%
ESDA14V2-2BF3	0.16%
Overall yield difference between Subcontractor in China and Current STMicroelectronics production	
Test Vehicle	Delta Yield
EMIF10-LCD02F3	-0.07%
EMIF07-LCD02F3	-0.07%
ESDA18-1F2	-0.01%
ESDA14V2-2BF3	-0.70%

- Additional results and comments:
 - All cpks measured on package dimensions are superior to 6,
 - Feed speed is suitable to high quality sawing regarding chipping,
 - Blades are replaced within ST's specification,
 - Devices are 100% inspected for chipping on both sides of the component at finishing step.

Consequently, a chipping occurrence was assessed with low probability.

- Product traceability is ensured through automation system, with no detected issue.
- In conclusion, based on comparative results obtained with qualification lots for electrical and visual parameters, quality sawing assessment and operation inspections performed along the subcontractor process, this new subcontractor in China is qualified. ST Philippines will be qualified according to the same criteria.

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