PRODUCT/PROCESS CHANGE NOTIFICATION

PCN IPD-DIS/12/7440
Dated 10 Sep 2012

APM - ASD & IPAD Division

Rectifiers and Protection Devices in SMAflat package

Additional Assembly and Test Location in China

Table 1. Change Implementation Schedule

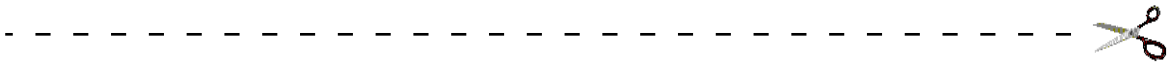
Forecasted implementation date for change	14-Sep-2012
Forecasted availability date of samples for customer	03-Sep-2012
Forecasted date for **STMicroelectronics** change Qualification Plan results availability	03-Sep-2012
Estimated date of changed product first shipment	07-Dec-2012

Table 2. Change Identification

Product Identification (Product Family/Commercial Product)	Rectifiers and Protection Devices in SMAflat
Type of change	Assembly additional location
Reason for change	To expand manufacturing capacities
Description of the change	In order to better meet the market demand, we have decided to expand our manufacturing capacities for all our Rectifiers and Protection Devices housed in SMAflat package with one additional assembly and test line in our ST China plant.
Change Product Identification	Product marking, internal part number, trace code, QA number
Manufacturing Location(s)	

Table 3. List of Attachments

Customer Part numbers list	
Qualification Plan results	



Customer Acknowledgement of Receipt	**PCN IPD-DIS/12/7440**
Please sign and return to STMicroelectronics Sales Office	**Dated 10 Sep 2012**

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

Remark

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DOCUMENT APPROVAL

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

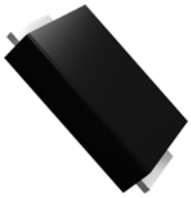
PRODUCT/PROCESS
CHANGE NOTIFICATION

PCN IPD-DIS/12/7440

APM - ASD & IPAD Division[1]

Rectifiers and Protection Devices in SMAflat package:

Additional Assembly and Test Location in China



(1) IPD: Industrial & Power Discretes - 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 manufacturing capacities** for all our **Rectifiers** and **Protection Devices** housed in **SMAflat package** with one **additional assembly and test line** in our **ST China plant**.

Multi-sourcing	Current	New
Assembly & test location	CHINA (subco) – ECOPACK®2	CHINA 1 (subco) – ECOPACK®2 **CHINA 2 (ST plant) – ECOPACK®2**

This multi-sourcing will increase our **manufacturing capacity** for a better service on the considered **Rectifiers** and **Protection Devices** housed in the **SMAflat** package.

The **product series** involved in this production extension are listed below.

Product sub-Family	Commercial product
Rectifiers	STPSxxxAF
Protection Devices	SMA4Fxxx/SMA6Fxxx SMA6F12AVCL SMTYFxxxA

Specific devices not expressly listed in the above table are included in this change.

WHAT IS THE CHANGE?

The assembly **bill of material** which remains **identical** is summarized in the table below.

Material	SMAflat series	
	Current (Subco China)	New (ST China)
Lead Frame	Raw Cu	
Die Attach	Solder paste	
Die Bonding	Raw Cu (clip)	
Moulding Compound	ECOPACK®2 graded resin	

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 **footprint** recommended by ST remains 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.

HOW AND WHEN?

Qualification and test results:

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

Sampling:

Samples of devices produced with the new line are **available on request** as indicated below.

Product Family	SMAflat	Availability
Rectifiers	STPS2L30AF STPS2L40AF STPS2150AF	**Now**
Protection Devices	SMA6F5.0A-TR	**On demand**
	SMA6F13A-TR	**Now**

Other samples are available on request for delivery within notice period if ordered within 30 days from notification.

Change implementation schedule:

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

Mass Production Start	1st Shipments
From **wk 37-2012**	From **wk 49-2012**

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**.

Product Marking and Traceability:

Parts produced on the new line are differentiated by their **marking** as indicated below:

Assembly location	Date code marking			
	Diffusion plant code	Assy location code	Back end code	Date code
China 1 (subco)	VU (Tours) VW (S'pore)	CHN	GK	y = 1 digit indicating the year ww = 2 digits indicating the week number
China 2 (ST)		**CHN**	**G4**	

The **traceability** of the products is ensured by the **internal part number** printed on the **box labelling**, by the **trace code** marked on the components and by the **QA number**.

Annex: Related Reliability Report

- **Reliability report 12180QRP-Rev1.0** for qualification.

Qualification of
Rectifiers and Protection in SMAflat package: Additional Assembly and Test Location in China

General Information	
Product Line	Rectifiers (BU78) Protection (BU80)
Product Description	Power Schottky and Protection devices in SMAflat package: Additional assembly and test location in China
Product Group	IPD
Product division	ASD & IPAD
Package	SMAflat
Maturity level step	Qualified

Locations	
Wafer fab	STM Singapore STM Tours (France)
Assembly plant	ST Long Gang (China)
Reliability Lab	STM Tours (France)

DOCUMENT INFORMATION

Version	Date	Pages	Prepared by	Comment
1.0	03-Sep-2012	7	I. BALLON	First issue Qualification of Rectifiers (Power Schottky and Protection devices in SMAflat package: Additional assembly and test location in China (Reference document: Product Change Notification PCN IPD-DIS/12/7440)

TABLE OF CONTENTS

1 APPLICABLE AND REFERENCE DOCUMENTS

Document reference	Short description
JESD47	Stress-Test-Driven Qualification of Integrated Circuits
SOP 2614	Reliability requirements for product qualification
0061692	Reliability tests and criteria for qualifications
FMEA	8315399
RER	1206004

2 GLOSSARY

DUT	Device Under Test
PCB	Printed Circuit Board
SS	Sample Size
HTRB	High Temperature Reverse Bias
TC	Temperature Cycling
PCT	Pressure Pot 2 bars
THB	Temperature Humidity Bias
RS	Repetitive Surges
SD	Solderability

3 RELIABILITY EVALUATION OVERVIEW

3.1 Objectives

The objective of this report is to qualify Rectifiers and Protection devices housed in SMAflat package with one additional assembly and test line in our ST China plant.

The product series currently involved in this qualification are listed below.

Product sub-Family	Commercial product
Rectifiers	STPSxxxAF
Protection Devices	SMA4Fxxxx/SMA6F13A SMA6F12AVCL SMTYFxxxA

Specific devices not expressly listed in the above table are included in this change.

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 robustness of the products and safe operation, which is consequently expected during their lifetime.

4 DEVICE CHARACTERISTICS

4.1 Device description

- Rectifiers (Power Schottky) and Protection devices in SMAflat package: Additional assembly and test location in China.

4.2 Construction note

	Rectifiers (Power Schottky) and Protection devices in SMAflat package
Wafer/Die fab. information	
Wafer fab manufacturing location	STMicroelectronics Singapore STMicroelectronics Tours (France)
Wafer Testing (EWS) information	
Electrical testing manufacturing location	STMicroelectronics Singapore STMicroelectronics Tours (France)
Assembly information	
Assembly site	STMicroelectronics Long Gang (China)
Package description	SMAflat
Molding compound	**ECOPACK®2** ("Halogen-free") molding compound
Lead finishing process	Electroplating
Lead finishing material	Matte Tin (Sn 100%)
Final testing information	
Testing location	STMicroelectronics Long Gang (China)

5 TESTS RESULTS SUMMARY

5.1 Test vehicles

Lot #	Product	Back End	Package	Product Family
1	STPS2150AF	ST LGG	SMAflat	Rectifiers
2	STPS2L40AF			
3	SMTYF12A			Protection
4	SMA6F13A			
5				
6				
7				
8	SMTYF5.0A			
9	SMA6F12AVCL			
10	SMA4F5.0A			
11	STPS2L30A			Rectifiers

5.2 Test plan and results summary

Die Oriented Tests

Test	PC	Std ref.	Conditions	SS	Steps	Failure/SS					Note
						Lot 1	Lot 3	Lot 4			
HTRB	N	JESD22 A-108	Tj, Vr = 0.8xVrrm	230	168 H	0/76	0/77	0/77			
					500 H	0/76	0/77	0/77			
					1000 H	0/76	0/77	0/77			

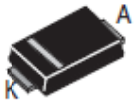
Package Oriented Tests

Test	PC	Std ref.	Conditions	SS	Steps	Failure/SS					Note
						Lot 1	Lot 3	Lot 4			
THB	Y	JESD22 A-101	Ta = 85°C, RH = 85%, Vr = 0.8xVrrm or 100V max	75	168 H	0/25	0/25	0/25			
					500 H	0/25	0/25	0/25			
					1000 H	0/25	0/25	0/25			
				SS	Steps	Failure/SS					Note
						Lot 2	Lot 3	Lot 4			
TC	Y	JESD22 A-104	Ta = -65°C to 150°C 2 cycles/hour	75	100 cy	0/25	0/25	0/25			
					500 cy	0/25	0/25	0/25			
				SS	Steps	Failure/SS					Note
						Lot 2	Lot 3	Lot 4			
PCT	Y	JESD22 A-102	121°C, RH=100%, P=2 bars	75	96hrs	0/25	0/25	0/25			
				SS	Steps	Failure/SS					Note
						Lot 3	Lot 5	Lot 6	Lot 7		
RS	Y	ST specification ADCS# 0060282	IPP(10/1000us)	80	50 Hits	0/20	0/20	0/20	0/20		
				SS	Steps	Failure/SS					Note
						Lot 1	Lot 2	Lot 3	Lot 4	Lot 8	Lot 9
Solderability	N	J-STD-002	245°C SnAgCu bath Wet aging	40		0/5	0/5	0/5	0/5	0/5	0/5
						Lot 10	Lot 11				
						0/5	0/5				
			220°C SnPb bath Wet aging	40		Lot 1	Lot 2	Lot 3	Lot 4	Lot 8	Lot 9
						0/5	0/5	0/5	0/5	0/5	0/5
						Lot 10	Lot 11				
						0/5	0/5				

6 ANNEXES

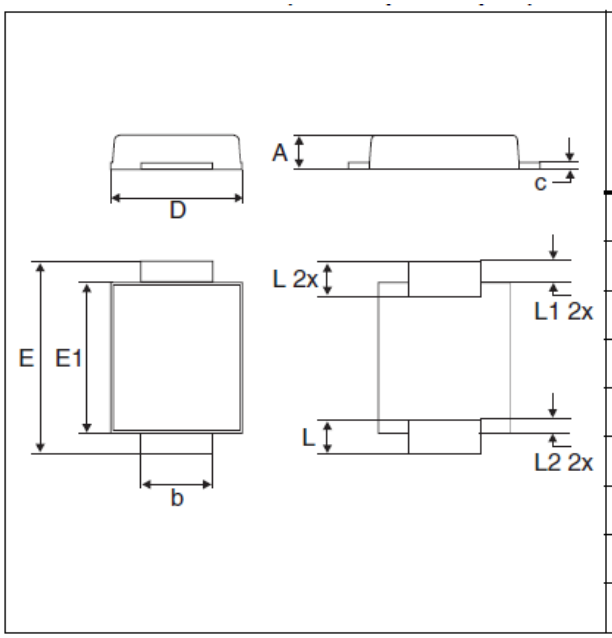
6.1 Device details

6.1.1 Pin connection

Package	Pin connection
SMAflat	 **SMAflat**

6.1.2 Package outline/Mechanical data

- **SMAflat (non-exposed pad)**



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.90		1.10	0.035		0.043
b	1.25		1.65	0.049		0.065
c	0.15		0.40	0.006		0.016
D	2.25		2.95	0.088		0.116
E	4.80		5.60	0.189		0.220
E1	3.95		4.60	0.156		0.181
L	0.75		1.50	0.030		0.059
L1		0.50			0.019	
L2		0.50			0.019	

6.2 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		
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.
PCT 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.

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