PRODUCT/PROCESS CHANGE NOTIFICATION

PCN IPG-DIS/14/8398
Dated 26 Mar 2014

Selected Power Rectifiers

Additional Assembly and Test Location in China for D2PAK package

Table 1. Change Implementation Schedule

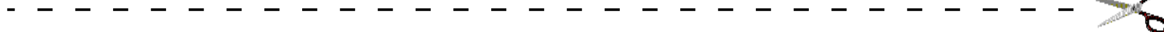
Forecasted implementation date for change	19-Mar-2014
Forecasted availability date of samples for customer	19-Mar-2014
Forecasted date for **STMicroelectronics** change Qualification Plan results availability	19-Mar-2014
Estimated date of changed product first shipment	25-Jun-2014

Table 2. Change Identification

Product Identification (Product Family/Commercial Product)	Selected Power Rectifiers
Type of change	Assembly additional location
Reason for change	to increase the manufacturing capacity
Description of the change	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	



Customer Acknowledgement of Receipt	**PCN IPG-DIS/14/8398**
Please sign and return to STMicroelectronics Sales Office	**Dated 26 Mar 2014**
☐ 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

PCN
Product/Process Change Notification

Selected Power Rectifiers
Additional Assembly and Test Location in China for D2PAK package

Notification number:	IPG-DIS/14/8398	**Issue Date**	19/03/2014
Issued by	Aline AUGIS		

Product series affected by the change

STPS10150CG-TR	STTH2003CG-TR
STPS10170CG-TR	STTH2004SG-TR
STPS10H100CG-TR	STTH20L03CG-TR
STPS10L25G-TR	STTH20P035SGTR
STPS10L40CG-TR	STTH20R04G-TR
STPS10LCD80CG-TR	STTH802G
STPS10M80CG-TR	STTH802G-TR
STPS10SM80CG-TR	STTH803G-TR
STPS1545CG-TR	STTH8R04G-TR
STPS1545G	
STPS1545G-TR	
STPS15LCD80CG-TR	
STPS15M80CG-TR	
STPS15SM80CG-TR	
STPS16170CG-TR	
STPS16H100CG-TR	
STPS20150CG	
STPS20150CG-TR	
STPS20170CG-TR	
STPS2045CG-TR	
STPS20H100CG	
STPS20H100CG-TR	
STPS20L15G-TR	
STPS20L45CG-TR	
STPS20LCD80CG-TR	
STPS20M100SG-TR	
STPS20M80CG-TR	
STPS20SM100SG-TR	
STPS20SM60CG-TR	
STPS20SM60SG-TR	
STPS20SM80CG-TR	
STPS2545CG-TR	
STPS30150CG-TR	
STPS30170CG-TR	
STPS3045CG-TR	
STPS30LCD80CG-TR	
STPS30SM100SG-TR	
STPS30SM80CG-TR	
STPS40LCD80CG-TR	
STPS745G-TR	
STPS8H100G	
STPS8H100G-TR	
STTH1002CG-TR	
STTH10P04SG-TR	
STTH10R04G-TR	
STTH1302CG-TR	
STTH15P035SG-TR	
STTH1602CG-TR	
STTH16R04CG-TR	
STTH2002CG	
STTH2002CG-TR	
STTH2002G-TR	
STTH2003CG	

Type of change	Additional assembly and test location

Description of the change

STMicroelectronics decided to **expand the manufacturing capacity Power Rectifiers** housed in **D2PAK package** with one **additional assembly** and **test plant** in China.

In order to cover both manufacturing locations D2PAK package outline dimensions, the package dimension table of the impacted products will be updated as below:

NEW D2PAK dimensions specified in datasheets

Ref.	Dimensions Millimeters Min.	Max.
A	4.36	4.6
A1	0	0.23
b	0.7	0.93
b2	1.14	1.7
c	0.38	0.694
c2	1.19	1.36
D	8.6	9.35
D1	6.9	-
E	10	10.55
E1	8.1	-
e	2.54 typ.	
H	15	15.85
L	1.9	2.79
L1	-	1.65
L2	-	1.78
L3	0.25 typ.	
L4	4.78	5.28

This D2PAK above drawing is an illustration provided for information only. D2PAK real shape may slightly differ from this particular example. Nevertheless, the mechanical dimensions specified in the table will remain applicable.

Original D2PAK dimensions specified in datasheets

Ref.	Dimensions Millimeters Min.	Max.
A	4.40	4.60
A1	2.49	2.69
A2	0.03	0.23
B	0.70	0.93
B2	1.14	1.70
C	0.45	0.60
C2	1.23	1.36
D	8.95	9.35
E	10.00	10.40
G	4.88	5.28
L	15.00	15.85
L2	1.27	1.40
L3	1.40	1.75
M	2.40	3.20
R	0.40 typ.	
V2	0°	8°

* FLAT ZONE NO LESS THAN 2mm

Reason for change

This additional multi-sourcing will increase our **manufacturing capacity** for a better service on the considered **Power Rectifier** devices.

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

Disposition of former products

As the purpose is to expand the manufacturing capacity, shipments of the products processed in the initial test and assembly site will continue.

Marking and traceability

Parts produced in the new China location are differentiated by their **marking** as indicated below

Assembly location	Date code marking		
	Assy plant code	Assy year	Assy week
China 1 (ST)	**GK**	**Y** (1 digit indicating the year)	**WW** (2 digits indicating the week number)
New location : China 2 (subco)	**GE**		

Traceability for the implemented change will be ensured by an **internal codification** and by the **Q.A. number**.

Qualification complete date	**August 2011**

Forecasted sample availability

Product family	Sub-family	Commercial part Number	Availability date
Diodes & Rectifiers	All	All	Upon request with from 4 to 8 weeks of delay

Change implementation schedule

Sales types	Estimated production start	Estimated first shipments
All	**Week 15-2014**	**Week 25-2014**

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	**11143QRP-Rev 1.0**

Qualification of
New ECOPACK®2 resin for Rectifiers products in *D²PAK package at Subcontractor in China*

General Information	
Product Line	Power Schottky & Ultrafast Bipolar up to 400V (BU78)
Product Description	Rectifiers in D²PAK package: New ECOPACK®2 resin
Product Group	APM
Product division	ASD & IPAD
Package	D²PAK
Maturity level step	Qualified

Locations	
Wafer fab	STM Tours (France) STM Ang Mo Kio (Singapore)
Assembly plant	Subcontrator (China)
Reliability Lab	STM Tours (France)

DOCUMENT INFORMATION

Version	Date	Pages	Prepared by	Comment
1.0	29-Jul-2011	8	I. BALLON	First issue Qualification of Power Schottky & Bipolar up to 400V (BU78) in D²PAK package: New ECOPACK®2 resin (Reference document: Product Information Letter PIL APM-DIS/11/6705, APM-DIS/11/6706, APM-DIS/11/6707, APM-DIS/11/6708)

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.
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1 APPLICABLE AND REFERENCE DOCUMENTS

Document reference	Short description
JESD47	Stress-Test-Driven Qualification of Integrated Circuits
FMEA	8343019
RER	1051002

2 GLOSSARY

DUT	Device Under Test
PCB	Printed Circuit Board
SS	Sample Size
HTRB	High Temperature Reverse Bias
TC	Temperature Cycling
PCT	Pressure Cooker Test (Pressure Pot)
THB	Temperature Humidity Bias
SD	Solderability

3 RELIABILITY EVALUATION OVERVIEW

3.1 Objectives

The objective of this report is to qualify new “Halogen-Free” encapsulation molding compound for Rectifiers housed in D²PAK package at Subcontractor in China.
The encapsulation molding compound chosen for the qualification is the same, which have been qualified at ST Shenzhen plant (China).

The reliability methodology used in this qualification follows the JESD47-G: «Stress Test Driven Qualification Methodology».

3.2 Conclusion

The perimeter addressed in this campaign qualifies the production of Rectifiers housed in D²PAK package with the new “Halogen-Free” encapsulation molding compound.
Reliability tests are positive.

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). Moreover, the stability of electrical parameters during the accelerated tests demonstrates the ruggedness of the products and safe operation, which is consequently expected during their lifetime.

4 DEVICE CHARACTERISTICS

4.1 Device description

- Rectifiers (Power Schottky & Ultrafast Bipolar up to 400V) in D²PAK package with new ECOPACK®2 Molding compound assembled at subcontractor in China.

4.2 Construction note

	Power Schottky & Ultrafast Bipolar up to 400V in D²PAK package with new ECOPACK®2 Molding compound
Wafer/Die fab. information	
Wafer fab manufacturing location	STM Ang Mo Kio (Singapore) STM Tours (France)
Wafer Testing (EWS) information	
Electrical testing manufacturing location	STM Ang Mo Kio (Singapore) STM Tours (France)
Assembly information	
Assembly site	Subcontractor in China
Package description	D²PAK
Molding compound	**ECOPACK®2** (“Halogen-free”) molding compound
Frame material	Copper
Die attach process	Soft solder
Die attach material	Preform Pb/Sn/Ag
Wire bonding process	Ultra Sonic wire bonding
Wires bonding materials	Aluminium
Lead finishing process	Plating
Lead finishing material	Tin (Sn 100%)
Final testing information	
Testing location	Subcontractor in China

5 TESTS RESULTS SUMMARY

5.1 Test vehicles

Lot #	Process/ Package	Product Family	Product
1	D²PAK	Power Schottky	STPS3045CG-TR
2			STPS30170CG-TR
3		Ultrafast Bipolar	STTH2004SG-TR

5.2 Test plan and results summary

Die Oriented Tests

Test	PC	Std ref.	Conditions	SS	Steps	Failure/SS Lot 2	Failure/SS Lot 3	Note
HTRB	N	JESD22 A-108	Tj, Vr = 0.8xVrrm	154	168 H	0/77	0/77	
					500 H	0/77	0/77	
					1000 H	0/77	0/77	

Package Oriented Tests

Test	PC	Std ref.	Conditions	SS	Steps	Failure/SS Lot 1	Failure/SS Lot 2	Failure/SS Lot 3	Note
THB	N	JESD22 A-101	Ta = 85°C, RH = 85%, Vr = 0.8xVrrm or 100V max	73	168 H	0/24	0/24	0/25	
					500 H	0/24	0/24	0/25	
					1000 H	0/24	0/24	0/25	
				SS	Steps	Lot 1	Lot 2	Lot 3	Note
TC	N	JESD22 A-104	Ta = -65°C to 150°C	75	100 cy	0/25	0/25	0/25	
					500 cy	0/25	0/25	0/25	
					1Kcy	0/25	0/25	0/25	
				SS	Steps	Lot 1	Lot 2	Lot 3	Note
PCT	N	JESD22 A-102	121°C, 100% RH, 2bars	75	96hrs	0/25	0/25	0/25	
				SS	Steps	Lot 1	Lot 2	Lot 3	Note
Solderability	N	J-STD-002	245°C SnAgCu bath Dry aging	30		0/10	0/10	0/10	
			245°C SnAgCu bath Wet aging	30		0/10	0/10	0/10	
				SS	Steps	Lot 1	Lot 2	Lot 3	Note
			220°C SnPb bath Dry aging	30		0/10	0/10	0/10	
			220°C SnPb bath Wet aging	30		0/10	0/10	0/10	

6 ANNEXES

6.1 Device details

6.1.1 Pin connection

Package	Pin connection	
	For Single diode configuration STPSxxxxSG STTHxxxxSG	For Double diodes configuration STPSxxxxCG STTHxxxxCG
D^{2}PAK	A A K K A A	A1 A2 K K A2 A1

6.1.2 Package outline/Mechanical data

- **D²PAK**

D²PAK dimensions

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.26	4.66	0.168	0.183
A1	0.00	0.25	0.000	0.010
b	0.70	0.93	0.028	0.037
b2	1.14	1.70	0.045	0.067
c	0.38	0.694	0.015	0.027
c2	1.19	1.36	0.047	0.053
D	8.60	9.35	0.339	0.368
D1	6.90	-	0.272	-
E	10.00	10.55	0.394	0.415
E1	8.10	-	0.319	-
e	2.54 typ.		0.100	
H	15.00	15.85	0.591	0.624
L	1.90	2.79	0.075	0.110
L1	-	1.65	-	0.065
L2	-	1.78	-	0.070
L3	0.25 typ.		0.010	
L4	4.78	5.28	0.188	0.208

6.2 Tests description

Test name	Description	Purpose
Die Oriented		
HTRB High Temperature Reverse Bias **HTFB / HTGB** High Temperature Forward (Gate) 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.
AC/PCT 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.

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