PRODUCT/PROCESS CHANGE NOTIFICATION

PCN IPG-DIS/14/8468
Dated 06 May 2014

Power Rectifiers

Additional Assembly and Test Location in China for DPAK package

Table 1. Change Implementation Schedule

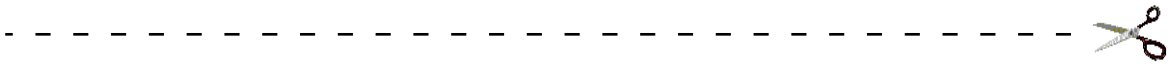
Forecasted implementation date for change	29-Apr-2014
Forecasted availability date of samples for customer	31-May-2014
Forecasted date for **STMicroelectronics** change Qualification Plan results availability	29-Apr-2014
Estimated date of changed product first shipment	05-Aug-2014

Table 2. Change Identification

Product Identification (Product Family/Commercial Product)	Power Rectifiers in DPAK package
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 and QA number
Manufacturing Location(s)	

Table 3. List of Attachments

Customer Part numbers list	
Qualification Plan results	



Customer Acknowledgement of Receipt	**PCN IPG-DIS/14/8468**
Please sign and return to STMicroelectronics Sales Office	**Dated 06 May 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

Power Rectifiers
Additional Assembly and Test Location in China for DPAK package

Notification number:	IPG-DIS/14/8468	**Issue Date**	29/04/2014
Issued by	Aline AUGIS		

Product series affected by the change

Power Schottky Diodes

STPS10170CB-TR
STPS1045B
STPS1045B-TR
STPS10LCD200CBTR
STPS10LCD80CB-TR
STPS1545CB-TR
STPS15H100CB
STPS15L30CB
STPS15L30CB-TR
STPS15L45CB
STPS15L45CB-TR
STPS15L60CB
STPS15L60CB-TR
STPS16170CB-TR
STPS20120CB-TR
STPS20LCD200CBTR
STPS340B-TR
STPS4S200B-TR
STPS5H100B
STPS5L25B-TR
STPS640CB
STPS640CB-TR
STPS660CB-TR
STPS8L30B
STPS8L30B-TR

Ultrafast Diodes

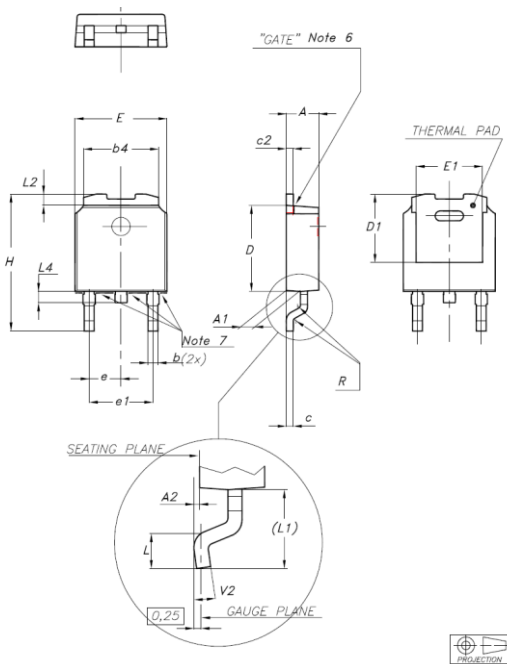
STTH1002CB
STTH1002CB-TR
STTH1004SB-TR
STTH10P04SB-TR
STTH25MC065B-TR
STTH312B-TR
STTH4R02B-TR
STTH506B
STTH512B-TR
STTH5L06B-TR
STTH5MC065B
STTH5R06B
STTH802B-TR
STTH802CB-TR
STTH8S06B-TR

Type of change	Additional assembly package location

Description of the change

STMicroelectronics decided to **expand the manufacturing capacity Power Rectifiers** (Power Schottky and Ultrafast Diodes) housed in **DPAK package** with one **additional assembly** and **test plant** in China.

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



NEW DPAK dimensions	Column1	Column2
	Dimensions (mm)	
	Min.	Max.
A	2.18	2.4
A1	0.9	1.1
A2	0.03	0.23
b	0.64	0.9
b4	4.95	5.46
c	0.46	0.61
c2	0.46	0.6
D	5.97	6.22
D1	5.1	
E	6.35	6.73
E1	4.32	
e1	4.4	4.7
H	9.35	10.4
L	1	1.78
L2		1.27
L4	0.6	1.02
V2	0°	8°

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 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	27-Nov-2012

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 10 - 2014**	**Week 31 - 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	QRP11259QRP

Qualification of
ECOPACK®2 resin for Rectifiers products in DPAK package

General Information	
Product Line	Rectifiers
Product Description	Rectifiers in DPAK package: ECOPACK®2 resin
Product Group	APM
Product division	ASD & IPAD
Package	DPAK
Maturity level step	Qualified

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

DOCUMENT INFORMATION

Version	Date	Pages	Prepared by	Comment
1.0	21-Nov-2011	8	I. BALLON	First issue Qualification of Rectifiers products in DPAK package at STM Long Gang: ECOPACK®2 resin
2.0	03-Dec-2012	9		Qualification of DPAK package at subcontractor in China: ECOPACK®2 resin

TABLE OF CONTENTS

1 APPLICABLE AND REFERENCE DOCUMENTS

Document reference	Short description
JESD47	Stress-Test-Driven Qualification of Integrated Circuits
FMEA	8315678 - 8320100
RER	1126008 (ST Long Gang in China) – 1126011 (subcontractor in China)

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 “Halogen-Free” encapsulation molding compound for Rectifiers housed in DPAK package at ST Long Gang (China) and subcontractor in China.

The product series are listed below.

Product sub-Family	DPAK series
Power Schottky Diodes	STPSxxxB(-TR) STPSxxxCB(-TR) STPSxxHxxB(-TR) STPSxxHxxCB(-TR) STPSxxLxxB(-TR) STPSxxLxxCB(-TR)
Ultrafast Diodes	STTHxxxB(-TR) STTHxxxCB(-TR) STTHxxxSB(-TR) STTHxxLCDxxSB(-TR) STTHxxPxxSB(-TR) STTHxxRxxB(-TR) STTHxxSxxB(-TR)

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 DPAK package at ST Long Gang (China) and subcontractor in China with the “Halogen-Free” encapsulation molding compound. Reliability tests are positive.

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 in DPAK package with ECOPACK®2 Molding compound assembled at ST Long Gang (China) plant and subcontractor plant in China.

4.2 Construction note

	Rectifiers in DPAK package with new ECOPACK®2 Molding compound
Wafer/Die fab. information	
Wafer fab manufacturing location	STM Singapore STM Tours (France)
Wafer Testing (EWS) information	
Electrical testing manufacturing location	STM Singapore STM Tours (France)
Assembly information	
Assembly site	STM Long Gang (China) Subcontractor in China
Package description	DPAK
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	STM Long Gang (China) Subcontractor in China

5 TESTS RESULTS SUMMARY

5.1 Test vehicles

Lot #	Process/ Package	Assembly plant	Product Family	Product
1	DPAK	ST China	Power Schottky	STPS15H100CB
2			Turboswitch	STTH512B
3			Power Schottky	STPS15H100CB
4			Turboswitch	STTH5R06B
5	D²PAK		Power Schottky	STPS3045CG
6			Power Schottky	STPS30170CG
7			Ultrafast	STTH2004SG
8			Power Schottky	STPS41H100CG
9	DPAK		Turboswitch	STTH512B
10			Power Schottky	STPS15H100CB
11 / 15	DPAK	Subcontractor (China)	Power Schottky	STPS15L45CB
12 / 16				STPS15H100CB
13 / 17			Ultrafast	STTH512B
14 / 18				STTH5R06B

5.2 Test plan and results summary

Die Oriented Tests

Test	PC	Std ref.	Conditions	SS	Steps	Failure/SS				Note
						Lots 5 to 10	Lot 12	Lot 13	Lot 14	
HTRB	N	JESD22 A-108	Tj, Vr = 0.8xVrrm	691	168 H	0/77	0/76	0/76	0/77	
					500 H	0/77	0/76	0/76	0/77	
					1000 H	0/77	0/76	0/76	0/77	

Package Oriented Tests

Test	PC	Std ref.	Conditions	SS	Steps	Failure/SS				Note
						Lot 1	Lot 2	Lot 11	Lot 13	
THB	Y	JESD22 A-101	Ta = 85°C, RH = 85%, Vr = 0.8xVrrm or 100V max	198	168 H	0/25	0/77	0/24	0/24	
					500 H	0/25	0/77	0/24	0/24	
					1000 H	0/25	0/77	0/24	0/24	
TC	Y	JESD22 A-104	Ta = -55°C to 150°C	SS	Steps	Failure/SS				Note
						Lot 3	Lot 4	Lot 11	Lot 12	Lot 14	
				227	100 cy	0/25	0/25	0/25	0/25	0/25	
					500 cy	0/25	0/25	0/25	0/25	0/25	
					Steps	Failure/SS				
						Lot 15	Lot 16	Lot 17	Lot 18	
					100 cy	0/28	0/26	0/23	0/25	
					500 cy	0/28	0/26	0/23	0/25	

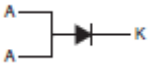
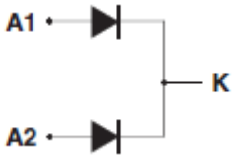
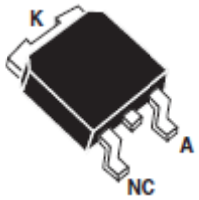
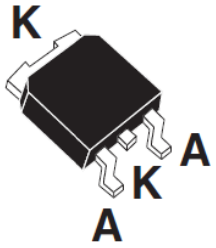
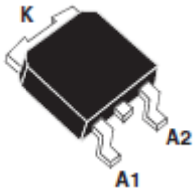
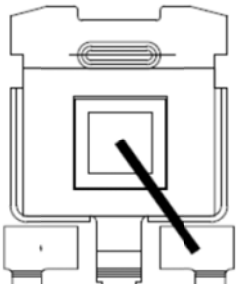
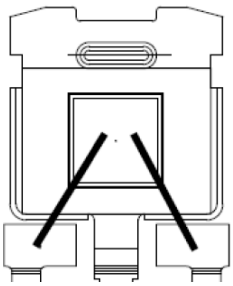
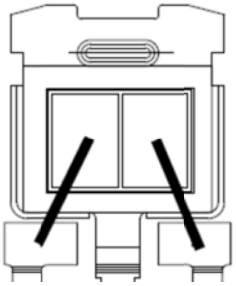
Test	PC	Std ref.	Conditions	SS	Steps	Failure/SS					Note
						Lot 1	Lot 2	Lot 11	Lot 12	Lot 14	
PCT	Y	JESD22 A-102	121°C, 100% RH, 2bars	276	96hrs	0/24	0/77	0/25	0/25	0/25	
					Steps	**Failure/SS**					
						Lot 15	**Lot 16**	**Lot 17**	**Lot 18**		
					96hrs	0/25	0/25	0/25	0/25		

Test	PC	Std ref.	Conditions	SS	Steps	Failure/SS					Note
						Lot 1	Lot 2	Lot 11	Lot 12	Lot 14	
Solderability	N	J-STD-002	245°C SnAgCu bath Dry aging	50		0/10	0/10	0/10	0/10	0/10	
			245°C SnAgCu bath Wet aging	50		0/10	0/10	0/10	0/10	0/10	
				SS	**Steps**	**Failure/SS**					**Note**
						Lot 1	**Lot 2**	**Lot 11**	**Lot 12**	**Lot 14**	
			220°C SnPb bath Dry aging	50		0/10	0/10	0/10	0/10	0/10	
			220°C SnPb bath Wet aging	50		0/10	0/10	0/10	0/10	0/10	

6 ANNEXES

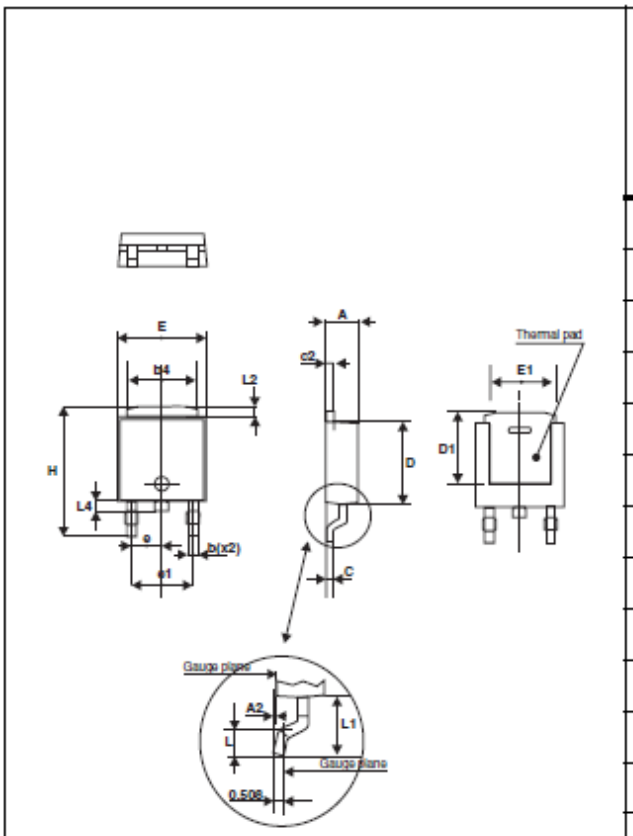
6.1 Device details

6.1.1 Pin connection and bonding diagram

Package	Pin connection		
	For Single diode configuration STPSxxxxB STTHxxxxB	For Single diode configuration STPSxxxxSB STTHxxxxSB	For Double diodes configuration STPSxxxxCB STTHxxxxCB
DPAK			
			
			

6.2 Package outline/Mechanical data

DPAK dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.18	2.39	0.085	0.94
A1	0.90	1.10	0.035	0.043
A2	0.03	0.23	0.001	0.009
B	0.64	0.89	0.025	0.035
B2	4.95	5.46	0.194	0.214
C	0.46	0.61	0.018	0.024
C2	0.46	0.60	0.018	0.023
D	5.97	6.22	0.235	0.244
D1	5.0		0.196	
E	6.35	6.73	0.25	0.264
E1	4.32		0.170	
e1	4.40	4.7	0.173	0.185
H	9.35	10.34	0.368	0.407
L	1.0	1.78	0.039	0.070
L2		1.27		0.05
L4		1.01		0.039

6.3 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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