



PRODUCT/PROCESS CHANGE NOTIFICATION

PCN IPG-DIS/14/8337

Dated 19 Feb 2014

Power Rectifiers

Additional Assembly and Test Location in China for DPAK package

Table 1. Change Implementation Schedule

Forecasted implementation date for change	12-Feb-2014
Forecasted availability date of samples for customer	12-Feb-2014
Forecasted date for STMicroelectronics change Qualification Plan results availability	12-Feb-2014
Estimated date of changed product first shipment	21-May-2014

Table 2. Change Identification

Product Identification (Product Family/Commercial Product)	Selected Power Rectifiers in DPAK package
Type of change	Assembly additional location
Reason for change	to increase ST's manufacturing capacity
Description of the change	see attached
Change Product Identification	marking, internal codification and QA number
Manufacturing Location(s)	

DOCUMENT APPROVAL

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

PCN

Product/Process Change Notification

Power Rectifiers

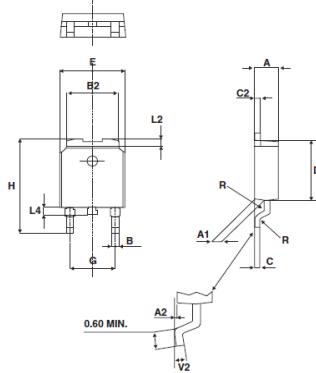
Additional Assembly and Test Location in China for DPAK package

Notification number:	IPG-DIS/14/8337	Issue Date	12/02/2014
Issued by	Aline AUGIS		
Product series affected by the change		<u>Power Schottky Diodes</u> STPS15H100CB-TR STPS5H100B-TR <u>Ultrafast Diodes</u> STTH5R06B-TR STTH506B-TR STTH1003SB-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:



	Original DPAK dimensions specified in datasheets		NEW DPAK dimensions specified in datasheets	
	Dimensions (mm)		Dimensions (mm)	
	Min.	Max.	Min.	Max.
A	2.2	2.4	A	2.18
A1	0.9	1.1	A1	0.9
A2	0.03	0.23	A2	0.03
B	0.64	0.9	B	0.64
B2	5.2	5.4	B2	4.95
C	0.45	0.6	C	0.45
C2	0.48	0.6	C2	0.46
D	6	6.2	D	5.97
E	6.4	6.6	E	6.35
G	4.4	4.6	G	4.4
H	9.35	10.1	H	9.35
L2	0.80 typ.		L2	1.27
L4	0.6	1	L4	0.6
V2	0°	8°	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.

(1) IPG: Industrial & Power Group - ASD: Application Specific Device – IPAD™: Integrated Passive and Active 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																									
<table border="1"> <thead> <tr> <th>Assembly location</th> <th>Assy plant code</th> <th>Date code marking</th> </tr> <tr> <th>Assy year</th> <th>Assy week</th> <th></th> </tr> </thead> <tbody> <tr> <td>China 1 (ST)</td> <td>GK</td> <td>Y (1 digit indicating the year)</td> <td>WW (2 digits indicating the week number)</td> </tr> <tr> <td>New location : China 2 (subco)</td> <td>GE</td> <td></td> <td></td> </tr> </tbody> </table>		Assembly location	Assy plant code	Date code marking	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												
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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																									
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Change implementation schedule

Sales types	Estimated production start	Estimated first shipments
All	Week 10 - 2014	Week 20 - 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		Locations
Product Line	Rectifiers	Wafer fab
Product Description	Rectifiers in DPAK package: ECOPACK®2 resin	STM Tours (France) STM Singapore
Product Group	APM	Assembly plant
Product division	ASD & IPAD	STM Long Gang (China) Subcontractor (China)
Package	DPAK	
Maturity level step	Qualified	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

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	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			Power Schottky	STPS3045CG
6			Power Schottky	STPS30170CG
7			Ultrafast	STTH2004SG
8			Power Schottky	STPS41H100CG
9			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	T _j , V _r = 0.8xV _{rrm}	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%, V _r = 0.8xV _{rrm} 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 13		
						100 cy	0/25	0/25	0/25		
				227	Steps	500 cy	0/25	0/25	0/25		
						Failure/SS					
						Lot 15	Lot 16	Lot 17	Lot 18		
						100 cy	0/28	0/26	0/23		
						500 cy	0/28	0/26	0/23		

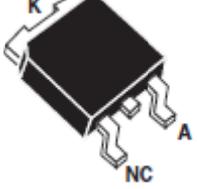
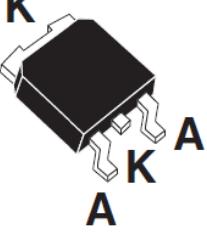
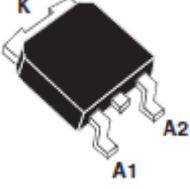
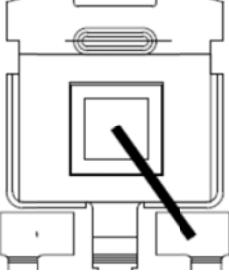
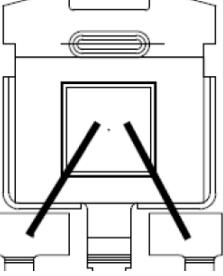
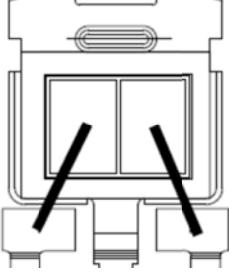
Test	PC	Std ref.	Conditions	SS	Steps	Failure/SS					Note
						Lot 1	Lot 2	Lot 11	Lot 12	Lot 14	
PCT	Y	JESD22 A-102	121°C, 100% RH, 2bars	276	96hrs	0/24	0/77	0/25	0/25	0/25	
					Steps	Failure/SS					
					96hrs	Lot 15	Lot 16	Lot 17	Lot 18		

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
			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

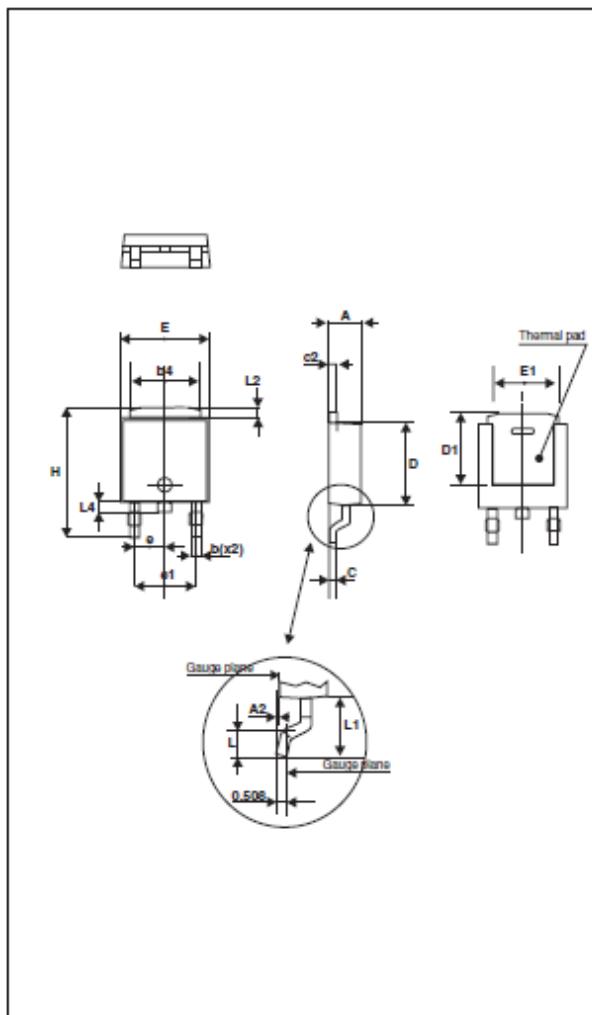
6.1 Device details

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



The diagram shows the physical dimensions of the DPAK package. It includes a top-down view, a side view, and a cross-sectional view of the gauge plane. Key dimensions labeled include: E, b4, L2, H, L4, e1, b(x2), A, a2, D, E1, D1, L1, L, and 0.508. A 'Thermal pad' is also indicated in the side view.

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.18	2.39	0.085	0.094
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	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.
HTFB / HTGB High Temperature Forward (Gate) Bias		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.



Public Products List

PCN Title : Power Rectifiers // Additional Assembly and Test Location in China for DPAK package

PCN Reference : IPG-DIS/14/8337

PCN Created on : 13-FEB-2014

Subject : Public Products List

Dear Customer,

Please find below the Standard Public Products List impacted by the change:

ST COMMERCIAL PRODUCT

STPS15H100CB-TR

STTH506B-TR

STPS5H100B-TR

STTH5R06B-TR

STTH1003SB-TR

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