STMicroelectronics
ADG - ASD & IPAD™ Division[1]
BU Rectifiers and Thyristors/Triacs

(1) ADG: Automotive & Discretes Group - ASD: Application Specific Device – IPAD™: Integrated Passive and Active Devices

PCN
Product/Process Change Notification

Halogen-free molding compound qualification for Rectifiers and Thyristors/Triacs housed in TOP3 and DOP3 packages

Notification number:	ADG-DIS/16/9797	**Issue Date**	31/05/2016
Issued by	Aline AUGIS		
Product series affected by the change		Rectifiers and Thyristors/Triacs housed in TOP3 and DOP3 packages. This PCN applies also to TOP3 / DOP3 customs devices.	
		<u>Thyristors and Triacs:</u> BTA26-600BRG BTA26-600BWRG BTA26-700BRG BTA26-800BRG BTA26-800BWRG BTA26-800CWRG BTA41-600BRG BTA41-700BRG BTA41-800BRG BTB26-600BRG BTB41-600BRG BTB41-800BRG BTW68-1200RG BTW68-600RG BTW68-800RG BTW69-1000RG BTW69-1200N BTW69-1200RG BTW69-200RG BTW69-600RG BTW69-800RG TPDV1025RG TPDV1225RG TPDV1240RG TPDV640RG TPDV825RG TPDV840RG	<u>Rectifiers:</u> STPS3045CPIRG STTH1506DPI STTH1506TPI STTH1512PI STTH3002PI STTH3006DPI STTH3006PI STTH3010PI STTH30R06PI STTH6002CPI
Type of change		Back-end realization, material change	
Description of the change Halogen-free molding compound conversion for TOP3 & DOP3 packages			

Reason for change

ST qualified the mentioned products with a halogen-free molding compound in order to be compliant with environmental requirements.

Former versus changed product:	The changed products do not present modified electrical, dimensional or thermal 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. The products is in full compliance with the ST ECOPACK®2 grade (“halogen-free”).

Disposition of former products

Former products will continue to be delivered as long as their stock will last.

Marking and traceability

The traceability is ensured by the marking (“G” letter), the date code and the QA number.

Qualification complete date	February 2016

Forecasted sample availability

Product family	Sub-family	Commercial part Number	Availability date
Thyristors/Triacs	**Triacs**	TPDV1025RG TPDV1225RG TPDV1240RG BTB41-800BRG BTB41-600BRG BTA26-800BRG BTA26-700BRG BTA26-600BRG BTA26-600BWRG BTA26-800BWRG BTA26-800CWRG BTA41-800BRG BTA41-600BRG	From week 29-2016
	SCRs	BTW68-1200RG BTW68-800RG BTW69-1200RG BTW69-600RG BTW69-800RG BTW69-1200N	

Rectifiers	**Ultrafast diodes**	STTH1506DPI STTH3006DPI STTH3006PI STTH30R06PI STTH3010PI STTH6002CPI	From week 29-2016

Samples not mentioned above will be available 4 weeks from the demand (starting week 29-2016)

Change implementation schedule

Sales types	Estimated production start	Estimated first shipments
all	Week 36-2016	Week 38- 2016

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	QRP15071 Attached

External Reliability Report

Halogen-Free Molding Compound qualification for DOP/TOP3 Insulated and Non Insulated packages

General Information	
Product Line	*PL 78 & 58*
Product Description	*Rectifier & Src Triac*
Finish Good(s)	*STTH1506TPI* *BTW69-1200RG* *BTA41-600BRG*
Product Group	*ASD & IPAD*
Product division	*ADG*
Package	*TOP3/DOP3*

Locations	
Wafer fab	*STM TOURS (FRANCE)*
Assembly plant	*Subcontractor – (PHILIPPINES - 9945)*
Reliability Lab	*ST TOURS*

Reliability Assessment
Pass

DOCUMENT INFORMATION

Version	Date	Pages	Prepared by	Approved by	Comment
1.0	08/10/2015	9	Gilles DUTRANNOY	Julien MICHELON	First issue

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1 APPLICABLE AND REFERENCE DOCUMENTS

Document reference	Short description
AEC-Q101	Stress test qualification for automotive grade discrete semiconductors
JESD 22	Reliability test methods for packaged devices
JESD 47	Stress-Test-Driven Qualification of Integrated Circuits
JESD 94	Application specific qualification using knowledge based test methodology
MIL-STD-750C	Test method for semiconductor devices
SOP 2614	Reliability requirements for product qualification
SOP 267	Product maturity levels
0061692	Reliability tests and criteria for qualifications

2 GLOSSARY

BOM	Bill Of Materials
DUT	Device Under Test
F/G	Finished Good
HTRB	High Temperature Reverse Bias
PCT	Pressure Cooker Test
P/N	Part Number
RH	Relative Humidity
SS	Sample Size
TCT	Temperature Cycling Test
THB	Temperature Humidity Bias
HTS	High Temperature Storage
UPS	Uninterruptible Power Supply

3 RELIABILITY EVALUATION OVERVIEW

3.1 Objectives

Halogen-Free Molding Compound qualification.

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 product which is consequently expected during their lifetime.

4 CHANGE DESCRIPTION

Resin conversion from Standard Molding Compound to Halogen-Free Molding Compound for TOP3& DOP3 packages.

5 TESTS RESULTS SUMMARY

5.1 Test vehicles

Qualification is supported by the following test vehicles:

Lot #	Finish Good	Package	Comments
Lot 1	BTA41-600BRG	TOP3 Insulated	High runner TRIAC
Lot 2	BTW69-1200RG	TOP3 Insulated	High runner SCR
Lot 3	STTH1506TPI	TOP3 Insulated	High runner RECTIFIER
Lot 4	BTW69-1200RG	TOP3 Insulated	High runner SCR
Lot 5	STTH1506TPI	TOP3 Insulated	High runner RECTIFIER
Lot 6	STTH12T06DI	TO220 Insulated	Similarity lot (same die technology, same resin, same stack assembly)

5.2 Test plan and results summary

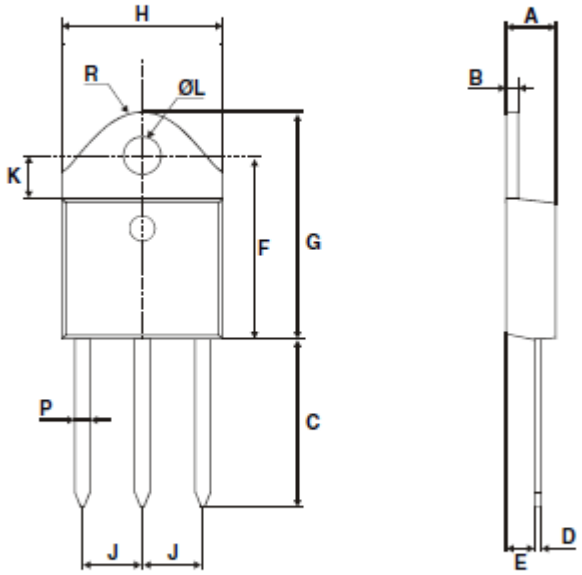
Test	Std ref.	Conditions	SS	Step	Failure/SS					
					LOT 1	LOT 2	LOT 3	LOT 4	LOT 5	LOT 6
HTRB	JESD22 A-108 MIL-STD-750C method 1040	T_j = 125 °C 600 V AC peak 1000 h	77	168 h	**0/77**					
				500 h	**0/77**					
				1000 h	**0/77**					
HTRB	JESD22 A-108 MIL-STD-750C method 1040	T_j = 125 °C 1200 V AC peak 1000 h	77	168 h		**0/77**				
				500 h		**0/77**				
				1000 h		**0/77**				
HTRB	JESD22 A-108 MIL-STD-750C method 1040	T_j = 150 °C VR = 960V 1000 h	77	168 h						**0/77**
				500 h						**0/77**
				1000 h						**0/77**
THB	JESD22 A-101	85 °C 85% RH V_r = 100 V 1000 h (200V for TRIAC)	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**		
TC	JESD22 A-104	-65 °C/+150 °C 2 cycles/h 500 cycles	75	500 cycles	**0/25**	**0/25**			**0/25**	
PCT	JESD22 A-102	121°C, 2 bars 100% RH	25				**0/25**			

6 ANNEXES

6.1 Tests Description

Test name	Standard Reference	Description	Purpose
Die Oriented			
HTRB High Temperature Reverse Bias	JESD22 A-108	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	JESD22 A-104	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	JESD22 A-101	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 Cooker Test	JESD22 A-102	The device is unbiased under 121 °C, and a 2 bars air atmosphere during 96 hours.	The PCT is performed to evaluate the reliability of non-hermetic packaged solid-state devices in humid environments. It employs severe conditions of temperature, humidity, and pressure which accelerate the penetration of moisture through the external protective material (encapsulant or seal) or along the interface between the external protective material and the metallic conductors which pass through it. The stress usually activates the same failure mechanisms as the "85/85" Steady-State Humidity Life Test (THB).

6.2 Package outline/Mechanical data



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.4	4.6	0.173	0.181
B	1.45	1.55	0.057	0.061
C	14.35	15.60	0.565	0.614
D	0.5	0.7	0.020	0.028
E	2.7	2.9	0.106	0.114
F	15.8	16.5	0.622	0.650
G	20.4	21.1	0.815	0.831
H	15.1	15.5	0.594	0.610
J	5.4	5.65	0.213	0.222
K	3.4	3.65	0.134	0.144
ØL	4.08	4.17	0.161	0.164
P	1.20	1.40	0.047	0.055
R	4.60 typ.		0.181 typ.	

6.3 List of product involved in this qualification

SCR TRIAC	RECTIFIER
BTA26-400BRG	STPS3045CPIRG
BTA26-600BRG	STPS3045CPIRG
BTA26-600BRG	STTH1506DPI
BTA26-600BWRG	STTH1506TPI
BTA26-700BRG	STTH1512PI
BTA26-700BRG	STTH3002PI
BTA26-800BRG	STTH3006DPI
BTA26-800BWRG	STTH3006PI
BTA26-800CWRG	STTH3010PI
BTA41-600BRG	STTH30AC06CP
BTA41-700BRG	STTH30R06PI
BTA41-800BRG	STTH6002CPI
BTB26-600BRG	STTH60AC06CP
BTB26-600BRG	STTH30AC06SP
BTB41-600BRG	
BTB41-800BRG	
BTW68-1200RG	
BTW68-600RG	
BTW68-800RG	
BTW69-1000RG	
BTW69-1200N	
BTW69-1200RG	
BTW69-200RG	
BTW69-600RG	
BTW69-800RG	
TPDV1025RG	
TPDV1225RG	
TPDV1240RG	
TPDV640RG	
TPDV640RG	
TPDV825RG	
TPDV825RG	
TPDV840RG	

Public Products List

PCN Title : Qualification of halogen free molding compound for Rectifiers and Thyristors/Triacs housed in TOP3 and DOP3 packages

PCN Reference : ADG/16/9797

PCN Created on : 12-May-2016

Subject : Public Products List

Dear Customer,

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

BTW68-800RG	BTA41-800BRG	STTH1512PI
STTH3006PI	STTH3002PI	BTA26-800CWRG
TPDV825RG	BTB41-600BRG	TPDV640RG
BTW69-1200RG	BTB41-800BRG	TPDV1025RG
BTA41-600BRG	STTH3010PI	STTH3006DPI
BTA26-800BRG	BTB26-600BRG	BTW69-1000RG
BTW69-1200N	BTW68-1200RG	TPDV840RG
STTH1506DPI	TPDV1240RG	BTW69-800RG
BTA26-600BRG	STTH30R06PI	STTH6002CPI
BTW69-600RG	STPS3045CPIRG	STTH1506TPI
BTW68-600RG	BTA26-600BWRG	BTA26-800BWRG
TPDV1225RG		

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