



PRODUCT/PROCESS CHANGE NOTIFICATION

PCN APM-PWR/11/6870
Notification Date 10/19/2011

**Continuous improvement by upgrading the boltdown LID of
STAC244B package to increase the max screw torque capability**

Table 1. Change Implementation Schedule

Forecasted implementation date for change	12-Oct-2011
Forecasted availability date of samples for customer	12-Oct-2011
Forecasted date for STMicroelectronics change Qualification Plan results availability	12-Oct-2011
Estimated date of changed product first shipment	18-Jan-2012

Table 2. Change Identification

Product Identification (Product Family/Commercial Product)	see attached list
Type of change	Package assembly material change
Reason for change	To improve long term reliability on STAC packages
Description of the change	In order to improve long term reliability using devices in STAC244B package, our bolt-down LID supplier came with a new bolt-down lid solution which improved the tolerance to high torque. This modification was validated in ST sockets without any failures (screw holes center spacing of ST sockets being 1.1 inch).
Product Line(s) and/or Part Number(s)	See attached
Description of the Qualification Plan	See attached
Change Product Identification	see Finished goods
Manufacturing Location(s)	

Table 3. List of Attachments

Customer Part numbers list	
Qualification Plan results	



Customer Acknowledgement of Receipt		PCN APM-PWR/11/6870
Please sign and return to STMicroelectronics Sales Office		Notification Date 10/19/2011
<input type="checkbox"/> Qualification Plan Denied <input type="checkbox"/> Qualification Plan Approved <input type="checkbox"/> Change Denied <input type="checkbox"/> Change Approved	Name:	
	Title:	
	Company:	
	Date:	
	Signature:	
Remark		

DOCUMENT APPROVAL

Name	Function
Juhel, Serge	Division Marketing Manager
Di giovanni, Filippo	Division Product Manager
Calderoni, Michele	Division Q.A. Manager



STAC244B

Screw torque resistance

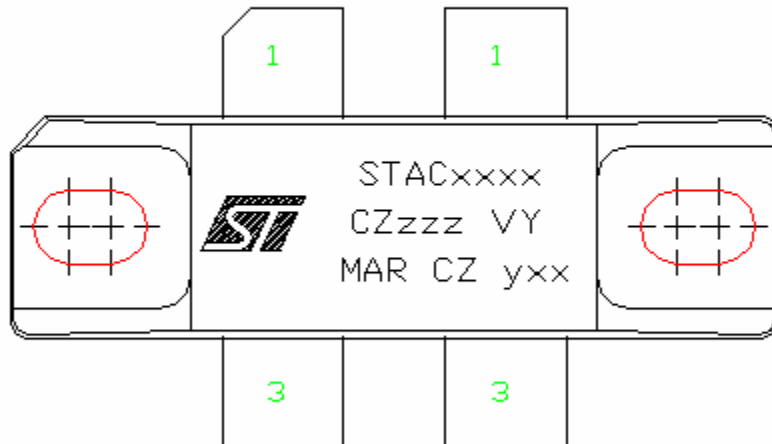
Qualification performed at supplier facility on three production lots.

August 2011

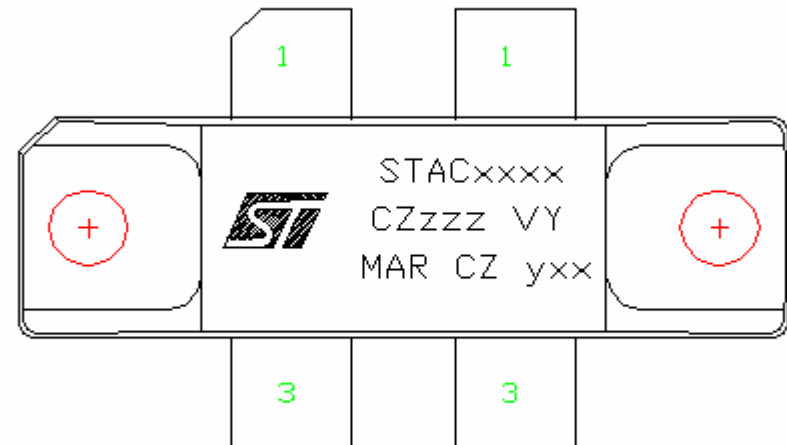
Picture of the two LID version



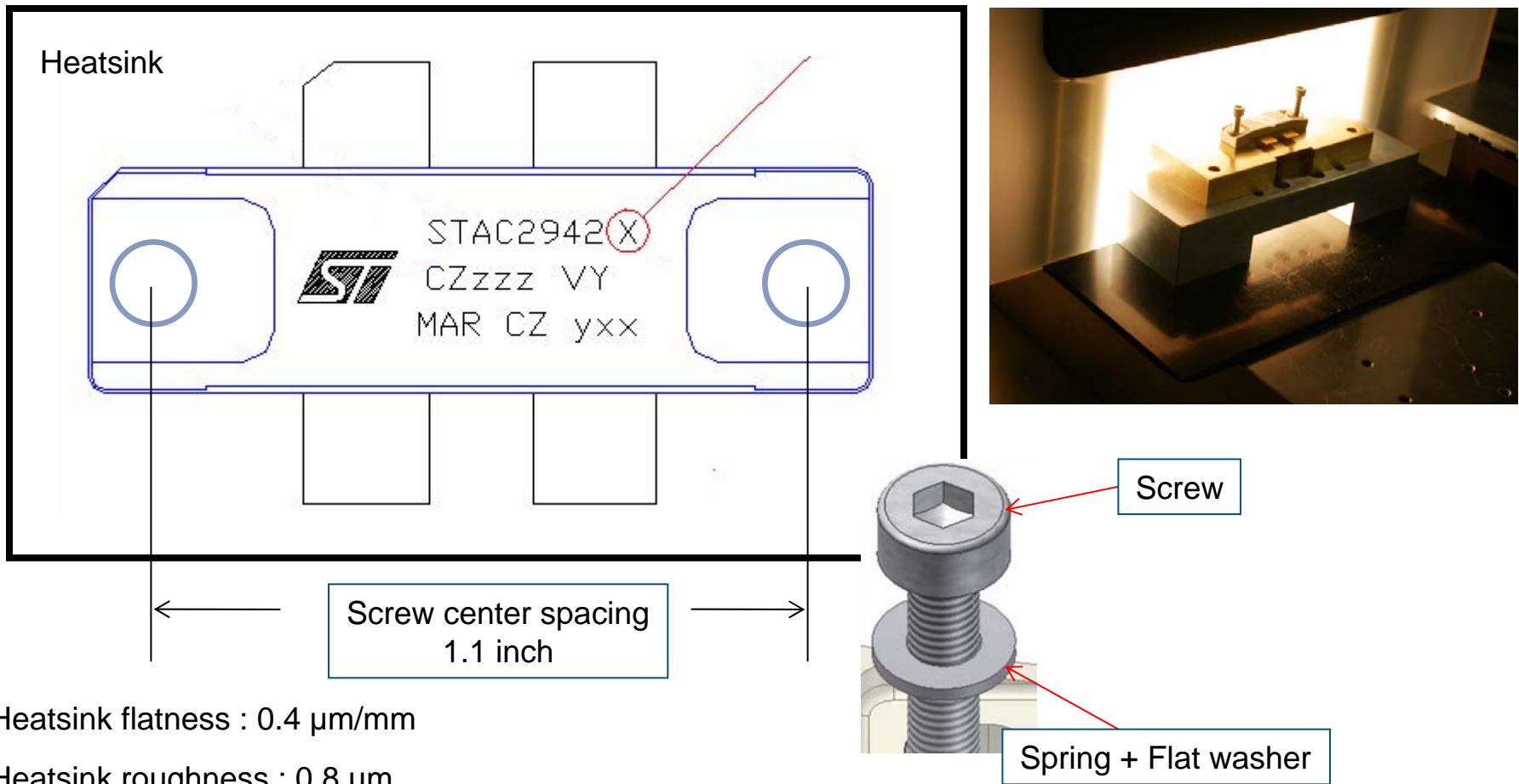
OLD LID



NEW LID



STAC244B New LID mounting



- Heatsink flatness : 0.4 $\mu\text{m}/\text{mm}$
- Heatsink roughness : 0.8 μm
- 2 each of 4-40 UNC-2A (or M3) TORX, HEX, or PHILLIPS cap screws (one for each end of the package body)
- 2 each of spring washers, ID=0.150"(3.81 mm) OD=0.275"(6.98 mm), t=0.015"(0.38 mm), h=0.025"(0.62mm)

Testing procedure

1. Finger tight each screw.
2. Alternately tighten both screws in steps up to the recommended torque value using a torque driver or equivalent.
3. Check for visual defects.
4. ST torque specification
 - 6.5 in-lbs maximum

Lindstrom MAL500-2 torque screwdriver. It supplies torque from 3-15 In. lbs.



Screw torque resistance - test results



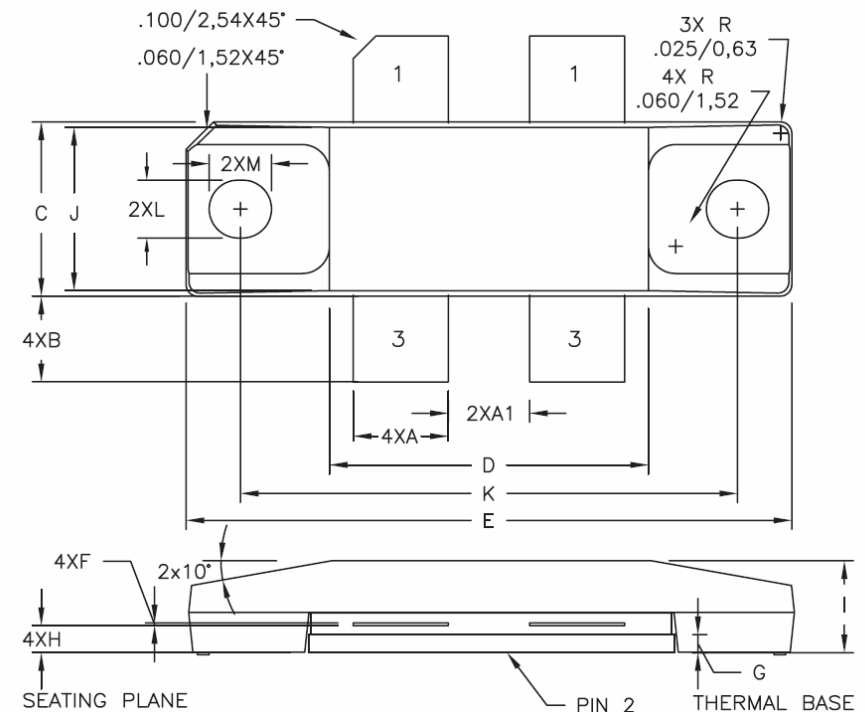
TORQUE	5 in-lbs		6 in-lbs		7 in-lbs		8 in-lbs	
	Naked Eye	x10	Naked Eye	x10	Naked Eye	x10	Naked Eye	x10
Lot A	20/20 PASS	20/20 PASS	20/20 PASS	20/20 PASS	20/20 PASS	20/20 PASS	20/20 PASS	20/20 PASS
Lot B	20/20 PASS	20/20 PASS	20/20 PASS	20/20 PASS	20/20 PASS	20/20 PASS	20/20 PASS	20/20 PASS
Lot C	20/20 PASS	20/20 PASS	20/20 PASS	20/20 PASS	20/20 PASS	20/20 PASS	20/20 PASS	20/20 PASS

- 20 parts from 3 production lots were tested and no visual defect was noticed on new LID.

STAC244B Mechanical Data



Dim.	mm		
	Min.	Typ.	Max.
A	5.08		5.59
A1	4.32		4.83
B	4.32		5.33
C	9.65		9.91
D	17.78		18.08
E	33.88		34.19
F	0.10		0.15
G		1.02	
H	1.45		1.70
I	4.83		5.33
J	9.27		9.52
K	27.69		28.19
L	3.12	3.23	3.33
M	3.35	3.45	3.56





Product Reliability Certificate

Package : STAC2942B new LID
Division : Power RF
Group : APM
Aim of the Qualification: New Package Version

Device construction note

DIE FEATURES			PACKAGE FEATURES		
Line	:	1941	Package Code	:	
			Description 1	:	STAC2942B
			Description 2	:	STAC2942B new LID
Diffusion Site	:	CT 6''	Assembly Site	:	ST – Bouskoura - CASABLANCA
Wafer Diameter (inches)	:	6	Die Attach material	:	Au eutectic
Die Size (X,Y)	:	5.38 x 3.26 mm ²	Bonding wire material	:	Au
			Bonding wire diameter	:	1.5 mils
Process Technology	:	DMOS	Combo LID	:	5CM96930
Passivation	:	OXNITRIDE		:	

Objectives:

Reliability evaluation on STAC2942B new LID.

Considering that the reliability verification on the Package STAC2942B has been positive, and that applied changes are classified as minor from reliability point of view, considering that the screw torque test has been performed on both package versions with positive results, the positive judgment on reliability evaluation on STAC2942B can be extended to STAC2942B new LID by similarity.

Conclusion:

This certificate assures that the package STAC2942B new LID, with the above construction notes, can be qualified by similarity and can be put in mass production.

Approved by:

Giovanni Presti QA & Reliability Manager

Andrea Foti Product Manager

Antonino Schillaci Design Manager



Reliability Report

STAC244B Package

Power RF

General Information	
Product Line	1931, 4925, 1941
Product Description	Power RF
P/N	STAC2932B, STAC3932B, STAC2942B
Product Group	Power RF
Product division	IMS
Package	STAC244B
Silicon Process technology	DMOS

Locations	
Wafer fab	CT 6"
Assembly plant	ST – Bouskoura - CASABLANCA
Reliability Lab	IMS APM Catania Reliability Lab

DOCUMENT INFORMATION

Version	Date	Pages	Prepared by	Approved by	Comment
1.0	March 2009	6	I. De Luca	G. Presti	First issue

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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TABLE OF CONTENTS

1	APPLICABLE AND REFERENCE DOCUMENTS	3
2	GLOSSARY.....	3
3	RELIABILITY EVALUATION OVERVIEW.....	3
3.1	OBJECTIVES	3
3.2	CONCLUSION	3
4	DEVICE CHARACTERISTICS.....	4
4.1	DEVICE DESCRIPTION.....	4
4.2	CONSTRUCTION NOTE	4
5	TESTS RESULTS SUMMARY.....	5
5.1	TEST PLAN AND RESULTS SUMMARY.....	5
6	ANNEXES.....	6
6.1	TESTS DESCRIPTION.....	6



1 APPLICABLE AND REFERENCE DOCUMENTS

Document reference	Short description
AEC-Q101	Stress test qualification for automotive grade discrete semiconductors

2 GLOSSARY

DUT	Device Under Test
SS	Sample Size

3 RELIABILITY EVALUATION OVERVIEW

3.1 Objectives

Qualification of STAC244B package using as test vehicles STAC2932B, STAC3932B and STAC2942B. Qualification strategy is based on the usage of already qualified silicon lines to concentrate the evaluation on package performances.

3.2 Conclusion

The 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

The STAC2932B, STAC3932B and STAC2942B are gold metallized N-channel MOS field-effect RF power transistors. They are intended for use in DC large signal applications up to 250 MHz.

4.2 Construction note

	STAC2932B	STAC3932B	STAC2942B
Wafer/Die fab. information			
Wafer fab manufacturing location	CT 6"	CT 6"	CT 6"
Technology	DMOS	DMOS	DMOS
Process family	1931	4925	1941
Die finishing back side	AuAs	AuAs	AuAs
Die size	5.38 x 3.26 mm ²	6.22 x 3.42 mm ²	5.38 x 3.26 mm ²
Bond pad metallization layers	Au	AlSiCu	Au
Passivation type	OXNITRIDE	NITRIDE	OXNITRIDE
Wafer Testing (EWS) information			
Electrical testing manufacturing location	EWS CATANIA	EWS CATANIA	EWS CATANIA
Tester	TESEC	TESEC	TESEC
Assembly information			
Assembly site	ST – Bouskoura - CASABLANCA	ST – Bouskoura - CASABLANCA	ST – Bouskoura - CASABLANCA
Package description	STAC244B	STAC244B	STAC244B
Frame material	HTP1280 4L 380x798 WIDES STAC244	HTP1280 4L 380x798 WIDES STAC244	HTP1280 4L 380x798 WIDES STAC244
Die attach process	HARD	HARD	HARD
Die attach material	Au eutectic	Au eutectic	Au eutectic
Die pad size	80x150um ²	80x150um ²	80x150um ²
Wire bonding process	Wedge wire bonding technology	Wedge wire bonding technology	Wedge wire bonding technology
Wires bonding materials/diameters	Au / 1.5 mils	Al	Au / 1.5 mils
Final testing information			
Testing location	ST – Bouskoura - CASABLANCA	ST – Bouskoura - CASABLANCA	ST – Bouskoura - CASABLANCA
Tester	TESEC	TESEC	TESEC



5 TESTS RESULTS SUMMARY

5.1 Test plan and results summary

P/N STAC2932B, STAC3932B, STAC2942B

Test	PC	Std ref.	Conditions	SS	Steps	Failure/SS	Note
						Lot	
HTSL	N	JESD22 A-103	Ta = 150°C	77	168 H	0/77	
					500 H	0/77	
					1000 H	0/77	
TC	N	JESD22 A-104	Ta = -65°C to 150°C	77	100 cy	0/77	
					200 cy	0/77	
					500 cy	0/77	
MS (*)	N	JESD22- B103B	<u>VIBRATION</u> a=20g; f=100/2000 Hz; 4' x 3 orient. x 4 cycles= 48'	30		0/30	
	N	JESD22- B104C	<u>MECHANICAL SHOCK</u> a=1500g; t=0.5 msec; 5 shocks x 6 orientations	30		0/30	



6 ANNEXES

6.1 Tests Description

Test name	Description	Purpose
HTSL High Temperature Storage Life	The device is stored in unbiased condition at the max. temperature allowed by the package materials, sometimes higher than the max. operative temperature.	To investigate the failure mechanisms activated by high temperature, typically wire-bonds solder joint ageing, data retention faults, metal stress-voiding.
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.
MS Mechanical Sequence	VIBRATION The devices shall be vibrated with simple harmonic motion corresponding to a test level above reported.	To determine the ability of the component(s) to withstand moderate to severe vibration as a result of motion produced by transportation or field operation. Vibration of this type may disturb operating characteristics, particularly if the repetitive stress causes fatigue. This is a destructive test intended for component qualification. It is normally applicable to cavity-type packages.
	MECHANICAL SHOCK Component level test consists subjecting the component(s) to at least one of the above service conditions.	To determine the compatibility of the component(s) to withstand moderately severe shocks as a result of suddenly applied forces or abrupt change in motion produced by handling, transportation or field operation. Mechanical Shock of this type may disturb operating characteristics, particularly if the shock pulses are repetitive. This is a destructive test intended component qualification. It is normally applicable to cavity-type packages.

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