PRODUCT/PROCESS CHANGE NOTIFICATION

PCN IPD-PWR/12/7533
Dated 26 Oct 2012

SOT23-6L copper wires assembly capacity expansion -

Nantong Fujitsu Microelectronics (China) Subcontractor

Table 1. Change Implementation Schedule

Forecasted implementation date for change	19-Oct-2012
Forecasted availability date of samples for customer	19-Oct-2012
Forecasted date for **STMicroelectronics** change Qualification Plan results availability	19-Oct-2012
Estimated date of changed product first shipment	25-Jan-2013

Table 2. Change Identification

Product Identification (Product Family/Commercial Product)	see attached list
Type of change	Package assembly location change, Testing location change
Reason for change	To increase capacity on SOT23-6L package.
Description of the change	Continuing in the program to introduce ECOPACK 2, graded Moulding Compound products and in order to be ready to support the market demand of Power MOSFET and Bipolar Transistors, the products listed in this PCN will be manufactured in Nantong Fujitsu Microelectronics (China) using green resin (already qualified) and copper wires. Products are in agreement with ST standards and guarantee the same quality and the electrical characteristics as the current production. Devices used for qualification are available as Samples.
Change Product Identification	By traceability code
Manufacturing Location(s)	

Table 3. List of Attachments

Customer Part numbers list	
Qualification Plan results	

- -

Customer Acknowledgement of Receipt	**PCN IPD-PWR/12/7533**
Please sign and return to STMicroelectronics Sales Office	**Dated 26 Oct 2012**
☐ Qualification Plan Denied	Name:
☐ Qualification Plan Approved	Title:
	Company:
☐ Change Denied	Date:
☐ Change Approved	Signature:

Remark

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DOCUMENT APPROVAL

Name	Function
Mottese, Anna	Marketing Manager
Aleo, Mario-Antonio	Product Manager
Falcone, Giuseppe	Q.A. Manager

Dear Customer,

Please be informed that Power MOSFET and Power Bipolar Transistors in SOT23-6L Package, manufactured in Nantong Fujitsu Microelectronics (China) Subcontractor, will be also produced using green resin and copper wires.

The involved product series and affected packages are listed in the table below:

Product Family	Package	Commercial Product / Series
Power MOSFET Transistors	SOT23-6L	STTxxx
Power Bipolar Transistors		

Any other Product related to the above series, manufactured in SOT23-6L package, even if not expressly included or partially mentioned in the attached table, is affected by this change.

Qualification program and results availability:

The reliability test report is provided in attachment to this document.

Samples availability:

Samples of the test vehicle devices will be available on request starting from week 43-2011.
Any other sample request will be processed and scheduled by Power Transistor Division upon request.

Product Family	Package	Part Number - Test Vehicle
Power MOSFET Transistors	SOT23-6L	STT5NF20V
Power Bipolar Transistors		STT818B

Change implementation schedule:

The production start and first shipment will be implemented according to our work in progress and materials availability:

Product Family	1st Shipment
Power MOSFET Transistors	From Week 03-2013
Power Bipolar Transistors	

Lack of acknowledgement of the PCN within 30 days will constitute acceptance of the change. After acknowledgement, lack of additional response within the 90 days period will constitute acceptance of the change (Jedec Standard No. 46-C). In any case, first shipment may start earlier with customer written agreement.

Marking and traceability:

Unless otherwise stated by customer specific requirement, traceability of SOT23-6L graded Moulding Compound and copper wires products, manufactured in FUJITSU (China), will be ensured by the traceability code.

Sincerely Yours.

Reliability Report on SOT23-6L Cu Wires Assembly Capacity Expansion Nantong Fujitsu Microelectronics (China)

General Information	
Product Lines:	BI01 TV2A
Product Families:	Power BIPOLAR Transistor N-Channel Power MOSFET
P/Ns:	STT818B STT5NF20V
Product Group:	IMS – IPD
Product division:	Power Transistor Division
Package:	SOT23-6L
Silicon Process techn.:	Epitaxial Planar STripFET™ II Power MOSFET

Locations	
Wafer Diffusion Plants:	*Ang Mo Kio (Singapore)* *CT6" (Catania)*
EWS Plants:	*Ang Mo Kio (Singapore)* *CT6" (Catania)*
Assembly Plant:	*Nantong Fujitsu Microelectronics (China)*
T&F Plant:	*Nantong Fujitsu Microelectronics (China)*
Reliability Lab	*IMS-APM Catania Reliability Lab*

DOCUMENT INFORMATION

Version	Date	Pages	Prepared by	Approved by	Comment
1.0	September 2012	8	C. Cappello	G. Falcone	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.
This report does not imply for STMicroelectronics expressly or implicitly any contractual obligations other than as set forth in STMicroelectronics general terms and conditions of Sale. This report and its contents shall not be disclosed to a third party without previous written agreement from STMicroelectronics.

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1 APPLICABLE AND REFERENCE DOCUMENTS

Document reference	Short description
JESD47	Stress-Test-Driven Qualification of Integrated Circuits

2 GLOSSARY

DUT	Device Under Test
SS	Sample Size
HF	Halogen Free

3 RELIABILITY EVALUATION OVERVIEW

3.1 Objectives

Qualification of Cu Wire into the SOT23-6L package graded Molding Compound manufactured in Nantong Fujitsu Microelectronics (China).

3.2 Conclusion

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

Power BIPOLAR and Power MOSFET technology.

4.2 Construction note

D.U.T.: STT818B LINE: BI01 PACKAGE: SOT23-6L

Wafer/Die fab. information	
Wafer fab manufacturing location	*Ang Mo Kio (SINGAPORE)*
Technology	Epitaxial Planar
Die finishing back side	Au/Cr/Ni/Au
Die size	1780 x 1020µm^2
Metal	Al/Si
Passivation type	PSG

Wafer Testing (EWS) information	
Electrical testing manufacturing location	*Ang Mo Kio (Singapore)*
Test program	WPIS

Assembly information	
Assembly site	*Nantong Fujitsu Microelectronics (China)*
Package description	SOT23-6L
Molding compound	HF Epoxy Resin
Frame material	Bare copper with Ag spot
Die attach process	Glue
Die attach material	Conductive Silver adhesive
Wire bonding process	Ball Bonding
Wires bonding materials	Cu 2 mils Base Cu 2 mils Emitter
Lead finishing/bump solder material	Pure Tin

Final testing information	
Testing location	*Nantong Fujitsu Microelectronics (China)*
Tester	Tesec / Juno

D.U.T.: STT5NF20V LINE: TV2A PACKAGE: SOT23-6L

Wafer/Die fab. information	
Wafer fab manufacturing location	*Ang Mo Kio (SINGAPORE)*
Technology	STripFET™ II Power MOSFET
Die finishing back side	Ti/Ni/Au
Die size	1790 x 1030 μm^2
Metal	AlSi
Passivation type	None

Wafer Testing (EWS) information	
Electrical testing manufacturing location	*Ang Mo Kio (SINGAPORE)*
Test program	WPIS

Assembly information	
Assembly site	*Nantong Fujitsu Microelectronics (China)*
Package description	SOT23-6L
Molding compound	HF Epoxy Resin
Frame material	Bare copper with Ag spot
Die attach process	Glue
Die attach material	Conductive Silver adhesive
Wire bonding process	Ball Bonding
Wires bonding materials	Cu 2 mils Gate Cu 2 mils Source
Lead finishing/bump solder material	Pure Tin

Final testing information	
Testing location	*Nantong Fujitsu Microelectronics (China)*
Tester	Tesec / Juno

5 TESTS RESULTS SUMMARY

5.1 Test vehicle

Lot #	Process/ Package	Product Line	Comments
1	STT818B	BI01	Power BIPOLAR
2	STT5NF20V	TV2A	Power MOSFET

5.2 Reliability test plan summary

Lot.1 - D.U.T.: STT818B LINE: BI01 PACKAGE: SOT23-6L

Test	PC	Std ref.	Conditions	SS	Steps	Failure/SS	Note
PRECONDITIONING OF SMD DEVICES	-	JESD22-A113-B	Dryng 24H @ 125°C Store 168H @ TA=85°C RH=85% Reflow @ 260°C 3 times	154 x 1 Lot	Parameter deviation within spec. limits at end of preconditioning	No parameter deviation out of spec. limits at end of preconditioning	
HTSL	N	JESD22 A-103	TA = 150°C	77 x 1 Lot	1000H	0/77	
AC	N	JESD22 A-102	Pa=2Atm / Ta=121°C	77 x 1 Lot	96 H	0/77	
H3TRB	Y	JESD22 A-101	TA=85°C, RH=85% Vbias=30V	77 x 1 Lot	1000 H	0/77	
TC	Y	JESD22 A-104	TA=-65°C TO 150°C (1 HOUR/CYCLE)	77 x 1 Lot	500 cy	0/77	

Lot.2 - D.U.T.: STT5NF20V LINE: TV2A PACKAGE: SOT23-6L

Test	PC	Std ref.	Conditions	SS	Steps	Failure/SS	Note
PRECONDITIONING OF SMD DEVICES	-	JESD22-A113-B	Dryng 24H @ 125°C Store 168H @ TA=85°C RH=85% Reflow @ 260°C 3 times	154 x 1 Lot	Parameter deviation within spec. limits at end of preconditioning	No parameter deviation out of spec. limits at end of preconditioning	
HTSL	N	JESD22 A-103	TA = 150°C	77 x 1 Lot	1000H	0/77	
AC	N	JESD22 A-102	Pa=2Atm / Ta=121°C	77 x 1 Lot	96 H	0/77	
H3TRB	Y	JESD22 A-101	TA=85°C, RH=85% Vbias=10V	77 x 1 Lot	1000 H	0/77	
TC	Y	JESD22 A-104	TA=-65°C TO 150°C (1 HOUR/CYCLE)	77 x 1 Lot	500 cy	0/77	

ANNEXES 6.0

6.1Tests 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.
AC 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.
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.
H3TRB 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.
PC Preconditioning	The device is submitted to a typical temperature profile used for surface mounting devices, after a controlled moisture absorption.	To verify that the surface mounting stress does not impact on the subsequent reliability performance. The typical failure modes are "pop corn" effect and delamination.

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