PRODUCT/PROCESS CHANGE NOTIFICATION

PCN MPA/06/2056
Notification Date 11/15/2006

TO220FPAK BARE COPPER STS PCN

MPA - MPA

Table 1. Change Identification

Product Identification (Product Family/Commercial Product)	Vreg & Power MOSFETS assembled in TO220FPAK
Type of change	Package assembly material change
Reason for change	To improve Quality
Description of the change	"Power MOSFET and V.Reg Divisions have decided to set up a new frame and new copper wire bonding process for TO-220FP package in Shenzhen Plant. Actually these devices are produced for V.Regs by using gold wires bonding on spot Ag lead frame, while the Power MOSFET devices are produced with Aluminium bonding wires on spot Nickel lead frame. The same products will be also produced by using the called "copper on copper" process. New process will not impact the electrical characteristics, performances and products fit".
Product Line(s) and/or Part Number(s)	See attached
Description of the Qualification Plan	See attached
Change Product Identification	See "N" as additional info field
Manufacturing Location(s)	1]St Shenzhen -China

Table 2. Change Implementation Schedule

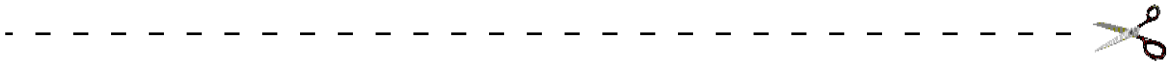
Forecasted implementation date for change	07-Feb-2007
Forecasted availabillity date of samples for customer	25-Oct-2006
Forecasted date for **STMicroelectronics** change Qualification Plan results availability	25-Oct-2006
Estimated date of changed product first shipment	07-Feb-2007

Table 3. Change Responsibility

	Name	Signature	Date
Division Product Manager	M.Pesce/I. Wilson		Nov.07 ,06
Division Q.A. Manager	G. Vitali/G.Falcone		Nov.07 ,06
Division Marketing Manager	M.Sanbiagio/M.Giudice		Nov.07 ,06

Table 4. List of Attachments

Customer Part numbers list	
Qualification Plan results	



Customer Acknowledgement of Receipt	**PCN MPA/06/2056**
Please sign and return to STMicroelectronics Sales Office	**Notification Date 11/15/2006**

☐ Qualification Plan Denied	Name:
☐ Qualification Plan Approved	Title:
	Company:
☐ Change Denied	Date:
☐ Change Approved	Signature:

Remark

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RELIABILITY EVALUATION ON

TO-220FP

BARE COPPER SHENZEN

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Introduction

This report aims at the qualification of the TO-220FP package BARE COPPER SHENZEN.

The Qualification Reliability test trials have been performed in ST Catania Site.

The evaluation results meet ST products qualification targets, therefore the TO-220 package BARE COPPER SHENZEN is qualified.

Test Vehicles :

Product Lines	Main Sales Types
EZ77 – TO-220FP	STP10NK70ZFP
SP21 – TO-220FP	IRF630MFP
EZ61 – TO-220FP	STP3NK60ZFP

Failure Criteria :

A failed component is a device which becomes inoperative during the test or it fails on meeting the end limits foreseen in the device specification, for one or more than the parameters here below reported

Parameter

Drain Leakage Current (Idss)
Gate Leakage Current (Igss)
Threshold Voltage (Vgs(th)

Reliability Evaluation Plan and results

D.U.T.: STP10NK70ZFP Line: EZ77 Package: TO-220FP

Test	Conditions	S.S.	Requirement	Results
H.T.S.	TA=150℃	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation out of spec. limits at 1000 hours.
T.H.B.	TA=85℃ - RH=85% Vbias= 100V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation out of spec. limits at 1000 hours.
H.T.R.B.	T.A.=150℃ Vdd=560V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation out of spec. limits at 1000 hours.
H.T.F.B.	TA=150℃ ; Vgss=30V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation out of spec. limits at 1000 hours.
PRESSURE POT	TA=121℃ - PA=2Atm	77 x 1 Lot	Parameter deviation within spec. limits at 96 hours.	No parameter deviation out of spec. limits at 96 hours.
THERMAL CYCLES AIR TO AIR	TA=-65℃ TO 150℃ 1 HOUR / CYCLE	77 x 1 Lot	Parameter deviation within spec. limits at 500 cycles.	No parameter deviation out of spec. limits at 500 cy
THERMAL FATIGUE	ΔTc =105℃ - Pd=3W	77 x 1 Lot	Parameter deviation within spec. limits at 10k cycles.	No parameter deviation out of spec. limits at 10Kcy.

Reliability Evaluation Plan and results

D.U.T.: IRF630MFP Line: SP21 Package: TO-220FP

Test	Conditions	S.S.	Requirement	Results
H.T.S.	TA=150°C	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation out of spec. limits at 1000 hours.
T.H.B.	TA=85°C - RH=85% Vbias= 100V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation out of spec. limits at 1000 hours.
H.T.R.B.	T.A.=150°C Vdd= 160V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation out of spec. limits at 1000 hours.
H.T.F.B.	TA = 150°C Vgss= 15V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation out of spec. limits at 1000 hours.
PRESSURE POT	TA=121°C - PA=2Atm	77 x 1 Lot	Parameter deviation within spec. limits at 96 hours.	No parameter deviation out of spec. limits at 96 hours.
THERMAL CYCLES AIR TO AIR	TA=-65°C TO +150°C 1 HOUR / CYCLE	77 x 1 Lot	Parameter deviation within spec. limits at 500 cycles.	No parameter deviation out of spec. limits at 500 cy
THERMAL FATIGUE	ΔTc =105°C - Pd=3W	77 x 1 Lot	Parameter deviation within spec. limits at 10k cycles.	No parameter deviation out of spec. limits at 10Kcy.

Reliability Evaluation Plan and results

D.U.T.: STP3NK60ZFP Line: EZ61 Package: TO-220FP

Test	Conditions	S.S.	Requirement	Results
H.T.S.	TA=150℃	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation out of spec. limits at 1000 hours.
T.H.B.	TA=85℃ - RH=85% Vbias= 100V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation out of spec. limits at 1000 hours.
H.T.R.B.	T.A.=150℃ Vdd=480V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation out of spec. limits at 1000 hours.
H.T.F.B.	TA=150℃ Vgss=30V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation out of spec. limits at 1000 hours.
PRESSURE POT	TA=121℃ - PA=2Atm	77 x 1 Lot	Parameter deviation within spec. limits at 96 hours.	No parameter deviation out of spec. limits at 96 hours.
THERMAL CYCLES AIR TO AIR	TA=-65℃ TO 150℃ 1 HOUR / CYCLE	77 x 1 Lot	Parameter deviation within spec. limits at 500 cycles.	No parameter deviation out of spec. limits at 500 cy
THERMAL FATIGUE	ΔTc =105℃ - Pd=3W	77 x 1 Lot	Parameter deviation within spec. limits at 10k cycles.	No parameter deviation out of spec. limits at 10Kcy.

Technological Characteristics

D.U.T.: STP10NK70ZFP Line: EZ77 Package: TO-220FP

DIE	*Technology:* SuperMESH™ MOSFET *Material:* Silicon		*Passivation :*	Nitride
	Metallization – Front : Al/Si *- Back :* Ti-Ni-Au		*Dimensions :*	5720 x 4580 µm
DIE ATTACH	Soft solder	**FRAME**	*Frame and lead material:* *Lead coating :*	Row copper Sn 100%
WIRE BOND	Thermosonic	**WIRE**	*Material :* *Diameter :*	Cu Gate Cu Source 2 mils Gate 2 mils Source
SEALING	Molding	**PACKAGING**	*Material :*	Epoxy Resin

PRODUCTION PLACES: WAFER PROCESSING : SINGAPORE
ASSEMBLY LOCATION : SHENZEN
Q.A. LOCATION : SHENZEN

Technological Characteristics

D.U.T.: IRF630MFP Line: SP21 Package: TO-220FP

DIE	*Technology:* MESH Overlay™ MOSFET *Material:* Silicon		*Passivation :*	None
	Metallization – Front : Al/Si		*Dimensions :*	2616.2 x 2387.6 µm
	- Back : Ti-Ni-Au			
DIE ATTACH	Soft solder	**FRAME**	*Frame and lead material:*	Row copper
			Lead coating :	Sn 100%
WIRE BOND	Thermosonic	**WIRE**	*Material :*	Cu Gate Cu Source
			Diameter :	2 mils Gate 2 mils Source
SEALING	Molding	**PACKAGING**	*Material :*	Epoxy Resin

PRODUCTION PLACES: WAFER PROCESSING : CATANIA
ASSEMBLY LOCATION : SHENZEN
Q.A. LOCATION : SHENZEN

Technological Characteristics

D.U.T.: STP3NK60ZFP Line: EZ61 Package: TO-220FP

DIE	*Technology:* SuperMESH™ MOSFET *Material:* Silicon *Passivation :* Nitride *Metallization – Front :* Al/Si *Dimensions :* 2700 x 2160 µm *- Back :* Ti-Ni-Au			
DIE ATTACH	Soft solder	**FRAME**	*Frame and lead material:* *Lead coating :*	Row copper Sn 100%
WIRE BOND	Thermosonic	**WIRE**	*Material :* *Diameter :*	Cu Gate Cu Source 2 mils Gate 2 mils Source
SEALING	Molding	**PACKAGING**	*Material :*	Epoxy Resin

PRODUCTION PLACES: WAFER PROCESSING : SINGAPORE
ASSEMBLY LOCATION : SHENZEN
Q.A. LOCATION : SHENZEN

Reliability Test Description

High Temperature Reverse Bias (HTRB)

This test is performed in order to demonstrate the quality and reliability of devices subjected to an elevated temperature and simultaneously reverse biased. The purpose of this test is to detect surface defects such as poor passivation, presence of contaminants, etc...

High Temperature Forward Bias (HTFB)

This test is performed in order to demonstrate the quality and reliability of devices subjected to an elevated temperature and simultaneously forward gate biased. The purpose of this test is to detect surface and gate oxide defects.

High Temperature Storage (HTS)

This stress test is performed to check the device life in a high temperature ambient. Specimens are put for a period of time inside a stove in free air. Detectable failure mechanisms are presence of contaminants and metal corrosion.

Thermal Cycles/Shocks

The purpose of this test is to determine the resistance of devices to exposure to extreme changes in temperature. Specimens are first placed in a suitable environment at a low temperature and then transferred to one at high temperature. Effects of thermal cycles/shocks include cracking of die, breaking of wire bonding, mechanical damage to the device case.

Reliability Test Description (continued)

Temperature Humidity Bias (THB)

This test is performed to check the device life in a high humidity ambient. Specimens are subjected to a permanent bias in a climatic chamber in the presence of steam. Detectable failure mechanisms are metal corrosion and moulding defects.

Pressure Pot

This test is performed in order to check device life in a high humidity ambient in an accelerated way. Specimens are subjected for a period of time inside an autoclave in the presence of steam and pressure. Detectable failure mechanism is metal corrosion.

MPA (Micro, Power, Analog) Group
Voltage Regulator, Interface, Advanced logic & Power RF
Quality Assurance & Reliability

Reliability Evaluation Plan and final results on LM317 (Cu wire bonded onto raw copper l/f)

REL-6337-248.06W

Line..... L317

Package... TO220FP

Test	Conditions	S.S.	Requirement	Results
H.T.S.	TA=15O °C	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation at 1000 hours.
T.H.B.	TA=85°C - RH=85% Vbias= 24V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation at 1000 hours.
H.T.B.	TA=125°C - Vdd= 35V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation at 1000 hours.
PRESSURE POT	TA=121°C - PA=2Atm	77 x 1 Lot	Parameter deviation within spec. limits at 240 hours.	No parameter deviation at 240 hours.
THERMAL CYCLES AIR TO AIR	TA=-65°C TO 150°C 1 HOUR / CYCLE	77 x 1 Lot	Parameter deviation within spec. limits at 1000 cycles.	No parameter deviation at 1000 cy
THERMAL SHOCKS LIQUID TO LIQUID	TA=-65°C TO 150°C 10 MIN / SHOCK	77 x 1 Lot	Parameter deviation within spec. limits at 500 shocks.	No parameter deviation at 500 sh.
ENVIRONMENTAL SEQUENCE	100 THERMAL CYCLES + 168H PP	50 x 1 Lot	Parameter deviation within spec. limits at end of test.	No parameter deviation at end of test.
THERMAL FATIQUE	/\t= 105°C	77 x 1 Lot	Parameter deviation within spec. limits at 10000 cycles.	No parameter deviation at 10000 cy

Comments: The reliability tests results are positive

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