PRODUCT/PROCESS CHANGE NOTIFICATION

PCN MPA/06/1959
Notification Date 08/28/2006

NEW COPPER ON COPPER PROCESS FOR DPAK PACKAGE

MPA - MPA

Table 1. Change Identification

Product Identification (Product Family/Commercial Product)	Volt. Regulators & Power MOSFET assembled in DPAK
Type of change	Package assembly material change
Reason for change	To improve performances and service
Description of the change	STD Linear & Interface and POWER MOSFET Division has been decided to set up a new frame for DPAK package in Shenzhen plant. Actually these devices are produced with a Copper Wire bonding on Cu/Ag SPOT Frame. The same products will be also produced with a Copper on Copper process. No change in electrical and Quality performances. Identification.
Product Line(s) and/or Part Number(s)	See attached
Description of the Qualification Plan	See attached
Change Product Identification	See letter "N" as additional info field
Manufacturing Location(s)	1]St Shenzhen -China

Table 2. Change Implementation Schedule

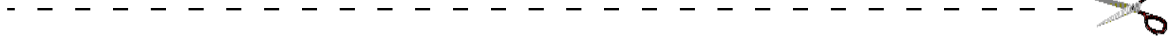
Forecasted implementation date for change	20-Nov-2006
Forecasted availabillity date of samples for customer	25-Jul-2006
Forecasted date for **STMicroelectronics** change Qualification Plan results availability	25-Jul-2006
Estimated date of changed product first shipment	27-Nov-2006

Table 3. Change Responsibility

	Name	Signature	Date
Division Product Manager	I.Wilson/M. Pesce		Aug.21 ,06
Division Q.A. Manager	G. Falcone/G. Vitali		Aug.21 ,06
Division Marketing Manager	M. Giudice/M. Sanbiagi		Aug.21 ,06

Table 4. List of Attachments

Customer Part numbers list	
Qualification Plan results	



Customer Acknowledgement of Receipt Please sign and return to STMicroelectronics Sales Office	**PCN MPA/06/1959** **Notification Date 08/28/2006**
☐ Qualification Plan Denied	Name:
☐ Qualification Plan Approved	Title:
	Company:
☐ Change Denied	Date:
☐ Change Approved	Signature:

Remark

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RELIABILITY EVALUATION

OF

COPPER ON COPPER - DPAK PACKAGE ASSEMBLED IN SHENZHEN for MOSFET TECHNOLOGY

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Introduction

This report aims at the internal qualification of copper on copper bonding process on the package DPAK assembled in SHENZHEN for MOSFET technology

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

The evaluation results meet ST products qualification targets, therefore the copper on copper bonding process is qualified in SHENZHEN for MOSFET technology.

Test Vehicles:

Product Lines	**Main Sales Types**
EC6M	STD1NK60T4
EZ60	STD2HNK60ZT4

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 Power MOSFET

Drain Leakage Current (Idss)
Gate Leakage Current (Igss)
Threshold Voltage (Vgs(th)
Forward On Voltage (Vsd)
Drain Source On Voltage (Vds(on))
Drain Source Breakdown Voltage (Bvdss)

Reliability Evaluation Plan and results

D.U.T. : STD1NK60T4 LINE: EC6M PACKAGE: DPAK

Test	Conditions	S.S.	Requirement	Results
PRECONDITIONING OF SMD DEVICES Before TC/THB/ENV. SEQ.	DRYNG 1H @ 125°C STORE 168H @ TA=85°C RH=85% Reflow @ 260°C 3 times	204 x 1 Lot	Parameter deviation within spec. limits at end of preconditioning.	*No parameter deviation out of spec. limits at end of pre-conditioning.*
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.	*D.U.T. SMD PRECONDITIONED* 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	*D.U.T. SMD PRECONDITIONED* TA=-55℃ 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	∆TC=105℃ - Pd=2W	77 x 1 Lot	Parameter deviation within spec. limits at 10k cycles.	No parameter deviation out of spec. limits at 10Kcy.
ENVIRONMENTAL SEQUENCE	D.U.T. SMD PRECONDITIONED 100 THERMAL CYCLES + 96H PP	50 x 1 Lot	Parameter deviation within spec. limits at end of test.	*No parameter deviation out of spec. limits at end of test.*

Reliability Evaluation Plan and results

D.U.T. : STD2HNK60ZT4 LINE: EZ60 PACKAGE: DPAK

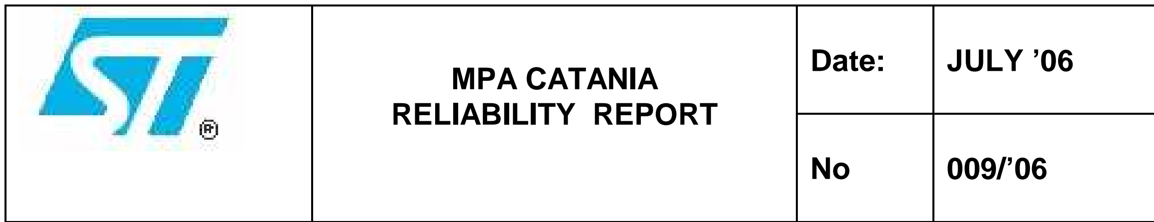
Test	Conditions	S.S.	Requirement	Results
PRECONDITIONING OF SMD DEVICES Before TC/THB/ENV. SEQ.	DRYNG 1H @ 125°C STORE 168H @ TA=85°C RH=85% Reflow @ 260°C 3 times	204 x 1 Lot	Parameter deviation within spec. limits at end of preconditioning.	*No parameter deviation out of spec. limits at end of pre-conditioning.*
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.	*D.U.T. SMD PRECONDITIONED* 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=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°C 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°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	*D.U.T. SMD PRECONDITIONED* TA=-55°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=2W	77 x 1 Lot	Parameter deviation within spec. limits at 10k cycles.	No parameter deviation out of spec. limits at 10Kcy.
ENVIRONMENTAL SEQUENCE	D.U.T. SMD PRECONDITIONED 100 THERMAL CYCLES + 96H PP	50 x 1 Lot	Parameter deviation within spec. limits at end of test.	*No parameter deviation out of spec. limits at end of test.*

Technological Characteristics

D.U.T. : STD1NK60T4 LINE: EC6M PACKAGE: DPAK

DIE	*Technology:* *Material:* *Metallization – Front :* *- Back :*	Super mesh III Silicon AlSi Ti-Ni-Au	 *Passivation :* *Dimensions :*	 Nitride (SiN) 2030 x 1730 (um2)
DIE ATTACH	Pb/ Ag/ Sn/ (95.5 /2.5/2)	**FRAME**	*Frame and lead material:* *Frame coating :* *Lead coating :*	Copper Sel Ni Sn
WIRE BOND	Thermosonic method	**WIRE**	*Material :* *Diameter :*	Copper 2 mils
SEALING	Molding	**PACKAGING**	*Material :*	Epoxy Resin

PRODUCTION PLACES : WAFER PROCESSING : Ang Mo Kio 5"
ASSEMBLY LOCATION : Shenzhen
Q.A. LOCATION : Shenzhen



Technological Characteristics

D.U.T. : STD2HNK60ZT4 LINE: EZ60 PACKAGE: DPAK

DIE	*Technology:* *Material:* *Metallization – Front :* *- Back :*	Super mesh III Silicon AlSi Ti-Ni-Au	 *Passivation :* *Dimensions :*	 Nitride (SiN) 2550 x 1990 (um2)
DIE ATTACH	Pb/ Ag/ Sn/ (95.5 /2.5/2)	**FRAME**	*Frame and lead material:* *Frame coating :* *Lead coating :*	Copper Sel Ni Sn
WIRE BOND	Thermosonic method	**WIRE**	*Material :* *Diameter :*	Copper 2 mils
SEALING	Molding	**PACKAGING**	*Material :*	Epoxy Resin

PRODUCTION PLACES : WAFER PROCESSING : Ang Mo Kio 5”
ASSEMBLY LOCATION : Shenzhen
Q.A. LOCATION : Shenzhen

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 molding 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.

Thermal Fatigue

This test is performed to demonstrate the quality and reliability of devices exposed to cyclic variation in electrical stress between "on" and "off" conditions and resultant cyclic variation in device and case temperatures (thermo-mechanical stress). The purpose of this test is to detect assembly defects : improper die-attach, bonding weakness and thermal mismatch among various components of the package.

Environmental Sequence

The purpose of this test is to study the influence of corrosion mechanism when the die/package system has already been stressed by temperature cycling.

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

REL-6337-154W06

Reliability Evaluation Plan and Results

L78M05
LAAT TECHNOLOGY

DPAK Cu wire bonded onto raw copper l/f in SHENZHEN.

Line L765 Package:DPAK

Test	Conditions	S.S.	Requirement
PRECONDITIONING OF SMD DEVICES BEFORE TC/THB/PP	DRYNG 24H @ 125°C STORE 168.H @ TA=85°C RH=85% IR 3 times @ 260°C	179x1 Lot	Parameter deviation within spec. limits after go no go test
H.T.S.	TA=150°C	77x1 Lot	Parameter deviation within spec. limits at 1000h
H.T.S. (Engineering Evaluation)	TA=175°C	77x1 Lot	Parameter deviation within spec. limits at 1000h
PRESSURE POT	*D.U.T. PRECONDITIONED* TA=121°C – PA=2ATM	77x1 Lot	Parameter deviation within spec. limits at 168h
THERMAL CYCLES AIR TO AIR	*D.U.T. PRECONDITIONED* TA=-65°C TO 150°C 1 HOUR/CYCLE	77x1 Lot	Parameter deviation within spec. limits at 500cycles
SMD MOISTURE INDUCED STRESS	DRYNG 24H @ 125°C STORE 168.H @ TA=85°C RH=85% IR 3 times @ 260°C	25x1 Lot	Parameter deviation within spec. limits at end of test

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