PRODUCT/PROCESS CHANGE NOTIFICATION

PCN HED-AUD/07/2493
Notification Date 05/01/2007

Copper wire bonding and new molding compound introduction for PowerSSO24-36 matrix line

AUD - AUDIO

Table 1. Change Identification

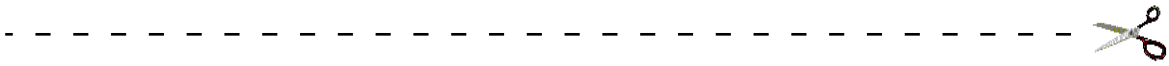
Product Identification (Product Family/Commercial Product)	PowerSSO Audio Division products
Type of change	Package assembly material change
Reason for change	Copper wires and molding compound material change
Description of the change	Following a Company package roadmap, we are on going to change the bonding wire material from gold to copper and the molding compound from Loctite GR725 to Hitachi CEL9240 on PowerSSO24-36 matrix line assembled in our STM Malaysia plant. Package Qualification Certificate and samples will be available upon request.
Product Line(s) and/or Part Number(s)	See attached
Description of the Qualification Plan	See attached
Change Product Identification	Internal sales type only
Manufacturing Location(s)	1]St Muar - Malaysia

Table 2. Change Implementation Schedule

Forecasted implementation date for change	24-Jul-2007
Forecasted availabillity date of samples for customer	15-May-2007
Forecasted date for **STMicroelectronics** change Qualification Plan results availability	24-Apr-2007
Estimated date of changed product first shipment	31-Jul-2007

Table 3. List of Attachments

Customer Part numbers list	
Qualification Plan results	



Customer Acknowledgement of Receipt	**PCN HED-AUD/07/2493**
Please sign and return to STMicroelectronics Sales Office	**Notification Date 05/01/2007**

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

Remark

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DOCUMENT APPROVAL

Name	Function
Onetti, Andrea Mario	Division Marketing Manager
Angelici, Marco	Division Product Manager
Piccoli, Massimo	Division Q.A. Manager

COPPER WIRE BONDING AND NEW MOLDING COMPOUND INTRODUCTION FOR POWERSSO24-36 MATRIX LINE

WHAT:
Following a Company package roadmap, on PowerSSO24-36 matrix line assembled in our STM Malaysia plant we are on going to change

- bonding wire material from gold to copper
- molding compound material from Loctite GR725 to Hitachi CEL9240

WHY:
Company package strategy for PowerSSO family

HOW:
See attached the Reliability Report (HED REL 02-07) that qualifies production in Muar for copper wires.
With test vehicle UD63 in PowerSSO36 leads we qualify, by extension, the PowerSSO 24 & 36 leads as well.
Qualification plan for new molding compound Hitachi CEL 9420 attached also.

WHEN:
From August 2007 deliveries onward.

HED BE Q&R RELIABILITY REPORT*

Assembly line: Muar
Package family: PowerSSO 36 Slug-up matrix

Abstract

The object of this reliability report is to validate the introduction of copper wire in PowerSSO-36 Slug-up Matrix assy line of ST Muar plant.

Change identification

Reliability report reference / date	HED Rel-02-07	February 26, 2007
Qualification request reference /date	TPA A10/04	April 14, 2004
Qualification plan reference / date	UD63PSSO36_copper_wired_plan	February 28, 2006
Affected products	All	

Conclusion

1st run results showed resin delamination on die which caused ball bond lifts (February 2006). No corrosion was observed.
Decision was taken to implement plasma cleaning before molding and a second run of reliability trials were launched.

The 2nd run results showed bond lifts after Pressure Pot test, caused by pad corrosion, may be due to die contamination (not linked to qualification subject).

Merging all the reliability test results, all Power SSO 36 leads slug-up matrix with copper wires and plasma cleaning before molding can be considered as qualified with JEDEC level **3 @ 260**°C (peak reflow temperature).

* HED BE Q&R – GRENOBLE
Issued by Corinne TRIOMPHE
Approved by Massimo PICCOLI

Package construction note

PACKAGE FEATURES	
Package name	PowerSSO-36 slug up matrix
Body size (mm^3)	10,30 x 6,5 x 2,28
Assembly site	ST Muar
Lead finish	Pure Sn
Die attach	PREFORM Pb/Ag/Sn 97.5/1.5/1
Molding compound	RESIN LOCTITE GR725-AG
Wire material / diameter	Copper wire / 2 mil

Test vehicles definition

DIE & PRODUCT FEATURES	
Technical code/ Line	UD63
RL Code	A8KB*UD63ACH
Ground wires	No
Pad size (μm^2)	6900 x 4500
Diffusion process	A1 BCD5S revision D
Wafer thickness (µm)	375
Die size (μm^2)	5120 x 3110
Die front finishing	NITRIDE (SiN)
Die back finishing	CHROMIUM/NICKEL

Construction analysis

See Construction analysis report C.A. 15.3.05/1153 – CTLib 24314 & C.A. 16.3.05/1153 – CTLib 24315 written by Mariateresa MERANTE (May 13, 2005).

1st run - Lot traceability

Lot numbers:

- Lot 1: 9951515Q01
- Lot 2: 9951515QZX
- Lot 3: 9951515QZY

1st run - reliability test conditions and results

		REJECTED PARTS		
TEST	**CONDITIONS**	*Lot 1*	*Lot 2*	*Lot 3*
JL3	Preconditioning - T-SCAN + C-SAM @ time 0 - 24h bake @ 125°C - 192h @ 30°C / 60% RH - Reflow simulation (3 times) with standard JEDEC profile @ 260°C - T-SAM + C-SAM after reflow	*0/154*	*0/154*	*0/154*
HTS	High temperature storage Ta=175°C Steps: 0, 500, 1000, 1500, 2000 hours	*1/77*	*0/77*	*0/77*
JL3 + PPT	Pressure pot P=2atm, Ta=121°C, 100%RH Steps: 0, 168h	*3/77*	*3/77*	*4/77*
JL3 + TCT	Thermal cycling Ta= -50/+150°C Steps: 0, 1000, 2000 cycles	*1/77*	*2/77*	*1/77*

Most of the failures were due to continuity problem (open) or RDSon degradation.
The failure analysis performed on parts after TC or PP pointed out bond lift issue but no corrosion of pad metal.
The qualification was stopped due to delamination and plasma cleaning before molding has been required.

2nd run - Lot traceability

Lot numbers:

- Lot 1: 996170KVZN
- Lot 2: 996170KWZW
- Lot 3: 996170KXZY

2nd run - Reliability test conditions and results

Line	Final test	Reliability plant	Particular points
UD63	Agrate	Castelletto	

		REJECTED PARTS		
TEST	**CONDITIONS**	*Lot 1*	*Lot 2*	*Lot 3*
JL3	Preconditioning - T-SCAN + C-SAM @ time 0 - 24h bake @ 125°C - 192h @ 30°C / 60% RH - Reflow simulation (3 times) with standard JEDEC profile @ 260°C - T-SAM + C-SAM after reflow	*0/154*	*0/154*	*0/154*
HTS	High temperature storage Ta=150°C Steps: 0, 168, 500 hours T-SCAN + C-SAM after 500 hours	*0/77*	*0/77*	*0/77*
JL3 + TCT	Thermal cycling Ta= -50/+150°C Steps: 0, 100, 500, 1000 cycles T-SCAN + C-SAM after 1000 cycles	*0/77*	*0/77*	*0/77*
TST	Thermal shocks Ta= -40/+150°C Steps: 0, 500 cycles T-SCAN + C-SAM after 500 cycles	*0/77*	*0/77*	*0/77*
JL3 + PPT	Pressure pot P=2atm, Ta=121°C, 100%RH Steps: 0, 168h T-SCAN + C-SAM after 168h	*Failures on each lot : bond lift due to pad corrosion (die contamination)*		

Annex: Reliability tests description

TEST NAME	DESCRIPTION	PURPOSE
JLn: JEDEC Level n surface mounting simulation	The device is submitted to a typical temperature profile used for surface mounting, after controlled moisture absorption.	*As stand-alone test:* to investigate the level of moisture sensitivity. *As preconditioning before other reliability tests:* 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.
HTS: High Temperature Storage	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.
TCT: Temperature Cycles Test	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, and die attach layer degradation.
TST: Thermal Shock Test	The device is submitted to cycle thermal shocks through alternate immersion in a hot and a cold oil bath.	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 or die-attach layer degradation.
PPT: Pressure Pot Test	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.

HITACHI CEL 9240HF10 Qualification Plan

test vehicle: UT57 **Package : PwSSO36-EPAD – wire 1.2mils**

Fab : CARROLLTON **Assy : MUAR B-END**

TEST	LOT1 (available wk38)	LOT2 (available wk38)	LOT3 (available wk38)
Construction Analysis in Muar	100 samples	No	No
Preconditioning ***JL3 (260°c) (J-STD-020C)*** ***SAM t=0 and after precond.***	Same parts used in TC and PP trials No Reject SAM shows resin-die pad delamination	Same parts used in TC and PP trials No Reject SAM shows resin-die pad delamination	Same parts used in TC and PP trials No Reject SAM shows resin-die pad delamination
High Temperature Storage *Conditions :No Bias, Tj=150 °C;* *1000 hrs*	50 samples - STAR WK39 500H: 0Rej/50 1000H: 0Rej/50	50 samples - STAR WK39 500H: 0Rej/50 1000H: 0Rej/50	50 samples - STAR WK39 500H: 0Rej/50 1000H: 0Rej/50
E.S.=Preconditioning+PressurePot *Conditions: 2atm,168hrs*	50 samples 168h: 0Rej/50	50 samples 168h: 0Rej/50	50 samples 168h: 0Rej/50
E.S.=Preconditioning + Temperature Cycles *Conditions : Ta = -50°C/+150°C;* *500 cycles (air)*	50 samples 500CY: 0Rej/50	50 samples 500CY: 0Rej/50	50 samples 500CY: 0Rej/50
High temperature Reverse Bias *Conditions : Vcc=20V;* *Vboost=Vcc+6V, V5V=6V* *Tj=150 °C; 1000hrs*	30 samples - STAR WK39 168H: 0REJ/30 500H: 0REJ/30 1000H: 0REJ/30 NO REMARKABLE DRIFT	30 samples - STAR WK39 168H: 0REJ/30 500H: 0REJ/30 1000H: 0REJ/30 NO REMARKABLE DRIFT	30 samples - STAR WK39 168H: 0REJ/30 500H: 0REJ/30 1000H: 0REJ/30 NO REMARKABLE DRIFT

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