PRODUCT/PROCESS CHANGE NOTIFICATION

PCN MPA-PWR/06/1963
Notification Date 09/14/2006

NEW COPPER ON COPPER PROCESS FOR DPAK PACKAGE

PWR - PWR BIP/ IGBT/ RF

Table 1. Change Identification

Product Identification (Product Family/Commercial Product)	Power Bipolar assmbled in DPAK Package
Type of change	Package assembly material change
Reason for change	To improve performances and service
Description of the change	Power Bipolar Division has been decided to set up a new frame and new copper bonding for DPAK package in Shenzhen plant. Actually these devices are produced with with a Gold wire on Spot Ag frame. The same products will be also produced with a Copper on Copper process. No change in electrical and Quality performances
Product Line(s) and/or Part Number(s)	See attached
Description of the Qualification Plan	See attached
Change Product Identification	See "N" on additional info field
Manufacturing Location(s)	1]St Shenzhen -China

Table 2. Change Implementation Schedule

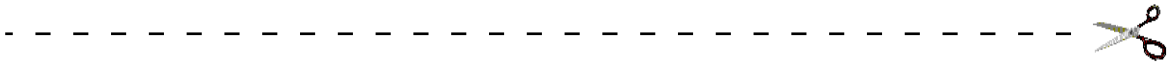
Forecasted implementation date for change	11-Dec-2006
Forecasted availabillity date of samples for customer	11-Sep-2006
Forecasted date for **STMicroelectronics** change Qualification Plan results availability	11-Sep-2006
Estimated date of changed product first shipment	18-Dec-2006

Table 3. Change Responsibility

	Name	Signature	Date
Division Product Manager	Claudio Porto		Sep.11 ,06
Division Q.A. Manager	Giuseppe Falcone		Sep.11 ,06
Division Marketing Manager	Alfio Lanzafame		Sep.11 ,06

Table 4. List of Attachments

Customer Part numbers list	
Qualification Plan results	



Customer Acknowledgement of Receipt	**PCN MPA-PWR/06/1963**
Please sign and return to STMicroelectronics Sales Office	**Notification Date 09/14/2006**
☐ 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 BIPOLAR TECHNOLOGY

Table of Contents

Introduction

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

Test Vehicles:

Product Lines	Main Sales Types
BA04	STD1802T4

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 BIPOLAR**

Collector Leakage Current (Icbo or Iceo or Ices, etc...)
Emitter Leakage (Iebo)
$H_{FE,}$ Vcesat, Vbesat, Vf
Breakdown Voltage (BVcbo, BVceo,Vbces, Bvebo)

Reliability Evaluation Plan and results

D.U.T. : STD1802T4 LINE: BA04 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= 50V	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℃; Vcbo=64V	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=-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	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.*

Technological Characteristics

D.U.T. : STD1802T4 LINE: BA04 PACKAGE: DPAK

DIE	*Technology:* **NPN Planar** *Material:* **Silicon** *Metallization – Front :* **Al/Si 1%** *– Back :* **AuAs/Cr/Ni/Au**		*Passivation :* **PSG** *Dimensions :* **1780x1770um**	
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 (Singapore)
ASSEMBLY LOCATION : Shenzhen (China)
Q.A. LOCATION : Shenzhen (China)

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.

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.

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