PRODUCT/PROCESS CHANGE NOTIFICATION

PCN MPA/06/2121
Notification Date 10/24/2006

NEW ASSEMBLY AND TESTING LOCATION FOR SOT-223 (IDS Malaysia)

MPA - MPA

Table 1. Change Identification

Product Identification (Product Family/Commercial Product)	Power MOSFETand Power Bipolar devices in SOT-223
Type of change	Package assembly location change
Reason for change	Service improvement and production optimization
Description of the change	MPA Catania has decided to sep up a new location for SOT-223 in Subcontractor IDS (Malaysia) . No change in processes and characteristics. Samples are available for line used for Subcon qualification
Product Line(s) and/or Part Number(s)	See attached
Description of the Qualification Plan	See attached
Change Product Identification	"S" as Assy location code on package near ST logo
Manufacturing Location(s)	

Table 2. Change Implementation Schedule

Forecasted implementation date for change	16-Jan-2007
Forecasted availabillity date of samples for customer	12-Oct-2006
Forecasted date for **STMicroelectronics** change Qualification Plan results availability	12-Oct-2006
Estimated date of changed product first shipment	16-Jan-2007

Table 3. Change Responsibility

	Name	Signature	Date
Division Product Manager	C. Porto/I. Wilson		Oct.12 ,06
Division Q.A. Manager	G. Falcone		Oct.12 ,06
Division Marketing Manager	A.Lanzafame/M.Giudice		Oct.12 ,06

Table 4. List of Attachments

Customer Part numbers list	
Qualification Plan results	

Customer Acknowledgement of Receipt **PCN MPA/06/2121**

Please sign and return to STMicroelectronics Sales Office **Notification Date 10/24/2006**

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

Remark

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RELIABILITY EVALUATION ON

SOT-223

MADE IN IDS

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Introduction

This report aims at the internal qualification of the SOT-223 package made in IDS.

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

The evaluation results meet ST products qualification targets, therefore the SOT-223 package made in IDS is qualified.

Test Vehicles:

Product Lines Power MOSFETs	Main Sales Types
EZ8Q	STN1NK80Z
EC6M	STN1HNK60
E33N	STN4NF03L

Product Lines Power Bipolars	Main Sales Types
BA04	STN851
F817	BCP53-16
BI01	STN790A

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 MOSFETs

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)

Parameter Power Bipolars

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.: STN1NK80Z LINE: EZ8Q PACKAGE: SOT-223

Test	Conditions	S.S.	Requirement	Results
PRECONDITIONING OF SMD DEVICES BEFORE TC/THB/ENV. SEQ.	DRYNG 1H @ 125℃ STORE 168H @ TA=85℃ RH=85% IR @ Tp=260℃ 3 times	204 x 1 Lot	Parameter deviation within spec. limits at end of pre-conditionings.	No parameter deviation at end of preconditionings.
H.T.S.	TA=150℃	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation 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 at 1000 hours.
H.T.R.B.	T.A.= 150℃ Vdd = 640V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation at 1000 hours.
H.T.F.B.	TA=150℃ Vgss=30V	77x1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation at 1000 hours.
PRESSURE POT	TA=121℃ - PA=2Atm	77 x 1 Lot	Parameter deviation within spec. limits at 96 hours.	No parameter deviation 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 at 500 cy
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 at end of test.

Reliability Evaluation Plan and results

D.U.T.: STN1HNK60 LINE: EC6M PACKAGE: SOT-223

Test	Conditions	S.S.	Requirement	Results
PRECONDITIONING OF SMD DEVICES BEFORE TC/THB/ENV. SEQ.	DRYNG 1H @ 125℃ STORE 168H @ TA=85℃ RH=85% IR @ Tp=260℃ 3 times	204 x 1 Lot	Parameter deviation within spec. limits at end of pre-conditionings.	No parameter deviation at end of preconditionings.
H.T.S.	TA=150℃	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation 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 at 1000 hours.
H.T.R.B.	T.A.= 150℃ Vdd= 480 V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation at 1000 hours.
H.T.F.B.	Ta=150℃ Vgss= 30V	77x1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation at 1000 hours.
PRESSURE POT	TA=121℃ – PA=2Atm	77 x 1 Lot	Parameter deviation within spec. limits at 96 hours.	No parameter deviation 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 at 500 cy
ENVIRONMENTAL SEQUENCE	D.U.T. SMD PRECONDITIONED 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.

Reliability Evaluation Plan and results

D.U.T.: STN4NF03L LINE: E33N PACKAGE: SOT-223

Test	Conditions	S.S.	Requirement	Results
PRECONDITIONING OF SMD DEVICES BEFORE TC/THB/ENV. SEQ.	DRYNG 1H @ 125℃ STORE 168H @ TA=85℃ RH=85% IR @ Tp=260℃ 3 times	204 x 1 Lot	Parameter deviation within spec. limits at end of pre-conditionings.	No parameter deviation at end of preconditionings.
H.T.S.	TA=150℃	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation at 1000 hours.
T.H.B.	D.U.T. SMD PRECONDITIONED TA=85℃ - RH=85% Vbias= 24V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation at 1000 hours.
H.T.R.B.	T.A.= 150℃ Vdd = 24V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation at 1000 hours.
H.T.F.B.	TA=150℃ Vgss=16V	77x1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation at 1000 hours.
PRESSURE POT	TA=121℃ – PA=2Atm	77 x 1 Lot	Parameter deviation within spec. limits at 96 hours.	No parameter deviation 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 at 500 cy
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 at end of test.

Reliability Evaluation Plan and results

D.U.T.: STN851 LINE: BA04 PACKAGE: SOT-223

Test	Conditions	S.S.	Requirement	Results
PRECONDITIONING OF SMD DEVICES BEFORE TC/THB/ENV. SEQ.	DRYNG 1H @ 125℃ STORE 168H @ TA=85℃ RH=85% IR @ Tp=260℃ 3 times	204 x 1 Lot	Parameter deviation within spec. limits at end of pre-conditionings.	No parameter deviation at end of preconditionings.
H.T.S.	TA=150℃	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation 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 at 1000 hours.
H.T.R.B.	T.A.= 150℃ Vces = 120V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation at 1000 hours.
PRESSURE POT	TA=121℃ - PA=2Atm	77 x 1 Lot	Parameter deviation within spec. limits at 96 hours.	No parameter deviation 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 at 500 cy
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 at end of test.

Reliability Evaluation Plan and results

D.U.T.: BCP53-1 LINE: F817 PACKAGE: SOT-223

Test	Conditions	S.S.	Requirement	Results
PRECONDITIONING OF SMD DEVICES BEFORE TC/THB/ENV. SEQ.	DRYNG 1H @ 125℃ STORE 168H @ TA=85℃ RH=85% IR @ Tp=260℃ 3 times	204 x 1 Lot	Parameter deviation within spec. limits at end of pre-conditionings.	No parameter deviation at end of preconditionings.
H.T.S.	TA=150℃	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation 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 at 1000 hours.
H.T.R.B.	T.A.= 150℃ Vces = 80V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation at 1000 hours.
PRESSURE POT	TA=121℃ - PA=2Atm	77 x 1 Lot	Parameter deviation within spec. limits at 96 hours.	No parameter deviation 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 at 500 cy
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 at end of test.

Reliability Evaluation Plan and results

D.U.T.: STN790A LINE: BI01 PACKAGE: SOT-223

Test	Conditions	S.S.	Requirement	Results
PRECONDITIONING OF SMD DEVICES BEFORE TC/THB/ENV. SEQ.	DRYNG 1H @ 125℃ STORE 168H @ TA=85℃ RH=85% IR @ Tp=260℃ 3 times	204 x 1 Lot	Parameter deviation within spec. limits at end of preconditionings.	No parameter deviation at end of preconditionings.
H.T.S.	TA=150℃	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation 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 at 1000 hours.
H.T.R.B.	T.A.= 150℃ Vces = 80V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation at 1000 hours.
PRESSURE POT	TA=121℃ - PA=2Atm	77 x 1 Lot	Parameter deviation within spec. limits at 96 hours.	No parameter deviation 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 at 500 cy
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 at end of test.

Technological Characteristics

D.U.T. : STN1NK80Z LINE: EZ8Q PACKAGE: SOT-223

DIE	*Technology:* SuperMESH™ MOSFET *Material:* Silicon		*Passivation :*	Nitride
	Metallization – Front : Al/Si (1%)		*Dimensions :*	2230 x 1760 µm
	- Back : Ti-Ni-Au			
DIE ATTACH	Soft Solder	**FRAME**	*Frame and lead material:* *Frame coating :* *Lead coating :*	Raw Copper Ag Spot on leads No coating Sn 100%
WIRE BOND	Thermosonic	**WIRE**	*Material :* *Diameter :*	Au Gate Au Source 2 mils Gate 2 mils Source
SEALING	Molding	**PACKAGING**	*Material :*	Epoxy Resin

PRODUCTION PLACES : WAFER PROCESSING : Singapore
ASSEMBLY LOCATION : Malaysia
Q.A. LOCATION : Malaysia

Technological Characteristics

D.U.T. : STN1HNK60 LINE: EC6M PACKAGE: SOT-223

DIE	*Technology:* SuperMESH™ MOSFET *Material:* Silicon *Metallization – Front :* Al/Si (1%) *- Back :* Ti-Ni-Au		*Passivation :* *Dimensions :*	Nitride 2030 x 1730 µm
DIE ATTACH	Soft Solder	**FRAME**	*Frame and lead material:* *Frame coating :* *Lead coating :*	Raw Copper Ag Spot on leads No coating Sn 100%
WIRE BOND	Thermosonic	**WIRE**	*Material :* *Diameter :*	Au Gate Au Source 2 mils Gate 2 mils Source
SEALING	Molding	**PACKAGING**	*Material :*	Epoxy Resin

PRODUCTION PLACES : WAFER PROCESSING : Singapore
ASSEMBLY LOCATION : Malaysia
Q.A. LOCATION : Malaysia

Technological Characteristics

D.U.T. : STN4NF03L LINE: E33N PACKAGE: SOT-223

DIE	*Technology:* STripFET II POWER MOSFET *Material:* Silicon *Passivation :* No passivation *Metallization – Front :* Al/Si (1%) *Dimensions :* 1750 x 1270 µm *- Back :* Ti-Ni-Au			
DIE ATTACH	Soft Solder	**FRAME**	*Frame and lead material:* *Frame coating :* *Lead coating :*	Raw Copper Ag Spot on leads No coating Sn 100%
WIRE BOND	Thermosonic	**WIRE**	*Material :* *Diameter :*	Au Gate Au Source 2 mils Gate 2 mils Source
SEALING	Molding	**PACKAGING**	*Material :*	Epoxy Resin

PRODUCTION PLACES : WAFER PROCESSING : Singapore
ASSEMBLY LOCATION : Malaysia
Q.A. LOCATION : Malaysia

Technological Characteristics

D.U.T.: STN851 Line: BA04 PACKAGE: SOT-223

DIE	*Technology:* EPITAXIAL PLANAR BASE ISLAND NPN TRANSISTOR *Material:* Silicon *Passivation :* P-Vapox *Metallization – Front :* Al/Si (1%) *Dimensions :* 1780 x 1770 µm *- Back :* Ti-Ni-Au			
DIE ATTACH	Soft Solder	**FRAME**	*Frame and lead material:* *Frame coating :* *Lead coating :*	Raw copper, Ag spot on leads No coating Sn 100%
WIRE BOND	Thermosonic	**WIRE**	*Material :* *Diameter :*	Au Base Au Emitter 2 mils Base 2 mils Emitter
SEALING	Molding	**PACKAGING**	*Material :*	Epoxy Resin

PRODUCTION PLACES : WAFER PROCESSING : Singapore
ASSEMBLY LOCATION : Malaysia
Q.A. LOCATION : Malaysia

Technological Characteristics

D.U.T.: BCP53-16 Line: F817 PACKAGE: SOT-223

DIE	*Technology:* PLANAR PNP TRANSISTOR *Material:* Silicon *Metallization – Front :* Al/Si (1%) *- Back :* Au/Cr/Ni/Au		*Passivation :* *Dimensions :*	P-Vapox 1070 x 1070 µm^2
DIE ATTACH	Soft Solder	**FRAME**	*Frame and lead material:* *Frame coating :* *Lead coating :*	Raw copper, Ag spot on leads No coating Sn 100%
WIRE BOND	Thermosonic	**WIRE**	*Material :* *Diameter :*	Au Base Au Emitter 2 mils Base 2 mils Emitter
SEALING	Molding	**PACKAGING**	*Material :*	Epoxy Resin

PRODUCTION PLACES : WAFER PROCESSING : Singapore
ASSEMBLY LOCATION : Malaysia
Q.A. LOCATION : Malaysia

Technological Characteristics

D.U.T.: STN790A Line: BI01 Package: SOT-223

DIE	*Technology:* BASE ISLAND PNP TRANSISTOR *Material:* Silicon *Metallization – Front :* Al/Si (1%) *- Back :* Au/Cr/Ni/Au		*Passivation :* *Dimensions :*	P-Vapox 1780 x 1020 µm^2
DIE ATTACH	Soft Solder	**FRAME**	*Frame and lead material:* *Frame coating :* *Lead coating :*	Row copper, Ag spot on leads No coating Sn 100%
WIRE BOND	Thermosonic	**WIRE**	*Material :* *Diameter :*	Au Base Au Emitter 2 mils Base 2 mils Emitter
SEALING	Molding	**PACKAGING**	*Material :*	Epoxy Resin

PRODUCTION PLACES : WAFER PROCESSING : Singapore
ASSEMBLY LOCATION : Malaysia
Q.A. LOCATION : Malaysia

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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