



PRODUCT/PROCESS CHANGE NOTIFICATION

PCN MPA-PMT/06/2235
Notification Date 12/22/2006

FDmesh TECHNOLOGY WITH ION IRRADIATION PROCESS

PMT - POWER MOSFET

Table 1. Change Identification

Product Identification (Product Family/Commercial Product)	Power MOSFET
Type of change	Waferfab process change
Reason for change	Service improvement and production optimization
Description of the change	New 'lifetime killer' technique (ion irradiation) performed on the Multiple Drain MESH Technology with Fast REcovery Diode series referred as FDMesh
Product Line(s) and/or Part Number(s)	See attached
Description of the Qualification Plan	See attached
Change Product Identification	See Week code 48/06
Manufacturing Location(s)	

Table 2. Change Implementation Schedule

Forecasted implementation date for change	25-Mar-2007
Forecasted availability date of samples for customer	18-Dec-2006
Forecasted date for STMicroelectronics change Qualification Plan results availability	18-Dec-2006
Estimated date of changed product first shipment	25-Mar-2007

Table 3. Change Responsibility


	Name	Signature	Date
Division Product Manager	Ian Wilson		Dec.18 ,06
Division Q.A. Manager	Giuseppe Falcone		Dec.18 ,06
Division Marketing Manager	Maurizio Giudice		Dec.18 ,06

Table 4. List of Attachments

Customer Part numbers list	
Qualification Plan results	



Customer Acknowledgement of Receipt		PCN MPA-PMT/06/2235	
Please sign and return to STMicroelectronics Sales Office		Notification Date 12/22/2006	
<input type="checkbox"/> Qualification Plan Denied <input type="checkbox"/> Qualification Plan Approved <input type="checkbox"/> Change Denied <input type="checkbox"/> Change Approved	Name:		
	Title:		
	Company:		
	Date:		
	Signature:		
Remark			

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Reliability evaluation

on

FDmesh technology
With Ion irradiation process

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Introduction

This report aims at the internal qualification of the new technique (ion irradiation) performed on the Multiple Drain MESH Technology with Fast REcovery Diode series referred as FDmesh.

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

The evaluation results meet ST products qualification targets, therefore the FDmesh Technology ion irradiated is qualified.


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Test Vehicles:

Product Line	Sales Types	Package
DF67	STP20NM60FD	TO-220
DF59	STW45NM50FD	TO-247

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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

Power MOSFET Main Parameters

Drain Leakage Current (I_{dss})
 Gate Leakage Current (I_{gss})
 Threshold Voltage ($V_{gs(th)}$)
 Forward On Voltage (V_{sd})
 Drain Source On Voltage ($V_{ds(on)}$)
 Drain Source Breakdown Voltage (B_{vds})

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Reliability Evaluation Plan and results

D.U.T. : STP20NM60FD LINE: DF67 PACKAGE: TO-220

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 = 480 V	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	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=4.8W	77 x 1 Lot	Parameter deviation within spec. limits at 10k cycles.	No parameter deviation out of spec. limits at 10Kcy.

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Reliability Evaluation Plan and results

D.U.T. : STW45NM50FD LINE: DF59 PACKAGE: TO-247

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 = 400 V	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	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=70°C - Pd=24W	77 x 1 Lot	Parameter deviation within spec. limits at 10k cycles.	No parameter deviation out of spec. limits at 10Kcy.

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Technological Characteristics

D.U.T. : STP20NM60FD LINE: DF67 PACKAGE: TO-220

DIE	<i>Technology:</i> MDmesh I MOSFETs <i>Material:</i> Silicon <i>Passivation :</i> Nitride <i>Metallization – Front :</i> Al/Si (1%) <i>Dimensions :</i> 182x225 (milsxmils) <i>- Back :</i> Ti-Ni-Au			
DIE ATTACH	Soft Solder	FRAME	<i>Frame and lead material:</i> Copper <i>Frame coating :</i> Ni/NiP <i>Lead coating :</i> Sn 100%	
WIRE BOND	Ultrasonic	WIRE	<i>Material :</i> Al/Mg Gate Al Source <i>Diameter :</i> 1 x 5 mils Gate 2 x10 mils Source	
SEALING	Molding	PACKAGING	<i>Material :</i> Epoxy Resin	

PRODUCTION PLACES : WAFER PROCESSING : CATANIA
 ASSEMBLY LOCATION : CASABLANCA / SHENZHEN
 Q.A. LOCATION : CASABLANCA / SHENZHEN

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Technological Characteristics

D.U.T. : STW45NM50FD LINE: DF59 PACKAGE: TO-247

DIE	<i>Technology:</i> FDmesh I MOSFETs <i>Material:</i> Silicon <i>Passivation :</i> Nitride <i>Metallization – Front :</i> Al/Si (1%) <i>Dimensions :</i> 259x377 (milsxmsls) <i>- Back :</i> Ti-Ni-Au			
DIE ATTACH	Soft Solder	FRAME	<i>Frame and lead material:</i> <i>Frame coating :</i> <i>Lead coating :</i>	Copper Ni/NiP Sn 100%
WIRE BOND	Ultrasonic	WIRE	<i>Material :</i> <i>Diameter :</i>	Al/Mg Gate Al Source 1 x 5 msls Gate 2 x15 msls Source
SEALING	Molding	PACKAGING	<i>Material :</i>	Epoxy Resin

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

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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.

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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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