PRODUCT/PROCESS CHANGE NOTIFICATION

PCN APM-PWR/07/2475
Notification Date 05/11/2007

NEW FRONT END LOCATION FOR IGBT POWER TRANSISTORS

PWR - PWR BIP/ IGBT/ RF

Table 1. Change Identification

Product Identification (Product Family/Commercial Product)	IGBT
Type of change	Waferfab location change
Reason for change	Service improvement and Front End capacity extension
Description of the change	Power Bipolar, IGBT & RF Division has decided to set up a new Front End location in STMicroelectronics (AMK S'Pore) for IGBT lines 5". The new wafer fab location will increase production capacity in order to satisfy our Customers demand. No change in Electrical & mechanical characteristics. No change in assembly and testing locations. The qualification of the production process has had as test vehicle the line IV64, whose the Qualification Report is attached. Such a line can be considered representative of the complete production process of the IGBT technology. To set to produce other IGBT lines in S'pore's wafer fab. could be planned in the future according to the productive and market needs.
Product Line(s) and/or Part Number(s)	See attached
Description of the Qualification Plan	See attached
Change Product Identification	See "W" in additional info field.
Manufacturing Location(s)	

Table 2. Change Implementation Schedule

Forecasted implementation date for change	06-Aug-2007
Forecasted availabillity date of samples for customer	04-May-2007
Forecasted date for **STMicroelectronics** change Qualification Plan results availability	04-May-2007
Estimated date of changed product first shipment	10-Aug-2007

Table 3. List of Attachments

Customer Part numbers list	
Qualification Plan results	

- -

Customer Acknowledgement of Receipt	**PCN APM-PWR/07/2475**
Please sign and return to STMicroelectronics Sales Office	**Notification Date 05/11/2007**
☐ Qualification Plan Denied	Name:
☐ Qualification Plan Approved	Title:
	Company:
☐ Change Denied	Date:
☐ Change Approved	Signature:

Remark

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DOCUMENT APPROVAL

Name	Function
Macauda, Michele	Division Marketing Manager
Porto, Michele Claudio	Division Product Manager
Falcone, Giuseppe	Division Q.A. Manager

RELIABILITY EVALUATION

ON

Silicon Line IV64

IGBT

Made in ANG MO KIO (SINGAPORE)

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Introduction

This report aims at the internal qualification of IV64 for new front end location for IGBT.

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

The evaluation results meet ST products qualification targets, therefore the new front end location for IGBT is qualified.

Test Vehicles:

Product Line	**Sales Type**	**Package**
IV64	STGD7NC60HT4	DPAK
IV64	STGB7NC60HDT4	D^2PAK

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

IGBTs Main Parameters

Collector Leakage Current (Icbo or Iceo or Ices, etc...)
Emitter Leakage (Iebo)
HFE, Vcesat, Vbesat, Vf
Breakdown Voltage (BVcbo, BVceo,Vbces, Bvebo)

Reliability Evaluation Plan and results

D.U.T.: STGD7NC60HT4 Line: IV64 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 precondi-tioning.
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= 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°C Vces = 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=20V	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 FATIGUE	ΔTC=105°C - Pd=2W	77x1 Lot	Parameter deviation within spec. limits at 10k cycles.	No failure up to 10Kcy.
THERMAL CYCLES AIR TO AIR	*D.U.T. SMD PRECONDITIONED* 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
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.: STGB7NC60HDT4 Line: IV64 Package: D^2PAK

Test	Conditions	S.S	Requirement	Results
PRECONDITIONING OF SMD DEVICES BEFORE TC/THB/ENV. SEQ.	DRYNG 1H @ 125℃ STORE 168H @ TA=85℃ RH=85% Oven Reflow @ Tp=245℃ 3 times	204 x 1 Lot	Parameter deviation within spec. limits at end of preconditionings.	No parameter deviation out of spec. limits at end of precondi-tionings.
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℃ Vces = 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℃ Vgss=20V	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 FATIGUE	ΔTC=105℃ - Pd=4.8W	77x1 Lot	Parameter deviation within spec. limits at 10k cycles.	No failure up to 10Kcy.
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
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.: STGB7NC60HDT4 Line: IV64 Package: DPAK

DIE	*Technology:* *Material:* *Metallization – Front :* *- Back :*	Fast IGBT Silicon Al/Si Cr/Ni/Au	 *Passivation :* *Dimensions :*	 P-Vapox 3610 x 2890 µm^2
DIE ATTACH	Soft Solder Pb/Sn/Ag	**FRAME**	*Frame and lead material:* *Frame coating :* *Lead coating :*	Row copper, Nickel plated Sn 100%
WIRE BOND	Ultrasonics	**WIRE**	*Material :* *Diameter :*	Al/Mg Base Al Emitter 5 mils Base 10 mils Emitter
SEALING	Molding	**PACKAGING**	*Material :*	Epoxy Resin

PRODUCTION PLACES:

WAFER PROCESSING: ANG MO KIO (SINGAPORE)
ASSEMBLY LOCATION : CASABLANCA / SHENZHEN
Q.A. LOCATION : CASABLANCA / SHENZHEN

Technological Characteristics

D.U.T.: STGB7NC60HDT4 Line: IV64 Package: D^2PAK

DIE	*Technology:* *Material:* *Metallization – Front :* *- Back :*	Fast IGBT Silicon Al/Si Cr/Ni/Au	*Passivation :* *Dimensions :*	P-Vapox 3610 x 2890 μm^2
DIE ATTACH	Soft Solder Pb/Sn/Ag	**FRAME**	*Frame and lead material:* *Frame coating :* *Lead coating :*	Row copper, Nickel plated Sn 100%
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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 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.

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.

Reliability Test Description (continued)

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.

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