PRODUCT/PROCESS CHANGE NOTIFICATION

PCN APM-PWR/07/2320
Notification Date 02/19/2007

Silicon Line Change for Bipolar devices (BI12)

PWR - PWR BIP/ IGBT/ RF

Table 1. Change Identification

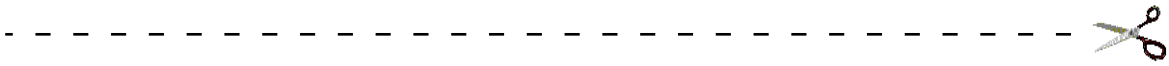
Product Identification (Product Family/Commercial Product)	Power Bipolar products
Type of change	Waferfab process change
Reason for change	To improve performances
Description of the change	Planar Base Island technology ready to replace the mature Epibase technology in order to align our products to the actual Market. The line BI12 will replace the old ones B641 Feature: Improved hFE linearity and Higher fT frequency benefit: Better performances in switching and linear application.
Product Line(s) and/or Part Number(s)	See attached
Description of the Qualification Plan	See attached
Change Product Identification	See "N" in additional info on P/N.
Manufacturing Location(s)	

Table 2. Change Implementation Schedule

Forecasted implementation date for change	12-May-2007
Forecasted availabillity date of samples for customer	12-Feb-2007
Forecasted date for **STMicroelectronics** change Qualification Plan results availability	12-Feb-2007
Estimated date of changed product first shipment	21-May-2007

Table 3. List of Attachments

Customer Part numbers list	
Qualification Plan results	



Customer Acknowledgement of Receipt	**PCN APM-PWR/07/2320**
Please sign and return to STMicroelectronics Sales Office	**Notification Date 02/19/2007**

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

Remark

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DOCUMENT APPROVAL

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

Reliability evaluation on BI12

for

Silicon Line Change on Bipolar devices

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Introduction

This report aims at the internal qualification of the BI12 Silicon Line for Bipolar devices.

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

The evaluation results meet ST products qualification targets, therefore the Silicon Line BI12 for Bipolar devices is qualified.

Test Vehicles:

Product Line	Sales Type	Package
BI12	BD238	SOT-32
BI12	MJD32C	DPAK
BI12	TIP32A	TO-220

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 Bipolar 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.: BD238 Line: BI12 Package: SOT-32

Test	Conditions	S.S.	Requirement	Results
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.	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 = 80 V	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= 3W	77x1 Lot	Parameter deviation within spec. limits at 10k cycles.	No failure up to 10Kcy.
THERMAL CYCLES AIR TO AIR	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

Reliability Evaluation Plan and results

D.U.T.: MJD32C Line: BI12 Package: DPAK

Test	Conditions	S.S.	Requirement	Results
PRECONDITIONING OF SMD DEVICES BEFORE TC/THB/ENV. SEQ.	DRYNG 1H @ 125℃ STORE 168H @ TA=85℃ RH=85% Reflow @ 260℃ 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 preconditioning.
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 = 80 V	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=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℃ 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 at end of test.

Reliability Evaluation Plan and results

D.U.T.: TIP32A Line: BI12 Package: TO-220

Test	Conditions	S.S.	Requirement	Results
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.	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 = 48 V	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=4.75W	77x1 Lot	Parameter deviation within spec. limits at 10k cycles.	No failure up to 10Kcy.
THERMAL CYCLES AIR TO AIR	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

Technological Characteristics

D.U.T.: BD238 Line: BI12 Package: SOT-32

DIE	*Technology:* Planar PNP *Material:* Silicon *Metallization – Front :* Al/Si *- Back :* AuAs/Cr/Ni/Au		*Passivation :* *Dimensions :*	P-Vapox 1340 x 1340 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/Mg Emitter 5 mils Base 5 mils Emitter
SEALING	Molding	**PACKAGING**	*Material :*	Epoxy Resin

PRODUCTION PLACES: WAFER PROCESSING : SINGAPORE
ASSEMBLY LOCATION : PHILIPPINES / INDIA / MOROCCO
Q.A. LOCATION : PHILIPPINES / INDIA / MOROCCO

Technological Characteristics

D.U.T.: MJD32 Line: BI12 Package: DPAK

DIE	*Technology:* Planar PNP *Material:* Silicon *Metallization – Front :* Al/Si *- Back :* AuAs/Cr/Ni/Au		*Passivation :* *Dimensions :*	P-Vapox 1340 x 1340 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	Ultrasonic	**WIRE**	*Material :* *Diameter :*	Al/Mg Base Al/Mg Emitter 5 mils Base 5 mils Emitter
SEALING	Molding	**PACKAGING**	*Material :*	Epoxy Resin

PRODUCTION PLACES: WAFER PROCESSING : SINGAPORE
ASSEMBLY LOCATION : MOROCCO / CHINA
Q.A. LOCATION : MOROCCO / CHINA

Technological Characteristics

D.U.T.: TIP31A Line: BI12 Package: TO-220

DIE	*Technology:* Planar PNP *Material:* Silicon *Metallization – Front :* Al/Si *- Back :* AuAs/Cr/Ni/Au		*Passivation :* *Dimensions :*	P-Vapox 1340 x 1340 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	Ultrasonic	**WIRE**	*Material :* *Diameter :*	Al/Mg Base Al/Mg Emitter 5 mils Base 5 mils Emitter
SEALING	Molding	**PACKAGING**	*Material :*	Epoxy Resin

PRODUCTION PLACES: WAFER PROCESSING : SINGAPORE
ASSEMBLY LOCATION : MOROCCO
Q.A. LOCATION : MOROCCO

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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