PRODUCT/PROCESS CHANGE NOTIFICATION

PCN APG-CRM/09/4867
Notification Date 08/20/2009

ASSY & FINAL TEST PRODUCTION INCREASE IN SHENZHEN FOR FLEXIWATT 25/27 VERTICAL & HORIZONTAL SPLITTING

Table 1. Change Implementation Schedule

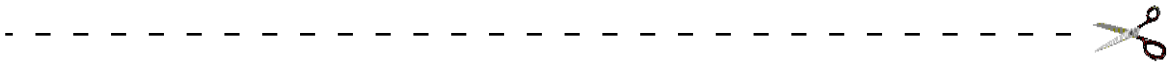
Forecasted implementation date for change	16-Nov-2009
Forecasted availabillity date of samples for customer	26-Aug-2009
Forecasted date for **STMicroelectronics** change Qualification Plan results availability	16-Aug-2009
Estimated date of changed product first shipment	30-Nov-2009

Table 2. Change Identification

Product Identification (Product Family/Commercial Product)	All flexiwatt 25/27 leads vertical & horizontal
Type of change	Multiple locations change
Reason for change	CAPACITY INCREASE AND COMPANY ROADMAP
Description of the change	As an extension of previous PCN APG-CRM/08/3717 about the qualification of Shenzhen as additional assembly & testing for Flexiwatt 25/27 leads, due to production capacity increase, we are going to assemble and test there an additional number of products.
Product Line(s) and/or Part Number(s)	See attached
Description of the Qualification Plan	See attached
Change Product Identification	"GK" AS IDENTIFICATION PLANT FOR SHENZHEN
Manufacturing Location(s)	

Table 3. List of Attachments

Customer Part numbers list	
Qualification Plan results	



Customer Acknowledgement of Receipt	**PCN APG-CRM/09/4867**
Please sign and return to STMicroelectronics Sales Office	**Notification Date 08/20/2009**

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

Remark

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DOCUMENT APPROVAL

Name	Function
Merli, Edoardo	Division Marketing Manager
Cassani, Fabrizio	Division Product Manager
Mercandelli, Laura	Division Q.A. Manager

FLEXIWATT SHENZHEN

RELIABILITY EVALUATION REPORT

Abstract

Aim of the present reliability exercise is to assess from reliability view point the transfer of FLEXIWATT line from ST Malta to ST SHENZHEN back-end plant.

The present report shows results from the selected test vehicles, UN01 and L390.

L390 has been assembled using std perform and the new type SSD-C2 identified to improve the workability at die–attach due to introduction of bare copper slug (less wettable than Ag spot one) .

Conclusion

On the basis of the results collected on the selected test vehicles and summarized in the present report, the reliability performance of the FLEXIWATT package assembled in ST SHENZHEN and using new perform SSD-C2, meets the applicable AEC-Q100 stress-test criteria.

Reliability test conditions and results vs AEC-Q100 requirement

TEST NAME / TYPE* (AEC-Q100 NAME)	CONDITIONS [SPEC]	TV1 REJ./S.S.	TV2 REJ./S.S.	TV3 REJ./S.S.	NOTES
TC / R (TC)	Ta=-50/+150°C,1000 cycles	Lot 1: 0/77 Lot 2: 0/77	Lot 1: 0/77 Lot 2: 0/7	Lot 1: 0/77 Lot 2: 0/77	1
PPT / R (AC)	96h PPT (2atm, 121°C)	Lot 1: 0/77 Lot 2: 0/77	Lot 1: 0/77 Lot 2: 0/77	Not performed	2
HTS / R (HTSL)	Ta=150°C, 1000h	Lot 1: 0/45 Lot 2: 0/45	Lot 1: 0/45 Lot 2: 0/45	Not performed	2
THB / R (THB)	Vs=18V, P_D negligible RH=85%, Ta=85°C, 1000h	Lot 1: 0/45 Lot 2: 0/45	Not performed	Lot 1: 0/45 Lot 2: 0/45	2
PTC / R (PTC)	Ta=-40/+125°C,1000 cycles	Not performed	Not performed	Not performed	3
OLT / R (HTOL)	Tj=150°C, 1000h	Not performed	Not performed	Not performed	4
ELFR / R (ELFR)	T=135 °C, 24h	Not performed	Not performed	Not performed	5
WBS / A (WBS)	30 wrs / 5 dev. / C_{PK}>1.33	PASSED	PASSED	PASSED	-
WBP / A (WBP)	30 wrs / 5 dev. / C_{PK}>1.33	PASSED	PASSED	PASSED	-
SD / A (SD)	15 dev. / Wetting >95%	PASSED	PASSED	PASSED	-
PD / A (PD)	10 dev/lot / C_{PK}>1.33	PASSED	PASSED	PASSED	-

***Type legenda:** R=Reliability, A=Assembly

NOTES:

1. Wire pull test after 1000 TC passed according to AEC-Q100 criteria (min 3g, s.s. 30 bonds from 5 devices)
2. Test done on one of the two lots including L390 as device vehicle because it is considered not significant to assess new vs std perform .
3. In a package qualification context PTC is focused on those failure mechanisms activated by thermal fatigue in wire bonds, die-attach, internal package interfaces (delamination). Since the change is only involving the assembly manufacturing plant with no change in silicon design, assembly materials and processes, these aspects can be considered fully investigated through TC and HTS tests.
4. Taking into account the absence of changes in package materials and structure, the only assembly-significant OLT stress factor is junction temperature, mainly affecting the intermetallic growth in wire-bonds. Since OLT thermal configuration is a steady-state stress at 150degC, the relevant failure mechanisms are fully covered by HTSL test.
5. Burn-in not available for FW products family.

Construction note

Test vehicle	**TV1**	**TV2**		**TV3**
Technical code	H84W*UN01AFH	H84W*L390BB6		
Diffusion process	BCD5CS	BI20II		
Wafer diameter	6 inches	6 inches		
Diffusion site	CARROLLTON 6	AMK 6		
Die size (mm^2)	5280 x 5430	7300 x 5140		
Metal levels	3, Ti/AlSiCu/TiN	2, AlSi, AlSiCu		
Passivation	USG-PSG-SiON-PIX	P-VAPOX /NITRIDE/ POLYIMIDE		
Back finishing	Cr/Ni/Au	Cr/Ni/Au		
Package name	FLEXIWATT 25	FLEXIWATT 25		
Assembly site	SHENZHEN B/E	SHENZHEN B/E		
Leadframe	5FF76086 FM2 SWin Wdg bare Cu	5FF76130 FM2 LWin Wdg Bare Cu SpAg		
Die attach	PbSn1Ag1.5	PbSn1Ag1.5		PbSn1Ag1.5(C2)
Wire bonding	Cu, 2 mils	Cu, 2 mils		
Molding compound	Kyocera KE-G280T	Kyocera KE-G280T		
Lead finishing	Pure Sn	Pure Sn		
Lot_id	GK80311701&GK803117ZZ	GK80313F01&GK80313FZZ		GK80313FZW&GK80313FZY

Attachments

1) Reliability tests description

ATTACHMENT 1: RELIABILITY TESTS DESCRIPTION

TEST NAME	DESCRIPTION	PURPOSE
HTRB: High Temperature Reverse Bias Test	The device is stressed in static configuration, trying to satisfy as much as possible the following conditions: -) low power dissipation; -) max. supply voltage compatible with diffusion process and internal circuitry limitations; -) max. junction temperature.	To maximize the electrical field across either reverse-biased junctions or dielectric layers, in order to investigate the failure modes linked to mobile contamination, oxide ageing, layout sensitivity to surface effects.
TCT: Temperature Cycles Test	The device is submitted to cycled temperature excursions, between a hot and a cold chamber in air atmosphere.	To investigate failure modes related to the thermo-mechanical stress induced by the different thermal expansion of the materials interacting in the die-package system. Typical failure modes are linked to metal displacement, dielectric cracking, moulding compound delamination, wire-bonds failure, die-attach layer degradation.
ES: Environmental Sequence	The device is submitted in sequence to TCT and PPT, sometimes preceded by JLn preconditioning.	To simulate the actual combination of environmental stresses interacting in the field application. The typical failure modes are those reported for JLn, TCT and PPT.
HTS: High Temperature Storage	The device is stored in unbiased condition at the max. temperature allowed by the package materials, sometimes higher than the max. operative temperature.	To investigate the failure mechanisms activated by high temperature, typically wire-bonds solder joint ageing, data retention faults, metal stress-voiding.
THB: Temperature Humidity Bias Test	The device is biased in static configuration minimizing its internal power dissipation, and stored at controlled conditions of ambient temperature and relative humidity.	To investigate failure mechanisms activated in the die-package environment by electrical field and wet conditions. Typical failure mechanisms are electro-chemical corrosion and surface effects related to the moulding compound.
OLT: Operating Life Test	The device is stressed in dynamic configuration, approaching the operative max. absolute ratings in terms of junction temperature, load current, internal power dissipation.	To simulate the worst-case application stress conditions. The typical failure modes are related to electromigration, wire-bonds degradation, oxide faults.
PTC: Power Temperature Cycling	The device is stressed in dynamic configuration with a duty cycle of 50% at cycled ambient temperature.	To simulate the application stress in terms of electrical and environmental conditions. The typical failure modes are related to active thermal fatigue in the die-packge system..
ELFR: Early Life Failure Rate	Test samples are placed under operating stress, approaching the maximum allowed junction temperature. Stress test will be conducted at a voltage level equal to or above the rated maximum Vcc.	To estimate the time-dependent failure rate of electronics components. This test measures reliability performance over the customers most critical product use period.

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