PRODUCT/PROCESS CHANGE NOTIFICATION

PCN APG-PTS/14/8479
Dated 26 May 2014

Diffusion Transfer from AngMoKio 5 inchs (AMK5) to 6 inchs (AMK6)

Table 1. Change Implementation Schedule

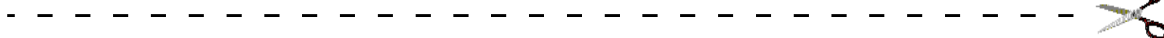
Forecasted implementation date for change	31-Jul-2014
Forecasted availability date of samples for customer	19-May-2014
Forecasted date for **STMicroelectronics** change Qualification Plan results availability	19-May-2014
Estimated date of changed product first shipment	31-Jul-2014

Table 2. Change Identification

Product Identification (Product Family/Commercial Product)	see list
Type of change	Waferfab location change
Reason for change	Company Road map
Description of the change	We are going to transfer products diffused in AngMoKio 5 inchs wafer Fab (AMK5) to AngMoKio 6 inchs wafer Fab (AMK6).
Change Product Identification	Tracecode
Manufacturing Location(s)	

Table 3. List of Attachments

Customer Part numbers list	
Qualification Plan results	



Customer Acknowledgement of Receipt	**PCN APG-PTS/14/8479**
Please sign and return to STMicroelectronics Sales Office	**Dated 26 May 2014**
☐ Qualification Plan Denied	Name:
☐ Qualification Plan Approved	Title:
	Company:
☐ Change Denied	Date:
☐ Change Approved	Signature:

Remark

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DOCUMENT APPROVAL

Name	Function
Nicoloso, Riccardo	Marketing Manager
Liporace, Nicola	Product Manager
Minerva, Francesco	Q.A. Manager

Diffusion Transfer from AngMoKio 5 inchs (AMK5) to 6 inchs (AMK6)

WHAT*:*

We are going to transfer products diffused in AngMoKio 5 inchs wafer Fab (AMK5) to AngMoKio 6 inchs wafer Fab (AMK6)

WHY:

Company Road Map

HOW:

See enclosed qualification report RR000514CT2235

Sample availability on demand through Sales Offices

WHEN:

We are ready to activate AMK6 difusion wafer fab, upon Customer agrement, from July 2014

See below list of products involved

Line	Product
W02303	DS434003/T013TR
W02303	L4949ED-E
W02303	L4949EDMITTR
W02303	L4949EDTR-E
W02303	L4949EP-E
W02303	L4949EPTR-E
W20003	DS534006/XT/TR
W20003	L4925PD
W20003	L4925PD013TR
W30003	04830419AATR
W30003	L4938EDTR-E
W30003	L4938EPD
W30003	L4938EPD13TR

BIPOLAR Technology Diffusion Fab transfer from ST AMK5 to ST AMK6 Ang Mo Kio (Singapore)

Revision history			
Rev.	**Date of Release**	**Author**	**Changes description**
0.1	May 9, 2014	F. Ceraulo - APG Q&R Catania	Creation

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1.2	4	Results
2	5	Traceability
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- 1. Reliability evaluations overview

1.1 Objectives

Aim of this report is to present the results of the reliability evaluations performed on several products chosen as test vehicles to qualify the Bipolar technology diffusion Fab transfer from ST AMK5 5” wafer Fab to ST AMK6 6” wafer Fab both located in Ang Mo Kio (Singapore).

Here below the test vehicles matrix with the raw material details:

	ST silicon line				
	W023		W300		W200
Wafer Fab information					
Site location	ST AMK6 6" Ang Mo Kio (Singapore)				
Silicon Technology	BIP				
Die finishing front	SiN/Polymide				
Die finishing back	CrNi				
Metal layer	2 layer, AlSi 1.2µm last level				
Assembly information					
Package	SO8	SO20	SO20	PSO20	PSO20
Plant location	ST Shenzhen (China)	ST Muar (Malaysia)	ST Muar (Malaysia)	ST Muar (Malaysia)	ST Muar (Malaysia)
Wire typology	Au, 1mils	Au, 1.3mils	Au, 2mils	Au, 2mils	Au, 2mils
Molding compound	SUMITOMO EME-G700KC	SUMITOMO EME-7026	SUMITOMO EME-7026	Hitachi CEL9240-HF	Hitachi CEL9240-HF
Die attach	Glue ABLEBOND	Glue Hitachi EN4900	Glue Hitachi EN4900	Preform PbAgSn 97.5/1.5/1	Preform PbAgSn 97.5/1.5/1

The qualification was done according to **AEC_Q100 Rev.G** specification applying a family approach due to specific similarity among the different test vehicles. In the below table the applied stress test as well as a comparison between the AEC-Q100 and ZVEI requirements are reported:

			Test Group A					Test Group B		Test Group C				Test Group D					Test Group E				
			THB	AC	TC	PTC	HTSL	HTOL	ELFR	WBS	WBP	SD	PD	EM	TDDB	HCI	NBTI	SM	HBM	CDM	LU	ED	GL
AEC-Q100			x	x	x	x		x	x	x	x			x	x	x	x	x	x	x	x	x	x
ZVEI			x	x	x	x		x	x	x	x			x	x	x	x	x	x	x	x	x	x
Commercial product	Silicon Line	Package																					
L4949	W023	SO8	x	x	x	NA	x	x	x	x	x	x	x	NA	NA	NA	NA	NA	x	x	x	x	x
		SO20		x	x	NA	x			x	x	x	x	NA	NA	NA	NA	NA	x	x	x		
L4938	W300	PSO20		x	x	NA	x			x	x	x	x	NA	NA	NA	NA	NA	x	x	x		
		SO20				NA				x	x	x	x	NA	NA	NA	NA	NA	x	x	x		
L4925	W200	SO20				NA				x	x	x	x	NA	NA	NA	NA	NA	x	x	x		

See details per each test group in section 3 of this report.

1.2 Results

All reliability tests have been completed with positive results neither functional nor parametric rejects were detected at final electrical testing.

The Wire Bond Pull/Shear tests (WBP, WBS) as Package Assembly Integrity (test Group C) pointed out neither abnormal break loads nor forbidden failure modes both before and after stress test.

Based on the overall positive results we consider the products qualified from a reliability point of view.

- 2. Traceability

Wafer fab information					
	L4949 W023	**L4949 W023**	**L4938 W300**	**L4938 W300**	**L4925 W200**
Wafer fab manufacturing location	ST AMK6 Ang Mo Kio (Singapore)				
Wafer diameter (inches)	6				
Diffusion Lots #	1st : 6222KTF 2nd : 62302LE 3rd : 62302LF	62302LE	6306N0T	6306N0T	6236PNK
Assembly Information					
Package description	SO8	SO20	PSO20	SO20	SO20
Assembly Lots #	1st : 993050PU01 2nd : 993050Q001 3rd : 993050PW01	993010BC01	1st : 9932409GRQ 2nd : 9932409GRP 3rd : 9932409GRR	993230R5RR	992490WJ02
Reliability Information					
Reliability test execution location	ST Catania (Italy)				

- 3. Reliability qualification plan and results

Test group A: Accelerated Environment Stress					
AEC #	**Test Name**	**STM Test Conditions**	**Sample Size/ Lots**	**Results Fails/SS/Lots**	**Comments**
A1	**PC** Pre Cond	- Preconditioning according to Jedec JESD22-A113F including 5 Temperature Cycling Ta=-40ºC/+60ºC - Reflow according to level 3 Jedec JSTD020D-1 - 100 Temperature Cycling Ta=-50ºC/+150ºC	Before THB, AC, TC, HTOL		
A2	**THB** Temp Humidity Bias	Ta=85ºC, RH=85%, Vcc=24V for 1000 hours	77/3	0/77/3	3 x W023 (SO8)
A3	**AC** Autoclave	**ENV. SEQ.** Enviromental Sequence **TC** (Ta=-65ºC / +150ºC for 100 cycles) + **AC** (Ta=121ºC, Pa=2atm for 96 hours)	77/5	0/77/5	3 x W023 (SO8) 1 x W023 (SO20) 1 x W300 (PSO20)
A4	**TC** Temp. Cycling	Ta=-65ºC / +150ºC for 500 cycles	77/5	0/77/5	3 x W023 (SO8) 1 x W023 (SO20) 1 x W300 (PSO20)
A5	**PTC** Power Temp. Cycling	Ta=-40ºC / +125ºC for 1000 cycles.	-	-	Not Applicable Pdis<1W
A6	**HTSL** High Temp. Storage Life	Ta=150ºC for 1000 hours.	45/5	0/45/5	3 x W023 (SO8) 1 x W023 (SO20) 1 x W300 (PSO20)

Test group B: Accelerated Lifetime Simulation					
AEC #	**Test Name**	**STM Test Conditions**	**Sample Size/ Lots**	**Results Fails/SS/Lots**	**Comments**
B1	**HTOL** High Temp. Op. Life	Bias Dynamic stress (JESD22-A108): Ta=125ºC, Vcc=28V for 1000 hours	77/3	0/77/3	3 x W023 (SO8)
B2	**ELFR** Early Life Failure Rate	Parts submitted to **HTOL** per JESD22-A108 requirements; GRADE 1: 24 hours at 150ºC	800/3	Passed	
B3	**EDR** Endurance Data Retention	Only for memory devices	-	-	Not Applicable

Test group C: Package Assembly Integrity					
AEC #	**Test Name**	**STM Test Conditions**	**Sample Size/ Lots**	**Results Fails/SS/Lots**	**Comments**
C1	**WBS** Wire Bond Shear	Per AEC-Q100-001	30 bonds /minimum 5 units/1 lot	All measurement within spec limits	3 x W023 (SO8) 1 x W023 (SO20) 3 x W300 (PSO20) 1 x W300 (SO20) 1 x W200 (SO20)
C2	**WBP** Wire Bond Pull	Per MIL-STD883, M2011 Condition C or D	30 bonds /minimum 5 units/1 lot	All measurement within spec limits	3 x W023 (SO8) 1 x W023 (SO20) 3 x W300 (PSO20) 1 x W300 (SO20) 1 x W200 (SO20)
C3	**SD** Solderability		15/9	All measurement within spec limits	3 x W023 (SO8) 1 x W023 (SO20) 3 x W300 (PSO20) 1 x W300 (SO20) 1 x W200 (SO20)
C4	**PD** Physical Dimensions		10/9	All measurement within spec limits	3 x W023 (SO8) 1 x W023 (SO20) 3 x W300 (PSO20) 1 x W300 (SO20) 1 x W200 (SO20)
C5	**SBS** Solder Ball Shear	Only for BGA package	-	-	Not Applicable
C6	**LI** Lead Integrity	Not required for Surface Mount Devices	-	-	Not Applicable

Test group D: Die Fabrication Reliability					
AEC #	**Test Name**	**STM Test Conditions**	**Sample Size/ Lots**	**Results Fails/SS/Lots**	**Comments**
D1	**EM** Electromigration				Not Applicable for Bipolar technology
D2	**TDDB** Time Dependent Dielectric Breakdown				Not Applicable for Bipolar technology
D3	**HCI** Hot Carrier Injection				Not Applicable for Bipolar technology
D4	**NBTI** Negative Bias Temperature Instability				Not Applicable for Bipolar technology
D5	**SM** Stress Migration				Not Applicable for Bipolar technology

Test group E: Electrical Verification

AEC #	Test Name	STM Test Conditions	Sample Size/ Lots	Results Fails/SS/Lots	Comments
E2	**ESD** HBM	HBM=[R=1.5kΩ, C=150pF]	1 lot	±2.0kV	1 x W023 (SO8) 1 x W023 (SO20) 1 x W300 (PSO20) 1 x W300 (SO20) 1 x W200 (SO20)
E3	**ESD** CDM		1 lot	±500V ±750V (*Corner pins)*	1 x W023 (SO8) 1 x W023 (SO20) 1 x W300 (PSO20) 1 x W300 (SO20) 1 x W200 (SO20)
E4	**LU** Latch-Up	Injection current : ±100mA Over voltage: 1.5 x Vop max	6/1	Inj-L/Inj-H@125°C: ±100mA all pins Inj+L/Inj+H@125°C: ±100mA all pins OV: passed	1 x W023 (SO8) 1 x W023 (SO20) 1 x W300 (PSO20) 1 x W300 (SO20) 1 x W200 (SO20)
E5	**ED** Electrical Distributions		30/3	Done	3 x W023 (SO8)
E7	**CHAR** Characterization			-	Not Applicable
E8	**GL** Gate Leakage		6/1	PASSED	1 x W023 (SO8)
E9	**EMC** Electromagnetic Compatibility		-	-	Not Applicable
E10	**SC** Short Circuit Characterization	According to **AEC-Q100-012**	-	Not Applicable	

Test group F: Defects Screening Tests

AEC #	Test Name	STM Test Conditions	Sample Size/ Lots	Results Fails/SS/Lots	Comments
F1	**PAT** Process Average Testing		Not performed on qualification lots listed on traceability section of this report. To be implemented starting from first production lot		
F2	**SBA** Statistical Bin/Yield Analysis				

Test group G: Cavity Package Integrity Tests					
AEC #	**Test Name**	**STM Test Conditions**	**Sample Size/ Lots**	**Results Fails/SS/Lots**	**Comments**
G1	**MS** Mechanical Shock	Not applicable: not for plastic packaged devices			
G2	**VFV** Variable Frequency Vibration				
G3	**CA** Constant Acceleration				
G4	**GFL** Gross/Fine Leak				
G5	**DROP** Package Drop				
G6	**LT** Lid Torque				
G7	**DS** Die Shear				
G8	**IWV** Internal Water Vapor				

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