



PRODUCT/PROCESS CHANGE NOTIFICATION

PCN IPD-IPC/12/7320

Dated 13 Aug 2012

**Bipolar products changing wafer size from 5" to 6" in
Ang Mo Kio fabs (Singapore)**

Table 1. Change Implementation Schedule

Forecasted implementation date for change	10-Aug-2012
Forecasted availability date of samples for customer	10-Sep-2012
Forecasted date for STMicroelectronics change Qualification Plan results availability	06-Aug-2012
Estimated date of changed product first shipment	12-Nov-2012

Table 2. Change Identification

Product Identification (Product Family/Commercial Product)	see attached list
Type of change	Waferfab process change
Reason for change	Capacity increase
Description of the change	We are going to change the wafer size from 5" to 6" of the products in bipolar technology, in Ang Mo Kio fabs (Singapore).
Change Product Identification	VW or V6 digits on trace code
Manufacturing Location(s)	

Table 3. List of Attachments

Customer Part numbers list	
Qualification Plan results	

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Customer Acknowledgement of Receipt		PCN IPD-IPC/12/7320
Please sign and return to STMicroelectronics Sales Office		Dated 13 Aug 2012
☐ Qualification Plan Denied ☐ Qualification Plan Approved ☐ Change Denied ☐ Change Approved	Name:	
	Title:	
	Company:	
	Date:	
	Signature:	
Remark		

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WHAT:

We are changing the wafer size from 5" to 6" of our products in bipolar technology, in Ang Mo Kio fabs (Singapore).

WHY:

To increase production capacity and to improve service.

HOW:

The test vehicles used to qualify the 6" are : 1708BA6, L693EA6, L740CA6, L843DA6 and L877EA6.

The package-oriented reliability evaluation and the electrical and parametric test result analysis on these five test vehicles have been positively completed, see the attached Reliability Report.

The change to 6" will be identified on the trace code by the digits "VW" or "V6".

WHEN:

The change from 5" to 6" will be made progressively from August onwards.

The first shipments could be from November 2012, depending on the orders volumes to allow phase-out and phase-in.

Samples can be delivered upon request in 6 weeks A.R.O.

Reliability Report

BIPOLAR TECHNOLOGY PRODUCTS WAFER SIZE CHANGE FROM 5" TO 6" in ANG MO KIO FABS, SINGAPORE

General Information	
Product Line TV1	1708 BA6
Product division	IPD- I&PC
Package	VDFPN8 4X4
Silicon process technology	BIP (111)

Locations	
Wafer fab location	ANG MO KIO 6"
Assembly plant location	CARSEM S
Reliability assessment	Pass

General Information	
Product Line TV2	L693 EA6
Product division	IPD- I&PC
Package	PwSO20
Silicon process technology	BIP (>6um)

Locations	
Wafer fab location	ANG MO KIO 6"
Assembly plant location	MUAR
Reliability assessment	Pass

General Information	
Product Line TV3	L740 CA6
Product division	IPD- I&PC
Package	HeptaWatt7
Silicon process technology	BIP (>6um)

Locations	
Wafer fab location	ANG MO KIO 6"
Assembly plant location	BOUSKOURA2
Reliability assessment	Pass

General Information	
Product Line TV4	L843 DA6
Product division	IPD- I&PC
Package	PDIP16
Silicon process technology	BIP (>6um)

Locations	
Wafer fab location	ANG MO KIO 6"
Assembly plant location	MUAR
Reliability assessment	Pass

General Information	
Product Line TV5	L877 EA6
Product division	IPD- I&PC
Package	SO20
Silicon process technology	BIP (>6um)

Locations	
Wafer fab location	ANG MO KIO 6"
Assembly plant location	MUAR
Reliability assessment	Pass

DOCUMENT HISTORY

Version	Date	Pages	Author	Comment
1.0	1-April-2012		A.Contrafatto	Original document

Issued by

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TABLE OF CONTENTS

1	APPLICABLE AND REFERENCE DOCUMENTS.....	3
2	QUALITY AND RELIABILITY EVALUATION OVERVIEW.....	4
2.1	Objectives.....	4
2.2	Conclusion.....	4
3	DEVICE CHARACTERISTICS.....	5
3.1	Traceability.....	5
3.1.1	TV1 – 1708BA6	5
3.1.2	TV2 – L693EA6	6
3.1.3	TV3 – L740CA6	7
3.1.4	TV4 – L843DA6	8
3.1.5	TV5 – L877EA6	9
4	RELIABILITY TESTS.....	10
4.1	Reliability test conditions and results.....	10
4.1.1	TV1 – 1708BA6	10
4.1.2	TV2 – L693EA6	10
4.1.3	TV3 – L740CA6	10
4.1.4	TV4 – L843DA6	11
4.1.5	TV5 – L877EA6	11
5	RELIABILITY TESTS DESCRIPTION & DETAILED RESULTS.....	12
5.1	Package oriented tests.....	12
5.1.1	Pre-Conditioning.....	12
5.1.2	Thermal Cycles	12
5.1.3	Autoclave.....	12
5.1.4	High Temperature Storage Life.....	12
5.1.5	Thermal Humidity Storage.....	12
6	PROCESS CHANGE CHARACTERIZATION.....	13
6.1	Parametric Test and EWS analysis.....	13

1. APPLICABLE AND REFERENCE DOCUMENTS

Document reference	Short description
AEC-Q100	: Stress test qualification for integrated circuits
8161393A	: General Specification For Product Development

2. QUALITY AND RELIABILITY EVALUATION OVERVIEW

2.1 Objectives

This report describes all the evaluation activities and the results achieved in order to convert IPC division products in BIPOLAR technology from 5" fab to 6" fabs in Ang Mo Kio – Singapore. BIPOLAR technology is already qualified in AMK 6" fabs, AMK6 and AMJ9.

The five test vehicles used for the qualification are:

- 1708BA6 assembled in VFDFPN 4x4 8L in CARSEM S.
- L693EA6 assembled in PowerSO20 in MUAR.
- L740CA6 assembled in HeptaWatt7 in BOUSKOURA 2.
- L843DA6 assembled in PDIP16 in MUAR.
- L877EA6 assembled in SO20 in MUAR.

The qualification activities include:

- Package-oriented reliability evaluation of 1708BA6, L693EA6, L740CA6, L843DA6 and L877EA6 devices diffused in AMK 6".
- Electrical and parametric test result analysis on the five test vehicles.

According to Reliability Qualification Plan, below is the list of the trials performed:

Package Oriented Tests

- Preconditioning
- High Temperature Storage
- Autoclave
- Thermal Cycles
- Thermal Humidity Storage

2.2 Conclusion

Taking in account the results of the evaluations performed, **the wafer size of I&PC Division products in BIPOLAR technology can be changed from 5" to 6" in ANG MO KIO wafer fabs - Singapore.**

3. DEVICE CHARACTERISTICS

3.1 Traceability

3.1.1 TV1 – 1708BA6

Wafer fab information	
Wafer fab manufacturing location	ANG MO KIO - SINGAPORE
Wafer diameter	6 inches
Wafer thickness	275 μm ± 25
Silicon process technology	BIP (111)
Die finishing back side	LAPPED SILICON
Die size	2930x2130 μm
Bond pad metallization layers	AlSiCu
Die Finish Front	P-VAPOX (Si glass)
Metal levels	1

Assembly Information	
Assembly plant location	CARSEM S - MALAYSIA
Package description	VFDFPN 4X4 8L
Molding compound	G770H
Wires bonding materials/diameters	Au/1mils
Die attach material	QMI519
Lead solder material	NiPdAu

3.1.2 TV2 – L693EA6

Wafer fab information	
Wafer fab manufacturing location	ANG MO KIO - SINGAPORE
Wafer diameter	6 inches
Wafer thickness	280 μm $\pm$ 25
Silicon process technology	BIP (>6 μm)
Die finishing back side	Cr/Ni/Au
Die size	3280x3080 μm
Bond pad metallization layers	AlSi
Die Finish Front	SiN (nitride)
Metal levels	1

Assembly Information	
Assembly plant location	MUAR - MALAYSIA
Package description	Power
Molding compound	SUMITOMO 7307A
Wires bonding materials/diameters	Au/2 mils
Die attach material	PREFORM Pb/Ag/Sn 97.5/1.5/1
Lead solder material	Sn

3.1.3 TV3 – L740CA6

Wafer fab information	
Wafer fab manufacturing location	ANG MO KIO - SINGAPORE
Wafer diameter	6 inches
Wafer thickness	275 μm ± 5
Silicon process technology	BIP ($>6\mu\text{m}$)
Die finishing back side	Cr/Ni/Au
Die size	3160x3170 μm
Bond pad metallization layers	AlSi
Die Finish Front	SiN (nitride)
Metal levels	1

Assembly Information	
Assembly plant location	BOUSKOURA - MOROCCO
Package description	HW 7L
Molding compound	SUMITOMO 6300HR1LD
Wires bonding materials/diameters	Cu/2 mils
Die attach material	PREFORM Pb/Ag/Sn 97.5/1.5/1
Lead solder material	Sn

3.1.4 TV4 – L843DA6

Wafer fab information	
Wafer fab manufacturing location	ANG MO KIO - SINGAPORE
Wafer diameter	6 inches
Wafer thickness	275 μm $\pm$ 25
Silicon process technology	BIP (>6 μm)
Die finishing back side	Cr/Ni/Au
Die size	2814x2795 μm
Bond pad metallization layers	AlSi
Die Finish Front	SiN (nitride)
Metal levels	1

Assembly Information	
Assembly plant location	MUAR - MALAYSIA
Package description	PDIP16L
Molding compound	PLASKON S-7PG
Wires bonding materials/diameters	Au/2 mils
Die attach material	PREFORM Pb/Ag/Sn 97.5/1.5/1
Lead solder material	Sn

3.1.5 TV5 – L877EA6

Wafer fab information	
Wafer fab manufacturing location	ANG MO KIO - SINGAPORE
Wafer diameter	6 inches
Wafer thickness	275 μm $\pm$ 25
Silicon process technology	BIP (>6 μm)
Die finishing back side	Cr/Ni/Au
Die size	3910x3660 μm
Bond pad metallization layers	AlSi
Die Finish Front	SiN (nitride)
Metal levels	1

Assembly Information	
Assembly plant location	MUAR - MALAYSIA
Package description	SO 20L
Molding compound	SUMITOMO EME7026
Wires bonding materials/diameters	Au/1.5 mils
Die attach material	HITACHI EN4900
Lead solder material	NiPdAu

4. RELIABILITY TESTS

4.1 Reliability test conditions and results

4.1.1 TV1 – 1708BA6

Package Oriented Tests						
Test	Method	Conditions	Sample/Lots	Number of lots	Duration	Results Fail/SS
PC	Pre-Conditioning: Moisture sensitivity level 3					
		24h bake@125 °C, 192h@30 °C/60%R.H.	154	1		0/154
TC	Temperature Cycling					
	PC before	Temp. range: -65°C /+150°C	77	1	500cy	0/77
AC	Autoclave					
	PC before	121°C 2atm	77	1	168h	0/77
HTS	High Temperature Storage					
	No bias	Tamb=150°C	77	1	1000h	0/77
THS	Temperature Humidity Storage					
	No bias	Ta=85 °C/85%, R.H.	77	1	1000h	0/77

4.1.2 TV2 – L693EA6

Package Oriented Tests						
Test	Method	Conditions	Sample/Lots	Number of lots	Duration	Results Fail/SS
PC	Pre-Conditioning: Moisture sensitivity level 3					
		24h bake@125 °C, 192h@30 °C/60%R.H.	154	1		0/154
TC	Temperature Cycling					
	PC before	Temp. range: -65°C /+150°C	77	1	500cy	0/77
AC	Autoclave					
	PC before	121°C 2atm	77	1	168h	0/77
HTS	High Temperature Storage					
	No bias	Tamb=150°C	77	1	1000h	0/77
THS	Temperature Humidity Storage					
	No bias	Ta=85 °C/85%, R.H.	77	1	1000h	0/77

4.1.3 TV3 – L740CA6

Package Oriented Tests						
Test	Method	Conditions	Sample/Lots	Number of lots	Duration	Results Fail/SS
TC	Temperature Cycling					
		Temp. range: -65°C /+150°C	77	1	500cy	0/77
AC	Autoclave					
		121°C 2atm	77	1	96h	0/77
HTS	High Temperature Storage					
	No bias	Tamb=150°C	77	1	1000h	0/77
THS	Temperature Humidity Storage					
	No bias	Ta=85 °C/85%, R.H.	77	1	1000h	0/77

4.1.4 TV4 – L843DA6

Package Oriented Tests						
Test	Method	Conditions	Sample/Lots	Number of lots	Duration	Results Fail/SS
TC	Temperature Cycling					
		Temp. range: -65°C /+150°C	77	1	500cy	0/77
AC	Autoclave					
		121°C 2atm	77	1	240h	0/77
HTS	High Temperature Storage					
	No bias	Tamb=150°C	77	1	1000h	0/77
THS	Temperature Humidity Storage					
	No bias	Ta=85 °C/85%, R.H.	77	1	1000h	0/77

4.1.5 TV5 – L877EA6

Package Oriented Tests						
Test	Method	Conditions	Sample/Lots	Number of lots	Duration	Results Fail/SS
PC	Pre-Conditioning: Moisture sensitivity level 3					
		24h bake@125 °C,192h@30 °C/60%R.H.	154	1		0/154
TC	Temperature Cycling					
	PC before	Temp. range: -65°C /+150°C	77	1	500cy	0/77
AC	Autoclave					
	PC before	121°C 2atm	77	1	168h	0/77
HTS	High Temperature Storage					
	No bias	Tamb=150°C	77	1	1000h	0/77
THS	Temperature Humidity Storage					
	No bias	Ta=85 °C/85%, R.H.	77	1	1000h	0/77

5. RELIABILITY TESTS DESCRIPTION & DETAILED RESULTS

5.1 Package oriented tests

5.1.1 Pre-Conditioning

The device is submitted to a typical temperature profile used for surface mounting, after controlled moisture absorption.

The scope is to verify that the surface mounting stress does not impact on the subsequent reliability performance. The typical failure modes are "pop corn" effect and delamination.

5.1.2 Thermal Cycles

The purpose of this test is to evaluate the thermo mechanical behavior under moderate thermal gradient stress.

Test flow chart is the following:

- Initial testing @ Ta=25°C.
- Readout @ 200 cycles.
- Final Testing @ 500 cycles @ Ta=25°C.

5.1.3 Autoclave

The purpose of this test is to point out critical water entry path with consequent corrosion phenomena related to chemical contamination and package hermeticity.

Test flow chart is the following:

- Initial testing @ Ta=25°C.
- Final Testing (168hrs) @ Ta=25°C.

TEST CONDITIONS:

- P=2.08 atm
- Ta=121°C
- test time= 168 hrs

5.1.4 High Temperature Storage Life

The device is stored in unbiased condition at the max. temperature allowed by the package materials, sometimes higher than the max. operative temperature.

The scope is to investigate the failure mechanisms activated by high temperature, typically wire-bonds solder joint ageing, data retention faults, metal stress-voiding

5.1.5 Thermal Humidity Storage

The Temperature Humidity Storage follows the same method than Unbiased HAST at lower temperature.

TEST CONDITIONS: 85°C/85% RH.

6. PROCESS CHANGE CHARACTERIZATION

6.1 Parametric Test and EWS analysis

Parametric test distributions have been analyzed: no significant difference has been observed on any T84 critical parameter between BIPOLAR products diffused on 6" and 5" wafer size in AMK fabs.

EWS yield results and parametric distributions have also been analyzed comparing 6" and 5 " wafer size.

All the results are conforming to the expectations: no significant difference in EWS yield % and in the parametric distributions is highlighted.

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