PRODUCT/PROCESS CHANGE NOTIFICATION

PCN APM-SLI/07/3273
Notification Date 12/20/2007

New Assembly + Test location in Amkor Philippines for MiniSO8 package & Lead Finishing Standardization in Carsem Malaysia subcontractor

SLI - LINEAR & INTERFACE

Table 1. Change Implementation Schedule

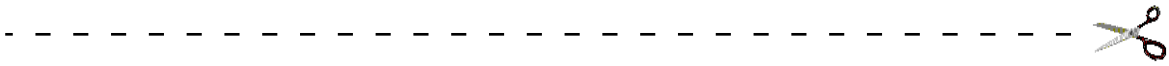
Forecasted implementation date for change	13-Dec-2007
Forecasted availabillity date of samples for customer	13-Dec-2007
Forecasted date for **STMicroelectronics** change Qualification Plan results availability	13-Dec-2007
Estimated date of changed product first shipment (according to JEDEC standard JESD46C 'customer Notification of product/process change by semiconductor suppliers')	20-Mar-2008

Table 2. Change Identification

Product Identification (Product Family/Commercial Product)	TS482IST / LM393ST / TS4990IST
Type of change	Multiple types of changes
Reason for change	To increase the production capacity & to standardize the Lead Finishing
Description of the change	New Assembly & Test location in Amkor Philippines for MiniSO8 package Lead Finishing Standardization in Carsem malaysia subcontractor. TS482IST & LM393ST samples are available now. TS4990IST samples will be available current of January 2008.
Product Line(s) and/or Part Number(s)	See attached
Description of the Qualification Plan	See attached
Change Product Identification	1st digit of trace code becomes B (instead of Y). And for the Lead Finishing, on label => 2LI:e4
Manufacturing Location(s)	

Table 3. List of Attachments

Customer Part numbers list	
Qualification Plan results	



Customer Acknowledgement of Receipt	**PCN APM-SLI/07/3273**
Please sign and return to STMicroelectronics Sales Office	**Notification Date 12/20/2007**

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

Remark

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DOCUMENT APPROVAL

Name	Function
Gilot, Yves	Division Marketing Manager
Kaire, Jean-Claude	Division Product Manager
Paccard, Francoise	Division Q.A. Manager

QUALIFICATION REPORT

Qualification Report n°: QAMSOPB1

PCN: APM-SLI/07/3273

Qualification Type: Qualification of Amkor Philippines assembly line for Miniso (NiPdAu lead-finishing) and Carsem MiniSO (NiPdAu)

Date of issue: 29th October 2007

Reference documents:

SOP 2.5.9	Process critical and key parameters
0076604	Process Qualification and release to production
0078588	Reliability requirements for product qualification
0046008	Process control plan for Front End
0060531	FMEA procedure
0061050	Back end qualification procedure
0091984	Construction analysis
0037709	Package construction analysis
7006451	Management of manufacturing source change
0033689	Process flow chart

Content

1. PROCESS MAIN SPECIFICATION CHANGE

1.1 Process change description

- Date of request: January 2007
- Nature of Change: Leadfree plating from Sn to NiPdAu in Carsem and new assembly line for standard linear Ic's in Amkor Philippines
- Reason for Change: Process standardisation and additional capacity
- Affected process: MiniSO package
- Affected products: All in MiniSO
- Is there a dead-line for current process use? Yes [] no [x]
- If yes, when?

1.2 Process main specification change

- Change classification: minor [] major [X]
- Is customer notification required: no [] yes [X]
- If yes, which customers? All using MiniSO packages

1.3 Possible effects of change on Parametric, Electrical, Quality or Reliability

P,E,Q or R	Parameter	Possible effect	Verification
P		Problem of contact with NiPdAu	Test of 2500 units of test vehicle
E	All	Parameter drift	Drift after THB final test yield check
R	MSL	MSL degradation	Preconditioning + TMC,PPT
Q	POA, solderability	POA change, Solderability degradation Finishing specificatrion	Construction analysis including solderability test T&R CA

2. QUALIFICATION PLAN

2.1 Test vehicle description

	TV1	TV2	TV3	TV4	TV5	TV6	TV7
Line	487101	S48201	4893	S482	0393	E-EPROM	Q990
Plant	Carsem	Carsem	Carsem	Amkor	Amkor	Amkor	Amkor
Sales Type	TS4871	TS482	TS4890	TS482IST	LM393ST	M24C16	TS4990IST
FE process	HF4CMOS	HF4CMOS	HF4CMOS	HF4CMOS	Bipolar	CMOSF6SP	HF4CMOS
Package	MiniSO	MiniSO	MiniSO	MiniSO	MiniSO	MiniSO	MiniSO
Die size (µm)	2120 X 1470	1460 X 1290	2120 X 1470	1460 x 1290	950 x 870		1460 x 2120
Die thickness (µm)	280	280	280	280µm	280µm		280µm
Metallisation	AlSiCu	AlSiCu	AlSiCu	AlSiCu	AlSiCu		AlSiCu
Passivation	Nitride	Nitride	Nitride	Nitride+ Pvapox	Nitride		Nitride+ Pvapox
Backside	Raw silicon	Raw silicon	Raw silicon	Raw silicon	Raw silicon	Raw silicon	Raw silicon
Plating	NiPdAu	NiPdAu	Sn	NiPdAu	NiPdAu	NiPdAu	NiPdAu
Molding compoud	EME 6600	EME 6600	EME 6600	Sumitomo G700A	Sumitomo G700A	Sumitomo G700A	Sumitomo G700A
Au Wire	1 Mil	1 Mil	1 Mil	0.8mils	0.8mils	0.8mils	0.8mils
Leadframe	Copper 94 X 68 preplated NiPdAu	Copper 94 X 68 preplated NiPdAu	Copper 94 X 68 preplated NiPdAu	1.73x2.39mm NiPdAu preplated	1.73x2.39mm NiPdAu preplated	1.73x2.39mm NiPdAu preplated	1.73x2.39mm NiPdAu preplated
Die attach	ABLEBOND 84-1LMISR4	ABLEBOND 84-1LMISR4	ABLEBOND 84-1LMISR4	ABLEBOND 8290	ABLEBOND 8290	ABLEBOND 8290	ABLEBOND 8290

2.2 Assembly, Final Test and Finishing qualification requirements

	TV1	TV2	TV3	TV4	TV5	TV6	TV7	Comment
Quantity of qualification lot	1	1	1	1	1	1	1	
Package type	MiniSO8	MiniSO8	MiniSO8	MiniSO8	MiniSO8	MiniSO8	MiniSO8	
Flow Chart	X	X	x	x	x	x	x	
Assembly report				X	X			
Solderability				x	x	X		
Lot average yield	X	X	X	X	X		X	
Parameters distribution	No test specification change for Carsem			X	X			
Test capability (nbr of lot)				X	X		X	
Packing qualification				X	X			

2.3 ESD and Reliability qualification requirements.

Tests	Conditions	Step	TV1	TV2	TV3	TV4	TV5	TV6	TV7
Line			487101	S48201	4893				
Plating			NiPdAu	NiPdAu	Sn				
ESD	HBM								
ESD	CDM								
ESD	MM								
HTB	Tj = 150C Vs = absolute max rating	168 1000							
OLT	Tj = 150C Vs = Max operating								
THB	Ta = 85C RH = 85% Vs = nominal	168 1000	78 78	78 78		78 78	78 78	80 80	
TMC	Ta = -65 / +150C	100 500 1000	78 78 78	78 78 78	78 78 78	78 78 78	78 78 78	80 80 80	
PPT	Ta = 121C P = 2atm	168 240	78 78	78 78	78 78	78 78	78 78	80 80	
Env seq	TMC + PPT	100 48h	78 78	78 78					
Jedec Level	Jedec1 = 168H THB + 3 IR reflow soldering		15	15	15	15	15	12	
TMSK	Ta = -65 / +150C	100shk 500shk	78 78	78 78					
HTS	Ta= 150 C	1000h							

o Drift analysis [X] yes [] no

3. QUALIFICATION RESULTS

3.1 Assembly, Final Test and Finishing qualification results

	TV1	TV2	TV3	TV4	TV5	TV6	TV7
Package type	MiniSO8	MiniSO8	MiniSO8	MiniSO8	MiniSO8	MiniSO8	MiniSO8
Flow Chart	7351968			7066191			
				67012-L0=2	67012-L0=3		
Solderability					See below results		
Lot average yield	99.90%	99.93%	99.95%	100%	99.98%	Qualification report reference QREE0310	99.96%
Parameters distribution	No test specification change for Carsem			See results on next pages			
Test capability (nbr of lot)							Dec-07
Packing qualification				In production for E²prom division See below results for TV1			

Solderability on TV4

Spec Limit	Must pass 1Hr STEAM AGE	Performed by	CLF QA
Equipment N°	Robotec	Method	DIP & LOOK
Supplier/model	Model 2002		

	S.S: 8 Units							
Result :	1	2	3	4	5	6	7	8
Dry Air Bake	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
Steam Aging	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS

TV5

Spec Limit	Must pass 1Hr STEAM AGE	Performed by	CLF QA
Equipment N°	Robotec	Method	DIP & LOOK
Supplier/model	Model 2002		

	S.S: 8 Units							
Result :	1	2	3	4	5	6	7	8
Dry Air Bake	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
Steam Aging	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS

TV6

Solderability	Steam ageing 90°C / 90%RH, 8hrs Dry Air 150°C, 8hrs	0/10 0/10

Packing cavity measurement

ATP LOT#	Ao	Bo	Ko	W	P
	5.3 ± 0.20	3.4 ± 0.2	1.4 ± 0.20	12.0 ± 0.30	8.0 ± 0.20
	5.1-5.5	3.2-3.6	1.2-1.6	11.7-12.3	7.8-8.2
P1-1716-00962	5.37	3.52	1.33	12.20	8.02
	5.43	3.51	1.30	12.27	8.05
	5.35	3.42	1.35	12.30	7.99
P1-1716-00963	5.46	3.47	1.35	12.28	7.96
	5.45	3.48	1.39	12.27	7.97
	5.49	3.59	1.36	12.30	7.97
P1-1717-00495	5.35	3.48	1.46	12.16	7.92
	5.35	3.43	1.40	12.12	8.07
	5.34	3.46	1.41	12.08	7.96
P1-1717-00496	5.33	3.46	1.52	12.17	7.93
	5.35	3.44	1.52	12.12	7.94
	5.35	3.47	1.49	12.13	8.03
P1-1717-01139	5.37	3.41	1.35	12.17	8.06
	5.37	3.44	1.35	12.18	7.98
	5.35	3.40	1.36	12.18	7.96

Notes : Dimensions in mm.

Final Test Qualification : TV1

Lot: 719FDS
Test Program: TS482BF4 (FT rev 04)
Date: 8/2/2007 12:28:15PM
Yield >99%

Extract of test results

Units	Multiname	Min	Avg	Max	Std dev.	CPK
Icc	P106_30	2.44	2.65	3.39	0.042	5.15
Vio	P101_A31	-2.34	0.27	2.72	0.51	3.10
Vio	P101_B31	-2.48	0.066	2.48	0.50	3.27
Icc	P106_32	2.26	2.47	2.66	0.04	3.82
Vio	P101_A33	-2.68	0.39	3.26	0.58	2.63
Vio	P101_B33	-2.86	0.12	3.03	0.58	2.82
AMR	P115_*1	1	1	1	0	
Icc	P106_30	2.44	2.64	3.38	0.042	5.13
Vio	P101_A31	-1.89	0.74	3.14	0.52	2.73
Vio	P101_B31	-1.89	0.51	3.09	0.52	2.88
Icc	P106_32	2.25	2.47	2.66	0.04	3.81
Vio	P101_A33	-2.14	0.82	3.47	0.57	2.45
Vio	P101_B33	-2.16	0.54	3.43	0.57	2.62

Final Test Qualification : TV2

Test Program : T0393CF2 (FT)
Version : No Version#
Lot ID : 719FFY
Operator : omart
Computer : P4ASL009
Handler : rasco_11
Autocorrelation : Disabled

Total : 5946
Total Pass : 5928
Total Fail : 18
Most Fail Bin: 6
Bin # : 1
Yield % : 99.70
Next Serial #: 5947

Thursday, August 02, 2007 19:08:34/Thursday, August 02, 2007 21:16:07

SW Bins

[1]	LMx93 A	BIN1/2	5891	99.70 %	(good)
[5]	Thn/Thp	BIN10	3	0.05 %	
[6]	Vio	BIN10	12	0.20 %	
[7]	Ib	BIN11	1	0.02 %	
[8]	Icc	BIN11	0	0.00 %	
[9]	Vio	BIN11	1	0.02 %	
[10]	Vol	BIN11	0	0.00 %	
[11]	Isk	BIN11	0	0.00 %	
[12]	Ioh	BIN11	1	0.02 %	
[13]			0	0.00 %	

Limits	test	Mode	Min	AVG	Max	Std dev	Min spec	Max spec	CPK	Mode
P150_*1	**Thn**	V	-0.87	-0.85	-0.85	0.002	-1.5	-0.5	49.68	V
P150_*1	**Thp**	V	5.00	5.00	5.00	0.000	4	6	2200.86	V
Vio(mV)_A0	**P101_A0**	mV	-3.67	-0.34	2.76	0.348	-10	10	9.26	mV
Vio(mV)_B0	**P101_B0**	mV	-1.78	0.31	3.22	0.378	-10	10	8.54	mV
Vio(mV)_A0	**P101_A0**	mV	-4.43	-0.78	2.46	0.368	-10	10	8.36	mV
Vio(mV)_B0	**P101_B0**	mV	-2.16	-0.09	3.07	0.398	-10	10	8.29	mV
P115_*1	**AMR**		1.00	1.00	1.00	0.000	none	none	99999.00	
P102_A1	**Iio 30V**	nA	-18.07	-15.08	-0.98	0.920	-25	25	3.59	nA
P102_B1	**Iio 30V**	nA	-11.60	-8.58	4.33	1.055	-25	25	5.19	nA
P103_A1	**Iibn 30V**	nA	-55.36	-50.22	-33.48	1.728	-100	0	9.60	nA
P103_B1	**Iibn 30V**	nA	-43.61	-39.48	-23.71	1.705	-100	0	7.72	nA
P103_A1	**Iibp 30V**	nA	-39.83	-35.14	-24.75	1.714	-100	0	6.84	nA
P103_B1	**Iibp 30V**	nA	-35.89	-30.90	-20.84	1.794	-100	0	5.74	nA
P106_*2	**Icc 30V**	mA	0.29	0.30	0.30	0.002	0.18	1.25	20.00	mA
P106_*1	**Icc 5V**	mA	0.24	0.25	0.25	0.002	0.12	0.5	21.97	mA
Vio(mV)_A1	**P101_A1**	mV	-3.84	-0.46	2.63	0.351	-5	5	4.31	mV
Vio(mV)_B1	**P101_B1**	mV	-1.87	0.20	3.20	0.381	-5	5	4.20	mV
Vio(mV)_A3	**P101_A3**	mV	-4.33	-0.75	2.44	0.365	-5	5	3.88	mV
Vio(mV)_B3	**P101_B3**	mV	-2.14	-0.06	3.05	0.395	-5	5	4.16	mV
Vio(mV)_A4	**P101_A4**	mV	-3.05	0.05	3.12	0.365	-5	5	4.52	mV
Vio(mV)_B4	**P101_B4**	mV	-1.72	0.68	3.54	0.400	-5	5	3.60	mV
Vio(mV)_A2	**P101_A2**	mV	-3.46	-0.25	2.82	0.349	-5	5	4.54	mV
Vio(mV)_B2	**P101_B2**	mV	-1.80	0.40	3.31	0.381	-5	5	4.03	mV
P117_A1	**Vol 5V**	V	0.20	0.25	0.27	0.005	none	0.4	9.04	V
P117_B1	**Vol 5V**	V	0.20	0.25	0.26	0.005	none	0.4	9.63	V
P137_A1	**Isk 5V**	mA	18.38	19.22	23.92	0.586	6	32	7.26	mA
P137_B1	**Isk 5V**	mA	18.57	19.41	24.13	0.574	6	32	7.31	mA
P137_A1	**Ioh 30V**	uA	0.02	0.03	0.03	0.001	0	0.1	5.81	uA
P137_B1	**Ioh 30V**	uA	0.00	0.01	0.02	0.002	0	0.1	2.04	uA

All results are in line with ST specification

3.2 ESD and Reliability qualification results

Tests	Conditions	Step	TV1	TV2	TV3	TV4	TV5	TV6	TV7
Line			487101	S48201	4893				
Plating			NiPdAu	NiPdAu	Sn				
THB	Ta = 85C RH = 85% Vs = nominal	168 1000	0/78 0/78	0/78 0/78		0/78 0/78	0/78 0/78	0/80 0/80	
TMC	Ta = -65 / +150C	100 500 1000	0/78 0/78 0/78	0/78 0/78 0/78	0/78 0/78 0/78	0/78 0/78 0/78	0/78 0/78 0/78	0/80 0/80 0/80	
PPT	Ta = 121C P = 2atm	168 240	0/78 0/78	0/78 0/78	0/78 0/78	0/78 0/78	0/78 0/78	0/80 0/80	
Env seq	TMC + PPT	100 48h	0/78 0/78	0/78 0/78					
Jedec Level	Jedec1 = 168H THB + 3 IR reflow soldering		0/15	0/15	0/15	0/15	0/15	0/12	
TMSK	Ta = -65 / +150C	100shk 500shk	0/78 0/78	0/78 0/78					

Conclusions:

All results are conforming to ST specifications:

- Amkor Philippines MiniSO8 assembly and Test&finishing line are qualified for standard linear Ic's
- NiPdAu lead-finishing in Carsem MiniSO8 is qualified for standard linear Ic's.

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