PRODUCT INFORMATION LETTER

PIL CRP/14/8399
Dated 20 Mar 2014

Lead frame 2nde source qualification

Sales Type/product family label	NA
Type of change	Package assembly material change
Reason for change	DCI supplier announced recently his "stamped" lead frame activity
Description	This change is concerning the qualification of a 2nd source for "stamped" lead frames currently provided by our supplier DCI.
Forecasted date of implementation	29-Mar-2014
Forecasted date of samples for customer	29-Mar-2014
Forecasted date for **STMicroelectronics** change Qualification Plan results availability	29-Mar-2014
Involved ST facilities	Muar, Bouskoura and Carsem

DOCUMENT APPROVAL

Name	Function
Livache, Veronique	Corporate Quality Manager
Low, Patrick	Process Owner

Lead frame 2nde source qualification

WHAT is the change?

This change is concerning the qualification of a 2nd source for "stamped" lead frames currently provided by our supplier DCI.
Packages and manufacturing plants concerned by this change are listed in the table below:

Plant	Package
Muar	PSSO24
Muar	SO20L
Muar	SO28
Muar	SO34
Bouskoura	PwSSO12
Bouskoura	PwSSO14
Carsem (Subcontractor)	SOT23, SOT323, SO24, TSSOP

WHY:

Reason for this change is:
- Our lead frame supplier DCI announced recently his "stamped" lead frame activity closure.
- A second source qualification has been immediately activated to protect our customers and business.

WHEN will this change occur?

Plant	Package	Production start date
Muar	PSSO24	W13 2014
Muar	SO20L	W36 2014
Muar	SO28	W13 2014
Muar	SO34	W16 2014
Bouskoura	PwSSO12	W31 2014
Bouskoura	PwSSO14	W31 2014
Carsem (Subcontractor)	SOT23, SOT323, SO24, TSSOP	W36 2014

HOW will the change be qualified?

- Second source suppliers are already identified:

Plant	Package	Identified second source
Muar	PSSO24	SHINCO
Muar	SO20L	SHINCO
Muar	SO28	SUMITOMO
Muar	SO34	SUMITOMO
Bouskoura	PwSSO12	SUMITOMO
Bouskoura	PwSSO14	SUMITOMO
Carsem (Subcontractor)	SOT23, SOT323, SO24, TSSOP	MITSUI, POSSEHL (*)

(*): MITSUI & POSSEHL will use the tools transferred by DCI.

- Approach for selecting the second source supplier is: same specifications, same materials, same finishing
- Risk have been evaluated (APPENDIX 1)
- This change will be qualified using the standard STMicroelectronics procedures for quality and reliability. Major steps of the qualification are:
  - Process capability assessment
  - Workability
  - Reliability
  - Line stressing

IMPACTS OF THE CHANGE:

Form: No change
Fit: No change
Function: No change

APPENDICES:

APPENDIX 1 Risk assessment
APPENDIX 2 Qualification plan
APPENDIX 3 Qualification results

APPENDIX 1: RISK ASSESSMENT

#	Risks identified	Potential risk resulting from	Class	Considered action
1	Workability issues on machines at different process step (Die attach, wire bonding, molding, plating, cropping)	Indexing holes with different positions Frame dimension(X, Y, thickness) different from actual ones	Low	Drawings check Samples verifications validation during workability exercise
2	Transport problems in magazines (D/Attach, wire bonding, molding)	Frame dimension(X, Y, thickness) different from actual sizes	Low	Drawings check Samples verifications validation during workability exercise
3	D/A Quality problem	Results not in accordance with ST requirements on following: - void - coverage - Bond line thickness - Die shear	Medium	Reinforced checks to be done during execution of Quality plan and line stressing
4	Wire bonding quality problems	Results not in accordance with ST requirements on following: - Non-stick on Leads (NSOL) . Poor bondability of 2nd bond - Pull test	Medium	Reinforced checks to be done during execution of Quality plan and line stressing
5	Molding quality problems	Results not in accordance with ST requirements on following: - Excessive resin flash - molding voids	Medium	Reinforced checks to be done during execution of Quality plan and line stressing
6	Deflash / Plating quality issues	Results not in accordance with ST requirements on following: - plating thickness - plating quality	Medium	Reinforced checks to be done during execution of Quality plan and line stressing
7	Cropping quality problems	Results not in accordance with ST requirements on following: - crack package - package mismatch (dimension) - Metal burrs	Medium	Reinforced checks to be done during execution of Quality plan and line stressing
8	Product Performance	Electrical performances or characteristics change due to frame new material (resistivity…)	Low	Datalog on critical parameters (test) during qualification
9	Reliability Risks	- Delamination Frame/ Die - Delamination frame / Molding compound - Plating quality - contamination	Medium	Checks to be done during qualification, reliability, line stressing
10	Manufacturing issues	Yield degradation	Low	Yield variation between the existing material and new one to monitor during ramp up phase and line stressing after change

		Productivity issue	Low	Production and down time parameters to monitor carefully during ramp up phase and line stressing after deployment
11	Supply Chain: To guarantee parts delivery to our customers and avoid business disruption	No sufficient Buffer stock	Medium	Buffer stock of existing material to be secured by DCI to cover ST needs including the qualification period
		Unscheduled problems during deployment reducing the production throughput or degrading the yield or stopping the assembly activity	Medium	- Deployment plan to be carefully prepared - All opened points highlighted during qualification must be solved before moving to production
12	Supply Chain: Quality issues (ECC)	Quality or reliability problems in the field	Low	- Quality and reliability plans to be carefully verified to address potential product vulnerabilities - Extension of qual and reliability exercise until failure to know the margins available if needed

APPENDIX 2: Qualification plan

1) <u>Reliability plan</u>

Test Name	***Conditions***	***Lots #***	***Sample Size***	***Notes***
JLn	*24 h bake @ 125C + MSLn TH soak + reflow simulation (3 times JEDEC J-STD -020C)*	*1 per L/F Option*	*160 pcs /lot*	*1, 2*
JLn + TCT	*Ta = - 50/150C, 500 cycles*	*1 per L/F Option*	*77 pcs / lot*	*1,2,3*
JLn + ES	*ES = 100 TC (-50/150C) + 96 h PP (2 atm, 121C)*	*1 per L/F Option*	*45 pcs / lot*	*1, 4*

Note	**Description**	**Sample size**
1	Electrical test	100%
2	SAM analysis in C and T mode to check delamination resin-die, resin-lead, resin-die pad , DA integrity	20pcs /lot min
3	Automotive products only: Wire pull test after de-capsulation (to collect pull strength and failure mode and to inspect by SEM all abnormal failure mode)	30 wire from 5 units min
4	VI inspection after de-capsulation to detect pad / metal corrosion	3 units/lot as min

2) Construction analysis

item	*Sample size*
Visual inspection	*50*
POA	*10 x 3 lots*
Tin thickness	*30*
Tin composition	*30*
Wetting balance	*10*
Cross section	*1*
Silver spot thickness	*1*
Decapsulation	*5*
SAM	*10*
X RAY	*20*
Pull test	*30 bonds / 3 lots*

APPENDIX 3: Qualification execution & results

Plant	Packages	Workability	Construction analysis	Reliability	Line stressing	Qualification completion
Muar	PSSO24	Passed	Passed	Passed	Passed	W13'2014
Muar	SO20	W16'2014	W23'2014	W27'2014	W27'2014	W36'2014
Muar	SO28	Passed	Passed	Passed	W12'2014	W13'2014
Muar	SO34	Passed	Passed	Passed	W15'2014	W16'2014
Bouskoura	PwSSO12	W13'2014	W19'2014	W21'2014	W29'2014	W31'2014
Bouskoura	PwSSO14	W13'2014	W19'2014	W21'2014	W29'2014	W31'2014
Carsem	SOT23 SOT323 SO24 TSSOP	W20'2014	NA	W30'2014	W35'2014	W36'2014

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