



3545 North First Street • San Jose, CA 95134 • USA

PRODUCT/PROCESS CHANGE NOTICE (PCN)

PCN Number: **06-07**

Date Issued: **December 13, 2006**

Product(s) Affected: **Products using TQFN/TDFN type packages**

Manufacturing Location Affected: **SPEL, Chennai, India.**

Date Effective: **January 12, 2007 - 30-day notification**

Adding SPEL's new package offering in these Very Thin Dual and Quad No-leads package types that have been previously qualified by other Pericom subcontractors.

Means of Distinguishing Changed Devices:

Product Mark:

Back Mark

Date Code: **SPEL letter code***

Other

* The second to last letter code will be an "X", designating SPEL as the assembly supplier.

Contact: **Ed Mello**

Title: **Director, Quality Systems**

Phone: **(408) 435-0800, Ext. 207**

Fax: **(408) 321-0324**

eMail: emello@pericom.com

Attachment: Yes; No

See attached Qualification data.

Samples: **Available upon request**

Description and Purpose of Change:

Pericom has qualified SPEL's production of these very thin, no-lead package types in both Dual and Quad configurations.

See Pericom's TQFN/TDFN Package information on our website at:
<http://www.pericom.com/products/packaging/mechanicals.php>

SPEL has been a valued package assembly subcontractor to Pericom for over 8 years in gull-wing small outline packages, and we have now qualified their new package types in the Thin Quad Flat No lead and Thin Dual Flat No lead package configurations. Please see the attached generic package qualification data of key environmental tests for representative products in each package family.

More information on SPEL is available at: <http://www.spel.com/>

Die Technology

Wafer Fabrication

Assembly Process

Equipment

Material

Testing

Manufacturing Site

Data Sheet

Other: **New Package type offering from SPEL**

Reliability/Qualification Summary: See attached Qual Reports.

Customer Acknowledgement of Receipt:

Customer: _____

Name: _____

Title: _____

Date: _____

E-Mail: _____

Phone: _____

Fax: _____

Approval for shipments prior to effective date

Customer Comments (Optional): _____



RELIABILITY QUALIFICATION REPORT
Green Compound / Pb-free Package – 12TDLMP (3.5 X3.0)

Lead / Package : 12 Lead TDLMP

Package Code : 12 ZE

Lead Finish : 100% matte Sn

Customer : Pericom, USA.

Device Type : PI3USB10

Fab Lot # : SH58489

**Assembly Location : SPEL Semiconductor Ltd
India.**

**Reported By : N.J.Chandrasekar
Head (QA)**

Date : Sep 14, 2006



RELIABILITY QUALIFICATION REPORT
Green Compound / Pb-free Package – 12TDLMP (3.5 X3.0)

INTRODUCTION

The purpose of this MSL qualification report is to document the results of MSL qualification tests (Level 1) performed on the following Pb-free packages assembled at SPEL with the green molding compound Sumitomo G770HCD.

Evaluated Package	Device Type
12 TDLMP (3.5X3.0)	PI3USB10 (6V48-L301A2)

PROCEDURE

The following environmental reliability stress tests & mechanical tests have been performed to determine the reliability of the units that were processed in accordance to SPEL assembly standards and the details are listed herewith.

ENVIRONMENTAL STRESS TESTS

- Preconditioned Temperature Cycling test.
- Preconditioned Autoclave test.
- Moisture Sensitivity Level tests.

MECHANICAL TESTS

- X-Ray Inspection
- Solderability Test

RAW MATERIALS USED

Evaluated Package (mm)	Die size (mm)	Lead frame die pad size (mm)
12 TDLMP (3.5x3.0)	2.85X1.19	3.3 x 2.0

Leadframe Material	A194 Ring Ag plated
Die Attach Adhesive	Sumitomo CRM 1076
Gold Wire	1.0 mil GW
Wire Bond	Thermosonic
Molding Compound	SUMITOMO G770HCD
Mold Type	Auto
Mark	Laser Mark
Lead Finish	100% matte Sn

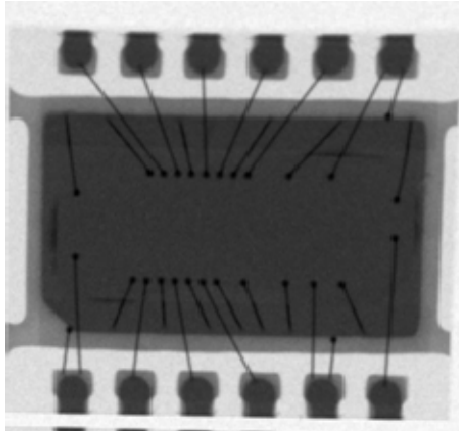


RELIABILITY QUALIFICATION REPORT
Green Compound / Pb-free Package – 12TDLMP (3.5 X3.0)

Environmental Reliability tests					
Stress Name	Reference Standard	Stress Condition & Duration	Electrical Test quantity (nos)		Electrical Test Result
			In	Out	
Preconditioning test	JESD22-A113E LEVEL 1	External Visual @ 40X.	200	200	Pass
		Temperature Cycle @ Ta = -40 ⇔ +60°C, 5 Cycles			
		Stabilization Bake @ Ta = 125°C, 24 Hrs.			
		Moisture soak @ Ta/RH = 85°C/85%, 168 Hrs.			
		IR reflow @ 260°C, 3 Cycles.			
Preconditioned Temperature Cycling Test	JESD22-A104C	+150°C ⇔ -65°C, 500 Cycles	77	77	Pass
Preconditioned Unbiased Autoclave Test	JESD22-A102C	121°C; 100% Rh, 15 psig, 168 Hrs	77	77	Pass

MECHANICAL TESTS

X-Ray Inspection:



SOLDERABILITY TEST – Bath Sn/Pb

Sample Size : 5 Units
Pre-conditioning : 8 Hrs Steam aging
Test Conditions : Bath Temperature 215±5°C
Flux type : Kester “R” Type
Solder bath composition : Sn:Pb / 60:40
Acceptance criteria : 95% coverage (min)

Coverage : 98%
Test Result : PASS

SOLDERABILITY TEST – Bath: Sn/Ag/Cu

Sample Size : 5 Units
Pre-conditioning : 8 Hrs Steam aging
Test Conditions : Bath Temperature 245±5°C
Flux type : Kester “R” Type
Solder bath composition : Sn: 95.5%, Ag (3.0-4.0),Cu(0.5-1)
Acceptance criteria : 95% coverage (min)

Coverage : 99%
Test Result : PASS

Preconditioning Test:

All the units were subjected to preconditioning tests as follows:

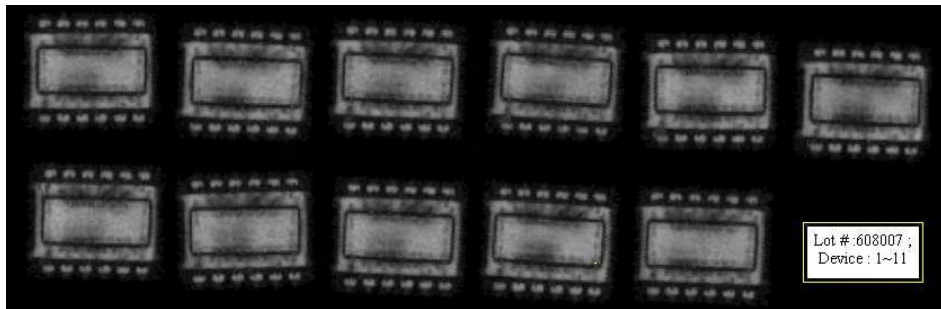
Conditions: JEDEC JESD22-A113E LEVEL 1

- a) External visual examination @ 40X to screen for mechanical failures
- b) Temperature cycle @ Ta= -40°C to +60°C, 5 cycles *to simulate shipping conditions.*
- c) Stabilization bake @ Ta=125°C, 24 hours *to remove all moisture from the package.*
- d) Moisture soak @ Ta / RH =85 °C / 85 %, 168 hours *to simulate to maximum floor life.*
- e) Solder reflow @ Tmax = 260°C, 3 cycles *to simulate one solder reflow and two rework cycles.*

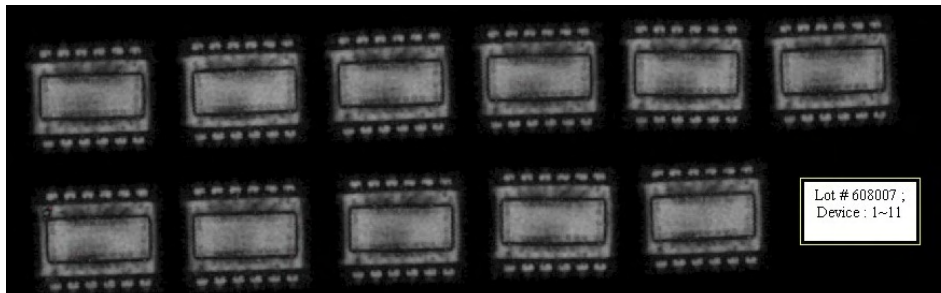
Electrical Test Result: Pass

CSAM performed on all the units as per the test conditions: **J-STD-020C** before and after the preconditioning tests (Level 1).

C-SAM Pictures before Preconditioning tests:



C-SAM Pictures after Preconditioning tests:





RELIABILITY QUALIFICATION REPORT
Green Compound / Pb-free Package – 12TDLMP (3.5 X3.0)

MSL Test Result:

Inspection details	
External Crack	Nil
Internal Crack	Nil
Delamination in critical areas:	
Die \ Mold compound	Nil
Leads \ Mold Compound	Nil

Conclusion:

- Moisture Sensitivity Level for 12 lead TDLMP: **Level 1**
- Dry Pack is not required for this package.
- Recommended Peak Solder Reflow temperature is 260+0/-5°C & maximum of 3 reflow passes allowed per component.



RELIABILITY QUALIFICATION REPORT
Green Compound / Pb-free Package – 56TQLMP (5.0 X11.0)

Lead / Package : 56 Lead TQLMP (ZF56)

Lead Finish : Preplated NiPdAu

Customer : Pericom, USA.

Device Type : PI3L500-AZFE

Fab Lot # : SHD1013

Assembly Location : SPEL Semiconductor Ltd
India.

Reported By : N.J.Chandrasekar
Head (QA)

Date : Nov 06, 2006



RELIABILITY QUALIFICATION REPORT
Green Compound / Pb-free Package – 56TQLMP (5.0 X11.0)

INTRODUCTION

The purpose of this qualification report is to document the results of Reliability and MSL qualification tests (Level 1) performed on the following Pb-free packages assembled at SPEL with the Preplated NiPdAu leadframes and green molding compound Sumitomo G770HCD.

Evaluated Package	Device Type
56 TQLMP (5.0 X 11)	PI3L500-AZFE (E656-L500EBM)

PROCEDURE

The following environmental reliability stress tests & mechanical tests have been performed to determine the reliability of the units that were processed in accordance to SPEL assembly standards and the details are listed herewith.

ENVIRONMENTAL STRESS TESTS

- Preconditioned Temperature Cycling test.
- Preconditioned Autoclave test.
- Moisture Sensitivity Level tests.

MECHANICAL TESTS

- X-Ray Inspection
- Solderability Test

RAW MATERIALS USED

Evaluated Package (mm)	Die size (mm)	Lead frame die pad size (mm)
56 TQLMP (5.0X11)	1.3X2.7	2.7 X 8.7

Leadframe Material	C194 Preplated
Die Attach Adhesive	Sumitomo CRM 1076
Gold Wire	1.0 mil GW
Wire Bond	Thermosonic
Molding Compound(S)	Sumitomo G770HCD
Mold Type	Auto
Mark	Laser Mark
Lead Finish	Preplated NiPdAu

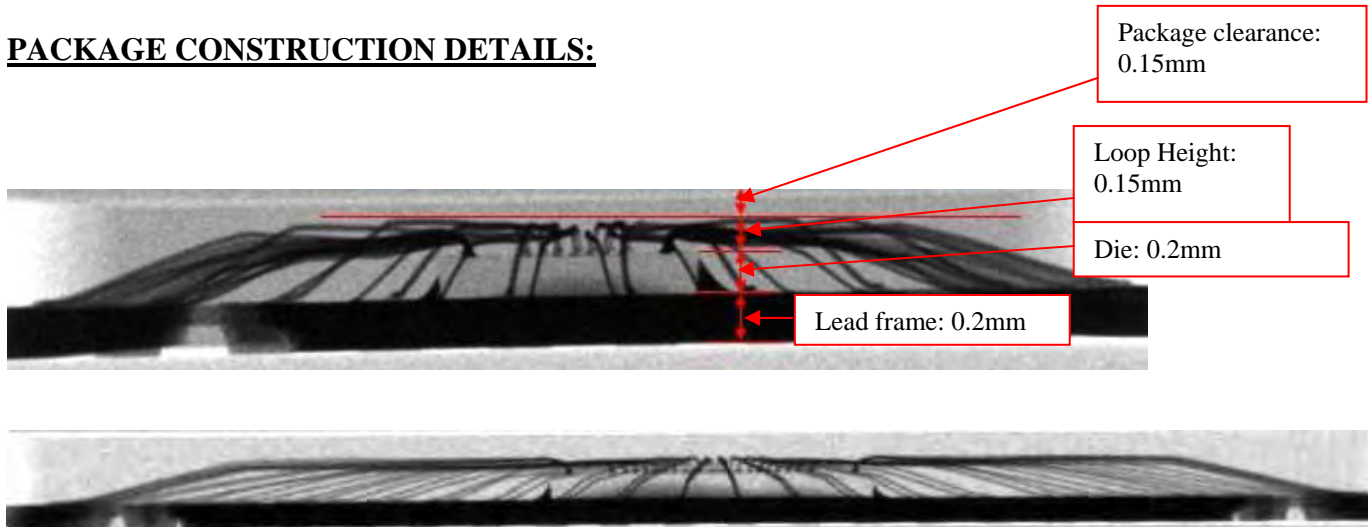


RELIABILITY QUALIFICATION REPORT
 Green Compound / Pb-free Package – 56TQLMP (5.0 X11.0)

Environmental Reliability tests					
Stress Name	Reference Standard	Stress Condition & Duration	Electrical Test quantity (nos)		Electrical Test Result
			In	Out	
Preconditioning test	JESD22-A113E LEVEL 1	External Visual @ 40X.	200	200	Pass
		Temperature Cycle @ Ta = -40 ⇔ +60°C, 5 Cycles			
		Stabilization Bake @ Ta = 125°C, 24 Hrs.			
		Moisture soak @ Ta/RH = 85°C/85%, 168 Hrs.			
		IR reflow @ 260°C, 3 Cycles.			
Preconditioned Temperature Cycling Test	JESD22-A104C	+150°C ⇔ -65°C, 500 Cycles	77	77	Pass
Preconditioned Unbiased Autoclave Test	JESD22-A102C	121°C; 100% Rh, 15 psig, 168 Hrs	77	77	Pass

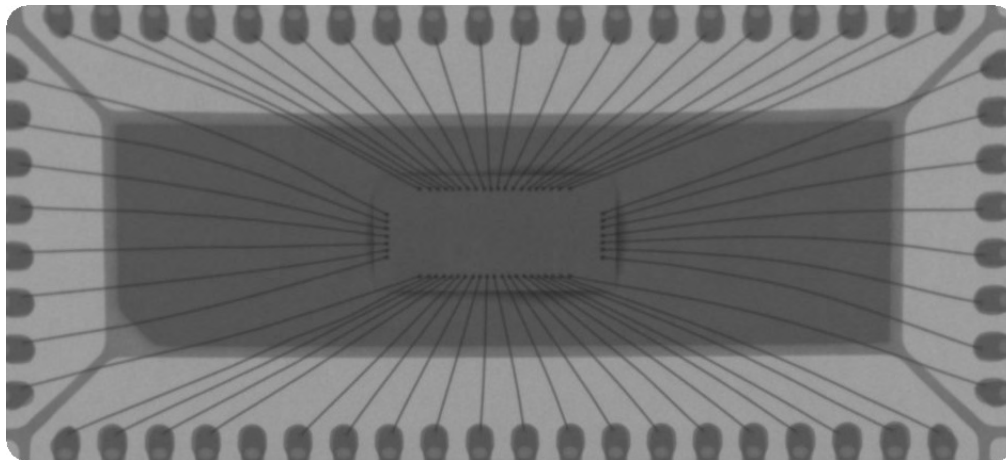
MECHANICAL TESTS

PACKAGE CONSTRUCTION DETAILS:



TYPICAL PACKAGE CONSTRUCTION	IN MM
Lead frame Thickness	0.20
Bond Line Thickness	0.01
Die Thickness	0.20
Loop Height	0.15
Laser Mark depth	0.04
Total Package Thickness	0.75
Package Clearance	0.15

X-RAY Inspection





RELIABILITY QUALIFICATION REPORT
Green Compound / Pb-free Package – 56TQLMP (5.0 X11.0)

SOLDERABILITY TEST – Bath Sn/Pb

Sample Size : 5 Units
Pre-conditioning : 8 Hrs Steam aging
Test Conditions : Bath Temperature 215±5°C
Flux type : Kester “R” Type
Solder bath composition : Sn:Pb / 60:40
Acceptance criteria : 95% coverage (min)

Coverage : 97%
Test Result : PASS

SOLDERABILITY TEST – Bath: Sn/Ag/Cu

Sample Size : 5 Units
Pre-conditioning : 8 Hrs Steam aging
Test Conditions : Bath Temperature 245±5°C
Flux type : Kester “R” Type
Solder bath composition : Sn: 95.5%, Ag (3.0-4.0),Cu(0.5-1)
Acceptance criteria : 95% coverage (min)

Coverage : 98%
Test Result : PASS

Preconditioning Test:

All the units were subjected to preconditioning tests as follows:

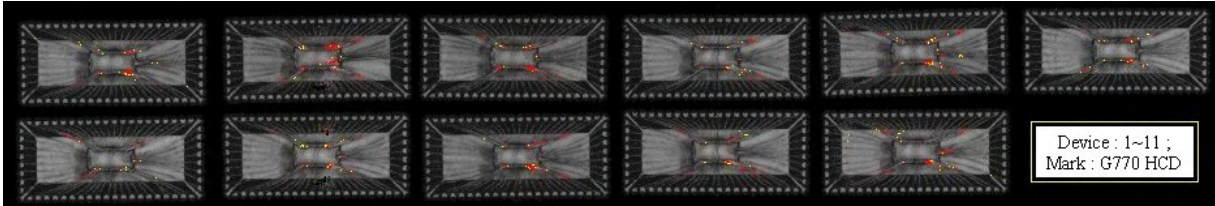
Conditions: JEDEC JESD22-A113E LEVEL 1

- a) External visual examination @ 40X to screen for mechanical failures
- b) Temperature cycle @ Ta= -40°C to +60°C, 5 cycles *to simulate shipping conditions.*
- c) Stabilization bake @ Ta=125°C, 24 hours *to remove all moisture from the package.*
- d) Moisture soak @ Ta / RH =85 °C / 85 %, 168 hours *to simulate to maximum floor life.*
- e) Solder reflow @ Tmax = 260°C, 3 cycles *to simulate one solder reflow and two rework cycles.*

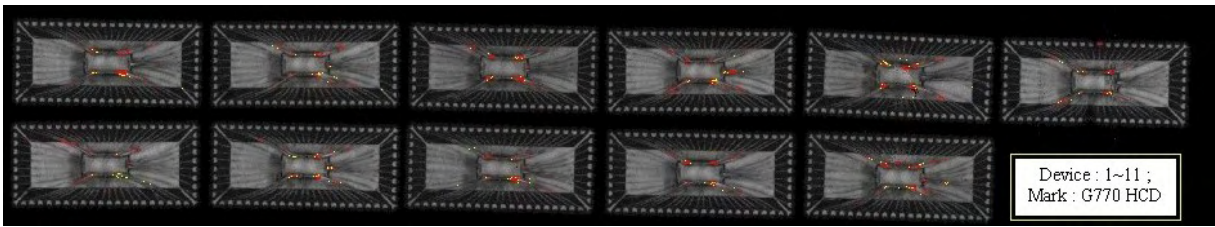
Electrical Test Result: Pass

CSAM performed on all the units as per the test conditions: **J-STD-020C** before and after the preconditioning tests (Level 1).

C-SAM Pictures before Preconditioning tests:



C-SAM Pictures after Preconditioning tests:



MSL Test Result:

Inspection details	
External Crack	Nil
Internal Crack	Nil
Delamination in critical areas:	
Die \ Mold compound	Nil
Leads \ Mold Compound	Nil

Conclusion:

- MSL for 56 Lead TQLMP (ZF56):1.
- Dry Pack is not required for this package.
- Recommended Peak Solder Reflow temperature is 260+0/-5°C & maximum of 3 reflow passes allowed per component.