# PRODUCT / PROCESS CHANGE NOTIFICATION

# PCN-000949

# Date: JUL-25-2025

## Change Details

**Part Number(s) Affected:**

| | | |
|---|---|---|
| GN1411AINE3 | GN2010D-INTE3D | GN2017AINTE3Z |
| GN1411AINTE3D | GN2010EAINE3 | GS2993-INE3 |
| GN1412AINE3 | GN2010EAINTE3D | GS2993-INTE3 |
| GN1412BINE3 | GN2012AINE3 | GS2993-INTE3Z |
| GN1412BINTE3D | GN2012AINTE3D | GX4002-INE3 |
| GN2010D-INE3 | GN2017AINE3 | |

**Customer Part Number(s) Affected:** ☒ N/A

**Description, Purpose and Effect of Change:**

CHANGE IN ASSEMBLY LOCATION AND LEAD FRAME SUPPLIER

Unisem, a Semtech supplier, plans to relocate the assembly location for Semtech's 4x4 and 5x5 QFN products as listed above. In addition, Unisem will be switching to a new lead frame supplier due to the current lead frame supplier's planned production shutdown.

| *Changes* | *Current (As-Is)* | *Future (To-Be)* |
|---|---|---|
| Unisem Assembly location | Unisem address:<br>1, Persiaran Pulai Jaya 9, Bandar Pulai Jaya, 31300 Ipoh, Perak, Malaysia | Unisem address:<br>Lot 302285, Jalan Industri 1/1, Kawasan Perindustrian Gopeng, 31600 Gopeng, Perak, Malaysia |
| Lead frame supplier | PEH (Possehl Electronics Hong Kong Ltd.) | AAMI (Advanced Assembly Material International Ltd.) |

- There are differences in equipment, but the process flow and final test location remain unchanged.
- There is a difference in the composition of lead, a lead frame constituent, in terms of mass (%).

| | | | |
|---|---|---|---|
| **Change Classification** | ☒ **Major** ☐ **Minor** | **Impact to Form, Fit, Function** | ☐ **Yes** ☒ **No** |
| **Impact to Data Sheet** | ☐ **Yes** ☒ **No** | **New Revision or Date** | ☒ **N/A** |

**Impact to Performance, Characteristics or Reliability:**

- There is no impact to form, fit, function, performance, characteristics, or reliability.

# PRODUCT / PROCESS CHANGE NOTIFICATION

# PCN-000949

# Date: JUL-25-2025

| Implementation Date | OCT-25-2025 | Work Week | 43 |
|---|---|---|---|
| Last Time Ship (LTS)<br>Of unchanged product | N/A | Affecting Lot No. / Serial No. (SN) | N/A |
| Sample Availability | JUL-25-2025<br>GN1412AINE3, GN1412BINE3, GN2012AINE3, GN2010D-INE3, GS2993-INE3 | Qualification Report Availability | OCT-25-2025 |

**Supporting Documents for Change Validation/Attachments:**

- Reliability Qualification Report - PRODDOC033250

| Quality Assurance | | |
|---|---|---|
| Semtech Business Unit | Signal Integrity Product Group (SIP) | |
| Semtech Contact Info: | Pedro Jr. Bernas<br>Staff Engineer, Product Quality Engineering<br>pbernas@semtech.com<br>(289) 856-9326 x 1162 |  |

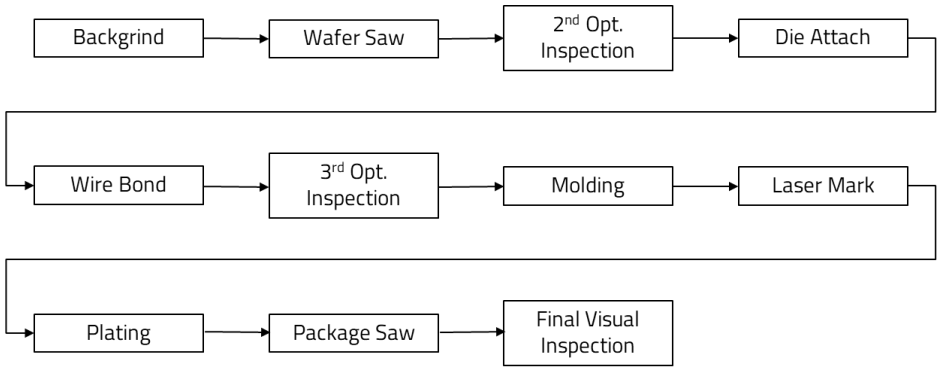
**FOR FURTHER INFORMATION & WORLDWIDE SALES COVERAGE:** http://www.semtech.com/contact/index.html#support

# PRODUCT / PROCESS CHANGE NOTIFICATION

# PCN-000949

# Date: JUL-25-2025

- **Process Flow Diagram**




The package assembly process flow is the same at both current and new locations.

- **Equipment Comparison**

| ***Process Step*** | ***Current (As-Is)*** | ***Future (To-Be)*** |
|---|---|---|
| *Backgrind* | Disco DGP 8761 & DFM 2800 ( inline ) | Disco DGP 8761 & DFM 2800 ( inline ) |
| *Wafer saw* | Disco DFD 6361 & 6362 | Disco DFD 6361 & 6362 |
| *Die Attach* | ESEC 2008hs, ESEC 2100xp/xp Plus/Hs/FC , Datacon 2200evo | ESEC 2008hs, ESEC 2100xp/xp Plus/Hs/FC , Datacon 2200evo |
| *Wire Bond* | K&S ICONN PLUS & K&S Rapid | K&S ICONN PLUS & K&S Rapid |
| *Molding ** | AMS-LM<br>GP-PRO DP/SP<br>Idealmold 2G/3G | AMS-LM<br>GP-PRO DP<br>Idealmold 2G |
| *Laser mark ** | SYT-AKSA, SYDNT-AKSA-RO, SYDNT-AKSA-R1, BSM364 | SYT-AKSA<br>BSM364 |
| *Plating* | UCT DBL-P1-3M X2 | UCT DBL-P1-3M X2 |
| *Package saw* | DFD 641 , DFD6361 , DFD6362 | DFD 641 , DFD6361 , DFD6362 |

There are differences in equipment. See process steps indicated with an asterisk (*).

# PRODUCT / PROCESS CHANGE NOTIFICATION

# PCN-000949

# Date: JUL-25-2025

- **Assembly Material Comparison**

| *Assembly Material* | *Current (As-Is)* | *Future (To-Be)* |
|---|---|---|
| Lead frame | PEH – Copper Ag plate | AAMI – Copper Ag plate |
| Epoxy | CRM1076NS | CRM1076NS |
| Wire | Tanaka 1.0 mil Au | Tanaka 1.0 mil Au |
| Mold compound | EME-G770HCD | EME-G770HCD |

Change in lead frame supplier from PEH to AAMI due to PEH's planned production shutdown.

- **Lead Frame Composition Comparison**

| *Constituent* | *Element* | *CAS No.* | *Current (As-Is)* *PEH* | *Future (To-Be)* *AAMI* |
|---|---|---|---|---|
| | | | *Mass (%)* | |
| Lead | Pb | 7439-92-1 | < 0.03 | 0.01 Max. |
| Copper | Cu | 7440-50-8 | Min 97 | BALANCE |
| Iron | Fe | 7439-89-6 | 2.1-2.6 | 2.10 ~ 2.60 |
| Phosphorus | P | 7723-14-0 | 0.015-0.150 | 0.015 ~0.150 |
| Zinc | Zn | 7440-66-6 | 0.050-0.200 | 0.050 ~0.200 |
| Plated Silver | Ag | 7440-22-4 | Per Drawing Requirement | 5.0 Max |

There is a difference in the composition of lead, a lead frame constituent, in terms of mass (%).

# PRODUCT / PROCESS CHANGE NOTIFICATION

# PCN-000949

# Date: JUL-25-2025

- **Manufacturing Analysis**

| Package | | | | 5x5mm 32L | | | 4x4mm 24L | | |
|---|---|---|---|---|---|---|---|---|---|
| Assembled Device | | | | GN2010D-IE3 | | | GS2993-IE3 | | |
| Lot# | | | | A592 | B592 | C592 | A596 | B596 | C596 |
| Assembly yield | | | | 99.58% | 99.79% | 99.79% | 99.59% | 99.79% | 99.53% |
| **Process** | **Parameter** | **Sample size** | **Specification** | **Average** | | | | | |
| *Wafer Backgrind* | Grind thickness | 9 points | 10 +/- 1 mil | 10.04 | | | 10.04 | | |
| *Wafer Saw* | Kerf width | 30 data | < 3 mil | 1.04 | | | 1.05 | | |
| | Bottom chip width | 30 data | < 100um | 19.33 | | | 19.41 | | |
| *Die Attach* | Epoxy BLT | 5 data | 0.3 - 0.8 mil | 0.44 | 0.44 | 0.44 | 0.44 | 0.45 | 0.43 |
| | Epoxy coverage | 5 units | > 95% | 100% | 100% | 100% | 100% | 100% | 100% |
| | Die Shear | 5 data | > 0.8 g/mil | 1.09 | 1.11 | 1.12 | 0.94 | 0.93 | 0.93 |
| *Wire Bond* | Wire Pull | 30 data | 3 g | 9.88 | 9.79 | 9.96 | 9.39 | 9.41 | 9.33 |
| | Ball Shear | 30 data | 15 g | 31.33 | 32.02 | 32.29 | 28.42 | 28.59 | 28.65 |
| | Loop Height | 10 data | 4 - 8 g | 5.68 | 5.71 | 5.73 | 5.76 | 5.77 | 5.8 |
| | Cratering | 5 units | Zero defect | Pass | Pass | Pass | Pass | Pass | Pass |
| *Molding* | Wire Sweep | < 15% | < 15% | Pass | Pass | Pass | Pass | Pass | Pass |
| *Plating* | Plating Thickness | 25 data | 400 - 900 u" | 567.79 | 553.5 | 565.2 | 570.25 | 563.9 | 568.9 |
| | Solderability test | 5 units | > 95% | Pass | Pass | Pass | Pass | Pass | Pass |
| *Package Saw* | Dimension X | 10 data | 5 +/- 0.05 mm<br>4 +/- 0.05 mm | 5 | 5 | 5 | 4 | 4 | 4 |
| | Dimension Y | 10 data | 5 +/- 0.05 mm<br>4 +/- 0.05 mm | 5 | 5 | 5 | 4 | 3.99 | 3.99 |
| | Package Thickness | 10 data | 0.8 - 0.9 mm | 0.84 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 |

The manufacturing analysis data provided above has met the assembly requirements.

# Reliability Report for Assembly Relocation of Unisem's 4x4 & 5x5 Packages to Gopeng and Use of ASM Leadframe

## Revision History

| Version | ECO | Date | Modifications |
|---|---|---|---|
| 0 | ECO-074375 | Jun 2025 | New Release |

## Contents

# 1 Background

Several of Semtech's 4x4 and 5x5 QFN products are currently assembled and final tested at Unisem Simpang Pulai plant. Unisem has announced that following changes:

1. The leadless QFN package assembly will be moved from Simpang Pulai to Gopeng Plant.
2. The current leadframe vendor (PEH) will shut down operation, and Unisem proposed to use leadframe from ASM as a replacement

This qualification is intended to qualify both changes at Unisem.

# 2 Product Scope

A total of two Semtech products will be affected by this process change. Please see table below for more information about the affected products and their part numbers.

Table 1: Semtech products affected by this process change

| Products | Package type | Qualification Vehicle |
|---|---|---|
| GS2993-INE3 | 4x4 24L QFN | GS2993-IE3 |
| GS2993-INTE3 | | |
| GS2993-INTE3Z | | |
| GN2010D-INE3 | 5x5 32L QFN | GN2010D-I33 |
| GN2010D-INTE3D | | |
| GN2010EAINE3 | | |
| GN2012AINE3 | | |
| GN2012AINTE3D | | |
| GN2017AINTE3Z | | |
| GN1411AINE3 | | |
| GN1411AINTE3D | | |
| GN1412AINE3 | | |
| GN1412BINE3 | | |
| GN1412BINTE3D | | |
| GX4002-INE3 | | |

# 3 Qualification Approach

All of the product affected have already been fully qualified previously. The product qualification reports are available upon request. (please refer to table 2 for the reliability qualification report of each product). Among all the products affected, GS2993 and GN2010D were selected as the qual vehicle due to their MSL level. package size and sale volume. This qualification only intends to qualify the process change related to the package assembly. Thus, die-level reliability stresses (HTOL, ESD and LU) were not planned.

3 lots of GS2993 and GN2010D each using the new leadframe from ASM and assembled at Unisem Gopeng plant were built for this qualification. TC, UHAST and HTS were carried out on each lot.  For more information about the conditions of reliability stresses, please refer to table 2 and 3 in section 4.

# 4 Reliability Qualification Stresses

Table 2: Reliability qualification stresses for GS2993 assembled at Unisem Gopeng

| Stress | Conditions | Duration | Vehicle | Sample Size | Results |
|---|---|---|---|---|---|
| Temperature Cycling | JESD22-A104, -65°C, +150°C, MSL1 preconditioning | 500 cycles | GS2993 | 80 pcs (lot 1) | Pass |
| | | | | 80 pcs (lot 2) | Pass |
| | | | | 80 pcs (lot 3) | Pass |
| High Temperature Storage | JESD22-A103 150ºC | 1000 hours | GS2993 | 80 pcs (lot 1) | Pass |
| | | | | 80 pcs (lot 2) | Pass |
| | | | | 80 pcs (lot 3) | Pass |
| uHAST | JESD22-A118 130 ºC, 85% RH MSL1 preconditioning | 96 hours | GS2993 | 80 pcs (lot 1) | Pass |
| | | | | 80 pcs (lot 2) | Pass |
| | | | | 80 pcs (lot 3) | Pass |

Table 3: Reliability qualification stresses for GN2010D assembled at Unisem Gopeng

| Stress | Conditions | Duration | Vehicle | Sample Size | Results |
|---|---|---|---|---|---|
| Temperature Cycling | JESD22-A104, -65°C, +150°C, MSL3 preconditioning | 500 cycles | GN2010D | 78 pcs (lot 1)* | Pass |
| | | | | 80 pcs (lot 2) | Pass |
| | | | | 80 pcs (lot 3) | Pass |
| High Temperature Storage | JESD22-A103 150ºC | 1000 hours | GN2010D | 80 pcs (lot 1) | Pass |
| | | | | 80 pcs (lot 2) | Pass |
| | | | | 80 pcs (lot 3) | Pass |
| uHAST | JESD22-A118 130 ºC, 85% RH MSL3 preconditioning | 96 hours | GN2010D | 80 pcs (lot 1) | Pass |
| | | | | 80 pcs (lot 2) | Pass |
| | | | | 80 pcs (lot 3) | Pass |

*One device censored due to non-stress related factors

# 5 Conclusion

In conclusion, both GS2993 and GN2010D units assembled at Unisem Gopeng with leadframes from ASM successfully passed all required reliability stress tests. Therefore, these process changes are qualified for implementation on the selected Semtech products.