



# PRODUCT / PROCESS CHANGE NOTIFICATION

PCN-000349

Date: December 15, 2015

P1/2

<input type="checkbox"/>	Semtech Corporation, 200 Flynn Road, Camarillo CA 93012
<input checked="" type="checkbox"/>	Semtech Canada Corporation, 4281 Harvester Road, Burlington, Ontario L7L 5M4 Canada
<input type="checkbox"/>	Semtech Irvine, 5141 California Ave., Suite 100, Irvine CA 92617
<input type="checkbox"/>	Semtech Neuchatel Sarl, Route des Gouttes d'Or 40, CH-2000 Neuchatel Switzerland
<input type="checkbox"/>	Nanotech Semiconductor, Semtech Corporation, 2 West Point Court, Bristol, United Kingdom, BS32 4PY
<input type="checkbox"/>	Semtech Corpus Christi SA de CV, Carretera Matamorros Edificio 7, Reynosa, Tamaulipas, Mexico 88780
<input type="checkbox"/>	Semtech Triune, 1101 Resource Drive, Suite 121, Plano TX 75074

## Change Details

<b>Part Number(s) Affected:</b> GN2403BIBE3, GN2403SBIBE3, GN2404BIBE3, GN2407BIBE3, GN2407SBIBE3, GN2408BIBE3, GN2409BIBE3, GN2410FBIBE3, GN2410BIBE3, GN2411BIBE3, GN2412BIBE3, GN2415BIBE3, GT1704-IBE3, GT1706-IBE3	<b>Customer Part Number(s) Affected:</b> <input checked="" type="checkbox"/> N/A
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**Description, Purpose and Effect of Change:**

- Namics, Amkor's Underfill supplier, has decided to change manufacturing plant from Japan Site to Taiwan. There will be no change in the material composition.
- A fire at Amkor's Lid supplier, Kenly, has forced the lid plating to be transferred to a new vendor. The plating will be done at Moderne Tech.

<b>Change Classification</b>	<input checked="" type="checkbox"/> Major <input type="checkbox"/> Minor	<b>Impact to Form, Fit, Function</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<b>Impact to Data Sheet</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<b>New Revision or Date</b>	<input type="checkbox"/> N/A

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

The package changes were evaluated both electrically for parametric performance as well as mechanically to ensure long-term package reliability. All variation seen between the control lot and qualification lots are well within expectations of normal lot to lot variation. Therefore, there is no discernable impact in device performance, characteristics or reliability.

<b>Implementation Date</b>	March 1, 2016 (1)	<b>Work Week</b>	NA
<b>Last Time Ship (LTS) Of unchanged product</b>	NA	<b>Affecting Lot No. / Serial No. (SN)</b>	NA
<b>Sample Availability</b>	Dec 15, 2015 (2)	<b>Qualification Report Availability</b>	Dec 15, 2015



# PRODUCT / PROCESS CHANGE NOTIFICATION

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Date: December 15, 2015

P2/2

## Supporting Documents for Change Validation/Attachments:

- Electrical evaluation report - GN2412-Family 2015 Amkor Product Change Qualification Report
- Semtech reliability Assessment - Kyocera substrate, Namics underfill plant location, and new lid coating Qualification Report
- C2MI/Semtech mechanical assessment - Die Pull and SMT Shear Test
- Amkor mechanical Assessment - Assembly Build Report: Semtech GN24XX Substrate, Lid and UF PCN Qualification Build

### Notes:

- (1) Implementation date could be sooner as current inventory of the plated lid is depleted and there is no possibility to order more due to the fire at the Supplier.
- (2) Samples for this PCN will include changes mentioned above as well changes referred to PCN-000348.

## Issuing Authority

Semtech Business Unit:

SIP

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# **SEMTECH**

GENNUM PRODUCTS

## **GN2412-Family 2015 Amkor Product Change Qualification Report**

1. Substrate change from NTK to Kyocera
  2. Namics Underfill Manufacture Location from Japan to Taiwan
  3. Lid Plating vendor change from Kenly to Moderne Tech
-

# Revision History

Version	ECO	Date	Modifications / Changes
0		December 2015	Initial release

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# 1 Purpose

Several changes within the Amkor supply chain were announced that will impact the GN2412-family of products:

1. NTK announced its decision to terminate manufacturing of the substrate which are currently produced at Eastern facilities, by the end of Mar, 2016. As such, the GN2412-Family of products will move substrate suppliers from NTK to Kyocera.
2. Namics, Amkor's GN2412-family Underfill supplier, has decided to change manufacturing plant from Japan Site to Taiwan. There will be no change in the material composition.
3. A fire at Amkor's GN2412-family Lid supplier, Kenly, has forced the lid plating to be transferred to a new vendor. The plating will be done at Moderne Tech.

The purpose of this document is to show that the proposed changes to the GN2412-Family BOM will not adversely affect the product performance.

# 2 Scope

The scope of this qualification report is restricted to Electrical Performance only. The changes will impact the following products:

GN2403BIBE3, GN2403SBIBE3, GN2404BIBE3, GN2407BIBE3, GN2407SBIBE3, GN2408BIBE3, GN2409BIBE3, GN2410FBIBE3, GN2410BIBE3, GN2411BIBE3, GN2412BIBE3, GN2415BIBE3, GT1704-IBE3, GT1706-IBE3

# 3 Qualification Approach

## 3.1 Sampling

One wafer (P30S42.00 – wafer#1) was split and 5 lots were assembled. One lot used the current BOM, one lot used current substrate with new underfill and lid plating and three lots used three different substrate lots, Underfill Lots and Lid-Plating lots. The table below shows the split.

SAP Batch	Amkor Lot#	Date Code	Lot#	Namics NAU27	Substrate	Lid Batch	Tested
49634.1	P30842.00-8992POR	1538	POR	POR (JPN)	NTK	POR	500
49636.1	P30842.00-8991Q4	1538	Q4	Batch 1 (TWN)	NTK	Batch1	548
49637.1	P30842.00-8988Q1	1538	Q1	Batch 1 (TWN)	Lot1	Batch 1	248
49638.1	P30842.00-8989Q2	1538	Q2	Batch 2 (TWN)	Lot2	Batch 2	250
49639.1	P30842.00-8990Q3	1538	Q3	Batch 3 (TWN)	Lot3	Batch 3	200

## 3.2 Procedure

- Each lot was tested through the latest revision of the GN2412B test program (GN2412\_C2W0\_F1PP\_rev090\_eco025934).
- The material was initially tested and both Functional Yield as well as Overall Yield was compared vs the Process of record.
- Subsequently, 100 passing devices from each lot were selected and run through GN2412\_C2W0\_F1PP\_rev090\_eco025934 . This data was used to gauge any parametric shifting between the POR and the new Substrate, Underfill and Lid Plating.
- The data is uploaded to Semtech's Test Data Server.

## 4 Analysis

Basic statistics consisting of mean and standard deviation are calculated for each parameter from each sub lot. A one-to-one comparison is then made for applicable parameters. In addition a yield and failure-mode comparison is done to ensure consistent functional performance between the various manufacturing changes. Explanation will be given for tests that do not meet the specified criteria.

### 4.1 Means Comparison

For the means comparison, parametric equivalence is achieved if the mean value from the New Material set is within 10% of the mean value from the POR material set as it relates to the guard banded test boundaries. The calculated value is as follows:

$$\frac{|\bar{X}_{NEW} - \bar{X}_{REF}|}{T_{high} - T_{low}} \leq 10\%$$

#### 4.1.1 Results

Table 1.1: Mean Comparison Summary

Test category	Mean within 10%			
	Q1	Q2	Q3	Q4
CONTINUITY	Yes	Yes	Yes	Yes
POWER SHORTS	Yes	Yes	Yes	Yes
OTP	Yes	Yes	Yes	Yes
UC_SIDD	Yes	Yes	Yes	Yes
VILH	Yes	Yes	Yes	Yes
VOLH	Yes	Yes	Yes	Yes
IILH	Yes	Yes	Yes	Yes
IOLH	Yes	Yes	Yes	Yes
MBIST	Yes	Yes	Yes	Yes
MISSION BIST	Yes	Yes	Yes	Yes
Life Clock Freq	Yes	Yes	Yes	Yes
RESISTORS	Yes	Yes	Yes	Yes
TX DC Magnitude and Polarity Check	Yes	Yes	Yes	Yes
Eye Height	Yes	Yes	Yes	Yes
Eye Width	Yes	Yes	Yes	Yes
IDD/Power	Yes	Yes	Yes	Yes

## 4.2 StdDev Comparison

For the Standard Deviation comparison, parametric equivalence is achieved if the Stdev value from the New Material set is within 10% of the Stdev value from the POR material set as it relates to the guard banded test boundaries. The calculated value is as follows:

$$\frac{|\sigma_{NEW} - \sigma_{REF}|}{T_{high} - T_{low}} \leq 10\% .$$

### 4.2.1 Results

**Table 1.2:** StdDev Comparison Summary

Test category	StdDev within 10%			
	Q1	Q2	Q3	Q4
CONTINUITY	Yes	Yes	Yes	Yes
POWER SHORTS	Yes	Yes	Yes	Yes
OTP	Yes	Yes	Yes	Yes
UC_SIDD	Yes	Yes	Yes	Yes
VILH	Yes	Yes	Yes	Yes
VOLH	Yes	Yes	Yes	Yes
IILH	Yes	Yes	Yes	Yes
IOLH	Yes	Yes	Yes	Yes
MBIST	Yes	Yes	Yes	Yes
MISSION BIST	Yes	Yes	Yes	Yes
Life Clock Freq	Yes	Yes	Yes	Yes
RESISTORS	Yes	Yes	Yes	Yes
TX DC Magnitude and Polarity Check	Yes	Yes	Yes	Yes
Eye Height	Yes	Yes	Yes	Yes
Eye Width	Yes	Yes	Yes	Yes
IDD/Power	Yes	Yes	Yes	Yes

### 4.3 Yield Comparison

Yield was reviewed and categorized between Continuity, Parametric and Functional failures. The chart below shows the relative yield for the current BOM (POR), the new underfill and Lid Plating but current substrate (Q4) and 3 lots of the new BOM (Q1-Q3).

	POR	Q4	Q1+Q2+Q3
Functional Fallout	2.0%	1.1%	1.6%
Parametric Fallout	1.8%	1.8%	1.3%
Continuity	0.0%	0.0%	0.0%
Total Yield	96.20%	97.10%	97.10%

Overall the variation in yield is <1% with the new BOM having marginally higher yield.



## 5 Conclusion

Based on the analysis of the data collected from the Control and Qualification Lots, there are no significant differences in electrical performance between the POR Material Set and the New Material Set:

1. Substrate change from NTK to Kyocera
2. Namics Underfill Manufacture Location from Japan to Taiwan
3. Lid Plating vendor change from Kenly to Moderne Tech

Therefore, in terms of electrical performance, the new material set (Kyocera substrate, Namics Underfill from Taiwan factory and lid plating from Moderne Tech) is considered qualified for production.



**SEMTECH**

GENNUM PRODUCTS

**Kyocera substrate, Namics underfill  
plant location, and new lid coating  
Qualification Report (GN2412)**

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## Revision History

Version	ECR	Date	Modifications / Changes
0	ECO-028860	Dec 2015	New Document

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## 1. Purpose

This qualification is to qualify the following changes:

- 1- NTK will terminate manufacturing of the substrates which are currently produced at Eastern facilities by the end of March 2016. As such, the GN2412-Family of products will need to move substrate suppliers from NTK to Kyocera.
- 2- Due to a fire at the GN2412-family Lid supplier, Kenly, the lid plating will be transferring to a new vendor.
- 3- Namics, GN2412-family underfill supplier, to change manufacturing plant from Japan Site to Taiwan. No Change in material composition. Namics plans to transfer manufacturing site

## 2. Qualification Strategy

The changes above affect package performance only, therefore, package level qualification will be run only. The qualification will use 3 package lots made with 3 substrate lots and 3 underfill batches. The three lots are referred to as Q1, Q2, and Q3.

The plan will also qualify one lot with new Namics underfill, old NTK substrate and new coating to qualify this combination because some of the material built will use this combination before fully migrating to the new substrate. This lot will be referred to as Q4

The package vendor is still Amkor which is a vendor that has been fully qualified with 3-lot qualification approach for the GN2412 product family. The GN2412 package level qualification is documented in the following document PRODDOC003243.

## 3. Impacted product

All GN2412 variants

## 4. Qualification Results

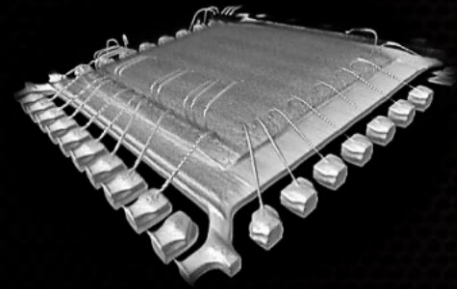
Table 1 below lists the stresses that will be done to the changes described in the Purpose.

Table 1.:

Item	Stress	Conditions	Read Points	Qualification Vehicle	Sample Size	Pass
1	UHAST (Q1, Q2, Q3)	JESD22-A118 MSL Preconditioning, 130 °C, 85 % RH and SAM, 96 hrs	RP0 = 0 RP1 = Post UHAST	GN2412	60 from 3 lots	Pass
2	MSL+TC (Q1, Q2, Q3)	JESD22-A104 MSL Preconditioning, -55°C to +125°C (Condition B)	1000 cycles 500 for qual 1000 for info	GN2412	60 from 3 lots	Pass
3	High Temperature Storage (Q1, Q2, Q3)	JEDSE22-A103 150 °C SAM	1008 hrs 500hrs for qual 1000 for info	GN2412	60 from 3 lots	Pass
4	MSL+TC (Q4)	JESD22-A104 MSL Preconditioning, -55°C to +125°C (Condition B)	1000 cycles 500 for qual 1000 for info	GN2412	50 from one lot	Pass
5	1- Die Pull 2- SMT Shear 3- Ball shear 4- Lid torque	Semtech test conditions	NA	GN2412	40	Pass

## 5. Conclusion

This report demonstrates that the proposed changes for GN2412 as described in section 1, have been qualified and passed the tests. Therefore, the new GN2412 substrate vendor, new location for under-fill factory, and the new plating on lid have all passed qualification and considered reliable.



IBM Systems

Bromont Packaging Analytical Services

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# Die Pull and SMT Shear Test

Analysis for



MiQro Innovation  
Collaborative Centre

45, boulevard de l'Aéroport, Bromont,  
Qc, J2L 1S8

**End Customer: Semtech**

Analysis done by:

Lab. Request:  
**S894**

Released  
**Version 3**

**Stephane Laforte, ing.**  
OIQ # 142467

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## Scope

- Semtech die pull 10 pcs et smt shear 30x 0402 components
  - 5 lots to investigate (1 is POR)
  - 2 die pull per lot / 2 series of 3x 0402 components shear per lot

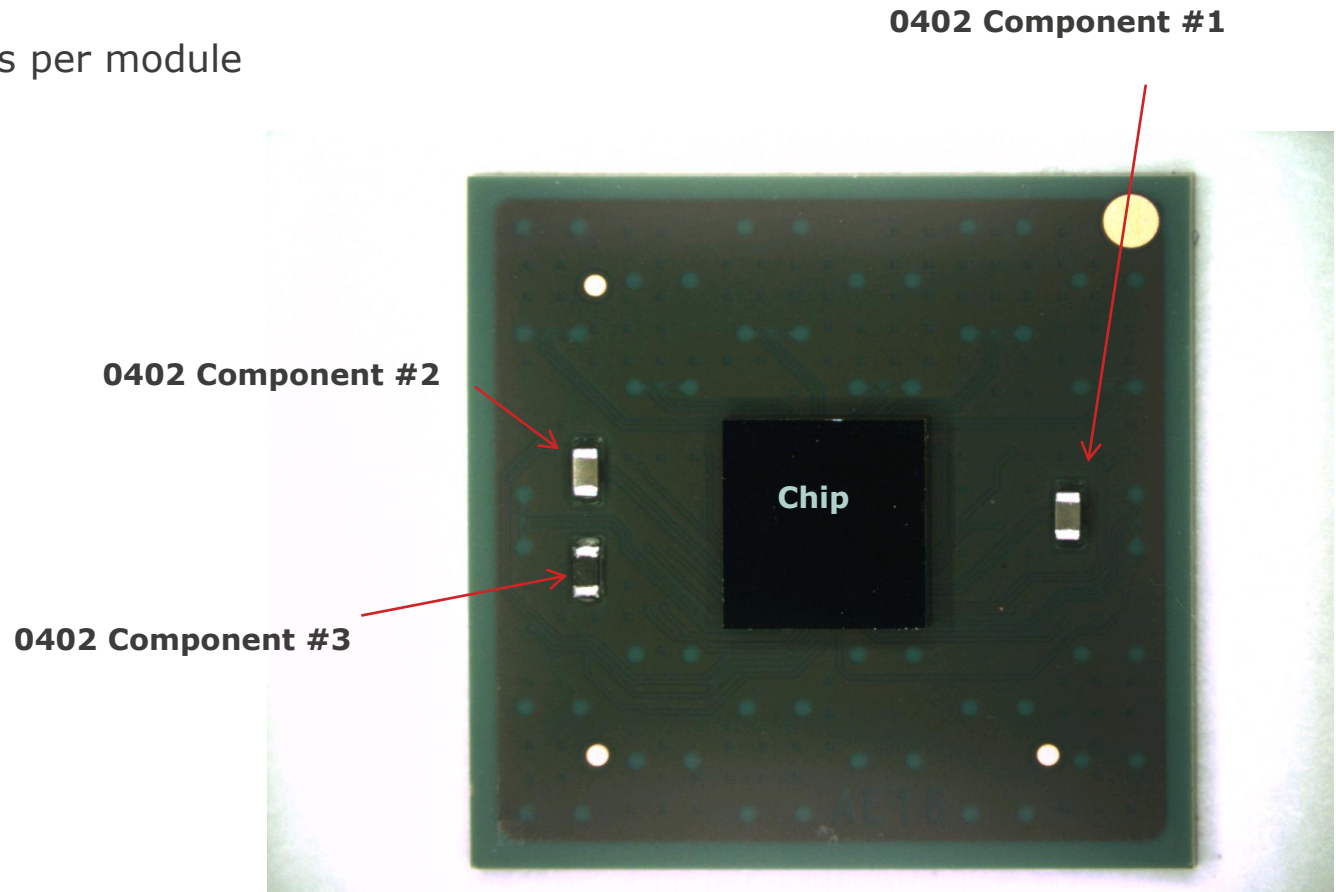
## Observations

- Chip pull results shows all the lots broke with standard rupture modes
  - No solder or cleanliness defect seen.
- 0402 components shear showed no solder problem or contamination
  - All components broke with a similar rupture mode



## Part description

- Electronic module with 13mm organic substrate
- Chip size: 3.2 mm
- 3x 0402 components per module



## Die pull results

Lot ID	Description	Part#	Load at fracture (lbs)	% of taffy pull	% intermetallic break at BLM	% chip pull out	% other rupture mode
P30S42-00-8992POR	NTK Control Lot 1	1	14.1	97	2	1	0
		2	12.2	97	3	0	0
P30S42-00-8991Q4	NTK Control Lot 2	1	9	90	10	0	0
		2	10.2	95	4	1	0
P30S42-00-8988Q1	Kyocera Qual Lot 1	1	11.2	67	32	1	0
		2	16.5	99	1	0	0
P30S42-00-8989Q2	Kyocera Qual Lot 2	1	14.3	99	1	0	0
		2	13.6	100	0	0	0
P30S42-00-8990Q3	Kyocera Qual Lot 3	1	10.5	100	0	0	0
		2	17.2	100	0	0	0

Average			13.9	94.2	5.7	0.2	0.0
Std Variation			2.7	13.3	12.9	0.4	0.0

### Observation:

- No solder problem on any part (non-wet, bridge, etc.)
- No contamination. Very good die & substrate surface cleanliness on all parts.
- No significant difference seen between the lots. Standard rupture mode seen.

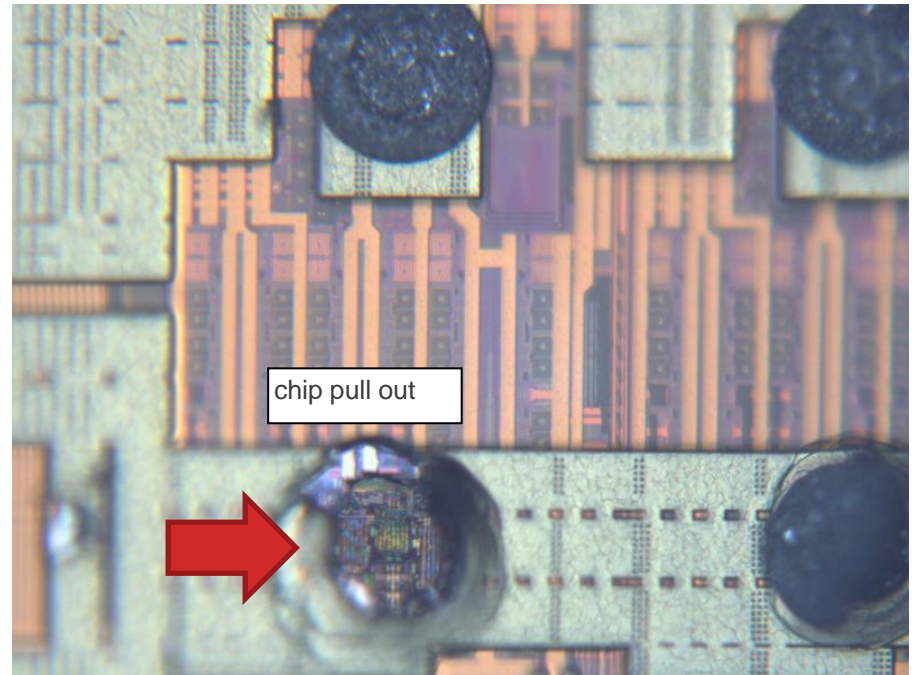
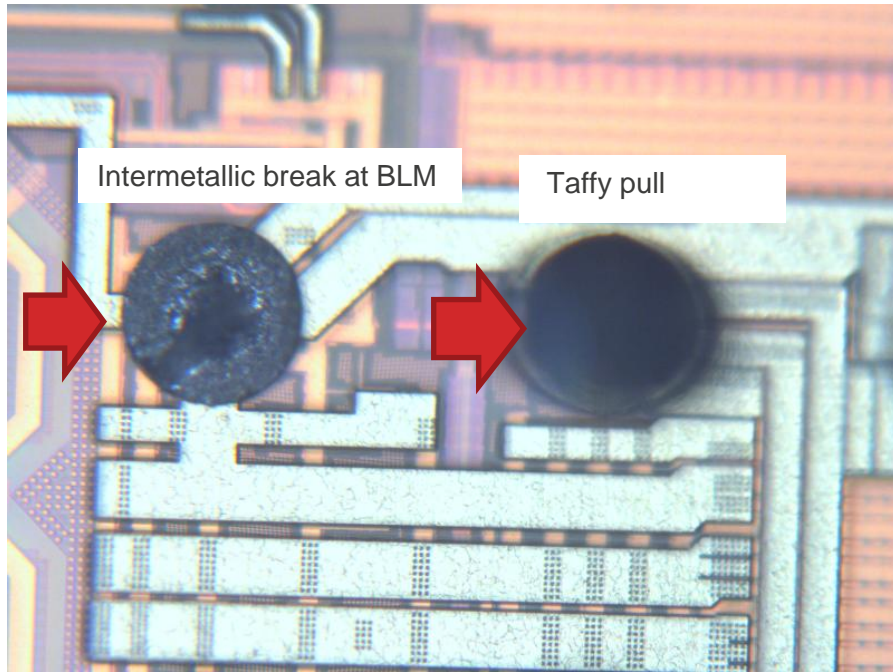
### Setup:

- Speed: 0.02 inches/min

### Tool info:

- Instron 8874 tool 2025
- Load cell M211-116 (s/n 99144)
- Last calibration: 2014/11/20

## Die pull: Examples of the different rupture modes



## 0402 component shear results

Lot ID	Description	Part#	Load at fracture (g) - 0402 component 1	Load at fracture (g) - 0402 component 2	Load at fracture (g) - 0402 component 3	Rupture mode
P30S42-00-8992POR	NTK Control Lot 1	3	2043	1581	1013	Capacitor surface (all)
		4	1988	1562	1388	Capacitor surface (all)
P30S42-00-8991Q4	NTK Control Lot 2	3	1662	1574	2059	Capacitor surface (all)
		4	1678	2098	1955	Capacitor surface (all)
P30S42-00-8988Q1	Kyocera Qual Lot 1	3	1501	1646	1368	Capacitor surface (all)
		4	1481	2053	1902	Capacitor surface (all)
P30S42-00-8989Q2	Kyocera Qual Lot 2	3	1731	1563	2110	Capacitor surface (all)
		4	1972	2146	1788	Capacitor surface (all)
P30S42-00-8990Q3	Kyocera Qual Lot 3	3	1853	1362	1817	Capacitor surface (all)
		4	1847	1853	1759	Capacitor surface (all)
Average			1731	1771	1791	
Std Variation			201	301	243	

### Observation:

- No solder problem or contamination seen
- All 0402 components broke near the body surface / solder interface.

### Setup:

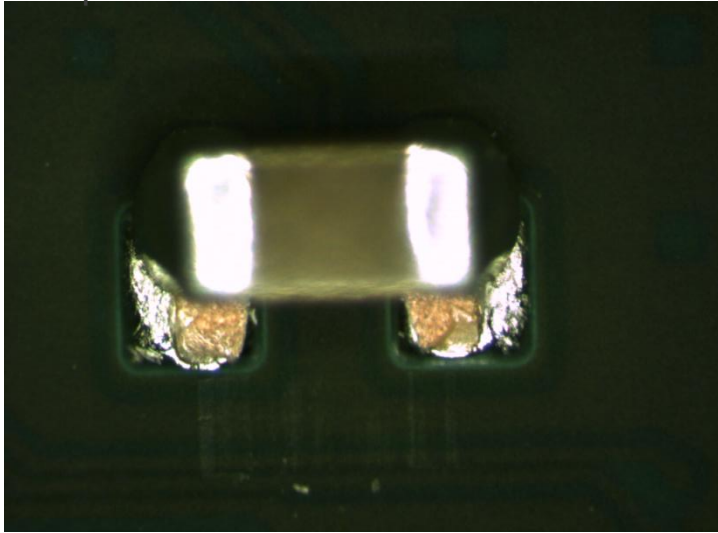
- Shear height: 50µm
- Speed: 85µm/s

### Tool info:

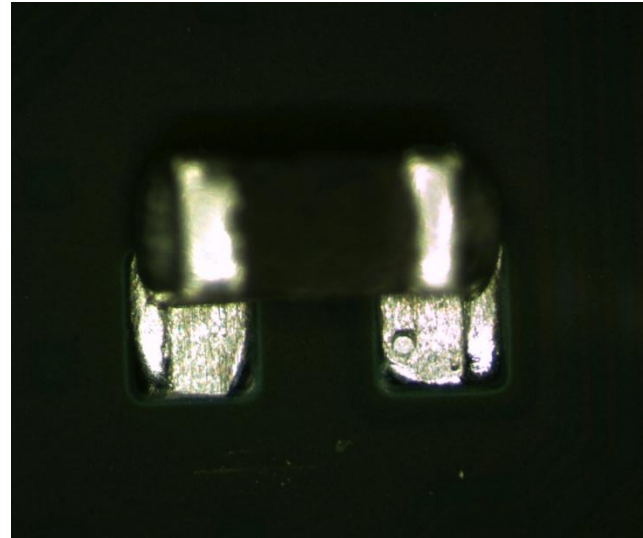
- Dage 4000+
- 5 kg load cell (s/n 20292511)
- Last calibration: 2015/08

## 0402 component shear: pictures of the rupture mode

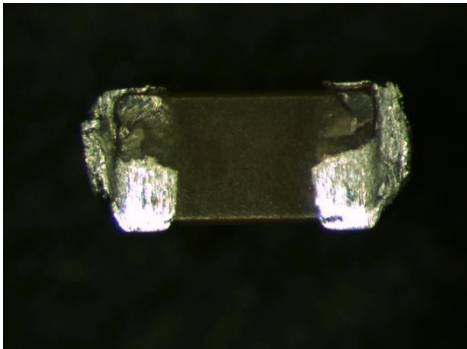
Top down view



Top down view



Sheared 0402 component bottom view



## Report versions

Version*	Publication Date	Modifications
1	2015/10/05	Original version
2	2015/10/06	Addition of lot description. Typo and wording changes following end customer request
3	2015/10/06	Correction of lot vs description mismatch

\* Last version replaces all previous ones

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# Assembly Build Report: Semtech GN24XX Substrate, Lid and UF PCN Qualification Build

ATT3 Assembly

October 14, 2015



- Purpose

- To provide the result of material qual test for GN24XX family device.

- BOM

- Substrate : 0.79mm thickness, 13x13 8Layer 1.0 pitch, build up ( NTK:101385647 vs Kyocera : 101393239 )
- Solder paste : M705-533A
- Capacitor : 0402 82nf +/-10% X7R 16V
- Resistor : 0402 3KOHM +/-1% 1/16W
- Flux : SCF-5
- Underfill : NAU-27 ( JPN vs TWN )
- Lid : 13x13, Black Aluminum ( Anodization by Kenly vs Moderen (Kenly outsourcing))
- Lid attach / TIM : DCL-5 / SHA-5
- Solder Ball : SAC305, 0.5mm

## ■ Lot information matrix

Lot#	Customer PO no.	NAU27 batch no.	Substrate (Kyocera lot number / q'ty)	Lid Anode Lot ( Q'ty )	Leg	Assembly lot	Device name	Loading Q'ty	Ship to
POR	PO600008992	POR( WH provide )	NTK( WH provide )	POR	Lot 1	P30S42.00-8992POR	GN2412B	500	Customer
	PO600008992	POR( WH provide )	NTK( WH provide )	POR	Lot 2	P30S42.00-8992POR	GN2411B	855	Customer
	PO600008992	POR( WH provide )	NTK( WH provide )	POR	Lot 3	P30S42.00-8992POR	GN2404B	200	Customer
	PO600008992	POR( WH provide )	NTK( WH provide )	POR	Lot 4	P30S42.00-8992POR	GN2411B	8	Customer
	PO600008992	POR( WH provide )	NTK( WH provide )	POR	Lot 5	Set up-POR	GN2411B	42	PD
Q1	PO600008988	50208-2T	0001 / 250 ea	5818 (250 ea )	Lot 1	P30S42.00-8988Q1	GN2412B	250	Customer
	PO600008988	50208-2T	0001 / 300 ea	5818 (300 ea )	Lot 2	P30S42.00-8988Q1	GN2411B	300	Customer
	PO600008988	50208-2T	0001 / 110 ea	5818 (110 ea)	Lot 3	P30S42.00-8988Q1	GN2407B	110	Customer
	PO600008988	50208-2T	0001 / 60 ea	5818 (60 ea )	Lot 4	P30S42.00-8988Q1	GN2415B	60	Customer
	PO600008988	50208-2T	0001 / 8 ea	5818 (8 ea)	Lot 5	P30S42.00-8988Q1	GN2411B	8	Customer
	PO600008988	50208-2T	0001 / 42 ea	5818 (42 ea)	Lot 6	Set up-Q1	GN2411B	42	PD
Q2	PO600008989	50204T	0002 / 250 ea	5724 (250 ea)	Lot 1	P30S42.00-8989Q2	GN2412B	250	Customer
	PO600008989	50204T	0002 / 300 ea	5724 (110 ea) + 5727 (190 ea)	Lot 2	P30S42.00-8989Q2	GN2411B	300	Customer
	PO600008989	50204T	0002 / 110 ea	5727 (110 ea)	Lot 3	P30S42.00-8989Q2	GN2403B	110	Customer
	PO600008989	50204T	0002 / 60 ea	5727 (60 ea)	Lot 4	P30S42.00-8989Q2	GT1704	60	Customer
	PO600008989	50204T	0002 / 8 ea	5819 (8 ea)	Lot 5	P30S42.00-8989Q2	GN2411B	8	Customer
	PO600008989	50204T	0002 / 42 ea	5819 (42 ea)	Lot 6	Set up-Q2	GN2411B	42	PD
Q3	PO600008990	50208-1T	0003 / 200 ea	5819 (200 ea)	Lot 1	P30S42.00-8990Q3	GN2412B	200	Customer
	PO600008990	50208-1T	0003 / 300 ea	5819 (300 ea)	Lot 2	P30S42.00-8990Q3	GN2411B	300	Customer
	PO600008990	50208-1T	0003 / 55 ea	2729 ( 55 ea )	Lot 3	P30S42.00-8990Q3	GN2410FB	55	Customer
	PO600008990	50208-1T	0003 / 110 ea	2729 ( 100 ea )	Lot 4	P30S42.00-8990Q3	GN2403B	110	Customer
	PO600008990	50208-1T	0003 / 60 ea	2729 ( 60 ea )	Lot 5	P30S42.00-8990Q3	GT1706	60	Customer
	PO600008990	50208-1T	0003 / 8 ea	2729 (8)	Lot 6	P30S42.00-8990Q3	GN2411B	8	Customer
	PO600008990	50208-1T	0003 / 42 ea	2729 (42)	Lot 7	Set up-Q3	GN2411B	42	PD
Q4	PO600008991	50208-2T	NTK( WH provide )	5818 (550 ea )	Lot 1	P30S42.00-8991Q4	GN2412B	550	Customer
	PO600008991	50208-2T	NTK( WH provide )	5818 (8 ea )	Lot 2	P30S42.00-8991Q4	GN2412B	8	Customer
	PO600008991	50208-2T	NTK( WH provide )	5818 (42 ea )	Lot 3	Set up-Q4	GN2412B	42	PD

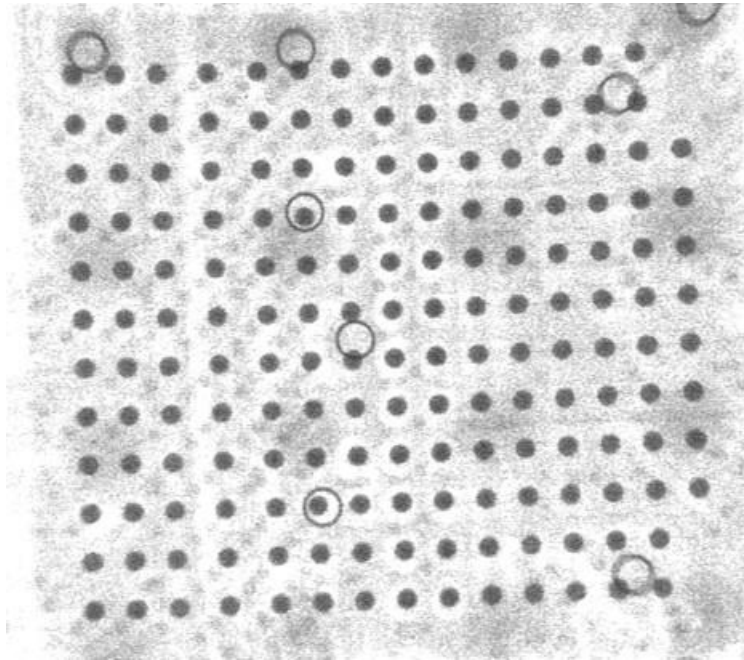
- DOE plan : quality inspection matrix

DOE Plan: NAU-27 UF from TWN Namics Factory and Kenly Lids Anodization at the Moderen												
Lot#	NAU27	Lid Batch	Qty	Set-up Units	Die Pull*	SMT Shear	Ball Shear (5 balls /unit)	SAT (post UF Cure)	Lid Torque (EOL)*	Pre-con (MSL3/250 C)	Lid Torque (Pre-con)*	SAT (pre-con)
Lot POR	POR (JPN)	POR	50	2	4	4	4	40	10	30	10	20
Lot Q1	Batch 1 (TWN)	Batch 1	50	2	4	4	4	40	10	30	10	20
Lot Q2	Batch 2 (TWN)	Batch 1	50	2	4	4	4	40	10	30	10	20
Lot Q3	Batch 2 (TWN)	Batch 2	50	2	4	4	4	40	10	30	10	20
Lot Q4	Batch 1 (TWN)	Batch 3	50	2	4	4	4	40	10	30	10	20

PS: Die Pull & SMT shear samples shipped to Semtech site for test and data collection.  
Pre-con and lid torque testing are in progress at ATT.

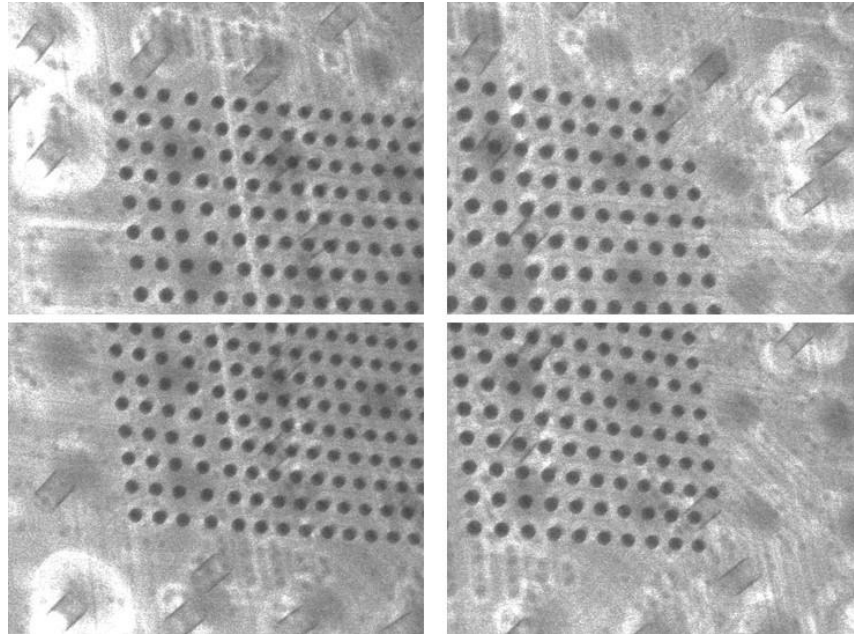
# Check list

- D/A process – X-ray(before reflow) : POR-No abnormality observed



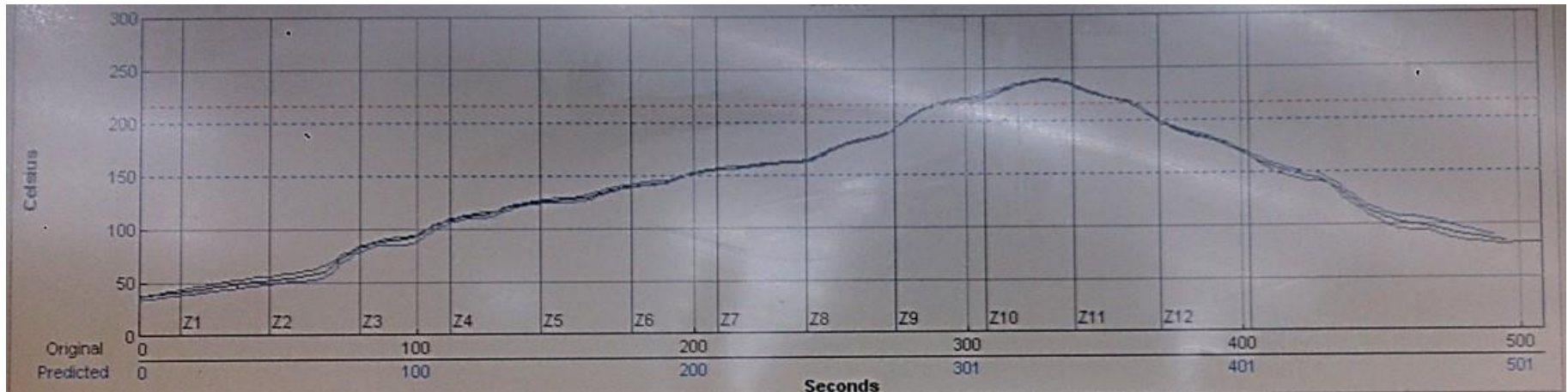
# Check list

- D/A process – X-ray(after reflow) : POR-No abnormality observed



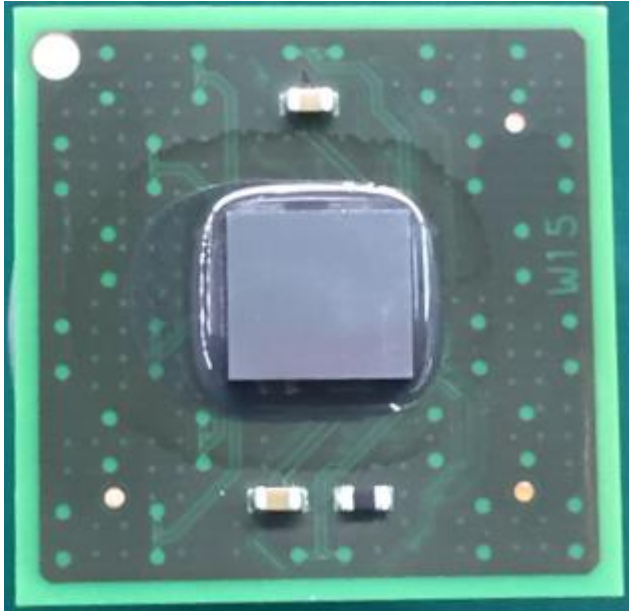
# Check list

- D/A process – Reflow profile : No abnormality observed

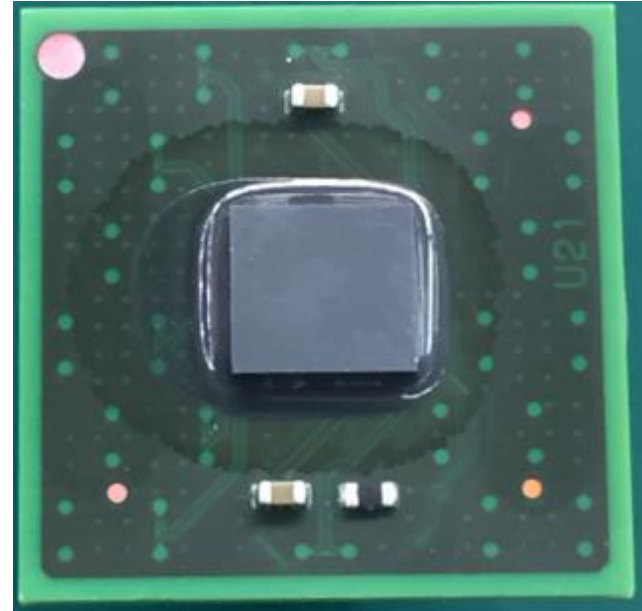


# Check list

- UF process : view photo : No abnormality observed (Bleeding shown below is acceptable. Criteria: UF cannot touch the capacitors)



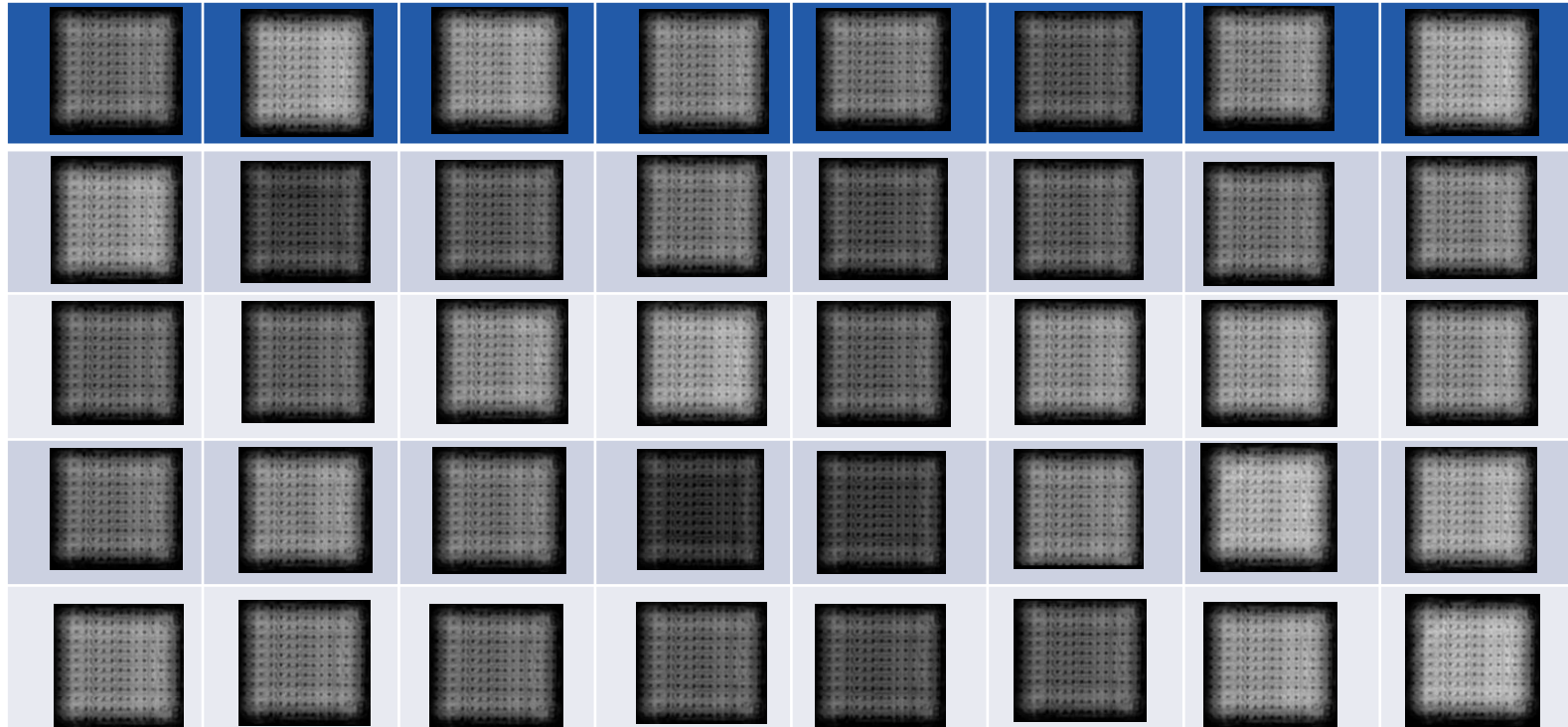
POR



Q1

# Check list

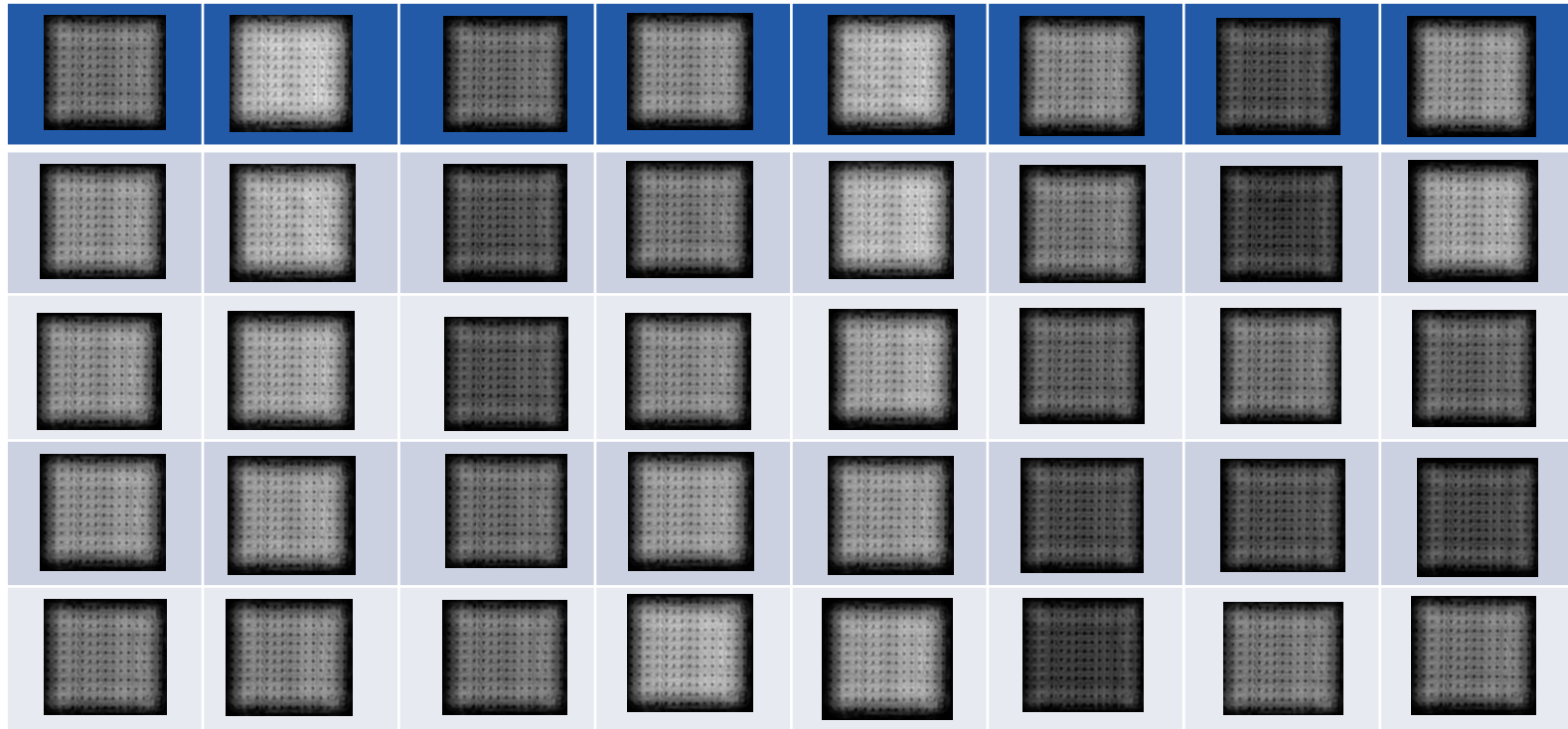
- UF process : SAT (post UF Cure)- POR : No abnormality observed





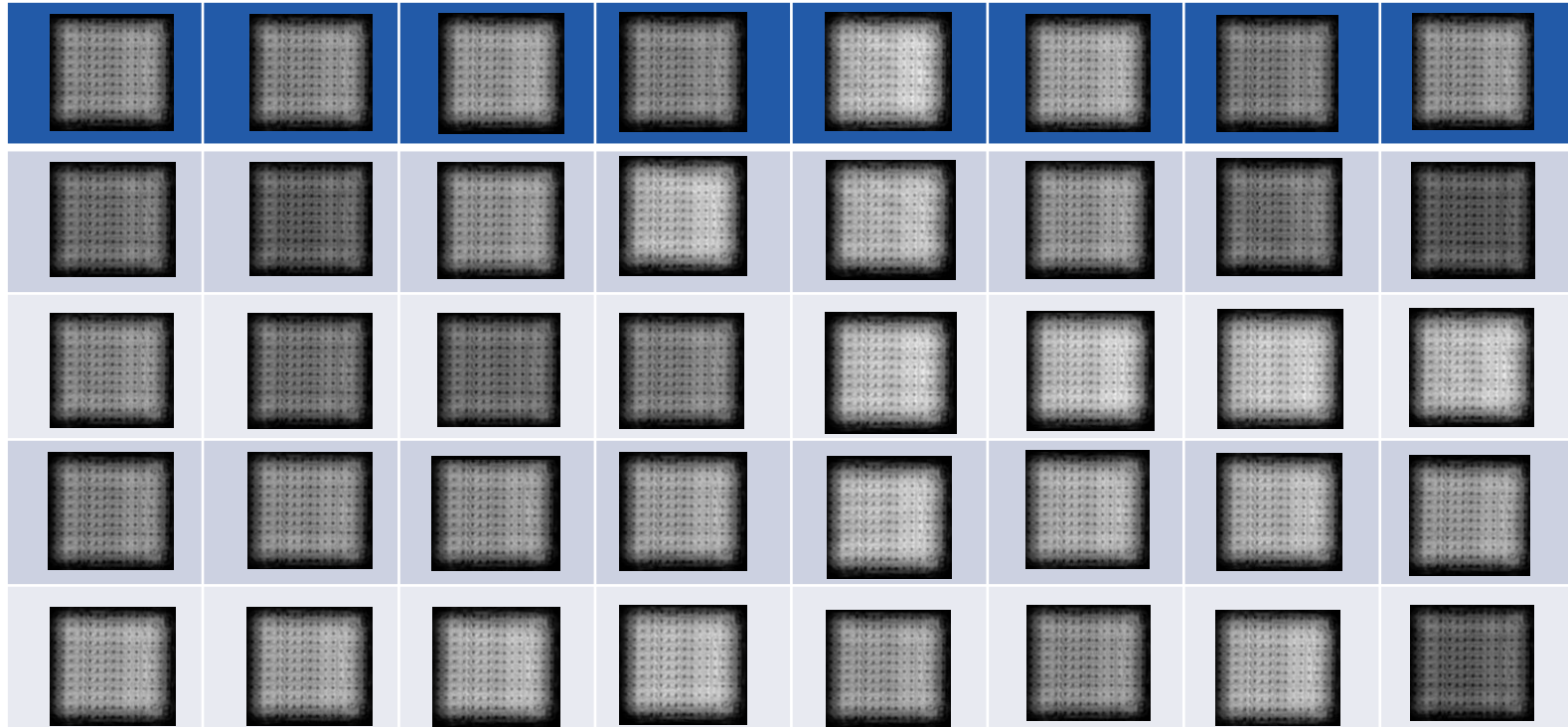
# Check list

- UF process : SAT (post UF Cure)-Q1 : No abnormality observed



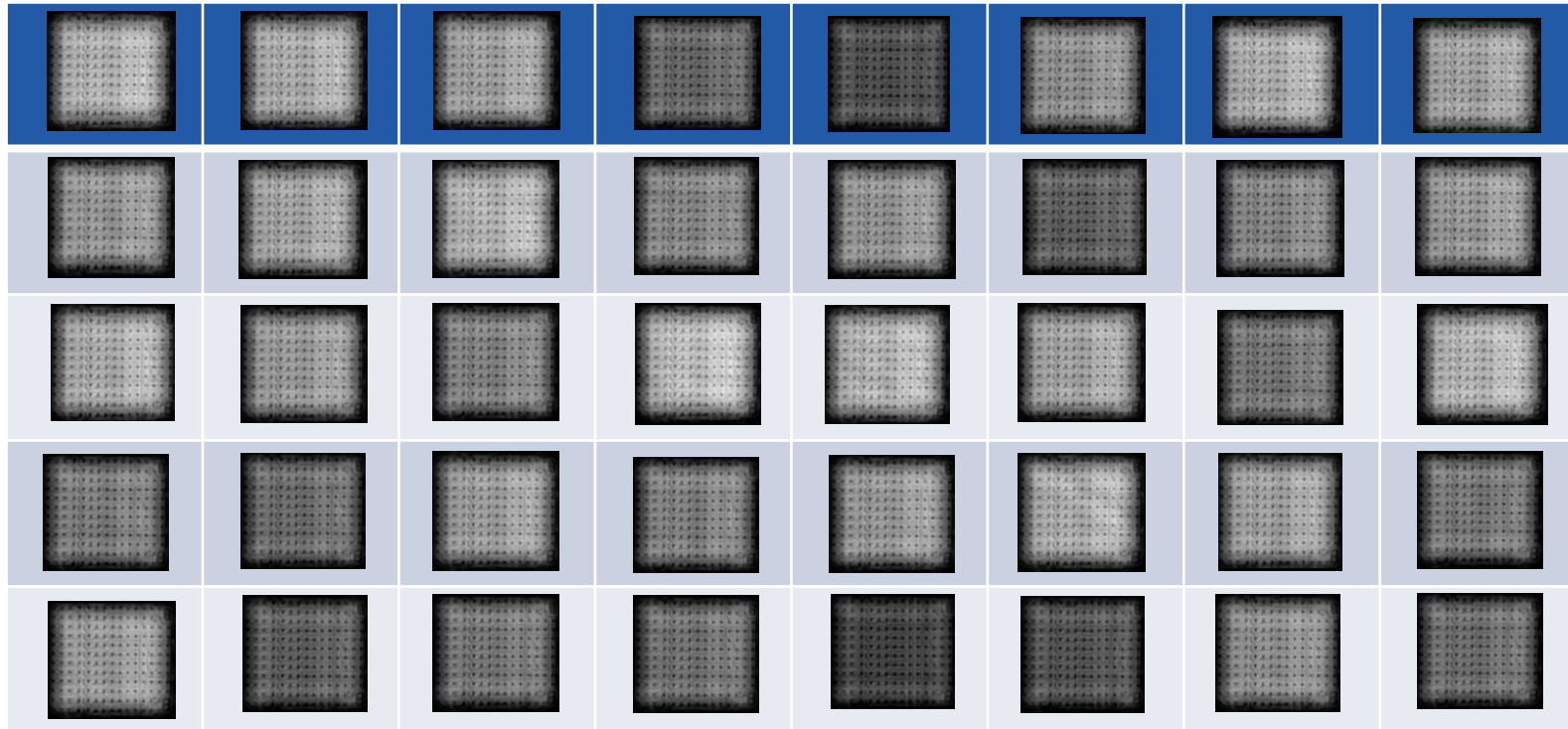
# Check list

- UF process : SAT (post UF Cure)- Q2 : No abnormality observed



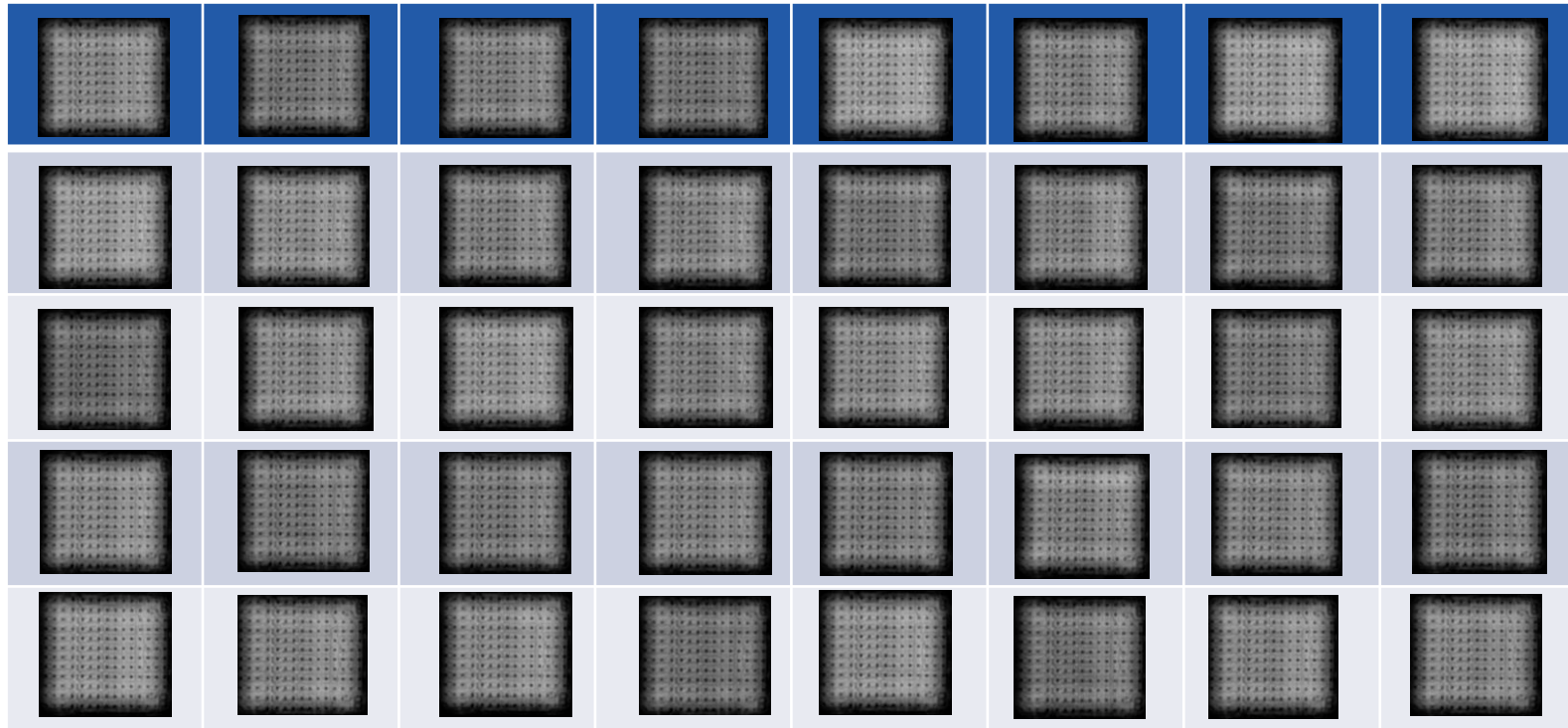
# Check list

- UF process : SAT (post UF Cure)- Q3 : No abnormality observed



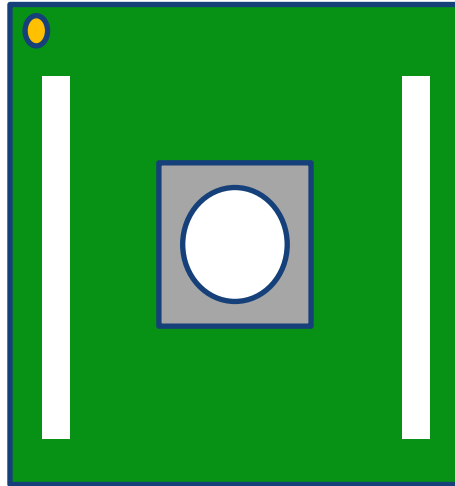
# Check list

- UF process : SAT (post UF Cure)- Q4 : No abnormality observed



# Check list

- Lid attach process : TIM & adhesive pattern : No abnormality observed



# Check list

- Lid attach process : Torque test: No abnormality observed

Lot	Device	SS	Avg	Min	Max	3S
POR	GN2411B	10	9.23	6.8	11	1.58
Q1	GN2411B	10	7.76	6.6	12.2	1.64
Q2	GN2411B	10	7.16	5.9	9	1.02
Q3	GN2411B	10	8.33	6.9	11.2	1.35
Q4	GN2412B	10	7.51	6.1	12.1	1.74

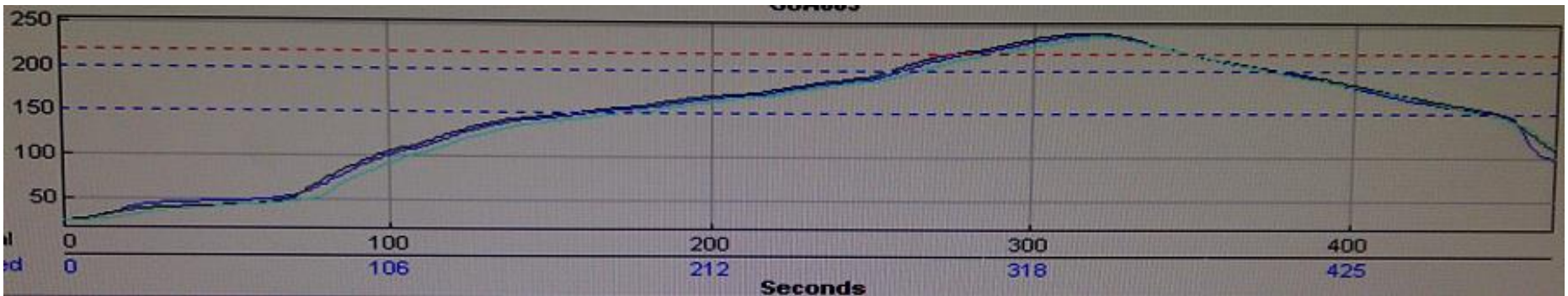
# Check list

- Marking process : Marking image : No abnormality observed

Lot#	GN2412B	GN2411B	GN2410FB	GN2404B	GN2407B	GN2403B	GN2415B	GT1704	GT1706
POR (PO60000089 92)									
Q1 (PO60000089 88)									
Q2 (PO60000089 89)									
Q3 (PO60000089 90)									
Q4 (PO60000089 91)									

# Check list

- B/A process : Reflow profile : No abnormality observed





# Check list

- B/A process  
: No abnormality observed

Lot	Device	SS	Spec	Avg	Min	Max	3S	CpK
POR	GN2411B	5	630	1311.0	1258.3	1388.8	193.6	3.5
Q1	GN2411B	5	630	1328.3	1194.7	1458.5	296.0	2.4
Q2	GN2411B	5	630	1359.4	1183.0	1457.4	311.4	2.3
Q3	GN2411B	5	630	1369.1	1291.3	1489.4	305.8	2.4
Q4	GN2412B	5	630	1282.3	1175.0	1387.9	280.1	2.3

- Co-planarity  
: No abnormality observed

Lot	Device	SS	Spec	Avg	Min	Max	3S	CpK
POR	GN2411B	32	200	31	21	130	16.2	10.4
Q1	GN2411B	32	200	29	23	42	12.62	13.51
Q2	GN2411B	32	200	30	21	51	11.78	14.46
Q3	GN2411B	32	200	30	23	52	13.53	12.56
Q4	GN2412B	32	200	30	21	45	11.1	15.26

# Check list

- Package dimensional measurement : No abnormality observed

Lot No	Device	Package	Spec	Min	Max	Avg	SD	PPK
POR	GN2411B	X	12.90 ~ 13.20mm	12.988	13	12.994	0.003162	21.71431
		Y	12.90 ~ 13.20mm	12.987	13.001	12.9935	0.004006	17.18059
Q1	GN2411B	X	12.90 ~ 13.20mm	12.987	13	12.9932	0.004147	16.6213
		Y	12.90 ~ 13.20mm	12.989	13.002	12.99567	0.003377	20.17074
Q2	GN2411B	X	12.90 ~ 13.20mm	12.987	13.002	12.99417	0.004052	16.93222
		Y	12.90 ~ 13.20mm	12.988	13.001	12.9951	0.003294	20.73344
Q3	GN2411B	X	12.90 ~ 13.20mm	12.988	13	12.99497	0.003232	21.14486
		Y	12.90 ~ 13.20mm	12.988	13.001	12.99417	0.003966	17.29943
Q4	GN2412B	X	12.90 ~ 13.20mm	12.988	13.002	12.9953	0.003761	18.14032
		Y	12.90 ~ 13.20mm	12.989	13.001	12.99477	0.00335	20.42392

SS : 30 unit

Thank You