



# PRODUCT / PROCESS CHANGE NOTIFICATION

## PCN-000727

**Date: AUG-17-2021**

P1/2

Semtech Corporation, 200 Flynn Road, Camarillo CA 93012

### Change Details

<b>Part Number(s) Affected:</b>  Please see page 2 for a list of affected part numbers.	<b>Customer Part Number(s) Affected:</b> <input checked="" type="checkbox"/> N/A
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**Description, Purpose and Effect of Change:**

Semtech will start using a qualified second backend source for the reconstructed wafer process, quarter wafer process, and waffle pack packing process of the affected part numbers listed on page 2. The purpose is capacity expansion.

These processes are currently performed at KYEC. Second backend source has been qualified at Greatek.

Please refer to the enclosed qualification reports.

<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 checked="" type="checkbox"/> N/A

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

This change has no impact on performance, characteristics, or reliability.

<b>Implementation Date</b>	<b>NOV-17-2021</b>	<b>Work Week</b>	<b>46</b>
<b>Last Time Ship (LTS)</b> <small>Of unchanged product</small>	<b>N/A</b>	<b>Affecting Lot No. / Serial No. (SN)</b>	<b>N/A</b>
<b>Sample Availability</b>	<b>Available Upon Request</b>	<b>Qualification Report Availability</b>	<b>N/A</b>

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

- PRODDOC024903 Rev. 01 Qualification Report for reconstructed wafer products Assembly at Greatek
- PRODDOC024901 Rev. 01 Qualification Report for Quarter Wafer Process Assembly at Greatek
- PRODDOC024904 Rev. 01 Qualification Report for Waffle Pack Packing Assembly at Greatek



# PRODUCT / PROCESS CHANGE NOTIFICATION

## PCN-000727

**Date: AUG-17-2021**

P2/2

Issuing Authority	
<b>Semtech Business Unit:</b>	Signal Integrity Product Group (SIP)
<b>Semtech Contact Info:</b>	<div style="display: flex; justify-content: space-between;"> <div style="width: 60%;">                     Pedro Jr. Bernas                      Quality Assurance                      pbernas@semtech.com                      (289) 856-9326 x1162                 </div> <div style="width: 35%; text-align: center;"> </div> </div>
<b>FOR FURTHER INFORMATION &amp; WORLDWIDE SALES COVERAGE:</b> <a href="http://www.semtech.com/contact/index.html#support">http://www.semtech.com/contact/index.html#support</a>	

**Part Number(s) Affected:**

Quarter Wafer Process		Reconstructed Wafer Process		Waffle Pack Packing Process			
1	GC1901-GRP6	13	GN1068-COT1	24	GN1081-CHIP	37	GN2109-CHIP
2	GN1068-GRP6	14	GN2108-GRP6R	25	GN1084-CHIP	38	GN2109S-CHIP
3	GN24L80-GRP6	15	GN2109-GRP6R	26	GN1085-CHIP	39	GN2110-CHIP
4	GN25L53-GRP6	16	GN7069A3-GRP6R	27	GN1086-CHIP	40	GN2110S-CHIP
5	HN5185CP-GRP6	17	GN7069E3-GRP6R	28	GN1088-CHIP	41	GN2147-CHIP
6	NT20067-GRP6	18	HN5180-GRP6R	29	GN1090-WP	42	GN2148-CHIP
7	NT20R67-GRP6	19	HN5180-GRP6RT	30	GN1185-CHIP	43	GN2149-CHIP
8	NT22010-GRP6	20	HN5185AR-GRP6R	31	GN1190-WP	44	GN2538-CHIP
9	NT23L50-GRP6	21	HN5185CP-GRP6R	32	GN1810-CHIP	45	GN2539-CHIP
10	NT24L50-GRP6	22	NT25L55-GRP6RS	33	GN1810SC2-CHIP	46	GN25L53-WP
11	NT24L55-GRP6	23	NT28L52-GRP6R	34	GN2108-CHIP	47	NT24L50-WP
12	NT25L51-GRP6			35	GN2108-CHIP-A1	48	NT25L50-WP
				36	GN2108S-CHIP		

**Qualification vehicles:**

- Quarter Wafer Process = GN1068-GRP6 & NT24L50-GRP6
- Reconstructed Wafer Process = GN7069A3-GRP6R & GN7069E3-GRP6R
- Waffle Pack Packing Process = GN1190-WP & GN1090-WP



## **Qualification Report for reconstructed wafer products Assembly at Greatek**




## Revision History

Date	Revision	Change Details	Author
July 21, 2021	01	New Release	Brian Chuang



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	<b>Title</b> <b>Qualification Report for reconstructed wafer products Assembly at Greatek</b>	<b>Document Number:</b> PRODDOC024903	
		<b>Revision:</b> 01	<b>Date:</b> July 21, 2021
	<b>Security Level:</b> External	<b>Author:</b> Brian Chuang	

# 1 Introduction

The GN7069A3-GRP6R and GN7069E3-GRP6R are reconstructed wafers. Good die are picked from a background, diced wafer and placed on a grip ring in specific pattern. Currently, these assemblies are qualified at KYEC. We desire to qualify them at Greatek as well in order to have security of supply.

This document will consist of two sections, one a comparison of the BOM and process at Greatek compared to KYEC, and the second an examination of how well Greatek builds the assemblies.

## 1.1 **Related Products**

Reconstructed wafers

## 1.2 **Process Change Summary**

Existing supplier is KYEC . Add Greatek as qualified supplier

## 1.3 **Products Affected**

HN5180-GRP6R

HN5180-GRP6RT

NT28L52-GRP6R

NT25L55-GRP6R

GN1068-COT1

HN5185AR-GRP6R


HN5185CP-GRP6R

GN2108-GRP6R

GN2109-GRP6R

GN7069A3-GRP6R

GN7069E3-GRP6R

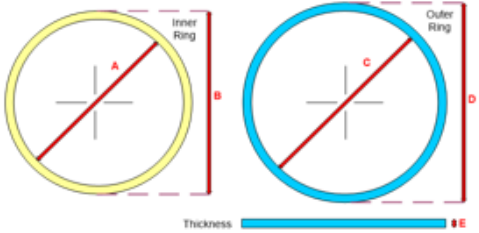
	<b>Title</b> Qualification Report for reconstructed wafer products Assembly at Greatek	<b>Document Number:</b> PRODDOC024903	
		<b>Revision:</b> 01	<b>Date:</b> July 21, 2021
	<b>Security Level:</b> External	<b>Author:</b> Brian Chuang	


## 2 Qualification Components

### 2.1 Comparison of Assembly Build

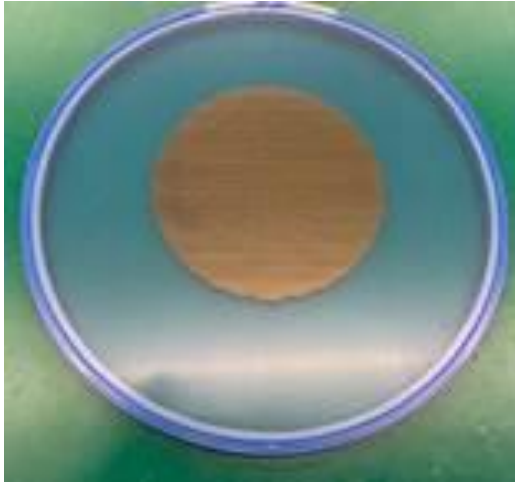
Check Items	KYEC	Greatek
GN7069A3-GRP6R GN7069E3-GRP6R	WTW Machine: Saultech KS12 Gross Die Q'ty : 4024 Column (X) = 83 Row (Y) = 63 Die gap = 250um (before expand) Die gap = 350um (After expand) Wafer Dia . =83mm(before expand) Wafer Dia. = 104mm (After expand)	WTW Machine: Saultech KS12 Gross Die Q'ty : 4024 Column (X) = 83 Row (Y) = 63 Die gap = 250um (before expand) Die gap = 350um (After expand) Wafer Dia . =83mm(before expand) Wafer Dia. = 104mm (After expand)

### 2.2 BOM – Same for both Sites

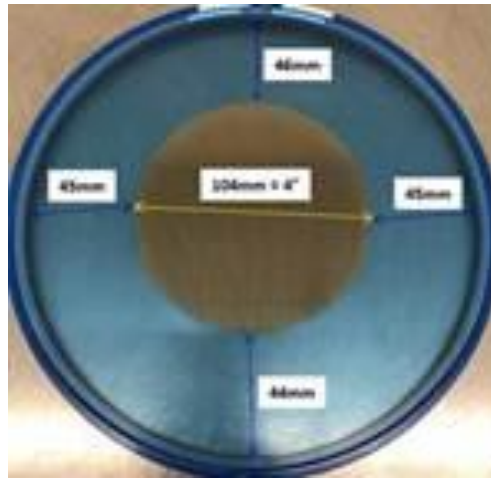
Non UV Tape	Nitto SPV 224			
Grip Ring (8" plastic ring)				
	Grip/Expander Ring Ref #	Inner Ring I.D / O.D.	Outer Ring I.D / O.D.	Ring Thickness
	Unit: mm	A / B	C / D	E
Highly GRP6	195.2/202.7	202.45/210.05	5.8	

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### 2.3 Format

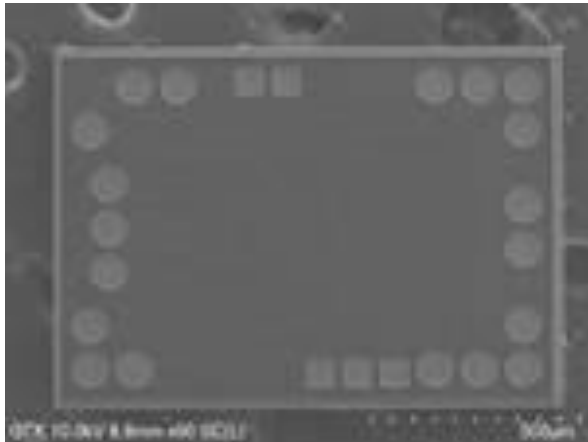


Greatek

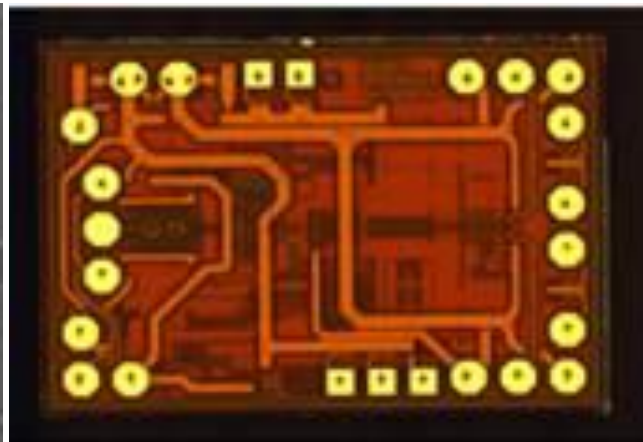


KYEC

### 2.4 Orientation



Greatek



KYEC





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	<b>Security Level:</b>	External	<b>Author:</b>	Brian Chuang		

### 3 Manufacturing Analysis

#### 3.1 SAW

GN7079A3-GRP6R

GN7069E3-GRP6R

Sample	Mechanical Saw			Sample	Mechanical Saw		
	Topside Chipping (um)	Backside Chipping (um)	Side-wall Chipping (um)		Topside Chipping (um)	Backside Chipping (um)	Side-wall Chipping (um)
1	3.20	8.30	1.90	1	4.80	9.90	2.00
2	2.20	14.30	2.10	2	2.80	17.60	1.90
3	2.20	13.10	3.00	3	4.50	21.90	2.60
4	1.00	9.30	1.80	4	3.80	6.60	1.60
5	3.10	8.20	2.00	5	2.70	10.30	2.70
6	2.30	6.50	1.40	6	2.90	12.50	1.40
7	1.60	13.20	1.30	7	4.10	16.10	2.40
8	3.40	20.30	2.50	8	3.10	16.80	2.30
9	4.10	7.00	1.70	9	2.20	8.90	1.60
10	3.10	20.90	2.40	10	4.20	20.30	1.80
11	1.00	20.00	2.10	11	5.10	9.90	1.80
12	2.40	13.60	3.00	12	1.40	18.10	2.40
13	1.50	7.80	1.70	13	2.50	20.00	1.20
14	2.50	18.80	2.70	14	1.90	19.40	2.30
15	2.10	23.60	1.50	15	2.20	6.00	2.80
16	2.30	22.80	2.60	16	2.60	14.90	2.60
17	1.80	12.40	2.40	17	4.70	9.90	2.50
18	1.30	12.70	3.00	18	2.20	15.00	1.80
19	4.50	12.40	1.20	19	4.40	15.20	1.20
20	1.20	8.80	2.80	20	4.70	23.70	2.30
21	3.80	15.00	2.20	21	4.80	20.50	1.80
22	1.30	19.40	1.20	22	2.80	11.00	1.60
23	4.10	11.20	1.20	23	2.20	18.10	2.20
24	3.20	23.90	1.50	24	3.70	10.40	1.40
25	2.80	19.60	2.80	25	3.90	19.90	1.60
26	4.80	13.20	1.30	26	2.80	11.20	1.30
27	3.20	9.20	1.30	27	2.80	8.10	2.10
28	1.10	19.10	2.40	28	2.90	6.50	2.90
29	1.20	22.00	1.50	29	4.30	18.10	3.00
30	1.80	14.90	2.90	30	3.10	6.10	1.30
<b>Spec</b>	<b>&lt;10um</b>	<b>&lt;50um</b>	<b>&lt;10um</b>	<b>Spec</b>	<b>&lt;10um</b>	<b>&lt;50um</b>	<b>&lt;10um</b>
<b>Min</b>	<b>1.000</b>	<b>6.500</b>	<b>1.200</b>	<b>Min</b>	<b>1.400</b>	<b>6.000</b>	<b>1.200</b>
<b>Max</b>	<b>4.800</b>	<b>23.900</b>	<b>3.000</b>	<b>Max</b>	<b>5.100</b>	<b>23.700</b>	<b>3.000</b>
<b>Avg</b>	<b>2.470</b>	<b>14.717</b>	<b>2.047</b>	<b>Avg</b>	<b>3.337</b>	<b>14.097</b>	<b>2.013</b>
<b>SD</b>	<b>1.1002</b>	<b>5.4135</b>	<b>0.6268</b>	<b>SD</b>	<b>1.0304</b>	<b>5.2896</b>	<b>0.5361</b>
<b>PPK</b>	<b>2.281</b>	<b>2.173</b>	<b>4.229</b>	<b>PPK</b>	<b>2.156</b>	<b>2.262</b>	<b>4.966</b>



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### 3.2 Wafer to Wafer

GN7079A3-GRP6R

GN7069E3-GRP6R

Location	Units Space (um)	Units Pitch (um)	Units to Grip Ring (mm)	Location	Units Space (um)	Units Pitch (um)	Units to Grip Ring (mm)
1	348.00	1618.00	46.30	1	357.55	1640.55	45.24
2	351.00	1624.00	45.80	2	355.81	1637.81	45.17
3	349.00	1625.00	45.10	3	359.46	1639.46	45.96
4	353.00	1626.00	45.20	4	351.24	1630.24	44.94
5	357.00	1634.00	45.30	5	355.64	1636.64	44.18
6	351.00	1626.00	46.30	6	357.52	1641.52	45.54
7	348.00	1618.00	45.30	7	359.90	1645.90	46.29
8	352.00	1628.00	46.10	8	349.11	1630.11	45.64
9	351.00	1629.00	44.90	9	354.52	1638.52	45.55
10	347.00	1626.00	45.20	10	355.14	1632.14	44.66
11	349.00	1622.00	45.70	11	360.36	1643.36	46.12
12	355.00	1630.00	45.60	12	356.58	1638.58	44.99
13	346.00	1615.00	44.90	13	353.15	1639.15	45.34
14	354.00	1624.00	45.20	14	351.91	1642.91	45.67
15	347.00	1627.00	44.70	15	354.82	1632.82	44.71
16	352.00	1622.00	45.60	16	353.43	1632.43	45.38
17	348.00	1624.00	45.20	17	349.24	1631.24	45.26
18	351.00	1624.00	44.90	18	352.57	1635.57	45.68
19	345.00	1619.00	46.10	19	354.27	1635.27	44.81
20	353.00	1622.00	45.20	20	351.24	1631.24	45.91
21	351.00	1632.00	45.80	21	354.87	1632.87	44.92
22	348.00	1618.00	44.90	22	353.76	1632.76	45.20
23	346.00	1627.00	46.10	23	347.94	1630.94	45.64
24	357.00	1627.00	45.70	24	361.54	1641.54	45.45
25	351.00	1620.00	44.90	25	352.34	1633.34	45.47
26	354.00	1630.00	45.20	26	359.17	1643.17	45.78
27	351.00	1627.60	45.40	27	348.24	1634.24	45.85
28	349.00	1622.00	45.70	28	356.11	1639.11	45.77
29	352.00	1632.00	45.30	29	354.47	1636.47	45.01
30	350.00	1626.00	45.20	30	349.23	1636.23	44.92
<b>Min</b>	<b>345.00</b>	<b>1615.00</b>	<b>44.70</b>	<b>Min</b>	<b>347.94</b>	<b>1630.11</b>	<b>44.18</b>
<b>Max</b>	<b>357.00</b>	<b>1634.00</b>	<b>46.30</b>	<b>Max</b>	<b>361.54</b>	<b>1645.90</b>	<b>46.29</b>
<b>Average</b>	<b>350.53</b>	<b>1624.82</b>	<b>45.43</b>	<b>Average</b>	<b>354.37</b>	<b>1636.54</b>	<b>45.37</b>
<b>STDEV</b>	<b>3.09</b>	<b>4.64</b>	<b>0.45</b>	<b>STDEV</b>	<b>3.69</b>	<b>4.48</b>	<b>0.48</b>
<b>Ppk</b>	<b>2.64</b>	<b>3.72</b>	<b>1.91</b>	<b>Ppk</b>	<b>1.86</b>	<b>3.09</b>	<b>1.83</b>




SEMTECH	Title	Qualification Report for reconstructed wafer products Assembly at Greatek	Document Number:		PRODDOC024903		
	Security Level:		External	Revision:	01	Date:	July 21, 2021
				Author:	Brian Chuang		

### 3.3 Die Size

GN7079A3-GRP6R

GN7069E3-GRP6R

Sample	PICK & PLACE		Sample	PICK & PLACE	
	PACKAGE OUTLINE DIMENSION			PACKAGE OUTLINE DIMENSION	
	Dimension D (mm)	Dimension E (mm)		Dimension D (mm)	Dimension E (mm)
1	1.27	0.90	1	1.283	0.919
2	1.27	0.90	2	1.282	0.916
3	1.28	0.90	3	1.280	0.917
4	1.27	0.90	4	1.279	0.915
5	1.28	0.90	5	1.281	0.914
6	1.28	0.90	6	1.284	0.917
7	1.27	0.90	7	1.286	0.921
8	1.28	0.90	8	1.281	0.920
9	1.28	0.90	9	1.284	0.916
10	1.28	0.91	10	1.277	0.919
11	1.27	0.90	11	1.283	0.922
12	1.28	0.91	12	1.282	0.919
13	1.27	0.90	13	1.286	0.916
14	1.27	0.90	14	1.291	0.917
15	1.28	0.90	15	1.278	0.920
16	1.27	0.89	16	1.279	0.916
17	1.28	0.90	17	1.282	0.917
18	1.27	0.90	18	1.283	0.918
19	1.27	0.90	19	1.281	0.921
20	1.27	0.90	20	1.280	0.915
21	1.28	0.90	21	1.278	0.919
22	1.27	0.90	22	1.279	0.917
23	1.28	0.91	23	1.283	0.916
24	1.27	0.91	24	1.280	0.921
25	1.27	0.90	25	1.281	0.918
26	1.28	0.90	26	1.284	0.917
27	1.28	0.90	27	1.286	0.920
28	1.27	0.90	28	1.283	0.914
29	1.28	0.90	29	1.282	0.922
30	1.28	0.90	30	1.287	0.915
<b>SPEC</b>	<b>1.275 ± 0.0275</b>	<b>0.903 ± 0.0275</b>	<b>SPEC</b>	<b>1.275 ± 0.0275</b>	<b>0.903 ± 0.0275</b>
<b>Min</b>	<b>1.27</b>	<b>0.89</b>	<b>Min</b>	<b>1.277</b>	<b>0.914</b>
<b>Max</b>	<b>1.28</b>	<b>0.91</b>	<b>Max</b>	<b>1.291</b>	<b>0.922</b>
<b>Average</b>	<b>1.27</b>	<b>0.90</b>	<b>Average</b>	<b>1.282</b>	<b>0.918</b>
<b>STDEV</b>	<b>0.0038</b>	<b>0.0037</b>	<b>STDEV</b>	<b>0.0031</b>	<b>0.0023</b>
<b>Ppk</b>	<b>2.34</b>	<b>2.28</b>	<b>Ppk</b>	<b>2.22</b>	<b>1.81</b>

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### 3.4 Summary

Process	Check Item	Unit	Sample Size	LSL	USL	Min	Max	Avg	Std Dev	PPK	Result (P/F)
Die Saw	Topside Chipping	um	30 points/lot	-	10	1.00	4.80	2.47	1.10	2.28	P
	Backside Chipping	um	30 points/lot	-	50	6.50	23.90	14.72	5.41	2.17	P
	Side-wall Chipping	um	30 points/lot	-	10	1.20	3.00	2.05	0.63	4.23	P
WTW	Unit Space	um	30 point	325	375	345.00	357.00	350.53	3.09	2.64	P
	Unit Pitch	um	30 point	1573.0	1678.0	1615.00	1634.00	1624.82	4.64	3.72	P
	Unit to Grip Ring	mm	30 point	42	48	44.70	46.30	45.43	0.45	1.91	P
POD	Dimension D	mm	30 points/lot	1.2475	1.3025	1.27	1.28	1.27	0.0038	2.34	P
	Dimension E	mm	30 points/lot	0.8755	0.9305	0.89	0.91	0.90	0.00	2.28	P

Summary: All processes are within specification.

## 4 Conclusion

The Greatek GN7069A3-GRP6R and GN7069E3-GRP6R assemblies are the same design as the KYEC assemblies and the manufacturing parameters are within specification.

GN7069A3-GRP6R and GN7069E3-GRP6R as qualification vehicle. All reconstructed wafer products could be qualified by Sameness.

Greatek is qualified to manufacture the reconstructed wafer products assemblies.

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	<b>Security Level:</b> External	<b>Author:</b> Brian Chuang	

## Appendix

Device Name	KYEC	Greatek
NT25L55-GRP6RS	Gross Die Q'ty : 4,653ea Column (X) = 73 Row (Y) = 81 Die Gap = 350um Wafer Dia . = 122mm	Gross Die Q'ty : 4,653ea Column (X) = 73 Row (Y) = 81 Die Gap = 350um Wafer Dia . = 122mm
GN7069A3-GRP6R GN7069E3-GRP6R	Gross Die Q'ty : 4024 Column (X) = 83 Row (Y) = 63 Die Gap = 350um Wafer Dia . =83mm	Gross Die Q'ty : 4024 Column (X) = 83 Row (Y) = 63 Die Gap = 350um Wafer Dia . =83mm
GN1068-COT1	Gross Die Q'ty : 3716 Column (X) = 76 Row (Y) = 60 Die Gap = 350um Wafer Dia . =75mm	Gross Die Q'ty : 3716 Column (X) = 76 Row (Y) = 60 Die Gap = 350um Wafer Dia . =75mm
NT28L52-GRP6R	Gross Die Q'ty : 7188 Column (X) = 102 Row (Y) = 88 Die Gap = 350um Wafer Dia . =106mm	Gross Die Q'ty : 7188 Column (X) = 102 Row (Y) = 88 Die Gap = 350um Wafer Dia . =106mm
HN5185AR-GRP6R HN5185CP-GRP6R	Gross Die Q'ty : 5575 Column (X) = 69 Row (Y) = 103 Die Gap = 350um Wafer Dia . =105mm	Gross Die Q'ty : 5575 Column (X) = 69 Row (Y) = 103 Die Gap = 350um Wafer Dia . =105mm
GN2108-GRP6R GN2109-GRP6R	Gross Die Q'ty : 1005 Column (X) = 37 Row (Y) = 33 Die Gap = 350um Wafer Dia . =135mm	Gross Die Q'ty : 1005 Column (X) = 37 Row (Y) = 33 Die Gap = 350um Wafer Dia . =135mm
HN5180-GRP6R	Gross Die Q'ty : 12467 Column (X) = 127 Row (Y) = 125 Die Gap = 350um Wafer Dia . = 150mm	Gross Die Q'ty : 12467 Column (X) = 127 Row (Y) = 125 Die Gap = 350um Wafer Dia . = 150mm
HN5180-GRP6RT	Gross Die Q'ty : 6731 Column (X) = 93 Row (Y) = 91 Die Gap = 350um Wafer Dia . = 110mm	Gross Die Q'ty : 6731 Column (X) = 93 Row (Y) = 91 Die Gap = 350um Wafer Dia . = 110mm



## **Qualification Report for Quarter Wafer Process Assembly at Greatek**



## Revision History


Date	Revision	Change Details	Author
July 21, 2021	01	New Release	Brian Chuang



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		<b>Revision:</b> 01	<b>Date:</b> July 21, 2021
	<b>Security Level:</b> External	<b>Author:</b> Brian Chuang	

## 1 Introduction

The GN1068-GRP6 and NT24L50-GRP6 are Quarter Wafer Process. Thinned and diced of quarter wafer on a grip ring in quarter pattern. Inked out bad die. Currently, these assemblies are qualified at KYEC. We desire to qualify them at Greatek as well in order to have security of supply.

This document will consist of two sections, one a comparison of the BOM and process at Greatek compared to KYEC, and the second an examination of how well Greatek builds the assemblies.

### 1.1 **Related Products**

Quarter Wafer Process

### 1.2 **Process Change Summary**

No Change

### 1.3 **Products Affected**

NT24L55-GRP6

NT24L50-GRP6

NT25L51-GRP6

GN25L53-GRP6

NT23L50-GRP6

NT22010-GRP6

GN1068-GRP6


NT20067-GRP6

NT20R67-GRP6

GC1901-GRP6

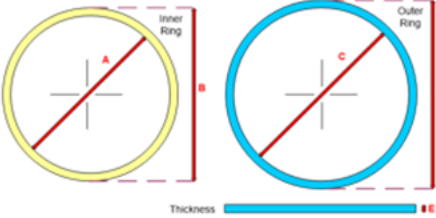
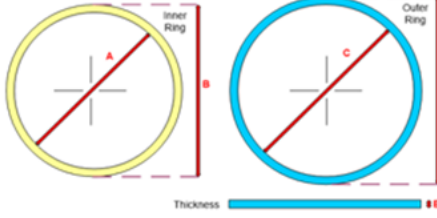
GN24L80-GRP6


HN5185CP-GRP6

	<b>Title</b> Qualification Report for Quarter Wafer Process Assembly at Greatek	<b>Document Number:</b> PRODDOC024901	
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## 2 Qualification Components

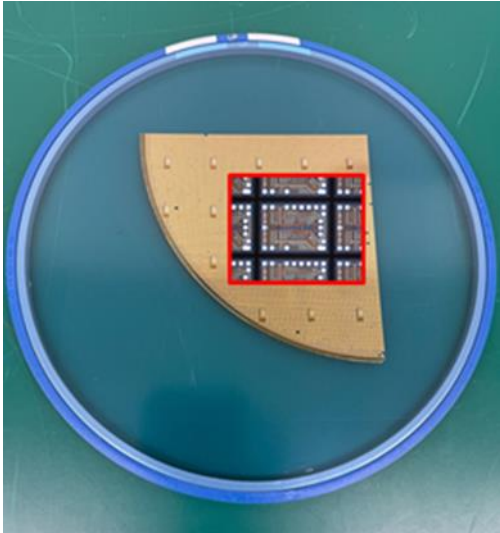
### 2.1 Comparison of Assembly Build

Process	KYEC	Greatek																								
Saw Blade	DISCO Blade Z1=30~35um Z2=20~25um	DISCO Blade Z1=30~35um Z2=20~25um																								
Non UV Tape	Nitto SPV 224 Tape thickness : 80um Elongation MD : 200% Adhesion (180° peeling) : 1.0 N/20mm Shelf life : 12 Month Color : Light Blue	Nitto V8-AR Tape thickness : 75um Elongation MD : 250% Adhesion (180° peeling) : 1.2 N/20mm Shelf life : 12 Month Color : Light Blue																								
Grip Ring (8" plastic ring)	<table border="1"> <thead> <tr> <th>Grip/Expander Ring Ref #</th> <th>Inner Ring I.D / O.D.</th> <th>Outer Ring I.D / O.D.</th> <th>Ring Thickness</th> </tr> </thead> <tbody> <tr> <td>Unit: mm</td> <td>A / B</td> <td>C / D</td> <td>E</td> </tr> <tr> <td>Highly GRP6</td> <td>195.2/202.7</td> <td>202.45/210.05</td> <td>5.8</td> </tr> </tbody> </table>	Grip/Expander Ring Ref #	Inner Ring I.D / O.D.	Outer Ring I.D / O.D.	Ring Thickness	Unit: mm	A / B	C / D	E	Highly GRP6	195.2/202.7	202.45/210.05	5.8	<table border="1"> <thead> <tr> <th>Grip/Expander Ring Ref #</th> <th>Inner Ring I.D / O.D.</th> <th>Outer Ring I.D / O.D.</th> <th>Ring Thickness</th> </tr> </thead> <tbody> <tr> <td>Unit: mm</td> <td>A / B</td> <td>C / D</td> <td>E</td> </tr> <tr> <td>Highly GRP6</td> <td>195.2/202.7</td> <td>202.45/210.05</td> <td>5.8</td> </tr> </tbody> </table>	Grip/Expander Ring Ref #	Inner Ring I.D / O.D.	Outer Ring I.D / O.D.	Ring Thickness	Unit: mm	A / B	C / D	E	Highly GRP6	195.2/202.7	202.45/210.05	5.8
	Grip/Expander Ring Ref #	Inner Ring I.D / O.D.	Outer Ring I.D / O.D.	Ring Thickness																						
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Unit: mm	A / B	C / D	E																							
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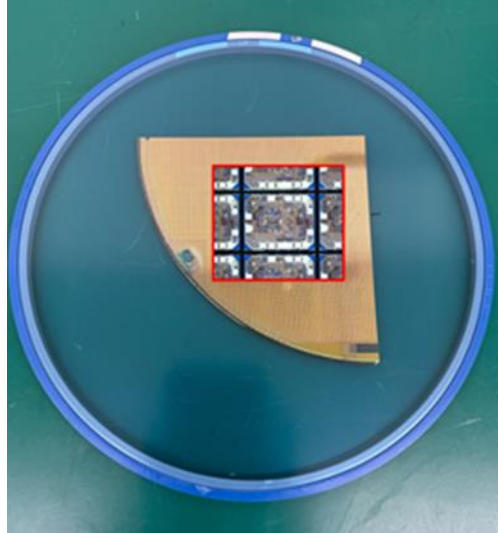
	<b>Title</b> Qualification Report for Quarter Wafer Process Assembly at Greatek	<b>Document Number:</b> PRODDOC024901	
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	<b>Security Level:</b> External	<b>Author:</b> Brian Chuang	

## 2.2 Format & Orientation

GN1068-GRP6

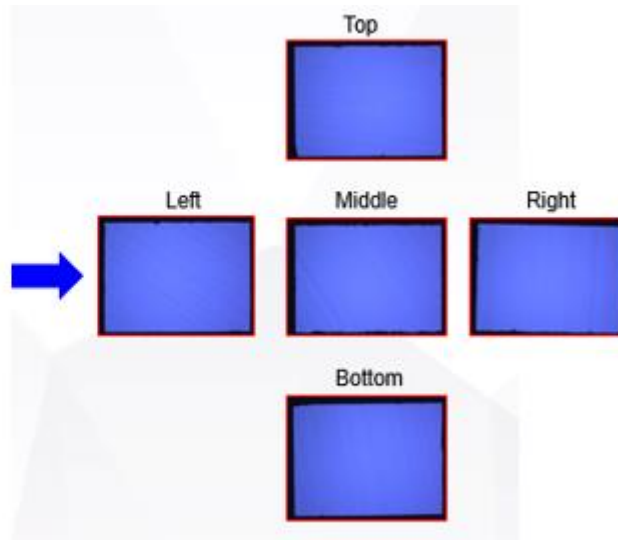



NT24L50-GRP6



## 2.3 Greatek Non UV tape evaluation

No glue residue



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### 3 Manufacturing Analysis

#### 3.1 Backgrinding

GN1086-GRP6

NT24L50-GRP6

Sample	Post Grind Thickness (um)	Surface Roughness Ra (um)	Sample	Post Grind Thickness (um)	Surface Roughness Ra (um)
1	251.00	0.0070	1	275.00	0.0090
2	252.00	0.0080	2	276.00	0.0080
3	251.00	0.0070	3	276.00	0.0080
4	250.00	0.0080	4	275.00	0.0060
5	251.00	0.0090	5	274.00	0.0070
6	250.00	0.0100	6	274.00	0.0070
7	252.00	0.0060	7	275.00	0.0090
8	250.00	0.0080	8	276.00	0.0100
9	248.00	0.0090	9	276.00	0.0080
10	249.00	0.0070	10	274.00	0.0070
11	248.00	0.0060	11	273.00	0.0100
12	249.00	0.0060	12	274.00	0.0090
13	250.00	0.0100	13	276.00	0.0080
14	249.00	0.0080	14	275.00	0.0060
15	249.00	0.0090	15	276.00	0.0080
16	249.00	0.0070	16	275.00	0.0090
17	249.00	0.0060	17	274.00	0.0090
18	250.00	0.0090	18	273.00	0.0100
19	251.00	0.0080	19	276.00	0.0090
20	250.00	0.0100	20	275.00	0.0080
21	249.00	0.0090	21	276.00	0.0070
22	252.00	0.0090	22	275.00	0.0070
23	251.00	0.0080	23	276.00	0.0090
24	250.00	0.0090	24	275.00	0.0080
25	249.00	0.0070	25	276.00	0.0060
26	248.00	0.0080	26	273.00	0.0070
27	249.00	0.0080	27	273.00	0.0080
28	251.00	0.0090	28	275.00	0.0070
29	252.00	0.0070	29	275.00	0.0100
30	251.00	0.0070	30	274.00	0.0090
<b>Spec</b>	<b>250 +/- 25</b>	<b>&lt;0.03</b>	<b>Spec</b>	<b>275 +/- 25</b>	<b>&lt;0.03</b>
<b>Min</b>	<b>248.0000</b>	<b>0.0060</b>	<b>Min</b>	<b>273.0000</b>	<b>0.0060</b>
<b>Max</b>	<b>252.0000</b>	<b>0.0100</b>	<b>Max</b>	<b>276.0000</b>	<b>0.0100</b>
<b>Avg</b>	<b>250.0000</b>	<b>0.00797</b>	<b>Avg</b>	<b>274.8667</b>	<b>0.00810</b>
<b>SD</b>	<b>1.2318</b>	<b>0.00122</b>	<b>SD</b>	<b>1.0417</b>	<b>0.00121</b>
<b>PPK</b>	<b>6.7654</b>	<b>6.03</b>	<b>PPK</b>	<b>7.9574</b>	<b>6.02</b>


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### 3.2 Saw

GN1068-GRP6

NT25L50-GRP6

Sample	Mechanical Saw			Sample	Mechanical Saw		
	Topside Chipping (um)	Backside Chipping (um)	Side-wall Chipping (um)		Topside Chipping (um)	Backside Chipping (um)	Side-wall Chipping (um)
1	0.90	11.70	2.50	1	3.40	5.40	0.60
2	4.70	10.20	3.00	2	3.10	8.60	2.00
3	2.60	15.50	0.50	3	1.20	8.30	2.50
4	1.70	8.30	0.20	4	4.80	8.40	0.80
5	1.60	12.20	2.40	5	1.50	6.40	2.40
6	3.60	9.60	0.80	6	2.70	7.10	1.40
7	1.50	12.60	0.50	7	2.30	6.60	0.30
8	3.90	13.30	0.20	8	4.10	14.90	1.90
9	2.50	8.80	0.00	9	1.70	6.70	0.70
10	3.20	6.20	2.30	10	0.80	11.60	0.00
11	3.40	5.50	0.50	11	3.00	15.30	0.20
12	3.00	13.00	1.60	12	3.20	6.50	1.90
13	4.10	12.80	1.00	13	3.90	10.30	1.60
14	2.10	11.60	2.30	14	2.70	15.50	1.20
15	2.90	11.90	2.10	15	1.40	10.30	0.10
16	0.00	16.00	2.90	16	4.10	9.30	1.90
17	3.10	11.60	0.80	17	3.10	9.00	0.40
18	3.60	10.60	2.80	18	4.30	10.00	0.30
19	4.70	14.80	0.00	19	1.10	14.40	1.10
20	3.30	12.80	0.40	20	3.40	5.80	1.80
21	3.00	10.80	1.40	21	2.80	12.70	1.20
22	4.00	5.10	0.40	22	2.00	11.50	1.80
23	1.50	6.60	2.40	23	1.60	12.40	1.50
24	1.10	14.30	2.90	24	2.60	13.90	0.30
25	1.00	10.50	0.60	25	3.00	6.80	2.50
26	1.90	14.70	2.70	26	4.60	15.00	2.30
27	2.40	8.20	1.20	27	2.60	12.20	1.60
28	3.40	6.30	2.20	28	3.00	9.10	1.50
29	1.10	14.60	0.10	29	3.80	6.40	2.80
30	1.00	5.20	1.60	30	2.60	7.10	2.60
<b>Spec</b>	<b>&lt;10um</b>	<b>&lt;50um</b>	<b>&lt;10um</b>	<b>Spec</b>	<b>&lt;10um</b>	<b>&lt;50um</b>	<b>&lt;10um</b>
<b>Min</b>	<b>0.000</b>	<b>5.100</b>	<b>0.000</b>	<b>Mn</b>	<b>0.800</b>	<b>5.400</b>	<b>0.000</b>
<b>Max</b>	<b>4.700</b>	<b>16.000</b>	<b>3.000</b>	<b>Max</b>	<b>4.800</b>	<b>15.500</b>	<b>2.800</b>
<b>Avg</b>	<b>2.560</b>	<b>10.843</b>	<b>1.410</b>	<b>Avg</b>	<b>2.813</b>	<b>9.917</b>	<b>1.373</b>
<b>SD</b>	<b>1.2283</b>	<b>3.2403</b>	<b>1.0377</b>	<b>SD</b>	<b>1.0673</b>	<b>3.2205</b>	<b>0.8412</b>
<b>PPK</b>	<b>2.019</b>	<b>4.028</b>	<b>2.759</b>	<b>PPK</b>	<b>2.245</b>	<b>4.149</b>	<b>3.419</b>

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### 3.3 Die Size

GN1068-GRP6

Sample	PICK & PLACE	
	PACKAGE OUTLINE DIMENSION	
	Dimension D (mm)	Dimension E (mm)
1	1.203	0.895
2	1.208	0.893
3	1.206	0.892
4	1.210	0.898
5	1.203	0.898
6	1.205	0.896
7	1.206	0.896
8	1.205	0.895
9	1.207	0.899
10	1.210	0.893
<b>SPEC</b>	<b>1.21+/-0.0275</b>	<b>0.9+/-0.0275</b>
<i>Min</i>	<b>1.2030</b>	<b>0.8920</b>
<i>Max</i>	<b>1.2100</b>	<b>0.8990</b>
<i>Average</i>	<b>1.2063</b>	<b>0.8955</b>
<i>STDEV</i>	<b>0.0025</b>	<b>0.0024</b>
<i>Ppk</i>	<b>3.18</b>	<b>3.24</b>

NT24L50-GRP6

Sample	PICK & PLACE	
	PACKAGE OUTLINE DIMENSION	
	Dimension D (mm)	Dimension E (mm)
1	1.225	0.972
2	1.224	0.971
3	1.220	0.967
4	1.217	0.971
5	1.224	0.970
6	1.221	0.971
7	1.225	0.972
8	1.219	0.970
9	1.217	0.968
10	1.218	0.973
<b>SPEC</b>	<b>1.22+/-0.0275</b>	<b>0.97+/-0.0275</b>
<i>Min</i>	<b>1.2170</b>	<b>0.9670</b>
<i>Max</i>	<b>1.2250</b>	<b>0.9730</b>
<i>Average</i>	<b>1.2210</b>	<b>0.9705</b>
<i>STDEV</i>	<b>0.0033</b>	<b>0.0018</b>
<i>Ppk</i>	<b>2.70</b>	<b>4.89</b>

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### 3.4 Summary

#### GN1068-GRP6

Process	Check Item	Unit	Sample Size	LSL	USL	Min	Max	Avg	Std Dev	PPK	Result (P/F)
Backgrind	Post-Grind Thickness	um	30 points/lot	225	275	248.0	252.0	250.00	1.23	6.77	P
	Surface Roughness	um	30 points/lot	-	0.0300	0.0060	0.0100	0.0080	0.0012	6.03	P
	TTV	um	30 points/lot	-	25.00	4.0000					
Die Saw	Topside Chipping	um	30 points/lot	-	10	0.00	4.70	2.56	1.23	2.02	P
	Backside Chipping	um	30 points/lot	-	50	5.10	16.00	10.84	3.24	4.03	P
	Side-wall Chipping	um	30 points/lot	-	10	0.00	3.00	1.41	1.04	2.76	P
POD	Dimension D	um	10 point	1.183	1.238	1.20	1.21	1.21	0.00	3.18	P
	Dimension E	um	10 point	0.873	0.928	0.89	0.90	0.90	0.00	3.24	P
	Dimension A	um	30 point	225	275.000	248.00	250.00	250.00	1.23	6.77	P

#### NT24L50-GRP6

Process	Check Item	Unit	Sample Size	LSL	USL	Min	Max	Avg	Std Dev	PPK	Result (P/F)
Backgrind	Post-Grind Thickness	um	30 points/lot	250	300	273.0	276.0	274.87	1.04	7.96	P
	Surface Roughness	um	30 points/lot	-	0.0300	0.0060	0.0100	0.0081	0.0012	6.02	P
	TTV	um	30 points/lot	-	25.00	3.0000					
Die Saw	Topside Chipping	um	30 points/lot	-	10	0.80	4.80	2.81	1.07	2.24	P
	Backside Chipping	um	30 points/lot	-	50	5.40	15.50	9.92	3.22	4.15	P
	Side-wall Chipping	um	30 points/lot	-	10	0.00	2.80	1.37	0.84	3.42	P
POD	Dimension D	um	10 point	1.193	1.248	1.22	1.23	1.22	0.00	2.70	P
	Dimension E	um	10 point	0.943	0.998	0.97	0.97	0.97	0.00	4.89	P
	Dimension A	um	30 point	250	300.000	273.00	276.00	274.87	1.04	7.96	P

Summary: All processes are within specification.

## 4 Conclusion

The Greatek GN1068-GRP6 and NT24L50-GRP6 assemblies are the same design as the KYEC assemblies and the manufacturing parameters are within specification.

Greatek is qualified to manufacture the quarter wafer assemblies.



## **Qualification Report for Waffle Pack Packing Assembly at Greatek**





## Revision History

Date	Revision	Change Details	Author
July 21, 2021	01	New Release	Brian Chuang



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	<b>Security Level:</b>	External	<b>Author:</b>	Brian Chuang		

# 1 Introduction

The GN1190-WP & GN1090-WP are Waffle Pack Packing Process. Thinned and diced of good dies wafer on waffle pack . Currently, these assemblies are qualified at KYEC. We desire to qualify them at Greatek as well in order to have security of supply.

This document will consist of two sections, one a comparison of the BOM and process at Greatek compared to KYEC, and the second an examination of how well Greatek builds the assemblies.

## 1.1 **Related Products**

Waffle Pack Packing Process

## 1.2 **Process Change Summary**

Existing supplier is KYEC . Add Greatek as qualified supplier

## 1.3 **Products Affected**

- GN1190-WP
- GN1090-WP
- GN2110-CHIP
- GN2109-CHIP
- GN2108-CHIP
- GN2108-CHIP-A1
- GN2108S-CHIP
- GN2109S-CHIP
- GN2110S-CHIP
- GN1086-CHIP
- GN1088-CHIP
- GN1085-CHIP
- GN1185-CHIP
- GN1810SC2-CHIP
- GN1810-CHIP
- GN2147-CHIP
- GN2148-CHIP
- GN2149-CHIP



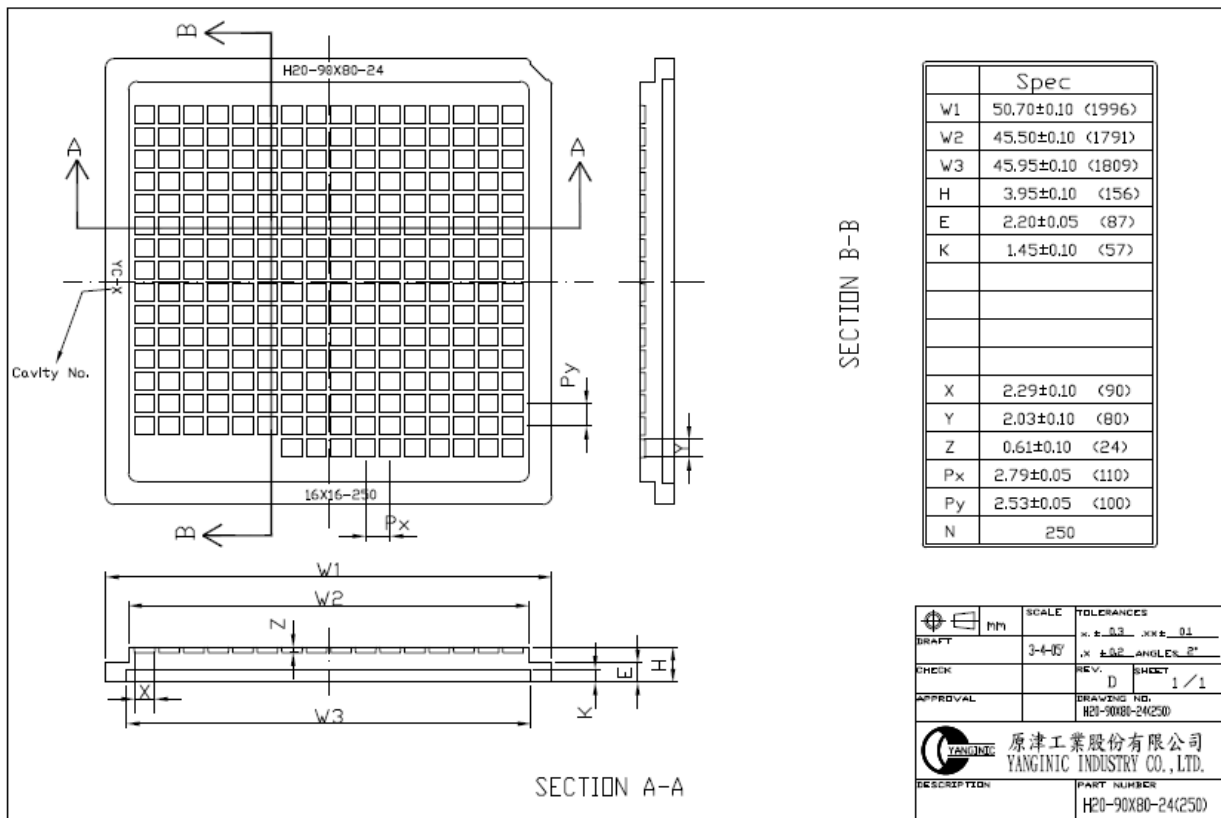
<b>Title</b> <b>Qualification Report for Waffle Pack Packing Assembly at Greatek</b>	<b>Document Number:</b> PRODDOC024904	
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	<b>Author:</b> Brian Chuang	
<b>Security Level:</b> External		

- GN2538-CHIP
- GN2539-CHIP
- GN1081-CHIP
- GN1084-CHIP
- GN25L53-WP
- NT25L50-WP
- NT24L50-WP

## 2 Qualification Components

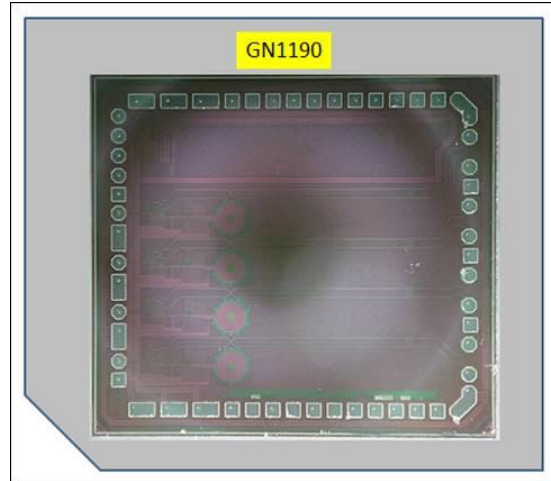
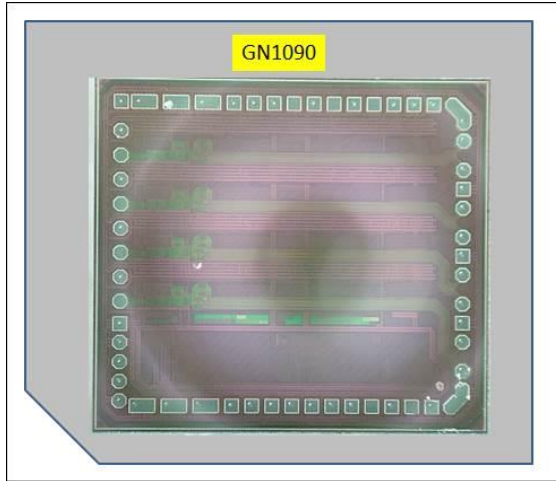
### 2.1 Comparison of Assembly Build & BOM – Same for both Sites

Device Name	Waffle pack	Waffle pack supplier
GN1190-WP	H20-90*80-24(250)	YANGINIC
GN1090-WP	H20-90*80-24(250)	YANGINIC



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2.2 Orientation – The same in both of KYEC and Greatek



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### 3 Manufacturing Analysis

#### 3.1 Backgrinding (GN1090 & GN1190 share the same one wafer)

Sample	Post Grind Thickness (um)	Surface Roughness Ra (um)
1	201.00	0.0110
2	201.00	0.0090
3	201.00	0.0080
4	201.00	0.0110
5	199.00	0.0080
6	203.00	0.0100
7	199.00	0.0090
8	201.00	0.0100
9	202.00	0.0080
10	196.00	0.0090
11	196.00	0.0100
12	202.00	0.0080
13	197.00	0.0070
14	204.00	0.0090
15	197.00	0.0090
16	198.00	0.0090
17	202.00	0.0100
18	198.00	0.0070
19	200.00	0.0080
20	201.00	0.0080
21	197.00	0.0090
22	204.00	0.0100
23	196.00	0.0100
24	200.00	0.0070
25	199.00	0.0090
26	202.00	0.0100
27	203.00	0.0110
28	196.00	0.0070
29	202.00	0.0080
30	199.00	0.0110
<b>Spec</b>	<b>200 +/- 25</b>	<b>&lt;0.02</b>
<b>Min</b>	<b>196.0000</b>	<b>0.0070</b>
<b>Max</b>	<b>204.0000</b>	<b>0.0110</b>
<b>Avg</b>	<b>199.9000</b>	<b>0.00900</b>
<b>SD</b>	<b>2.4824</b>	<b>0.00126</b>
<b>PPK</b>	<b>3.3436</b>	<b>5.56</b>



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### 3.2 Laser Grooving and saw (GN1090 & GN1190 share the same one wafer)

Sample	Laser Grooving			Mechanical Saw			
	Laser Groove Width (um)	Laser Groove Depth (um)	Keep Out Zone (um)	Topside Chipping (um)	Backside Chipping depth (um)	Backside Chipping width (um)	Side-wall Chipping (um)
1	51.94	14.80	14.03	0.00	8.90	18.10	0.00
2	52.15	17.20	13.93	0.00	11.20	24.70	0.00
3	51.29	16.40	14.36	0.00	14.10	25.00	0.00
4	52.54	14.80	13.73	0.00	13.00	19.50	0.00
5	51.94	15.40	14.03	0.00	11.50	19.00	0.00
6	51.43	16.60	14.29	0.00	16.00	19.10	0.00
7	51.79	14.30	14.11	0.00	13.10	21.10	0.00
8	51.85	15.40	14.08	0.00	6.70	19.10	0.00
9	52.28	16.80	13.86	0.00	10.90	10.90	0.00
10	52.52	17.10	13.74	0.00	6.30	17.80	0.00
11	51.42	16.30	14.29	0.00	6.00	20.30	0.00
12	51.76	15.50	14.12	0.00	13.20	20.20	0.00
13	52.76	15.50	13.62	0.00	6.40	19.90	0.00
14	51.47	17.20	14.27	0.00	10.10	19.60	0.00
15	52.67	15.40	13.67	0.00	12.70	23.00	0.00
16	52.75	16.30	13.63	0.00	6.90	17.10	0.00
17	52.34	16.50	13.83	0.00	10.80	18.70	0.00
18	52.06	14.80	13.97	0.00	15.40	16.00	0.00
19	52.15	16.90	13.93	0.00	7.80	8.30	0.00
20	52.12	16.70	13.94	0.00	11.20	23.90	0.00
21	52.21	14.70	13.90	0.00	10.30	18.70	0.00
22	51.82	15.20	14.09	0.00	9.30	11.30	0.00
23	52.26	16.20	13.87	0.00	12.40	16.60	0.00
24	51.80	15.30	14.10	0.00	15.90	17.20	0.00
25	52.79	14.40	13.61	0.00	9.70	25.90	0.00
26	52.17	16.80	13.92	0.00	11.30	12.30	0.00
27	51.91	17.20	14.05	0.00	13.00	23.70	0.00
28	52.16	15.80	13.92	0.00	5.20	12.60	0.00
29	52.12	16.10	13.94	0.00	15.00	9.90	0.00
30	52.20	17.00	13.90	0.00	8.20	23.80	0.00
<b>Spec</b>	<b>52±3um</b>	<b>&gt;10um</b>	<b>&gt; 10 um</b>	<b>&lt;10um</b>	<b>&lt;50um</b>	<b>&lt;50um</b>	<b>&lt;10um</b>
<b>Min</b>	<b>51.290</b>	<b>14.300</b>	<b>13.605</b>	<b>0.000</b>	<b>5.200</b>	<b>8.300</b>	<b>0.000</b>
<b>Max</b>	<b>52.790</b>	<b>17.200</b>	<b>14.355</b>	<b>0.000</b>	<b>16.000</b>	<b>25.900</b>	<b>0.000</b>
<b>Avg</b>	<b>52.089</b>	<b>15.953</b>	<b>13.956</b>	<b>0.000</b>	<b>10.750</b>	<b>18.443</b>	<b>0.000</b>
<b>SD</b>	<b>0.4014</b>	<b>0.9145</b>	<b>0.2007</b>	<b>0.0000</b>	<b>3.1086</b>	<b>4.6721</b>	<b>0.0000</b>
<b>PPK</b>	<b>2.417</b>	<b>2.170</b>	<b>6.569</b>	<b>#DIV/0!</b>	<b>4.209</b>	<b>2.251</b>	<b>#DIV/0!</b>

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### 3.3 Die size

#### GN1090-WP POD

Sample	PICK & PLACE	
	PACKAGE OUTLINE DIMENSION	
	Dimension D (mm)	Dimension E (mm)
1	1.848	2.050
2	1.854	2.045
3	1.846	2.051
4	1.849	2.054
5	1.848	2.047
6	1.846	2.050
7	1.847	2.050
8	1.848	2.051
9	1.855	2.053
10	1.852	2.047
11	1.846	2.050
12	1.848	2.054
13	1.850	2.049
14	1.851	2.047
15	1.847	2.054
16	1.846	2.047
17	1.855	2.050
18	1.851	2.052
19	1.852	2.048
20	1.853	2.049
21	1.845	2.048
22	1.851	2.049
23	1.848	2.047
24	1.849	2.051
25	1.854	2.049
26	1.846	2.049
27	1.852	2.054
28	1.853	2.053
29	1.845	2.047
30	1.850	2.052
<b>SPEC</b>	<b>1.8525+/-0.0275</b>	<b>2.0525+/-0.0275</b>
<b>Min</b>	<b>1.8450</b>	<b>2.0450</b>
<b>Max</b>	<b>1.8550</b>	<b>2.0540</b>
<b>Average</b>	<b>1.8495</b>	<b>2.0499</b>
<b>STDEV</b>	<b>0.0031</b>	<b>0.0025</b>
<b>Ppk</b>	<b>2.64</b>	<b>3.29</b>

#### GN1190-WP POD

Sample	PICK & PLACE	
	PACKAGE OUTLINE DIMENSION	
	Dimension D (mm)	Dimension E (mm)
1	1.848	2.048
2	1.852	2.052
3	1.849	2.053
4	1.852	2.048
5	1.852	2.045
6	1.848	2.053
7	1.850	2.045
8	1.852	2.045
9	1.846	2.050
10	1.850	2.055
11	1.850	2.045
12	1.849	2.054
13	1.850	2.045
14	1.845	2.045
15	1.846	2.053
16	1.854	2.052
17	1.849	2.054
18	1.851	2.050
19	1.846	2.049
20	1.853	2.055
21	1.849	2.048
22	1.851	2.046
23	1.853	2.051
24	1.849	2.045
25	1.851	2.048
26	1.850	2.045
27	1.850	2.049
28	1.853	2.053
29	1.852	2.055
30	1.853	2.051
<b>SPEC</b>	<b>1.8525+/-0.0275</b>	<b>2.0525+/-0.0275</b>
<b>Min</b>	<b>1.8450</b>	<b>2.0450</b>
<b>Max</b>	<b>1.8540</b>	<b>2.0550</b>
<b>Average</b>	<b>1.8501</b>	<b>2.0496</b>
<b>STDEV</b>	<b>0.0024</b>	<b>0.0036</b>
<b>Ppk</b>	<b>3.55</b>	<b>2.26</b>



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### 3.4 Summary

#### GN1090-WP

Process	Check Item	Unit	Sample Size	LSL	USL	Min	Max	Avg	Std Dev	PPK	Result (P/F)
Backgrind	Post-Grind Thickness	um	30 points/lot	175	225	196.0	204.0	199.90	2.48	3.34	P
	Surface Roughness	um	30 points/lot	-	0.0200	0.0070	0.0110	0.0090	0.0013	2.91	P
	TTV	um	30 points/lot	8.0000							
Laser grooving	Laser Groove Width	um	30 points/lot	49.00	55.00	51.3	52.8	52.1	0.4	2.4	P
	Laser Groove Depth	um	30 points/lot	10.00	-	14.3	17.2	16.0	0.9	2.2	P
	Keep Out Zone	um	30 points/lot	10.00	-	13.6	14.4	14.0	0.2	6.6	P
Die Saw	Topside Chipping	um	30 points/lot	-	10	0.0	0.0	0.0	0.0	-	P
	Backside Chipping	um	30 points/lot	-	50	5.2	16.0	10.8	3.1	4.2	P
	Backside Chipping	um	30 points/lot	-	50	8.3	25.9	18.4	4.7	2.3	P
	Side-wall Chipping	um	30 points/lot	-	10	0.0	0.0	0.0	0.0	-	P
Pick & Place	Dimension D	mm	30 points/lot	1.8250	1.8800	1.8450	1.8550	1.8495	0.0031	2.64	P
	Dimension E	mm	30 points/lot	2.0250	2.0800	2.0450	2.0540	2.0499	0.0025	3.29	P

#### GN1190-WP

Process	Check Item	Unit	Sample Size	LSL	USL	Min	Max	Avg	Std Dev	PPK	Result (P/F)
Backgrind	Post-Grind Thickness	um	30 points/lot	175	225	196.0	204.0	199.90	2.48	3.34	P
	Surface Roughness	um	30 points/lot	-	0.0200	0.0070	0.0110	0.0090	0.0013	5.56	P
	TTV	um	30 points/lot	8.0000							
Laser grooving	Laser Groove Width	um	30 points/lot	49.00	55.00	51.3	52.8	52.1	0.4	2.4	P
	Laser Groove Depth	um	30 points/lot	10.00	-	14.3	17.2	16.0	0.9	2.2	P
	Keep Out Zone	um	30 points/lot	10.00	-	13.6	14.4	14.0	0.2	6.6	P
Die Saw	Topside Chipping	um	30 points/lot	-	10	0.0	0.0	0.0	0.0	-	P
	Backside Chipping	um	30 points/lot	-	50	5.2	16.0	10.8	3.1	4.2	P
	Backside Chipping	um	30 points/lot	-	50	8.3	25.9	18.4	4.7	2.3	P
	Side-wall Chipping	um	30 points/lot	-	10	0.0	0.0	0.0	0.0	-	P
Pick & Place	Dimension D	mm	30 points/lot	1.8250	1.8800	1.8450	1.8540	1.8501	0.0024	3.55	P
	Dimension E	mm	30 points/lot	2.0250	2.0800	2.0450	2.0550	2.0496	0.0036	2.26	P

Summary: All processes are within specification.

## 4 Conclusion

The Greatek GN1190-WP & GN1090-WP assemblies are the same design as the KYEC assemblies and the manufacturing parameters are within specification.

Greatek is qualified to manufacture the Waffle Pack Packing assemblies.

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**Appendix (Waffle pack drawing)**

Device Name	Waffle pack drawing#	Supplier Name
GN2110-CHIP	H20-167*149-10(72)Black	YANGINIC
GN2109-CHIP	H20-167*149-10(72)Black	YANGINIC
GN2108-CHIP	H20-167*149-10(72)Black	YANGINIC
GN2108-CHIP-A1	H20-167*149-10(72)Black	YANGINIC
GN2108S-CHIP	H20-126*88-12(108)Black	YANGINIC
GN2109S-CHIP	H20-126*88-12(108)Black	YANGINIC
GN2110S-CHIP	H20-126*88-12(108)Black	YANGINIC
GN2148-CHIP	H20-125*57-10(135)Black	YANGINIC
GN2149-CHIP	H20-125*57-10(135)Black	YANGINIC
GN1086-CHIP	H20-70*48-20(400)淺 Gray	YANGINIC
GN1190-WP	H20-90*80-24(250)Gray	YANGINIC
GN1090-WP	H20-90*80-24(250)Gray	YANGINIC
GN25L53-WP	H20-50*55-20(400)Gray	YANGINIC
NT25L50-WP	H20-50*55-20(400)Gray	YANGINIC
NT24L50-WP	H20-50*55-20(400)Gray	YANGINIC
GN1810SC2-CHIP	H20-70*130-28(200)Black	YANGINIC
GN1810-CHIP	H20-70*130-28(200)Black	YANGINIC
GN2147-CHIP	H20-129*78-10(117)Black	YANGINIC
GN2539-CHIP	H20-165*95-28(100)Gray	YANGINIC
GN2538-CHIP	H20-165*95-28(100)Gray	YANGINIC
GN1081-CHIP	H20-65*44-10(270)Black	YANGINIC
GN1084-CHIP	H20-65*44-10(270)Black	YANGINIC
GN1088-CHIP	NH20-70*160-22(200)Gray	Neng Hung
GN1185-CHIP	NH20-70*160-22(200)Gray	Neng Hung
GN1085-CHIP	NH20-70*160-22(200)Gray	Neng Hung