MACRONIX INTERNATIONAL CO., LTD.

Product/Process Change Notice

PCN # P-2005-0003
Date: 2020/05/14

Dear Customer:

Please be informed that Macronix is going to add 2nd source assembly subcontractor to backup customer original approved assembly subcontractors for 16 SOP(300mil) package products. The 2nd source assembly subcontractor is LINGSEN.

The detailed information about this change is described in the following pages. This process change has passed Macronix’ qualification based on JEDEC standard, and the qualification report is attached below.

If you have any questions, concerns, or requests about this change, please contact your local Macronix Sales Representatives within 30 days, otherwise Macronix will assume customer received the PCN with no comments and the change is acceptable to the customer. Macronix follows JEDEC J-STD-046, it stipulates: ".....Lack of acknowledgement of the PCN within 30 days constitutes acceptance of the change".

Thank you.

Macronix International Co., Ltd.
旺宏電子股份有限公司

(Note: For the customers who receive Macronix PCNs via distributors, Macronix will assist the distributors to convey the PCNs to the customers. It is each distributor’s responsibility to communicate and track the responses of each customers and report back to Macronix, the distributor shall assume full responsibilities if failed to do so.)

PCN No.: P-2005-0003 **Issue Date :** 2020/05/14

Subject: Adding a new assembly vendor–LINGSEN for 16 SOP(300mil) package products.

Affected Macronix Part No.:

MX66U1G45GMI00, MX66U1G45GMJ00, MX66L1G59GMI-08G

Package type: 16 SOP(300mil) package products

Change Category : New assembly vendor

Reason of Change:

Due to COVID-19 pandemic induced community lockdown and L/F material shortage in Malaysia, which affected the assembly site ASECL, in order to ensure a smooth supply chain, add a new assembly site --LINGSEN, to avoid shortage and to increase production flexibility.

Before Change :	**After Change :**
Assembly vendor:	Assembly vendors:
1. ASECL	1. ASECL
	2. LINGSEN

Product identification:

ASECL assembled IC the marking has vendor code: X

LINGSEN assembled IC the marking has vendor code: L

Assessment of Change:

1. No impact to Form, Fit, Function, Quality & Reliability.
2. LINGSEN assembled 16 SOP(300mil) package has passed Macronix' qualification based on JEDEC MSL level 3 standards, and it is also Halogen-Free, and meets the RoHS standards..

   * Attached is LINGSEN assembled 16 SOP(300mil) package qualification report.
3. LINGSEN has been one of Macronix' qualified assembly vendors with good quality for a long time.

Schedule:

Sample available date: 2020/6/20

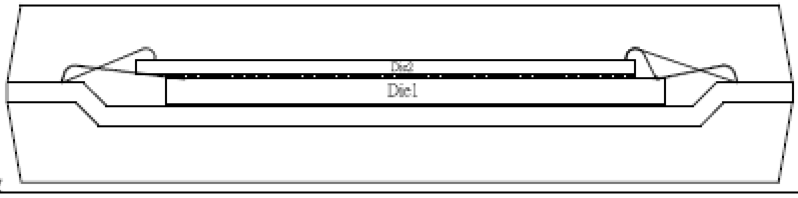
1st shipping date: 2020/8/15 (Or follow PCN agreement with the customer)

LINGSEN 16 SOP(300mil) Package Qualification Report

1. PURPOSE:

To qualify the new assembly subcontractor “LINGSEN” for 16 SOP(300mil) package.

2. PACKAGE PROFILE:

ASSEMBLY HOUSE	LINGSEN
PACKAGE	16 SOP(300mil)
DIE SIZE	6532 x 5208 μm^2
DIE ATTACH	Nitto EM310 (Top Die) HITACHI HR-9004 (Btm Die)
LEAD FRAME	Copper, Double Ring Silver
WIRE BOND MATERIAL	Au
MOLD COMPOUND	Sumitomo G700
LEAD FINISH	Matte Sn
STRUCTURE	

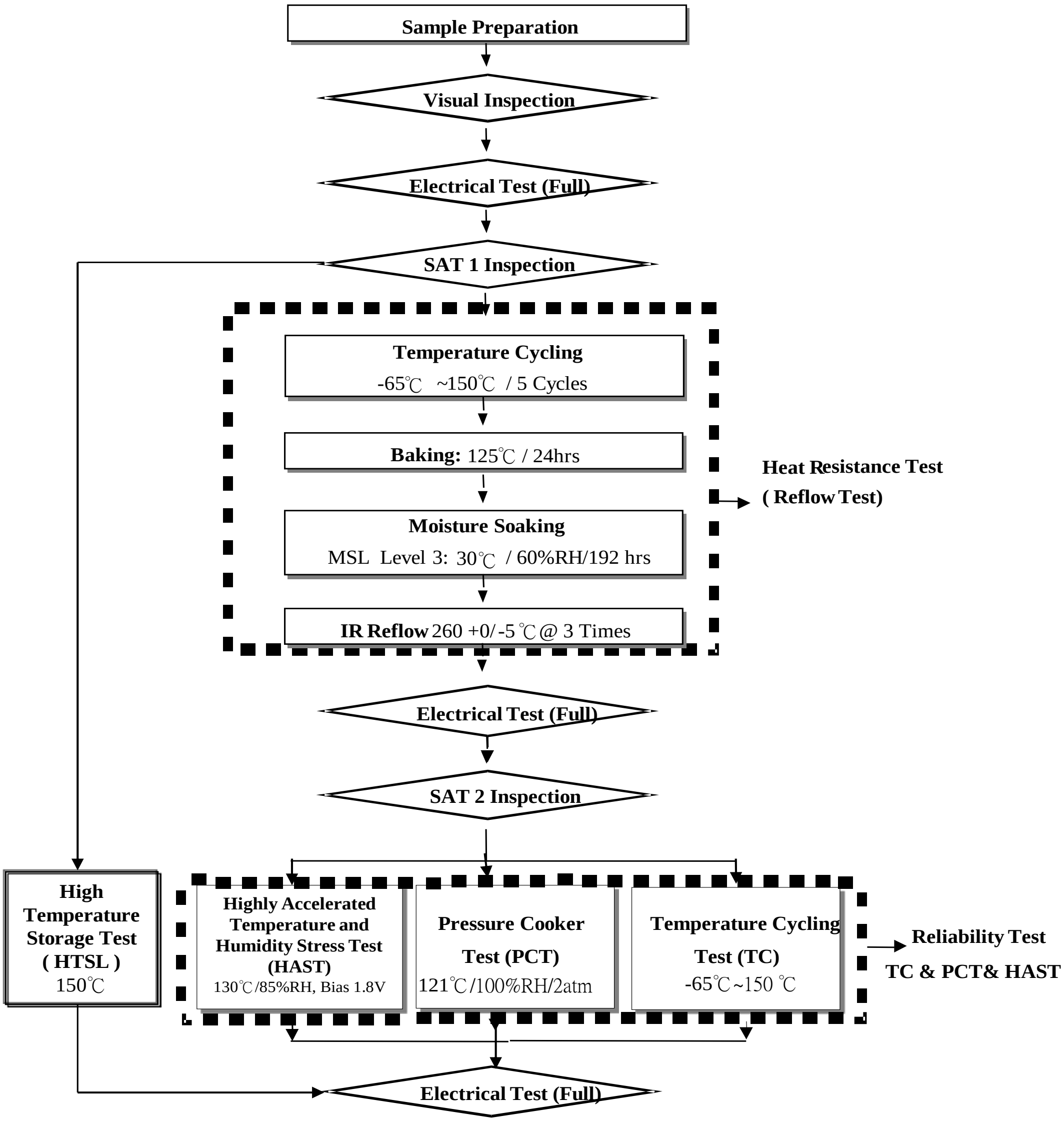
3. QUALIFICATION ITEMS, TEST CONDITION AND FLOW:

3-1. QUALIFICATION ITEMS:

Test Item	Reference	Test Condition
1. Heat Resistance Test: Reflow Test	JEDEC J-STD-020	MSL: Follow JEDEC MSL Level 3 (30℃/ 60%RH, 192hrs)
2. Pressure Cooker Test	JESD22-A102	121℃/ 100%RH/ 2atm
3.Temperature Cycling Test	JESD22-A104	-65℃ ~150℃
4. Highly Accelerated Temperature and Humidity Stress Test	JESD22-A110	130℃/ 85% RH, Bias: 1.8V
5.High Temperature Storage Life Test	JESD22-A103	150℃
6. Solderability Test	JESD22-B102	■ Steam aging 8hrs & Dipping Time≦ 5sec ■ Sn-Ag-Cu solder paste: 245℃ ■ Sn-Pb solder paste: 235℃

*Perform SAT examination before and after Preconditioning per JESD22-A112.

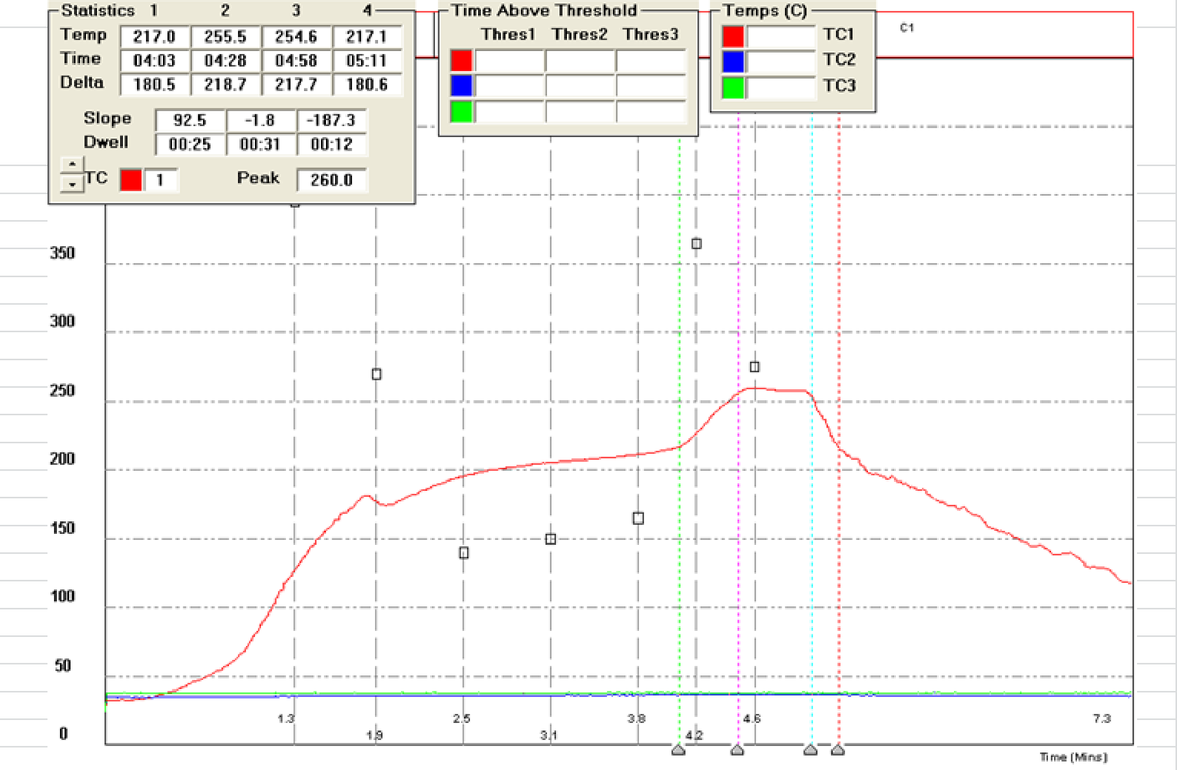
3-2. HEAT RESISTANT TEST (REFLOW TEST) AND RELIABILITY TEST FLOW



3-2-1. REFLOW PROFILE:

Ra Lab Reflow Test Data

Equipment Name：	IR Reflow
Equipment Model：	SIERRA THERM/3K16-63C42-7AN
委託單號：	R-2019073001,02,03
Test Date：	2019/8/9



Statistics	1	2	3	4
Temp	217.0	255.5	254.6	217.1
Time	04:03	04:28	04:58	05:11
Delta	180.5	218.7	217.7	180.6

Slope	92.5	-1.8	-187.3
Dwell	00:25	00:31	00:12

TC 🟥 1 Peak 260.0

	Ramp-up rate(1)：	Pre-heat time：	Ramp-up rate(2)：	Peak Temperature：	Soldering Zone	Ramp-down rate：	結果判定
Temp rang	50~150℃	150~200℃	217~255℃	260+0/-5℃	217~217℃	255~217℃	Pass
Spec	1.5~3℃/Sec	60~120Sec	1.5~3℃/Sec	30~40Sec	60~150Sec	＜6℃/Sec	
Data	2.09	73	1.54	30	68	2.88	

Note 1: Subject the samples to 3 cycles of the above defined reflow conditions

Note 2: Time 25℃ to peak temperature: 8 minutes max.

Note 3: The time between reflows shall be 5 minutes minimum and 40 minutes maximum.

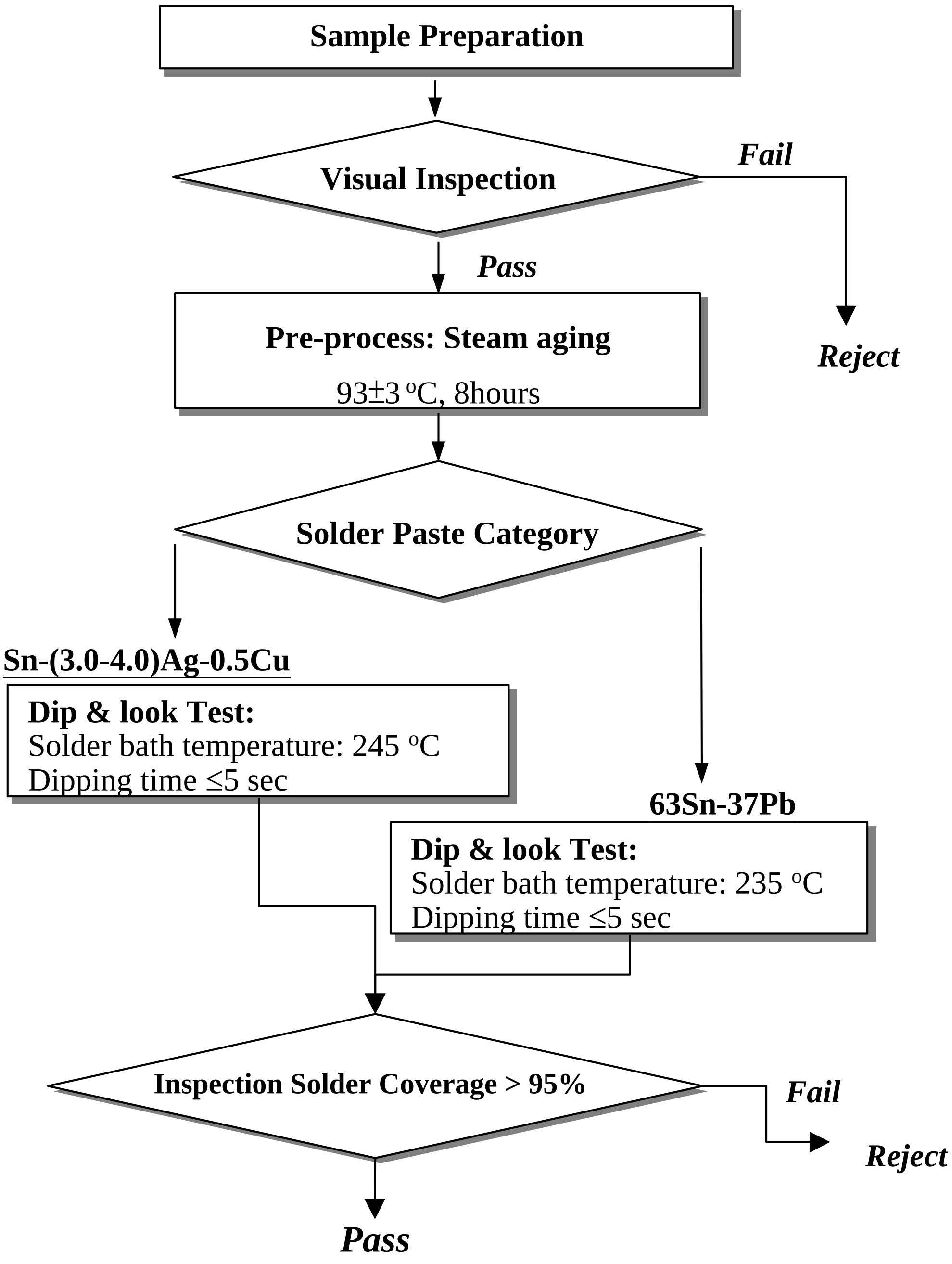
3-2-2. CRITERIA:

LTPD= 3%, PCT 96 hours and TC 500 cycles & HAST 96 hours & HTSL 500 hours.

3-2-3. REFERENCE SPECIFICATION:

5650-0901: ASSEMBLY RELIABILITY QUALIFICATION SPEC

3-3. SOLDERABILITY TEST FLOW



4. RESULTS:

4-1. HEAT RESISTANCE TEST and RELIABILITY TEST RESULTS:

PRODUCT	6140		
LOT#	8F504604BA	8F504604BN	8F504604BM
DATE CODE	L1929	L1929	L1930
SAT 1	0/22	0/22	0/22
PRECON	0/231	0/231	0/231
SAT 2	0/22	0/22	0/22
PCT 96 HRS	0/77	0/77	0/77
TC 500 CYC	0/77	0/77	0/77
HAST 96 HRS	0/77	0/77	0/77
HTSL 500 HRS	0/45	0/45	0/45

FAIL / SAMPLE SIZE

4-2. SOLDERABILITY TEST RESULTS:

Matte Sn Plating

Plating Material	Matte Sn		
Solder Paste Material	Sn-(3.0-4.0)Ag-0.5Cu		
INSPECTION	0/5	0/5	0/5

FAIL / SAMPLE SIZE

Plating Material	Matte Sn		
Solder Paste Material	63Sn-37Pb		
INSPECTION	0/5	0/5	0/5

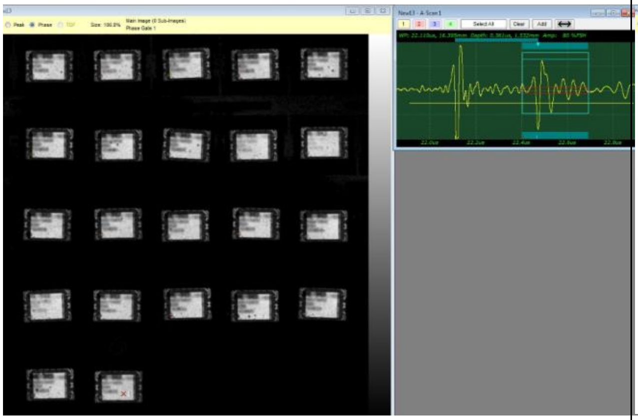
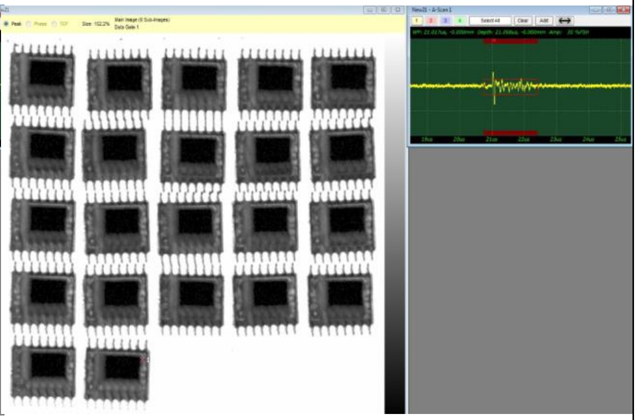
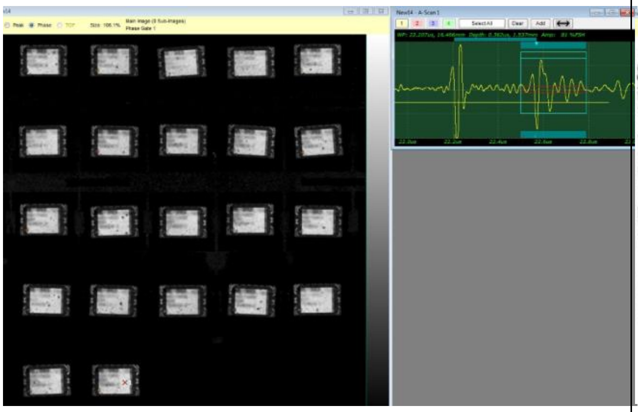
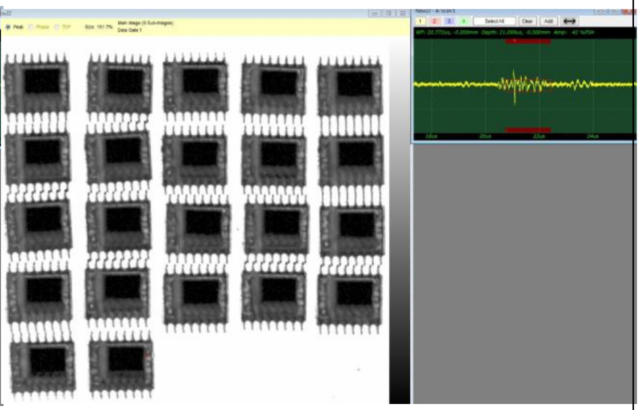
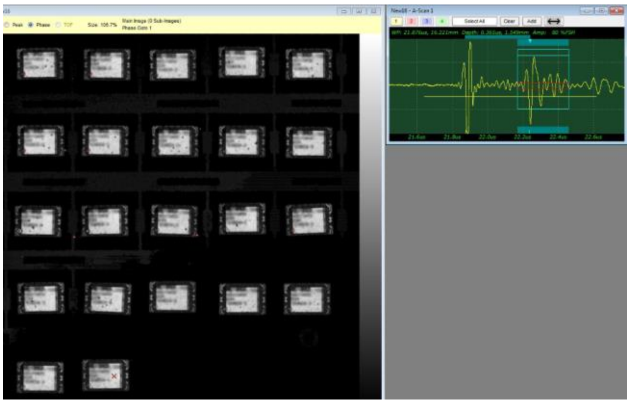
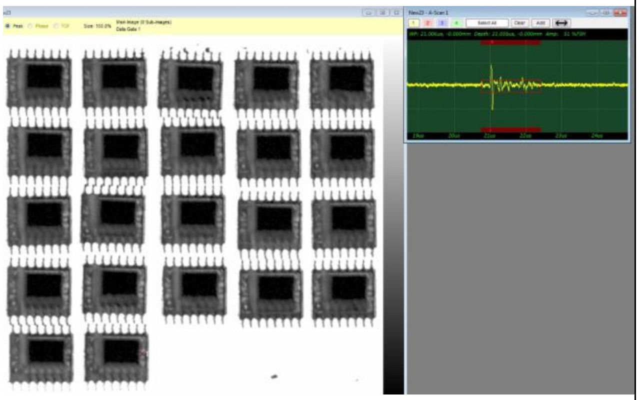
FAIL / SAMPLE SIZE

5. CONCLUSION: PASS

6. ATTACHED FILE:

6-1. SAT PHOTO

6-1-1. BEFORE PRE-CONDITION

a1.Lot no# 8F504604BA: Topside of package	a2.Lot no#8F504604BA: Through Scan View
	
b1.Lot no# 8F504604BN: Topside of package	b2.Lot no# 8F504604BN: Through Scan View
	
c1.Lot no# 8F504604BM: Topside of package	c2.Lot no#8F504604BM: Through Scan View
	

6-1-2. AFTER PRE-CONDITION

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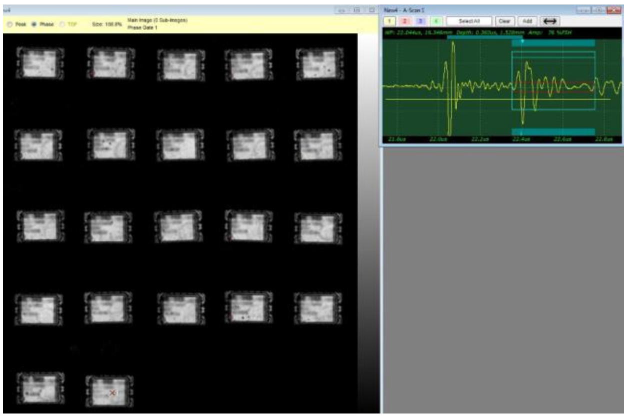
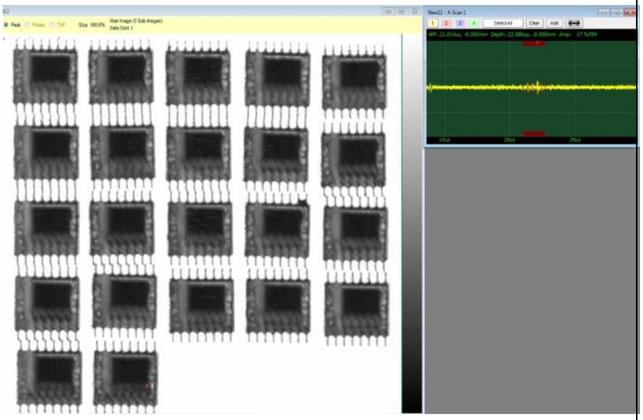
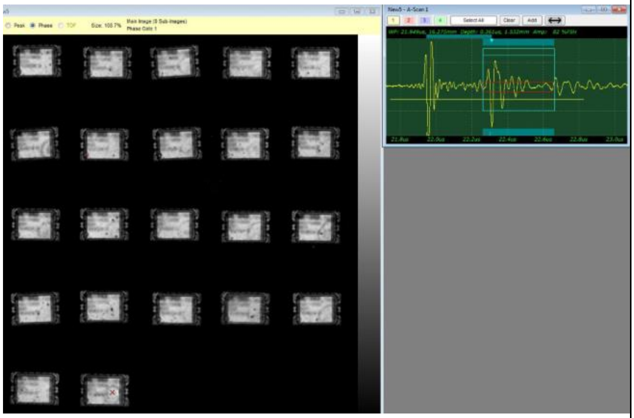
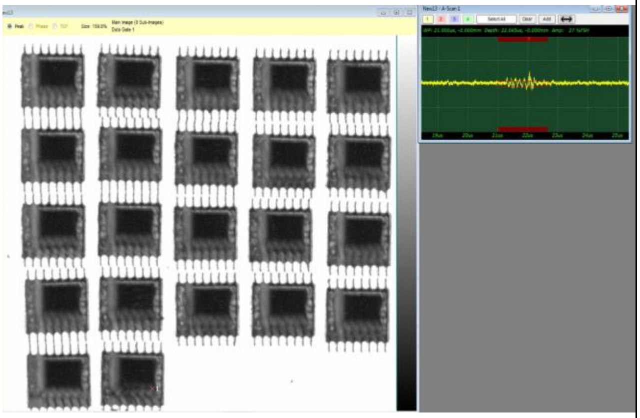
	
b1.Lot no# 8F504604BN: Topside of package	b2.Lot no# 8F504604BN: Through Scan View
	
c1.Lot no# 8F504604BM: Topside of package	c2.Lot no# 8F504604BM: Through Scan View