



**MACRONIX INTERNATIONAL CO., LTD.**

## **Product/Process Change Notice**

PCN # P-2107-0004

Date: 2021/7/19

Dear Customer:

Please be informed that Macronix is going to add a 2nd source subcontractor to backup Macronix FAB for the RDL (Re-Direction Layer) process of NAND Flash products. The 2nd source subcontractor for the RDL process is a semiconductor firm called Raytek.

The detailed information about this change is described in the following pages. This process change has passed Macronix' qualification based on JEDEC standard, 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, which 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

PCN No.: P-2107-0004

Issue Date : 2021/7/19

**Subject:** Adding a 2nd source subcontractor to backup Macronix FAB for the RDL (Re-Direction Layer) process of NAND Flash products.

**Affected Macronix Part No.:**

MX30LF1G189C-TI, MX30LF1G18AC-TI, MX30LF1G18AC-TJ, MX30LF1G28AD-TI,  
 MX30LF1GE8AB-TI, MX30UF2G18AC-TI, MX30UF2G18AC-XKI, MX30UF4G18AC-WMJ,  
 MX35LF1G24AD-Z4I, MX35LF1GE4AB-Z4I, MX35LF2G14AC-Z4I, MX35LF2G24AD-Z4I,  
 MX35LF2GE4AB-MI, MX35LF4G24AD-Z4I, MX35UF1G24AD-Z4I, MX35UF2G14AC-Z4I,  
 MX35UF2G24AD-Z4I, MX35UF4G24AD-Z4I

**Change Category :** New subcontractor for the RDL process

**Reason of Change:** To increase production capacity of NAND Flash products.

**Before Change :**

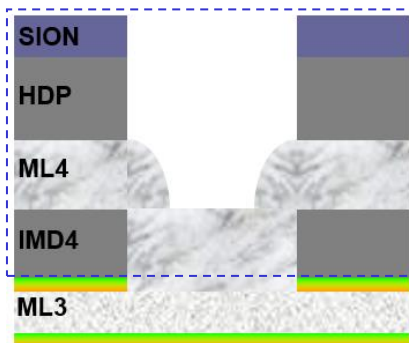
RDL process at:  
 Macronix FAB

**After Change :**

RDL process at:  
 Macronix FAB and  
 Raytek.

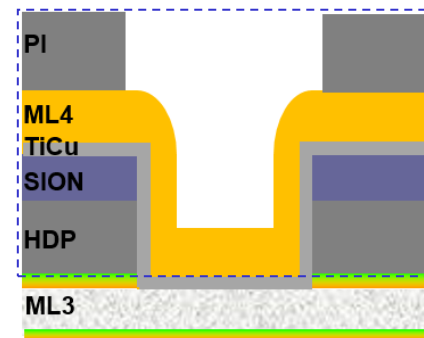
RDL Layer and bond pad material cross-section plot:

Macronix FAB:



Bond pad size: 65x50um<sup>2</sup>

Raytek:



Bond pad size: 45x40um<sup>2</sup>

**Assessment of Change:**

1. The purpose of the RDL is to re-layout the pad to different locations in order to configure different wire-bond spacing for different types of package option. There is no other changes in the product design nor on the specifications.
2. Raytek RDL process has passed Macronix' qualification based on JEDEC standards.  
 \* Attached is Raytek processed product qualification reports.
3. Raytek is ISO 9001 certified, and has been one of Macronix's qualified subcontractors for the RDL process for the WLCSP packages for a long time with good quality.

**Schedule:**

CS Sample available: 2021/7/30

Mass production: 2021/08/19. (Or follow PCN agreement with the customer)



## Raytek RDL Process Wafer Reliability Qualification Report

### 1. Purpose:

This reliability qualification is to qualify the Raytek RDL process for NAND Flash products.

### 2. Qualify Lot information:

Process: N19R

Product: 6323

Package: 8WSON

Lot ID: 8F721400BS/8F721400CF

### 3. Qualification Item, Test condition and Results:

Qual item	Condition	Reference	Sample size(ea)	Result
HT NVCE + HTDR	85°C/21days + 125°C/3hrs/10hrs	JESD22-A117 JESD47	38	Pass
HT NVCE + read disturb	85°C/21days + 25°C/1k/3k/10k		56	Pass
RT NVCE + LTDR	25°C/21days + 25°C/168hrs/500hrs	JESD22-A117 JESD47	38	Pass
ELFR	85°C/100 cycle + 125°C 48hrs HTOL	JESD22-A108 JESD47	1668	Pass
HTOL	125°C/168hrs/500hrs/ 1000hrs	JESD22-A108 JESD85	77	Pass
Endurance	85°C/60k cycle		56	Pass
Non-cyc read disturb	25°C/10k/100k		56	Pass
POR	85/25/-40°C		56	Pass
HTSL	150°C/168hrs / 500hrs / 1000hrs	JESD22-A103	77	Pass

### 4. Conclusion:

The Raytek RDL process pass the qualification.



**Raytek RDL Process Wafer Package Qualification Report**  
**(ASECL 8L WSON (8x6x0.8mm))**

**1. PURPOSE:**

To qualify the new subcontractor “Raytek” for RDL process.

**2. PACKAGE PROFILE:**

ASSEMBLY HOUSE	ASECL
PACKAGE	8WSON (8x6x0.8MM)
DIE SIZE	4802 x 5424 $\mu\text{m}^2$ (RDL processed by Raytek)
DIE ATTACH	Nitto EM710 (Film)
LEAD FRAME	Copper, Double Ring Silver
WIRE BOND MATERIAL	Au
MOLD COMPOUND	Sumitomo EME-G700LA
LEAD FINISH	Matte Sn

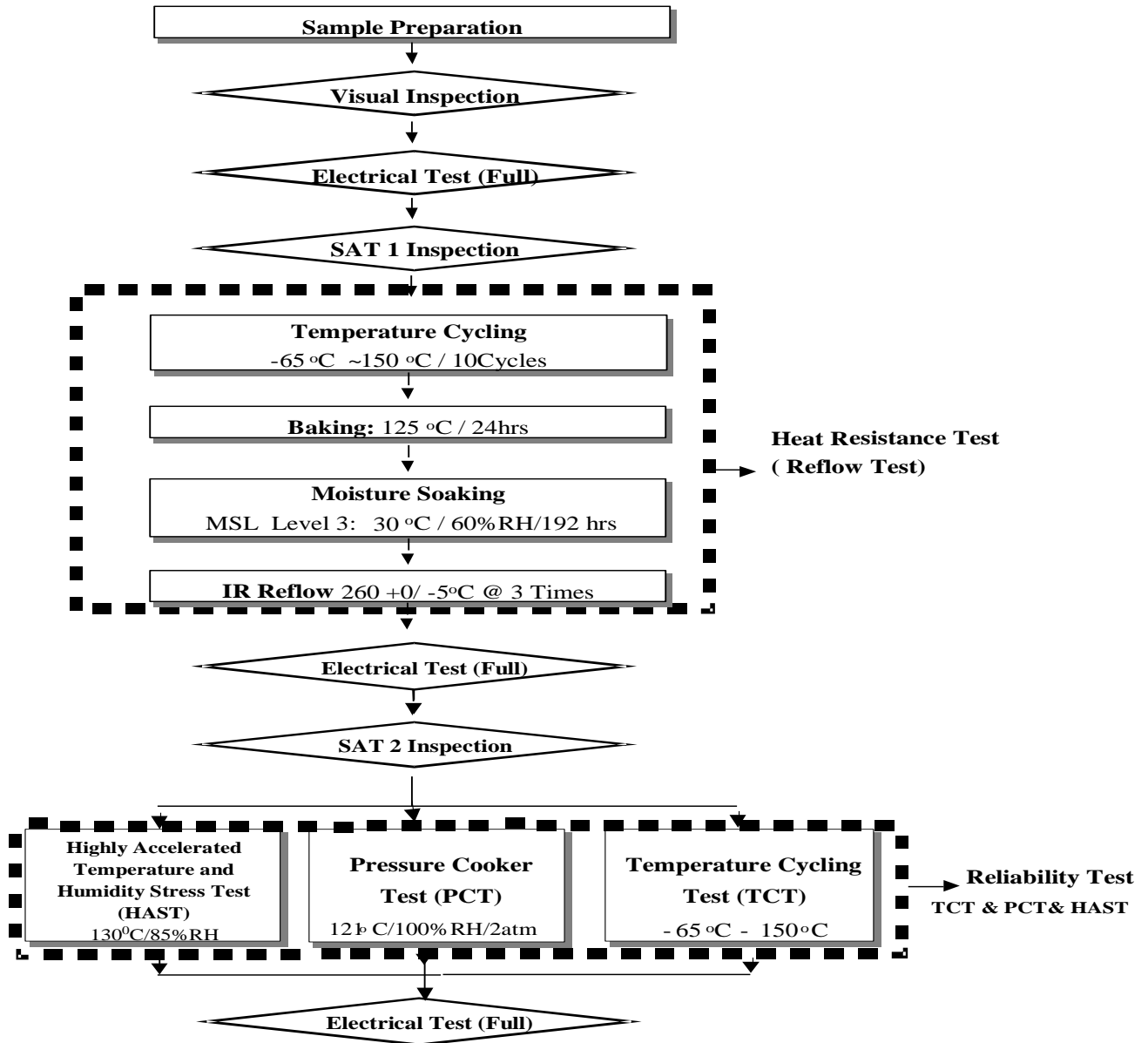
**3. QUALIFICATION ITEMS, TEST CONDITION AND FLOW:**
**3-1. QUALIFICATION ITEMS:**

Test Item	Reference	Test Condition
1. Heat Resistance Test: Reflow Test	JEDEC J-STD-020C	MSL: Follow JEDEC MSL Level 3 (30°C/60%RH, 192hrs)
2. Pressure Cooker Test	JESD22-A102C	121 °C/ 100%RH/2 atm
3. Temperature Cycling Test	JESD22-A104C	-65 °C - 150 °C
4. Highly Accelerated Temperature and Humidity Stress Test	JESD22-A110B	130 °C / 85% RH

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



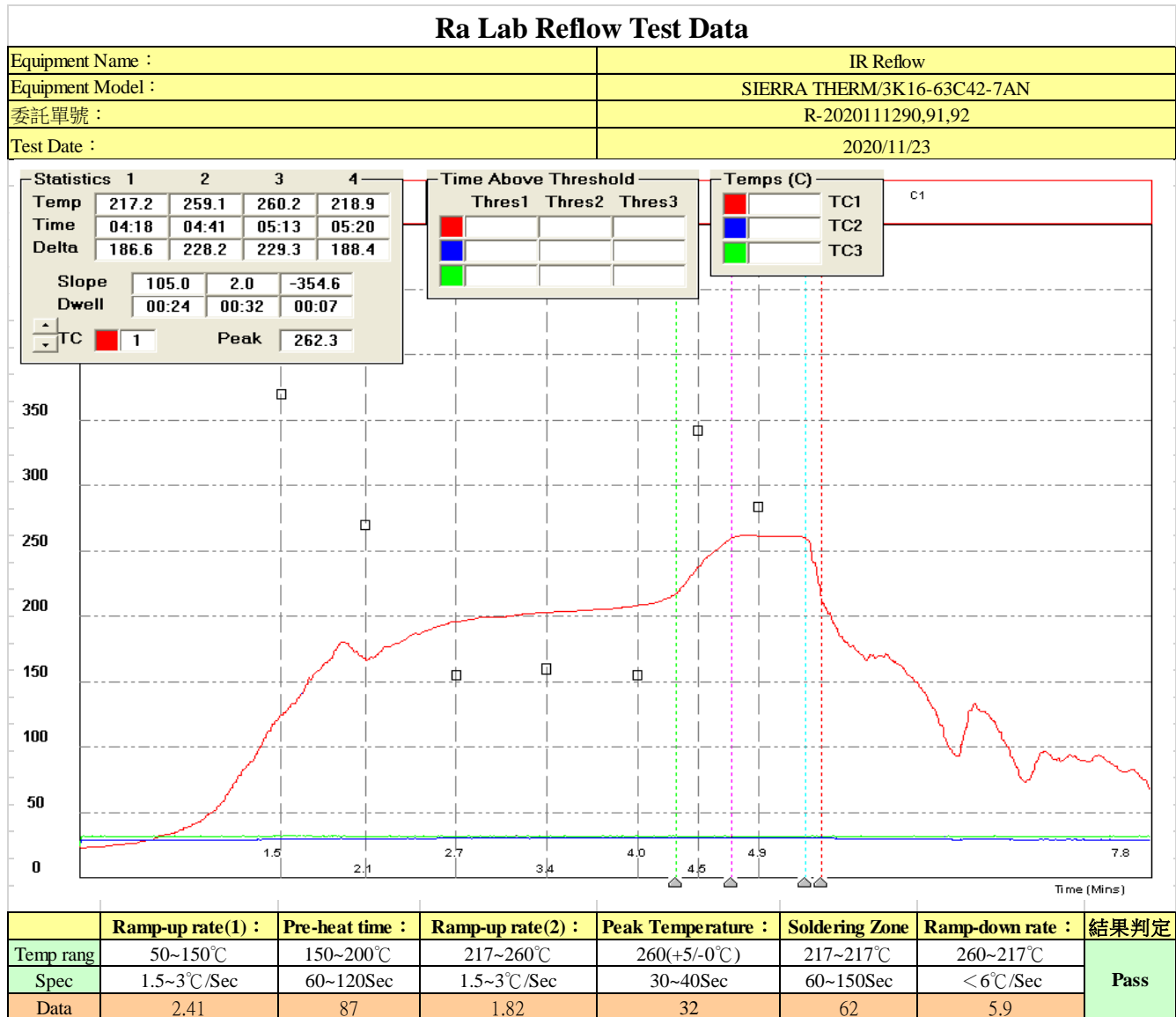
### 3-2. HEAT RESISTANT TEST (REFLOW TEST) AND RELIABILITY TEST FLOW





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### 3-2-1. REFLOW PROFILE:



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

Note 2: Time 25°C 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 TCT 500 cycles & HAST 96 hours.

### 3-2-3. REFERENCE SPECIFICATION:

5650-0901: ASSEMBLY RELIABILITY QUALIFICATION SPEC



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#### 4. RESULTS:

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

PRODUCT	6323A		
LOT#	8F721400CH	8F721400CJ	8F721400C8
DATE CODE	X2038	X2038	X2039
SAT 1	0/22	0/22	0/22
PRECON	0/250	0/250	0/250
SAT 2	0/22	0/22	0/22
PCT 96 HRS	0/77	0/77	0/77
TCT 500 CYC	0/77	0/77	0/77
HAST 96 HRS	0/77	0/77	0/77
HTSL 500HRS	0/45	0/45	0/45

**FAIL / SAMPLE SIZE**

#### 5. CONCLUSION: PASS





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6. Attached File:

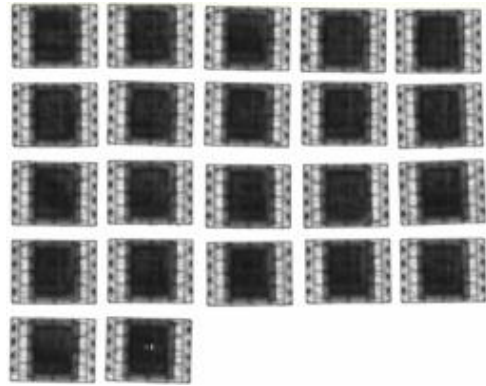
6-1. Sat Photo

6-1-1. Before Pre-Condition

a1. Lot: 8F721400CH: Topside of package



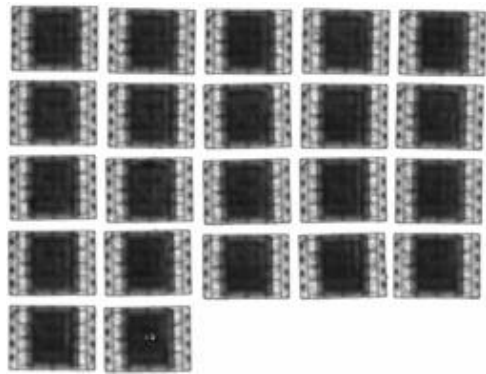
a2. Lot: 8F721400CH: Through Scan View



b1. Lot: 8F721400CJ: Topside of package



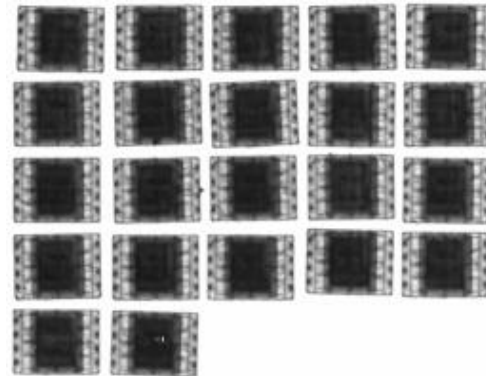
b2. Lot: 8F721400CJ: Through Scan View



c1. Lot: 8F721400C8: Topside of package



c2. Lot: 8F721400C8: Through Scan View

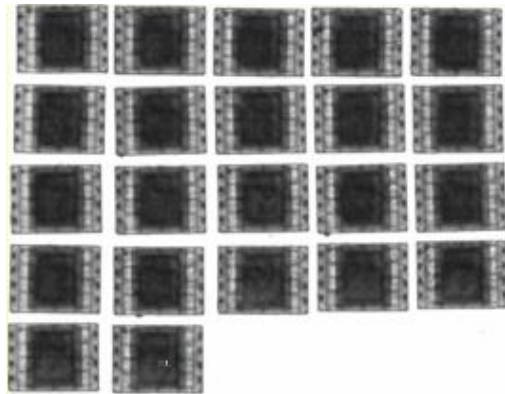


**6-1-2. After Pre-Condition**

a1. Lot: 8F721400CH: Topside of package



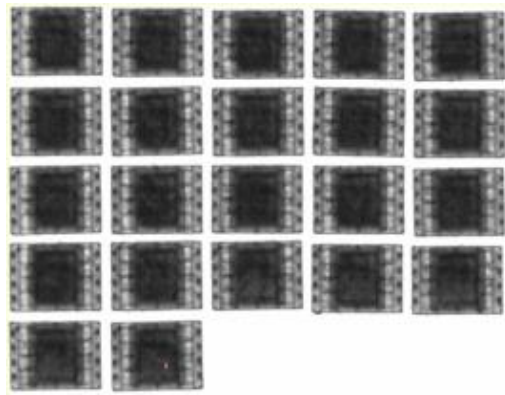
a2. Lot: 8F721400CH: Through Scan View



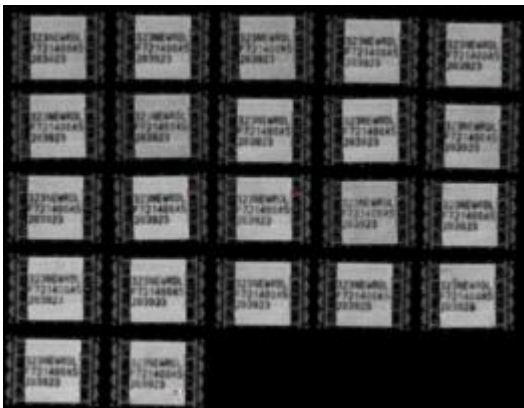
b1. Lot: 8F721400CJ: Topside of package



b2. Lot: 8F721400CJ: Through Scan View



c1. Lot: 8F721400C8: Topside of package



c2. Lot: 8F721400C8: Through Scan View

