

Product / Process Change Notice

PCN No.: Q000-PCN-PA201908-01

Date: 2019-08-07.

Change Title: <u>Add TFME as new assembly and testing site for N76E003AT20 product.</u>			
Change Classification: ☒ Major ☐ Minor Change item: ☐ Design ☐ Raw Material ☐ Wafer FAB ☒ Package Assembly ☒ Testing ☐ Others: _____.			
Affected Product(s) : The affected product is N76E003AT20.			
Description of Change(s) : Add new assembly and testing site for N76E003AT20 at TFME (Tongfu Microelectronics Co., Ltd, China) as the 2nd source for back up. TFME is a qualified vendor for Nuvoton in assembly and testing process. <u>New Supplier</u> Tongfu Microelectronics Co., Ltd, China (hereinafter "TFME"), (Jiangsu province Nantong City Road, No. 288)			
Reason for Change(s) : To increase manufacturing capacity and flexibility and to have multiple manufacturing routes for backup in case of disruption, Nuvoton is adding a new source of N76E003AT20 product at TFME.			
Impact of Change(s) : (positive & negative) Form: No change on top effective marking except marking code. The marking code of TFME shall be "N", please refer to Fig.1 for details. Fit: No change. Function: No change. Reliability: No concern (Passed Nuvoton package qualification.)			
Qualification Plan/ Results : 1. TSSOP 20L package was qualified as per Nuvoton's standard qualification procedures, please refer to appendix A for the qualification report. 2. Passed the testing machine correlation qualification, please refer to appendix B for the details.			
Implementation Plan : ☐ Date Code: _____ onward ☐ Lot No.: _____ onward ☐ Implemented date: <u>Nov. 05, 2019 (scheduled)</u>			
Originator:	H.Y. Lai / Q100	Approval:(QRA Director)	C.M. Lin/ Q000
Contact for Questions & Concerns	Name: <u>HYLai</u> TEL: <u>886-3-5770066 (ext. 31226)</u> FAX: <u>886-3-5792673.</u> Address: <u>No.4, Creation Rd. III Science-Based Industrial Park Hsinchu, Taiwan, R.O.C..</u> E-mail: <u>hylai0@nuvoton.com.</u>		

Customer Comments:

Note: Please sign this notice, and return to **Nuvoton** contact within **30** days. If no response is received within **30** days, this Change Request will be assumed to meet your approval.

☐ Approval	☐ Disapproval	☐ Conditional Approval: _____.
Date: _____	Dept. name: _____	Person in charge: _____.

Follow-up and Tracing:

A. copies to

FAB: ☐ Integration _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____.

Test / Product: ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____.

Design/ Marketing: ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____.

Production control/ Others: ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____.

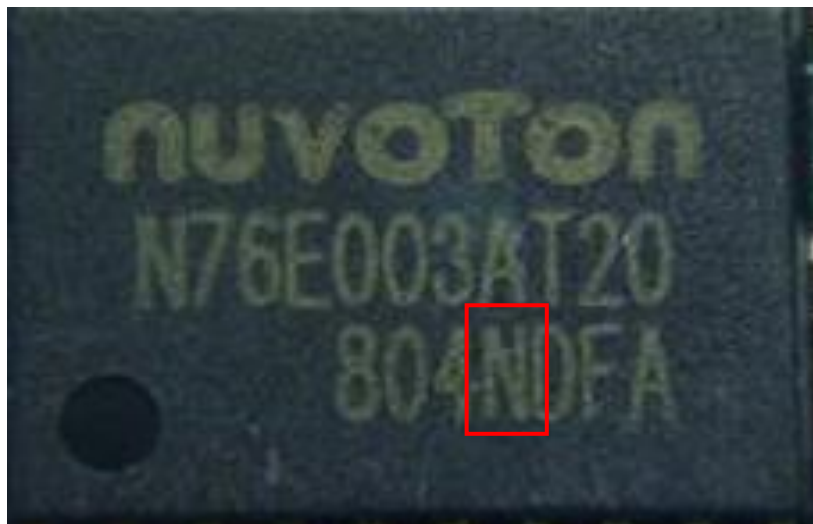
B. Changes:

1. Document / Test program:

Document No/ test program	Document name/ test program name	Version		Responsible	Completed date	Remark
		before	after			
NA	NA	NA	NA	NA	NA	NA

Verified by: _____.

Fig.1 The marking code of TFME in the position marked in red shall be “N”



Appendix A: TSSOP20 package qualification report at TFME

PACKAGE QUALIFICATION REPORT

Assembly company : TFME(通富微電)

Package : TSSOP20 4.5x6.5 mm

Package Material : Green

Wire Bonding Material : Cu

Test Vehicle: FA8265N01 AD_N76E003AT20

RA ENGINEER : MYTsai

RA MANAGER : CMLin

SUMMARY

The TSSOP 20 4.5x6.5mm package was passed the qualification tests.
A summary of the test result was as follows:

I. ENVIRONMENTAL STRESS TEST

<u>Test items</u>	<u>defect/ sample size</u>
⌘. Pre-condition Test	: 0/924
⌘. Pressure Cooker Test	: 0/231
⌘. Temperature Cycle Test	: 0/231
⌘. Highly Temp. Storage Life Test	: 0/231
⌘. Temperature Humidity Bias	: 0/231

II. PACKAGE ASSEMBLY INTEGRITY TESTS

<u>Test items</u>	<u>Result</u>
⌘. Ball Shear (10 balls/lot x 3 lots)	Cpk= 2.0
⌘. Wire Pull (10 wires/lot x 3 lots)	Cpk= 2.1

Results of the life tests and environmental tests as well as the methods used on **TSSOP20** product are described in.

CONTENT

I. ENVIRONMENTAL TEST

A. Introduction

1. Pre-condition Test
2. Pressure Cooker Test (PCT)
3. Temperature Cycle Test (TCT)
4. High Temp. Storage Life Test (HTSL)
5. Temperature Humidity Bias (THB)

B. Test Results

1. Pre-condition Test
2. Pressure Cooker Test (PCT)
3. Temperature Cycle Test (TCT)
4. Highly Temp. Storage Life Test (HTSL)
5. Temperature Humidity Bias (THB)

I. ENVIRONMENTAL TESTS OF PROCEDURE

A. Introduction

1. Pre-condition Test

1.1 SCOPE

Pre-condition Test is to measure the resistance of SMD (Surface Mount Devices) to the storage environment at the customer site and to thermal stress created by IR reflow or Vapor Phase Reflow.

1.2 TEST CONDITION

- Step 1: TCT (-65°C/150°C, 5 cycles)
- Step 2: Bake (125°C, 24 hours)
- Step 3: Soak (30°C/60%RH, 192 hours)
- Step 4: IR reflow (260 °C), 3 Passes.

1.3 SAT COFIRMATION: To confirm delamination, cracking, popcorn.

Criteria: IPC/JEDEC J-STD-020

1.4 IR REFLOW PROFILE (FOR IPC/JEDEC J-STD-020)

2. Pressure Cooker Test (PCT)

2.1 SCOPE

PCT is to evaluate the device resistance to moisture penetration.

2.2 TEST CONDITION

Ta = 121°C, RH = 100%, Duration = 96 Hrs. 2 ATM, (JESD22-A102-A)

3. Temperature Cycle Test (TCT)

3.1 SCOPE

TCT is to evaluate the resistance of device to environmental temperature change.

3.2 TEST CONDITION

-65°C / 15min, transfer time 1min, +150 °C/15min, and 500 cycles.

MIL-STD-883E, Method 1010, Condition "C". JESD22-A104

4. Highly Temp. Storage Life Test (HTSL)

4.1 SCOPE

The purpose of this test is to determine the effect on solid state electronic devices of storage at elevated temperature without electrical stress applied.

4.2 Test condition:

Temperature: 150°C, Duration: 1000hrs
(JESD22-A103-C)

5. Temperature Humidity Bias (THB)

5.1 SCOPE

THB test is to measure the moisture resistance of plastic encapsulated circuit.

5.2 TEST CONDITION

Temp = 85°C, Humidity = 85% RH, Duration = 1000 hrs.

(Reference: JESD22-A101)

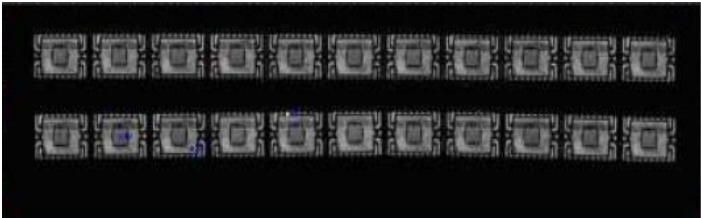
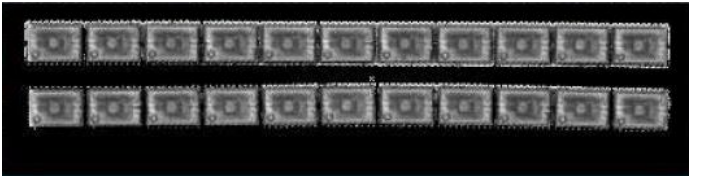
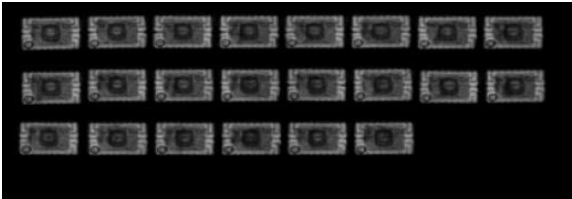
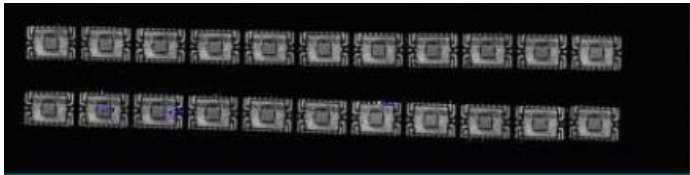
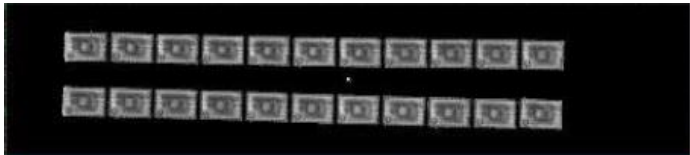
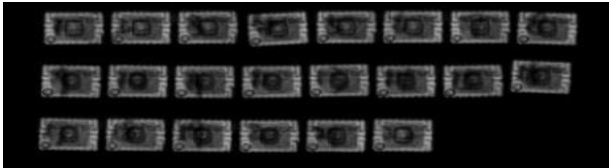
B. Test Results

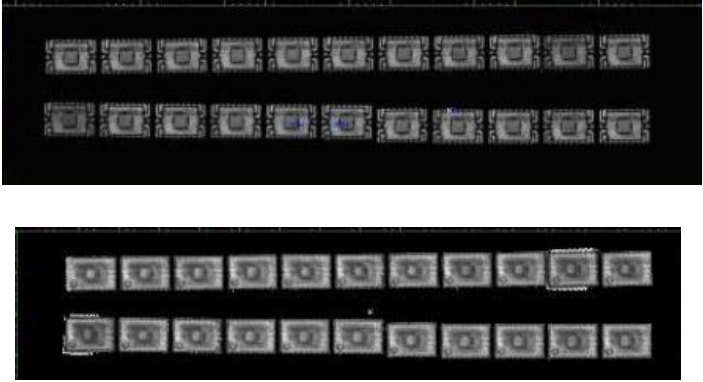
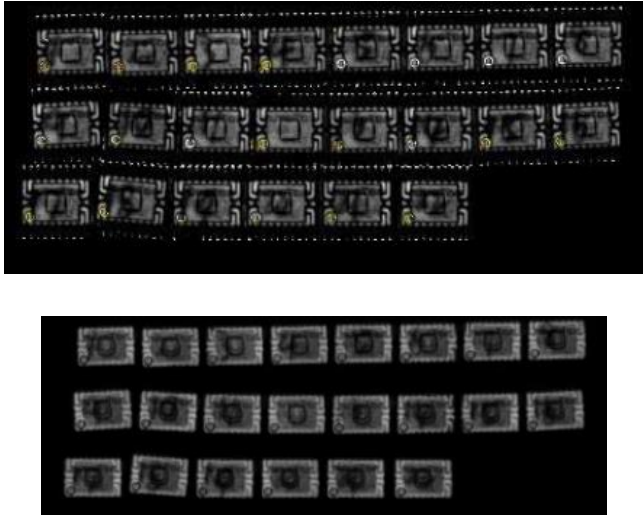
1.1 Pre-condition Test

*Criteria: Acc/Rej = 0/1.

Run	Lot No	SAT After Pre-condition	Electric Result
		SCAN	
#1	2820B106-ZW	0/77	0/231
#2	2820B106-ZY	0/77	0/231
#3	2820B106-ZX	0/77	0/231

1.2 SAT confirmation

SAT -2820B106-ZW	
Before Precondition	After Precondition
 	 
SAT 2820B106-ZX	
Before Precondition	After Precondition
 	 

SAT -2815B058-ZY	
Before Precondition	After Precondition
	

2. Pressure Cooker Test (PCT)

Run	Lot No	168 hrs	Remark
#1	2820B106-ZW	0/77	Pass
#2	2820B106-ZY	0/77	Pass
#3	2820B106-ZX	0/77	Pass

*Criteria : Acc/Rej = 0/1.

3. Temperature Cycle Test (TCT)

Run	Lot No	1000 cycles	Remark
#1	2820B106-ZW	0/77	Pass
#2	2820B106-ZY	0/77	Pass
#3	2820B106-ZX	0/77	Pass

*Criteria : Acc/Rej = 0/1.

4. Highly Temp. Storage Life Test (HTSL)

Run	Lot No	1000 hrs	Remark
#1	2820B106-ZW	0/77	Pass
#2	2820B106-ZY	0/77	Pass
#3	2820B106-ZX	0/77	Pass

*Criteria : Acc/Rej = 0/1.

5. Temperature Humidity Bias (THB)

Run	Lot No	1000 Hrs	Remark
#1	2845B106-ZW	0/77	Pass
#2	2845B106-ZY	0/77	Pass
#3	2845B106-ZX	0/77	Pass

*Criteria: Acc/Rej = 0/1.

Appendix B: The testing machine correlation qualification report

FT Correlation Summary Table

Lot No.	2723B086-C3	Result	
	2723B086-C4		
Product No.	FA8265N01AD		
Part No.	N76E003AT20	PASS	FAIL
Pass	(>=20EA)	30	0
Fail	(>=20EA)	0	20