

## Product / Process Change Notice

PCN No.: Q000-PCN-PA201510-04

Date: 2015-10-22.

<p><b>Change Title:</b> <u>Add TIPC as new assembly site for LOFP package products.</u></p> <p>Change Classification: <input checked="" type="checkbox"/> Major <input type="checkbox"/> Minor</p> <p>Change item: <input type="checkbox"/> Design <input type="checkbox"/> Raw Material <input type="checkbox"/> Wafer FAB <input checked="" type="checkbox"/> Package Assembly <input type="checkbox"/> Testing <input type="checkbox"/> Others: _____.</p>			
<p><b>Affected Product(s) :</b></p> <p>The affected products are NCT6779D and NCT6791D.</p>			
<p><b>Description of Change(s) :</b></p> <p>Add new assembly site for LQFP package products at TIPC(Taiwan IC Packaging Corporation) as the 2nd source for back up. TIPC is a qualified vendor for Nuvoton in assembly process.</p> <p><b><u>New Supplier</u></b></p> <p>Taiwan IC Packaging Corporation, (hereinafter "TIPC"), (No.1, S. 2nd Rd., K.E.P.Z., Kaohsiung City 806, Taiwan, R.O.C.)</p>			
<p><b>Reason for Change(s) :</b></p> <p>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 LQFP package products at TIPC.</p>			
<p><b>Impact of Change(s) : ( positive &amp; negative )</b></p> <p>Form: No change on top effective marking except marking code. The marking code of TIPC shall be "T".</p> <p>Fit: No change.</p> <p>Function: No change.</p> <p>Reliability: No concern (Passed Nuvoton package qualification.)</p>			
<p><b>Qualification Plan/ Results :</b></p> <p>TIPC's LQFP packages were qualified as per Nuvoton's standard qualification procedures, please refer to appendix A for the qualification report."</p>			
<p><b>Implementation Plan :</b></p> <p><input type="checkbox"/> Date Code: _____ onward <input type="checkbox"/> Lot No.: _____ onward <input checked="" type="checkbox"/> Implemented date: <u>Jan. 20, 2016 (scheduled)</u></p>			
<b>Originator:</b>	<u>H.Y. Lai / Q100</u>	<b>Approval:(QRA Director)</b>	<u>K.L. Lin/ Q000</u>
<b>Contact for Questions &amp; Concerns</b>	<p>Name: <u>HYLai</u> TEL: <u>886-3-5770066 (ext. 1226)</u> FAX: <u>886-3-5792673.</u></p> <p>Address: <u>No.4, Creation Rd. III Science-Based Industrial Park Hsinchu, Taiwan, R.O.C..</u></p> <p>E-mail: <u>hylai0@nuvoton.com.</u></p>		

**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.

<input type="checkbox"/> Approval	<input type="checkbox"/> Disapproval	<input type="checkbox"/> 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		responsibor	Completed date	Remark
		before	after			
NA	NA	NA	NA	NA	NA	NA

Verified by: \_\_\_\_\_.

Appendix A: LQFP packages qualification report



**Package Qualification Report**

**Company : TICP**

**Package : LQFP Series**

**Package Material : GREEN**

**Wire Bonding Material : Cu wire**

**RA ENGINEER : 許心怡**

**RA MANAGER : 蔡明耀**

### SUMMARY

The **LQFP Series** product was passed the qualification tests.  
A summary of the test result was as follows:

▣. Pre-condition Test	: 0/270 EA
▣. Temperature Cycle Test	: 0/135 EA
▣. Highly Temp. Storage Life Test	: 0/135 EA
▣. Pressure Cycle Test	: 0/135 EA
▣. Wire Pull Test	: 5 units / 30 wires
▣. Ball Shear Test	: 5 units / 30 balls

### I . ENVIRONMENTAL TEST

#### A. Introduction

1. Pre-condition Test
2. Pressure Cooker Test (PCT) or UHAST
3. Temperature Cycle Test (TCT)
4. High Temp. Storage Life Test(HTSL)
5. Wire Pull Test
6. Ball Shear Test

#### B. Test Results

1. Pre-condition Test
2. Pressure Cooker Test (PCT) or UHAST
3. Temperature Cycle Test (TCT)
4. Highly Temp. Storage Life Test(HTSL)
5. Wire Pull Test
6. Ball Shear Test

### 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-020C

*Publication Release Date: Dec.2010*

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

Temp.	Criteria
Preheat 150 °C to 200 °C	60~180 sec
Time maintained above: Above 217 °C	60~150 sec
Peak temp	260 °C +0 °C/-5 °C
Time within 5 °C of actual Peak Temperature of peak	20~40 sec

### 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%, Td = 168 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, 1000 cycles.

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

### 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.

*Publication Release Date: Dec.2010*

4.2 Test condition:  
Temperature:150°C,Time: 500/1000hrs

### 5. Wire Pull Test

#### 5.1 SCOPE

Wire Pull Test is to measure the First bond and Second bond quality at the Assembly wire bonding process.

#### 5.2 TEST CONDITION

5 units 30 wires CPK  $\geq$  1.66

### 6. Ball Shear Test

#### 6.1 SCOPE

Ball Shear Test is to measure the Copper ball quality on pad of chip.

#### 6.2 Test condition:

5 units 30 balls CPK  $\geq$  1.66

### 7. Solderability:

#### 7.1 SCOPE

The purpose of this test method is to evaluation the solderability of terminations that are normally joined by soldering operation. This evaluation is made on the basis of the ability of these terminations be wetted by a coating of solder ,and to produce a suitable fillet when dip soldered.

#### 7.2 Test procedure is as following:

Stept1: Steam aging (8hrs)

Stept2: Dipping with flux(type R) , Condition: 245 $\pm$ 5°C , Dwell Time:5 $\pm$ 0.5secs.

**B. Test Results**

**1.1 Pre-condition Test**

Run	Lot No	SAT before Precondition		SAT After Precondition		Electric result
		Topside	Backside	Topside	Backside	
#1	20380640-ZU	0/270	0/270	0/270	0/270	PASS
#2	20380640-ZV	0/270	0/270	0/270	0/270	PASS
#3	20380640-ZW	0/270	0/270	0/270	0/270	PASS

\*Criteria: Acc/Rej = 0/1.

**1.2 SAT confirmation**



### 2. Pressure Cooker Test (PCT) or UHAST

Run	Lot No	168 Hrs	Remark
#1	20380640-ZU	PASS	
#2	20380640-ZV	PASS	
#3	20380640-ZW	PASS	

\*Criteria : Acc/Rej = 0/1.

### 3. Temperature Cycle Test (TCT)

Run	Lot No	1000 Cycles	Remark
#1	20380640-ZU	PASS	
#2	20380640-ZV	PASS	
#3	20380640-ZW	PASS	

\*Criteria : Acc/Rej = 0/1.

### 4. Highly Temp. Storage Life Test (HTSL)

Run	Lot No	1000 Hrs	Remark
#1	20380640-ZU	PASS	
#2	20380640-ZV	PASS	
#3	20380640-ZW	PASS	

\*Criteria : Acc/Rej = 0/1.

### 5. Wire Pull Result

- Sample size : 5units / 30wires
- Spec:  $\geq 4g$
- MAX.10.27
- MIN.: 8.6
- CPK:2.04

Criteria :  $CPK \geq 1.66$

### 6. Ball Shear Result

- Sample size : 5units / 30 balls
- Spec:  $\geq 9g$
- MAX.28.19
- MIN.19.86
- CPK: 1.92

Criteria :  $CPK \geq 1.66$