Product / Process Change Notice

PCN No.: Q000-PCN-PA201403-04A Date: 2014-03-25.

Change Title: **Add Greatek and JCET as new assembly site for QFN package products.**

Change Classification: ☑ Major ☐ Minor
Change item: ☐ Design ☐ Raw Material ☐ Wafer FAB ☑ Package Assembly ☐ Testing ☐ Others: _____.

Affected Product(s) :

The affected part no. list, please refer to the Table I for more information.

Description of Change(s) :

Add new assembly site for QFN package products at Greatek (Greatek Electronics Inc, Taiwan) and JCET (Jiangsu Changjiang Electronics Technology Co., Ltd, China).

New Suppliers

1. Greatek Electronics Inc, Taiwan (hereinafter "Greatek"), (136, Gung-Yi Rd., Chunan Cheng, Miaoli Hsien, 350, Tawin)
2. Jiangsu Changjiang Electronics Technology Co., Ltd, China (hereinafter "CJ"), (78th changshan Road,jiangyin , jiangsu, 214437, China)

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 new assembly source for QFN package products at Greatek and JCET.

Impact of Change(s) : (positive & negative)

Form: No change on top effective marking except assembly vendor marking code. The assembly vendor marking code of Greatek shall be "G" and CJ shall be "Q", as illustrated in fig.1~3.

Fit: No change.

Function: No change.

Reliability: No concern (Passed Nuvoton package qualification.)

Qualification Plan/ Results :

QFN packages were qualified as per Nuvoton's standard qualification procedures, please refer to appendix A & B for the qualification report.

Implementation Plan :

☐ Date Code: _____ onward ☐ Lot No.: _____ onward ☐ Implemented date: Jun. 23, 2014 (scheduled)

Originator:	***HYLai / Q100***	***Approval:(QA Director)***	***C.C. Chen/ Q000***
Contact for Questions & Concerns	Name: HYLai TEL: 886-3-5770066 (ext. 1226) FAX: 886-3-5792673. Address: No.4, Creation Rd. III Science-Based Industrial Park Hsinchu, Taiwan, R.O.C.. E-mail: hylai0@nuvoton.com.		

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		responsibor	Completed date	Remark
		before	after			
NA	NA	NA	NA	NA	NA	NA

Verifed by: _____.

Table I: Affected parts list

Part No.	Part No.
NAU8500YG	I2115AYYI
NAU8810YG	I2115AYYIR
NAU8811YG	NCT7511Y
NAU8223YG	NCT7802Y
NAU8224YG	NCT5605Y
I2130YYIR	ARH08AXXXX

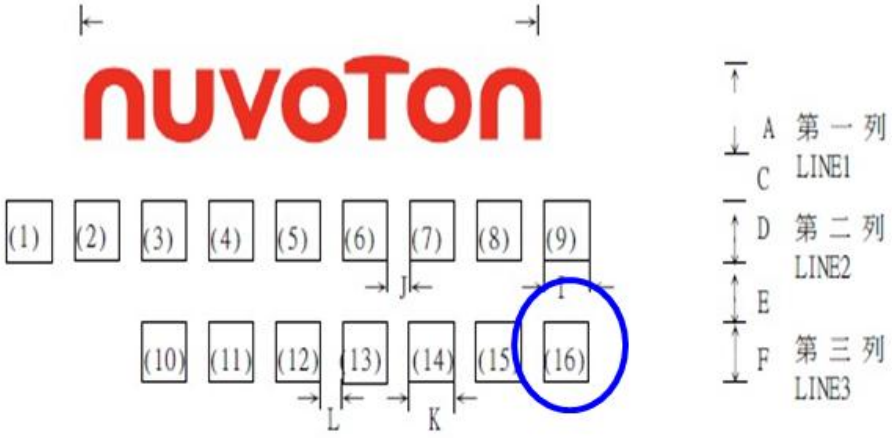


Fig.1: For NAU8500YG, NAU8223YG, NAU8224YG, NAU8811YGand NAU8810YG, the assembly vendor code of Greatek on top marking will be marked as "G" and the assembly vendor code of CJ will be marked as "Q"

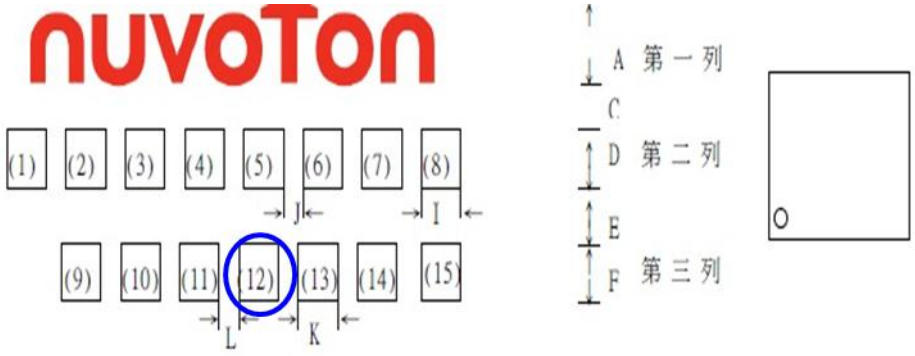


Fig.2: For NCT7511Y and NCT7802Y, the assembly vendor code of Greatek on top marking will be marked as "G" and the assembly vendor code of CJ will be marked as "Q"

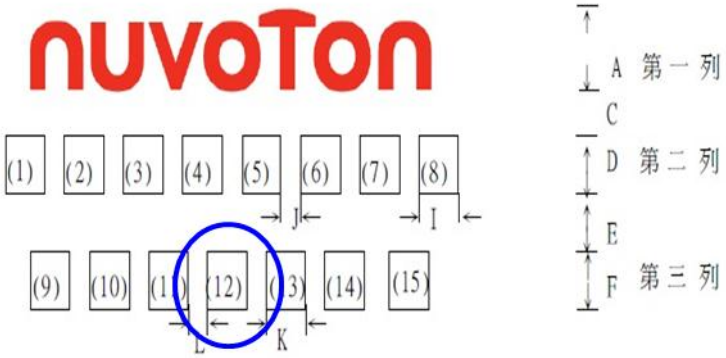


Fig.3: For NCT5605Y, the assembly vendor code of Greatek on top marking will be marked as "G" and the assembly vendor code of CJ will be marked as "Q"

PACKAGE QUALIFICATION REPORT

Subcontractor: Greatek
Package Type: QFN Series
Package Material: GREEN
Wire Bonding Material: Cu wire

ASSISTANT MANAGER : 黃玠升

RA MANAGER : 蔡明耀

Publication Release Date: Mar.2010

nuvoTon

SUMMARY

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

. **Wire Pull Test**	**: 5 units / 30 wires**
. **Ball Shear Test**	**: 5 units /30 balls**
. **Pre-condition Test**	**: 0/405EA**
. **Pressure Cooker Test**	**: 0/135 EA**
. **Temperature Cycle Test**	**: 0/135 EA**
. **Highly Temp. Storage Life Test**	**: 0/135 EA**
. **Solderability Test**	**: 0/15 EA**

Publication Release Date: Mar.2010

nuvoTon

Ⅰ. ENVIRONMENTAL TEST

A. Introduction

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

B. Test Results

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

Ⅰ. ENVIRONMENTAL TESTS OF PROCEDURE

A. Introduction

1. Wire Pull Test

1.1 SCOPE

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

1.2 TEST CONDITION

5 units 30 wires CPK $\geqq$ 1.66

nuvoTon

2. Ball Shear Test

2.1 SCOPE

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

2.2 Test condition:

5 units 30 balls CPK $\geqq$ 1.66

3. Pre-condition Test

3.1 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.

3.2 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.

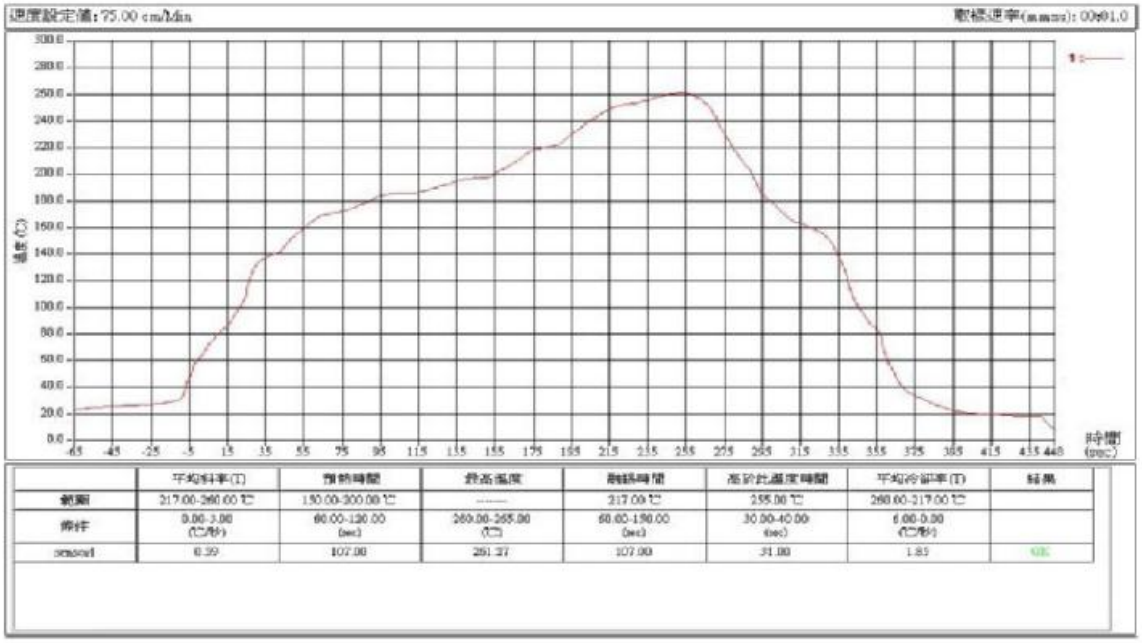
3.3 SAT COFIRMATION: To confirm delamination, cracking, popcorn .

Criteria: IPC/JEDEC J-STD-020D

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

nuvoTon

IR PROFILE(Tmax:260℃) for SMD.



Temp.	Criteria
Preheat 150 ℃ to 200 ° C	60~120 sec
Time maintained above: Above 217 ℃	60~150 sec
Peak temp	260 ℃ +0 ℃/-5 ℃
Time within 5 ℃ of actual Peak Temperature of peak	20~40 sec

4. Pressure Cooker Test (PCT)

4.1 SCOPE

PCT is to evaluate the device resistance to moisture penetration.

4.2 TEST CONDITION

Ta = 121°C, RH = 100%, Td = 168 Hrs. 2 ATM ,(JESD22-A102-A)

nuvoTon

5. Temperature Cycle Test (TCT)

5.1 SCOPE

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

5.2 TEST CONDITION

-65°C / 15min, transfer time 1min, +150 °C/15min, 1000 cycles.

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

6. Highly Temp. Storage Life Test (HTSL)

6.1 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.

6.2 Test condition:

Temperature:150℃,Time: 500/1000hrs

7. Solderability Test :

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.

Test procedure is as following:

Stept1: Steam aging (8hrs)

Stept2: Dipping with flux(type R) , Condition: 245±5℃ , Dwell Time:5±0.5secs.

B. Test Results

1. Wire Pull Test

- Sample size : 5units / 30wires
- Spec: ≧ 3 g
- Max: 12.21 g
- Min: 7.32 g
- Avg. : 11.14 g

nuvoTon

- Sd : 0.86
- CPK: 3.14

Criteria : CPK $\geqq$ 1.66

2. Ball Shear Test

- Sample size : 5units / 30 balls
- Spec: ≧ 10 g
- Max: 21.93 g
- Min: 16.34 g
- Avg. : 18.85 g
- Sd: 0.97
- CPK: 3.05

Criteria : CPK $\geqq$ 1.66

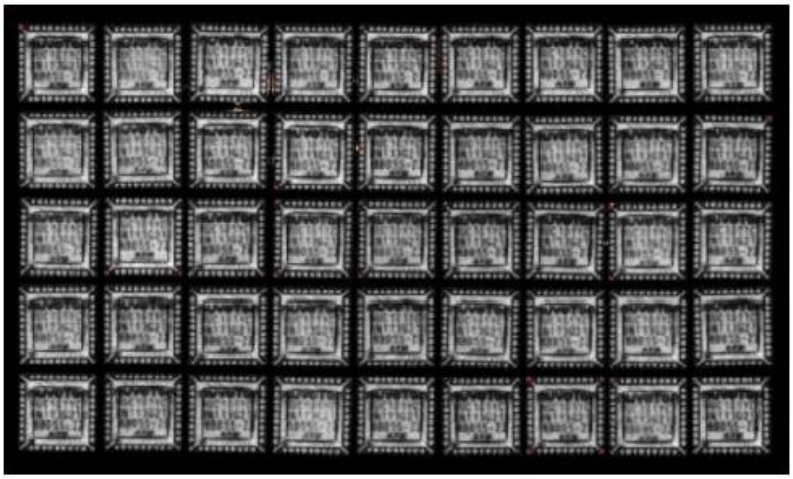
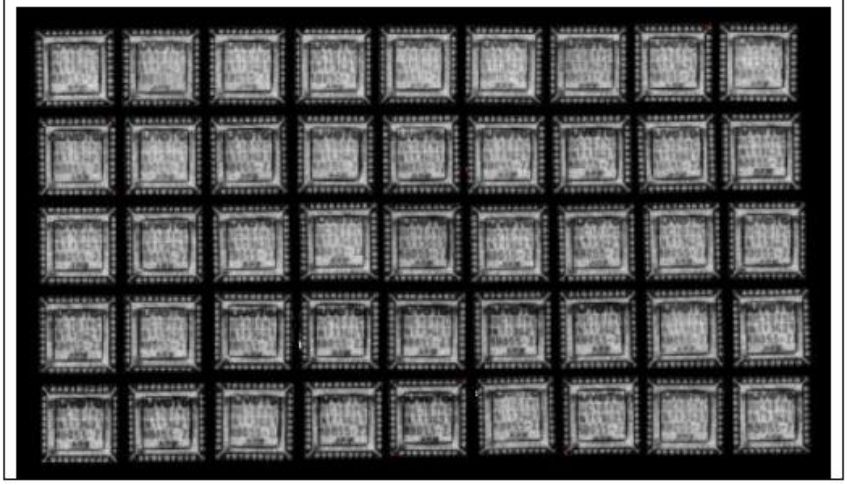
3.1 Pre-condition Test

Run	Lot No	SAT before Precondition	SAT After Precondition	Remark
	Lot number	Topside Result	Topside Result	
#1	2108B055 –ZX	0/135	0/135	
#2	2108B055 –ZY	0/135	0/135	
#3	2108B055 –ZZ	0/135	0/135	

*Criteria: Acc/Rej = 0/1.

nuvoTon

3.2 SAT confirmation:

SAT before Precondition

SAT after Precondition


nuvoTon

4. Pressure Cooker Test (PCT)

Run	Lot No	168 Hrs	Remark
#1	2108B055 –ZX	0/45	
#2	2108B055 –ZY	0/45	
#3	2108B055 –ZZ	0/45	

*Criteria : Acc/Rej = 0/1.

5. Temperature Cycle Test (TCT)

Run	Lot No	500 Cycles	Remark
#1	2108B055 –ZX	0/45	
#2	2108B055 –ZY	0/45	
#3	2108B055 –ZZ	0/45	

*Criteria : Acc/Rej = 0/1.

Run	Lot No	1000 Cycles	Remark
#1	2108B055 –ZX	0/45	
#2	2108B055 –ZY	0/45	
#3	2108B055 –ZZ	0/45	

*Criteria : Acc/Rej = 0/1.

nuvoTon

6. Highly Temp. Storage Life Test (HTSL)

Run	Lot No	500 Hrs	Remark
#1	2108B055 –ZX	0/45	
#2	2108B055 –ZY	0/45	
#3	2108B055 –ZZ	0/45	

*Criteria : Acc/Rej = 0/1.

Run	Lot No	1000 Hrs	Remark
#1	2108B055 –ZX	0/45	
#2	2108B055 –ZY	0/45	
#3	2108B055 –ZZ	0/45	

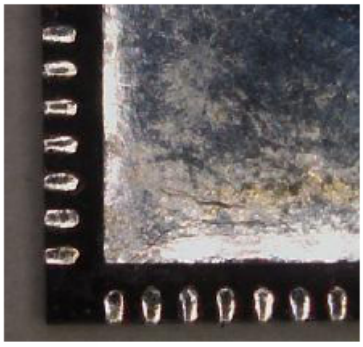
*Criteria : Acc/Rej = 0/1.

7. Solderability Test

Run	Lot No	Visual inspection	Remark
#1	2108B055 –ZX	0/5	
#2	2108B055 –ZY	0/5	
#3	2108B055 –ZZ	0/5	

After solderability :

nuvoTon



nuvoTon

Headquarter
No. 4 , Creation Rd. Ⅲ, Hsinchu Science Park, 300
Taiwan, R.O.C.
Tel: 886-3-5770066
http://www.nuvoton.com.tw/

Taipei Sales Office
9F, No. 480, Rueiguang Rd., Neihu Chiu,
Taipei, 114, Taiwan, R.O.C.
Tel: 886-2-26588066

Nuvoton Electronics Technology (H.K.) Limited
Unit 9-11, 22F, Millennium City 2, 378 Kwun Tong Road,
Kowloon, Hong Kong
Tel: 852-27513100

Nuvoton Electronics Technology (Shanghai) Limited
27F, 2299 Yan An Road (West), Shanghai,
P.R. China
Tel: 86-21-62365999

Nuvoton Electronics Technology (Shenzhen) Limited
Unit 1501, New World Center, 6009 Yitian Road, Futian, Shenzhen 518026, P.R.China
Tel: 86-755-83515350

Nuvoton Technology Corp. America
2727 North First Street, San Jose, CA 95134,
U.S.A.
Tel:1-408-544-1718

Nuvoton Technology Israel Ltd.
8 Hasadnaot Street, Herzlia B, 46130,
Israel
Tel: 972-9-970-2000

Publication Release Date: Mar.2010

Table No.: 1110-0001-08-A

PACKAGE QUALIFICATION REPORT

Company：Jiangsu Changjiang Electronics Technology CO.

Package：QFN 20L

Package Material： Green

Wire Bonding Material： Cu Wire

RA ENGINEER ：黃玠升

RA MANAGER ：蔡明耀

Publication Release Date: DEC.2012

Table No.: 1110-0001-08-A

nuvoTon

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)

B. Test Results

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

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

nuvoTon

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, 500 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.

4.2 Test condition:

Temperature:150℃,Time: 1000hrs

B. Test Results

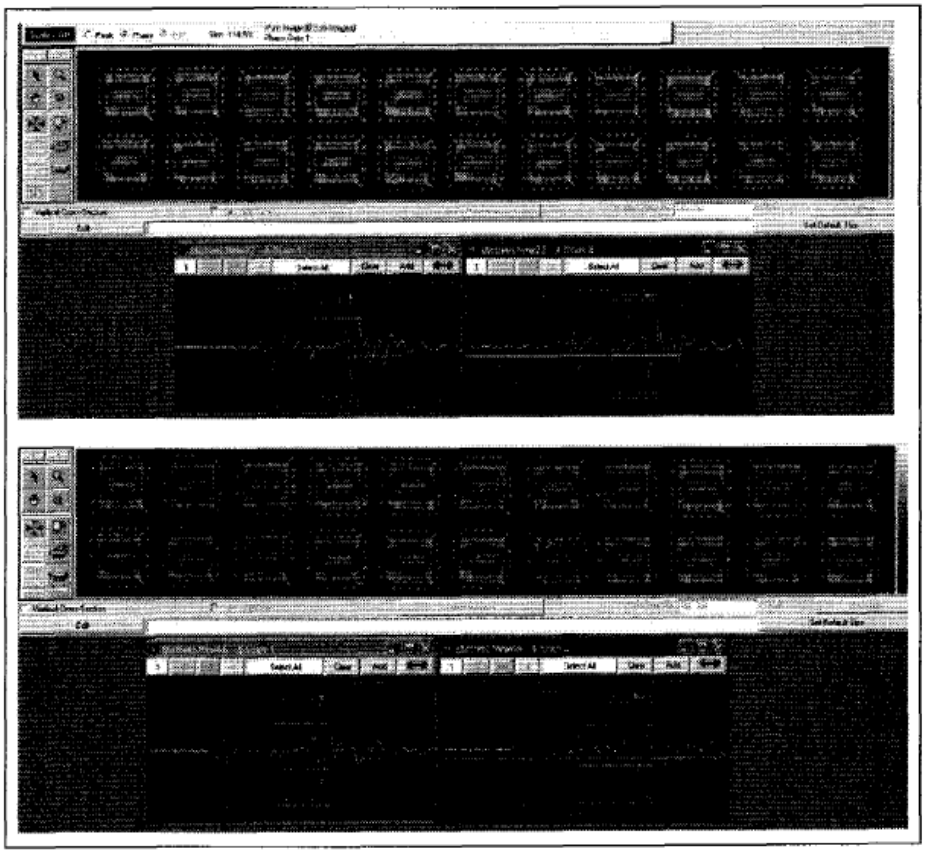
1.1 Pre-condition Test

Run	Lot No	SAT before Precondition		SAT After Precondition		Electric result
		Topside	Backside	Topside	Backside	
#1	E229B006-ZX	0/135	0/135	0/135	0/135	0/135
#2	E229B006-ZY	0/135	0/135	0/135	0/135	0/135
#3	E229B006-ZZ	0/135	0/135	0/135	0/135	0/135

*Criteria: Acc/Rej = 0/1.

Publication Release Date: DEC.2012

nuvoTon



2. Pressure Cooker Test (PCT)

Run	Lot No	168 Hrs	Remark
#1	E229B006-ZX	0/135	
#2	E229B006-ZY	0/135	
#3	E229B006-ZZ	0/135	

*Criteria : Acc/Rej = 0/1.