



# PRODUCT/PROCESS CHANGE NOTIFICATION

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PCN APG-ABD/13/8027

Dated 08 Aug 2013

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**VIpower hosed in TO-220,DPAK,D2PK: Al Soft Wire Implementation**

**Table 1. Change Implementation Schedule**


|  |             |
|--|-------------|
| Forecasted implementation date for change  | 20-Oct-2013 |
| Forecasted availability date of samples for customer   | 01-Aug-2013 |
| Forecasted date for <b>STMicroelectronics</b> change Qualification Plan results availability | 01-Aug-2013 |
| Estimated date of changed product first shipment   | 25-Oct-2013 |

**Table 2. Change Identification**

|   |  |
|---|--|
| Product Identification<br>(Product Family/Commercial Product) | see enclosed   |
| Type of change  | Package assembly material change   |
| Reason for change   | To improve workability and optimization of assembly process  |
| Description of the change                                     | Please be informed that on VIPower products housed in TO-220, D2PAK, DPAK packages Al (Aluminum) soft wire will be implemented replacing the hard one. |
| Change Product Identification                                 | DataCode   |
| Manufacturing Location(s)                                     | 1]St Shenzhen -China   |

**Table 3. List of Attachments**

|                            |  |
|----------------------------|--|
| Customer Part numbers list |  |
| Qualification Plan results |  |

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|  |            |                     |
|--|------------|---------------------|
| Customer Acknowledgement of Receipt  |            | PCN APG-ABD/13/8027 |
| Please sign and return to STMicroelectronics Sales Office  |            | Dated 08 Aug 2013   |
| <input type="checkbox"/> Qualification Plan Denied<br><input type="checkbox"/> Qualification Plan Approved<br><br><input type="checkbox"/> Change Denied<br><input type="checkbox"/> Change Approved | Name:      |                     |
|  | Title:     |                     |
|  | Company:   |                     |
|  | Date:      |                     |
|  | Signature: |                     |
| Remark<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....  |            |                     |

## DOCUMENT APPROVAL

| Name               | Function          |
|--------------------|-------------------|
| Liporace, Nicola   | Marketing Manager |
| Nicoloso, Riccardo | Product Manager   |
| Minerva, Francesco | Q.A. Manager      |

### **VIPower housed in TO-220, DPAK, D2PAK: Al Soft Wire Implementation**

**INVOLVED P&L FAMILY: 30**

**WHAT:**

We are going to implement Al (Aluminum ) soft wire on VIPower products housed in TO-220, DPAK and D2PAK, replacing the hard one.

**WHY:**

To improve workability and optimization of assembly process.

**WHO:**

All the Customers that are using VIPower products housed in TO220,DPAK,D2PAK.

**WHEN:**

Tentative date of change is from October 2013 onward.  
Sample available on request  
Qualification report included to this communication.

**WHERE:**

ST Shenzhen (China) assembly Plant.

|  |
|--|
| <b>Aluminum 10 and 15 mils soft wires</b><br><b>Package TO220, DPAK, D2PAK</b> |
|--|

| General Informations       |   |
|----------------------------|---|
| Commercial Product         | VNB14NV04-E<br>VND14NV04-E<br>VNP14NV04-E |
| Product Line               | VN78                                      |
| Silicon process technology | VIPower M03                               |
| Package                    | D2PAK<br>DPAK<br>TO220                    |

| Locations                |  |
|--------------------------|--|
| Diffusion fab location   | ST CT6 Catania (Italy)<br>ST AMK6 Ang Mo Kio (Singapore) |
| Assembly plant location  | ST Shenzhen (China)                                      |
| Test plant location      | ST Shenzhen (China)                                      |
| Reliability lab location | ST Shenzhen (China)                                      |

| General Informations       |             |
|----------------------------|-------------|
| Commercial Product         | VNP35N07-E  |
| Product Line               | VN19        |
| Silicon process technology | VIPower M02 |
| Package                    | TO220       |

| Locations                |                        |
|--------------------------|------------------------|
| Diffusion fab location   | ST CT6 Catania (Italy) |
| Assembly plant location  | ST Shenzhen (China)    |
| Test plant location      | ST Shenzhen (China)    |
| Reliability lab location | ST Shenzhen (China)    |

#### Revision history

| REV. | Date of Release            | Author    | Changes description |
|------|----------------------------|-----------|---------------------|
| 0.1  | July 11 <sup>th</sup> 2013 | F.Ceraulo | Creation            |

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## - 1. Reliability evaluations overview

### 1.1 Objectives

Aim of this report is to present the results of the reliability evaluations performed on some test vehicles to qualify the Aluminum 10mils and 15mils soft wires for the VIPower products designed in M03 and M02 technology assembled in packages DPAK, D2PAK, TO220.

The chosen test vehicles were the **VNx14NV04-E** (VN78 as ST internal silicon line) and the **VNP35N07-E** (VN19 as ST internal silicon line). The qualification lots were diffused both in ST CT6 Catania (Italy) and ST AMK6 Ang Mo Kio (Singapore) 6" wafer fabs.

The reliability evaluation was performed according to the **AEC\_Q100 Rev.G** specification for the package oriented test described in Group A (Accelerated Environment Stress) and Group C (Package Assembly Integrity) using lots with the new soft wires and lots with the hard wires as reference.

### 1.2 Results

All reliability tests have been completed with positive results, neither functional nor parametric rejects were detected at final electrical testing.

The Device Physical Analysis (DPA) performed on stressed units including the Wire Bond Pull/Shear tests (WBP, WBS) didn't pointed out neither abnormal break loads nor forbidden failure modes.

**Based on the overall positive results we consider the products qualified from a reliability point of view.**

## - 2. Traceability

| Package | Device | Diffusion lot | Diffusion fab    | Assembly lot |            | Wire diameter |
|---------|--------|---------------|------------------|--------------|------------|---------------|
|         |        |               |                  | Soft wire    | Hard wire  |               |
| DPAK    | VN78   | 6213VYT       | AMK6 (Singapore) | GK22611FZZ   | GK22611F01 | 10 mils       |
| D2PAK   | VN78   | 3201173       | CT6 (Catania)    | GK22611CZZ   | GK22611C01 | 10 mils       |
| TO220   | VN78   | 6213X01       | AMK6 (Singapore) | GK2250KYZR   | GK2250KY01 | 10 mils       |
|         | VN19   | 3214756       | CT6 (Catania)    | GK224072ZY   | GK22407202 | 15 mils       |



### - 3. Reliability qualification plan and results

| AEC # | Test Name                                 | STM Test Conditions  | Sample Size/Lots                                     | Results Fails/SS/Lots                       | Comments  |
|-------|---|--|--|---|---|
| A1    | <b>PC</b><br>Pre Cond                     | - Preconditioning according to<br>Jedec JESD22-A113F<br>including 5 Temperature Cycling<br>Ta=-40°C/+60°C<br>- Reflow according to level 3 Jedec<br>JSTD020D-1<br>- 100 Temperature Cycling<br>Ta=-50°C/+150°C | Before AC, TC  |   |   |
| A3    | <b>AC</b><br>Autoclave                    | <b>ENV. SEQ.</b> Enviromental Sequence<br><b>TC</b> (Ta=-65°C / +150°C for 100<br>cycles) +<br><b>AC</b> (Ta=121°C, Pa=2atm for 96<br>hours)   | 77/8   | 0/77/8                                      | Each assy lot<br>reported in<br>traceability<br>section |
| A4    | <b>TC</b><br>Temp.<br>Cycling             | Ta=-65°C / +150°C for 500 cycles   | 77/8   | 0/77/8                                      | Each assy lot<br>reported in<br>traceability<br>section |
| A6    | <b>HTSL</b><br>High Temp.<br>Storage Life | Ta=150°C for 1000 hours.   | 77/8   | 0/77/8                                      | Each assy lot<br>reported in<br>traceability<br>section |
| C1    | <b>WBS</b><br>Wire Bond<br>Shear          |  | 30 bonds from<br>minimum 5 of<br>units from 1<br>lot | All<br>measurement<br>within spec<br>limits | Each assy lot<br>reported in<br>traceability<br>section |
| C2    | <b>WBP</b><br>Wire Bond<br>Pull           |  | 30 bonds from<br>minimum 5 of<br>units from 1<br>lot | All<br>measurement<br>within spec<br>limits | Each assy lot<br>reported in<br>traceability<br>section |

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