PRODUCT/PROCESS CHANGE NOTIFICATION

PCN APG-AED/10/5437
Notification Date 04/01/2010

VIPower M03 Lead-free (Passive Pad Implementation)

Table 1. Change Implementation Schedule

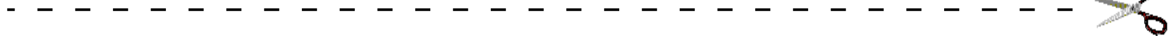
Forecasted implementation date for change	30-Jun-2010
Forecasted availabillity date of samples for customer	31-Mar-2010
Forecasted date for **STMicroelectronics** change Qualification Plan results availability	25-Mar-2010
Estimated date of changed product first shipment	01-Jul-2010

Table 2. Change Identification

Product Identification (Product Family/Commercial Product)	SEE ENCLOSED LIST
Type of change	Waferfab process change
Reason for change	QUALITY IMPROVEMENT
Description of the change	Following APCN APG-BOD/09/4696 please be informed that we are going to implement on VIPower M03 housed in lead-free packages (using Au wires on active area) the passive pad. This change is aligned to the company roadmap on environmental friendly components.
Product Line(s) and/or Part Number(s)	See attached
Description of the Qualification Plan	See attached
Change Product Identification	FINISHED-GOOD / "P" ON PART NUMBER
Manufacturing Location(s)	

Table 3. List of Attachments

Customer Part numbers list	
Qualification Plan results	



Customer Acknowledgement of Receipt	**PCN APG-AED/10/5437**
Please sign and return to STMicroelectronics Sales Office	**Notification Date 04/01/2010**
☐ Qualification Plan Denied	Name:
☐ Qualification Plan Approved	Title:
	Company:
☐ Change Denied	Date:
☐ Change Approved	Signature:

Remark

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DOCUMENT APPROVAL

Name	Function
Nicoloso, Riccardo	Division Marketing Manager
Russo, Alfio	Division Product Manager
Parrino, Emanuele	Division Q.A. Manager

PROCESS/PRODUCT
CHANGE NOTIFICATION

VIPower M03 Lead-free (Passive Pad Implementation)

INVOLVED P&L FAMILY: 30

WHAT*:*

Introduction of Passive Pads on VIPower M03 products housed in Lead-Free (Pb-free) packages that are using gold (Au) wire/s on active area.

WHY:

To guarantee higher quality standard due to more stressing soldering profile (J-STD-020C) condition compared to the Lead-Present versions.

WHO:

See enclosed list.

WHEN:

Change will be implemented according to the following scheduled dates:
-Qualification results: enclosed to this PCN.
-Samples availability: on demand.
-Date of implementation: July 1, 2010.

WHERE:

Change impact CT6F and AMK6 Front End Plant.

VIPower M0-3
Lead-free migration guidelines

APG

Automotive Electronic Division

General Information

According to JEDEC regulation (J-STD-020C) the soldering profile for lead-free devices requires higher peak temperature compared to the leaded versions.

Under this more stressing condition and in order to guarantee better standards of quality, Lead-Free VIPower^{TM} M0-3 products, using Gold (Au) bonding wire on active area, have been enriched introducing Passive PADs.

This action consist of slight layout reshaping moving bonding PAD from active area (die region with power structure under it) to “passive” one. This new bonding PAD is called “Passive PAD”.

Two different change-typologies can be identified in VIPower^{TM} M0-3 product portfolio:

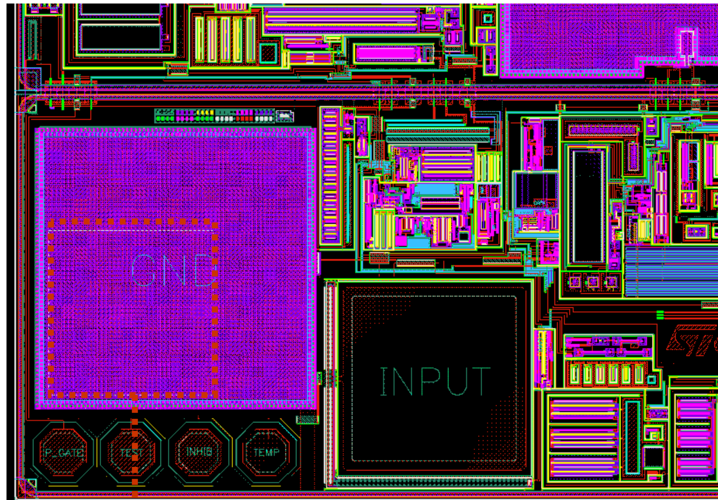
Case 1 - Passive PAD on Ground
(Au bonding wire - on active area - used for ground PAD only).

Case 2 - Multiple Passive PAD
(Au bonding wire - on active area - used for power and signal PADs).

VIPower M0-3:
Case 1 - Passive PAD on Ground

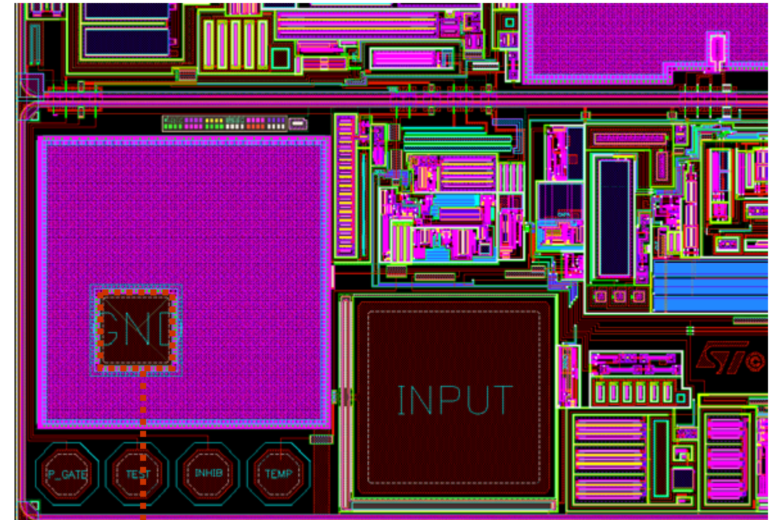
VIPower M0-3 products, using Au wire on ground PAD, have been modified as follows:

BEFORE



Bonding area

AFTER



New bonding area (Passive PAD)

Active area   No active area

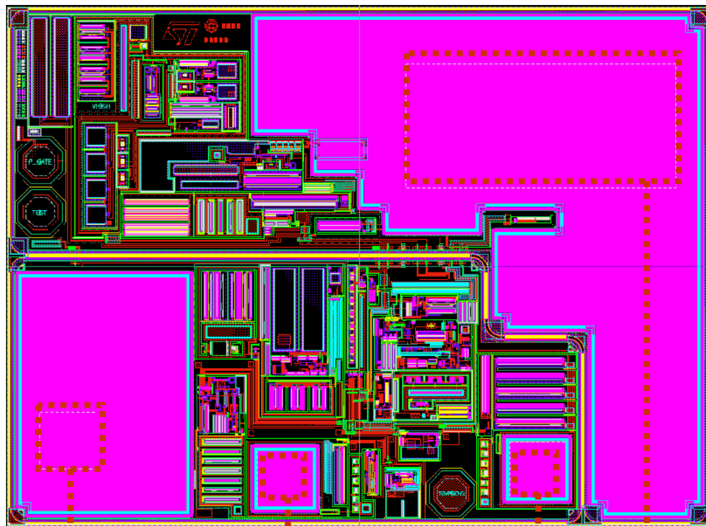
Above pictures show the ground PAD re-layout.

No-active area has been reserved for bonding (Passive PAD).

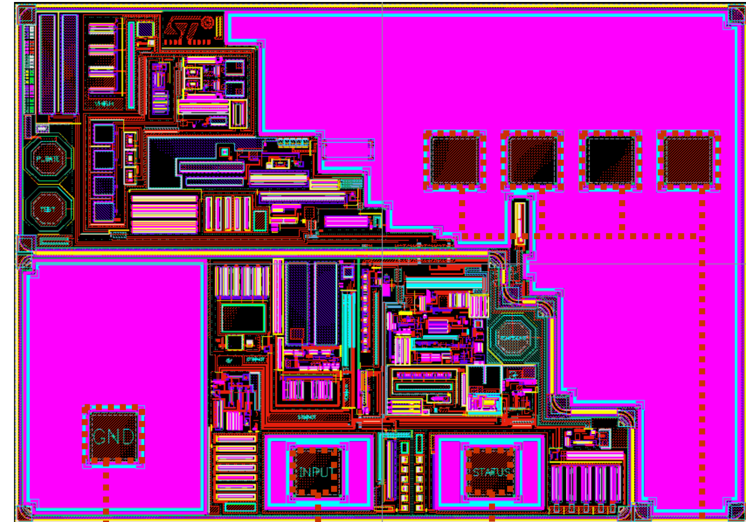
VIPower M0-3:
Case 2 - Multiple Passive PAD

VIPower M0-3 products, using Au wires for bonding on active area (ground, output, input, etc…), have been modified as follows:

BEFORE



AFTER



Output bonding area
Signal bonding area
Ground bonding area

Output Passive PADs
Signal Passive PADs
Ground Passive PADs

Active area   No active area

Above pictures show the PADs re-layout.

No-active area has been reserved for bonding (Passive PAD).

VIPower M0-3: Case 1 Product list

Part Number	Package
VN610SPTR-E	PowerSO-10
VN750-12-E	PENTAWATT
VN750B5-E	P2PAK
VN750B5TR-58-E	P2PAK
VN750B5TR-E	P2PAK
VN750-E	PENTAWATT
VN750PT-E	PPAK
VN750PTTR-E	PPAK
VN820-11-E	PENTAWATT
VN820-12-E	PENTAWATT
VN820B5-E	P2PAK
VN820B5TR-E	P2PAK
VN820-E	PENTAWATT
VN820PT-E	PPAK
VN820PTTR-E	PPAK
VN820SP-E	PowerSO-10
VN820SPTR-E	PowerSO-10

Part Number	Package
VN920B5HTR-E	P2PAK
VN920B5TR-E	P2PAK
VN920DB5-E	P2PAK
VN920DB5TR-E	P2PAK
VN920SP-E	PowerSO-10
VN920SPTR-E	PowerSO-10
VND600SP-E	PowerSO-10
VND600SPTR-E	PowerSO-10
VND810SP-E	PowerSO-10
VND810SPTR-E	PowerSO-10
VND830ASP-E	PowerSO-10
VND830ASPTR-E	PowerSO-10
VND830LSP-E	PowerSO-10
VND830LSPTR-E	PowerSO-10
VND830MSP-E	PowerSO-10
VND830MSPTR-E	PowerSO-10
VND830SP-E	PowerSO-10
VND830SPTR-E	PowerSO-10

VIPower M0-3: Case 2 Product list

Part Number	Package	New Part Number
VN750S-E	SO 8	VN750PS-E
VN750SM-E	SO 8	VN750SMP-E
VN750SMTR-E	SO 8	VN750SMPTR-E
VN750STR-E	SO 8	VN750PSTR-E
VN800S-61-E	SO 8	VN800PS-61-E
VN800S-E	SO 8	VN800PS-E
VN800STR-61-E	SO 8	VN800PSTR-61-E
VN800STR-E	SO 8	VN800PSTR-E
VND810-E	SO 16 Narrow	VND810P-E
VND810TR-E	SO 16 Narrow	VND810PTR-E
VNN1NV04TR-E	SOT 223	VNN1NV04PTR-E
VNN3NV04TR-E	SOT 223	VNN3NV04PTR-E (*)

(*) in development

Part Number	Package	New Part Number
VNN7NV04TR-E	SOT 223	VNN7NV04PTR-E
VNS14NV04-E	SO 8	VNS14NV04P-E
VNS14NV04TR-E	SO 8	VNS14NV04PTR-E
VNS1NV04D-E	SO 8	VNS1NV04DP-E
VNS1NV04DTR-E	SO 8	VNS1NV04DPTR-E
VNS1NV04-E	SO 8	VNS1NV04P-E
VNS1NV04TR-E	SO 8	VNS1NV04PTR-E
VNS3NV04D-E	SO 8	VNS3NV04DP-E
VNS3NV04DTR-E	SO 8	VNS3NV04DPTR-E
VNS3NV04-E	SO 8	VNS3NV04P-E
VNS3NV04TR-E	SO 8	VNS3NV04PTR-E
VNS7NV04-E	SO 8	VNS7NV04P-E
VNS7NV04TR-E	SO 8	VNS7NV04PTR-E

Dedicated part numbers with “P” have been generated for products involved in this change, in order to be compliant with the methodology used to classify VIPower M03 products with Passive Pad on Power Outputs.

VIPower M0_3.5 Products Qualification assembled in Lead Free finishing configuration

Packages and assembly plants involved

- **ST Muar (Malaysia)**
  - SO16 narrow
  - SO16 wide
  - SO28
  - PSO10
- **ST Shenzen (China)**
  - SO8
  - DPAK
  - PPAK
  - P2PAK
- **ST Bouskoura (Morocco)**
  - PW5

Author:
A.Marmoni
QA and Qualification Team Leader
APG Q&R CBD Catania

ST approved:
E.Parrino
Car Body Division
APG Q&R Catania Mng

Reliability and electrical test executed by:
G.Foti, M.Spitaleri, M.Palermo
Rel. Eng.
IMS Rel Dept. – APG Support

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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 several VIPower products designed in M0_3.5 technology chosen as test vehicles in order to qualify the Lead Free finishing assembly configuration on different package typologies involving three ST Assembly Plants. Here below the products and the relevant packages involved:

Assy plant	Package	Product	Silicon Line
Muar	SO16 narrow	VND810P-E VNQ500P-E	VNE4 VNF6
Muar	SO16 wide	VND830E-E	VNI2
Muar	SO28	VNQ830E-E	VNI2
Muar	PSO10	VN920SP-E	VN92
Shenzen	SO8	VNS7NV04P-E VN750PS-E VNS1NV04P-E	VNS2 VNE7 VNL6
Shenzen	DPAK	VND14NV04-E	VN78
Shenzen	PPAK	VN750PT-E	VN75
Shenzen	P2PAK	VN920B5-E	VN92
Bouskoura	PW5	VN820-E	VN82
Bouskoura	PSO10	VND600SP-E	VN60

According with the AEC_Q100 Rev.G specification for the reliability evaluations the following tests were performed for each test vehicle: High Temperature Storage (HTS), Thermal Cycling (TC), Autoclave (AC), Temperature Humidity Bias (THB). All the reliability tests as well as the electrical verification were performed in ST Catania (Italy).

1.2 Results

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

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

- 2. ST Muar (Malaysia)

Here below a summary table about the products and the packages involved:

Package	Product	Silicon Line
SO16 narrow	VND810P-E VNQ500P-E	VNE4 VNF6
SO16 wide	VND830E-E	VNI2
SO28	VNQ830E-E	VNI2
PSO10	VN920SP-E VND600SP-E (*)	VN92 VN60

(*) ST Bouskoura (Morocco)

- 2.1 Traceability

2.1.1 - SO16 narrow

The lead free finishing configuration on this package was done qualifying on the same time the new Pre Plated µAdvPPF LeadFrame and for this reason the qualification was based on three lots: two two lots of VND810P-E and one of VNQ500P-E that were the products chosen as test vehicles.
The new Pre Plated Frame is composed by Nickel (Ni)/ Palladium (Pd)/ Silver (Ag)/ Gold (Au) instead of the old one that is composed of Nickel (Ni)/ Palladium (Pd)/ Gold (Au).

VND810P-E

General Informations test vehicle 1	
Product Line	VNE4
Commercial Product	**VND810P-E**
Silicon process technology	M03.5
Package	**SO16 Narrow**

Locations	
Diffusion fab location	ST CT6 Catania (Italy)
Assembly plant location	ST Muar (Malaysia)
Test plant location	ST Muar (Malaysia)
Reliability lab location	ST Catania (Italy)

Wafer fab information	
Wafer fab manufacturing location	ST CT 6" CATANIA (Italy)
Wafer diameter	6
Silicon process technology	VIPOWER M03.5
Die finishing back side	Ti-Ni-Au
Die size	3820 x 2150 micron
Metal materials/levels	AlSi (3 micron) / 1
Passivation	SiN / Polyimide
Diffusion Lot #	**3538213E**

Assembly Information	
Assembly plant location	ST Muar (Malaysia)
Package description	SO16 narrow
Lead Frame	SO16L 94x172 Ni/Pd/Ag/Au - Advanced µPPF
Molding compound	RESIN NITTO MP8000CH4-2A D11mm W2.73g
Wires bonding materials/diameters	Au 2.0 mils
Die attach material	LOCTITE - QMI9507-2A1
Assy Lots #	**998350FM01, 998341PG01**

Final Testing Information	
Electrical testing manufacturing location	ST Muar (Malaysia)

VNQ500P-E

General Informations test vehicle 2	
Product Line	VNF6
Commercial Product	**VNQ500P-E**
Silicon process technology	M03.5
Package	**SO16 Narrow**

Locations	
Diffusion fab location	ST CT6 Catania (Italy)
Assembly plant location	ST Muar (Malaysia)
Test plant location	ST Muar (Malaysia)
Reliability lab location	ST Catania (Italy)

Wafer fab information	
Wafer fab manufacturing location	ST CT 6" CATANIA (Italy)
Wafer diameter	6
Silicon process technology	VIPOWER M03.5
Die finishing back side	Ti-Ni-Au
Die size	3070 x 2230 micron
Metal materials/levels	AlSi (3 micron) / 1
Passivation	SiN / Polyimide
Diffusion Lot #	**3812286E**

Assembly Information	
Assembly plant location	ST Muar (Malaysia)
Package description	SO16 narrow
Lead Frame	SO16L 94x172 Ni/Pd/Ag/Au - Advanced µPPF
Molding compound	RESIN NITTO MP8000CH4-2A D11mm W2.73g
Wires bonding materials/diameters	Au 1.3 / 2.0 mils
Die attach material	LOCTITE - QMI9507-2A1
Assy Lots #	**998341PN01**

Final Testing Information	
Electrical testing manufacturing location	ST Muar (Malaysia)

2.1.2 - SO16 large

VND830E-E

General Informations	
Product Line	**VNI2**
Commercial Product	VND830E-E
Silicon process technology	VIPower M0_3.5
Package	**SO16 large**

Locations	
Diffusion fab location	CT6 Catania (Italy)
Assembly plant location	ST Muar (Malaysia)
Test plant location	ST Muar (Malaysia)
Reliability lab location	ST Catania (Italy)

Wafer fab information	
Wafer fab manufacturing location	ST CT 6” CATANIA (Italy)
Wafer diameter	6
Silicon process technology	VIPOWER M0_3.5
Die finishing back side	Ti-Ni-Au
Die size	3400 x 3590 micron
Metal materials/levels	AlSi (3 micron) / 1
Passivation	SiN / Polyimide
Diffusion Lot #	**3529396E**

Assembly Information	
Assembly plant location	ST Muar (Malaysia)
Package description	SO16 large
Lead Frame	SO16L 200x263 SpAg
Molding compound	RESIN NITTO MP8000CH4-2A D11mm W2.73g
Wires bonding materials/diameters	Au 2.0mils
Die attach material	PREFORM Pb/Ag/Sn 97.5/1.5/1
Assy Lots #	**9984515601**

Final Testing Information	
Electrical testing manufacturing location	ST Muar (Malaysia)

2.1.3 - SO28

VNQ830E-E

General Informations	
Product Line	**VNI2**
Commercial Product	VNQ830E-E
Silicon process technology	VIPower M0_3.5
Package	**SO28**

Locations	
Diffusion fab location	ST CT6 Catania (Italy)
Assembly plant location	ST Muar (Malaysia)
Test plant location	ST Muar (Malaysia)
Reliability lab location	ST Catania (Italy)

Wafer fab information	
Wafer fab manufacturing location	ST CT 6" CATANIA (Italy)
Wafer diameter	6
Silicon process technology	VIPower M0_3.5
Die finishing back side	Ti-Ni-Au
Die size	3400 x 3590 micron
Metal materials/levels	AlSi (3 micron) / 1
Die finishing front side	SiN / Polyimide
Diffusion Lots #	**3529396E**

Assembly Information	
Assembly plant location	ST Muar (Malaysia)
Package description	SO28
Lead Frame	SO28L 190x563 SpAg
Molding compound	SUMITOMO EME7026
Wires bonding materials/diameters	Au 2.0mils
Die attach material	PREFORM Pb/Ag/Sn 97.5/1.5/1
Assy Lots #	**998410QN01**

Final Testing Information	
Electrical testing manufacturing location	ST Muar (Malaysia)

2.1.4 - PowerSO10

On this package a double goal was reached qualifying on the same time the Lead Free finishing configuration and the Passive Pad on Ground. For this reason the qualification was based on three lots, two of VN920SP-E and one of VND600SP-E that were the products chosen as test vehicles assembled respectively in in ST Muar (Malaysia) and in ST Bouskoura (Morocco) in order to qualify two different assembly plants. Here below a traceability for both product is reported although later will be a section dedicated just to Bouskoura.

VN920SP-E

General Informations	
Product Line	**VN92**
Commercial Product	VN920SP-E
Silicon process technology	VIPower M0_3.5
Package	**PowerSO_10**

Locations	
Diffusion fab location	ST CT6 Catania (Italy)
Assembly plant location	ST Muar (Malaysia)
Test plant location	ST Muar (Malaysia)
Reliability lab location	ST Catania (Italy)

Wafer fab information	
Wafer fab manufacturing location	ST CT 6” CATANIA (Italy)
Wafer diameter	6
Silicon process technology	VIPower M0_3.5
Die finishing back side	Ti-Ni-Au
Die size	4420 x 3860 micron
Metal materials/levels	AlSi (3.2 micron) / 1
Die finishing front side	SiN
Diffusion Lots #	**3912186**

Assembly Information	
Assembly plant location	ST Muar (Malaysia)
Package description	PowerSO_10
Lead Frame	PSO-10 4riv 1-2/4-5Fus PlNi/NiP-Ag
Molding compound	HYSOL MG47F-ES
Wires bonding materials/diameters	Au 1.3mils, Al 10mils
Die attach material	PREFORM Pb/Ag/Sn 97.5/1.5/1
Assy Lots #	**9992403T01, 999250TN01**

Final Testing Information	
Electrical testing manufacturing location	ST Muar (Malaysia)

VND600SP-E

General Informations	
Product Line	**VN60**
Commercial Product	VND600SP-E
Silicon process technology	VIPower M0_3.5
Package	**PowerSO_10**

Locations	
Diffusion fab location	ST CT6 Catania (Italy)
Assembly plant location	ST Bouskoura (Morocco)
Test plant location	ST Bouskoura (Morocco)
Reliability lab location	ST Catania (Italy)

Wafer fab information	
Wafer fab manufacturing location	ST CT 6” CATANIA (Italy)
Wafer diameter	6
Silicon process technology	VIPower M0_3.5
Die finishing back side	Ti-Ni-Au
Die size	5450 x 3590 micron
Metal materials/levels	AlSi (3.2 micron) / 1
Die finishing front side	SiN
Diffusion Lots #	**3912184**

Assembly Information	
Assembly plant location	ST Bouskoura (Morocco)
Package description	PowerSO_10
Lead Frame	PSO-10 Mon Ve3 OpB/G 16u PlNi/NiP
Molding compound	SUMITOMO 6650RL1L D14mm W4.4g
Wires bonding materials/diameters	Au 1.3mils, Al 10mils
Die attach material	PREFORM Pb/Ag/Sn 95.5/2.5/2
Assy Lots #	**CZ91908A01**

Final Testing Information	
Electrical testing manufacturing location	ST Bouskoura (Morocco)

- 2.2 Reliability qualification plan and results

AEC #	Test Name	STM Test Conditions	Sample Size	Results Fails/SS	Comments
A1	**PC** Pre Cond	Preconditioning at Jedec Level 3, store 192 hours at Ta=30ºC, RH=60%, reflow (3 times)	Before THB, AC, TC - Tpeak=260ºC for SO16 wide and narrow, SO28 - Tpeak=250ºC for PSO10		
A2	**THB** Temp Humidity Bias	Ta=85ºC, RH=85%, Vcc=24V for 1000 hours	77	0/77	- 3 lots for SO16 narrow - 1 lot for SO16 large - 1 lot for SO28 - 3 lots for PSO10
A3	**AC** Autoclave	Ta=121ºC, Pa=2atm, RH=100% for 96 hours	77	0/77	
A4	**TC** Temp. Cycling	Ta=-65ºC / +150ºC for 500 cycles	77	0/77	
A6	**HTSL** High Temp. Storage Life	Ta=150ºC for 1000 hours. TST before and after at room and hot temperatures.	45	0/45	

- 3. ST Shenzen (China)

Here below a summary table about the products and the packages involved:

Package	Product	Silicon Line
SO8	VNS7NV04P-E VN750PS-E VNS1NV04P-E	VNS2 VNE7 VNL6
DPAK	VND14NV04-E	VN78
PPAK	VN750PT-E	VN75
P2PAK	VN920B5-E	VN92

- 3.1 Traceability

3.1.1 - SO8

The lead free finishing configuration on this package was done qualifying on the same time the new Pre Plated µAdvPPF LeadFrame and three products were chosen as test vehicles:, one lot per each test vehicle that are VNS7NV04P-E (VNS2) single island, VN750PS-E (VNE7) single island and VNS1NV04P-E (VNL6) double island.
The new Pre Plated Frame is composed by Nickel (Ni)/ Palladium (Pd)/ Silver (Ag)/ Gold (Au) instead of the old one that is composed of Nickel (Ni)/ Palladium (Pd)/ Gold (Au).

VNS7NV04P-E

General Informations test vehicle 1	
Product Line	**VNS2**
Commercial Product	VNS7NV04P-E
Silicon process technology	M03.5
Package	**SO8**

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

Wafer fab information	
Wafer fab manufacturing location	ST CT 6" CATANIA (Italy)
Wafer diameter	6
Silicon process technology	VIPOWER M03.5
Die finishing back side	Ti-Ni-Au
Die size	2130 x 2540 micron
Metal materials/levels	AlSi (3.2 micron) / 1
Passivation	SiN / Polyimide
Diffusion Lot #	**3728110**

Assembly Information	
Assembly plant location	ST Shenzen (China)
Package description	**SO 08 STRIP SINGLE ISLAND**
Molding compound	RESIN NITTO MP8000CH4-2A D14mm W3.9g
Wires bonding materials/diameters	Au 2.0 mils
Die attach material	LOCTITE - QMI9507-2A1
Assy Lots #	**GK8391Y501**

Final Testing Information	
Electrical testing manufacturing location	*ST Shenzen (China)*

VN750PS-E

General Informations test vehicle 2	
Product Line	**VNE7**
Commercial Product	VN750PS-E
Silicon process technology	M03.5
Package	**SO8**

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

Wafer fab information	
Wafer fab manufacturing location	ST CT 6” CATANIA (Italy)
Wafer diameter	6
Silicon process technology	VIPOWER M03.5
Die finishing back side	Ti-Ni-Au
Die size	3540 x 2040 micron
Metal materials/levels	AlSi (3 micron) / 1
Passivation	SiN / Polyimide
Diffusion Lot #	**3811685**

Assembly Information	
Assembly plant location	ST Shenzen (China)
Package description	**SO 08 STRIP SINGLE ISLAND**
Molding compound	RESIN NITTO MP8000CH4-2A D14mm W3.9g
Wires bonding materials/diameters	Au 2.0 mils
Die attach material	LOCTITE - QMI9507-2A1
Assy Lots #	**GK8420KU01**

Final Testing Information	
Electrical testing manufacturing location	ST Shenzen (China)

VNS1NV04P-E

General Informations test vehicle 3	
Product Line	**VNL6**
Commercial Product	VNS1NV04P-E
Silicon process technology	M03.5
Package	**SO8**

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

Wafer fab information	
Wafer fab manufacturing location	ST CT 6" CATANIA (Italy)
Wafer diameter	6
Silicon process technology	VIPOWER M03.5
Die finishing back side	Ti-Ni-Au
Die size	1710 x 1520 micron
Metal materials/levels	AlSi (3.2 micron) / 1
Passivation	SiN / Polyimide
Diffusion Lot #	**3824020**

Assembly Information	
Assembly plant location	ST Shenzen (China)
Package description	**SO 08 STRIP DOUBLE ISLAND**
Molding compound	RESIN NITTO MP8000CH4-2A D14mm W3.9g
Wires bonding materials/diameters	Au 2.0 mils
Die attach material	LOCTITE - QMI9507-2A1
Assy Lots #	**GK8391Y602**

Final Testing Information	
Electrical testing manufacturing location	ST Shenzen (China)

3.1.2 - DPAK – PPAK – P2PAK

On these packages a double goal was reached qualifying on the same time the Lead Free finishing configuration and the Passive Pad on Ground. For this reason the qualification was based on three lots, one lot per each package. Here below the details for the chosen test vehicle:

VND14NV04-E

General Informations	
Product Line	**VN78**
Commercial Product	VND14NV04-E
Silicon process technology	VIPower M0_3.5
Package	**DPAK**

Locations	
Diffusion fab location	ST AMK6 Ang Mo Kio (Singapore)
Assembly plant location	ST Shenzen (China)
Test plant location	ST Shenzen (China)
Reliability lab location	ST Catania (Italy)

Wafer fab information	
Wafer fab manufacturing location	ST AMK6 Ang Mo Kio (Singapore)
Wafer diameter	6
Silicon process technology	VIPower M0_3.5
Die finishing back side	Ti-Ni-Au
Die size	3540 x 2540 micron
Metal materials/levels	AlSi (3 micron) / 1
Die finishing front side	SiN
Diffusion Lots #	**6836350**

Assembly Information	
Assembly plant location	ST Shenzen (China)
Package description	**DPAK**
Molding compound	SUMITOMO EME7026
Wires bonding materials/diameters	Al 10mils, Al-Mg 5mils
Die attach material	PREFORM Pb/Ag/Sn
Assembly Lots #	**GK8421YT01**

Final Testing Information	
Electrical testing manufacturing location	ST Shenzen (China)

VN750PT-E

General Informations	
Product Line	**VN75**
Commercial Product	VN750PT-E
Silicon process technology	VIPower M0_3.5
Package	**PPAK**

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

Wafer fab information	
Wafer fab manufacturing location	ST CT6 Catania (Italy)
Wafer diameter	6
Silicon process technology	VIPower M0_3.5
Die finishing back side	Ti-Ni-Au
Die size	*3360 x 2130 micron*
Metal materials/levels	AlSi (3.2 micron) / 1
Die finishing front side	SiN
Diffusion Lots #	**3903129**

Assembly Information	
Assembly plant location	ST Shenzen (China)
Package description	**PPAK**
Molding compound	*SUMITOMO EME7026*
Wires bonding materials/diameters	*Au 2.0mils, Al 10mils*
Die attach material	PREFORM Pb/Ag/Sn 95.5/2.5/2 D.76mm SSD
Assembly Lots #	**GK9270YQ01**

Final Testing Information	
Electrical testing manufacturing location	ST Shenzen (China)

VN920B5-E

General Informations	
Product Line	**VN92**
Commercial Product	VN920B5-E
Silicon process technology	VIPower M0_3.5
Package	**P2PAK**

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

Wafer fab information	
Wafer fab manufacturing location	ST CT6 Catania (Italy)
Wafer diameter	6
Silicon process technology	VIPower M0_3.5
Die finishing back side	Ti-Ni-Au
Die size	*4420 x 3860 micron*
Metal materials/levels	AlSi (3 micron) / 1
Die finishing front side	SiN
Diffusion Lots #	**3912186A**

Assembly Information	
Assembly plant location	ST Shenzen (China)
Package description	**P2PAK**
Molding compound	*SUMITOMO EME7026*
Wires bonding materials/diameters	*Au 2.0mils, Al 10mils*
Die attach material	PREFORM Pb/Ag/Sn 95.5/2.5/2 D.76mm SSD
Assembly Lots #	**GK9270YP01**

Final Testing Information	
Electrical testing manufacturing location	ST Shenzen (China)

- 3.2 Reliability qualification plan and results

<table>
<tr><th>AEC #</th><th>Test Name</th><th>STM Test Conditions</th><th>Sample Size</th><th>Results Fails/SS</th><th>Comments</th></tr>
<tr><td>A1</td><td>PC
Pre Cond</td><td>Preconditioning at Jedec Level 3, store 192 hours at Ta=30°C, RH=60%, reflow (3 times)</td><td colspan="3">Before THB, AC, TC
- Tpeak=225°C for SO8
- Tpeak=260°C for DPAK
- Tpeak=260°C for PPAK
- Tpeak=245°C for P2PAK</td></tr>
<tr><td>A2</td><td>THB
Temp Humidity Bias</td><td>Ta=85°C, RH=85%, Vcc=24V for 1000 hours</td><td>77</td><td>0/77</td><td rowspan="4">- 3 lots for SO8
- 1 lot for DPAK
- 1 lot for PPAK
- 1 lot for P2PAK</td></tr>
<tr><td>A3</td><td>AC
Autoclave</td><td>Ta=121°C, Pa=2atm, RH=100% for 96 hours</td><td>77</td><td>0/77</td></tr>
<tr><td>A4</td><td>TC
Temp. Cycling</td><td>Ta=-65°C / +150°C for 500 cycles</td><td>77</td><td>0/77</td></tr>
<tr><td>A6</td><td>HTSL
High Temp. Storage Life</td><td>Ta=150°C for 1000 hours. TST before and after at room and hot temperatures.</td><td>45</td><td>0/45</td></tr>
</table>

- 4. ST Bouskoura (Morocco)

Here below a summary table about the products and the packages involved:

Package	Product	Silicon Line
PentaWatt 5	VN820-E	VN82
PSO10	VND600SP-E (*)	VN60

(*) See section dedicated to ST Muar assembly plant

- 4.1 Traceability

4.1.1 - Pentawatt (PW) 5

On this package a double goal was reached qualifying on the same time the Lead Free finishing configuration and the Passive Pad on Ground.

VN820-E_VN82

General Informations	
Product Line	**VN82**
Commercial Product	VN820-E
Silicon process technology	VIPower M0_3.5
Package	**PW5**

Locations	
Diffusion fab location	ST CT6 Catania (Italy)
Assembly plant location	ST Bouskoura (Morocco)
Test plant location	ST Bouskoura (Morocco)
Reliability lab location	ST Catania (Italy)

Wafer fab information	
Wafer fab manufacturing location	ST CT6 Catania (Italy)
Wafer diameter	6
Silicon process technology	VIPower M0_3.5
Die finishing back side	Ti-Ni-Au
Die size	*3210 x 2640 micron*
Metal materials/levels	AlSi (3 micron) / 1
Die finishing front side	SiN
Diffusion Lots #	**3912187**

Assembly Information	
Assembly plant location	ST Bouskoura (Morocco)
Package description	**PW5**
Molding compound	*SUMITOMO 6300HR1L D11mm W3.1g*
Wires bonding materials/diameters	*Au 2.0mils, Al 10mils*
Die attach material	PREFORM Pb/Ag/Sn 95.5/2.5/2 D.76mm SSD
Assembly Lots #	**CZ9360NSZZ**

Final Testing Information	
Electrical testing manufacturing location	ST Bouskoura (Morocco)

- 4.2 Reliability qualification plan and results

AEC #	Test Name	STM Test Conditions	Sample Size	Results Fails/SS	Comments
A2	**THB** Temp Humidity Bias	Ta=85ºC, RH=85%, Vcc=24V for 1000 hours	77	0/77	- 1 lot for PW5
A3	**AC** Autoclave	Ta=121ºC, Pa=2atm, RH=100% for 96 hours	77	0/77	
A4	**TC** Temp. Cycling	Ta=-65ºC / +150ºC for 500 cycles	77	0/77	
A6	**HTSL** High Temp. Storage Life	Ta=150ºC for 1000 hours. TST before and after at room and hot temperatures.	45	0/45	

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