PRODUCT/PROCESS CHANGE NOTIFICATION

PCN APG-ABD/14/8514
Dated 06 Jun 2014

Matrix lead-frame: Additional lead-frame option implementation on VIPower products housed in DPAK package

Table 1. Change Implementation Schedule

Forecasted implementation date for change	26-Jul-2014
Forecasted availability date of samples for customer	02-Jun-2014
Forecasted date for **STMicroelectronics** change Qualification Plan results availability	26-Jul-2014
Estimated date of changed product first shipment	26-Jul-2014

Table 2. Change Identification

Product Identification (Product Family/Commercial Product)	see list
Type of change	Package assembly material change
Reason for change	Product Line Optimization
Description of the change	We are going to implement the matrix lead-frame on VIPower products housed in DPAK package as additional lead-frame option. No other material have been changed.
Change Product Identification	Dedicated Finished-Good
Manufacturing Location(s)	

DOCUMENT APPROVAL

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

Matrix lead-frame: Additional lead-frame option implementation on VIPower products housed in DPAK package.

WHAT:

We are going to implement the matrix lead-frame on VIPower products housed in DPAK package as additional lead-frame option. No other material have been changed.

Item	Current	New
Molding Compound	SUMITOMO EME7026	SUMITOMO EME7026
Die Attach	Preform Pb/Ag/Sn	Preform Pb/Ag/Sn
Bonding wire	Al 7 mils, 10 mils	Al 7 mils, 10 mils
LeadFrame	Standard	Matrix
Lead-plating	Sn 100%	Sn 100%

WHY:

Product Line Optimization

HOW:

See enclosed qualification plan and lead-frames comparison

WHEN:

- Qualification Completion within wk30-2014

- Implementation, upon Customer agrement, from wk30-2014 onward

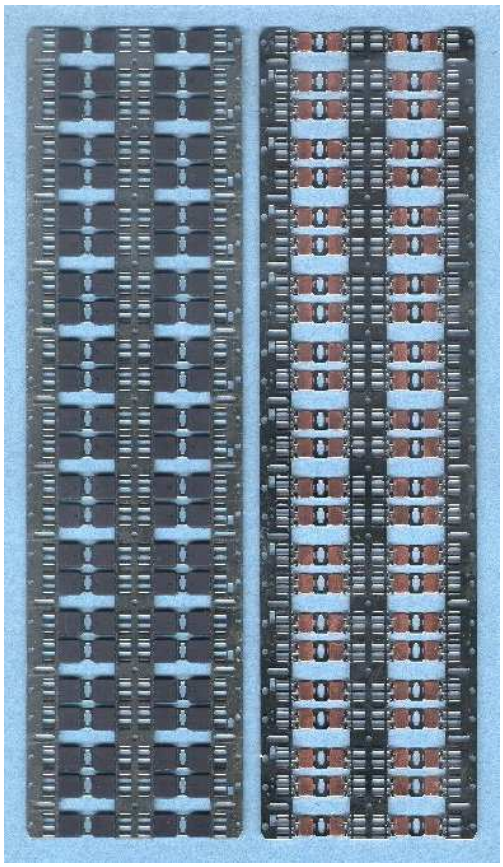
- Sample will be available on request

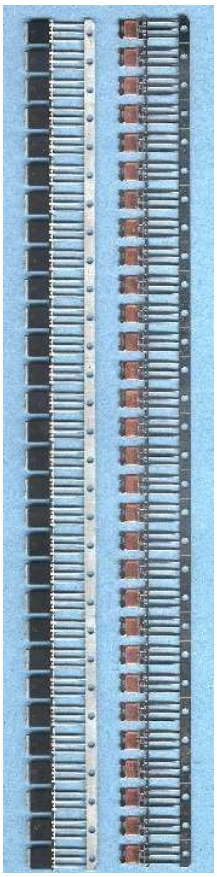
See below list of products involved

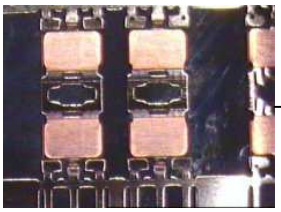
LINE	PRODUCT
V49Y	VND7N04-E
V49Y	VND7N04TR-E
VN28	VND10N06-E
VN28	VND10N06TR-E
VN49	VND5N07-E
VN49	VND5N07TR-E
VN58	VN1160-E
VN58	VN1160C-E
VN58	VN1160CTR-E
VN58	VN1160CTR-E
VN58	VN1160TR-E
VN78	VND14NV04-E
VN78	VND14NV04TR-E
VN79	VND7NV04-E
VN79	VND7NV04TR-E
VN84	VND3NV04-E
VN84	VND3NV04TR-E

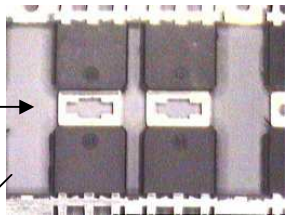
DPAK FRAME COMPARISON

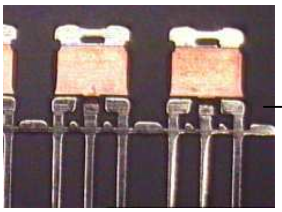
MATRIX	CURRENT STANDARD

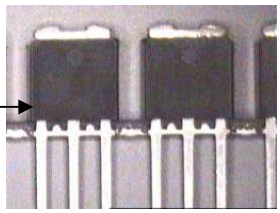


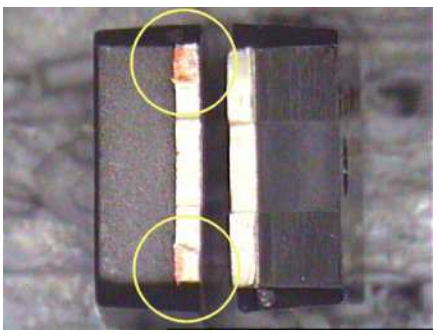












DPAK Matrix Frame Introduction

Revision history			
Rev.	**Date of Release**	**Author**	**Changes description**
0.1	May 26, 2014	A.Marmoni - APG Q&R Catania	Creation

Table of contents		
Section	**Pag**	**Content**

- 1. Reliability evaluations overview

Aim of this qualification plan is to describe the reliability job that will be done according to **AEC_Q100 Rev.G** specification to release in production the Matrix Frame for package DPAK instead of the Standard one. No change will occur between the two frames neither in the material nor in the dimension. The impacted products are the VIPower devices designed in M02 and M03 technologies, here below the chosen test vehicles:

General information				
Commercial Product	VND14NV04-E	VND7NV04-E	VND3NV04-E	VND5N07-E
Product Line	VN78	VN79	VN84	VN49
Wafer fab information				
Silicon process technology	VIPower M03	VIPower M03	VIPower M03	VIPower M02
Die size (mm2)	8.99	5.41	3.80	6.69
Die finishing front side	SiN			
Die finishing back side	Ti-Ni-Au			
Metal levels / materials	1 level /AlSiCu (3.0 µm)			
Assemby information				
Assembly plant location	ST Shenzhen (China)			
Package	DPAK			
Molding compound	Sumitomo EME7026			
Die attach material	Preform Pb/Ag/Sn 95.5/2.5/2			
Wires bonding materials/diameters	Al 7mils + Al 10mils			Al 7mils

The qualification will follow the path described here below:

Test group as per **AEC-Q100 Rev.G**		To be performed (Y/N)	Comment
A	Accelerated Environment Stress	Y	Completion wk30-2014
B	Accelerated Lifetime Simulation	N	
C	Package Assembly Integrity	Y	Completion wk30-2014
D	Die Fabrication Reliability	N	
E	Electrical Verification	N	
F	Defect Screening	N	To be implemented starting from first production lot
G	Cavity Package Integrity	N	N/A: not for plastic packaged devices

See details per each test group in section 2 of this report.

- 2. Reliability qualification plan

Test group A: Accelerated Environment Stress					
AEC #	**Test Name**	**STM Test Conditions**	**Sample Size/ Lots**	**Results Fails/SS/Lots**	**Comments**
A1	**PC** Pre Cond	- Preconditioning according to Jedec JESD22-A113F including 5 Temperature Cycling Ta=-40ºC/+60ºC - Reflow according to level 3 Jedec JSTD020D-1 - 100 Temperature Cycling Ta=-50ºC/+150ºC	Before AC, TC, PTC		
A2	**THB** Temp Humidity Bias	Ta=85ºC, RH=85%, Vcc=24V for 1000 hours	-	-	Not Applicable
A3	**AC** Autoclave	**ENV. SEQ.** Enviromental Sequence **TC** (Ta=-65ºC / +150ºC for 100 cycles) + **AC** (Ta=121ºC, Pa=2atm for 96 hours)	77/4		1 Lot each TV
A4	**TC** Temp. Cycling	Ta=-65ºC / +150ºC for 500 cycles	77/4		1 Lot each TV
A5	**PTC** Power Temp. Cycling	Ta=-40ºC / +125ºC for 1000 cycles.	45/1		Only for VND14NV04-E as worst case product having max die size
A6	**HTSL** High Temp. Storage Life	Ta=150ºC for 1000 hours.	-	-	Not Applicable

Test group B: Accelerated Lifetime Simulation					
AEC #	**Test Name**	**STM Test Conditions**	**Sample Size/ Lots**	**Results Fails/SS/Lots**	**Comments**
B1	**HTOL** High Temp. Op. Life	Bias Dynamic stress (JESD22-A108): Ta=125ºC, Vcc=28V for 1000 hours	-	-	Not Applicable
B2	**ELFR** Early Life Failure Rate	Parts submitted to **HTOL** per JESD22-A108 requirements; GRADE 1: 24 hours at 150ºC	-	-	Not Applicable
B3	**EDR** Endurance Data Retention	Only for memory devices	-	-	Not Applicable

Test group C: Package Assembly Integrity					
AEC #	**Test Name**	**STM Test Conditions**	**Sample Size/ Lots**	**Results Fails/SS/Lots**	**Comments**
C1	**WBS** Wire Bond Shear		30 bonds /minimum 5 units/1 lot		1 Lot each TV
C2	**WBP** Wire Bond Pull		30 bonds /minimum 5 units/1 lot		1 Lot each TV
C3	**SD** Solderability		15/4		1 Lot each TV
C4	**PD** Physical Dimensions		10/4		1 Lot each TV
C5	**SBS** Solder Ball Shear	Only for BGA package	-	-	Not Applicable
C6	**LI** Lead Integrity	Not required for Surface Mount Devices	-	-	Not Applicable

Test group D: Die Fabrication Reliability					
AEC #	**Test Name**	**STM Test Conditions**	**Sample Size/ Lots**	**Results Fails/SS/Lots**	**Comments**
D1	**EM** Electromigration		-	-	Not Applicable
D2	**TDDB** Time Dependent Dielectric Breakdown		-	-	Not Applicable
D3	**HCI** Hot Carrier Injection		-	-	Not Applicable
D4	**NBTI** Negative Bias Temperature Instability		-	-	Not Applicable
D5	**SM** Stress Migration		-	-	Not Applicable

Test group E: Electrical Verification					
AEC #	**Test Name**	**STM Test Conditions**	**Sample Size/ Lots**	**Results Fails/SS/Lots**	**Comments**
E2	**ESD** HBM / MM		-	-	Not Applicable
E3	**ESD** CDM		-	-	Not Applicable
E4	**LU** Latch-Up		-	-	Not Applicable
E5	**ED** Electrical Distributions		-	-	Not Applicable
E7	**CHAR** Characterization		-	-	Not Applicable
E8	**GL** Gate Leakage		-	-	Not Applicable
E9	**EMC** Electromagnetic Compatibility		-	-	Not Applicable
E10	**SC** Short Circuit Characterization	According to **AEC-Q100-012**	10/3	Not requested	

Test group F: Defects Screening Tests					
AEC #	**Test Name**	**STM Test Conditions**	**Sample Size/ Lots**	**Results Fails/SS/Lots**	**Comments**
F1	**PAT** Process Average Testing		To be implemented starting from first production lot		
F2	**SBA** Statistical Bin/Yield Analysis				

Test group G: Cavity Package Integrity Tests					
AEC #	**Test Name**	**STM Test Conditions**	**Sample Size/ Lots**	**Results Fails/SS/Lots**	**Comments**
G1	**MS** Mechanical Shock	Not applicable: not for plastic packaged devices			
G2	**VFV** Variable Frequency Vibration				
G3	**CA** Constant Acceleration				
G4	**GFL** Gross/Fine Leak				
G5	**DROP** Package Drop				
G6	**LT** Lid Torque				
G7	**DS** Die Shear				
G8	**IWV** Internal Water Vapor				

Public Products List

PCN Title : Matrix lead-frame: Additional lead-frame option implementation on VIPower products housed in DPAK package
PCN Reference : APG-ABD/14/8514
PCN Created on : 04-JUN-2014

Subject : Public Products List

Dear Customer,

Please find below the Standard Public Products List impacted by the change:

ST COMMERCIAL PRODUCT

VND10N06-E
VND10N06TR-E
VND14NV04-E
VND14NV04TR-E
VND3NV04-E
VND3NV04TR-E
VND7N04-E
VND7N04TR-E
VND7NV04-E
VND7NV04TR-E

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