


PRODUCT / PROCESS CHANGE NOTIFICATION

1. PCN basic data

1.1 Company		STMicroelectronics International N.V
1.2 PCN No.	ADG/21/12514	
1.3 Title of PCN	VIPower M05 in SOT-223: Conversion to Copper Wire and Mod Compound Change	
1.4 Product Category	see list	
1.5 Issue date	2021-01-20	

2. PCN Team

2.1 Contact supplier	
2.1.1 Name	ROBERTSON HEATHER
2.1.2 Phone	+1 8475853058
2.1.3 Email	heather.robertson@st.com
2.2 Change responsibility	
2.2.1 Product Manager	Nicola LIPORACE, Mario ASTUTI
2.1.2 Marketing Manager	Carmelo PISTRITTO
2.1.3 Quality Manager	Vincenzo MILITANO

3. Change

3.1 Category	3.2 Type of change	3.3 Manufacturing Location
Materials	New direct material part number (same supplier, different supplier or new supplier), Bond wire material, diameter	Subcontractor Fujitsu/TongFu (China)

4. Description of change

	Old	New
4.1 Description	Au 2 mils bonding wire Molding Compound SUMITOMO EMEG600F	Cu 2 mils bonding wire Molding Compound HITACHI CEL8240HF10NF
4.2 Anticipated Impact on form, fit, function, quality, reliability or processability?	No Impact	

5. Reason / motivation for change

5.1 Motivation	Capacity Increase
5.2 Customer Benefit	SERVICE IMPROVEMENT

6. Marking of parts / traceability of change

6.1 Description	Dedicated Finished Good Codes
-----------------	-------------------------------

7. Timing / schedule

7.1 Date of qualification results	2020-12-18
7.2 Intended start of delivery	2021-03-31
7.3 Qualification sample available?	Upon Request

8. Qualification / Validation

8.1 Description	12514 Validation.pdf		
8.2 Qualification report and qualification results	Available (see attachment)	Issue Date	2021-01-20

9. Attachments (additional documentations)

10. Affected parts		
10. 1 Current		10.2 New (if applicable)
10.1.1 Customer Part No	10.1.2 Supplier Part No	10.1.2 Supplier Part No
	VNL5050N3TR-E	
	VNL5090N3TR-E	
	VNL5160N3TR-E	

IMPORTANT NOTICE – PLEASE READ CAREFULLY

Subject to any contractual arrangement in force with you or to any industry standard implemented by us, STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers' products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2018 STMicroelectronics – All rights reserved

PRODUCT/PROCESS CHANGE NOTIFICATION

TITLE	VIPower M05 in SOT-223: Conversion to Copper Wire and Mold Compound Change
IMPACTED PRODUCTS	See list
MANUFACTURING STEP	Assembly
INVOLVED PLANT	Subcontractor TongFu (former Fujitsu) – CHINA
CHANGE REASON	Capacity Increase - Product Optimization
CHANGE DESCRIPTION	<p>On VIPower products housed in SOT223 the following changes will be implemented:</p> <ul style="list-style-type: none"> - Cu 2 mils bonding wire replacing current Au 2 mils bonding wire - Molding Compound HITACHI CEL8240HF10NF replacing current SUMITOMO EMEG600F <p>No modifications of the current Assembly Process Flow.</p>
TRACEABILITY	New dedicated Finished Good Code (Internal Part Number)
VALIDATION	<p>According to AEC-Q100 qualification plan for Integrated Circuits and ZVEI Guidelines:</p> <p>SEM-PA-08 Change of wire bonding SEM-PA-11 Change of Mold Compound</p>
REPORTS	<p>Qualification included to this communication</p> <p>12514 Validation.pdf</p>



Public Products List

Public Products are off the shelf products. They are not dedicated to specific customers, they are available through ST Sales team, or Distributors, and visible on ST.com

PCN Title : VIPower M05 in SOT-223: Conversion to Copper Wire and Mod Compound Change

PCN Reference : ADG/21/12514

Subject : Public Products List

Dear Customer,

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

VNL5050N3TR-E	VNL5090N3TR-E	VNL5160N3TR-E
---------------	---------------	---------------



IMPORTANT NOTICE – PLEASE READ CAREFULLY

Subject to any contractual arrangement in force with you or to any industry standard implemented by us, STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers' products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.



life.augmented

**VIPower® in M0-5 Technology in SOT-223
package in TongFu (Fujitsu) plant:
conversion from 2.0 mils Au to 2.0 mils Cu wire
and mold compound change.**

Agenda

3 Change Description

7 Conclusions

4 Bill Of Material Comparison

5 ZVEI Guidelines

6 Selected Test Vehicles

Change description

- Aim of this document is to describe the qualification activity performed to convert the 2.0mils gold wire to 2.0mils copper wire and to qualify the new mold compound halogen free for the VIPower® products in M0-5 Technology.
- The package SOT-223 is assembled in TongFu (Fujitsu) plant.
- Detailed qualification activity has been performed in order to qualify the 2.0 mils copper wire and the halogen free mold compound.
- This report shows the positive results achieved. The new materials are ensuring the same quality and electrical characteristics as the current products assembled in SOT-223 package.
- All reliability tests (2x AEC-Q100 requirement) have been completed with positive results.

Bill Of Material Comparison

Actual Bill of Material	
ITEM	MATERIAL
WIRE	2.0 MILS Au
FRAME	FRAME TO-263
SOFT SOLDER	DIE ATTACH 95.5Pb/2Sn/2.5Ag
MOLD COMPOUND	SUMITOMO EMEG600F



New Bill of Material	
ITEM	MATERIAL
WIRE	2.0 MILS Cu
FRAME	FRAME TO-263
SOFT SOLDER	DIE ATTACH 95.5Pb/2Sn/2.5Ag
MOLD COMPOUND	HITACHI CEL8240HF10NF

ZVEI Guidelines

- According to ZVEI recommendations, the notification is required.

		Assessment of impact on Supply Chain regarding following aspects - contractual agreements - technical interface of processability/manufacturability of customer - form, fit, function, quality performance, reliability		Remaining risks within Supply Chain?		Understanding of semiconductors experts	Examples to explain	
	ID	Type of change		No	Yes			
		ANY						
		DATA SHEET						
		DESIGN						
		PROCESS - WAFER PRODUCTION						
		BARE DIE						
		PROCESS - ASSEMBLY						
x	SEM-PA-08	Change of wire bonding			P	P	Material, diameter, change in bonding diagram and / or change in process resulting in a new technology.	e.g. change from Au to Cu material e.g. change from 25µm to 23µm diameter e.g. change from single to double bond e.g. change from stitch bond to stitch on ball bond
x	SEM-PA-11	Change of mold compound / encapsulation material			P	P	Change of mold compound / encapsulation material.	e.g. change to green mold compound e.g. change of filler particles

Selected Test Vehicles

- VIPower® M0-5 Technology:
 - SOT-223 : VNL5050N3TR-E (Silicon Line VNR103)
 - SOT-223 : VNL5160N3TR-E (Silicon Line VNL203)
 - SOT-223 : VNL5090N3TR-E (Silicon Line VNY903)

Conclusions

- Detailed qualification activity has been performed in order to qualify the 2.0 mils copper wire and the halogen free mold compound.
- All reliability tests (2x AEC-Q100 requirement) have been completed with positive results.
- Neither functional nor parametric rejects were detected at final electrical test.
- This report shows the positive results achieved. The new materials are ensuring the same quality and electrical characteristics as the current products assembled in SOT-223 package.

Reliability Evaluation Report new BOM in SOT223 package SC-NANTONG FUJITSU

General Information	
Commercial Product :	VNL5050N3-E, VNL5160N3-E, VNL5090N3-E
Product Line :	VNR1, VNL2, VNY9
Package :	SOT223
Silicon Technology :	VIPOWER M05

Note: this report is a summary of the reliability trials performed in good faith by STMicroelectronics in order to evaluate the electronic device conformance to its specific mission profile for Automotive Application. This report and its contents shall not be disclosed to a third party without previous written agreement from STMicroelectronics or under the approval of the author (see below).

Revision history

Rev.	Changes description	Author	Date
A	Initial Release	A. Vilaro	Jan 14, 2021

Approved by

Function	Location	Name	Date
Division Reliability Manager	ST Catania (Italy)	A. Marmoni	Jan 14, 2021

TABLE OF CONTENTS

1	RELIABILITY EVALUATION OVERVIEW.....	3
1.1	OBJECTIVE	3
1.2	RELIABILITY STRATEGY AND TEST PLAN	3
1.2.1	<i>Reliability strategy.....</i>	<i>3</i>
1.2.2	<i>Test Plan.....</i>	<i>4</i>
1.3	CONCLUSION	5
2	PRODUCT CHARACTERISTICS	6
2.1	GENERALITIES	6
2.2	PIN CONNECTION	9
2.3	BLOCK DIAGRAM.....	9
2.4	BONDING DIAGRAM	9
2.5	TRACEABILITY	10
2.5.1	<i>Wafer Fab information.....</i>	<i>10</i>
2.5.2	<i>Assembly information.....</i>	<i>10</i>
2.5.3	<i>Reliability testing information.....</i>	<i>10</i>
3	TESTS RESULTS SUMMARY	10
3.1	LOT INFORMATION	10
3.2	TEST RESULTS SUMMARY	11
3.2.1	<i>Additional Tests Results Summary (Robustness/AEC Q006).....</i>	<i>16</i>
	TERMS OF USE	17

1 RELIABILITY EVALUATION OVERVIEW

1.1 Objective

Aim of this report is to present the results of the reliability evaluation following the introduction of new BOM in **SOT223** package assembled in SC-NANTONG FUJITSU (CHINA) assembly plant; in particular, have been evaluated the introduction of CU wire and a new molding compound.

For this evaluation have been chosen the following test vehicles:

VNL5050N3-E (VNR1 as ST internal silicon line), **VNL5160N3-E** (VNL2 as ST internal silicon line) and **VNL5090N3-E** (VNY9 as ST internal silicon line).

These devices are monolithic devices, made using STMicroelectronics VIPower® technology, intended for driving resistive or inductive loads for automotive applications, designed in M05 OMNIFET technology, diffused in ST SG6 Ang Mo Kio (Singapore), 6" wafer Fab. and assembled in SOT223 package in SC-NANTONG FUJITSU (CHINA) assembly plant.

1.2 Reliability Strategy and Test Plan

1.2.1 Reliability strategy

Reliability trials performed as part of this reliability evaluation are in agreement with ST 0061692 and **AEC Q100 rev. H Grade 1** specification and are listed in below Test Plan. For details on test conditions, generic data used and specifications references refer to test results summary in section 3.

An extended reliability (2x AEC-Q100 requirement) through selected stress test with relevant Construction Analysis is also performed to cover **AEC-Q006** requirement.

1.2.2 Test Plan

AEC-Q100 TEST PLAN

TEST GROUP	TEST NAME	DESCRIPTION / COMMENTS	TEST FLAG
A Accelerated Environment Stress Tests	PC (JL3)	Preconditioning (JL3+3 reflows simulation)	Yes
	THB	Temperature Humidity Bias	Yes
	AC	Autoclave at 2atm	Yes
	TC	Temperature Cycling	Yes
	PTC	Power Temperature Cycling	Yes
	HTSL	High Temperature Storage Life	Yes
B Accelerated Lifetime Simulation Tests	HTOL	High Temperature Operating Life	Yes
	ELFR	Early Life Failure Rate	Yes
	EDR	Endurance Data Retention	Not Applicable
C Package Assembly Integrity Tests	WBS	Wire Bond Shear	Yes
	WBP	Wire Bond Pull	Yes
	SD	Solderability	Yes
	PD	Physical Dimension	Yes
	SBS	Solder Ball Shear	Not Applicable
	LI	Lead Integrity	Not Applicable
D Die Fabrication Reliability Tests	Test list is reported in section 5	Performed during process qualification	Not Applicable
E Electrical Verification Tests	ESD (HBM)	Electrostatic Discharge (Human Body Model)	Not Applicable
	ESD (CDM)	Electrostatic Discharge (Charged Device Model)	Not Applicable
	LU	Latch Up	Not Applicable
	ED	Electrical distribution	Yes
	FG	Fault grading	Not Applicable
	CHAR	Characterization	Not Applicable
	EMC	Electromagnetic Compatibility	Not Applicable
	SC	Short Circuit Characterization	Yes
	SER	Soft Error Rate	Not Applicable
	LF	Lead(Pb) Free: (see AEC-Q005)	Not Applicable
F Defect Screening Tests	Test list is reported in section 5	To be implemented starting from first production lot	No
G Cavity Package Integrity Tests	Test list is reported in section 5	N/A: not for plastic packaged devices	Not Applicable

AEC-Q100 TEST PLAN – Robustness / AEC-Q006

TEST GROUP	TEST NAME	DESCRIPTION / COMMENTS	TEST FLAG
A Accelerated Environment Stress Tests	THB	Temperature Humidity Bias	Yes
	TC	Temperature Cycling	Yes
	PTC	Power Temperature Cycling	Yes
	HTSL	High Temperature Storage Life	Yes

In the below table a comparison between the AEC-Q100 and ZVEI requirements vs the applied ST qualification plan is reported:

	Test Group A					Test Group B		Test Group C				Test Group D					Test Group E						
	THB	AC	TC	PTC	HTSL	HTOL	ELFR	WBS	WBP	SD	PD	EM	Tddb	HCI	NBTI	SM	HBM	CDM	LU	ED	EMC	SC	
AEC-Q100	x	x	x	x	x	x	x	x	x	x	x	x								x		x	
ZVEI	x	x	x	x	x	x	x	x	x	x	x	x								x		x	
ST	x	x	x	x	x	x	x	x	x	x	x									x			

Rationale for ST qualification plan:

- EM: not performed because change is not directly linked to Electromigration phenomena


1.3 Conclusion

All reliability tests (2x AEC-Q100 requirement) have been completed with positive results. Neither functional nor parametric rejects were detected at final electrical testing.

Wire Bond Pull/Shear tests (WBP, WBS) as Package Assembly Integrity (test Group C) performed before and after the package oriented stress test pointed out neither abnormal break loads nor forbidden failure modes. SAM analysis performed after the package oriented stress test, pointed out no delamination at the Die/Molding Compound, Die-Pad/Molding Compound and Die Attach Material interfaces.

2. Product Characteristics

2.1. Generalities

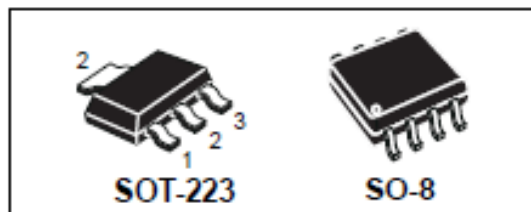


VNL5050N3-E
VNL5050S5-E

OMNIFET III

fully protected low-side driver

Datasheet - production data



Features

Type	V_{olamp}	$R_{DS(on)}$	I_D
VNL5050N3-E	41 V	50 mΩ	19 A
VNL5050S5-E			

- Automotive qualified
- Drain current: 19 A
- ESD protection
- Overvoltage clamp
- Thermal shutdown
- Current and power limitation
- Very low standby current
- Very low electromagnetic susceptibility
- Compliant with European directive 2002/95/EC
- Open drain status output (VNL5050S5-E only)

Description

The VNL5050N3-E and VNL5050S5-E are monolithic devices made using STMicroelectronics VIPower® Technology, intended for driving resistive or inductive loads with one side connected to the battery.

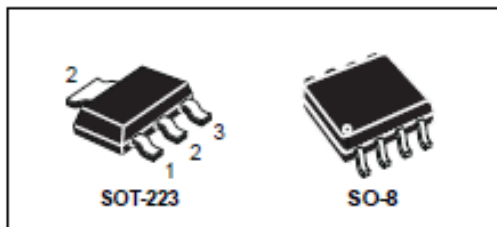
Built-in thermal shutdown protects the chip from overtemperature and short-circuit. Output current limitation protects the devices in an overload condition. In case of long duration overload, the devices limit the dissipated power to a safe level up to thermal shutdown intervention. Thermal shutdown, with automatic restart, allows the devices to recover normal operation as soon as a fault condition disappears. Fast demagnetization of inductive loads is achieved at turn-off.



VNL5160N3-E VNL5160S5-E

OMNIFET III fully protected low-side driver

Datasheet - production data



Description

The VNL5160N3-E and VNL5160S5-E are monolithic devices, made using STMicroelectronics® VIPower® Technology, intended for driving resistive or inductive loads with one side connected to the battery. Built-in thermal shutdown protects the chip from overtemperature and short circuit. Output current limitation protects the devices in an overload condition. In the case of a long duration overload, the device limits the dissipated power to a safe level up to thermal shutdown intervention. Thermal shutdown, with automatic restart, allows the device to recover normal operation as soon as a fault condition disappears. Fast demagnetization of inductive loads is achieved at turn-off.

Features

Type	V_{olamp}	$R_{DS(on)}$	I_D
VNL5160N3-E	41 V	160 mΩ	3.5 A
VNL5160S5-E			

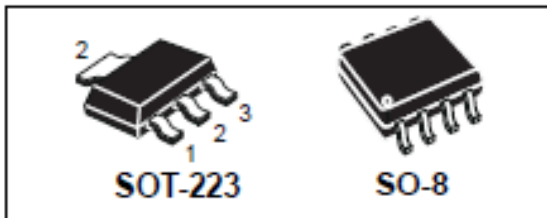
- Automotive qualified
- Drain current: 3.5A
- ESD protection
- Overvoltage clamp
- Thermal shutdown
- Current and power limitation
- Very low standby current
- Very low electromagnetic susceptibility
- In compliance with the 2002/95/EC European directive
- Open drain status output (VNL5160S5-E only)
- Specially intended for R10W or 2x R5W automotive signal lamps



VNL5090N3-E, VNL5090S5-E

OMNIFET III fully protected low-side driver

Datasheet - production data



Description

The VNL5090N3-E and VNL5090S5-E are monolithic devices made using STMicroelectronics® VIPower® technology, intended for driving resistive or inductive loads with one side connected to the battery. Built-in thermal shutdown protects the chip from overtemperature and short-circuit.

Output current limitation protects the devices in an overload condition. In case of long duration overload, the device limits the dissipated power to a safe level up to thermal shutdown intervention. Thermal shutdown, with automatic restart, allows the devices to recover normal operation as soon as a fault condition disappears. Fast demagnetization of inductive loads is achieved at turn-off.

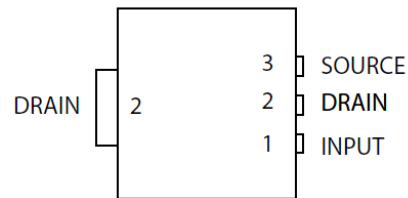
Features

Type	V_{olamp}	$R_{DS(on)}$	I_D
VNL5090N3-E	41 V	90 mΩ	13 A
VNL5090S5-E			

- Automotive qualified
- Drain current: 13 A
- ESD protection
- Overvoltage clamp
- Thermal shutdown
- Current and power limitation
- Very low standby current
- Very low electromagnetic susceptibility
- Compliant with European directive 2002/95/EC
- Open drain status output (VNL5090S5-E only)
- Specially intended for 2 x R10W or 4 x R5W automotive signal lamps

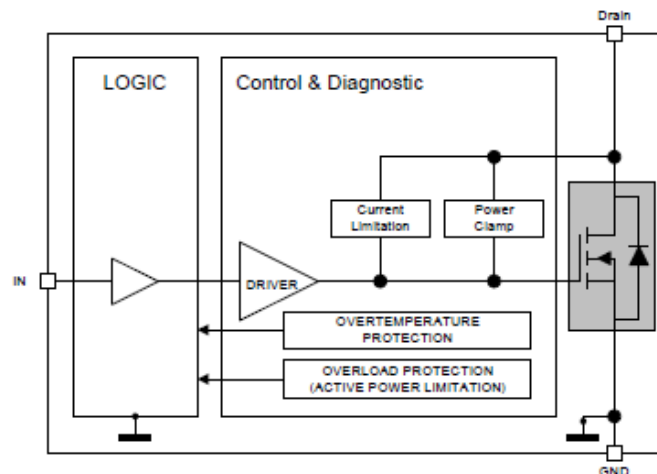
2.2. Pin connection

VNL5050N3-E, VNL5160N3-E, VNL5090N3-E



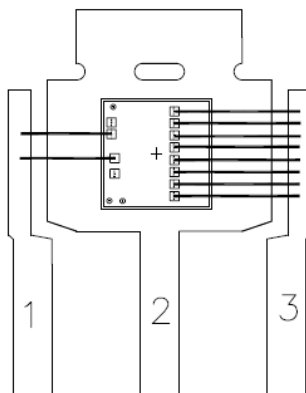
2.3. Block diagram

VNL5050N3-E, VNL5160N3-E, VNL5090N3-E

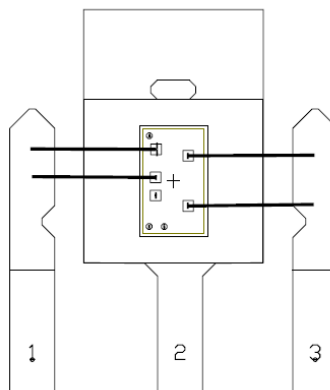


2.4. Bonding diagram

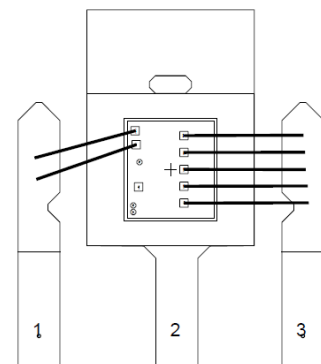
VNL5050N3-E



VNL5160N3-E



VNL5090N3-E



2.5 Traceability

2.5.1 Wafer Fab information

Device	VNL5050N3-E	VNL5160N3-E	VNL5090N3-E
Wafer fab name / location	ST Singapore SG6		
Wafer diameter (inches)	6"		
Silicon process technology	VIPower M05		
Die finishing front side	SiN/POLYIMIDE		
Die finishing back side	Ti-Ni-Au		
Die size (micron)	2010 x 2010	1720 x 1060	1720 x 1550
Metal levels/ materials/ thicknesses	2 level; Metal 1 Ti/TiTi/ALSiCu/TiN (0.780µm); Metal 2 Ti/TiN/Ti/ALSiCu (3.200µm)		

2.5.2 Assembly information

Device	VNL5050N3-E	VNL5160N3-E	VNL5090N3-E
Assembly plant name / location	SC -NANTONG FUJITSU		
Package description	SOT223		
Lead frame finishing (material/thickness)	SOT223D(S-AG) stamp PSJ	SOT-223 STD (SC FUJITSU)	SOT-223 STD (SC FUJITSU)
Die attach material	SOFT SOLDER DIE ATTACH 95.5Pb/2Sn/2.5Ag		
Wire bonding material/diameter	Cu 2.0 mils		
Molding compound material	HITACHI CEL8240HF10NF		
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL3		

2.5.3 Reliability Testing information

Reliability laboratory location	ST Catania (Italy), ST Shenzhen (China)
---------------------------------	---

3 TESTS RESULTS SUMMARY

3.1 Lot Information

Lot #	Diffusion Lot	Assy Lot	Note
1	6908KT5	GK9520JD01	VNL5050N3-E
2	6938H5K	GK9520JB01	VNL5160N3-E
3	6908HLE	GK9520JC01	VNL5090N3-E
4	6721T46	GK8170HJRP	VNL5050N3-E
5	6721T46	GK8170HHRK	VNL5050N3-E
6	6723PPX	GK8170HLRR	VNL5090N3-E

3.2 Tests results summary

Test method revision reference is the one active at the date of reliability trial execution.

TEST GROUP A – ACCELERATED ENVIRONMENT STRESS TESTS

Test	#	Reference	AEC-Q100 STM Test Conditions	Lots	S.S.	Total	Results FAIL/SS/Lots	Comments
PC	A1	JESD22-A113 J-STD-020	24h bake@125°C, including 5 Temperature Cycling Ta=-40°C/+60°C ACC MSL3 (52h@60C/60%RH) 3x Reflow simulation Peak Reflow Temp= 260°C 100 Temperature Cycling Ta=-50°C/+150°C	6	-	969	0/969/6	Performed before THB, AC, TC, PTC HTOL
THB	A2	JESD22 A101 JESD22 A110	Ta=85°C, 85%RH, Duration= 2000hrs	3	77	231	0/77/3	Performed on lots # 4, 5, 6
AC	A3	JESD22 A102 or JESD22 A118 or JESD22- A101	ENV. SEQ. Environmental Sequence TC (Ta=-65°C / +150°C for 100 cycles) + AC (Ta=121°C, Pa=2atm for 96 hours)	3	77	231	0/77/3	Performed on lots # 1, 2, 3
TC	A4	JESD22 A104	Ta=-55°C /+150 °C Duration= 2000 cycles	3	77	231	0/77/3	Performed on lots # 1, 2, 3
PTC	A5	JESD22 A105	Ta=-40°C /+125 °C Duration=2000 cycles	1	45	45	0/45/1	Performed on lot# 4
HTSL	A6	JESD22 A103	Ta= 150°C Duration= 2000hrs	3	77	231	0/77/3	Performed on lots # 1, 2, 3

TEST GROUP B – ACCELERATED LIFETIME SIMULATION TESTS

Test	#	Reference	AEC-Q100 STM Test Conditions	Lots	S.S.	Total	Results FAIL/SS/Lots	Comments
HTOL	B1	JESD22 A108	TJ=150°C Duration= 1000hrs Bias dynamic stress (OLT)	-	-	-	-	
HTOL	B1	JESD22 A108	Ta=150°C Duration= 2000hrs Bias static stress (HTB)	3	77	231	0/77/3	Performed on lots # 4, 5, 6
ELFR	B2	AEC-Q100-008	Ta max=150°C Duration=24hrs	3	800	2400	0/800/3	Performed on lots # 4, 5, 6
EDR	B3	AEC-Q100-005	Specific tests and conditions to be defined in case of NVM	-	-	-	-	Not Applicable

TEST GROUP C – PACKAGE ASSEMBLY INTEGRITY TESTS

Test	#	Reference	AEC-Q100 STM Test Conditions	Lots	S.S.	Total	Results FAIL/SS/Lots	Comments
WBS	C1	AEC-Q100-001 AEC-Q003	Wire Bond Shear: (Cpk > 1.67)	3	min 5 units	min 15 units	All measurement within spec limits	All assembly lots
WBP	C2	Mil-STD-883, Method 2011 AEC-Q003	Wire Bond Pull: (Cpk > 1.67)	3	min 5 units	min 15 units	All measurement within spec limits	All assembly lots
SD	C3	JESD22 B102 JSTD-002D	Solderability: (>95% coverage) 8hr steam aging prior to testing	3	15	45	All measurement within spec limits	All assembly lots
PD	C4	JESD22 B100, JESD22 B108 AEC-Q003	Physical Dimensions: (Cpk > 1.67)	3	10	30	All measurement within spec limits	All assembly lots
SBS	C5	AEC-Q100-010 AEC-Q003	Only for BGA package	-	-	-	-	Not Applicable
LI	C6	JESD22 B105	Not required for Surface Mount Devices	-	-	-	-	Not Applicable

TEST GROUP D – DIE FABRICATION RELIABILITY TESTS

Test	#	Reference	AEC-Q100 STM Test Conditions	Lots	S.S.	Total	Results FAIL/SS/Lots	Comments
EM	D1	JESD61	Data, test method and criteria available upon request	–	–	–	–	Not Applicable
TDDb	D2	JESD35	Data, test method and criteria available upon request	–	–	–	–	Not Applicable
HCI	D3	JESD60 & 28	Data, test method and criteria available upon request	–	–	–	–	Not Applicable
NBTI	D4	JESD90	Data, test method and criteria available upon request	–	–	–	–	Not Applicable
SM	D5	JESD61, 87, & 202	Data, test method and criteria available upon request	–	–	–	–	Not Applicable

TEST GROUP E – ELECTRICAL VERIFICATION

Test	#	Reference	AEC-Q100 STM Test Conditions	Lots	S.S.	Total	Results FAIL/SS/Lots	Comments
TEST	E1	User/Supplier Specification	Pre and Post Stress Electrical Test	All	All	All	Passed	All parametric and functional tests
HBM	E2	AEC-Q100-002	Target: $\pm 2\text{kV}$	–	See test method		–	Not Applicable
CDM	E3	AEC-Q100-011	Target: $\pm 750\text{V}$ on corner pins $\pm 500\text{V}$ all others	–	See test method		–	Not Applicable
LU	E4	AEC-Q100-004	Current Injection Class II – Level A ($\pm 100\text{mA}$)	–	–	–	–	Not Applicable
ED	E5	AEC-Q100-009 AEC-Q003	Electrical Distributions: (Test @ Rm/Hot/Cold) (where applicable, Cpk > 1.67)	3	30	90	Passed	All diffusion lots
EMC	E9	SAE J1752/3	Electromagnetic Compatibility (Radiated Emissions)	–	–	–	–	Not performed
SC	E10	AEC Q100-012	Short Circuit Characterization	3	30	90	Passed	Performed on lots # 4, 5, 6
SER	E11	JESD89-1 JESD89-2 JESD89-3	Applicable to devices with memory	–	–	–	–	Not Applicable
LF	E12	AEC-Q005	Lead(Pb) Free: (see AEC-Q005)	–	–	–	–	Not Applicable

TEST GROUP F – DEFECT SCREENING TESTS

Test	#	Reference	AEC-Q100 STM Test Conditions	Lots	S.S.	Total	Results FAIL/SS/Lots	Comments
PAT	F1	AEC-Q001	Process Average Testing: (see AEC-Q001)	Not performed on qualification lots. It will be implemented starting from first production lot				
SBA	F2	AEC-Q002	Statistical Bin/Yield Analysis: (see AEC-Q002)					

TEST GROUP G – CAVITY PACKAGE INTEGRITY TESTS

Test	#	Reference	AEC-Q100 STM Test Conditions	Lots	S.S.	Total	Results FAIL/SS/Lots	Comments
MS	G1	JESD22 B104	Mechanical Shock					Not Applicable: not for plastic packaged devices
VFV	G2	JESD22 B103	Variable Frequency Vibration					
CA	G3	MIL-STD-883 Method 2001	Constant Acceleration					
GFL	G4	MIL-STD-883 Method 1014	Gross and Fine Leak					
DROP	G5		Drop Test, Package Drop					
LT	G6	MIL-STD-883 Method 2004	Lid Torque					
DS	G7	MIL-STD-883 Method 2019	Die Shear					
IWV	G8	MIL-STD-883 Method 1018	Internal Water Vapor					

3.2.1 Additional Tests Results Summary (Robustness/AEC Q006)

Test	#	Reference	AEC-Q100 STM Test Conditions	Lots	S.S.	Total	Results FAIL/SS/Lots	Comments
THB	A2	JESD22 A101 JESD22 A110	Ta=85°C, 85%RH, Duration= 2000hrs	3	72	216	0/72/3	5 units/assembly lot used for physical analysis after 1000hrs
TC	A4	JESD22 A104	Ta=-55°C /+150 °C Duration= 2000 cyc	3	72	216	0/72/3	5 units/assembly lot used for physical analysis after 1000 cy
PTC	A5	JESD22 A105	Ta=-40°C /+125 °C Duration=1000 cycles	1	45	45	0/45/1	Performed on lots # 4,
HTSL	A6	JESD22 A103	Ta= 150°C Duration= 2000hrs	3	72	225	0/72/3	5 units/assembly lot used for physical analysis after 1000hrs

TERMS OF USE

BY ACCEPTING THIS REPORT, YOU AGREE TO THE FOLLOWING TERMS OF USE:

This Reliability Evaluation Report (the "Report") and all information contained herein is the property of STMicroelectronics ("ST") and is provided solely for the purpose of obtaining general information relating to an ST product. Accordingly, you hereby agree to make use of this Report solely for the purpose of obtaining general information relating to the ST product. You further acknowledge and agree that this Report may not be used in or in connection with any legal or administrative proceeding in any court, arbitration, agency, commission or other tribunal or in connection with any action, cause of action, litigation, claim, allegation, demand or dispute of any kind. You further acknowledge and agree that this Report shall not be construed as an admission, acknowledgement or evidence of any kind, including, without limitation, as to the liability, fault or responsibility whatsoever of ST or any of its affiliates, or as to the accuracy or validity of the information contained herein, or concerning any alleged product issue, failure, or defect. ST does not promise that this Report is accurate or error free and specifically disclaims all warranties, express or implied, as to the accuracy of the information contained herein. Accordingly, you agree that in no event will ST or its affiliates be liable to you for any direct, indirect, consequential, exemplary, incidental, punitive, or other damages, including lost profits, arising from or relating to your reliance upon or use of this Report. You further acknowledge and agree that the use of this Report in violation of these Terms of Use would cause immediate and irreparable harm to ST which could not adequately be remedied by damages. You therefore agree that injunctive relief is an appropriate remedy to enforce these Terms of Use.

Disclosure of this document to any non-authorized party must be previously authorized by ST only under the provision of a proper confidentiality contractual arrangement executed between ST and you and must be treated as strictly confidential.

At all times you will comply with the following security rules:

- Do not copy or reproduce all or part of this document
- Keep this document locked away
- Further copies can be provided on a "need to know basis", Please contact your local ST Sales Office or document writer

Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgement, including, without limitation, the warranty provisions thereunder.

In that respect please note that ST products are not designed for use in some specific applications or environments described in above mentioned terms and conditions.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers' products.

Information furnished is believed to be accurate and reliable. However, ST assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license, express or implied, to any intellectual property right is granted by ST herein.

ST and ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior version of this document.

©2020 STMicroelectronics – All rights reserved