PRODUCT / PROCESS CHANGE NOTIFICATION

1. PCN basic data	
1.1 Company	STMicroelectronics International N.V
1.2 PCN No.	ADG/20/12472
1.3 Title of PCN	MDmesh™ DM6 Technology Power MOSFET Transistors 8” Wafer Front-end Capacity Extension (SG8” Singapore) - AUTOMOTIVE
1.4 Product Category	Power MOSFET HV
1.5 Issue date	2020-12-09

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	Maurizio GIUDICE
2.1.2 Marketing Manager	Paolo PETRALI
2.1.3 Quality Manager	Vincenzo MILITANO

3. Change		
3.1 Category	3.2 Type of change	3.3 Manufacturing Location
Transfer	Line transfer for a full process or process brick (process step, control plan, recipes) from one site to another site: Wafer fabrication	SG8" (Singapore)

4. Description of change		
	Old	New
4.1 Description	MDmesh™ DM6 Technology is manufactured in the 6” wafer line of (SG6” Singapore)	MDmesh™ DM6 Technology will be manufactured in the 8” wafer line of (SG8” Singapore)
4.2 Anticipated Impact on form,fit, function, quality, reliability or processability?	no impact	

5. Reason / motivation for change	
5.1 Motivation	Capacity Extension
5.2 Customer Benefit	CAPACITY INCREASE

6. Marking of parts / traceability of change	
6.1 Description	by FG code and Q.A. number

7. Timing / schedule	
7.1 Date of qualification results	2020-11-18
7.2 Intended start of delivery	2021-05-20
7.3 Qualification sample available?	Upon Request

8. Qualification / Validation			
8.1 Description	12472 Rel08-2020_V2.pdf		
8.2 Qualification report and qualification results	Available (see attachment)	Issue Date	2020-12-09

9. Attachments (additional documentations)
12472 Public product.pdf 12472 MDmesh™ DM6 Tech Power MOSFET Trans 8 Wafer Front-end Capacity Extension - SG8.pdf 12472 Rel08-2020_V2.pdf

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
	STB41N40DM6AG	
	STB47N50DM6AG	
	STB47N60DM6AG	
	STH47N60DM6-2AG	
	STI47N60DM6AG	

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Reliability evaluation report for

MDmesh™ DM6 Technology 8" Wafer Front-end Capacity Extension (SG8" Singapore)
AUTOMOTIVE
Process change

General Information	
Commercial Product	: *STHU36N60DM6AG* *STHU47N60DM6AG* *STB47N60DM6AG* *STB41N40DM6AG* *STI47N60DM6AG* *STW72N60DM6AG* *STWA72N60DM6AG*
Product Line	: PQ6KA1 – PQ6LA1– PQ4LA1- PQ6BA1
Product Description	: Power MOSFET
Package	: HU3PAK - D^2PAK- *I^2PAK* *TO-247 - TO-247 Long Leads*
Silicon Technology	: MDmesh™ DM6
Division	: Power Transistor Macro-Division

Traceability	
Diffusion Plant	: SG8" (Singapore)
Assembly Plant	: Amkor ATJ6 (Japan) Shenzhen (China) Tongfu Microelectronics (China) subcontractor
Reliability Lab	: Catania (Italy)
Reliability Assessment	
Passed	☒

Disclaimer: *this report is a summary of the qualification plan results performed in good faith by STMicroelectronics to evaluate the electronic devices conformance to its specific mission profile. This report and its contents shall not be disclosed to a third party, except in full, without previous written agreement by STMicroelectronics or under the approval of the author (see below)*

REVISION HISTORY

Version	Date	Author	Changes description
1.0	21 October 2020	G. MANOLA	Final Report

TABLE OF CONTENTS

1. RELIABILITY EVALUATION OVERVIEW

1.1 Objective

Reliability evaluation plan for MDmesh™ DM6 Technology 8" Wafer Front-end Capacity Extension (SG8" Singapore).

1.2 Reliability Test Plan

Reliability tests performed on this device are in agreement with ZVEI Guidelines and are listed in the Test Plan.
For details on test conditions, generic data used and spec reference see test results summary at Par.3 .

#	Stress	Abrv	Reference	Data type	Test flag	Comments
1	Pre and Post-Stress Electrical Test	TEST	User specification or supplier's standard Specification	1	Y	
2	External Visual	EV	JESD22B-101	1	Y	
3	Parametric Verification	PV	User specification	1	Y	
4	High Temperature Reverse Bias	HTRB	MIL-STD-750-1 M1038 Method A	1	Y	
5	High Temperature Gate Bias	HTGB	JESD 22A-108	1	Y	
6	Pre-conditioning	PC	JESD22A-113	1	Y	
7	Temperature Cycling	TC	JESD22A-104	1	Y	
7a	Temperature Cycling Hot Test	TCHT	JESD22A-104	1	Y	
7a alt	TC Delamination Test	TCDT	JESD22A-104	1	Y	
8	Autoclave	AC	JESD22A-102	1	Y	
9	High Humidity High Temperature Reverse Bias	H3TRB	JESD22A-101	1	Y	
10	Intermittent Operational Life / Thermal Fatigue	IOL / TF	MIL-STD-750 Method 1037	1	Y	
11	ESD Characterization	ESD (HBM,CDM)	AEC Q101-001 and 005	1	Y	
12	Destructive Physical Analysis	DPA	AEC-Q101-004 Section 4	1	Y	
13	Thermal Resistance	TR	JESD24-3, 24-4, 24-6 as appropriate	3	Y	
14	Wire Bond Strength	WBS	MIL-STD-750 Method 2037	3	Y	
15	Bond Shear	BS	AEC-Q101-003	3	Y	
16	Die Shear	DS	MIL-STD-750 Method 2017	3	Y	
17	Dielectric Integrity	DI	AEC-Q101-004 section 3	3	Y	

1.3 Conclusion

All reliability tests have been completed with positive results. Neither functional nor parametric rejects were detected at final electrical testing.
Parameter drift analysis performed on samples submitted to die and package oriented test showed a good stability of the main electrical monitored parameters.
Package oriented tests have not put in evidence any criticality.
ESD is accordance with ST spec.

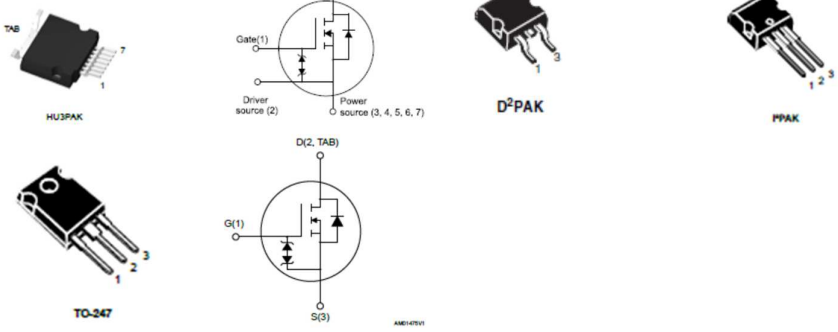
On the basis of the overall results obtained, we can give a positive judgment on the reliability evaluation for MDmesh™ DM6 Technology 8" Wafer Front-end Capacity Extension for Automotive product, in details STHU36N60DM6AG, STH47N60DM6-7TAG,STB47N60DM6AG, STB41N40DM6AG and STI47N60DM6AG diffused in SG8" (Singapore) Fab and assembled in ST Shenzhen (China) and Amkor ATJ6 (Japan) subcontractor, in agreement with ZVEI Guidelines.
A further report version will be released as soon as the results on products STW72N60DM6AG-STWA72N60DM6AG will be available.

2. DEVICE/TEST VEHICLE CHARACTERISTICS

2.1 Generalities

Power MOSFET

2.2 Pin Connection



2.3 Traceability

Reference “Product Baseline” document if existing, else provide following chapters/information:

D.U.T.: STHU36N60DM6AG PACKAGE: HU3PAK

Wafer fab information	
Wafer fab manufacturing location	SG8” (Singapore)
Wafer diameter (inches)	8”
Silicon process technology	MDmesh™ DM6
Die finishing front side (passivation)	TEOS + SiN
Die finishing back side	Ti/Ni/Ag
Die area (Stepping die size)	6330 x 4610 µm^2
Metal levels/Materials	1 / AlCu

Assembly Information	
Assembly plant location	Amkor ATJ6 (Japan)
Package code description	HU3PAK
Lead frame/Substrate	HU3PAK Lead Frame TypeA
Die attach material	PREFORM Pb/Ag/Sn
Wires bonding materials/diameters	**Gate:** Al 5 mils - Source: Al 15mils
Molding compound	Halogen present

D.U.T.: STHU47N60DM6AG PACKAGE: HU3PAK

Wafer fab information	
Wafer fab manufacturing location	SG8” (Singapore)
Wafer diameter (inches)	8”
Silicon process technology	MDmesh™ DM6
Die finishing front side (passivation)	TEOS + SiN
Die finishing back side	Ti/Ni/Ag
Die area (Stepping die size)	6850 x 5080 µm^2
Metal levels/Materials	1 / AlCu

Assembly Information	
Assembly plant location	Amkor ATJ6 (Japan)
Package code description	HU3PAK
Lead frame/Substrate	HU3PAK Lead Frame TypeA
Die attach material	PREFORM Pb/Ag/Sn
Wires bonding materials/diameters	Gate: Al 5 mils - Source: Al 15mils
Molding compound	Halogen present

D.U.T.: STB47N60DM6AG PACKAGE: D²PAK

Wafer fab information	
Wafer fab manufacturing location	SG8" (Singapore)
Wafer diameter (inches)	8"
Silicon process technology	MDmesh™ DM6
Die finishing front side (passivation)	TEOS + SiN
Die finishing back side	Ti/Ni/Ag
Die area (Stepping die size)	6850 x 5080 µm²
Metal levels/Materials	1 / AlCu

Assembly Information	
Assembly plant location	Shenzhen (China)
Package code description	D²PAK
Lead frame/Substrate	TO263 Dt Ver 5 Opt D/G/H 40u Selected NiNiP
Die attach material	PREFORM Pb/Ag/Sn
Wires bonding materials/diameters	Gate: Al/Mg 5 mils - Source: Al 15mils
Molding compound	Halogen present

D.U.T.: STB41N40DM6AG PACKAGE: D²PAK

Wafer fab information	
Wafer fab manufacturing location	SG8" (Singapore)
Wafer diameter (inches)	8"
Silicon process technology	MDmesh™ DM6
Die finishing front side (passivation)	TEOS + SiN
Die finishing back side	Ti/Ni/Ag
Die area (Stepping die size)	6850 x 5080 µm²
Metal levels/Materials	1 / AlCu

Assembly Information	
Assembly plant location	Shenzhen (China)
Package code description	D²PAK
Lead frame/Substrate	TO263 Dt Ver 5 Opt D/G/H 40u Selected NiNiP
Die attach material	PREFORM Pb/Ag/Sn
Wires bonding materials/diameters	Gate: Al/Mg 5 mils - Source: Al 15mils
Molding compound	Halogen present

D.U.T.: STI47N60DM6AG PACKAGE: I^2PAK

Wafer fab information	
Wafer fab manufacturing location	SG8" (Singapore)
Wafer diameter (inches)	8"
Silicon process technology	MDmesh™ DM6
Die finishing front side (passivation)	TEOS + SiN
Die finishing back side	Ti/Ni/Ag
Die area (Stepping die size)	6850 x 5080 μm^2
Metal levels/Materials	1 / AlCu

Assembly Information	
Assembly plant location	Shenzhen (China)
Package code description	I^2PAK
Lead frame/Substrate	TO220 Mon Ver 5 Opt D/M/Q Selected NiNiP
Die attach material	PREFORM Pb/Ag/Sn
Wires bonding materials/diameters	Gate: Al/Mg 5 mils - Source: Al 15mils
Molding compound	Halogen present

D.U.T.: STW72N60DM6AG PACKAGE: TO-247

Wafer fab information	
Wafer fab manufacturing location	SG8" (Singapore)
Wafer diameter (inches)	8"
Silicon process technology	MDmesh™ DM6
Die finishing front side (passivation)	TEOS + SiN
Die finishing back side	Ti/Ni/Ag
Die area (Stepping die size)	9680 x 6560 μm^2
Metal levels/Materials	1 / AlCu

Assembly Information	
Assembly plant location	Shenzhen (China)
Package code description	TO-247
Lead frame/Substrate	TO247 3L Mon Ver 6 Opt A/Q Selected NiNiP
Die attach material	PREFORM Pb/Ag/Sn
Wires bonding materials/diameters	Gate: Al/Mg 5 mils - Source: Al 15mils
Molding compound	Halogen Free

D.U.T.: STWA72N60DM6AG PACKAGE: TO-247 long leads

Wafer fab information	
Wafer fab manufacturing location	SG8" (Singapore)
Wafer diameter (inches)	8"
Silicon process technology	MDmesh™ DM6
Die finishing front side (passivation)	TEOS + SiN
Die finishing back side	Ti/Ni/Ag
Die area (Stepping die size)	9680 x 6560 μm^2
Metal levels/Materials	1 / AlCu

Assembly Information	
Assembly plant location	Tongfu Microelectronics (China) subcontractor
Package code description	TO-247 Long Leads
Lead frame/Substrate	TO247-3A(IP CU) Full Ni raw Cu on frame pad
Die attach material	PREFORM Sn/Ag/Sb
Wires bonding materials/diameters	Gate: Al 5 mils - Source: Al 15mils
Molding compound	Halogen Free

Reliability Testing Information	
Reliability laboratory location	Catania (Italy)
Electrical testing location	Catania (Italy)

3. TESTS RESULTS SUMMARY

3.1 Lot Information

Lot #	Commercial Product	Silicon line	Package	Wafer Fab	Assembly plant	Note
1	STHU36N60DM6AG	PQ6K	HU3PAK	SG8" (Singapore)	Amkor ATJ6 (Japan)	
2	STHU47N60DM6AG	PQ6L				
3	STB47N60DM6AG		D^2PAK		Shenzhen (China)	
4	STB41N40DM6AG	PQ4L				
5	STI47N60DM6AG	PQ6L	I^2PAK			
6	STW72N60DM6AG	PQ6B	TO-247			
7	STWA72N60DM6AG		TO-247 long leads		Tongfu Microelectronics (China) subcontractor	

3.2 Test results summary

Test	Std ref.	Conditions	SS	Steps	Failure/SS						
					Lot 1	Lot 2	Lot 3	Lot 4	Lot 5	Lot 6	Lot 7
TEST	User specification	All qualification parts tested per the requirements of the appropriate device specification.			462	462	462	77	462	-	-
External visual	JESD22B-101	All devices submitted for testing			462	462	462	77	462	-	-
Parametric Verification	User specification	All parameters according to user specification from -55°C to 150°C		125	0/25	0/25	0/25	0/25	0/25	-	-
Silicon oriented tests											
HTRB	MIL-STD-750-1 M1038 Method A	Tj = 150°C, BIAS = 600V	308	1000 h	0/77	0/77	0/77		0/77	-	-
		Tj = 150°C, BIAS = 400V	77					0/77			
HTGB	JESD22A-108	Tj = 150°C, BIAS = 25V	308	1000 h	0/77	0/77	0/77		0/77	-	-
Package oriented tests											
PC	JESD22A-113	Dryng 24H @ 125°C Store 168H @ TA=85°C,RH=85% IR Reflow @ 245°C 3 times	All devices to be subjected to H3TRB,TC, AC, IOL	Final	Pass	Pass	Pass				
TC	JESD22A-104	TA=-55°C TO 150°C	308	1000cy	0/77	0/77	0/77		0/77	-	-
TCHT	JESD22 A-104 Appendix 6	125°C TEST after TC	308		0/77	0/77	0/77		0/77	-	-
		decap and wire pull for parts with internal bond wire sizes 5 mil diameter and less	20		0/5	0/5	0/5		0/5	-	-
TCDT		100% C-SAM inspection after TC	308		Pass	Pass	Pass		Pass	-	-
AC	JESD22A-102	TA=121°C ; PA=2ATM	308	96h	0/77	0/77	0/77		0/77	-	-
H3TRB	JESD22A-101	TA=85°C ; RH=85% BIAS= 100V	308	1000 h	0/77	0/77	0/77		0/77	-	-
IOL	MIL-STD-750 Method 1037	ΔTj ≥100°C	308	15Kcy	0/77	0/77	0/77		0/77	-	-
ESD	AEC Q101-001,002 and 005	CDM / HBM	180		0/30 0/30		0/30 0/30		0/30 0/30	-	-
D.P.A.	AEC-Q101-004 Section 4	Devices after H3TRB - TC	12		0/2 0/2		0/2 0/2		0/2 0/2	-	-
Thermal Resistance	JESD24-3, 24-4, 24-6 as appropriate		10 each Pre-post change		0/10		0/10		0/10	-	-
Wire Bond Strength	MIL-STD-750 Method 2037		10 bonds from min of 5 devices		0/5		0/5		0/5	-	-
Bond Shear	AEC-Q101-003		10 bonds from min of 5 devices 5		0/5		0/5		0/5	-	-
Die Shear	MIL-STD-750 Method 2017		15		0/5		0/5		0/5	-	-
Dielectric Integrity	AEC-Q101-004 section 3		15		0/5		0/5		0/5	-	-

Public Products List

Publict 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 : MDmesh™ DM6 Technology Power MOSFET Transistors 8” Wafer Front-end Capacity Extension (SG8” Singapore) - AUTOMOTIVE

PCN Reference : ADG/20/12472

Subject : Public Products List

Dear Customer,

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

STW36N60DM6AG	STB47N60DM6AG	STH47N60DM6-2AG
STB47N50DM6AG	STI47N60DM6AG	STW47N60DM6AG
STB41N40DM6AG		

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