PRODUCT / PROCESS CHANGE NOTIFICATION

1. PCN basic data	
1.1 Company	STMicroelectronics International N.V
1.2 PCN No.	MDG/21/12439
1.3 Title of PCN	AMKOR (Taiwan) Additional DPS line for WLCSP 12" STM32L4x, STM32L5x, STM32G0x, STM32G4x listed products
1.4 Product Category	STM32G0 128K STM32G03 64K STM32G05 64K STM32G4 128K STM32G4 512K STM32L42x 128K STM32L44x 256K STM32L46x 512KB STM32L4Ax 1MB STM32L4R 2MB STM32L4x 1Mb STM32L5 512K
1.5 Issue date	2021-10-25

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	Ricardo Antonio DE SA EARP
2.1.2 Marketing Manager	Veronique BARLATIER
2.1.3 Quality Manager	Pascal NARCHE

3. Change		
3.1 Category	3.2 Type of change	3.3 Manufacturing Location
Machines	(Not Defined)	Amkor ATT6 TaoYuan (Taiwan)

4. Description of change		
	Old	New
4.1 Description	Existing DPS source: - ASE Kaohsiung Taiwan WLCSP12" - Amkor ATT3 HuKou (Taiwan) WLCSP12"	Already existing DPS source: - ASE Kaohsiung Taiwan WLCSP12" - Amkor ATT3 HuKou (Taiwan) WLCSP12" Additional DPS source - Amkor ATT6 TaoYuan (Taiwan) source for WLCSP12" For more information, please refer to PCN12439 – Additional information attached document.
4.2 Anticipated Impact on form,fit, function, quality, reliability or processability?	no impact	

5. Reason / motivation for change	
5.1 Motivation	Due to the success on the market of STM32 WLCSP devices, ST Microcontrollers Division decided to qualify an additional DPS site to maintain state of the art service level to our customers thanks to extra capacity.
5.2 Customer Benefit	CAPACITY INCREASE

6. Marking of parts / traceability of change	
6.1 Description	traceability ensured by ST internal tools

7. Timing / schedule	
7.1 Date of qualification results	2021-10-15
7.2 Intended start of delivery	2021-12-20
7.3 Qualification sample available?	Upon Request

8. Qualification / Validation			
8.1 Description	12439 MDG-MCD RER2101 V1.0 - PCN12439 - ATT6 Additional DPS line for WLCSP 12'' - Reliability Evaluation Report.pdf		
8.2 Qualification report and qualification results	Available (see attachment)	**Issue Date**	2021-10-25

9. Attachments (additional documentations)
12439 Public product.pdf 12439 MDG-MCD RER2101 V1.0 - PCN12439 - ATT6 Additional DPS line for WLCSP 12'' - Reliability Evaluation Report.pdf 12439 PCN12439_Additional information.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**
	STM32G031Y8Y6TR	
	STM32G071EBY6TR	
	STM32L422TBY6TR	
	STM32L431CBY6TR	
	STM32L431CBY7TR	
	STM32L431CCY6TR	
	STM32L431RBY6TR	
	STM32L431RCY6TR	
	STM32L433CBY6TR	
	STM32L433CCY6TR	
	STM32L433RBY6TR	
	STM32L433RCY3TR	
	STM32L433RCY6TR	
	STM32L443CCY6TR	
	STM32L443RCY6TR	
	STM32L451REY6TR	
	STM32L452REY6TR	
	STM32L462REY6TR	
	STM32L476JEY6TR	
	STM32L476JGY6TR	
	STM32L476JGY7TR	
	STM32L476MEY6TR	
	STM32L476MGY6TR	
	STM32L486JGY6TR	
	STM32L496VGY6PTR	
	STM32L496VGY6TR	
	STM32L4A6VGY6PTR	
	STM32L4A6VGY6TR	
	STM32L4R5ZIY6TR	
	STM32L4R9ZIY6PTR	
	STM32L4R9ZIY6TR	
	STM32L4S9ZIY6TR	
	STM32L562MEY6PTR	

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Reliability Evaluation Report

MDG-MCD-RER2101

AMKOR (Taiwan) Additional DPS line for WLCSP 12"
STM32L4x, STM32L5x, STM32G0x, STM32G4x
products
PCN12439

General Information for TV	
Commercial Product	*: STM32F476MGY6TR*
Product Line	*: 415X66*
Die revision	*: X415CCC4*
Package	*: WLCSP 81L*
Silicon Technology	*: 90nm eFlash Generic TSMC*
Division	*: MDG-MCD*
Reliability Maturity Level	*: 30*

Traceability	
Diffusion Plant	*: TSMC Fab14*
Assembly Plant	*: Amkor ATT1 (Bumping)* *Amkor ATT6 (DPS)*

Reliability Assessment	
Pass	☒
Fail	☐
Investigation required	☐

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. 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).*

Version	Date	Author	Function
1.0	15th Oct 2021	Céline Navarro	MDG-MCD Q&R Technicien

APPROVED BY:

Function	Location	Name	Date
Division Quality Manager	RSST	Pascal NARCHE	15th Oct 2021
Back-end MCD Quality Manager	RSST	Gisele SEUBE	15th Oct 2021

TABLE OF CONTENTS

1 RELIABILITY EVALUATION OVERVIEW

1.1 Objective

The aim of this report is to present results of the reliability evaluation on WLCSP12" Test Vehicle with DPS (Die Processing Services for device singulation and packing in Tape & Reel) in ATT6 site.

This Production Change Notification (PCN12439) concerns AMKOR (Taiwan) Additional DPS line for WLCSP 12" STM32L4x, STM32L5x, STM32G0x, STM32G4x products.

Changes are described here below:

	Current source		Added site
RDL Site (Wafer Level Processing)	ASE Kaohsiung Taiwan WLCSP12"	Amkor T1 Taiwan WLCSP12"	
DPS Site (Die Processing Services)	ASE Kaohsiung Taiwan WLCSP12"	Amkor T3 Taiwan WLCSP12"	Amkor T6 Taiwan WLCSP12"

1.2 Reliability Strategy

Test vehicle is described here below:

Product	Process or Package	Assembly plant
STM32F476MGY6TR	WLCSP 81L	AMKOR ATT1 (Bumping) AMKOR ATT6 (DPS)

Qualification is based on standard STMicroelectronics Corporate Procedures for Quality and Reliability, in full compliancy with the JESD-47 international standard.

1.3 Conclusion

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

According to good reliability tests results in line with validated product mission profile and reliability strategy, the qualification is granted for AMKOR (Taiwan) Additional DPS line for WLCSP 12" STM32L4x, STM32L5x, STM32G0x, STM32G4x products.

Refer to Section 3.0 for reliability test results.

2 TEST VEHICLE CHARACTERISTICS

2.1 Description

Package line	Bumping Line DPS line	Package	Device (RawLine)	Diffusion Process	Number of Lots
WLCSP	AMKOR ATT1 AMKOR ATT6	WLCSP 81L	STM32F476 (00AQ*415ESC4)	TSMC90	3

2.2 Wafer fab information

Table 1

Wafer fab information	
FAB1	
Wafer fab name / location	Fab14 TSMC TAIWAN
Wafer diameter (inches)	12
Wafer thickness (µm)	775µm +/- 25µm
Silicon process technology	TSMC 90nm eFlash Generic
Number of masks	45
Die finishing front side (passivation) materials/thicknesses	PSG + NITRIDE
Die finishing back side Materials/thicknesses	RAW SILICON
Die area (Stepping die size)	3794.4 x 4443.4 µm
Die pad size	123, 59
Sawing street width (X,Y) (µm)	80, 80
Metal levels/Materials/Thicknesses	Metal 1 TaN/Ta/CuSeed/Cu 0.240 µm Metal 2 TaN/Ta/CuSeed/Cu 0.310 µm Metal 3 TaN/Ta/CuSeed/Cu 0.310 µm Metal 4 TaN/Ta/CuSeed/Cu 0.310 µm Metal 5 TaN/Ta/CuSeed/Cu 0.310 µm Metal 6 TaN/Ta/CuSeed/Cu 0.850 µm Metal 7 AlCu 1.450 µm

2.3 Assembly information

Table 2

Assembly Information	
Package 1 – WLCSP81L die 415	
Assembly plant name / location	AMKOR ATT1 (Bumping) & ATT6 (DPS) / KOREA
Pitch (mm)	0.4
Die thickness after back-grinding (µm)	355µm +/-10µm
Die sawing method	Laser Groove + Step cut mechanical
Bill of Material elements	
Balls metallurgy/diameter	Solder ball SACN125 Diam 230um
Routing/Redistribution layer (RDL) material (CSP)	RDL Copper
Passivation material (CSP)	PBO passivation HD8820
Backside coating material/thickness (CSP)	Back side coating PET film 25µm
Package Moisture Sensitivity Level (JEDEC J-STD020D)	1

2.4 Reliability testing information

Table 3

Reliability Testing Information	
Reliability laboratory name / location	ST Grenoble / France

Note: ST is ISO 9001 certified. This induces certification of all internal and subcontractor labs.
ST certification document can be downloaded under the following link:
http://www.st.com/content/st_com/en/support/quality-and-reliability/certifications.html

3 TESTS RESULTS SUMMARY

3.1 Lot information

Table 4

Lot #	Diffusion Lot / Wafer ID	Die Revision (Cut)	Assy Lot / Trace Code	Raw Line	Package
1	9R037010 Wafer 01	Cut 1.3	A5102017	00AQ*415ESC4	WLCSP 81L
2	9R037010 Wafer 02	Cut 1.3	A5102017	00AQ*415ESC4	WLCSP 81L
3	9R037010 Wafer 03	Cut 1.3	A5102017	00AQ*415ESC4	WLCSP 81L

3.2 Test plan and results summary

Table 5 – ACCELERATED ENVIRONMENT STRESS TESTS

Test code	Stress method	Stress Conditions	Lots	S.S.	Total	Results/Lot Fail/S.S.	Comments: (N/A =Not Applicable)
PC	J-STD-020	24h bake@125°C, MSL1 (168h@85C/85%RH) 3x Reflow simulation Peak Reflow Temp= 260°C	3	308	924	Lot1: 0/308 Lot2: 0/308 Lot3: 0/308	
TC	JESD22-A104	Ta=-65/150°C Duration= 500cyc ☒ After PC	3	77	231	Lot 1: 0/77 Lot 2: 0/77 Lot 3: 0/77	
UHAST	JESD22-A118	Ta=130°C ,85% RH Duration= 96hrs ☒ After PC	3	77	231	Lot 1: 0/77 Lot 2: 0/77 Lot 3: 0/77	
HTSL	JESD 22-A103	Ta=150°C, Duration= 1000hrs ☒ After PC	3	77	231	Lot 1: 0/77 Lot 2: 0/77 Lot 3: 0/77	
THB	JESD 22-A101	Ta=85°C/85%RH VDD=3v6 Duration= 1000hrs ☒ After PC	3	77	231	Lot 1: 0/77 Lot 2: 0/77 Lot 3: 0/77	

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

Table 6 – PACKAGE ASSEMBLY INTEGRITY TESTS

Test code	Method	Tests Conditions	Lots	S.S.	Total	Results/Lot Fail/S.S.	Comments: (N/A =Not Applicable)
CA	Construction Analysis including -Physical dimensions	Internal ST specs JESD22-B100	3	50	150	Lot1: 0/50 Lot2 : 0/50 Lot3 : 0/50	No concern TPY MDG CA_21_00015 lot1 TPY MDG CA_21_00015 lot2 TPY MDG CA_21_00015 lot3

4 APPLICABLE AND REFERENCE DOCUMENTS

Reference	Short description
JESD47	Stress-Test-Driven Qualification of Integrated Circuits
JESD22-B100	Physical Dimension
DMS 0061692	Reliability Tests and Criteria for Product Qualification
JESD22-A108	Temperature, Bias and Operating Life
JESD22-A103	High Temperature Storage Life
J-STD-020	Moisture/reflow sensitivity classification for non-hermetic solid state surface mount devices
JESD22-A101	Steady State Temperature Humidity Bias Life Test
JESD22-A113	Preconditioning of non-hermetic surface mount devices prior to reliability testing
JESD22-A118	Unbiased Highly Accelerated temperature & humidity Stress Test
JESD22-A104	Temperature cycling
JESD22-A110	Temperature Humidity Bake

5 GLOSSARY

Reference	Short description
PC	Preconditioning (solder simulation)
THB	Temperature Humidity Bias
TC	Temperature cycling
uHAST	Unbiased Highly Accelerated Stress Test
HTSL	High temperature storage life
DMS	ST Advanced Documentation Controlled system/ Documentation Management system
CA	Construction Analysis

6 REVISION HISTORY

Revision	Author	Content description	Approval List			
			Function	Location	Name	Date
1.0	Céline Navarro	Initial release	Division Quality Manager	RSST	Pascal NARCHE	15th Oct 2021
			Back-end MCD Quality Manager	RSST	Gisele SEUBE	15th Oct 2021

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PRODUCT/PROCESS CHANGE NOTIFICATION PCN12439 – Additional information

AMKOR (Taiwan) Additional DPS line for WLCSP 12" STM32L4x, STM32L5x, STM32G0x, STM32G4x listed products

MDG - Microcontrollers Division (MCD)

What are the changes?

Changes described in table below:

	Current source		Added site
RDL Site (Wafer Level Processing)	ASE Kaohsiung Taiwan WLCSP12”	Amkor T1 Taiwan WLCSP12”	
DPS Site (Die Processing Services)	ASE Kaohsiung Taiwan WLCSP12”	Amkor T3 Taiwan WLCSP12”	Amkor T6 Taiwan WLCSP12”

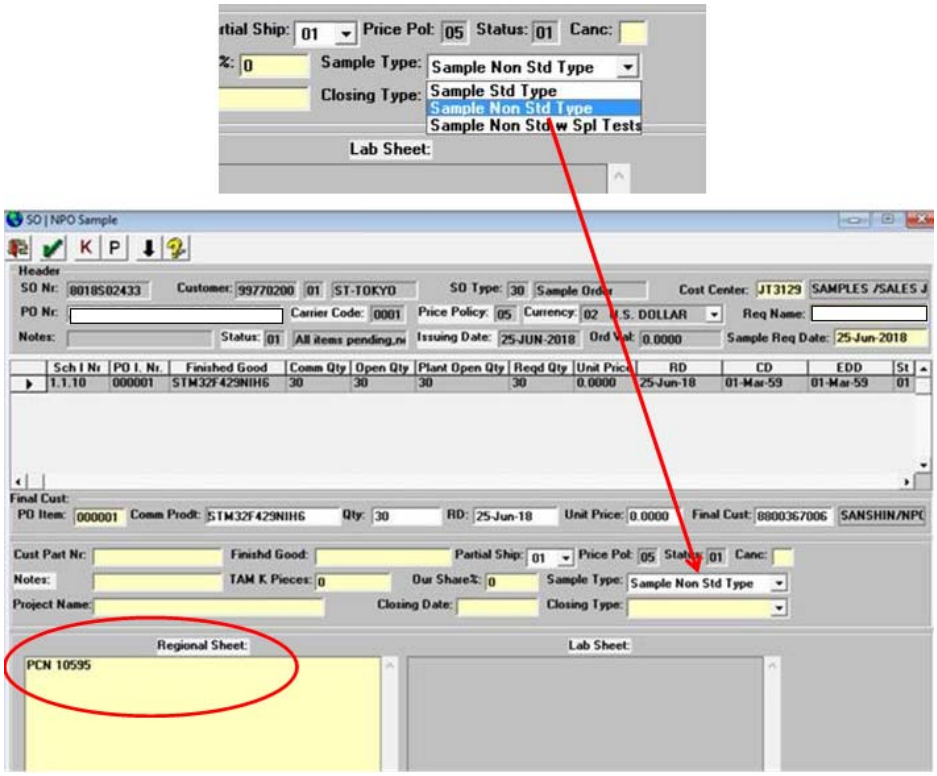
How can the change be seen?

No change in Form, Fit or Function

How to order samples? *

For all samples request linked to this PCN, please:

- place a **Non-standard** sample order (choose Sample Non Std Type from pull down menu)
- insert the PCN number "**PCN 12439**" into the NPO Electronic Sheet/**Regional Sheet**
- request sample(s) through Notice tool, indicating a single Commercial Product for each request



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PCN Title : AMKOR (Taiwan) Additional DPS line for WLCSP 12" STM32L4x, STM32L5x, STM32G0x, STM32G4x listed products

PCN Reference : MDG/21/12439

Subject : Public Products List

Dear Customer,

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

STM32L4R9ZGY6TR	STM32G431CBY3TR	STM32G061F8Y6TR
STM32L433CCY6TR	STM32L412TBY6PTR	STM32G081EBY6TR
STM32L562MEY6PTR	STM32G474MEY3TR	STM32L4S5ZIY6TR
STM32L476JGY7TR	STM32L433CCY3TR	STM32L4R9ZIY6TR
STM32L476MGY6TR	STM32L443RCY6TR	STM32L486JGY6TR
STM32L496VGY6PTR	STM32G441CBY6TR	STM32L433RCY6TR
STM32L4R9ZIY6PTR	STM32L476JGY6TR	STM32L433RBY6TR
STM32L562MEY6QTR	STM32L443CCY6TR	STM32L451REY6TR
STM32G431CBY6TR	STM32L4A6VGY6TR	STM32L452REY6TR
STM32L431CCY6TR	STM32L431RBY6TR	STM32L443CCF6TR
STM32L476JEY6TR	STM32L476MEY6TR	STM32L462REY6TR
STM32G071EBY6TR	STM32L476MGY6MTR	STM32L4S9ZIY6TR
STM32L431RCY6TR	STM32L431CBY6TR	STM32L476JGY6PTR
STM32G484MEY3TR	STM32G041Y8Y6TR	STM32L476MGY3TR
STM32G031Y8Y6TR	STM32L4R5ZGY6TR	STM32G473MEY3TR
STM32L452REY6PTR	STM32L4R5ZIY6TR	STM32L476JGY3TR
STM32L433RCY3TR	STM32L431CBY7TR	STM32G474MEY6TR
STM32L433CBY6TR	STM32L552MEY6QTR	STM32L496WGY6PTR
STM32L4A6VGY6PTR	STM32L552MEY6PTR	STM32L412TBY6TR
STM32L422TBY6TR	STM32G483MEY6TR	STM32G484MEY6TR
STM32L496VGY6TR	STM32G473MEY6TR	STM32G051F8Y6TR

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