



PRODUCT/PROCESS CHANGE NOTIFICATION PCN12437– Additional information

STM32G43x, STM32G44x, STM32G47x, STM32G48x and STM32G49x, STM32G4Ax products enhancement

MDG - Microcontrollers Division (MCD)

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 “**PCN12437**” into the NPO Electronic Sheet/**Regional Sheet**
- request sample(s) through Notice tool, indicating a single Commercial Product for each request

Partial Ship: 01 Price Pol: 05 Status: 01 Canc:

%: 0 Sample Type: Sample Non Std Type

Closing Type: Sample Std Type
Sample Non Std Type
Sample Non Std w Spl Tests

Lab Sheet:

SO | NPO Sample

Header
SO Nr: 8018502433 Customer: 99770200 01 ST-TOKYO SO Type: 30 Sample Order Cost Center: JT3129 SAMPLES /SALES J

PO Nr: Carrier Code: 0001 Price Policy: 05 Currency: 02 U.S. DOLLAR Req Name:

Notes: Status: 01 All items pending.ri Issuing Date: 25-JUN-2018 Ord Val: 0.0000 Sample Req Date: 25-Jun-2018

Sch I Nr	PO I. Nr.	Finished Good	Comm Qty	Open Qty	Plant Open Qty	Reqd Qty	Unit Price	RD	CD	EDD	St
1.1.10	000001	STM32F429NIH6	30	30	30	30	0.0000	25-Jun-18	01-Mar-59	01-Mar-59	01

Final Cust: PO Item: 000001 Comm Prod: STM32F429NIH6 Qty: 30 RD: 25-Jun-18 Unit Price: 0.0000 Final Cust: 8800367006 SANSHIN/NPO

Cust Part Nr: Finishd Good: Partial Ship: 01 Price Pol: 05 Status: 01 Canc:

Notes: TAM K Pieces: 0 Our Share%: 0 Sample Type: Sample Non Std Type

Project Name: Closing Date: Closing Type:

Regional Sheet: PCN 10595

Lab Sheet:



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

This document is combinin three Reliability Evaluation report as shown below

Page 2



*Quality & Reliability -MDG-MCD
STM32G431/G441/GBK1x - Reliability Evaluation Report*

Reliability Evaluation Report
MDG-MCD-RER1904
STM32G431 /G441 /GBK1x (468x66)
Reliability Evaluation Purpose (New Product Qualification)

Page 20



*Quality & Reliability -MDG-MCD
STM32G47x/G48x - Reliability Evaluation Report*

Reliability Evaluation Report
MDG-MCD-RER1703
STM32G471 /G473 /G474 /G483 /G484
(469x66)
Reliability Evaluation Purpose (New Product Qualification)

Page 44



*Quality & Reliability -MDG-MCD
STM32G491x - Reliability Evaluation Report*

Reliability Evaluation Report
MDG-MCD-RER1920
STM32G491x (479x66)
Reliability Evaluation Purpose (New Product Qualification)

Reliability Evaluation Report

MDG-MCD-RER1904

STM32G431 /G441 /GBK1x (468x66)

Reliability Evaluation Purpose (New Product Qualification)

General Information		Traceability	
Commercial Product	STM32G431/G441/GBK1 x6/x8/xB	Diffusion Plant	TSMC Fab14, Taiwan.
Product Line	468X66	Assembly Plant	SC AMKOR ATP1, Philippines. SC AMKOR ATP3, Philippines. AMKOR ATT1, Taiwan. JSCC, China.
Die revision	468XXXX (Cut2.3)	Reliability Assessment	
Product Description	STM32G431/G441/GBK1x family		
Package	LQFP14x14 100L, LQFP12x12 80L LQFP10x10 64L, LQFP7x7 48L LQFP7x7 32L, UFBGA5x5 64L, UFQFPN7x7 48L, UFQFPN5x5 32L, WLCSP49		
Silicon Technology	TSMC Fab14 90ULL	Pass	<input checked="" type="checkbox"/>
Division	MDG-MCD	Fail	<input type="checkbox"/>
Reliability Maturity Level	30	Investigation required	<input type="checkbox"/>

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	15 th Feb 2019	Moses TAN	MDG-MCD-Q&R Engineer
1.1	10 th Dec 2019	Moses TAN	MDG-MCD-Q&R Engineer
1.2	9 th Oct 2020	Berengere ROUTIER- SCAPPUCCI Moses TAN	MDG-MCD-Q&R Engineer
1.3	9 th Nov 2020	Moses TAN	MDG-MCD-Q&R Engineer

APPROVED BY:

Function	Location	Name	Date
Version 1.0 Division Q&R Manager	Grenoble	Dominique GALIANO	26 th -Feb-2019
	Rousset	Frederic BRAVARD	18 th -Feb-2019
Version 1.0 Division Quality Manager	Rousset	Pascal NARCHE	28 th -Feb-2019
Version 1.1 Division Q&R Manager	Grenoble	Dominique GALIANO	10th Dec 2019
Version 1.2 Division Q&R Manager	Grenoble	Dominique GALIANO	09 th Oct 2020
Version 1.3 Division Q&R Manager	Grenoble	Dominique GALIANO	09 th Nov 2020

TABLE OF CONTENTS

1	RELIABILITY EVALUATION OVERVIEW	4
1.1	OBJECTIVE	4
1.2	RELIABILITY STRATEGY	4
1.3	CONCLUSION	5
2	PRODUCT OR TEST VEHICLE CHARACTERISTICS.....	6
2.1	GENERALITIES.....	6
2.2	TRACEABILITY	6
2.2.1	<i>Wafer fab information.....</i>	<i>6</i>
2.2.2	<i>Assembly information.....</i>	<i>7</i>
2.2.3	<i>Reliability testing information.....</i>	<i>10</i>
3	TESTS RESULTS SUMMARY	10
3.1	LOT INFORMATION	10
3.2	TEST PLAN AND RESULTS SUMMARY	11
4	APPLICABLE AND REFERENCE DOCUMENTS.....	16
5	GLOSSARY	17
6	REVISION HISTORY	17

1 RELIABILITY EVALUATION OVERVIEW

1.1 Objective

The aim of this report is to present results of the reliability evaluation performed on STM32G431/G441/GBK1 x6/x8/xB – Die 468XXXX.

Test vehicle is described here below:

Product	Process / Package	Diffusion / Assembly plant
STM32G431VBT6	90ULL, LQFP 14x14 100L	TSMC Fab14 , SC AMKOR ATP1
STM32G431MBT6	90ULL, LQFP 12x12 80L	TSMC Fab14 , JSCC
STM32G431RBT6	90ULL, LQFP 10x10 64L	TSMC Fab14 , JSCC
STM32G431CBT6	90ULL, LQFP 7x7 48L	TSMC Fab14 , JSCC
STM32GBK1CBT6	90ULL, LQFP 7x7 48L	TSMC FAB14, JSCC
STM32G431KBT6	90ULL, LQFP 7x7 32L	TSMC Fab14 , JSCC
STM32G431CBU6	90ULL, UFQFPN 7x7 48L	TSMC Fab14 , JSCC
STM32G431KBU6	90ULL, UFQFPN 5x5 32L	TSMC Fab14 , JSCC
STM32G431RBI6	90ULL, UFBGA 5x5 64L	TSMC Fab14 , SC AMKOR ATP3
STM32G431CBY6TR	90ULL, WLCSP 49L	TSMC Fab14 , SC AMKOR ATT1

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

1.2 Reliability Strategy

The STM32G431/G441/GBK1 x6/x8/xB – Die 468XXXX, is processed in the 90ULL process from TSMC Fab14 Taiwan plant which is qualified through ORCA 1M – Die 415 (RERMCD1112) for our division.

All packages used for this product, are qualified at division level or have been qualified for this project.

Package	Reference	Assy Plant location
LQFP14x14 100L	RERMCD1312 / RERMCD1112	AMKOR ATP1
LQFP12x12 80L	RERMCD1818	JSCC, China
LQFP10x10 64L	RERMCD1621	JSCC, China
LQFP7x7 48L	RERMCD1621	JSCC, China
LQFP7x7 32L	RERMCD1621	JSCC, China
UFQFPN 7x7 48L	RERMCD1622	JSCC, China
UFQFPN 5x5 32L	RERMCD1622	JSCC, China
UFBGA5x5 64L	RERMCD1402	AMKOR ATP3
WLCSP 49	RERMCD1803	AMKOR ATT1

According to “RELIABILITY TESTS AND CRITERIA FOR QUALIFICATION” specification (DMS 0061692), the following qualification strategy has been defined:

- Die Qualification:
 - Cut1.0:1 full qualification lot to assess the die in LQFP100 package.
 - Cut2.0:1 full qualification lot to assess the die in LQFP100 package.
 - Cut2.1:1 subset qualification lot to assess the die in LQFP100 package.
 - Cut2.2:1 subset qualification lot to assess the die in LQFP100 package.
 - Cut2.3:1 subset qualification lot to assess the die in LQFP100 package.

- Package Qualification:

The reliability test plan and result summary are presented in the following tables:

Package	Body	Pitch	Package Code	Wire	Assembly	Bonding Option	Trial
LQFP 100	14x14	0.5	1L	Gold	ATP1		CDM only
LQFP 80	12x12	0.5	9X	Gold	JSCC		2 reliability lots
LQFP 64	10x10	0.5	5W	Silver/ULA	JSCC		CDM only
LQFP 48	7x7	0.5	5B	Silver/ULA	JSCC		CDM only
LQFP 32	7x7	0.5	5V	Silver/ULA	JSCC		CDM only
UFBGA 64L	5x5	0.5	A019	Gold	ATP3		1 reliability lot
UFQFPN 48L	7x7	0.5	A0B9	Silver	JSCC		CDM only
UFQFPN 32L	5x5	0.5	A0B8	Silver	JSCC		CDM only
WLCSP49	-	0.4	B03Q	-	ATT1		1 reliability lot

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 the STM32G431/G441/GBK1 x6/x8/xB – Die 468XXXX in all packages listed in the Chapter 1.2.

Refer to Section 3.0 for reliability test results.

2 PRODUCT OR TEST VEHICLE CHARACTERISTICS

2.1 Generalities

STM32G431x product is based on Arm® 32-bit Cortex®-M4 CPU with FPU, Adaptive real-time accelerator (ART Accelerator™) allowing 0-wait-state execution from Flash memory, frequency up to 170 MHz with 213 DMIPS, MPU, DSP instructions. There are 128 Kbytes of Flash memory with ECC support, 2 16-bits resolution ADC, 4 12-bit DAC, 4 ultra-fast comparators, 3 operational amplifiers, 14 timers, and USB Type-C power delivery controller in this product.

For additional information concerning the product behavior, refer to STM32G431x datasheets.

2.2 Traceability

2.2.1 Wafer fab information

Table 1

Wafer fab information	
FAB1	
Wafer fab name / location	TSMC Fab14 / Taiwan
Wafer diameter (inches)	12
Wafer thickness (µm)	775 +/- 25
Silicon process technology	90nm eFlash Generic TSMC
Number of masks	43
Die finishing front side (passivation) materials/thicknesses (µm)	PSG + NITRIDE, 1.1
Die area (Stepping die size) (µm)	3152.4, 3167.8
Die pad size (X,Y) (µm)	123, 59
Sawing street width (X,Y) (µm)	80, 80
Metal levels/Materials/Thicknesses (µm)	Metal 1 Cu 0.24 / Metal 2 Cu 0.31 / Metal 3 Cu 0.31 Metal 4 Cu 0.31 / Metal 5 Cu 0.31 / Metal 6 Cu 0.85 Metal 7 AlCu 1.45
Die over coating (material/thickness)	No
FIT level (Ea=0.7eV, C.L: 60%, 55°C)	3.1 FITs at qualification date.
Soft Error Rate - Alpha SER [FIT/Mb] - Neutron SER [FIT/Mb] - Conditions	Alpha SER: 491 FIT/Mb Neutron SER: 445 FIT/Mb Neutron SER is an estimation at sea level of NYC (14n/h/cm²). Alpha result is estimated using a nominal flux of 0.001α/h/cm²
Wafer Level Reliability - Electro-Migration (EM) - Time Dependent Dielectric Breakdown (TDDB) or Gate Oxide Integrity (GOI) - Hot Carrier Injection (HCI) - Negative Bias Thermal Instability (NBTI) - Stress Migration (SM)	Yes
Other Device(s) using same process	STM32L4x product family, 415, 435, 461, 462, 464, 470

2.2.2 Assembly information

Table 2

Assembly Information	
Package 1 – LQFP 14x14x1.4 100L 1L	
Assembly plant name / location	SC AMKOR ATP1, Philippine.
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	375 +/- 25
Die sawing method	Mechanical Sawing
Bill of Material elements	
Lead Frame material/supplier/reference	LQFP14x14 100L PPF 5sq SID#101389126
Die attach material/type(glue/film)/supplier	GLUE SUMITOMO EPOXY CRM 1076YB
Wire bonding material/diameter/supplier	GOLD WIRE 0.8MIL
Molding compound material/supplier/reference	Resin Sumitomo G631HQ
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL 3
Package 2 – LQFP 14x14x1.4 100L 1L	
Assembly plant name / location	SC AMKOR ATP1, Philippine.
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	375 +/- 25
Die sawing method	Mechanical Sawing
Bill of Material elements	Laser Groove + Mechanical Sawing
Lead Frame material/supplier/reference	LQFP14x14 100L PPF 5sq SID#101389126
Die attach material/type(glue/film)/supplier	GLUE SUMITOMO EPOXY CRM 1076YB
Wire bonding material/diameter/supplier	GOLD WIRE 0.8MIL
Molding compound material/supplier/reference	Resin Sumitomo G631HQ
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL 3
Package 3 – LQFP 12x12x1.4 80L 9X	
Assembly plant name / location	JSCC, China.
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	375 +/- 25
Die sawing method	Mechanical Sawing
Bill of Material elements	
Lead Frame material /supplier/reference	LQ12 80L 208sq eff slot Etch LF JSCC
Lead frame finishing (material/thickness)	PURE TIN thickness: tolerance 7 to 20µm
Die attach material/type(glue/film)/supplier	D/A Ablestik 3230
Wire bonding material/diameter/supplier	Ag 96.5 0.8 MIL Diam
Molding compound material/supplier/reference	Mold Sumitomo low alpha G631SHQ
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL 3
Package 4 – LQFP 10x10x1.4 64L 5W	
Assembly plant name / location	JSCC, China.

Pitch (mm)	0.5
Die thickness after back-grinding (µm)	375 +/- 25
Die sawing method	Mechanical Sawing
Bill of Material elements	
Lead Frame material /supplier/reference	LQFP64 236sq no slots STMP LF JSCC
Die attach material/type(glue/film)/supplier	D/A Ablestik 3230
Wire bonding material/diameter/supplier	Ag 96.5 0.8 MIL Diam
Molding compound material/supplier/reference	Mold Sumitomo low alpha G631SHQ
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL 3
Package 5 – LQFP 7x7x1.4 48 5B	
Assembly plant name / location	JSCC, China.
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	375 +/- 25
Die sawing method	Mechanical Sawing
Bill of Material elements	
Lead Frame material /supplier/reference	LQFP48L 184sq Eff slots pur tin STMP LF JSCC
Die attach material/type(glue/film)/supplier	D/A Ablestik 3230
Wire bonding material/diameter/supplier	Ag 96.5 0.8 MIL Diam
Molding compound material/supplier/reference	Mold Sumitomo low alpha G631SHQ
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL 3
Package 6 – LQFP 7x7x1.4 32 5V	
Assembly plant name / location	JSCC, China.
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	375 +/- 25
Die sawing method	Mechanical Sawing
Bill of Material elements	
Lead Frame material /supplier/reference	LQ7 32L 184sq Eff slots STMP LF JSCC
Die attach material/type(glue/film)/supplier	D/A Ablestik 3230
Wire bonding material/diameter/supplier	Ag 96.5 0.8 MIL Diam
Molding compound material/supplier/reference	Mold Sumitomo low alpha G631SHQ
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL 3
Package 7 – UFBGA 5x5x0.6 64 A019	
Assembly plant name / location	SC AMKOR ATP1, Philippine.
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	75 +/- 12
Die sawing method	Mechanical Sawing
Bill of Material elements	
Substrate material/supplier/reference	SUBSTRATE UFBGA 5X5 64L SID#101405840

Die attach material/type(glue/film)/supplier	DAF Ablestik ATB130U
Wire bonding material/diameter/supplier	WIRE GOLD DIAM. 0.8 MIL
Balls metallurgy/diameter/supplier (BGA/CSP)	SOLDER BALLS WITH 200um DIAM SN96.5 AG3.5%
Molding compound material/supplier/reference	MOLDING COMPOUND GE100LFCS
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL 3
Package 8 – UFQFPN 7x7x0.55 48L A0B9	
Assembly plant name / location	JSCC, China.
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	150 +/- 25
Die sawing method	Mechanical Sawing
Bill of Material elements	
Lead Frame material /supplier/reference	LF FOR UQFN 7x7 48L Sn PAD 5.2 MM SQ Groove
Die attach material/type(glue/film)/supplier	GLUE ABLEBOND 8290
Wire bonding material/diameter/supplier	Ag 96.5 0.8 MIL Diam
Molding compound material/supplier/reference	RESIN SUMITOMO G770
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL 3
Package 9 – UFQFPN 5x5x0.55 32L A0B8	
Assembly plant name / location	JSCC, China.
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	150 +/- 25
Die sawing method	Mechanical Sawing
Bill of Material elements	
Lead Frame material /supplier/reference	LF FOR UQFN 5x5 32L Sn PAD 3.7 MM SQ
Die attach material/type(glue/film)/supplier	GLUE ABLEBOND 8290
Wire bonding material/diameter/supplier	Ag 96.5 0.8 MIL Diam
Molding compound material/supplier/reference	RESIN SUMITOMO G770
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL 3
Package 10 – WLCSP 49 B03Q	
Assembly plant name / location	SC AMKOR ATT1, Taiwan.
Pitch (mm)	0.4
Die thickness after back-grinding (µm)	355 +/- 25
Die sawing method	Laser Groove
Bill of Material elements	
PBO material/reference	Passivation HD8820
RDL	Copper
UBM	Ti/Cu/Cu
Balls metallurgy/diameter/supplier (BGA/CSP)	Solder ball SAC405 Diam 230um
Backside Coating material/supplier/reference	Back side coating PET film

Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL 1
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2.2.3 Reliability testing information

Table 3

Reliability Testing Information	
Reliability laboratory name / location	ST GRAL in Grenoble

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	Assy Information Package #	Note
1	9R742036 Wafer#2	1.0	7B809834	P01L*468ESXA	LQFP 14x14 100L	1	Die Reliability assessment.
2	9R829134 Wafer#2	2.0	7B839734	P01L*468ESXB	LQFP 14x14 100L	1	Die Reliability assessment.
3	9R829137 Wafer#3	2.1	7B901542	P01L*468ESXZ	LQFP 14x14 100L	1	Die Reliability assessment.
4	9R928234 Wafer#1	2.2	7B940656	P01L*468ESXY	LQFP 14x14 100L	1	Die Reliability assessment.
5	9R928234 Wafer#7	2.2	GQ943295	S09X*468ISXY	LQFP 12x12 80L	3	Package Reliability assessment.
6	9R928234 Wafer#7	2.2	GQ94425K	S09X*468ISXY	LQFP 12x12 80L	3	Package Reliability assessment.
7	9R742036 Wafer#14	1.0	GQ81429F	S05W*468ISXA	LQFP 10x10 64L	4	Package Reliability assessment.
8	9R742036 Wafer#14	1.0	GQ81429D	S05B*468ISXA	LQFP 7x7 48L	5	Package Reliability assessment.
9	9R742036 Wafer#14	1.0	GQ821269	S35B*468ISXA	LQFP 7x7 48L (GBK1 option)	5	Package Reliability assessment.
10	9R742036 Wafer#14	1.0	GQ8142A9	S05V*468ISXA	LQFP 7x7 32L	6	Package Reliability assessment.
11	9R742036 Wafer#10	1.0	7B818A3R	P02I*468ESXA	UFPGA 5x5 64L	7	Package Reliability assessment.
12	9R742036 Wafer#14	1.0	GQ81426W	S0MI*468ISXA	UFQFPN 7x7 48L	8	Package Reliability assessment.
13	9R742036 Wafer#15	1.0	GQ81429G	S0MG*468ISXA	UFQFPN 5x5 32L	9	Package Reliability assessment.
14	9R742036 Wafer#12	1.0	A5814007	T0GV*468ESXA	WLCSF 49L	10	Package Reliability assessment.
15	9R030016 Wafer#19	2.3	7B038477	P01L*468ESXX	LQFP 14x14 100L	2	Die Reliability assessment.

Test plan and results summary

Table 5 – ACCELERATED LIFETIME SIMULATION TESTS

Test code	Stress method	Stress Conditions	Lots	S.S.	Total	Results/ Lot Fail/S.S.	Comments: (N/A =Not Applicable)
HTOL	JESD22 A108	Ta=125°C Duration= 1200H Vcore :1V28 Vdd : 3V6	2	77	154	Lot1: 0/77 Lot2: 0/77	
		Ta=125°C Duration= 168H Vcore :1V28 Vdd : 3V6	2	77	154	Lot3: 0/77 Lot4: 0/77 Lot15: 0/77	
ESD HBM	ANSI/ESDA/ JEDEC JS-001	1500 Ω, 100 pF 2kV class2	3	3	9	Lot1: 0/3 Lot2: 0/3 Lot3: 0/3 Lot4: 0/3 Lot15: 0/3	
ESD CDM	ANSI/ESDA/ JEDEC JS-002	250V	3	3	9	Lot1: 0/3 Lot2: 0/3 Lot3: 0/3 Lot4: 0/3 Lot15: 0/3	
Latch Up	JESD78	130°C	3	3	9	Lot1: 0/3 Lot2: 0/3 Lot3: 0/3 Lot4: 0/3 Lot15: 0/3	
EDR	JESD22-A117	10kcy EW @ 125°C then Storage HTB 150°C - Duration 1500H	2	77	154	Lot1: 0/77 Lot2: 0/77	
		10kcy EW @ 125°C then Storage HTB 150°C - Duration 168H	1	77	77	Lot4: 0/77	
EDR	JESD22-A117	10kcy EW @ 25°C then Storage HTB 150°C - Duration 168h	3	77	234	Lot1: 0/77 Lot2: 0/77 Lot4: 0/77	
EDR	JESD22-A117	10kcy EW @ -40°C then Storage HTB 150°C - Duration 168H	3	77	234	Lot1: 0/77 Lot2: 0/77 Lot4: 0/77	
ELFR	JESD22-A108 JESD74	Ta=125°C Duration= 48hrs Vcore :1V28 Vdd : 3V6	2	500	1000	Lot1: 0/500 Lot2: 0/500	

Table 6 – ACCELERATED ENVIRONMENT STRESS TESTS

For LQFP 14x14 100L

Test code	Stress method	Stress Conditions	Lots	S.S.	Total	Results/ Lot Fail/S.S.	Comments: (N/A =Not Applicable)
ESD CDM	ANSI/ESDA/ JEDEC JS-002	250V	4	3	12	Lot1: 0/3 Lot2: 0/3 Lot3: 0/3 Lot4: 0/3 Lot15: 0/3	

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

For LQFP 12x12 80L

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, MSL3 (192h@30C/60%RH) 3x Reflow simulation Peak Reflow Temp= 260°C	2	256	512	Lot 5: 0/256 Lot 6: 0/256	Included in MDG-MCD-RER1818
TC	JESD22-A104	Ta=-65/150°C Duration= 500cyc <input checked="" type="checkbox"/> After PC	2	77	154	Lot 5: 0/77 Lot 6: 0/77	Included in MDG-MCD-RER1818
HTSL	JESD 22-A103	Ta=150°C , Duration= 1000hrs <input checked="" type="checkbox"/> After PC	2	77	154	Lot 5: 0/77 Lot 6: 0/77	Included in MDG-MCD-RER1818
UHAST	JESD 22-A118	Ta=130°C ,85% RH Duration= 96hrs <input checked="" type="checkbox"/> After PC	2	77	154	Lot 5: 0/77 Lot 6: 0/77	Included in MDG-MCD-RER1818
THB	JESD 22-A101	Ta=85°C/85%RH VDD=3v6 Duration= 1000hrs <input checked="" type="checkbox"/> After PC	2	25	50	Lot 5: 0/25 Lot 6: 0/25	Included in MDG-MCD-RER1818
ESD CDM	ANSI/ESDA/ JEDEC JS-002	250V	1	3	3	Lot 5: 0/3	Included in MDG-MCD-RER1818

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

Note2 : silver wire is more sensitive and qualify the gold wire solution

For LQFP 10x10 64L

Test code	Stress method	Stress Conditions	Lots	S.S.	Total	Results/ Lot Fail/S.S.	Comments: (N/A =Not Applicable)
ESD CDM	ANSI/ESDA/ JEDEC JS-002	250V	1	3	3	Lot7: 0/3	

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

For LQFP 7x7 48L

Test code	Stress method	Stress Conditions	Lots	S.S.	Total	Results/ Lot Fail/S.S.	Comments: (N/A =Not Applicable)
ESD CDM	ANSI/ESDA/ JEDEC JS-002	250V	1	3	3	Lot8: 0/3	

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

For LQFP 7x7 48L (STM32GBK1x)

Test code	Stress method	Stress Conditions	Lots	S.S.	Total	Results/ Lot Fail/S.S.	Comments: (N/A =Not Applicable)
ESD CDM	ANSI/ESDA/ JEDEC JS-002	250V	1	3	3	Lot9: 0/3	

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

For LQFP 7x7 32L

Test code	Stress method	Stress Conditions	Lots	S.S.	Total	Results/ Lot Fail/S.S.	Comments: (N/A =Not Applicable)
ESD CDM	ANSI/ESDA/ JEDEC JS-002	250V	1	3	3	Lot10: 0/3	

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

For UFBGA 5x5 64L

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, MSL3 (192h@30C/60%RH) 3x Reflow simulation Peak Reflow Temp= 260°C	1	231	231	Lot 11: 0/231	
TC	JESD22-A104	Ta=-65/150°C Duration= 500cyc <input checked="" type="checkbox"/> After PC	1	77	77	Lot 11: 0/77	
HTSL	JESD 22-A103	Ta=150°C , Duration= 1000hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot 11: 0/77	
THB	JESD 22-A101	Ta=85°C/85%RH VDD=3v6 Duration= 1000hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot 11: 0/77	
ESD CDM	ANSI/ESDA/ JEDEC JS-002	250V	1	3	3	Lot11: 0/3	

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

For UFQFPN 7x7 48L

Test code	Stress method	Stress Conditions	Lots	S.S.	Total	Results/ Lot Fail/S.S.	Comments: (N/A =Not Applicable)
ESD CDM	ANSI/ESDA/ JEDEC JS-002	250V	1	3	3	Lot12: 0/3	

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

For UFQFPN 5x5 32L

Test code	Stress method	Stress Conditions	Lots	S.S.	Total	Results/ Lot Fail/S.S.	Comments: (N/A =Not Applicable)
ESD CDM	ANSI/ESDA/ JEDEC JS-002	250V	1	3	3	Lot13: 0/3	

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

For WLCSP 49

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	1	308	308	Lot14 :0/308	
TC	JESD22-A104	Ta=-65/150°C Duration= 500cyc <input checked="" type="checkbox"/> After PC	1	77	77	Lot14 : 0/77	
HTSL	JESD 22-A103	Ta=150°C , Duration= 1000hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot14 : 0/77	
UHAST	JESD 22-A118	Ta=130°C ,85% RH Duration= 96hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot14 : 0/77	
THB	JESD 22-A101	Ta=85°C/85%RH VDD=3v6 Duration= 1000hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot14 : 0/77	
ESD CDM	ANSI/ESDA/ JEDEC JS-002	250V	1	3	3	Lot14 : 0/3	

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

Table 8 – PACKAGE ASSEMBLY INTEGRITY TESTS

For LQFP 12x12 80L

Test code	Method	Tests Conditions	Lots	S.S.	Total	Results/ Lot Fail/S.S.	Comments: (N/A =Not Applicable)
CA	Construction Analysis including –Wire bond shear –Wire bond pull –Solderability	JESD 22B102 JESDB100/ B108	1	50	50	Lot5: 0/50	Included in: MDG–MCD–RER1818 No concern

4 APPLICABLE AND REFERENCE DOCUMENTS

Reference	Short description
JESD47	Stress–Test–Driven Qualification of Integrated Circuits
SOP2.4.4	Record Management Procedure
SOP2.6.2	Internal Change Management
SOP2.6.7	Finished Good Maturity Management
SOP2.6.9	Package & Process Maturity Management in BE
SOP2.6.11	Program Management for Product Development
SOP2.6.17	Management of Manufacturing Transfers
SOP2.6.19	Front–End Technology Platform Development and Qualification
DMS 0061692	Reliability Tests and Criteria for Product Qualification
ANSI/ESDA JEDEC JS–001	Electrostatic discharge (ESD) sensitivity testing human body model (HBM)
ANSI/ESDA JEDEC JS–002	Electrostatic discharge (ESD) sensitivity testing charge device model (CDM)
JESD78	IC Latch–up test
JESD 22–A108	Temperature, Bias and Operating Life
JESD 22–A103	High Temperature Storage Life
J–STD–020:	Moisture/reflow sensitivity classification for non–hermetic solid state surface mount devices
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
JESD 22B102:	Solderability test
JESD22B100/B108:	Physical dimension

5 GLOSSARY

Reference	Short description
HTOL	High Temperature Operating Life
EDR	Endurance and Data Retention
ELFR	Early Failure Rate
PC	Preconditioning (solder simulation)
THB	Temperature Humidity Bias
TC	Temperature cycling
uHAST	Unbiased Highly Accelerated Stress Test
HAST	Highly Accelerated Stress Test
HTSL	High temperature storage life
DMS	ST Advanced Documentation Controlled system/ Documentation Management system
ESD HBM	Electrostatic discharge (human body model)
ESD CDM	Electrostatic discharge (charge device model)
LU	Latch-up
CA	Construction Analysis

6 REVISION HISTORY

Revision	Author	Content description	Approval List			
			Function	Location	Name	Date
1.0	Moses TAN	Initial Release	Div. Quality Manager	Rousset	Pascal NARCHE	28 th -Feb-2019
			Q&R Quality Manager	Grenoble	Dominique GALIANO	26 th -Feb-2019
				Rousset	Frederic BRAVARD	18 th -Feb-2019
				Rousset	Frederic BRAVARD	13 th Mar 2019
1.1	Moses TAN	Updated with Reliability trial results on Cut 2.0, 2.1, 2.2	Q&R Quality Manager	Grenoble	Dominique GALIANO	10 th Dec 2019
1.2	Berengere ROUTIER-SCAPPUCCI Moses TAN	Updated with Reliability trial results on LQFP80	Q&R Quality Manager	Grenoble	Dominique GALIANO	9 th Oct 2020
1.3	Moses TAN	Updated with Reliability trial results on Cut 2.3	Q&R Quality Manager	Grenoble	Dominique GALIANO	9 th Nov 2020

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Reliability Evaluation Report

MDG-MCD-RER1703

STM32G471 /G473 /G474 /G483 /G484
(469x66)

Reliability Evaluation Purpose (New Product Qualification)

General Information		Traceability	
Commercial Product	STM32G471 /G473 /G474 xB/xC/xE STM32G483 /G484 xE	Diffusion Plant	TSMC Fab14, Taiwan.
Product Line	469X66	Assembly Plant	SC AMKOR ATP1, Philippines. SC AMKOR ATP3, Philippines. AMKOR ATT1, Taiwan. JSCC, China. ASEKH, Taiwan
Die revision	469XXXX (Cut2.3)	Reliability Assessment	
Product Description	STM32G47x / G48x family		
Package	LQFP14x14 128L, LQFP14x14 100L LQFP12x12 80L, LQFP10x10 64L LQFP7x7 48L, TFBGA8x8 100L, UFBGA6x6 121L, UFQFPN7x7 48L, WLCSP81		
Silicon Technology	TSMC Fab14 90ULL		
Division	MDG-MCD	Pass	<input checked="" type="checkbox"/>
Reliability Maturity Level	30	Fail	<input type="checkbox"/>
		Investigation required	<input type="checkbox"/>

***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	1 st Mar 2019	Pascal CARDOSI	MDG-MCD-Q&R Engineer
2.0	29 th Jul 2019	Pascal CARDOSI	MDG-MCD-Q&R Engineer
2.1	4 th Dec 2019	Pascal CARDOSI	MDG-MCD-Q&R Engineer
2.2	20 th Apr 2020	Lionel NEVORET Pascal CARDOSI	MDG-MCD-Q&R Engineers
2.3	4 th Nov 2020	Berengere ROUTIER-SCAPPUCCI Pascal CARDOSI	MDG-MCD-Q&R Engineers

APPROVED BY:

VERSION 1.0

Function	Location	Name	Date
Division Q&R Responsible	Rousset	Frederic BRAVARD	01-Mar-2019
Division Quality Manager	Rousset	Pascal NARCHE	01-Mar-2019

VERSION 2.0

Function	Location	Name	Date
Division Q&R Manager	Rousset	Frederic BRAVARD	29 th -Jul-2019

VERSION 2.1

Function	Location	Name	Date
Division Q&R Responsible	Grenoble	Dominique GALIANO	06-Dec -2019

VERSION 2.2

Function	Location	Name	Date
Division Q&R Responsible	Grenoble	Dominique GALIANO	11-May-2020

VERSION 2.3

Function	Location	Name	Date
Division Q&R Responsible	Grenoble	Dominique GALIANO	9 th Nov 2020

TABLE OF CONTENTS

1	RELIABILITY EVALUATION OVERVIEW	4
1.1	OBJECTIVE.....	4
1.2	RELIABILITY STRATEGY	5
1.3	CONCLUSION.....	6
2	PRODUCT OR TEST VEHICLE CHARACTERISTICS	6
2.1	GENERALITIES.....	6
2.2	TRACEABILITY.....	7
2.2.1	<i>Wafer fab information</i>	7
2.2.2	<i>Assembly information</i>	8
2.2.3	<i>Reliability testing information</i>	11
3	TESTS RESULTS SUMMARY	12
3.1	LOT INFORMATION.....	12
3.2	TEST PLAN AND RESULTS SUMMARY	14
4	APPLICABLE AND REFERENCE DOCUMENTS	22
5	GLOSSARY	22
6	REVISION HISTORY	23

1 RELIABILITY EVALUATION OVERVIEW

1.1 Objective

The aim of this report is to present results of the reliability evaluation performed on STM32G47x/G48x xB/xC/xE – Die 469XXXX.

Test vehicle is described here below:

Product	Process / Package	Diffusion / Assembly plant
STM32G474QET6	90ULL, LQFP 14x14 128L	TSMC Fab14 , SC AMKOR ATP1
STM32G474VET6	90ULL, LQFP 14x14 100L	TSMC Fab14 , SC AMKOR ATP1
STM32G474MET6	90ULL, LQFP 12x12 80L	TSMC Fab14 , JSCC
STM32G474RET6	90ULL, LQFP 10x10 64L	TSMC Fab14 , JSCC
STM32G474CET6	90ULL, LQFP 7x7 48L	TSMC Fab14 , JSCC
STM32G474VEH6	90ULL, TFBGA 8x8 100L	TSMC Fab14 , SC AMKOR ATP3
STM32G474PEI6	90ULL, UFBGA 6x6 121L	TSMC Fab14 , ASEKH
STM32G474CEU6	90ULL, UFQFPN 7x7 48L	TSMC Fab14 , JSCC
STM32G474MEY6TR	90ULL, WLCSP 81L	TSMC Fab14 , SC AMKOR ATT1

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

1.2 Reliability Strategy

The STM32G47x/G48x xB/xC/xE – Die 469XXXX, is processed in the 90ULL process from TSMC Fab14 Taiwan plant which is qualified through ORCA 1M – Die 415 (RERMCD1112) for our division.

All packages used for this product, are qualified at division level or have been qualified for this project

Package	Reference	Assy Plant location
LQFP 14x14 128L	RERMCD1312 / RERMCD1703	AMKOR ATP1
LQFP 14x14 100L	RERMCD1312 / RERMCD1112	AMKOR ATP1
LQFP 12x12 80L	RERMCD1818	JSCC, China
LQFP 10x10 64L	RERMCD1621	JSCC, China
LQFP 7x7 48L	RERMCD1621	JSCC, China
TFBGA 8x8 100L	RERMCD1309	AMKOR ATP3
UFBGA 6x6 121L	RERMCD1901 / RERMCD1703	ASEKH, TAIWAN
UFQFPN 7x7 48L	RERMCD1622 / RERMCD1718	JSCC, China
WLCSP 81L	RERMCD1112	AMKOR ATT1

According to “RELIABILITY TESTS AND CRITERIA FOR QUALIFICATION” specification (DMS 0061692), the following qualification strategy has been defined:

- Die Qualification:
 - Cut1.0:1 full qualification lot to assess the die in LQFP100 package.
 - Cut2.0:1 full qualification lot to assess the die in LQFP100 package.
 - Cut2.1:1 subset qualification lot to assess the die in LQFP100 package.
 - Cut2.2:1 subset qualification lot to assess the die in LQFP100 package
 - Cut2.3:1 subset qualification lot to assess the die in LQFP100 package

Note: For all Cuts, ESD HBM & LU is done in LQFP128 (Max pin count)

- Package Qualification:

The reliability test plan and result summary are presented in the following tables:

Package	Body	Pitch	Package Code	Wire	Assembly	Bonding Option	Trial
LQFP 128	14x14	0.4	TC	Gold	ATP1		1 reliability lot & Construction Analysis
LQFP 100	14x14	0.5	1L	Gold	ATP1		CDM only
LQFP80	12x12	0.5	9X	Gold	JSCC		1 reliability lot
LQFP 64	10x10	0.5	5W	Silver/ULA	JSCC		1 reliability lot
LQFP 48	7x7	0.5	5B	Silver/ULA	JSCC		CDM only
TFBGA 100L	8x8	0.8	A08Q (DY)	Gold	ATP3		1 reliability lot & Construction Analysis
UFBGA 121L	6x6	0.6	B0CU(7B)	Gold	ASE		1 reliability lot & Construction Analysis
UFQFN 48L	7x7	0.5	A0B9 (MI)	Silver	JSCC		1 reliability lot
WLCSP81	-	0.4	B068 (IY)	-	ATT1		1 reliability lot

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 the STM32G47x/G48x xB/xC/xE – Die 469XXXX in all packages listed in the Chapter 1.2.

Report will be updated when new reliability results are available

Refer to Section 3.0 for reliability test results.

2 PRODUCT OR TEST VEHICLE CHARACTERISTICS

2.1 Generalities

STM32G47x product is based on Arm® 32-bit Cortex®-M4 CPU with FPU, Adaptive real-time accelerator (ART Accelerator™) allowing 0-wait-state execution from Flash memory, frequency up to 170 MHz with 213 DMIPS, MPU, DSP instructions. There are 512 Kbytes of Flash memory with ECC

support, 5 12-bits resolution ADC, 7 12-bit DAC, 7 ultra-fast comparators, 6 operational amplifiers, 17 timers, and USB Type-C power delivery controller in this product.

For additional information concerning the product behavior, refer to STM32G47x/STM32G48x datasheets.

2.2 Traceability

2.2.1 Wafer fab information

Table 1

Wafer fab information	
FAB1	
Wafer fab name / location	TSMC Fab14 / Taiwan
Wafer diameter (inches)	12
Wafer thickness (µm)	775 +/- 25
Silicon process technology	90nm eFlash Generic TSMC
Number of masks	43
Die finishing front side (passivation) materials/thicknesses (µm)	PSG + NITRIDE, 1.75
Die area (Stepping die size) (µm)	4298.4, 4045.6
Die pad size (X,Y) (µm)	123, 59
Sawing street width (X,Y) (µm)	80, 80
Metal levels/Materials/Thicknesses (µm)	Metal 1 Cu 0.24 / Metal 2 Cu 0.31 / Metal 3 Cu 0.31 Metal 4 Cu 0.31 / Metal 5 Cu 0.31 / Metal 6 Cu 0.85 Metal 7 AlCu 1.45
Die over coating (material/thickness)	No
FIT level (Ea=0.7eV, C.L: 60%, 55°C)	3.1 FITs at qualification date
Soft Error Rate – Alpha SER [FIT/Mb] – Neutron SER [FIT/Mb] – Conditions	Alpha SER: 491 FIT/Mb Neutron SER: 445 FIT/Mb Neutron SER is an estimation at sea level of NYC (14n/h/cm ²). Alpha result is estimated using a nominal flux of 0.001α/h/cm ²
Wafer Level Reliability – Electro-Migration (EM) – Time Dependent Dielectric Breakdown (TDDB) or Gate Oxide Integrity (GOI) – Hot Carrier Injection (HCI) – Negative Bias Thermal Instability (NBTI) – Stress Migration (SM)	Yes
Other Device(s) using same process	STM32L4x, STM32G4x product family, 415, 435, 461, 462, 464, 470, 468

2.2.2 Assembly information

Table 2

Assembly Information	
Package 1 – LQFP 14x14x1.4 128L TC	
Assembly plant name / location	SC AMKOR ATP1, Philippines
Pitch (mm)	0.4
Die thickness after back-grinding (µm)	375 +/- 25
Die sawing method	Mechanical Sawing
Bill of Material elements	
Lead Frame material /supplier/reference	LF FOR LQ 128L PAD 5.0 SID 101385780 DR post p
Die attach material/type(glue/film)/supplier	Glue Evertech AP4200
Wire bonding material/diameter/supplier	GOLD WIRE 0.8MIL
Molding compound material/supplier/reference	Resin Sumitomo G631HQ
Package Moisture Sensitivity Level (JEDEC J–STD020D)	MSL 3
Package 2 – LQFP 14x14x1.4 100L 1L	
Assembly plant name / location	SC AMKOR ATP1, Philippine.
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	375 +/- 25
Die sawing method	Mechanical Sawing
Bill of Material elements	
Lead Frame material/supplier/reference	LQFP14x14 100L PPF 5sq SID#101389126
Die attach material/type(glue/film)/supplier	GLUE SUMITOMO EPOXY CRM 1076YB
Wire bonding material/diameter/supplier	GOLD WIRE 0.8MIL
Molding compound material/supplier/reference	Resin Sumitomo G631HQ
Package Moisture Sensitivity Level (JEDEC J–STD020D)	MSL 3
Package 3 – LQFP 12x12x1.4 80L 9X	
Assembly plant name / location	JSCC, China.
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	375 +/- 25
Die sawing method	Mechanical Sawing
Bill of Material elements	
Lead Frame material /supplier/reference	LQ12 80L 208sq eff slot Etch LF JSCC
Lead frame finishing (material/thickness)	PURE TIN thickness: tolerance 7 to 20µm
Die attach material/type(glue/film)/supplier	D/A Ablestik 3230
Wire bonding material/diameter/supplier	Gold 0.8 MIL Diam
Molding compound material/supplier/reference	Mold Sumitomo low alpha G631SHQ
Package Moisture Sensitivity Level (JEDEC J–STD020D)	MSL 3

Package 4 – LQFP 10x10x1.4 64L 5W	
Assembly plant name / location	JSCC, China.
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	375 +/- 25
Die sawing method	Mechanical Sawing
Bill of Material elements	
Lead Frame material /supplier/reference	LQFP64 236sq no slots STMP LF JSCC
Die attach material/type(glue/film)/supplier	D/A Ablestik 3230
Wire bonding material/diameter/supplier	Ag 96.5 0.8 MIL Diam
Molding compound material/supplier/reference	Mold Sumitomo low alpha G631SHQ
Package Moisture Sensitivity Level (JEDEC J–STD020D)	MSL 3
Package 5 – LQFP 7x7x1.4 48L 5B	
Assembly plant name / location	JSCC, China.
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	375 +/- 25
Die sawing method	Mechanical Sawing
Bill of Material elements	
Lead Frame material /supplier/reference	LQFP48L 184sq Eff slots pur tin STMP LF JSCC
Die attach material/type(glue/film)/supplier	D/A Ablestik 3230
Wire bonding material/diameter/supplier	Ag 96.5 0.8 MIL Diam
Molding compound material/supplier/reference	Mold Sumitomo low alpha G631SHQ
Package Moisture Sensitivity Level (JEDEC J–STD020D)	MSL 3
Package 6 – TFBGA 8x8x1.2 100L A08Q (DY)	
Assembly plant name / location	SC AMKOR ATP3, Philippines
Pitch (mm)	0.8
Die thickness after back-grinding (µm)	178 +/- 15
Die sawing method	Laser Groove + Mechanical Sawing
Bill of Material elements	
Lead Frame material /supplier/reference	subst for TFBGA 8x8 P 0.8 SID 101406557
Die attach material/type(glue/film)/supplier	ABLEBOND GLUE 2300
Wire bonding material/diameter/supplier	WIRE GOLD DIAM. 0.8 MIL
Balls metallurgy/diameter/supplier	SOLDER BALL SAC 105 DIAM 0.35 MM
Molding compound material/supplier/reference	MOLDING COMPOUND GE100LFCS
Package Moisture Sensitivity Level (JEDEC J–STD020D)	MSL 3

Package 7 - UFBGA 6x6x0.6 121L B0CU (7B)	
Assembly plant name / location	ASEKH - TAIWAN
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	75 +/- 10
Die sawing method	Mechanical Sawing
Bill of Material elements	
Lead Frame material /supplier/reference	SUBSTRATE UFBGA 6x6 121 P0.5 ASE A27254
Die attach material/type(glue/film)/supplier	D/A Tape ABLESTICK ATB-125
Wire bonding material/diameter/supplier	wire gold 2N 0.8 mils
Balls metallurgy/diameter/supplier	SOLDER BALLS WITH 200 DIAM SN96.5 AG3.5%
Molding compound material/supplier/reference	Resin KYOCERA G1250AAS ULA
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL 3
Package 8 - UQFPN 7x7x0.55 48L A0B9 (MI)	
Assembly plant name / location	JSCC, China.
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	150 +/- 25
Die sawing method	Mechanical Sawing
Bill of Material elements	
Lead Frame material /supplier/reference	LF FOR UQFN 7x7 48L Sn PAD 5.2 MM SQ Groove
Die attach material/type(glue/film)/supplier	Glue Hitachi EN4900GC
Wire bonding material/diameter/supplier	Ag 96.5 0.8 MIL Diam
Molding compound material/supplier/reference	RESIN SUMITOMO G770
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL 3
Package 9 - WLCSP 81 B068 (IY)	
Assembly plant name / location	SC AMKOR ATT1, Taiwan.
Pitch (mm)	0.4
Die thickness after back-grinding (µm)	355 +/- 25
Die sawing method	Laser Groove
Bill of Material elements	
PBO material/reference	Passivation HD8820
RDL	Copper 6µm
UBM	Ti/Cu/Cu
Balls metallurgy/diameter/supplier (BGA/CSP)	Solder ball SAC405 Diam 230µm
Backside Coating material/supplier/reference	Back side coating PET film
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL 1

Package 10 – LQFP 14x14x1.4 128L TC	
Assembly plant name / location	SC AMKOR ATP1, Philippines
Pitch (mm)	0.4
Die thickness after back-grinding (µm)	375 +/- 25
Die sawing method	Laser Groove + Mechanical Sawing
Bill of Material elements	
Lead Frame material /supplier/reference	LF FOR LQ 128L PAD 5.0 SID 101385780 DR post p
Die attach material/type(glue/film)/supplier	Glue Evertech AP4200
Wire bonding material/diameter/supplier	GOLD WIRE 0.8MIL
Molding compound material/supplier/reference	Resin Sumitomo G631HQ
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL 3
Package 11 – LQFP 14x14x1.4 100L 1L	
Assembly plant name / location	SC AMKOR ATP1, Philippine.
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	375 +/- 25
Die sawing method	Laser Groove + Mechanical Sawing
Bill of Material elements	
Lead Frame material/supplier/reference	LQFP14x14 100L PPF 5sq SID#101389126
Die attach material/type(glue/film)/supplier	GLUE SUMITOMO EPOXY CRM 1076YB
Wire bonding material/diameter/supplier	GOLD WIRE 0.8MIL
Molding compound material/supplier/reference	Resin Sumitomo G631HQ
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL 3

2.2.3 Reliability testing information

Table 3

Reliability Testing Information	
Reliability laboratory name / location	ST RSST in Rousset

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	Assy Information Package #	Note
1	9R742046 Wafer#03	1.0	7B810883	P01L*469ESXA	LQFP 14x14 100L	2	Die Reliability assessment.
2	9R829130 Wafer#02	2.0	7B839653	P01L*469ESXB	LQFP 14x14 100L	2	Die Reliability assessment.
3	9R829133 Wafer#02	2.1	7B852367	P01L*469ESXZ	LQFP 14x14 100L	2	Die Reliability assessment.
4	9R742046 Wafer#02	1.0	7B810882	P0TC*469ESXA	LQFP 14x14 128L	1	Die Reliability assessment.
5	9R829130 Wafer#05	2.0	7B841737	P0TC*469ESXB	LQFP 14x14 128L	1	Die Reliability assessment.
6	9R829133 Wafer#01	2.1	7B851679	P0TC*469ESXZ	LQFP 14x14 128L	1	Die Reliability assessment.
7	9R949165 Wafer#10	2.2	GQ01726G	709X*469ESXY	LQFP 12x12 80L	3	Package Reliability assessment.
8	9R742046 Wafer#09	1.0	GQ81024X	S05W*469ISXA	LQFP 10x10 64L	4	Package Reliability assessment.
9	9R742046 Wafer#09	1.0	GQ81024Y	S05B*469ISXA	LQFP 7x7 48L	5	Package Reliability assessment.
10	9R742046 Wafer#12	1.0	7B817A5W	P1DY*469ESXA	TFBGA 8x8 100L	6	Package Reliability assessment.
11	9R742046 Wafer#07	1.0	GQ81327B	S0MI*469ISXA	UFQFPN 7x7 48L	8	Package Reliability assessment.
12	9R742046 Wafer#11	1.0	A5811007	T0IY*469ESXA	WLCSP 81L	9	Package Reliability assessment.

13	9R928236 Wafer#02	2.2	7B940388	P01L*469ESXY	LQFP 14x14 100L	2	Die Reliability assessment.
14	9R928236 Wafer#02	2.2	7B942638	P0TC*469ESXY	LQFP 14x14 128L	1	Die Reliability assessment.
15	9R928236 Wafer#12	2.2	AA002171	E07B*469XXXY	UFBGA 6x6 121L	7	Package Reliability assessment.
16	9R030017 Wafer#01	2.3	7B034283	P01L*469ESXX	LQFP 14x14 100L	11	Die Reliability assessment.
17	9R030017 Wafer#01	2.3	7B034284	P0TC*469ESXX	LQFP 14x14 128L	10	Die Reliability assessment.

3.2 Test plan and results summary

Table 5 – ACCELERATED LIFETIME SIMULATION TESTS

Test code	Stress method	Stress Conditions	Lots	S.S.	Total	Results/ Lot Fail/S.S.	Comments: (N/A =Not Applicable)
HTOL	JESD22 A108	Ta=125°C Duration= 168h/1200H Vcore :1V28 Vdd : 3V6	4	77	308	Lot1: 1200h 0/77 Lot2: 1200h 0/77 Lot3: 168h 0/77 Lot13: 168h 0/77 Lot16: 168h 0/77	
ESD HBM	ANSI/ESDA/ JEDEC JS-001	1500 Ω, 100 pF 2kV class2	4	3	12	Lot4: 0/3 Lot5: 0/3 Lot6: 0/3 Lot14: 0/3 Lot 17: 0/3	
ESD CDM	ANSI/ESDA/ JEDEC JS-002	250V	4	3	12	Lot4: 0/3 Lot5: 0/3 Lot6: 0/3 Lot14: 0/3 Lot 17: 0/3	
Latch Up	JESD78	130°C	4	3	12	Lot4: 0/3 Lot5: 0/3 Lot6: 0/3 Lot14: 0/3 Lot 17: 0/3	
EDR	JESD22-A117	10kcy EW @ 125°C then Storage HTB 150°C - Duration 1500h	2	77	154	Lot1: 0/77 Lot2: 0/77	
EDR	JESD22-A117	10kcy EW @ 125°C then Storage HTB 150°C - Duration 168h	1	77	77	Lot13: 0/77	
EDR	JESD22-A117	10kcy EW @ 25°C then Storage HTB 150°C - Duration 168h	3	77	231	Lot1: 0/77 Lot2: 0/77 Lot13: 168h 0/77	
EDR	JESD22-A117	10kcy EW @ -40°C then Storage HTB 150°C - Duration 168H	3	77	231	Lot1: 0/77 Lot2: 0/77 Lot13: 168h 0/77	
ELFR	JESD22-A108 JESD74	Ta=125°C Duration= 48hrs Vcore :1V28 Vdd : 3V6	2	500	1000	Lot1: 0/500 Lot2: 0/500	

Table 6 - ACCELERATED ENVIRONMENT STRESS TESTS

For LQFP 14x14 128L

Test code	Stress method	Stress Conditions	Lots	S.S.	Total	Results/ Lot	Comments: (N/A =Not Applicable)
PC	J-STD-020	24h bake@125°C, MSL3 (192h@30C/60%RH) 3x Reflow simulation Peak Reflow Temp= 260°C	1	308	308	Lot4: 0/308	
TC	JESD22-A104	Ta=-65/150°C Duration= 500cyc <input checked="" type="checkbox"/> After PC	1	77	77	Lot4: 0/77	
HTSL	JESD 22-A103	Ta=150°C, Duration= 1000hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot4: 0/77	
UHASt	JESD 22-A118	Ta=130°C ,85% RH Duration= 96hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot4: 0/77	
THB	JESD 22-A101	Ta=85°C/85%RH VDD=3v6 Duration= 1000hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot4: 0/77	
ESD CDM	ANSI/ESDA/ JEDEC JS-002	250V	3	3	9	Lot4: 0/3 Lot5: 0/3 Lot6: 0/3 Lot14: 0/3 Lot 17: 0/3	

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

For LQFP 14x14 100L

Test code	Stress method	Stress Conditions	Lots	S.S.	Total	Results/ Lot	Comments: (N/A =Not Applicable)
ESD CDM	ANSI/ESDA/ JEDEC JS-002	250V	1	3	1	Lot1: 0/3	

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

For LQFP 12x12 80L

Test code	Stress method	Stress Conditions	Lots	S.S.	Total	Results/ Lot	Comments: (N/A =Not Applicable)
PC	J-STD-020	24h bake@125°C, MSL3 (192h@30C/60%RH) 3x Reflow simulation Peak Reflow Temp= 260°C	1	308	308	Lot7:	Included in MDG-MCD-RER1818
TC	JESD22-A104	Ta=-65/150°C Duration= 500cyc <input checked="" type="checkbox"/> After PC	1	77	77	Lot7:	Included in MDG-MCD-RER1818
HTSL	JESD 22-A103	Ta=150°C , Duration= 1000hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot7:	Included in MDG-MCD-RER1818
UHAST	JESD 22-A118	Ta=130°C ,85% RH Duration= 96hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot7:	Included in MDG-MCD-RER1818
THB	JESD 22-A101	Ta=85°C/85%RH VDD=3v6 Duration= 1000hrs <input checked="" type="checkbox"/> After PC	1	25	25	Lot7:	Included in MDG-MCD-RER1818
ESD CDM	ANSI/ESDA/ JEDEC JS-002	250V	1	3	3	Lot7:	Included in MDG-MCD-RER1818

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

For LQFP 10x10 64L

Test code	Stress method	Stress Conditions	Lots	S.S.	Total	Results/ Lot	Comments: (N/A =Not Applicable)
PC	J-STD-020	24h bake@125°C, MSL3 (192h@30C/60%RH) 3x Reflow simulation Peak Reflow Temp= 260°C	1	308	308	Lot8: 0/308	
TC	JESD22-A104	Ta=-65/150°C Duration= 500cyc <input checked="" type="checkbox"/> After PC	1	77	77	Lot8: 0/77	
HTSL	JESD 22-A103	Ta=150°C, Duration= 1000hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot8: 0/77	
UHAST	JESD 22-A118	Ta=130°C ,85% RH Duration= 96hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot8: 0/77	
THB	JESD 22-A101	Ta=85°C/85%RH VDD=3v6 Duration= 1000hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot8: 0/77	
ESD CDM	ANSI/ESDA/ JEDEC JS-002	500V	1	3	3	Lot8: 0/3	

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

For LQFP 7x7 48L

Test code	Stress method	Stress Conditions	Lots	S.S.	Total	Results/ Lot	Comments: (N/A =Not Applicable)
ESD CDM	ANSI/ESDA/ JEDEC JS-002	500V	1	3	3	Lot9: 0/3	

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

For TFBGA 8x8 100L

Test code	Stress method	Stress Conditions	Lots	S.S.	Total	Results/ Lot	Comments: (N/A =Not Applicable)
PC	J-STD-020	24h bake@125°C, MSL3 (192h@30C/60%RH) 3x Reflow simulation Peak Reflow Temp= 260°C	1	231	231	Lot10: 0/231	
TC	JESD22-A104	Ta=-65/150°C Duration= 500cyc <input checked="" type="checkbox"/> After PC	1	77	77	Lot10: 0/77	
HTSL	JESD 22-A103	Ta=150°C, Duration= 1000hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot10: 0/77	
THB	JESD 22-A101	Ta=85°C/85%RH VDD=3v6 Duration= 1000hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot10: 0/77	
ESD CDM	ANSI/ESDA/ JEDEC JS-002	500V	1	3	3	Lot10: 0/3	

For UFBGA 6x6 121L

Test code	Stress method	Stress Conditions	Lots	S.S.	Total	Results/ Lot	Comments: (N/A =Not Applicable)
PC	J-STD-020	24h bake@125°C, MSL3 (192h@30C/60%RH) 3x Reflow simulation Peak Reflow Temp= 260°C	1	231	231	Lot15: 0/231	
TC	JESD22-A104	Ta=-65/150°C Duration= 500cyc <input checked="" type="checkbox"/> After PC	1	77	77	Lot15: 0/77	
HTSL	JESD 22-A103	Ta=150°C, Duration= 1000hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot15: 0/77	
THB	JESD 22-A101	Ta=85°C/85%RH VDD=3v6 Duration= 1000hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot15: 0/77	
ESD CDM	ANSI/ESDA/ JEDEC JS-002	500V	1	3	3	Lot15: 0/3	

For UFQFPN 7x7 48L

Test code	Stress method	Stress Conditions	Lots	S.S.	Total	Results/ Lot	Comments: (N/A =Not Applicable)
PC	J-STD-020	24h bake@125°C, MSL3 (192h@30C/60%RH) 3x Reflow simulation Peak Reflow Temp= 260°C	1	308	308	Lot11: 0/308	
TC	JESD22-A104	Ta=-65/150°C Duration= 500cyc <input checked="" type="checkbox"/> After PC	1	77	77	Lot11: 0/77	
HTSL	JESD 22-A103	Ta=150°C, Duration= 1000hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot11: 0/77	
UHAST	JESD 22-A118	Ta=130°C ,85% RH Duration= 96hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot11: 0/77	
THB	JESD 22-A101	Ta=85°C/85%RH VDD=3v6 Duration= 1000hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot11: 0/77	
ESDCDM	ANSI/ESDA/ JEDEC JS-002	500V	1	3	3	Lot11: 0/3	

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

For WLCSP 81

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	1	308	308	Lot12: 0/308	
TC	JESD22-A104	Ta=-65/150°C Duration= 500cyc <input checked="" type="checkbox"/> After PC	1	77	77	Lot12: 0/77	
HTSL	JESD 22-A103	Ta=150°C, Duration= 1000hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot12: 0/77	
UHAST	JESD 22-A118	Ta=130°C ,85% RH Duration= 96hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot12: 0/77	
THB	JESD 22-A101	Ta=85°C/85%RH VDD=3v6 Duration= 1000hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot12: 0/77	
ESD CDM	ANSI/ESDA/ JEDEC JS-002	500V	1	3	3	Lot12: 0/3	

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

Table 8 - PACKAGE ASSEMBLY INTEGRITY TESTS

For LQFP 14x14 128L

Test code	Method	Tests Conditions	Lots	S.S.	Total	Results/ Lot	Comments: (N/A =Not Applicable)
CA	Construction Analysis including -Wire bond shear -Wire bond pull -Solderability	JESD 22B102 JESDB100/ B108	1	50	50	Lot4: 0/50	

For TFBGA 8x8 100L

Test code	Method	Tests Conditions	Lots	S.S.	Total	Results/ Lot	Comments: (N/A =Not Applicable)
CA	Construction Analysis including -Wire bond shear -Wire bond pull -Solderability	JESD 22B102 JESDB100/ B108	1	50	50	Lot10: 0/50	

For UFBGA 6x6 121L

Test code	Method	Tests Conditions	Lots	S.S.	Total	Results/ Lot	Comments: (N/A =Not Applicable)
CA	Construction Analysis including POA conformity	JESD 22B102 JESDB100/ B108	1	50	50	Lot15: 0/50	

For LQFP 12x12 80L

Test code	Method	Tests Conditions	Lots	S.S.	Total	Results/ Lot	Comments: (N/A =Not Applicable)
CA	Construction Analysis including -Wire bond shear -Wire bond pull -Solderability	JESD 22B102 JESDB100/ B108	1	50	50	Lot7: 0/50	Reference to: MDG-MCD-RER1818 No concern

4 APPLICABLE AND REFERENCE DOCUMENTS

Reference	Short description
JESD47	Stress-Test-Driven Qualification of Integrated Circuits
SOP2.4.4	Record Management Procedure
SOP2.6.2	Internal Change Management
SOP2.6.7	Finished Good Maturity Management
SOP2.6.9	Package & Process Maturity Management in BE
SOP2.6.11	Program Management for Product Development
SOP2.6.17	Management of Manufacturing Transfers
SOP2.6.19	Front-End Technology Platform Development and Qualification
DMS 0061692	Reliability Tests and Criteria for Product Qualification
ANSI/ESDA JEDEC JS-001	Electrostatic discharge (ESD) sensitivity testing human body model (HBM)
ANSI/ESDA JEDEC JS-002	Electrostatic discharge (ESD) sensitivity testing charge device model (CDM)
JESD78	IC Latch-up test
JESD 22-A108	Temperature, Bias and Operating Life
JESD 22-A103	High Temperature Storage Life
J-STD-020:	Moisture/reflow sensitivity classification for non-hermetic solid state surface mount devices
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
JESD 22B102:	Solderability test
JESD22B100/B108:	Physical dimension

5 GLOSSARY

Reference	Short description
HTOL	High Temperature Operating Life
EDR	Endurance and Data Retention
ELFR	Early Failure Rate
PC	Preconditioning (solder simulation)
THB	Temperature Humidity Bias
TC	Temperature cycling
uHAST	Unbiased Highly Accelerated Stress Test
HAST	Highly Accelerated Stress Test
HTSL	High temperature storage life
DMS	ST Advanced Documentation Controlled system/ Documentation Management system
ESD HBM	Electrostatic discharge (human body model)
ESD CDM	Electrostatic discharge (charge device model)
LU	Latch-up
CA	Construction Analysis

6 REVISION HISTORY

Revision	Author	Content description	Approval List			
			Function	Location	Name	Date
1.0	Pascal CARDOSI	Initial Release	Div. Quality Manager	Rousset	Pascal NARCHE	01 st –Mar–2019
			Q&R Quality Manager	Rousset	Frederic BRAVARD	01 st –Mar–2019
2.0	Pascal CARDOSI	Add all Commercial Products linked to die 469 Maturity update: 30	Q&R Quality Manager	Rousset	Frederic BRAVARD	29 th –Jul–2019
2.1	Pascal CARDOSI	Update with results for cut2.2 qualification – PCN11871	Q&R Quality Manager	Grenoble	Dominique GALIANO	06 th –Dec–2019
2.2	Lionel NEVORET Pascal CARDOSI	Add UFBGA 6x6 121L package qualification	Q&R Quality Manager	Grenoble	Dominique GALIANO	11 th –May–2020
2.3	Berengere ROUTIER–SCAPPUCCI Pascal CARDOSI	Updated with Reliability trial results on LQFP80. Update with results for cut2.3 qualification – PCN12437.	Q&R Quality Manager	Grenoble	Dominique GALIANO	09 th Nov 2020

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Reliability Evaluation Report

MDG-MCD-RER1920

STM32G491x (479x66)

Reliability Evaluation Purpose (New Product Qualification)

General Information		Traceability	
Commercial Product	STM32G491x	Diffusion Plant	TSMC Fab14, Taiwan.
Product Line	479X66	Assembly Plant	ASE, Taiwan. JSCC, China.
Die revision	479XXXZ (Cut1.1)	Reliability Assessment	
Product Description	STM32G491		
Package	LQFP14x14 100L, LQFP14x14 80L LQFP12x12 80L, LQFP10x10 64L LQFP7x7 48L, UFBGA64 5x5, UFQFPN7x7 48L, UFQFPN5x5 32L WLCSP64		
Silicon Technology	TSMC Fab14 90ULL	Pass	<input checked="" type="checkbox"/>
Division	MDG-MCD	Fail	<input type="checkbox"/>
Reliability Maturity Level	30	Investigation required	<input type="checkbox"/>

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	Aug 28 th 2020	Muriel GALTIER	MDG-MCD-Q&R Engineer
1.1	Nov 3 th 2020	Muriel GALTIER	MDG-MCD-Q&R Engineer

APPROVED BY:

VERSION 1.0

Function	Location	Name	Date
Division Q&R Manager	Grenoble	Dominique GALIANO	15-Sep-2020
Division Quality Manager	Rousset	Pascal NARCHE	17-Sep-2020

VERSION 1.1

Function	Location	Name	Date
Division Q&R Manager	Grenoble	Dominique GALIANO	10 th Nov 2020

TABLE OF CONTENTS

1	RELIABILITY EVALUATION OVERVIEW	4
1.1	OBJECTIVE	4
1.2	RELIABILITY STRATEGY	4
1.3	CONCLUSION	5
2	PRODUCT OR TEST VEHICLE CHARACTERISTICS.....	6
2.1	GENERALITIES.....	6
2.2	TRACEABILITY	6
2.2.1	<i>Wafer fab information.....</i>	<i>6</i>
2.2.2	<i>Assembly information.....</i>	<i>7</i>
2.2.3	<i>Reliability testing</i>	
	<i>information.....</i>	<i>1</i>
	<i>0</i>	
3	TESTS RESULTS SUMMARY	10
3.1	LOT INFORMATION	10
3.2	TEST PLAN AND RESULTS SUMMARY	12
4	APPLICABLE AND REFERENCE DOCUMENTS	19
5	GLOSSARY	20
6	REVISION HISTORY	21

1 RELIABILITY EVALUATION OVERVIEW

1.1 Objective

The aim of this report is to present results of the reliability evaluation performed on STM32G491x – Die 479XXXZ.

Test vehicle is described here below:

Product	Process / Package	Diffusion / Assembly plant
STM32G491VET6	90ULL, LQFP 14x14 100L	TSMC Fab14, ASE
STM32G491MES6	90ULL, LQFP 14x14 80L	TSMC Fab14, ASE
STM32G491MET6	90ULL, LQFP 12x12 80L	TSMC Fab14, JSCC
STM32G474RET6	90ULL, LQFP 10x10 64L	TSMC Fab14, JSCC
STM32G491CET6	90ULL, LQFP 7x7 48L	TSMC Fab14, JSCC
STM32G491REI6	90ULL, UFBGA64 5x5	TSMC Fab14, ASE
STM32G491CEU6	90ULL, UFQFPN 7x7 48L	TSMC Fab14, JSCC
STM32G491KEU6	90ULL, UFQFPN 5x5 32L	TSMC Fab14, JSCC
STM32G491MEY6TR	90ULL, WLCSP 64L	TSMC Fab14, ASE

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

1.2 Reliability Strategy

The STM32G491x – Die 479XXXZ, is processed in the 90ULL process from TSMC Fab14 Taiwan plant which is qualified through– Die 415 (RERMCD1112).

Two packages need CA:

- LQFP14x14 80L because not yet qualified in ASE
- UFQFN32COL because already qualified in Fab 3 TSMC but not in TSMC90nm

For LQFP64 we can apply similarity rules with LQFP80 12x12 so only CDM needed.

For WLCSP64, only CDM needed thanks to available reliability on same packages with similar die sizes.

Package reliability exercise is planned on 1 lot to assess the LQFP14x14 80L.

Package	Reference	Assy Plant location
LQFP 14x14 100L	RERMCD1810	ASE (K1), Taiwan
LQFP 12x12 80L	RERMCD1818	JSCC, China
LQFP 10x10 64L	RERMCD1621	JSCC, China
LQFP 7x7 48L	RERMCD1621	JSCC, China
UFBGA 5x5 64L	RERMCD1901	ASE (K5), Taiwan
UFQFPN 7x7 48L	RERMCD1622/RERMCD1718	JSCC, China
WLCSP 64L	RERMCD1909	ASE, Taiwan

According to “RELIABILITY TESTS AND CRITERIA FOR QUALIFICATION” specification (DMS 0061692), the following qualification strategy has been defined:

- Die Qualification:
 - Cut1.0:1 full qualification lot to assess the die in LQFP100 package.
 - Cut 1.1: 1 partial qualification lot to assess the minor fix of die in LQFP100 package

Note: ESD HBM & LU is done in LQFP100 (Max pin count)

- Package Qualification:
 The reliability test plan and result summary are presented in the following tables:

Package	Body	Pitch	Package Code	Wire	Assembly	Bonding Option	Trial
LQFP 100	14x14	0.5	1L	Gold	ASE (K1)		1 reliability lot
LQFP80	14x14	0.65	1S	Gold	JSCC		1 reliability lot + Partial CA
LQFP80	12x12	0.5	9X	Gold	JSCC		1 reliability lot
LQFP 64	10x10	0.5	5W	Gold	JSCC		CDM only
LQFP 48	7x7	0.5	5B	Gold	JSCC		1 reliability lot
UFGBA64	5x5	0.5	A019 (2I)	Gold	ASE (K5)		1 reliability lot
UFQFN 48L	7x7	0.5	A0B9 (MI)	Gold	JSCC		1 reliability lot
UFQFN 32L COL	5x5	0.5	A09E	Gold	JSCC		1 reliability lot + Partial CA
WLCSP64	-	0.4	B0D3 (3N)	-	ASE		CDM only

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 the STM32G491 – Die 479XXXZ for all packages listed in the above table except LQFP80 14x14 and UFQFN32. Reliability Report to be updates when corresponding results will be available

Refer to Section 3.0 for reliability test results.

2 PRODUCT OR TEST VEHICLE CHARACTERISTICS

2.1 Generalities

STM32G491x product is based on Arm® 32-bit Cortex®-M4 CPU with FPU, Adaptive real-time accelerator (ART Accelerator™) allowing 0-wait-state execution from Flash memory, frequency up to 170 MHz, 213 DMIPS, 512k Flash, 96KB SRAM, 16KB CCM-SRAM, 16 DMA channels, rich analog peripherals 3x12bits ADC, 4xDAC, 4x OPAMP, 4xCOM, 17 com peripherals ...

For additional information concerning the product behavior, refer to STM32G491x datasheets.

2.2 Traceability

2.2.1 Wafer fab information

Table 1

Wafer fab information	
FAB1	
Wafer fab name / location	TSMC Fab14 / Taiwan
Wafer diameter (inches)	12
Wafer thickness (µm)	775 +/- 25
Silicon process technology	90nm eFlash Generic TSMC
Number of masks	43
Die finishing front side (passivation) materials/thicknesses (µm)	PSG + NITRIDE, 1.75
Die area (Stepping die size) (µm)	3546, 3579
Die pad size (X,Y) (µm)	123, 59
Sawing street width (X,Y) (µm)	80, 80
Metal levels/Materials/Thicknesses (µm)	Metal 1 Cu 0.24 / Metal 2 Cu 0.31 / Metal 3 Cu 0.31 Metal 4 Cu 0.31 / Metal 5 Cu 0.31 / Metal 6 Cu 0.85 Metal 7 AlCu 1.45
Die over coating (material/thickness)	No
FIT level (Ea=0.7eV, C.L: 60%, 55°C)	3.1 FITs at qualification date
Soft Error Rate - Alpha SER [FIT/Mb] - Neutron SER [FIT/Mb] - Conditions	Alpha SER: 491 FIT/Mb Neutron SER: 445 FIT/Mb Neutron SER is an estimation at sea level of NYC (14n/h/cm²). Alpha result is estimated using a nominal flux of 0.001α/h/cm²
Wafer Level Reliability - Electro-Migration (EM) - Time Dependent Dielectric Breakdown (TDDB) or Gate Oxide Integrity (GOI) - Hot Carrier Injection (HCI) - Negative Bias Thermal Instability (NBTI) - Stress Migration (SM)	Yes
Other Device(s) using same process	STM32L4x, STM32G4x product family, 415, 435, 461, 462, 464, 470, 468, 469

2.2.2 Assembly information

Table 2

Assembly Information	
Package 1 – LQFP 14x14x1.4 100L 1L	
Assembly plant name / location	ASE, K1.
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	375 +/- 25
Die sawing method	Mechanical Sawing
Bill of Material elements	
Lead Frame material/supplier	LQFP14x14 100L Cu_Ag plating/Sumitomo
Die attach material/type(glue/film)/supplier	CRM-1076WA/glue/Sumitomo
Wire bonding material/diameter/supplier	GOLD WIRE 0.8MIL
Molding compound material/supplier	EME-G631SH/ Sumitomo
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL 3
Package 2 – LQFP 14x14x1.4 80L 1S	
Assembly plant name / location	ASE, K1.
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	375 +/- 25
Die sawing method	Mechanical Sawing
Bill of Material elements	
Lead Frame material/supplier	LQFP80 14x14 Cu_Ag plating/Sumitomo
Die attach material/type(glue/film)/supplier	CRM-1076WA/glue/Sumitomo
Wire bonding material/diameter/supplier	GOLD WIRE HTS 0.8MILS/TANAKA
Molding compound material/supplier	EME-G631SH/ Sumitomo
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL 3
Package 3 – LQFP 12x12x1.4 80L 9X	
Assembly plant name / location	JSCC, China.
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	375 +/- 25
Die sawing method	Mechanical Sawing
Bill of Material elements	
Lead Frame material /supplier	C194 ESH Mitsui
Die attach material/type(glue/film)/supplier	Epoxy 3230 ABLESTIK
Wire bonding material/diameter/supplier	GOLD 0.8 MIL MKE
Molding compound material/supplier	Mold compound EME G631SHQ 14*5.2G SUMITIMO
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL 3
Package 4 – LQFP 10x10x1.4 64L 5W	
Assembly plant name / location	JSCC, China.

Pitch (mm)	0.5
Die thickness after back-grinding (µm)	375 +/- 25
Die sawing method	Mechanical Sawing
Bill of Material elements	
Lead Frame material /supplier	LQFP64LD C9–RSM 207x207
Die attach material/type(glue/film)	D/A Epoxy 3230 10CC (36G)
Wire bonding material/diameter/supplier	GOLD 0.8 MIL Diam HA3 EN HERAEUS
Molding compound material/supplier	Mold compound EME G631SHQ 16*7.4G
Package Moisture Sensitivity Level (JEDEC J–STD020D)	MSL 3
Package 5 – LQFP 7x7x1.4 48L 5B	
Assembly plant name / location	JSCC, China.
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	375 +/- 25
Die sawing method	Mechanical Sawing
Bill of Material elements	
Lead Frame material /supplier	LQFP48L C9–DSM 184x184 (7x7PCK)
Die attach material/type(glue/film)/supplier	D/A Ablestik 3230 10CC (36G)
Wire bonding material/diameter/supplier	GOLD 0.8MIL HA3 EN HERAEUS
Molding compound material/supplier	Mold COMPOUND EME G631SHQ 14*5.7G
Package Moisture Sensitivity Level (JEDEC J–STD020D)	MSL 3
Package 6 – UFBA 5x5x0.6 64L A019 (2I)	
Assembly plant name / location	ASE, K5.
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	75 +/- 12
Die sawing method	Mechanical Sawing
Bill of Material elements	
Lead Frame material /supplier	NiPd plating/ ASE
Die attach material/type(glue/film)/supplier	ATB–125/ film/ Henkel
Wire bonding material/diameter/supplier	WIRE GOLD DIAM. 0.8 MIL
Balls metallurgy/diameter/supplier	SN96.5 AG3.5%/ 200um/ Shenmao
Molding compound material/supplier	KE–G1250AAS/ Kyocera
Package Moisture Sensitivity Level (JEDEC J–STD020D)	MSL 3

Package 7 – UFQFPN 7x7x0.55 48L A0B9 (MI)	
Assembly plant name / location	JSCC, China.
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	150 +/- 25
Die sawing method	Mechanical Sawing
Bill of Material elements	
Lead Frame material /reference	UQFNS-4S 48L 7x7 C7 DR 5.2X5.2-196u A
Die attach material/type(glue/film)/supplier	EPOXY EN4900GC MUSASHI 10CC
Wire bonding material/diameter/supplier	GOLD 0.8 MIL Diam/ UR2/MKE
Molding compound material/supplier	EME G770/ Sumitomo/
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL 3
Package 8 – UFQFPN 5x5x0.55 32L A0E9	
Assembly plant name / location	JSCC, China.
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	135 +/- 25
Die sawing method	Mechanical Sawing
Bill of Material elements	
Lead Frame material /supplier	C7025 1/2H HDS
Die attach material/type(glue/film)/supplier	Film Hitachi
Wire bonding material/diameter/supplier	GOLD 0.8 MIL Diam MKE
Molding compound material/supplier	RESIN SUMITOMO G770HCD-A
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL 3
Package 9 – WLCSP 64 B0D3 (3N)	
Assembly plant name / location	ASE
Pitch (mm)	0.4
Die thickness after back-grinding (µm)	355 +/- 25
Die sawing method	Mechanical + Laser Groove
Bill of Material elements	
PBO material/reference	LTC9320
RDL	Ti/Cu/Cu
UBM	Ti/Cu/Cu
Balls metallurgy/diameter/supplier (BGA/CSP)	SAC405, 230 um, Senju
Backside Coating material/supplier/reference	LC2850 / LINTEC
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL 1

2.2.3 Reliability testing information

Table 3

Reliability Testing Information	
Reliability laboratory name / location	GRAL/Grenoble

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	Note
1	P63W41 Wafer#18	1.0	AA012142	E11L*479ESXA	LQFP 14x14 100L	Die and Package Reliability assessment.
2	P63W41 Wafer#20	1.0	AA017075	E01S*479ESXA	LQFP 14x14 80L	Package Reliability assessment.
3	P63W41 Wafer#09	1.0	GQ01128D	719X*479ESXA	LQFP 12x12 80L	Package Reliability assessment.
4	P63W41 Wafer#08	1.0	GQ011278	735W*479ESXA	LQFP 10x10 64L	Package Reliability assessment.
5	P63W41 Wafer#08	1.0	GQ01129Y	715B*479ESXA	LQFP 7x7 48L	Package Reliability assessment.
6	P63W41 Wafer#19	1.0	AA012146	E02I*479ESXA	UFPGA 5x5 64L	Package Reliability assessment.
7	P63W41 Wafer#10	1.0	GQ01223M	70MI*479ESXA	UFQFPN 7x7 48L	Package Reliability assessment.

8	P63W41 Wafer#11	1.0	GQ02129Z	71EL*479ESXA	UFQFPN 7x7 32L	Package Reliability assessment.
9	P63W41 Wafer#07	1.0	AA027066	E03N*479ESXA	WLCSP64	Package Reliability assessment.
10	P63W43 Wafer#22	1.1	AA033211	E11L*479ESXZ	LQFP 14x14 100L	Die Reliability assessment

3.2 Test plan and results summary

Table 5 – ACCELERATED LIFETIME SIMULATION TESTS
For LQFP 14x14 100L

Test code	Stress method	Stress Conditions	Lots	S.S.	Total	Results/ Lot Fail/S.S.	Comments: (N/A =Not Applicable)
HTOL	JESD22 A108	Ta=125°C Duration= 1200H Lot 1 Duration= 168H Lot 10 Vcore :1V28 Vdd: 3V6	2	77	154	Lot1: 0/77 Lot 10: 0/77	
ESD HBM	ANSI/ESDA/ JEDEC JS-001	1500 Ω, 100 pF 2kV class2	2	3	6	Lot1: 0/3 Lot 10: 0/3	
ESD CDM	ANSI/ESDA/ JEDEC JS-002	250V	2	3	6	Lot1: 0/3 Lot 10: 0/3	
Latch Up	JESD78	130°C	2	3	6	Lot1: 0/3 Lot 10: 0/3	
EDR	JESD22-A117	10kcy EW @ 125°C then Storage HTB 150°C - Duration 1500H	1	77	77	Lot1: 0/77	
EDR	JESD22-A117	10kcy EW @ 25°C then Storage HTB 150°C - Duration 168h	1	77	77	Lot1: 0/77	
EDR	JESD22-A117	10kcy EW @ -40°C then Storage HTB 150°C - Duration 168H	1	77	77	Lot1: 0/77	
ELFR	JESD22-A108 JESD74	Ta=125°C Duration= 48hrs Vcore :1V28 Vdd : 3V6	1	500	500	Lot1: 0/500	

Table 6 – ACCELERATED ENVIRONMENT STRESS TESTS

For LQFP 14x14 100L

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, MSL3 (192h@30C/60%RH) 3x Reflow simulation Peak Reflow Temp= 260°C	1	308	308	Lot1: 0/308	
TC	JESD22-A104	Ta=-65/150°C Duration= 500cyc <input checked="" type="checkbox"/> After PC	1	77	77	Lot1: 0/77	
HTSL	JESD 22-A103	Ta=150°C, Duration= 1000hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot1: 0/77	
UHAST	JESD 22-A118	Ta=130°C ,85% RH Duration= 96hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot1: 0/77	
THB	JESD 22-A101	Ta=85°C/85%RH VDD=3v6 <input checked="" type="checkbox"/> After PC	1	77	77	Lot1: 0/77	
ESD CDM	ANSI/ESDA/ JEDEC JS-002	250V	1	3	3	Lot1: 0/3	

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

For LQFP 14x14 80L

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, MSL3 (192h@30C/60%RH) 3x Reflow simulation Peak Reflow Temp= 260°C	1	308	308	Lot2:	Qualification in Q4-20
TC	JESD22-A104	Ta=-65/150°C Duration= 500cyc <input checked="" type="checkbox"/> After PC	1	77	77	Lot2:	Qualification in Q4-20

HTSL	JESD 22-A103	Ta=150°C , Duration= 1000hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot2:	Qualification in Q4-20
UHAST	JESD 22-A118	Ta=130°C ,85% RH Duration= 96hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot2:	Qualification in Q4-20
THB	JESD 22-A101	Ta=85°C/85%RH VDD=3v6 <input checked="" type="checkbox"/> After PC	1	77	77	Lot2:	Qualification in Q4-20
ESD CDM	ANSI/ESDA/ JEDEC JS-002		1	3	3	Lot2:	Qualification in Q4-20

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

For LQFP 12x12 80L

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, MSL3 (192h@30C/60%RH) 3x Reflow simulation Peak Reflow Temp= 260°C	1	308	308	Lot3: 0/308	
TC	JESD22-A104	Ta=-65/150°C Duration= 500cyc <input checked="" type="checkbox"/> After PC	1	77	77	Lot3: 0/77	
HTSL	JESD 22-A103	Ta=150°C , Duration= 1000hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot3: 0/77	
UHAST	JESD 22-A118	Ta=130°C ,85% RH Duration= 96hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot3: 0/77	
THB	JESD 22-A101	Ta=85°C/85%RH VDD=3v6 <input checked="" type="checkbox"/> After PC	1	77	77	Lot3: 0/77	
ESD CDM	ANSI/ESDA/ JEDEC JS-002	500V	1	3	3	Lot3: 0/3	

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

For LQFP 10x10 64L

Test code	Stress method	Stress Conditions	Lots	S.S.	Total	Results/ Lot Fail/S.S.	Comments: (N/A =Not Applicable)
ESD CDM	ANSI/ESDA/ JEDEC JS-002	500V	1	3	3	Lot4: 0/3	

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

For LQFP 7x7 48L

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, MSL3 (192h@30C/60%RH) 3x Reflow simulation Peak Reflow Temp= 260°C	1	308	308	Lot5: 0/308	
TC	JESD22-A104	Ta=-65/150°C Duration= 500cyc <input checked="" type="checkbox"/> After PC	1	77	77	Lot5: 0/77	
HTSL	JESD 22-A103	Ta=150°C, Duration= 1000hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot5: 0/77	
UHAST	JESD 22-A118	Ta=130°C ,85% RH Duration= 96hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot5: 0/77	
THB	JESD 22-A101	Ta=85°C/85%RH VDD=3v6 <input checked="" type="checkbox"/> After PC	1	77	77	Lot5: 0/77	
ESD CDM	ANSI/ESDA/ JEDEC JS-002		1	3	3	Lot5: 0/3	

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

For UFBGA 5x5 64L

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, MSL3 (192h@30C/60%RH) 3x Reflow simulation Peak Reflow Temp= 260°C	1	231	231	Lot6: 0/308	

TC	JESD22-A104	Ta=-65/150°C Duration= 500cyc <input checked="" type="checkbox"/> After PC	1	77	77	Lot6: 0/77	
HTSL	JESD 22-A103	Ta=150°C, Duration= 1000hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot6: 0/77	
THB	JESD 22-A101	Ta=85°C/85%RH VDD=3v6 <input checked="" type="checkbox"/> After PC	1	77	77	Lot6: 0/77	
ESD CDM	ANSI/ESDA/ JEDEC JS-002	500V	1	3	3	Lot6: 0/3	

For UFQFPN 7x7 48L

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, MSL3 (192h@30C/60%RH) 3x Reflow simulation Peak Reflow Temp= 260°C	1	308	308	Lot7: 0/308	
TC	JESD22-A104	Ta=-65/150°C Duration= 500cyc <input checked="" type="checkbox"/> After PC	1	77	77	Lot7: 0/77	
HTSL	JESD 22-A103	Ta=150°C, Duration= 1000hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot7: 0/77	
UHAST	JESD 22-A118	Ta=130°C ,85% RH Duration= 96hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot7: 0/77	
THB	JESD 22-A101	Ta=85°C/85%RH VDD=3v6 <input checked="" type="checkbox"/> After PC	1	77	77	Lot7: 0/77	
ESD CDM	ANSI/ESDA/ JEDEC JS-002	500V	1	3	3	Lot7: 0/3	

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

For UFQFPN 5x5 32L

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, MSL3 (192h@30C/60%RH) 3x Reflow simulation Peak Reflow Temp= 260°C	1	308	308	Lot8:	Qualification in Q4-20
TC	JESD22-A104	Ta=-65/150°C Duration= 500cyc <input checked="" type="checkbox"/> After PC	1	77	77	Lot8:	Qualification in Q4-20
HTSL	JESD 22-A103	Ta=150°C, Duration= 1000hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot8:	Qualification in Q4-20

UHAST	JESD 22-A118	Ta=130°C ,85% RH Duration= 96hrs <input checked="" type="checkbox"/> After PC	1	77	77	Lot8:	Qualification in Q4-20
THB	JESD 22-A101	Ta=85°C/85%RH VDD=3v6 <input checked="" type="checkbox"/> After PC	1	77	77	Lot8:	Qualification in Q4-20
ESD CDM	ANSI/ESDA/ JEDEC JS-002		1	3	3	Lot8:	Qualification in Q4-20

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

For WLCSP 64

Test code	Stress method	Stress Conditions	Lots	S.S.	Total	Results/ Lot Fail/S.S.	Comments: (N/A =Not Applicable)
ESD CDM	ANSI/ESDA/ JEDEC JS-002	500V	1	3	3	Lot9: 0/3	

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

Table 8 – PACKAGE ASSEMBLY INTEGRITY TESTS

For LQFP 14x14 80L

Test code	Method	Tests Conditions	Lots	S.S.	Total	Results/ Lot Fail/S.S.	Comments: (N/A =Not Applicable)
CA	Construction Analysis including –Wire bond shear –Wire bond pull –Solderability – Physical Dimension	JESD 22B102 JESDB100/ B108	1	50	50	Lot2	Qualification in Q4-20

For UFQFN 5x5 32L

Test code	Method	Tests Conditions	Lots	S.S.	Total	Results/ Lot Fail/S.S.	Comments: (N/A =Not Applicable)
CA	Construction Analysis including –Wire bond shear –Wire bond pull –Solderability – Physical Dimension	JESD 22B102 JESDB100/ B108	1	50	50	Lot2: 0/50	

4 APPLICABLE AND REFERENCE DOCUMENTS

Reference	Short description
JESD47	Stress–Test–Driven Qualification of Integrated Circuits
SOP2.4.4	Record Management Procedure
SOP2.6.2	Internal Change Management
SOP2.6.7	Finished Good Maturity Management
SOP2.6.9	Package & Process Maturity Management in BE
SOP2.6.11	Program Management for Product Development
SOP2.6.17	Management of Manufacturing Transfers
SOP2.6.19	Front–End Technology Platform Development and Qualification
DMS 0061692	Reliability Tests and Criteria for Product Qualification
ANSI/ESDA JEDEC JS–001	Electrostatic discharge (ESD) sensitivity testing human body model (HBM)
ANSI/ESDA JEDEC JS–002	Electrostatic discharge (ESD) sensitivity testing charge device model (CDM)
JESD78	IC Latch–up test
JESD 22–A108	Temperature, Bias and Operating Life
JESD 22–A103	High Temperature Storage Life
J–STD–020:	Moisture/reflow sensitivity classification for non–hermetic solid state surface mount devices
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
JESD 22B102:	Solderability test
JESD22B100/B108:	Physical dimension

5 GLOSSARY

Reference	Short description
HTOL	High Temperature Operating Life
EDR	Endurance and Data Retention
ELFR	Early Failure Rate
PC	Preconditioning (solder simulation)
THB	Temperature Humidity Bias
TC	Temperature cycling
uHAST	Unbiased Highly Accelerated Stress Test
HAST	Highly Accelerated Stress Test
HTSL	High temperature storage life
DMS	ST Advanced Documentation Controlled system/ Documentation Management system
ESD HBM	Electrostatic discharge (human body model)
ESD CDM	Electrostatic discharge (charge device model)
LU	Latch–up
CA	Construction Analysis

6 REVISION HISTORY

Revision	Author	Content description	Approval List			
			Function	Location	Name	Date
1.0	Muriel GALTIER	Initial Release	Div. Quality Manager	Rousset	Pascal NARCHE	17 th Sep 2020
			Q&R Quality Manager	Grenoble	Dominique GALIANO	15 th Sep 2020
1.1	Muriel GALTIER	Final Release	Q&R Quality Manager	Grenoble	Dominique GALIANO	10 th Nov 2020

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