PRODUCT/PROCESS CHANGE NOTIFICATION PCN13482 – Additional information

STM32G0B0x, STM32G0B1x and STM32G0C1x 512K - product enhancement

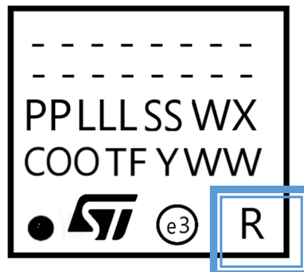
MDG – General Purpose Microcontrollers Division (GPM)

What are the changes?

Changes described in table below:

STM32G0B0x **STM32G0B1x** **STM32G0C1x**	Current Cut1.0	New Cut1.1
Die revision Marking **R**	“A”	“Z”

Example: Marking on package UFQFPN 7X7X0.55 48L



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For all samples request linked to this PCN, please:

- place a **<u>Non-standard</u>** sample order (choose Sample Non Std Type from pull down menu)
- insert the PCN number “**PCN13482**” 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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Reliability Evaluation Report

MDG-MCD-RER1918

STM32G0Bx (467X66)

New product qualification

General Information	
Commercial Product	STM32G0Bx
Product Line:	467X66
Die revision:	467XXXZ (cut1.1)
Product Description:	STM32G0 512Kbytes flash
Package:	LQFP 14x14 100L LQFP 12x12 80L LQFP 10x10 64L LQFP 7x7 48L LQFP 7x7 32L UFQFPN 7x7 48L UFQFPN 5x5 32L UFBGA 7x7 100L UFBGA 5x5 64L WLCSP52
Silicon Technology:	TSMC Fab14 90ULL
Division:	MDG-MCD
Reliability Maturity Level:	*20->W29*

Traceability	
Diffusion Plant:	TSMC Fab14, Taiwan
Assembly Plant:	ASE KH, Taiwan JSCC, China

Reliability Assessment	
Pass	☒
Fail	☐
Investigation required	☐

Note: *this report is a summary of the reliability trials performed in good faith by STMicroelectronics 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	22-Oct-2020	Philippe ADAM	MDG-MCD Q&R engineer
1.1	10-Dec-2020	Philippe ADAM	MDG-MCD Q&R engineer
1.2	26-Feb-2021	Philippe ADAM	MDG-MCD Q&R engineer
1.3	17-Sept-2021	Philippe ADAM	MDG-MCD Q&R engineer
1.4	17-June-2022	Philippe ADAM – Octavia NDJOYE-KOGOU	MDG-MCD Q&R engineers

APPROVED BY:

VERSION 1.0

Function	Location	Name	Date
Division Q&R Responsible	Grenoble	Dominique GALIANO	19-Nov-2020
Division Quality Manager	Rousset	Pascal NARCHE	19-Nov-2020

VERSION 1.1

Function	Location	Name	Date
Division Q&R Responsible	Grenoble	Dominique GALIANO	10-Dec-2020

VERSION 1.2

Function	Location	Name	Date
Division Q&R Responsible	Grenoble	Dominique GALIANO	16-Mar-2021

VERSION 1.3

Function	Location	Name	Date
Division Q&R Responsible	Grenoble	Dominique GALIANO	10-Sept-2021

VERSION 1.4

Function	Location	Name	Date
Division Q&R Responsible	Grenoble	Dominique GALIANO	23 -June-2022

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1 RELIABILITY EVALUATION OVERVIEW

1.1 Objective

The aim of this report is to present results of the reliability evaluation performed on STM32G0Bx – Die 467XXXZ

Test vehicle is described here below:

Product	Process / Package	Diffusion, Assembly plant	Option
STM32G0B1VET6	90ULL, LQFP 14x14 100L	TSMC Fab14, SC ASE TAIWAN	General Purpose (GP)
STM32G0B1MET6	90ULL, LQFP 12x12 80L	TSMC Fab14, JSCC	General Purpose (GP)
STM32G0B1RET6	90ULL, LQFP 10x10 64L	TSMC Fab14, JSCC	General Purpose (GP)
STM32G0B1RET6N	90ULL, LQFP 10x10 64L	TSMC Fab14, JSCC	Power Delivery (PD)
STM32G0B1CET6	90ULL, LQFP 7x7 48L	TSMC Fab14, JSCC	General Purpose (GP)
STM32G0B1CET6N	90ULL, LQFP 7x7 48L	TSMC Fab14, JSCC	Power Delivery (PD)
STM32G0B1KET6	90ULL, LQFP 7x7 32L	TSMC Fab14, JSCC	General Purpose (GP)
STM32G0B1KET6N	90ULL, LQFP 7x7 32L	TSMC Fab14, JSCC	Power Delivery (PD)
STM32G0B1CEU6	90ULL, UFQFPN 7x7 48L	TSMC Fab14, JSCC	General Purpose (GP)
STM32G0B1CEU6N	90ULL, UFQFPN 7x7 48L	TSMC Fab14, JSCC	Power Delivery (PD)
STM32G0B1KEU6N	90ULL, UFQFPN 7x7 32L	TSMC Fab14, JSCC	General Purpose (GP)
STM32G0B1KEU6N	90ULL, UFQFPN 7x7 32L	TSMC Fab14, JSCC	Power Delivery (PD)
STM32G0B1VEI6	90ULL, UFBGA 7x7 100L	TSMC Fab14, ASE TAIWAN	General Purpose (GP)
STM32G0B1REI6N	90ULL, UFBGA 7x7 100L	TSMC Fab14, ASE TAIWAN	Power Delivery (PD)
STM32G0B1NEY6TR	90ULL, WLCSP 52L	TSMC Fab14, ASE TAIWAN	General Purpose (GP)

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 STM32G0Bx (Die 467) is based on STM32G0 product family, processed in TSMC90nm technology in FAB14 and qualified on other STM32 products:

STM32L486x (die 415): RERMCD1112
STM32L433x (die 435): RERMCD1424
STM32G0x (die 460): RERMCD1602
STM32L496x (die 461): RERMCD1521
STM32L452x (die 462): RERMCD1526

The STM32G0Bx (Die 467) device is assembled in the following packages already qualified for this product family:

Package	Reference	Assy Plant / location
LQFP100 14x14	RERMCD1810	ASE KH / Taiwan
LQFP80 12x12	RERMCD1818	JSCC / China
LQFP64 10x10	RERMCD1621	
LQFP48 7x7	RERMCD1621	
LQFP32 7x7	RERMCD1621	
UFQFPN48 7x7	RERMCD1622 RERMCD1718	
UFQFPN32 5x5	RERMCD1622	
UFBGA100 7x7	RERMCD1901	ASE KH / Taiwan
UFBGA64 5x5	RERMCD1901	
WLCSP52 P0.4	RERMCD1909	

Based on these data, and according to "RELIABILITY TESTS AND CRITERIA FOR QUALIFICATION" specification (DMS 0061692), the following qualification strategy has been defined:

- Die Qualification:

  The full die reliability trials are conducted on one lot cut1.0 in LQFP100 GP bonding option and an add-on trial on cut1.1

- Package Qualification:

  All packages used for this product have been already or will be validated on TSMC 90nm technology through the STM32L4 and STM32G4 families. Because of the introduction of the flying bonding at ASE KH and with LQFP80 at JSCC, one reliability lot is planned for LQFP100 ASE KH and one for LQFP80 JSCC. One additional lot is planned for QFN48 JSCC to collect reliability data on QFN 7x7. One reliability lot is planned for WLCSP52 ASE KH.

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

Package	Body	Pitch	Package Code	Wire	Assy	Bonding Option	Trial
LQFP 100	14x14	0.5	1L	Gold	ASE KH	GP	1 reliability lot (including partial CA)
LQFP 80	12x12	0.5	1S	Gold	JSCC	GP	1 reliability lot (including partial CA)
LQFP 64	10x10	0.5	5W	Gold	JSCC	GP	ESD CDM
						PD	ESD CDM
LQFP 48	7x7	0.5	5B	Gold	JSCC	GP	ESD CDM
						PD	ESD CDM
LQFP 32	7x7	0.5	5V	Gold	JSCC	GP	ESD CDM
						PD	ESD CDM
UFQFPN 48	7x7	0.5	A0B9	Gold	JSCC	GP	1 reliability lot (including partial CA)
						PD	ESD CDM
UFQFPN 32	5x5	0.5	A0B8	Gold	JSCC	GP	ESD CDM
						PD	ESD CDM
UFBGA 100	5x5	0.5	A0C2	Gold	ASE KH	GP	ESD CDM and partial CA
UFBGA 64	5x5	0.5	A019	Gold	ASE KH	PD	ESD CDM
WLCSP 52	N.A	0.4	B0BG	N.A	ASE KH	GP	1 reliability lot (including partial CA)

Bonding options: GP, General Purpose or Legacy; PD, USB Power Delivery

Note: In order to cover all I/O options, some additional ESD CDM trials have been planned on different package bonding option.

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 STM32G0Bx – Die 467XXXA in LQFP100 ASE KH, LQFP80 JSCC, LQFP64 JSCC, LQFP48 JSCC, LQFP32 JSCC, UFQFPN48 JSCC, UQFN32 JSCC, UFBGA64 ASE KH, UFBGA100 ASE KH and WLCSP52 ASE KH.

Refer to Section 3.0 for reliability test results.

2 PRODUCT CHARACTERISTICS

2.1 Generalities

The STM32G0Bx device – die 467 – is the ultra-low-power microcontroller based on the high-performance ARM® Cortex®-M0+ 32-bit RISC core operating at a frequency of up to 64MHz
For additional information concerning the product behavior, refer to STM32L4G0Bx datasheet.

2.2 Traceability

2.2.1 Wafer fab information

Table 1

Wafer fab information	
FAB1	
Wafer fab name / location	T14F / TSMC Fab 14
Wafer diameter (inches)	12
Wafer thickness (µm)	775 +/- 25
Silicon process technology	90nm eFlash Generic TSMC
Number of masks	45
Die finishing front side (passivation) materials/thicknesses	USG + NITRIDE, 1.75 µm
Die finishing back side Materials/thicknesses	Raw silicon
Die area (Stepping die size)	3125x3190
Die pad size (X, Y)	123, 59
Sawing street width (X, Y) (µm)	80, 80
Metal levels/Materials/Thicknesses	Metal 1 TaN/Ta/CuSeed/Cu 0.240µm Metal 2 TaN/Ta/CuSeed/Cu 0.310µm Metal 3 TaN/Ta/CuSeed/Cu 0.310µm Metal 4 TaN/Ta/CuSeed/Cu 0.310µm Metal 5 TaN/Ta/CuSeed/Cu 0.310µm Metal 6 TaN/Ta/CuSeed/Cu 0.850µm Metal 7 AlCu 1.450µm
Die over coating (material/thickness)	No
FIT level (Ea=0.7eV, C.L: 60%, 55°C)	2.3 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, 468, 469, 470

2.2.2 Assembly information

Table 2

Assembly Information	
Package 1 – 1L LQFP 14x14 100L General Purpose (GP)	
Assembly plant name/location	ASE KH / Taiwan
Pitch (mm)	0.5
Die thickness after back-grinding (μm)	375 +/-25
Die sawing method	laser grooving + mechanical sawing
Bill of Material elements	
Lead frame reference/supplier	LF# A25516 / Sumitomo
Die attach material type/supplier	GLUE EPOXY CRM 1076WA / Sumitomo
Wire bonding material/diameter/supplier	Wire gold / 0.8 mil / Tanaka
Molding compound material/reference/supplier	Resin Sumitomo / EME-G631SH / Sumitomo
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL3
Package 2 – 9X LQFP 12x12 80L General Purpose (GP)	
Assembly plant name/location	JSCC / China
Pitch (mm)	0.5
Die thickness after back-grinding (μm)	375 +/-25
Die sawing method	laser grooving + mechanical sawing
Bill of Material elements	
Lead frame reference/supplier	LQ12 80L 208sq eff slot Etch LF JSCC / Mitsui
Die attach material type/supplier	Epoxy 3230 / Ablestik
Wire bonding material/diameter/supplier	Wire Gold / 0.8 mil / Heraeus
Molding compound material/reference/supplier	Mold Sumitomo / low alpha EME-G631SHQ / Sumitomo
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL3
Package 3 – 5W LQFP 10x10 64L General Purpose (GP)	
Assembly plant name/location	JSCC / China
Pitch (mm)	0.5
Die thickness after back-grinding (μm)	375 +/-25
Die sawing method	laser grooving + mechanical sawing
Bill of Material elements	
Lead frame reference/supplier	LQ10 64L 207sq Eff slots STMP LF JSCC / Mistui
Die attach material type/supplier	Epoxy R008-0005A / Musashi
Wire bonding material/diameter/supplier	Wire Gold / 0.8 mil / Heraeus
Molding compound material/reference / supplier	Mold Sumitomo / low alpha G631SHQ / Sumitomo
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL3
Package 4 – 5W LQFP 10x10 64L Power Delivery (PD)	
Assembly plant name / location	JSCC / China

Pitch (mm)	0.5
Die thickness after back-grinding (µm)	375 +/-25
Die sawing method	laser grooving + mechanical sawing
Bill of Material elements	
Lead frame reference/supplier	LQ10 64L 207sq Eff slots STMP LF JSCC / Mitsui
Die attach material type/supplier	R008-0005A / Musashi
Wire bonding material/diameter/supplier	Gold Wire / 0.8 mil / Heraeus
Molding compound material/reference/supplier	Mold Sumitomo / low alpha G631SHQ / Sumitomo
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL3
Package 5 – 5B LQFP 7x7 48L General Purpose (GP)	
Assembly plant name/location	JSCC / China
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	150 +/-25
Die sawing method	laser grooving + mechanical sawing
Bill of Material elements	
Lead frame reference/supplier	LQFP48L 184sq Eff slots STMP LF JSCC / HDS
Die attach material type/supplier	Epoxy 3230 / Ablestik
Wire bonding material/diameter/supplier	Wire Gold / 0.8mil / Heraeus
Molding compound material/reference/supplier	Mold Sumitomo / low alpha EME-G631SHQ / Sumitomo
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL3
Package 6 – 5B LQFP 7x7 48L Power Delivery (PD)	
Assembly plant name / location	JSCC / China
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	150 +/-25
Die sawing method	laser grooving + mechanical sawing
Bill of Material elements	
Lead frame reference/supplier	LQFP48L 184sq Eff slots STMP LF JSCC / HDS
Die attach material type/supplier	Epoxy 3230 / Ablestik
Wire bonding material/diameter/supplier	Wire Gold / 0.8mil / Heraeus
Molding compound material/reference/supplier	Mold Sumitomo / low alpha EME-G631SHQ / Sumitomo
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL3
Package 7 – 5V LQFP 7x7 32L General Purpose (GP)	
Assembly plant name / location	JSCC / China
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	375 +/-25
Die sawing method	laser grooving + mechanical sawing
Bill of Material elements	
Lead frame reference	LQ7 32L 184sq Eff slots STMP LF JSCC

Die attach material type/supplier	Epoxy 3230 / Ablestik
Wire bonding material/diameter	Wire Gold / 0.8mil
Molding compound material/reference/supplier	Mold Sumitomo / low alpha G631SHQ / Sumitomo
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL3
Package 8 – 5V LQFP 7x7 32L Power Delivery (PD)	
Assembly plant name / location	JSCC / China
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	375 +/-25
Die sawing method	laser grooving + mechanical sawing
Bill of Material elements	
Lead frame reference	LQ7 32L 184sq Eff slots STMP LF JSCC
Die attach material type/supplier	Epoxy 3230 / Ablestik
Wire bonding material/diameter	Wire Gold / 0.8mil
Molding compound material/reference/supplier	Mold Sumitomo / low alpha G631SHQ / Sumitomo
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL3
Package 9 – A0B9 UFQFPN 7x7 48L General Purpose (GP)	
Assembly plant name / location	JSCC / China
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	150 +/-25
Die sawing method	laser grooving + mechanical sawing
Bill of Material elements	
Lead frame reference/supplier	Rough Cu LF UQFN48L 5.2sq Groove JSCC / HDS
Die attach material type/supplier	Glue EN4900GC / Hitachi
Wire bonding material/diameter/supplier	Wire Gold / 0.8mil / MKE
Molding compound material/reference/supplier	RESIN SUMITOMO / EME-G770 / Sumitomo
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL3
Package 10 – A0B9 UFQFPN 7x7 48L Power Delivery (PD)	
Assembly plant name / location	JSCC / China
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	150 +/-25
Die sawing method	laser grooving + mechanical sawing
Bill of Material elements	
Lead frame reference/supplier	Rough Cu LF UQFN48L 5.2sq Groove JSCC/HDS
Die attach material type /supplier	Glue EN4900GC / Hitachi
Wire bonding material/diameter/supplier	Wire Gold / 0.8mil / MKE
Molding compound material/reference/supplier	RESIN SUMITOMO / EME-G770 / Sumitomo
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL3

Package 11 – A0B8 UFQFPN 5x5 32L General Purpose (GP)	
Assembly plant name / location	JSCC / China
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	150 +/-10
Die sawing method	laser grooving + mechanical sawing
Bill of Material elements	
Lead frame reference/supplier	LF FOR UQFN 5x5 32L Sn PAD 3.1 MM SQ Groove / HDS
Die attach material type/supplier	Glue EN4900GC / Hitachi
Wire bonding material/diameter/supplier	Wire Gold / 0.8mil / MKE
Molding compound material/reference/supplier	RESIN SUMITOMO / G770 / Sumitomo
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL3
Package 12 – A0B8 UFQFPN 5x5 32L Power Delivery (PD)	
Assembly plant name / location	JSCC / China
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	150 +/-10
Die sawing method	laser grooving + mechanical sawing
Bill of Material elements	
Lead frame reference/supplier	LF FOR UQFN 5x5 32L Sn PAD 3.1 MM SQ Groove / HDS
Die attach material type/supplier	Glue EN4900GC / Hitachi
Wire bonding material/diameter/supplier	Wire Gold / 0.8mil / MKE
Molding compound material/supplier/reference	RESIN SUMITOMO / G770 / Sumitomo
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL3
Package 13 – A0C2 UFBGA 7x7 100L General Purpose (GP)	
Assembly plant name / location	ASE KH / Taiwan
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	75 +/-10
Die sawing method	laser grooving + mechanical sawing
Bill of Material elements	
Substrate material/supplier/reference	SUBSTRATE ASE A28313
Die attach material type(glue/film)/supplier	D/A Tape ABLESTICK ATB-125
Wire bonding material/diameter/supplier	Wire gold / 0.8 mils/ FP2
Balls metallurgy/diameter/supplier	SOLDER BALLS SN96.5 AG3.5% / 200 DIAM / SHENMAO
Molding compound material/reference/supplier	Resin / G1250AAS ULA / KYOCERA
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL3
Package 14 – A019 UFBGA 7x7 64L Power Delivery (PD)	
Assembly plant name / location	ASE KH / Taiwan
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	75 +/-10

Die sawing method	laser grooving + mechanical sawing
Bill of Material elements	
Substrate material/reference/supplier	SUBSTRATE / A28314 / ASE
Die attach material/type(glue/film)/supplier	D/A Tape ABLESTICK ATB-125
Wire bonding material/diameter/supplier	Wire gold / 0.8 mils / FP2
Balls metallurgy/diameter/supplier	SOLDER BALLS SN96.5 AG3.5% / 200 DIAM / Taoyuan
Molding compound material/reference/supplier	Resin / G1250AAS ULA / KYOCERA
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL3
Package 15 - B0BG WLCSP 52L General Purpose (GP)	
Assembly plant name / location	ASE KH / Taiwan
Pitch (mm)	0.4
Die thickness after back-grinding (µm)	355 (+/-25)
Die sawing method	Laser groove + mechanical sawing
Bill of Material elements	
Balls metallurgy/diameter/supplier	Solder ball alloy SAC405 Diam 230um
Routing/Redistribution layer (RDL) material	RDL Copper 6um
PBO passivation material	Low temp polyimide passivation - LTC9320
Backside coating material/thickness	Backside coating PET film
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL1

2.2.3 Reliability testing information

Table 3

Reliability Testing Information	
Reliability laboratory name / location	GRAL / ST 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)	Trace Code	Raw Line	Package	Note
1	9R009397/ 9	1.0	AA025002	E01L*467ESXA	ASE KH LQFP 14x14 100L GP	Die reliability assessment
2	9R009397 / 9	1.0	AA025002	E01L*467ESXA	ASE KH LQFP 14x14 100L GP	Package reliability assessment
3	9R009397 / 4	1.0	GQ02628B	709X*467ESXA	JSCC LQFP 12x12 80L GP	Package reliability assessment
4	9R009397 / 3	1.0	GQ025282	705W*467ESXA	JSCC LQFP 10x10 64L GP	ESD CDM reliability assessment
5	9R009397 / 3	1.0	GQ0282A9	715W*467ESXA	JSCC LQFP 10x10 64L PD	ESD CDM reliability assessment
6	9R009397 / 4	1.0	GQ028294	705B*467ESXA	JSCC LQFP 7x7 48L GP	ESD CDM reliability assessment
7	9R009397 / 3	1.0	GQ03020X	715B*467ESXA	JSCC LQFP 7x7 48L PD	ESD CDM reliability assessment
8	9R009397 / 4	1.0	GQ029243	705V*467ESXA	JSCC LQFP 7x7 32L GP	ESD CDM reliability assessment
9	9R009397 / 7	1.0	GQ03020F	715V*467ESXA	JSCC LQFP 7x7 32L PD	ESD CDM reliability assessment
10	9R009397 / 5	1.0	GQ0272B9	70MI*467ESXA	JSCC UFQFPN 7x7 48L GP	Package reliability assessment
11	9R009397 / 6	1.0	GQ0292C8	71MI*467ESXA	JSCC UFQFPN 7x7 48L PD	ESD CDM reliability assessment
12	9R009397 / 6	1.0	GQ029223	70MG*467ESXA	JSCC UFQFPN 5x5 32L GP	ESD CDM reliability assessment

13	9R009397 / 6	1.0	GQ0292C7	71MG*467ESXA	JSCC UFQFPN 5x5 32L PD	ESD CDM reliability assessment
14	9R009397 /10	1.0	AA029077	E0MJ*467ESXA	ASE KH UFBGA 7x7 100L GP	ESD CDM & partial CA reliability assessment
15	9R009397 / 10	1.0	AA029076	E02I*467ESXA	ASE KH UFBGA 5x5 64L PD	ESD CDM reliability assessment
16	9R009397 / 13	1.0	AA036199	E00E*467ESXA	ASE KH WLCSP52 GP	Package reliability assessment
17	9R024461 / 18	1.0	AA043021	E00E*467XXXA		
18	9R113632 / 1	1.1	AA208102	E41L*467ESXZ	ASE KH LQFP 14x14 100L GP	Die reliability assessment

3.2 Test plan and results summary

Table 5 – ACCELERATED LIFETIME SIMULATION TESTS – LQFP 14x14 100L GP, ASE KH/Gold, cut 1.0

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

ELFR	JESD22-A108 JESD74	Ta=125°C Duration= 48hrs 3V6	1	500	500	Lot 1: 0/500	

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

Table 6 – ACCELERATED LIFETIME SIMULATION TESTS – LQFP 14x14 100L GP, ASE KH/Gold, cut 1.1

Test code	Stress method	Stress Conditions	Lots	S.S.	Total	Results/Lot Fail/S.S.	Comments: (N/A =Not Applicable)
HTOL	JESD22 A108	T=125°C Duration= 168H 3V6	1	77	77	Lot 18: 0/77	
ESD HBM	ANSI/ESDA/ JEDEC JS-001	Ta = +25°C 1500 Ω, 100 pF 2kV class2	1	3	3	Lot 18: 0/3	
Latch Up	JESD78	130°C	1	3	3	Lot 18: 0/3	
ESD CDM	AEC Q100-011, AEC Q101-005, JS-002	Ta = +25°C 250V	1	3	3	Lot 18: 0/3	

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

Table 7 – ACCELERATED ENVIRONMENT STRESS TESTS: LQFP 14x14 100L GP, ASE KH / Gold

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	Lot 2: 0/3	
PC	J-STD-020	24h bake@125°C, MSL3 (192h@30C/60%RH) 3x Reflow simulation Peak Reflow Temp= 260°C	1	308	308	Lot 2: 0/308	
TC	JESD22-A104	Ta=-65/150°C Duration= 500cyc ☒ After PC	1	77	77	Lot 2: 0/77	

UHAST	JESD22-A118	Ta=130°C ,85% RH Duration= 96hrs ☒ After PC	1	77	77	Lot 2: 0/77	
HTSL	JESD 22-A103	Ta=150°C Duration= 1000hrs ☒ After PC	1	77	77	Lot 2: 0/77	
THB	JESD 22-A101	Ta=85°C/85%RH VDD=3v6 Duration= 1000hrs ☒ After PC	1	77	77	Lot 2: 0/77	

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

Table 8 – PACKAGE ASSEMBLY INTEGRITY TESTS: LQFP 14x14 100L GP, ASE KH / Gold

Test code	Method	Tests Conditions	Lots	S.S.	Total	Results/Lot Fail/S.S.	Comments: (N/A =Not Applicable)
CA	Construction Analysis including - Visual inspection - Sawing inspection - Pull test - Ball shear	Internal ST specification	1	50	50	Lot 2: 0/50	PASS

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

Table 9 – ACCELERATED ENVIRONMENT STRESS TESTS: LQFP 12x12 80L GP, JSCC / Gold

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	Lot 3: 0/3	
PC	J-STD-020	24h bake@125°C, MSL3 (192h@30C/60%RH) 3x Reflow simulation Peak Reflow Temp= 260°C	1	77	77	Lot 3: 0/308	

TC	JESD22-A104	Ta=-65/150°C Duration= 500cyc ☒ After PC	1	77	77	Lot 3: 0/77	
UHAST	JESD22-A118	Ta=130°C ,85% RH Duration= 96hrs ☒ After PC	1	77	77	Lot 3: 0/77	
HTSL	JESD 22-A103	Ta=150°C Duration= 1000hrs ☒ After PC	1	77	77	Lot 3: 0/77	
THB	JESD 22-A101	Ta=85°C/85%RH VDD=3v6 Duration= 1000hrs ☒ After PC	1	77	77	Lot 3: 0/77	

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

Table 10 – PACKAGE ASSEMBLY INTEGRITY TESTS: LQFP 12x12 80L GP, JSCC / Gold

Test code	Method	Tests Conditions	Lots	S.S.	Total	Results/Lot Fail/S.S.	Comments: (N/A =Not Applicable)
CA	Construction Analysis including - Visual inspection - Sawing inspection - Pull test - Ball shear	Internal ST specification	1	50	50	Lot 3: 0/50	PASS

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

Table 11 – ENVIRONMENT STRESS TESTS: LQFP 10x10 64L GP, JSCC / Gold

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	77	77	Lot 4: 0/3	

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

Table 12 – ENVIRONMENT STRESS TESTS: LQFP 10x10 64L PD, JSCC / Gold

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	77	77	Lot 5: 0/3	

Table 13 – ENVIRONMENT STRESS TESTS: LQFP 7x7 48L GP, JSCC / Gold

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	77	77	Lot 6: 0/3	

Table 14 – ENVIRONMENT STRESS TESTS: LQFP 7x7 48L PD, JSCC / Gold

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	77	77	Lot 7: 0/3	

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

Table 15 – ENVIRONMENT STRESS TESTS: LQFP 7x7 32L GP, JSCC / Gold

Test code	Stress method	Stress Conditions	Lots	S.S.	Total	Results/Lot Fail/S.S.	Comments: (N/A =Not Applicable)

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	77	77	Lot 8: 0/3	

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

Table 16 – ENVIRONMENT STRESS TESTS: LQFP 7x7 32L PD, JSCC / Gold

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	77	77	Lot 9: 0/3	

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

Table 17 – ACCELERATED ENVIRONMENT STRESS TESTS: UFQFPN 7x7 48L GP, JSCC / Gold

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	77	77	Lot 10: 0/3	
PC	J-STD-020	24h bake@125°C, MSL3 (192h@30C/60%RH) 3x Reflow simulation Peak Reflow Temp= 260°C	1	77	77	Lot 10: 0/308	
TC	JESD22-A104	Ta=-65/150°C Duration= 500cyc ☒ After PC	1	77	77	Lot 10: 0/77	
UHAST	JESD22-A118	Ta=130°C ,85% RH Duration= 96hrs ☒ After PC	1	77	77	Lot 10: 0/77	
HTSL	JESD 22-A103	Ta=150°C Duration= 1000hrs ☒ After PC	1	77	77	Lot 10: 0/77	

THB	JESD 22-A101	Ta=85°C/85%RH VDD=3v6 Duration = 1000hrs ☒ After PC	1	77	77	Lot 10: 0/77	

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

Table 18 – PACKAGE ASSEMBLY INTEGRITY TESTS: UFQFPN 7x7 48L GP, JSCC / Gold

Test code	Method	Tests Conditions	Lots	S.S.	Total	Results/Lot Fail/S.S.	Comments: (N/A =Not Applicable)
CA	Construction Analysis including - Visual inspection - Sawing inspection - Pull test - Ball shear	Internal ST specification	1	50	50	Lot 10: 0/50	PASS

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

Table 19 – ENVIRONMENT STRESS TESTS: UFQFPN 7x7 48L PD, JSCC / Gold

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	77	77	Lot 11: 0/3	

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

Table 20 – ENVIRONMENT STRESS TESTS: UFQFPN 5x5 32L GP, JSCC / Gold

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	77	77	Lot 12: 0/3	

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

Table 21 – ENVIRONMENT STRESS TESTS: UFQFPN 5x5 32L PD, JSCC / Gold

Test code	Stress method	Stress Conditions	Lots	S.S.	Total	Results/Lot Fail/S.S.	Comments: (N/A =Not Applicable)

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	77	77	Lot 13: 0/3	

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

Table 22 – ENVIRONMENT STRESS TESTS: UFBGA 7x7 100L GP, ASE KH / Gold

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	77	77	Lot 14: 0/3	

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

Table 23 – PACKAGE ASSEMBLY INTEGRITY TESTS: UFBGA 7x7 100L GP, ASE KH / Gold

Test code	Method	Tests Conditions	Lots	S.S.	Total	Results/Lot Fail/S.S.	Comments: (N/A =Not Applicable)
CA	Construction Analysis including – Visual inspection – Package dimensions	JESDB100/B108 Internal ST specification	1	50	50	Lot 14: 0/50	Pass

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

Table 24 – ENVIRONMENT STRESS TESTS: UFBGA 5x5 64L PD, ASE KH / Gold

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	77	77	Lot 15: 0/3	

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

Table 25 – ACCELERATED ENVIRONMENT STRESS TESTS: WLCSP52 GP, ASE KH

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	77	77	Lot 16: 0/3	
PC	J-STD-020	24h bake@125°C, MSL1 (168h@85C/85%RH) 3x Reflow simulation Peak Reflow Temp= 260°C	1	77	77	Lot 16: 0/308	
TC	JESD22-A104	Ta=-65/150°C Duration= 500cyc ☒ After PC	1	77	77	Lot 16:0/77	
UHAST	JESD22-A118	Ta=130°C ,85% RH Duration= 96hrs ☒ After PC	1	77	77	Lot 16:0/77	
HTSL	JESD 22-A103	Ta=150°C Duration= 1000hrs ☒ After PC	1	77	77	Lot 16:0/77	
THB	JESD 22-A101	Ta=85°C/85%RH VDD=3v6 Duration = 1000hrs ☐ After PC	1	77	77	Lot 17: 0/77	

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

Table 26 – PACKAGE ASSEMBLY INTEGRITY TESTS: WLCSP52 GP, ASE KH

Test code	Method	Tests Conditions	Lots	S.S.	Total	Results/Lot Fail/S.S.	Comments: (N/A =Not Applicable)
CA	Construction Analysis including - Visual inspection - SEM - POA - Sawing inspection - Cross section	JESDB100/B108	1	50	50	Lot 16: 0/50	PASS

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

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 (ESD CDM)
JESD78	IC Latch-up test
JESD 22-A108	Temperature, Bias and Operating Life
JESD 22-A117	Endurance and Data retention
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
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	Philippe ADAM	Initial release	Q&R Quality Manager	Grenoble	Dominique GALIANO	19-Nov-2020
			Div. Quality Manager	Rousset	Pascal NARCHE	19-Nov-2020
1.1	Philippe ADAM	Add LQFP80 JSCC, LQFP64 PD JSCC, LQFP48 PD JSCC, UFQFPN48 JSCC, UQFN32 JSCC & UFBGA64 ASE KH	Q&R Quality Manager	Grenoble	Dominique GALIANO	10-Dec-2020
1.2	Philippe ADAM	Add UFBGA100 ASE KH	Q&R Quality Manager	Grenoble	Dominique GALIANO	16-Mar-2021
1.3	Philippe ADAM	Add WLCSP52 ASE KH	Q&R Quality Manager	Grenoble	Dominique GALIANO	20-Sept-2021
1.4	Philippe ADAM – Octavia NDJOYE-KOGOU	Cut 1.1 LQFP100 ASE KH	Q&R Quality Manager	Grenoble	Dominique GALIANO	23-June-2022

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