PRODUCT/PROCESS CHANGE NOTIFICATION PCN13481 – Additional information

JSCC capacity increase - for STM32H7 2M products in LQFP 64 10x10 - addendum to PCN12050

MDG – General Purpose Microcontrollers sub-group (GPM)

What are the changes?

Changes described in table below:

- LQFP 64 10x10x1.4

	Existing capacity	Added capacity
Assembly site	StatsChipPAC JSCC Jiangyin China	
Wire	Silver 96.5% 0.8mil	Gold 0.8mil

How to order samples?

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 "**PCN13481**" 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-RER1617

STM32H7A/7B x I/U

(480x66)

New Product Qualification

General Information	
Commercial Product	*: STM32H7A/7B x I/U*
Product Line	*: 480X66*
Die revision	*: 480XXXX (Cut1.3)*
Product Description	*: STM32H7 2Mb eSTM40*
Package	*TFBGA13x13 225L, TFBGA13x13 216L, TFBGA8x8 100L, LQFP24x24 176L, LQFP20x20 144L, LQFP14x14 100L, LQFP10x10 64L, UFBGA10x10 176L, UFBGA7x7 169L, WLCSP132*
Silicon Technology	*: CMOS eSTM40 40nm*
Division	*: MDG-MCD*
Reliability Maturity Level	*: 20->30*

Traceability	
Diffusion Plant	*: Crolles 300 (12") France*
Assembly Plant	*AMKOR ATP3. ASE, Taiwan AMKOR, ATP1 JSCC. AMKOR, ATT1.*

Reliability Assessment	
Pass	☒
Fail	☐
Investigation required	☐

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

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Version	Date	Author	Function
1.0	15th Jan 2020	Pierre DELEAGE	MDG-MCD-Q&R Engineer
1.1	17th Jul 2020	Pierre DELEAGE	MDG-MCD-Q&R Engineer
1.2	2nd Dec 2020	Pierre DELEAGE	MDG-MCD-Q&R Engineer
1.3	16th Nov 2021	Pierre DELEAGE	MDG-MCD-Q&R Engineer
1.4	17th Jun 2022	Berengere ROUTIER	MDG-GPM-QA Back End

VERSION 1.0 APPROVED BY:

Function	Location	Name	Date
Division Q&R Responsible	Grenoble	Dominique GALIANO	20th January 2020
FE Quality Manager	Rousset	Antonio DI-GIACOMO	22nd January 2020
Division Quality Manager	Rousset	Pascal NARCHE	10th February 2020

VERSION 1.1 APPROVED BY

Function	Location	Name	Date
Division Q&R Responsible	Grenoble	Dominique GALIANO	20th July 2020

VERSION 1.2 APPROVED BY

Function	Location	Name	Date
Division Q&R Responsible	Grenoble	Dominique GALIANO	3rd Dec 2020

VERSION 1.3 APPROVED BY

Function	Location	Name	Date
Division Q&R Responsible	Grenoble	Dominique GALIANO	17th Nov 2021

VERSION 1.4 APPROVED BY

Function	Location	Name	Date
Division Q&R Responsible	Grenoble	Dominique GALIANO	20th Jun 2022
Division Quality Manager	Rousset	Pascal NARCHE	20th Jun 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 *STM32H7A/7B x I/U,* die 480XXXX 2Mbytes, diffused in ST Crolles 300 (CMOS40 eSTM40 40nm).

Test vehicle is described here below:

Product	Process – Package	Diffusion – Assembly plant	Comment
STM32H7B3IIT6	eSTM40 - LQFP24x24 176L	Crolles 300 (12”) - (ASE TAIWAN)	LQFP176 legacy crypto
STM32H7B3IIT6Q	eSTM40 - LQFP24x24 176L	Crolles 300 (12”) - (ASE TAIWAN)	LQFP176 SMPS crypto
STM32H7B3ZIT6	eSTM40 - LQFP20x20 144L	Crolles 300 (12”) - (AMKOR ATP1)	LQFP144 legacy crypto
STM32H7A3ZIT6Q	eSTM40 - LQFP20x20 144L	Crolles 300 (12”) - (AMKOR ATP1)	LQFP144 SMPS
STM32H7B3VIT6	eSTM40 - LQFP14x14 100L	Crolles 300 (12”) - (AMKOR ATP1)	LQFP100 legacy crypto
STM32H7B3VIT6Q	eSTM40 - LQFP14x14 100L	Crolles 300 (12”) - (AMKOR ATP1)	LQFP100 SMPS crypto
STM32H7B3LIH6Q	eSTM40 - TFBGA13x13 225L	Crolles 300 (12”) - (AMKOR ATP3)	TFBGA225 SMPS crypto
STM32H7B3NIH6	eSTM40 - TFBGA13x13 216L	Crolles 300 (12”) - (AMKOR ATP3)	TFBGA216 legacy crypto
STM32H7B3IIK6	eSTM40 - UFBGA10x10 176L	Crolles 300 (12”) - (AMKOR ATP3)	UFBGA176 legacy crypto
STM32H7B3IIK6Q	eSTM40 - UFBGA10x10 176L	Crolles 300 (12”) - (AMKOR ATP3)	UFBGA176 SMPS crypto
STM32H7B3AII6Q	eSTM40 - UFBGA7x7 169L	Crolles 300 (12”) - (AMKOR ATP3)	UFBGA169 SMPS crypto
STM32H7B3VIH6	eSTM40 - TFBGA8x8 100L	Crolles 300 (12”) - (AMKOR ATP3)	TFBGA100 legacy crypto
STM32H7B3VIH6Q	eSTM40 - TFBGA8x8 100L	Crolles 300 (12”) - (AMKOR ATP3)	TFBGA100 SMPS crypto
STM32H7A3RIT6	eSTM40 - LQFP10x10 64L	Crolles 300 (12”) - (JSCC)	LQFP64 legacy
STM32H7B3QIY6QTR	eSTM40 - WLCSP132	Crolles 300 (12”) - (AMKOR ATT1)	WLCSP132 SMPS crypto

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

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1.2 Reliability Strategy

The STM32H7x, die 480 is processed in eSTM40 40nm technology in Crolles 300, based on M40 with a new bitcel memory. Die 480 is a derivative of STM32H7xx (die 450) and reuse a subset of its IPs:

STM32H7xx (die 450) : RERMCD1401

The *STM32H7A/7B x I/U* (Die 480) device is assembled in the following packages already qualified for this product family:

Package	Reference	Assy Plant location
LQFP24x24 176L	RERMCD1401 RERMCD1023	ASE TAIWAN
LQFP20x20 144L	RERMCD1401 RERMCD1312	AMKOR ATP1
LQFP14x14 100L	RERMCD1401 RERMCD1312	AMKOR ATP1
LQFP10X10 64L	RERMCD 1606	JSCC
TFBGA 13X13 225L & 216L P0.8	RERMCD1421	AMKOR ATP3
TFBGA 8X8 100L P0.8	RERMCD1309	AMKOR ATP3
UFBGA10x10 176L P0.65	RERMCD1402 RERMCD1401	AMKOR ATP3
UFBGA7x7 169L P0.5	RERMCD1402 RERMCD1401	AMKOR ATP3
WLCSP132 P0.35	RERMCD1401 RERMCD1213	AMKOR ATT1

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:

  Full reliability exercise on 2 diffusion lots for Cut1.0
  Full reliability exercise on 1 diffusion lot for Cut1.1
  Partial reliability exercise on 1 diffusion lot for Cut1.3

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- Package Qualification:

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

Package	Body	Pitch	Package Code	Wire	Assy	Bounding Option	Trial
TFBGA 225	13x13	0.8	B04V	Gold	ATP3	SMPS	1 reliability lot
TFBGA 216	13x13	0.8	A0L2	Gold	ATP3	Legacy	CDM
TFBGA 100	8X8	0.8	A08Q	Gold	ATP3	SMPS	1 reliability lot
TFBGA 100	8X8	0.8	A08Q	Gold	ATP3	Legacy	CDM
UFBGA 176	10X10	0.65	A0E7	Gold	ATP3	SMPS	CDM
UFBGA 176	10X10	0.65	A0E7	Gold	ATP3	Legacy	CDM
UFBGA 169	7x7	0.5	A0AS	Gold	ATP3	SMPS	CDM
LQFP 176	24x24	0.5	1T	Gold	ASE	SMPS	CDM
LQFP 176	24x24	0.5	1T	Gold	ASE	Legacy	CDM
LQFP 144	20x20	0.5	1A	Gold	ATP1	SMPS	CDM
LQFP 144	20x20	0.5	1A	Gold	ATP1	Legacy	CDM
LQFP 100	14x14	0.5	1L	Gold	ATP1	SMPS	CDM
LQFP 100	14x14	0.5	1L	Gold	ATP1	Legacy	CDM
LQFP 64	10X10	0.5	5W	Silver	JSCC	Legacy	1 reliability lot (*)
WLCSP132		0.35	B06G		ATT1	SMPS	CDM

(*) Package LQFP 64 assembled in JSCC with silver wire also qualifies by extension the same package using gold wires that are more robust in reliability.

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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 *STM32H7A/7B x I/U* – Die 480XXXX, diffused in ST Crolles 300, France, and assembled in the following package types:

TFBGA225-216	13X13	AMKOR ATP3
TFBGA100	8X8	AMKOR ATP3
UFBGA176	10X10	AMKOR ATP3
UFBGA169	7X7	AMKOR ATP3
LQFP176	24X24	ASE TAIWAN
LQFP144	20X20	AMKOR ATP1
LQFP100	14X14	AMKOR ATP1
LQFP64	10X10	JSCC
WLCSP132		AMKOR ATT1

Refer to Section 3.0 for reliability test results.

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2 PRODUCT OR TEST VEHICLE CHARACTERISTICS

2.1 Generalities

Package line	Assembly Line Package	Device (Partial Raw Line Code)	Diffusion Process	Number of Lots
TFBGA225	ATP3	ES32H7B3LIH6Q	eSTM40	3

The STM32H7A/7B x I/U device – die 480XXXX – is processed in eSTM40 based on STM32H7xx product (die 450) in CMOSM40 with a new bitcel memory, but lower frequency (250MHz) and less IP. The microcontroller is a single core ARM® Cortex® M7. It will embed two power domains (LDO & SMPS).

For additional information concerning the product behavior, refer to STM32H7A/7B x I/U datasheet.

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2.2 Traceability

2.2.1 Wafer fab information

Table 1

Wafer fab information	
FAB1	
Wafer fab name / location	ST Crolles 300 / France
Wafer diameter (inches)	12’’
Wafer thickness (µm)	775 +/-20µm
Silicon process technology	CMOSE40 LP HVT SVT GO2 50
Number of masks	50
Die finishing front side (passivation) materials/thicknesses	PSG (PECVD) (Oxide 500nm) + NITRIDE(SiN 600nm)
Die finishing back side Materials/thicknesses	RAW SILICON
Die area (Stepping die size)	4602*4394 = 20.22mm2
Die pad size	54.9*54.4µm2 (bonding) + 41.4*49.1µm2 (probing)
Sawing street width (X,Y) (µm)	(72.0,72.0) (µm)
Metal levels/Materials/Thicknesses	7M2T with Alu cap thick. 1.45µm Metal 1 Cu 0.130 µm Metal 2 Cu 0.140 µm Metal 3 Cu 0.140 µm Metal 4 Cu 0.140 µm Metal 5 Cu 0.140 µm Metal 6 Cu 1.000 µm Metal 7 Cu 1.000 µm Metal 8 Ta/TaN/AlCu 1.450 µm
Die over coating (material/thickness)	No
FIT level (Ea=0.7eV, C.L: 60%, 55°C)	FIT not yet available at product level at qualification date
Soft Error Rate - Alpha SER [FIT/Mb] - Neutron SER [FIT/Mb] - Conditions	Alpha SER : 470 Fit/Mb Neutron SER: 900 Fit/Mb conditions : Alpha SER 0.001 α/cm²/h, SER/SEL at 125°C 14 n/cm²/h (>400MeV)
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 Yes Yes Yes Yes
Other Device(s) using same process	STM32H7XX family

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2.2.2 Assembly information

Table 2

Assembly Information	
Package 1 – B04V – TFBGA225 13x13x1.2	
Assembly plant name / location	AMKOR ATP3 – PHILIPPINES
Pitch (mm)	0.8
Die thickness after back-grinding (µm)	180 +/-15
Die sawing method	LASER GROOVE + MECHANICAL SAWING
Bill of Material elements	
Lead frame/Substrate /supplier/reference	TFBGA 13x13 225 P0.8 / DS7409HGBM NI/AU / SCC / 101407394
Die attach /type(glue/film)/supplier	ABLEBOND / GLUE 2300 / HENKEL TECH
Wire bonding material/diameter	GOLD WIRE 2N / 0.8 mils
Balls metallurgy/diameter	SAC 105 / DIAM 0.35 MM
Molding compound /supplier/reference	GE100LFCS / Hitachi Chem PTE / 101342201
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL 3
Package 2 – A0L2 – TFBGA216 13x13x1.2	
Assembly plant name / location	AMKOR ATP3 – PHILIPPINES
Pitch (mm)	0.8
Die thickness after back-grinding (µm)	180 +/-15
Die sawing method	LASER GROOVE + MECHANICAL SAWING
Bill of Material elements	
Lead frame/Substrate /supplier/reference	TFBGA 13x13 216 P0.8 / DS7409HGBM NI/AU / SCC / 101407459
Die attach /type(glue/film)/supplier	ABLEBOND / GLUE 2300 / HENKEL TECH
Wire bonding material/diameter	GOLD WIRE 2N / 0.8 mils
Balls metallurgy/diameter	SAC 105 / DIAM 0.35 MM
Molding compound /supplier/reference	GE100LFCS / Hitachi Chem PTE / 101342201
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL 3

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Package 3 – A08Q – TFBGA100 8x8 x1.2	
Assembly plant name / location	AMKOR ATP3 – PHILIPPINES
Pitch (mm)	0.8
Die thickness after back-grinding (µm)	180 +/-15
Die sawing method	LASER GROOVE + MECHANICAL SAWING
Bill of Material elements	
Lead frame/Substrate /supplier/reference	TFBGA 8x8 100 P0.8 / DS7409HGBM 64P / KCC / 101408304
Die attach /type(glue/film)/supplier	ABLEBOND / GLUE 2300 / HENKEL TECH
Wire bonding material/diameter	GOLD WIRE 2N / 0.8 mils
Balls metallurgy/diameter	SAC 105 / DIAM 0.35 MM
Molding compound /supplier/reference	GE100LFCS / Hitachi Chem PTE / 101342201
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL 3
Package 4 – A0E7 – UFBGA176 10x10x0.6	
Assembly plant name / location	AMKOR ATP3 – PHILIPPINES
Pitch (mm)	0.65
Die thickness after back-grinding (µm)	75 +/-10
Die sawing method	LASER GROOVE + MECHANICAL SAWING
Bill of Material elements	
Lead frame/Substrate /supplier/reference	UFBGA 10X10 176-25 / DS7409HGBM / KCC / 101407863
Die attach /type(glue/film)/supplier	DAF Ablestik / ATB130U / HENKEL TECH
Wire bonding material/diameter	GOLD WIRE 2N / 0.8 mils
Balls metallurgy/diameter	SN96.5 AG3.5% / DIAM 0.2MM
Molding compound /supplier/reference	GE100LFCS / Hitachi Chem PTE / 101342201
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL 3

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Package 5 – A0AS – UFBGA169 7x7x0.6	
Assembly plant name / location	AMKOR ATP3 – PHILIPPINES
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	75 +/-10
Die sawing method	LASER GROOVE + MECHANICAL SAWING
Bill of Material elements	
Lead frame/Substrate /supplier/reference	SUBSTRATE UFBGA 7X7 169L / DS7409HGBM NI/AU / SCC / 101406005
Die attach /type(glue/film)/supplier	DAF Ablestik / ATB130U / HENKEL TECH
Wire bonding material/diameter	GOLD WIRE 2N /0.8 mils
Balls metallurgy/diameter	SN96.5 AG3.5% / DIAM 0.2MM
Molding compound /supplier/reference	GE100LFCS / Hitachi Chem PTE / 101342201
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL 3
Package 6 – 1T – LQFP176 24x24x1.4	
Assembly plant name / location	SC ASE – TAIWAN
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/Substrate /supplier/reference	LF# LQ176L / C7025 / FUSHENG / A21299-0
Lead frame finishing	Pure Tin (e3)
Die attach /type(glue/film)/supplier	GLUE YIZTECH 8143 / YIZBOND
Wire bonding material/diameter	GOLD WIRE 2N / 0.8 MIL
Molding compound /supplier/reference	EME-G631H / SUMITOMO / 81230820017-000
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL 3

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Package 7 - 1A - LQFP144 20x20x1.4	
Assembly plant name / location	AMKOR ATP1 - PHILIPPINES
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	290 +/-20
Die sawing method	LASER GROOVE + MECHANICAL SAWING
Bill of Material elements	
Lead frame/Substrate /supplier/reference	LF # LQ 144L / C7025 / MITSUI HIGH-TEC INC / 101408239
Lead frame finishing	Pure Tin (e3)
Die attach /type(glue/film)/supplier	EP ABLEBOND / 3230 / HENKEL TECH. KOREA LTD
Wire bonding material/diameter	GOLD WIRE 2N / 0.8MIL
Molding compound /supplier/reference	EME-G631SHQ / SUMITOMO BAKELITE SINGAPORE / D183301665
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL 3
Package 8 - 1L - LQFP100 14x14x1.4	
Assembly plant name / location	AMKOR ATP1 - PHILIPPINES
Pitch (mm)	0.5
Die thickness after back-grinding (µm)	290 +/-20
Die sawing method	LASER GROOVE + MECHANICAL SAWING
Bill of Material elements	
Lead frame/Substrate /supplier/reference	LF FOR LQ 100L / C7025 / MITSUI HIGH-TEC INC / 101408463
Lead frame finishing	Pure Tin (e3)
Die attach /type(glue/film)/supplier	EP ABLEBOND / 3230 / HENKEL TECH. KOREA LTD
Wire bonding material/diameter	GOLD WIRE 2N / 0.8MIL
Molding compound /supplier/reference	EME-G631SHQ / SUMITOMO BAKELITE SINGAPORE / D192501032
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL 3

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Package 9 – 5W – LQFP64 10x10x1.4	
Assembly plant name / location	JSCC – China
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/Substrate / reference	LQFP 64LD C9-RSM 207x207 / 043309H(A)
Lead frame finishing	Pure Tin (e3)
Die attach /type(glue/film)/supplier	EP ABLEBOND / 3230 / HENKEL TECH. KOREA LTD
Wire bonding material/diameter	Ag 96.5 / 0.8 MIL
Molding compound /supplier/reference	EME-G631SHQ / SUMITOMO BAKELITE SINGAPORE / D192501032
Package Moisture Sensitivity Level (JEDEC J-STD020D)	MSL 3
Package 10 – B06G – WLCSP132	
Assembly plant name / location	AMKOR ATT1 – TAIWAN
Pitch (mm)	0.35
Die thickness after back-grinding (µm)	355 +/-25
Die sawing method	LASER GROOVE + MECHANICAL SAWING
Bill of Material elements	
Balls metallurgy/diameter	SAC405 / 0.22MIL
Routing/Redistribution layer (RDL) material	RDL / Copper 6.6um
PBO passivation material /supplier	PBO Passivation HD8820 / HITACHI CHEMICAL
Backside coating material	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	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

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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 (assessment)
1	Q811097 w15	1.0	3A84704	G9IB*480ESXA	ATP3 TFBGA225 SMPS	Die
2	Q815132 w3	1.0	7B901A2Y	P9IB*480ESXA	ATP3 TFBGA225 SMPS	Die & Package
3	Q815132 w10	1.0	3A91902	G9IB*480ESXA	ATP3 TFBGA225 SMPS	Die
4	Q812193 w1	1.0	3A92002	G9IB*480ESXA	ATP3 TFBGA225 SMPS	Die
5	Q811097 w1	1.0	7B850A3L	P0IB*480ESXA	ATP3 TFBGA225 SMPS	Die
6	Q912139 w4	1.1	7B931A9C	P6IB*480ESXZ	ATP3 TFBGA225 SMPS	Die & Package
7	Q811097	1.0	7B850A3M	P0RM*480ESXA	ATP3 TFBGA216 Legacy	Package
8	Q815132	1.0	7B904A4U	P0DY*480ESXA	ATP3 TFBGA100 Legacy	Package
9	Q815132 w3	1.0	7B904A6J	P9DY*480ESXA	ATP3 TFBGA100 SMPS	Package
10	Q815132	1.0	7B910A6A	P0MR*480ESXA	ATP3 UFBGA176 Legacy	Package
11	Q815132	1.0	7B910A5X	P9MR*480ESXA	ATP3 UFBGA176 SMPS	Package
12	Q815132	1.0	7B910A6V	P90Q*480ESXA	ATP3 UFBGA169 SMPS	Package
13	Q811097	1.0	AA904024	X01T*480ESXA	ASE LQFP 176 Legacy	Package
14	Q815132	1.0	AA852056	X91T*480ESXA	ASE LQFP 176 SMPS	Package
15	Q811097	1.0	7B851574	P31A*480ESXA	ATP1 LQFP 144 Legacy	Package
16	Q811097	1.0	7B851574	P41A*480ESXA	ATP1 LQFP 144 SMPS	Package
17	Q811097	1.0	7B916524	P01L*480ESXA	ATP1 LQFP 100 Legacy	Package
18	Q812193	1.0	7B926622	P91L*480ESXA	ATP1 LQFP 100 SMPS	Package
19	Q815132	1.0	GQ920271	S15W*480ISXA	ATP1 LQFP 64 Legacy	Package
20	Q912139 w3	1.1	A5928016	T9J1*480ESXZ	ATT1 WLCSP132 SMPS	Package
21	Q931841 w8	1.1	7B016A3L	P6IB*480ESXZ	ATP3 TFBGA225 SMPS	Die
22	Q932537 w24	1.3	7B016A3K	P6IB*480ESXX	ATP3 TFBGA225 SMPS	Die & Package

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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= 1200H 3V6	3	77	231	Lot1: 0/77 Lot2: 0/77 Lot6: 0/77	*480A cut1.0* *480A cut1.0* *480Z cut1.1*
HTOL	JESD22 A108	Ta=125°C Duration= 168H 3V6	1	77	77	Lot22: 0/77	*480X cut1.3*
ESD HBM	ANSI/ESDA/ JEDEC JS-001	1500 Ω, 100 pF 2kV class2 legacy 1kV class1 SMPS *	4	3	12	Lot1: 0/3 Lot2: 0/3 Lot6: 0/3 Lot22: 0/3	*480A cut1.0* *480A cut1.0* *480Z cut1.1* *480X cut1.3*
Latch Up	JESD78	130°C	4	3	12	Lot1:0/3 Lot2:0/3 Lot6:0/3 Lot22: 0/3	*480A cut1.0* *480A cut1.0* *480Z cut1.1* *480X cut1.3*
EDR	JESD22-A117	10kcy EW @ 125°C then Storage HTB 150°C – Duration 1500H	3	77	231	Lot3: 0/77 Lot4: 0/77 Lot6: 0/77	*480A cut1.0* *480A cut1.0* *480Z cut1.1*
EDR	JESD22-A117	10kcy EW @ 125°C then Storage HTB 150°C Duration 168H	1	77	77	Lot22: 0/77	*480X cut1.3*
EDR	JESD22-A117	10kcy EW @ 25°C then Storage HTB 150°C Duration 168h	4	77	308	Lot3: 0/77 Lot4: 0/77 Lot6: 0/77 Lot22: 0/77	*480A cut1.0* *480A cut1.0* *480Z cut1.1* *480X cut1.3*
EDR	JESD22-A117	10kcy EW @ -40°C then Storage HTB 150°C Duration 168H	4	77	308	Lot3: 0/77 Lot4: 0/77 Lot6: 0/77 Lot22: 0/77	*480A cut1.0* *480A cut1.0* *480Z cut1.1* *480X cut1.3*
ELFR	JESD22-A108 JESD74	Ta=125°C Duration= 48hrs 3V6	3	800	1800	Lot1: 0/800 Lot2: 0/200 Lot6: 0/800 Lot21: 0/800	*480A cut1.0* *480A cut1.0* *480Z cut1.1* *480Z cut1.1*

** all pin pass 2kV, except VFBSD which pass 1.6Kv*

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Table 6 – ACCELERATED ENVIRONMENT STRESS TESTS

TFBGA13x13x1.2 225 p0.8 SMPS, ATP3

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	3	3	9	Lot2: 0/3 Lot6: 0/3 Lot22: 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	Lot2: 0/308	
TC	JESD22-A104	Ta=-65/150°C Duration= 500cyc ☒ After PC	1	77	77	Lot2: 0/77	
UHAST	JESD22-A118	Ta=130°C ,85% RH Duration= 96hrs ☒ After PC	1	77	77	Lot2: 0/77	
HTSL	JESD 22-A103	Ta=150°C Duration= 1000hrs ☒ After PC	1	77	77	Lot2: 0/77	
THB	JESD 22-A101	Ta=85°C/85%RH VDD=3v6 ☒ After PC	1	77	77	Lot2: 0/77	

TFBGA13x13x1.2 216 p0.8 Legacy, ATP3

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	Lot7: 0/3	

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TFBGA 8x8x1.2 100 p0.8 Legacy, ATP3

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	Lot8: 0/3	

TFBGA 8x8x1.2 100 p0.8 SMPS, ATP3

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	
PC	J-STD-020	24h bake@125°C MSL3 (192h@30C/60%RH) 3x Reflow simulation Peak Reflow Temp= 260°C	1	308	308	Lot9: 0/308	
TC	JESD22-A104	Ta=-65/150°C Duration= 500cyc ☒ After PC	1	77	77	Lot9: 0/77	
UHAST	JESD22-A118	Ta=130°C ,85% RH Duration= 96hrs ☒ After PC	1	77	77	Lot9: 0/77	
HTSL	JESD 22-A103	Ta=150°C Duration= 1000hrs ☒ After PC	1	77	77	Lot9: 0/77	
THB	JESD 22-A101	Ta=85°C/85%RH VDD=3v6 ☒ After PC	1	77	77	Lot9: 0/77	

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UFBGA 10x10x1.2 176 p0.8 Legacy, ATP3

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	Lot10: 0/3	

UFBGA 10x10x1.2 176 p0.8 SMPS, ATP3

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	Lot11: 0/3	

UFBGA 7x7x1.2 169 p0.5 SMPS, ATP3

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	Lot12: 0/3	

LQFP 24x24x1.4 176 Legacy, ASE

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	

LQFP 24x24x1.4 176 SMPS, ASE

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	Lot14: 0/3	

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LQFP 20x20x1.4 144 Legacy, ATP1

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	Lot15: 0/3	

LQFP 20x20x1.4 144 SMPS, ATP1

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	Lot16: 0/3	

LQFP 14x14x1.4 100 Legacy, ATP1

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	Lot17: 0/3	

LQFP 14x14x1.4 100 SMPS, ATP1

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	Lot18: 0/3	

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LQFP 10x10x1.4 64 Legacy, ATP1

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	Lot19: 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	Lot19: 0/308	
TC	JESD22-A104	Ta=-65/150°C Duration= 500cyc ☒ After PC	1	77	77	Lot19: 0/77	
UHAST	JESD22-A118	Ta=130°C ,85% RH Duration= 96hrs ☒ After PC	1	77	77	Lot19: 0/77	
HTSL	JESD 22-A103	Ta=150°C Duration= 1000hrs ☒ After PC	1	77	77	Lot19: 0/77	
THB	JESD 22-A101	Ta=85°C/85%RH VDD=3v6 ☒ After PC	1	77	77	Lot19: 0/77	

Test code	Method	Test 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	JESD22-B116 Mil Std 883-M2011	1	50	50	Lot19: 0/50	N/A

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WLCSP132 p0.35 SMPS, ATT1

ESD CDM	ANSI/ESDA/ JEDEC JS-002	250V	1	3	3	Lot20: 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	Lot20: 0/308	*Monitoring only*
TC	JESD22-A104	Ta=-65/150°C Duration= 500cyc ☒ After PC	1	77	77	Lot20: 0/77	*Monitoring only*
UHAST	JESD22-A118	Ta=130°C ,85% RH Duration= 96hrs ☒ After PC	1	77	77	Lot20: 0/77	*Monitoring only*
HTSL	JESD 22-A103	Ta=150°C Duration= 1000hrs ☒ After PC	1	77	77	Lot20: 0/77	*Monitoring only*
THB	JESD 22-A101	Ta=85°C/85%RH VDD=3v6 ☒ After PC	1	77	77	Lot20: 0/77	*Monitoring only*

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

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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-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
JESD 22B116:	Wire Bond Shear Test method
Mil Std 883 M2011:	Bond Pull Strength
JESD22B100/B108:	Physical dimension

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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
MSL3	Moisture Sensitivity Level 3
SMPS	Switched Mode Power Supply (DC-DC Converter)

6 REVISION HISTORY

Revision	Author	Content description	Approval List			
			Function	Location	Name	Date
1.0	Pierre DELEAGE	Initial release	Division Q&R Responsible	Grenoble	Dominique GALIANO	20th Jan 2020
			FE Quality Manager	Rousset	Antonio-Di GIACOMO	22nd Jan 2020
			Division Quality Manager	Rousset	Pascal NARCHE	10th Feb 2020
1.1	Pierre DELEAGE	Cut1.3 update	Q&R Quality Manager	Grenoble	Dominique GALIANO	20th Jul 2020
1.2	Pierre DELEAGE	Last results update	Q&R Quality Manager	Grenoble	Dominique GALIANO	3rd Dec 2020
1.3	Pierre DELEAGE	Typography correction	BE Quality Manager	Grenoble	Dominique GALIANO	17th Nov 2021
1.4	Berengere ROUTIER	QLFP64 JSCC Silver qualified Gold wire solution	BE Quality Manager	Grenoble	Dominique GALIANO	20th Jun 2022
			Division Quality Manager	Rousset	Pascal NARCHE	20th Jun 2022

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