PRODUCT/PROCESS
CHANGE NOTIFICATION
PCN13918– Additional information

ASE Kaohsiung (Taiwan) additional source for LQFP 7x7 package on STM32L4/L5x, STM32C01/C03x and STM32G0x products (Addendum to PCN10548 and PCN12854)

MDG - Microcontrollers Division (MCD)

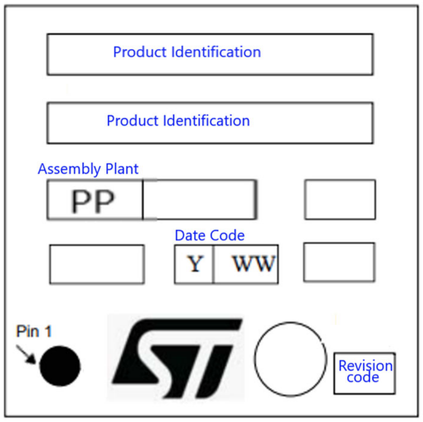
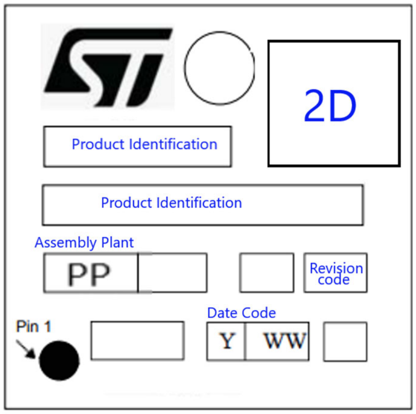
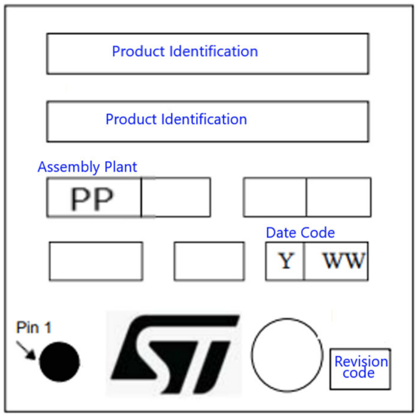
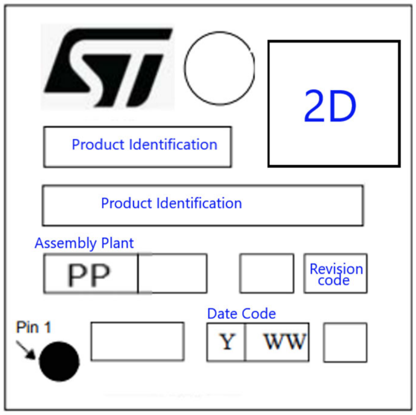
	Existing back-end site	Added back-end site
Assembly site	Stats ChipPAC JSCC Jiangyin China	ASE Kaohsiung Taiwan
Resin (1)	Sumitomo G631SHQ	Sumitomo G631SH
Glue	Ablestik 3230	Sumitomo CRM 1076WA
Wire	Silver 96.5% 0.8mil	Gold 0.8mil
Marking composition	Without 2D	With 2D Marking

What is the change?

(1) Package darkness changes depending on molding compound.
Pin1 identifier can change in terms of form and positioning.
Marking position and size could be different upon assembly site, without any loss of information.

How can the change be seen?

Package top view Marking is:

	Stats ChipPAC JSCC Jiangyin China	ASE Kaohsiung Taiwan
LQFP32		
LQFP48		

PP code indicates assembly traceability plant code.

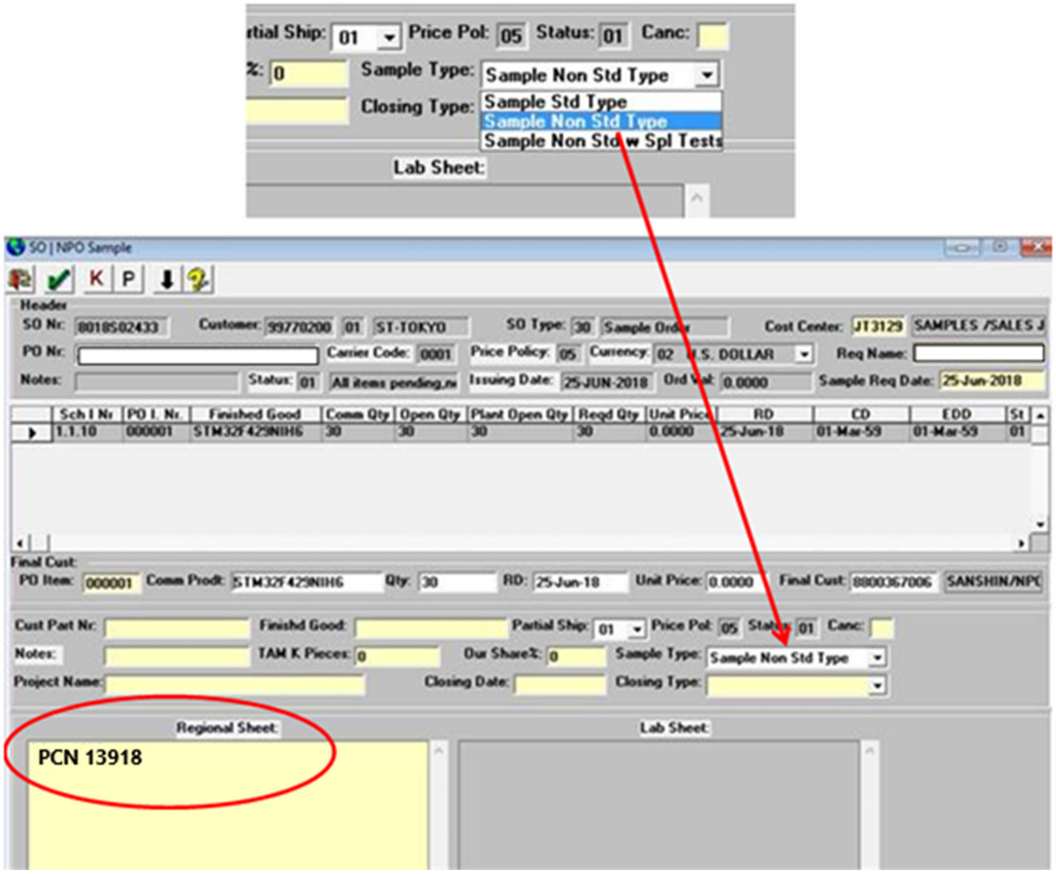
Existing		Additional	
PP code	Fab	PP code	Fab
GQ	Stats ChipPAC JSCC Jiangyin China	**AA**	ASE Kaohsiung Taiwan

Please refer to product **DataSheet** or Technical Note **TN1433** for package marking details.

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 “**PCN13918**” into the NPO Electronic Sheet/**Regional Sheet**
- request sample(s) through Notice tool, indicating a single Commercial Product for each request



rtial Ship: 01
Price Pol: 05
Status: 01
Canc:
%: 0
Sample Type: Sample Non Std Type
Closing Type:

SO Nr: 8018S02433
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,n
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 Prodt: STM32F429NIH6
Qty: 30
RD: 25-Jun-18
Unit Price: 0.0000
Final Cust: 8800367006 SANSHIN/NPC

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 13918
Lab Sheet:

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MDG-MCD-RER1810
Reliability Report

Qualification Type: ASSEMBLY LINE QUALIFICATION

ASE Kaohsiung (Taiwan) additional source for LQFP 7x7, LQFP 10x10, LQFP14x14 & LQFP20x20 extended listed products

(PCN10548)
(PCN10549)
(PCN10689)
(PCN12854)
(PCN13918)

Product / Process / Package Information for test vehicles				
Commercial Product	STM8L052C6T6 STM32F303CBT7	STM32F205RET6 STM32L052R8T6	STM32L151VDT6 STM32F071VBT6 STM32F207VET6 STM32L431VCT6	STM32F103ZET6 STM32F405ZGT6 STM32H743ZIT6
Mask Set Revision	F764XXXY F422XXXY	E411XXX3 F417XXXX	F436XXXX F448XXX1 E411XXX3 E435XXXZ	F414XXX3 E413XXX2 E450XXXY
Silicon Process Technology	CMOSF9GO2 CMOS0.18µm Emb.Flash	CMOSM10ULP 6M1T CMOSF9GO2s	CMOSF9GO2 CMOS0.18µm Emb.Flash CMOSM10ULP 6M1T 90nm eFlash Generic TSMC	CMOS0.18µm Emb.Flash CMOSM10LP 6M1T CMOSM40
Wafer Fabrication Location	ROUSSET R8 TSMC Fab11 US	TSMC Fab14 Taiwan ROUSSET R8	ROUSSET R8 TSMC Fab8 Taiwan TSMC Fab14 Taiwan TSMC Fab14 Taiwan	TSMC Fab8 Taiwan ST Crolles 300 ST Crolles 300
Package	LQFP 7x7x1.4 48L	LQFP 10x10x1.4 64L	LQFP 14x14x1.4 100	LQFP 20x20x1.4 144
Assembly Plant Location	ASE Kaohsiung (Taiwan)			

MDG-MCD-RER1810
Reliability Report

Approval List rev 1			
Function	**Location**	**Name**	**Date**
Division Back-End Quality Manager	ST Rousset	Gisèle SEUBE	30 Nov., 2018
Division Quality Manager	ST Rousset	Pascal NARCHE	30 Nov., 2018
Approval List rev 2			
Function	**Location**	**Name**	**Date**
Division Back-End Quality Manager	ST Rousset	Gisèle SEUBE	17 Jan., 2019
Division Quality Manager	ST Rousset	Pascal NARCHE	17 Jan., 2019
Approval List rev 3			
Function	**Location**	**Name**	**Date**
Division Back-End Quality Manager	ST Rousset	Gisèle SEUBE	26 Apr., 2019
Division Quality Manager	ST Rousset	Pascal NARCHE	2 May, 2019
Approval List rev 4			
Function	**Location**	**Name**	**Date**
Division Back-End Quality Manager	ST Rousset	Gisèle SEUBE	25 Jun.,2019
Division Quality Manager	ST Rousset	Pascal NARCHE	25 Jun.,2019
Approval List rev 5			
Function	**Location**	**Name**	**Date**
Division Back-End Quality Manager	ST Rousset	Gisèle SEUBE	25 Jun.,2021
Approval List rev 6			
Function	**Location**	**Name**	**Date**
Subgroup Quality Manager	ST Rousset	Pascal NARCHE	21 Feb.,2023

MDG-MCD-RER1810
Reliability Report

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MDG-MCD-RER1810
Reliability Report

1 RELIABILITY RESULTS OVERVIEW

1.1 Objectives

The assembly line LQFP7x7 is qualified and in production for STM32 devices (please refer to report MDG-MCD-RER1717).
The aim of this report is to present results of the reliability evaluation for LQFP 7x7, LQFP 10x10, LQFP 14X14 & LQFP20x20 package manufactured at ASE Kaohsiung (Taiwan) assembly and test plant for STM8L and STM32 extended devices.

Test vehicles are described here below:

Product	Package	Assembly plant
STM8L052C6T6	LQFP 48 7x7x1.4	ASE Kaohsiung (Taiwan)
STM32F303CBT7		
STM32F205RET6	LQFP 64 10x10x1.4	
STM32L052R8T6		
STM32L151VDT6	LQFP 100 14x14x1.4	
STM32F071VBT6		
STM32F207VET6		
STM32L431VCT6		
STM32F103ZET6 STM32F405ZGT6 STM32H743ZIT6	LQFP 144 20x20x1.4	

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

1.2 Conclusion

All reliability tests have been completed with positive results for LQFP7x7, LQFP10x10, LQFP14x14 & LQFP20x20. Neither functional nor parametric rejects were detected at final electrical testing.

So, according to good reliability tests results in line with validated product mission profile and reliability strategy, the qualification is granted for the LQFP7x7, LQFP10x10, LQFP14x14 & LQFP20x20 assembly and test line at ASE Kaohsiung (Taiwan).

Refer to Section 2.0 for reliability test results.

2 RELIABILITY EVALUATION CONTEXT / PLAN / STRATEGY & RESULTS SUMMARY

2.1 Reliability Evaluation: Context & strategy summary

Due to the success on the market of STM8L & STM32 devices, ST Microcontrollers Division decided to qualify an additional back-end site to maintain state of the art service level to our customers thanks to extra capacity.
This reliability evaluation concerns the qualification of a new assembly line for LQFP 7x7, LQFP 10x10, LQFP 14x14 and LQFP 20x20 package in ASE Kaohsiung (Taiwan).

PCN10548 - Changes are described here below for LQFP7x7 & LQFP10x10:

	Existing Back-end sites			**Added back-end site**
Assembly site	**Stats ChipPAC JSCC Jiangyin China**	**ST Muar Malaysia**	**Amkor ATP Philippines**	**ASE Kaohsiung Taiwan**
Lead frame supplier	Copper Frame Spot Ag	Pre Plated Frame	Copper Frame Spot Ag	Copper Frame Spot Ag
Leadfinishing (1)	Pure Tin (e3)	Ni Pd Au (e4)	Pure Tin (e3)	Pure Tin (e3)
Molding compound (2)	Sumitomo G631SHQ	Sumitomo G700LS	Sumitomo G631HQ	Sumitomo G631SH
Die attach Glue	Ablestik 3230	Hitachi EN4900	Evertech AP4200	Sumitomo CRM 1076WA
Wire	Silver 96.5% 0.8mil	Gold 0.8mil Silver 96.5% 0.8mil	Gold 0.8mil	Gold 0.8mil
Enhanced traceability in marking	2 digits	2 digits	No digit	2 digits

PCN10689 - Changes are described here below for LQFP14x14:

	Existing Back-end sites			**Added back-end site**
Assembly site	**ST Muar Malaysia**	**ST Muar Malaysia**	**Amkor ATP Philippines**	**ASE Kaohsiung Taiwan**
Lead frame supplier	Pre Plated Frame	Copper Frame Spot Ag	Copper Frame Spot Ag	Copper Frame Spot Ag
Leadfinishing (1)	Ni Pd Au (e4)	Pure Tin (e3)	Pure Tin (e3)	Pure Tin (e3)
Molding compound (2)	Sumitomo G700LS	Sumitomo G700LS	Sumitomo G631HQ	Sumitomo G631SH
Die attach Glue	Henkel 3280T	Henkel ABP8302	Evertech AP4200	Sumitomo CRM 1076WA
Wire	1.0mil Au	0.8mil Ag	0.8mil Au	0.8mil Au
Enhanced traceability in marking	No digit	2 digits	No digit	2 digits

PCN10549 - Changes are described here below for LQFP20x20:

	Existing Back-end sites			**Added back-end site**
Assembly site	**Amkor ATP Philippines**			**ASE Kaohsiung Taiwan**
Lead frame supplier	Copper Frame Spot Ag		Copper Frame	Copper Frame Spot Ag
Leadfinishing (1)	Pure Tin (e3)		PPF (e4)	Pure Tin (e3)
Molding compound (2)	Sumitomo EME-G631SHQ	Sumitomo G631HQ		Sumitomo G631SH
Die attach Glue	Ablestik 3230	Evertech AP4200	Sumitomo CRM1076YB	Sumitomo CRM 1076WA
Enhanced traceability in marking	No digit			2 digits

PCN12854 - Changes are described here below for LQFP7x7, for additional listed products in PCN:

	Existing Back-end site	**Added back-end site**
Assembly site	**Stats ChipPAC JSCC Jiangyin China**	**ASE Kaohsiung Taiwan**
Molding compound (2)	Sumitomo G631SHQ	Sumitomo G631SH
Die attach Glue	Ablestik 3230	Sumitomo CRM 1076WA
Wire	Silver 96.5% 0.8mil	Gold 0.8mil

PCN13918 - Changes are described here below for LQFP7x7, for additional listed products in PCN:

	Existing Back-end site	**Added back-end site**
Assembly site	**Stats ChipPAC JSCC Jiangyin China**	**ASE Kaohsiung Taiwan**
Molding compound (2)	Sumitomo G631SHQ	Sumitomo G631SH
Die attach Glue	Ablestik 3230	Sumitomo CRM 1076WA
Wire	Silver 96.5% 0.8mil	Gold 0.8mil
Marking composition	Without 2D	With 2D marking

(1) Lead color and surface finish change depending on leadfinishing.

(2) Package darkness changes depending on molding compound.

2.2 Reliability Test vehicles description

Package line	Assembly Line	Package	Device (Partial RawLine Code)	Diffusion Process	Number Reliability Lots
LQFP	LQFP 7*7	48L	STM8(5B*764)	Rousset R8 F9GO2	1
			STM32(5B*422)	TSMC 0.18µm	1
	LQFP 10*10	64L	STM32(5W*411)	TSMC M10	1
			STM32(5W*417)	Rousset R8 F9GO2s	1
	LQFP 14*14	100L	STM32(1L*436)	Rousset R8 F9GO2	1
			STM32(1L*448)	TSMC 0.18µm	1
			STM32(1L*411)	TSMC M10	1
			STM32(1L*435)	TSMC 90nm	1
	LQFP 20*20	144L	STM32(1A *414)	TSMC 0.18µm	1
			STM32(1A *413)	Crolles CR300 M10	1
			STM32(1A *450)	Crolles CR300 M40	1

2.3 Reliability Information

Product / Process / Package Information for test vehicles				
Finish Good	ES8L052 C6T6$E6	ES32F303 CBT7$E3	ES32F205 RET6$EA	ES32L052 R8T6$E4
Die Name /cut	F764XXXY	F422XXXY	E411XXX3	F417XXXX
Diffusion Lot Number	VG808155	9U804096	9R807141	VG815029
Trace Code	AA824048	AA830068	AA824059	AA824047
Reliability Lab location	ST ROUSSET (France) ST MUAR (Malaysia)			
Fab name location	ROUSSET R8	TSMC Fab11 US	TSMC Fab14 Taiwan	ROUSSET R8
Assembly Plant Location	ASE Kaohsiung (Taiwan)			
Package description	LQFP 48 7x7x1.4		LQFP 64 10x10x1.4	

Product / Process / Package Information for test vehicles							
Finish Good	ES32L151 VDT6$E1	ES32F071 VBT6$E1	ES32F207 VET6$EA	ES32L431 VCT6$E2	ES32F103 ZET6$EA	ES32F405 ZGT6$E4	ES32H743 ZIT6$E3
Die Name /cut	F436XXXX	F448XXX1	E411XXX3	E435XXXZ	F414XXX3	E413XXX2	E450XXXY
Diffusion Lot Number	VG813171	98815033	9R807141	9R807069	98812034	VQ749877	VQ743682
Trace Code	AA826001	AA826003	AA826002	AA836029	AA838038	AA845065	AA904060
Reliability Lab location	ST ROUSSET (France) ST MUAR (Malaysia)						

Fab name location	ROUSSET R8	TSMC Fab8 Taiwan	TSMC Fab14 Taiwan	TSMC Fab14 Taiwan	TSMC Fab8 Taiwan	ST Crolles 300	ST Crolles 300
Assembly Plant Location	ASE Kaohsiung (Taiwan)						
Package description	LQFP 100 14x14x1.4				LQFP 100 20x20x1.4		

Comment:
ST is certified ISO/TS 16949. This induces certification for all internal and subcontractor plants
ST certification document can be downloaded under the following link:
http://www.st.com/content/st_com/en/support/quality-and-reliability/certifications.html

2.4 Reliability Evaluation: Results summary

Package oriented test results in LQFP7x7

Package Related Tests						Results	
						LQFP 7x7	
Description	***Test/Method***	***Conditions***	***Sample Size***	***Criteria***	***Readout / Duration***	***Lot 1***	***Lot 2***
						764 *E75B*764ESXY*	***422*** *E65B*422ESXY*
Electrostatic discharge – Charge Device Model							
ESD	ANSI/ESD STM5.3.1	N.A.	2 x 3	500V (764)	NA	0/3	
	JEDEC JS-002			500V (422)			0/3
Preconditioning: moisture sensitivity level 3							
PC	J-STD-020 JESD22-A113	MSL3	2 x 308	Electrical test: A0/R1 (Accepted 0 reject/ Rejected 1 reject)	NA	0/308	0/308
		Delamination	2 x 60	No delamination		0/60	0/60
High Temperature Storage Life after preconditioning							
HTSL	JESD 22-A103	150°C	1 x 77	Elect test A0/R1	1000h	0/77	
Thermal Cycling after Preconditioning							
TC	JESD 22-A104	-65°C/+150°C	1 x 77	Elect test A0/R1	500cy	0/77	
					1000cy for monitoring	0/77	
Unbiased Highly Accelerated Temperature and Humidity Stress after Preconditioning							
uHAST	JESD 22A118	130°C, 85%RH 2Atm	1 x 77	Elect test A0/R1	96h	0/77	
Biased Highly Accelerated temperature & humidity stress Test after Preconditioning							
HAST	JESD 22A110	110°C, 85%RH 1.2atm Bias	1 x 77	Elect test A0/R1	264h	0/77	

Construction Analysis							
CA	Construction Analysis including : -Wire bond shear -Wire bond pull -Solderability -Physical Dimension	JESD 22B102 JESDB100/B 108	2 x 50	No concern	NA	No concern	No concern

Note: The assembly line LQFP7x7 is qualified and in production for STM32 devices in TSMC 0.18µm (please refer to report MDG-MCD-RER1717).
For die 422 in LQFP7x7, only MSL3 CDM and construction analysis were performed to qualify leadframe with slot.

Package oriented test results in LQFP10x10

Package Related Tests							
						LQFP 10x10	
						Lot 3	***Lot 4***
Description	***Test/Method***	***Conditions***	***Sample Size***	***Criteria***	***Readout / Duration***	***411*** ***E45W*411ESX3***	***417*** ***E35W*417ESXX***
Electrostatic discharge – Charge Device Model							
ESD	ANSI/ESD STM5.3.1	N.A.	2 x 3	500V (417)	NA		0/3
	JESD22-C101			500V (411)		0/3	
Preconditioning: moisture sensitivity level 3							
PC	J-STD-020 JESD22-A113	MSL3	2 x 308	Electrical test: A0/R1 (Accepted 0 reject/ Rejected 1 reject)	NA	0/308	0/308
		Delamination	2 x 60	No delamination		0/60	0/60
High Temperature Storage Life after preconditioning							
HTSL	JESD 22-A103	150°C	2 x 77	Elect test A0/R1	1000h	0/77	0/77
Thermal Cycling after Preconditioning							
TC	JESD 22-A104	-65°C/+150°C	2 x 77	Elect test A0/R1	500cy	0/77	0/77
					1000cy for monitoring	0/77	0/77
Unbiased Highly Accelerated Temperature and Humidity Stress after Preconditioning							
uHAST	JESD 22A118	130°C, 85%RH 2Atm	2 x 77	Elect test A0/R1	96h	0/77	0/77
Temperature Humidity Bias after Preconditioning							
THB	JESD 22-A101	85°C/85%RH Bias VDD=3v6	2 x 77	Elect test A0/R1	1000h	0/77	0/77
Construction Analysis							
CA	Construction Analysis including :	JESD 22B102	2 x 50	No concern	NA	No concern	No concern

	-Wire bond shear -Wire bond pull -Solderability -Physical Dimension	JESDB100/B 108					

Package oriented test results in LQFP14x14

Package Related Tests						Results			
						LQFP 14x14			
Description	***Test/Method***	***Conditions***	***Sample Size***	***Criteria***	***Readout / Duration***	***Lot 5***	***Lot 6***	***Lot 7***	***Lot 8***
						436 *E21L*436ESXX*	***448*** *E41L*448ESX1*	***411*** *E71L*411ESX3*	***435*** *E31L*435ESXZ*
Electrostatic discharge – Charge Device Model									
ESD	ANSI/ESD STM5.3.1	N.A.	4 x 3	500V (448 & 435)	NA		0/3		0/3
	JESD22-C101			500V (436 & 411)		0/3		0/3	
Preconditioning: moisture sensitivity level 3									
PC	J-STD-020 JESD22-A113	MSL3	4 x 308	Electrical test: A0/R1 (Accepted 0 reject/ Rejected 1 reject)	NA	0/308	0/308	0/308	0/308
		Delamination	4 x 60	No delamination		0/60	0/60	0/60	0/60
High Temperature Storage Life after preconditioning									
HTSL	JESD 22-A103	150°C	4 x 77	Elect test A0/R1	1000h	0/77	0/77	0/77	0/77
Thermal Cycling after Preconditioning									
TC	JESD 22-A104	-65°C/+150°C	4 x 77	Elect test A0/R1	500cy	0/77	0/77	0/77	0/77
					1000cy for monitoring	0/77	0/77	0/77	0/77
Unbiased Highly Accelerated Temperature and Humidity Stress after Preconditioning									
uHAST	JESD 22A118	130°C, 85%RH 2Atm	4 x 77	Elect test A0/R1	96h	0/77	0/77	0/77	0/77
Temperature Humidity Bias after Preconditioning									
THB	JESD 22-A101	85°C/85%RH Bias VDD=3v6	4 x 77	Elect test A0/R1	1000h	0/77	0/77	0/77	0/77
Construction Analysis									
CA	Construction Analysis including : -Wire bond shear -Wire bond pull -Solderability -Physical Dimension	JESD 22B102 JESDB100/B108	4 x 50	No concern	NA	No concern	No concern	No concern	No concern

Package oriented test results in LQFP20x20

Package Related Tests						Results		
Description	**Test/Method**	**Conditions**	**Sample Size**	**Criteria**	**Readout / Duration**	**LQFP 20x20**		
						Lot 9	**Lot 10**	**Lot 11**
						414 E01A*414ESX3	**413** E01A*413ESX2	**450** E01A*450ESXY
Electrostatic discharge – Charge Device Model								
ESD	JESD22-C101	N.A.	4 x 3	500V for 414	N.A.	0/3		
	ANSI/ESD STM5.3.1			250V for 414 500V for 413		0/3	0/3	
	JEDEC JS-002			250V for 450				0/3
Preconditioning: moisture sensitivity level 3								
PC	J-STD-020 JESD22-A113	MSL3	3 x 308	Electrical test: A0/R1 (Accepted 0 reject/ Rejected 1 reject)	NA	0/308	0/308	0/308
		Delamination	3 x 60	No delamination		0/60	0/60	0/60
High Temperature Storage Life after preconditioning								
HTSL	JESD 22-A103	150°C	3 x 77	Elect test A0/R1	1000h	0/77	0/77	0/77
Thermal Cycling after Preconditioning								
TC	JESD 22-A104	-65°C/+150°C	3 x 77	Elect test A0/R1	500cy	0/77	0/77	0/77
					1000cy for monitoring	0/77	0/77	
Unbiased Highly Accelerated Temperature and Humidity Stress after Preconditioning								
uHAST	JESD 22A118	130°C, 85%RH 2Atm	3 x 77	Elect test A0/R1	96h	0/77	0/77	0/77
Temperature Humidity Bias after Preconditioning								
THB	JESD 22-A101	85°C/85%RH Bias VDD=3v6	3 x 77	Elect test A0/R1	1000h	0/77	0/77	0/77
Construction Analysis								
CA	Construction Analysis including : -Wire bond shear -Wire bond pull -Solderability -Physical Dimension	JESD 22B102 JESDB100/B108	3 x 50	No concern	NA	No concern	No concern	No concern

3 RELIABILITY TEST VEHICLES CHARACTERISTICS

3.1 Front-End information

Front-end information in LQFP7x7

Front-End	Diffusion FAB	
	Lot 1 ***764*** ***E75B*764ESXY***	Lot 2 ***422*** ***E65B*422ESXY***
Wafer Fab Name	ROUSSET R8	TSMC Fab11 US
Wafer Fab Location/ Address	190 Avenue Celestin COQ, 13106 Rousset FRANCE	5509 N W Parker Street CAMAS WA 98607-9299 U.S.
Process Technology Name	CMOSF9GO2	CMOS M8 0.18µm EMBEDDED FLASH
Wafer Diameter	8 inches	8 inches
Wafer Thickness	375 +/- 25 µm	375 +/- 25 µm
Die Size	X: 1738 µm Y: 2876 µm 5.0 mm²	X: 4236 µm Y: 4698 µm 19.9 mm²
Technology Mask Number	39	34
Scribe Line size x/y:	80 µm x 80 µm	80 µm x 80 µm
Pad Die Size /Pad type:	65 µm x 108 µm	65 µm x 70 µm
Metal Layers Number Materials Thickness	Metal 1 TaN/Ta/Cu 0.280 µm Metal 2 TaN/Ta/Cu 0.350 µm Metal 3 TaN/Ta/Cu 0.350 µm Metal 4 TaN/Ta/Cu 0.350 µm Metal 5 Ti/AlCu/TxTN 0.900 µm	Metal 1 Tin/AlCu/Tin 0.450 µm Metal 2 Tin/AlCu/Tin 0.450 µm Metal 3 Tin/AlCu/Tin 0.450 µm Metal 4 Tin/AlCu/Tin 0.450 µm Metal 5 Tin/AlCu/Tin 0.875 µm
Passivation Layers Number Materials Thickness	USG + NitUV (HFP USG+UV Nitride) 1.75µm	HDPox 10kA+SRO 1.5kA+PESIN 6kA 1.75µm
Back Metal Finishing Thickness	RAW SILICON - BACK GRINDING	RAW SILICON - BACK GRINDING

Front-end information in LQFP10x10

Front-End	**Diffusion FAB**	
	Lot 3 *411* *E45W*411ESX3*	Lot 4 *417* *E35W*417ESXX*
Wafer Fab Name	TSMC Fab14 Taiwan	ROUSSET R8
Wafer Fab Location/ Address	No. 1-1, Nan-Ke North Rd., Southern Taiwan Science Park,741-44 TAIWAN	190 Avenue Celestin COQ, 13106 Rousset FRANCE
Process Technology Name	CMOSM10ULP 6M1T	CMOSF9GO2S
Wafer Diameter	12 inches	8 inches
Wafer Thickness	775 +/- 25 µm	375 +/- 25 µm
Die Size	X: 4006 µm Y: 3674 µm 14.7 mm²	X: 2903 µm Y: 2631 µm 7.6 mm²
Technology Mask Number	42	37
Scribe Line size x/y:	80 µm x 80 µm	80 µm x 80 µm
Pad Die Size /Pad type:	59 µm x 123 µm 63 µm x 73 µm	53 µm x 108 µm
Metal Layers Number Materials Thickness	Metal 1 TaN/Ta/CuSeed/Cu 0.220 µm Metal 2 TaN/Ta/CuSeed/Cu 0.280 µm Metal 3 TaN/Ta/CuSeed/Cu 0.280 µm Metal 4 TaN/Ta/CuSeed/Cu 0.280 µm Metal 5 TaN/Ta/CuSeed/Cu 0.280 µm Metal 6 Ta/TaN/AlCu 0.730 µm Metal 7 AlCu 1.200 µm	Metal 1 TaN/Ta/Cu 0.280 µm Metal 2 Ti/AlCu/TxTN 0.310 µm Metal 3 Ti/AlCu/TxTN 0.310 µm Metal 4 Ti/AlCu/TxTN 0.310 µm Metal 5 Ti/AlCu/TxTN 1.200 µm
Passivation Layers Number Materials Thickness	USG + NITRIDE 1.75µm	USG + NitUV (HFP USG+UV Nitride) 1.2 µm
Back Metal Finishing Thickness	RAW SILICON	RAW SILICON - BACK GRINDING

Front-end information in LQFP14x14

Front-End	**Diffusion FAB**			
	Lot 5 ***436*** ***E21L*436ESXX***	Lot 6 ***448*** ***E41L*448ESX1***	Lot 7 ***411*** ***E71L*411ESX3***	Lot 8 ***435*** ***E31L*435ESXZ***
Wafer Fab Name	ROUSSET R8	TSMC Fab8 - Taiwan	TSMC Fab14 - Taiwan	TSMC Fab14 - Taiwan
Wafer Fab Location/ Address	190 Avenue Celestin COQ, 13106 Rousset FRANCE	No. 1-1, Nan-Ke North Rd., Southern Taiwan Science Park,741-44 TAIWAN	No. 1-1, Nan-Ke North Rd., Southern Taiwan Science Park,741-44 TAIWAN	No. 1-1, Nan-Ke North Rd., Southern Taiwan Science Park,741-44 TAIWAN
Process Technology Name	CMOSF9GO2	CMOS M8 0.18µm EMBEDDED FLASH	CMOSM10ULP 6M1T	90nm eFlash Generic TSMC
Wafer Diameter	8 inches	8 inches	12 inches	12 inches
Wafer Thickness	375 +/- 25 µm	381 +/- 25 µm	775 +/- 25 µm	775 +/- 25 µm
Die Size	X: 4574 µm Y: 4946 µm 22.6 mm²	X: 3312 µm Y: 3144 µm 10.4 mm²	X: 4006 µm Y: 3674 µm 14.7 mm²	X: 3176.4 µm Y: 3162.4 µm 10.0 mm²
Technology Mask Number	38	34	42	44
Scribe Line size x/y	80 µm x 80 µm	80 µm x 80 µm	80 µm x 80 µm	80 µm x 80 µm
Pad Die Size /Pad type	65 µm x 108 µm	65 µm x 70 µm	59 µm x 123 µm 63 µm x 73 µm	123 µm x 59 µm
Metal Layers Number Materials Thickness	Metal 1 TaN/Ta/Cu 0.280 µm Metal 2 TaN/Ta/Cu 0.350 µm Metal 3 TaN/Ta/Cu 0.350 µm Metal 4 TaN/Ta/Cu 0.350 µm Metal5 Ti/AlCu/TxTN 0.900 µm	Metal 1 Tin/AlCu/Tin 0.450 µm Metal 2 Tin/AlCu/Tin 0.450 µm Metal 3 Tin/AlCu/Tin 0.450 µm Metal 4 Tin/AlCu/Tin 0.450 µm Metal 5 Tin/AlCu/Tin 0.875 µm	Metal 1 TaN/Ta/CuSeed/Cu 0.220 µm Metal 2 TaN/Ta/CuSeed/Cu 0.280 µm Metal 3 TaN/Ta/CuSeed/Cu 0.280 µm Metal 4 TaN/Ta/CuSeed/Cu 0.280 µm Metal 5 TaN/Ta/CuSeed/Cu 0.280 µm Metal 6 Ta/TaN/AlCu 0.730 µm Metal 7 AlCu 1.200 µm	Metal 1 TaN/Ta/CuSeed/Cu 0.240 µm Metal 2 TaN/Ta/CuSeed/Cu 0.310 µm Metal 3 TaN/Ta/CuSeed/Cu 0.310 µm Metal 4 TaN/Ta/CuSeed/Cu 0.310 µm Metal 5 TaN/Ta/CuSeed/Cu 0.310 µm Metal 6 TaN/Ta/CuSeed/Cu 0.850 µm Metal 7 AlCu 1.450 µm
Passivation Layers Number Materials Thickness	USG + NitUV (HFP USG+UV Nitride) 1.75µm	HDPox 10kA+SRO 1.5kA+PESIN 6kA 1.75µm	USG + NITRIDE 1.75µm	USG + NITRIDE 1.75µm
Back Metal Finishing Thickness	RAW SILICON - BACK GRINDING	RAW SILICON - BACK GRINDING	RAW SILICON	RAW SILICON

Front-end information in LQFP20x20

Front-End	**Diffusion FAB**		
	Lot 9 ***414*** ***E01A*414ESX3***	Lot 10 ***413*** ***E01A*413ESX2***	Lot 11 ***450*** ***E01A*450ESXY***
Wafer Fab Name	TSMC Fab8 Taiwan	ST Crolles 300	ST Crolles 300
Wafer Fab Location/ Address	No. 1-1, Nan-Ke North Rd., Southern Taiwan Science Park,741-44 TAIWAN	850 rue Jean MONNET 38920 Crolles FRANCE	850 rue Jean MONNET 38920 Crolles FRANCE
Process Technology Name	CMOS0.18µm Emb.Flash	CMOSM10LP 6M1T	CMOSM40
Wafer Diameter	8 inches	12 inches	12 inches
Wafer Thickness	375 +/- 25 µm	775 +/- 25 µm	775 +/- 25 µm
Die Size	X: 4511 µm Y: 4440 µm 20.0 mm^2	X: 4004 µm Y: 4258 µm 17.0 mm^2	X:4983 µm Y: 4662 µm 23.2 mm^2
Technology Mask Number	31	41	50
Scribe Line size x/y	80.6 µm x 80.2 µm	80 µm x 80 µm	72 µm x 72 µm
Pad Die Size /Pad type	65 µm x 70 µm	59 µm x 123 µm 63 µm x 73 µm	54.9 µm x 54.4 µm
Metal Layers Number Materials Thickness	Metal 1 Tin/AlCu/Tin 0.450 µm Metal 2 Tin/AlCu/Tin 0.450 µm Metal 3 Tin/AlCu/Tin 0.450 µm Metal 4 Tin/AlCu/Tin 0.450 µm Metal 5 Tin/AlCu/Tin 0.875 µm	Metal 1 TaN/CuSeed/Cu 0.240 µm Metal 2 TaN/CuSeed/Cu 0.330 µm Metal 3 TaN/CuSeed/Cu 0.330 µm Metal 4 TaN/CuSeed/Cu 0.330 µm Metal 5 TaN/CuSeed/Cu 0.330 µm Metal 6 TaN/CuSeed/Cu 0.850 µm Metal 7 AlCu/TinArc 1.450 µm	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 0.140 µm Metal 7 Cu 1.000 µm Metal 8 Ta/TaN/AlCu 1.450 µm
Passivation Layers Number Materials Thickness	HDPox 10kA+SRO 1.5kA+PESIN 6kA 1.75µm	PSG + NITRIDE 1.1µm	PSG + NITRIDE 1.1µm
Back Metal Finishing Thickness	RAW SILICON - BACK GRINDING	RAW SILICON	RAW SILICON

3.2 Back-End information

Back-end information in LQFP7x7

Back-End	**Lot 1** *764* *E75B*764ESXY*	**Lot 2** *422* *E65B*422ESXY*
Assembly Plant Location/ Address:	No.26, Chin 3rd Rd. Nantze, Kaohsiung, Taiwan	
Die Thickness after Back grinding:	NA	NA
Die sawing method:	Step cut	
Die attach material: **Type:** **Supplier:**	GLUE CRM 1076WA Sumitomo	
Lead frame material: **Die paddle size:**	Copper Frame Spot Ag 4.092 mm x 4.092 mm	Copper Frame Spot Ag 5.0 mm x 5.0 mm
Wire bonding: **Type /Diameter:**	WIRE Au 0.8 mil	
Lead Plating **Natures** **Thickness**	Pure Tin (e3) Tolerance 7 to 20 µm	
Molding Compound **Supplier:**	EME-G631SH Sumitomo	
Package Moisture Sensitivity Level (JEDEC J-STD020D):	3 (1 WEEK at <=30C/60%RH)	

Back-end information in LQFP10x10

Back-End	**Lot 3** *411* *E45W*411ESX3*	**Lot 4** *417* *E35W*417ESXX*
Assembly Plant Location/ Address:	No.26, Chin 3rd Rd. Nantze, Kaohsiung, Taiwan	
Die Thickness after Back grinding:	375 +/- 25 µm	NA
Die sawing method:	Step cut	
Die attach material: **Type:** **Supplier:**	GLUE CRM 1076WA Sumitomo	
Lead frame material: **Die paddle size:**	Copper Frame Spot Ag 5.7 mm x 5.7 mm	Copper Frame Spot Ag 5.7 mm x 5.7 mm
Wire bonding: **Type /Diameter:**	WIRE Au 0.8 mil	
Lead Plating **Natures** **Thickness**	Pure Tin (e3) Tolerance 7 to 20 µm	
Molding Compound **Supplier:**	EME-G631SH Sumitomo	
Package Moisture Sensitivity Level (JEDEC J-STD020D):	3 (1 WEEK at <=30C/60%RH)	

Back-end information in LQFP14x14

Back-End	Lot 5 *436* *E21L*436ESXX*	Lot 6 *448* *E41L*448ESX1*	Lot 7 *411* *E71L*411ESX3*	Lot 8 *435* *E31L*435ESXZ*
Assembly Plant Location/ Address:	No.26, Chin 3rd Rd. Nantze, Kaohsiung, Taiwan			
Die Thickness after Back grinding:	NA	NA	375 +/- 25 µm	375 +/- 25 µm
Die sawing method:	Step cut			
Die attach material: **Type:** **Supplier:**	GLUE CRM 1076WA Sumitomo			
Lead frame material: **Die paddle size:**	Copper Frame Spot Ag 6.6 mm x 6.6 mm			
Wire bonding: **Type /Diameter:**	WIRE Au 0.8 mil			
Lead Plating **Natures** **Thickness**	Pure Tin (e3) Tolerance 7 to 20 µm			
Molding Compound **Supplier:**	EME-G631SH Sumitomo			
Package Moisture Sensitivity Level (JEDEC J-STD020D):	3 (1 WEEK at <=30C/60%RH)			

Back-end information in LQFP20x20

Back-End	**Lot 9** *414* *E01A*414ESX3*	**Lot 10** *413* *E01A*413ESX2*	**Lot 11** *450* *E01A*450ESXY*
Assembly Plant Location/ Address:	No.26, Chin 3rd Rd. Nantze, Kaohsiung, Taiwan		
Die Thickness after Back grinding:	NA	375 +/- 20 µm	300 +/- 25 µm
Die sawing method:	Step cut		Laser Grooving + Mechanical dicing
Die attach material: **Type:** **Supplier:**	GLUE CRM 1076WA Sumitomo		
Lead frame material: **Die paddle size:**	Copper Frame Spot Ag 6.6 mm x 6.6 mm		
Wire bonding: **Type /Diameter:**	WIRE Au 0.8 mil		
Lead Plating **Natures** **Thickness**	Pure Tin (e3) Tolerance 7 to 20 µm		
Molding Compound **Supplier:**	EME-G631SH Sumitomo		
Package Moisture Sensitivity Level (JEDEC J-STD020D):	3 (1 WEEK at <=30C/60%RH)		

4 APPLICABLE AND REFERENCE DOCUMENTS

DMS 0061692 :	Reliability Tests And Criteria For Qualifications
SOP 2.6.2:	Process qualification and transfer management
SOP 2.6.7:	Product Maturity Level
SOP 2.6.9:	Package and process maturity management in Back End
SOP 2.6.11:	Program management from product qualification
SOP 2.6.19:	Process maturity level
ANSI/ESD STM5.3.1:	Electrostatic discharge (ESD) sensitivity testing charge device model (CDM)
JESD22-C101:	Electrostatic discharge (ESD) sensitivity testing charge device model (CDM)
JEDEC JS-002:	Electrostatic discharge (ESD) sensitivity testing charge device model (CDM)
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:	Biased Highly Accelerated temperature & humidity stress
JESD22-A101:	Temperature Humidity Bias
JESD 22B102:	Solderability test
JESD22B100/B108:	Physical dimension

5 GLOSSARY AND TESTS DESCIPTION

PC	Preconditioning (solder simulation)
HAST	Biased Highly Accelerated temperature & humidity stress Test
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 CDM	Electrostatic discharge (charge device model)
CA	Construction Analysis

6 REVISION HISTORY

Revision	Date	Author	Comment
1	30 Nov., 2018	B. Routier-Scappucci	Release for production LQFP7x7& LQFP10x10
2	15 Jan., 2019	B. Routier-Scappucci	Correction typo errors and added LQFP14x14 package
3	25 Apr., 2019	B. Routier-Scappucci	Added LQFP20x20 package
4	25 Jun., 2019	B. Routier-Scappucci	Added results on die 450 LQFP20x20
5	23 Jun., 2021	B. Routier-Scappucci	Added new PCN12854 for additional products in LQFP7x7: STM32G0/STM32G03/STM32G05/STM32L46x/STM32L4P/STM32L5 families
6	21 Feb., 2023	B. Routier-Scappucci	Added new PCN13918 for additional products in LQFP7x7: STM32L4/L5x, STM32C01/C03x and STM32G0x products

MDG-MCD-RER1810
Reliability Report

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