PRODUCT / PROCESS CHANGE NOTIFICATION

1. PCN basic data	
1.1 Company	STMicroelectronics International N.V
1.2 PCN No.	MDG/21/12405
1.3 Title of PCN	TSMC Singapore Wafer Fab (SSMC) additional source for STM32F33x 64K listed products
1.4 Product Category	STM32F33x 64K
1.5 Issue date	2021-06-07

2. PCN Team	
2.1 Contact supplier	
2.1.1 Name	ROBERTSON HEATHER
2.1.2 Phone	+1 8475853058
2.1.3 Email	heather.robertson@st.com
2.2 Change responsibility	
2.2.1 Product Manager	Ricardo Antonio DE SA EARP
2.1.2 Marketing Manager	Veronique BARLATIER
2.1.3 Quality Manager	Pascal NARCHE

3. Change		
3.1 Category	3.2 Type of change	3.3 Manufacturing Location
Transfer	Line transfer for a full process or process brick (process step, control plan, recipes) from one site to another site: Wafer fabrication	TSMC Singapore Wafer Fab SSMC

4. Description of change		
	Old	New
4.1 Description	Wafer diffusion plants : - TSMC Taiwan Wafer Fab 3	Wafer diffusion plants : - TSMC Taiwan Wafer Fab 3 - TSMC Singapore Wafer Fab (SSMC) There is no change in the product functionality.
4.2 Anticipated Impact on form,fit, function, quality, reliability or processability?	no change	

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

6. Marking of parts / traceability of change	
6.1 Description	Traceability of the change is ensured by ST internal tools. Change is visible through diffusion traceability plant, in the marking: - “93” for TSMC Taiwan Wafer Fab 3 - “9C” for TSMC Singapore Wafer Fab SSMC Please refer to PCN 12405 – Additional information attached document.

7. Timing / schedule	
7.1 Date of qualification results	2021-06-01
7.2 Intended start of delivery	2021-07-30
7.3 Qualification sample available?	Upon Request

8. Qualification / Validation	
8.1 Description	12405 MDG-MCD-RER1802 V4.0 - PCN10553 - PCN10803 - PCN10979 - PCN12405 - STM32F - TSMC SSMC 0.18 Xfer - Reliability Evaluation Report.pdf

8.2 Qualification report and qualification results	Available (see attachment)	Issue Date	2021-06-07

9. Attachments (additional documentations)
12405 Public product.pdf 12405 MDG-MCD-RER1802 V4.0 - PCN10553 - PCN10803 - PCN10979 - PCN12405 - STM32F - TSMC SSMC 0.18 Xfer - Reliability Evaluation Report.pdf 12405 PCN12405_Additional information.pdf

10. Affected parts		
10. 1 Current		10.2 New (if applicable)
10.1.1 Customer Part No	10.1.2 Supplier Part No	10.1.2 Supplier Part No
	STM32F303C6T6	
	STM32F303C8T6	
	STM32F303K6T6	
	STM32F303K8T6	
	STM32F303R6T6	
	STM32F303R8T6	
	STM32F303R8T6TR	
	STM32F303R8T7	
	STM32F328K8T6	
	STM32F334C4T6	
	STM32F334C6T6	
	STM32F334C6T6TR	
	STM32F334C6T7	
	STM32F334C8T6	
	STM32F334C8T7	
	STM32F334C8Y6TR	
	STM32F334C8Y7TR	
	STM32F334K4T6	
	STM32F334K6T6	
	STM32F334K6T7	
	STM32F334K8T6	
	STM32F334K8T6TR	
	STM32F334K8T7	
	STM32F334R6T6	
	STM32F334R8T6	
	STM32F334R8T7	

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Public Products List

Publict Products are off the shelf products. They are not dedicated to specific customers, they are available through ST Sales team, or Distributors, and visible on ST.com

PCN Title : TSMC Singapore Wafer Fab (SSMC) additional source for STM32F33x 64K listed products

PCN Reference : MDG/21/12405

Subject : Public Products List

Dear Customer,

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

STM32F334C8T6TR	STM32F334C6T7	STM32F334C6T6
STM32F303R8T7TR	STM32F334R8T6TR	STM32F334C8Y7TR
STM32F334C8T7TR	STM32F334K8T6TR	STM32F303R8T6
STM32F334K8U6TR	STM32F334K8U6	STM32F334K8T6
STM32F334C8T6	STM32F303C6T6	STM32F303R8T7
STM32F334R8T7TR	STM32F334K4T6	STM32F334C6T6TR
STM32F334R8T6	STM32F334R8T7	STM32F303K8T6
STM32F334C4T6	STM32F334R6T6	STM32F334K6T7
STM32F303K6T6	STM32F334C8Y6TR	STM32F303C8Y6TR
STM32F334C6T7TR	STM32F334K6T6	STM32F334K8T7
STM32F334C8T7	STM32F303R8T6TR	STM32F303C8T6
STM32F303R6T6	STM32F328C8T6	

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MDG-MCD-RER1802
Reliability Report

Qualification Type: Product & Package evaluation

TSMC Singapore Wafer Fab SSMC
Additional source for STM32
in TSMC180nm technology

PCN10553 - PCN10803 - PCN10979 - PCN12405

Product / Process / Package Information							
Commercial Product:	STM32F051 R8T6	STM32F303V CT6	STM32F030C 6T6	STM32F071V BT6	STM32F070C 6T6	STM32F091V CT6	STM32F334R 8T7
Mask Set Revision:	F440CCC2 (cut 2.0)	F422CCC1 (cut 1.2)	F444CCC2 (cut 1.0)	F448CCC2 (cut 2.1)	F445CCC1 (cut 1.0)	F442CCC1 (cut 1.0)	F438CCC1 (cut 1.1)
Silicon Process Technology:	TSMC 0.18µm EMBEDDED FLASH						
Wafer Fabrication Location:	TSMC SSMC (Singapore)						
Package:	LQFP64 10x10	LQFP100 14x14	LQFP48 7x7	LQFP100 14x14	LQFP48 7x7	LQFP100 14x14	LQFP64 10x10
Assembly Plant location:	STATS ChipPac JSCC (China)	AMKOR ATP1 (Philippines)	ST Muar (Malaysia)	ST Muar (Malaysia)	STATS ChipPac JSCC (China)	ST Muar (Malaysia)	STATS ChipPac JSCC (China)

Approval List rev 1			
Function	**Location**	**Name**	**Date**
Division Q&R Responsible	ST Rousset	Frederic BRAVARD	10th – September - 2018
Division Quality Manager	ST Rousset	Pascal NARCHE	10th – September - 2018

Approval List rev 2			
Function	**Location**	**Name**	**Date**
Division Q&R Responsible	ST Rousset	Frederic BRAVARD	15th – March - 2019

Approval List rev 3			
Function	**Location**	**Name**	**Date**
Division Q&R Responsible	ST Grenoble	Dominique GALIANO	07th – Februray – 2020

Approval List rev 4			
Function	**Location**	**Name**	**Date**
Back-End MCD Quality Manager	ST Rousset	Gisele SEUBE	1st – June - 2021
Division Quality Manager	ST Rousset	Pascal NARCHE	1st – June - 2021

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1 RELIABILITY RESULTS OVERVIEW

1.1 Objectives

The aim of this report is to present results of the reliability evaluation performed for the following products diffused in TSMC SSMC (0.18µm EMBEDDED FLASH) and evaluated in the listed packages:

Test vehicles are described here below:

Product	Die	Package	Assembly plant
STM32F030/050/051/058	440CCC2	LQFP64 10x10x1.4	STATS ChipPac JSCC (China)
		LQFP48 7x7x1.4	ASEKH (Taiwan)
		UQFN48 7x7x0.55	STATS ChipPac JSCC (China)
		UFBGA64 5x5x0.6	AMKOR ATP3 (Philippines)
STM32F301/302/303/358	422CCC1	LQFP100 14x14x1.4	AMKOR ATP1 (Philippines)
		LQFP100 14x14x1.4	ST Muar (Malaysia)
		WLCSP100	STATS ChipPac Singapore (Singapore)
STM32F03/031/038	444CCC2	UFQFPN28 4x4 COL	STATS ChipPac JSCC (China)
		TSSOP20 BODY 4.4	ST Shenzhen (China)
		LQFP48 7x7x1.4	ST Muar (Malaysia)
STM32F071/072/078	448CCC2	LQFP100 14x14x1.4	ST Muar (Malaysia)
STM32F042/048/070 STM32P042/048	445CCC1	LQFP48 7x7x1.4	STATS ChipPac JSCC (China)
STM32F030/091/098	442CCC1	LQFP100 14x14x1.4	ST Muar (Malaysia)
STM32F334R8T7	438CCC1	LQFP64 10x10x1.4	STATS ChipPac JSCC (China)

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 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 all Finished Goods diffused in TSMC SSMC 8'' (0.18µm EMBEDDED FLASH) – for the die F422CCC1, F440CCC2, F444CCC2, F448CCC2, F445CCC1, F442CC1 & F438CCC1 and assembled in the following packages:

LQFP48 7x7 ASEKH, LQFP48 7x7 ST Muar, LQFP64 10x10 JSCC, UQFN48 7x7 JSCC, UFBGA64 5x5 ATP3, LQFP100 14x14 ATP1, LQFP100 14x14 ST Muar, WLCSP STATS ChipPac Singapore, UFQFPN28 4x4 COL JSCC, TSSOP20 ST Shenzhen & LQFP48 7x7 JSCC.

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 STM32 devices, ST Microcontrollers Division decided to qualify an additional front-end site to maintain state of the art service level to our customers thanks to extra capacity.

This reliability evaluation concerns the qualification of an additional plant TSMC SSMC for STM32F product families linked to the dice F440CCC2, F422CCC1, F444CCC2, F448CCC2, F445CCC1, F442CCC1 & F438CCC1.

The process 0.18µm Logic based embedded flash, is duplicated from TSMC Fab 11 to TSMC SSMC Taiwan wafer fab (Refer to PCN10553 & PCN10803).
All following dice have been already qualified in TSMC Fab11 and/or Fab8 and/or Fab3.

DIE / FAB	440	422	444	448	445	442	438
TSMC Fab11	RERMCD1033	RERMCD1101	RERMCD1203	RERMCD1208	-		
TSMC Fab8	RERMCD1508	-	RERMCD1507	RERMCD1404	-		
TSMC Fab3	-	-	-	-	RERMCD1305	RERMCD1317	RERMCD1207

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PCN10553 Changes for die 440 and 422 are described here below :

Products	Current sources		Added source
	TSMC USA Wafer Fab11	TSMC Taiwan Wafer Fab8	TSMC Singapore Wafer Fab SSMC
STM32F030x8 STM32F051 STM32F058	X	X	X
STM32F301xB/C STM32F302xB/C STM32F303xB/C STM32F358xC	X		X

PCN10803 Change for dies 444, 448 and 445 are described here below:

Products	Current sources			Added source
	TSMC USA Wafer Fab11	TSMC Taiwan Wafer Fab8	TSMC Taiwan Wafer Fab3	TSMC Singapore Wafer Fab SSMC
STM32F031x4/6 STM32F030X4/6/I STM32F038 STM32F050 STM32F070 STM32F071x8/B STM32F072x8/B STM32FECG STM32P072	X	X		X
STM32F042 STM32F048 STM32F070 STM32P042 STM32P048			X	X

PCN10979 Change for die 442 is described here below :

Products	Current source	Added source
	TSMC Taiwan Wafer Fab3	TSMC Singapore Wafer Fab SSMC
STM32F030 STM32F091 STM32F098	X	X

PCN12405 Changes for die 438 are described here below:

Products	Current sources	Added source
	TSMC Taiwan Wafer Fab3	TSMC Singapore Wafer Fab SSMC
STM32F30x STM32F32x STM32F33x	X	X

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The transfer to SSMC has been assessed through reliability results of tests vehicles STM32F05x, STM32F303x, STM32F03, STM32F071x, STM32F070 and STM32F091 (Dice F440CCC2, F422CCC1, F444CCC2, F448CCC2, F445CCC1, F442CCC1 & F438CCC1) in packages listed and recorded in document RERMCD1802.

Package	Die	Reference	Assy Plant location	Final Test Plant location
LQFP100 14x14x1.4	F422	RERMCD1101 RERMCD1312	AMKOR ATP1 (Philippines)	AMKOR ATP3 (Philippines)
		RERMCD1101 RERMCD1604	ST MUAR (Malaysia)	ST MUAR (Malaysia)
WLCSP100	F422	RERMCD1101 QA09-017	STATS ChipPAC Singapore (Singapore)	STATS ChipPAC Singapore (Singapore)
LQFP64 10x10x1.4	F440 F438	RERMCD1033 RERMCD1508 RERMCD1621 RERMCD1207	STATS ChipPac Jiangyin JSCC (China)	STATS ChipPac Jiangyin JSCC (China)
LQFP48 7x7x1.4	F440	RERMCD1033 RERMCD1508 RERMCD1717	ASE Kaohsiung (Taiwan)	ASE Kaohsiung (Taiwan)
UQFN48 7x7x0.55	F440	RERMCD1033 RERMCD1508 RERMCD1622	STATS ChipPac Jiangyin JSCC (China)	STATS ChipPac Jiangyin JSCC (China)
UFBGA64 5x5x0.6	F440	RERMCD1402 RERMCD1508	AMKOR ATP3 (Philippines)	AMKOR ATP3 (Philippines)
UQFN28 4x4 COL	F444	RERMCD1203 RERMCD1507 RERMCD1623	STATS ChipPac JSCC (China)	STATS ChipPac JSCC (China)
TSSOP20	F444	RERMCD1203 RERMCD1507 RERMCD1512	ST Shenzhen (China)	ST Shenzhen (China)
LQFP48 7x7x1.4	F444	RERMCD1203 RERMCD1507 RERMCD1514	ST Muar (Malaysia)	ST Muar (Malaysia)
LQFP100 14x14x1.4	F448	RERMCD1208 RERMCD1404 RERMCD1604	ST MUAR (Malaysia)	ST MUAR (Malaysia)
LQFP48 7x7x1.4	F445	RERMCD1305	STATS ChipPac JSCC (China)	STATS ChipPac JSCC (China)
LQFP100 14x14x1.4	F442	RERMCD1317	ST MUAR (Malaysia)	ST MUAR (Malaysia)

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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:
  - 2 diffusion lots for die 422CCC1 (Cut1.2)
  - 1 diffusion lot for die 440CCC2 (Cut2.0)
  - 1 diffusion lot for die 444CCC2 (Cut1.0)
  - 1 diffusion lot for die 448CCC2 (Cut2.1)
  - 1 diffusion lot for die 445CCC1 (Cut1.0)
  - 1 diffusion lot for die 442CCC1 (Cut1.0)
  - 1 diffusion lot for die 438CCC1 (Cut1.1)

- Package Qualification:

Package	Body	Pitch	Package Code	Wire	Assy	Trial
LQFP100	14x14	0.5	1L	Gold	ATP1	2 reliability lots linked to die 422 (Die test vehicle)
LQFP100	14x14	0.5	1L	Silver	ST MUAR	1 reliability lot + 1 reliability lot linked to die 448 (Die test vehicle)
LQFP48	7x7	0.5	5B	Silver	ST MUAR	1 reliability lot linked to die 444 (Die test vehicle)
LQFP64	10x10	0.5	5W	Silver	JSCC	1 reliability lot linked to die 440 (Die test vehicle) 1 reliability lot linked to die 438 (Die test vehicle)
LQFP48	7x7	0.5	5B	Gold	ASEKH	1 reliability lot
UQFN48	7x7	0.5	MI	Silver	JSCC	1 reliability lot
UQFN28 COL	4x4	0.5	MB	Gold	JSCC	1 reliability lot
UFBGA64	5x5	0.5	2I	Gold	ATP3	1 reliability lot
WLCSP100	-	0.4	1M	-	SCS	1 reliability lot
TSSOP20		0.65	YA	Silver	STS	1 reliability lot

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2.2 Reliability Test vehicles description

STM32 Die Test Vehicles

Die Vehicle	Process Perimeter	Assembly Line	Package	Number of Reliability Lots
422	TSMC 0.18µm	ATP1	LQFP100	3 lots to qualify Process Perimeter Then 1 lot by Die
440		JSCC	LQFP64	
438				
444		MUAR	LQFP48	
445		JSCC	LQFP48	
448		ST MUAR	LQFP100	
442		ST MUAR	LQFP100	

STM32 Package Test Vehicles

Package Line	Assembly line	Package	Wire	Die Vehicule/partial rawline	Number of reliability Lots
LQFP	ATP1	LQFP14*14 100L	Au	422 / 1L*422	3 lots to qualify Process Perimeter Then 1 lot by Package Assembly Line
	ST MUAR	LQFP14*14 100L	Ag	422 / 1L*422	
	ST MUAR	LQFP14*14 100L	Ag	448 / 1L*448	
	JSCC	LQFP10*10 64L	Ag	440 / 5W*440 438 / 5W*438	
	JSCC	LQFP7*7 48L	Ag	445 / 5B*445	
	ASEKH	LQFP7*7 48L	Au	440 / 5B*440	
	MUAR	LQFP7*7 48L	Ag	444 / 5B*444	
QFN	JSCC	UQFN7*7 48L	Ag	440 / MI*440	
	JSCC	UQFN4*4 28L COL	Au	444 / MB*444	
TSSOP	STS	TSSOP20 Body 4.4	Ag	444 / YA*444	
UFBGA	ATP3	UFBGA64 5x5	Au	440 / 2I*440	
WLCSP	SCS	WLCSP 100b	Na	422 / 1M*422	

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2.3 Reliability Information

Lot ID	Lot 1 Die + package	Lot 2 Die + package	Lot 3 Die + package	Lot 10 Die + package	Lot 11 Die + package
Finish Good:	IS32F051R8T6 $S6	ES32F303VCT6 $P4	ES32F303VCT6 $P4	IS32F030C6T6 $M3	IS32F071VBT6 $96
Die Name /cut:	F440CCC2 Cut 2.0	F422CCC1 Cut 1.2	F422CCC1 Cut 1.2	F444CCC2 Cut 1.0	F448CCC2 Cut 2.1
Diffusion Lot Number:	S9B396.1	S9B397.1	S9B398.1	S9B617.1	S9B817.1
Trace Code :	GQ8062E8	7B810975	7B810663	9982921A	998360RN
Reliability Lab location :	ST Rousset	ST Rousset	ST Rousset	ST Rousset	ST Rousset
Fab name location:	SSMC Singapore	SSMC Singapore	SSMC Singapore	SSMC Singapore	SSMC Singapore
Assembly plant location:	STATS ChipPac JSCC (China)	AMKOR ATP1 (Philippines)	AMKOR ATP1 (Philippines)	ST Muar (Malaysia)	ST Muar (Malaysia)
Package description:	LQFP64 10x10x1.4 REG ON	LQFP100 14x14x1.4 REG ON	LQFP100 14x14x1.4 REG ON	LQFP48 7x7x1.4 REG ON	LQFP100 14x14x1.4 REG ON

Lot ID	Lot 16 Die + package	Lot 17 Die + package	Lot 21 Die + package
Finish Good:	IS32F070C6T6 $S2	IS32F091VCT6 $92	IS32F334R8T7$ S3
Die Name /cut:	F445CCC1 Cut 1.0	F442CCC1 Cut 1.0	F438CCC1 Cut 1.1
Diffusion Lot Number:	S9C033.1	S9C320.1	S6B3891 #10 and #11
Trace Code :	GQ846239	999240Y2	GQ029225
Reliability Lab location :	ST Rousset	ST Rousset	ST Rousset
Fab name location:	SSMC Singapore	SSMC Singapore	SSMC Singapore
Assembly plant location:	STATS ChipPac JSCC (China)	ST Muar (Malaysia)	STATS ChipPac JSCC (China)
Package description:	LQFP48 7x7x1.4 REG ON	LQFP100 14x14x1.4 REG ON	LQFP64 10x10x1.4 REG ON

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Lot ID	Lot 4 Die	Lot 12 Die	Lot 13 Die	Lot 18 Die	Lot 19 Die	Lot 20 Die	Lot 22 Die
Finish Good:	IS32F058R8T6 $S6	IS32F038C6T6 $M3	ES32F078VBT6$P6	IS32F098VCT6 $92	ES32F303VCT6$S2	IS32F048C6U6$S2	IS32F334R8T6$S3
Die Name /cut:	F440CCC2 Cut 2.0	F444CCC2 Cut 1.0	F448CCC2 Cut 2.1	F442CCC1 Cut 1.0	F422CCC1 Cut 1.2	F445CCC1 Cut 1.0	F438CCC1 Cut 1.1
Diffusion Lot Number:	S9B396.1	S9B617.1	S9B817.1	S9C320.1	S9B397.1	S9C033.1	S6B3891 #11
Trace Code:	GQ81529H	9983415T	7B839733	999310W2	7B826349	GQ846238	GQ02926K
Reliability Lab location :	ST Rousset	ST Rousset	ST Rousset	ST Rousset	ST Rousset	ST Rousset	ST Rousset
Fab name location:	SSMC Singapore	SSMC Singapore	SSMC Singapore	SSMC Singapore	SSMC Singapore	SSMC Singapore	SSMC Singapore
Assembly plant location:	STATS ChipPac JSCC (China)	ST Muar (Malaysia)	AMKOR ATP1 (Philippines))	ST Muar (Malaysia)	AMKOR ATP1 (Philippines)	STATS ChipPac JSCC (China)	STATS ChipPac JSCC (China)
Package description:	LQFP64 10x10x1.4 REG OFF	LQFP48 7x7x1.4 REG OFF	LQFP100 14x14x1.4 REG OFF	LQFP100 14x14x1.4 REG OFF	LQFP100 14x14x1.4 REG OFF	UQFN48 7x7x0.55 REG OFF	LQFP64 10x10x1.4 REG OFF

	Lot 5 Package	Lot 6 Package	Lot 7 Package	Lot 8 Package	Lot 9 Package
Finish Good:	IS32F051C8U6 $S6	ES32F051R8H6 $P6	IS32F303VCT6 $94	ES32F051C8T6$E6	ES32F303VCY6$H4
Die Name /cut:	F440CCC2 Cut 2.0	F440CCC2 Cut 2.0	F422CCC1 Cut 1.2	F440CCC2 Cut 2.0	F422CCC1 Cut 1.2
Diffusion Lot Number:	S9B396.1	S9B396.1	S9B397.1	S9B544.1	S9B397.1
Trace Code :	GQ81327A	7B815A3F	998290XX	AA823075	8N813GB6
Reliability Lab location :	ST Rousset	ST Rousset	ST Rousset	ST Rousset	ST Rousset
Fab name location:	SSMC Singapore	SSMC Singapore	SSMC Singapore	SSMC Singapore	SSMC Singapore
Assembly plant location:	STATS ChipPac JSCC (China)	AMKOR ATP3 (Philippines)	ST Muar (Malaysia)	ASEKH (Taiwan)	SCS (Singapore)
Package description:	UQFN48 7x7x0.55	UFBGA64 5x5x0.6	LQFP100 14x14x1.4	LQFP48 7x7x1.4	WLCSP100

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	Lot 14 Package	Lot 15 Package
Finish Good:	ES32F031G6U6 $73	IS32F030F4P6 $C3
Die Name /cut:	F444CCC2 Cut 1.0	F444CCC2 Cut 2.1
Diffusion Lot Number:	S9B617.1	S9B617.1
Trace Code :	GQ822288	GK82407P
Reliability Lab location :	ST Rousset	ST Rousset
Fab name location:	SSMC Singapore	SSMC Singapore
Assembly plant location:	STATS ChipPac JSCC (China)	ST Shenzhen (China)
Package description:	UQFN28 COL 4x4	TSSOP20 BODY 4.4

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.

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2.4 Reliability Evaluation: Results summary

Die oriented test results:

Die Related Tests Product drivers						Results		
Description	Test/Method	Conditions	Sample Size	Criteria	Readout / Duration	***Lot 1***	***Lot 2***	***Lot 3***
						440 Cut2.0 REG ON	422 Cut1.2 REG ON	422 Cut1.2 REG ON
Electrostatic discharge - Human Body Model								
ESD HBM	ANSI/ESDA/ JEDEC JS-001 JESD22-A114	1500 Ω, 100 pF	3x3	2kV class 2	2KV	0/3	0/3	0/3
Latch Up								
LU	JESD78	125°C, 100mA	3x6	A0/R1	125°C	0/6	0/6	0/6
NVM Endurance & Data Retention – 10kcy EW @ 125°C then Storage								
EDR	JESD22-A117	HTB 150°C	3x77	A0/R1 10kcyc + 1500h	10Kcy	0/77	0/77	0/77
					1500h	0/77	0/77	0/77
NVM Endurance & Data Retention – 10kcy EW @ 25°C then Storage								
EDR	JESD22-A117	HTB 150°C	3x77	A0/R1 10kcyc + 168h	10Kcy	0/77	0/77	0/77
					168h	0/77	0/77	0/77
NVM Endurance & Data Retention – 10kcy EW @ -40°C then Storage								
EDR	JESD22-A117	HTB 150°C	3x77	A0/R1 10kcyc + 168h	10Kcy	0/77	0/77	0/77
					168h	0/77	0/77	0/77
Early Failure Rate								
ELFR	JESD22-A108 JESD74	HTOL 125°C, 3V6	3x800	A0/R1	48h	0/800	0/800	0/800
High Temperature Operating Live								
HTOL	JESD22-A108	HTOL 125°C, 3V6	3x77	A0/R1	1200h	0/77	0/77	0/77

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Die Related Tests Product drivers						Results				
Description	Test/Method	Conditions	Sample Size	Criteria	Readout / Duration	***Lot10***	***Lot11***	***Lot16***	***Lot17***	***Lot21***
						444 Cut1.0 REG ON	448 Cut2.1 REG ON	445 Cut1.0 REG ON	442 Cut1.0 REG ON	438 Cut1.1 REG ON
Electrostatic discharge - Human Body Model										
ESD HBM	ANSI/ESDA/ JEDEC JS-001 JESD22-A114	1500 Ω, 100 pF	5x3	2kV class 2	2KV	0/3	0/3	0/3	0/3	0/3
Latch Up										
LU	JESD78	125°C, 100mA	4x6 1x3	A0/R1	125°C	0/6	0/6	0/6	0/6	0/3
NVM Endurance & Data Retention – 10kcy EW @ 125°C then Storage										
EDR	JESD22-A117	HTB 150°C	5x77	A0/R1 10kcyc + 1500h	10Kcy	0/77	0/77	0/77	0/77	0/77
					1500h	0/77	0/77	0/77	0/77	0/77
NVM Endurance & Data Retention – 10kcy EW @ 25°C then Storage										
EDR	JESD22-A117	HTB 150°C	5x77	A0/R1 10kcyc + 168h	10Kcy	0/77	0/77	0/77	0/77	0/77
					168h	0/77	0/77	0/77	0/77	0/77
NVM Endurance & Data Retention – 10kcy EW @ -40°C then Storage										
EDR	JESD22-A117	HTB 150°C	5x77	A0/R1 10kcyc + 168h	10Kcy	0/77	0/77	0/77	0/77	0/77
					168h	0/77	0/77	0/77	0/77	0/77
Early Failure Rate										
ELFR	JESD22-A108 JESD74	HTOL 125°C, 3V6	5x500	A0/R1	48h	0/500	0/500	0/500	0/500	0/500
High Temperature Operating Live										
HTOL	JESD22-A108	HTOL 125°C, 3V6	5x77	A0/R1	1200h	0/77	0/77	0/77	0/77	0/77

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Die Related Tests other products						Results			
Description	Test/Method	Conditions	Sample Size	Criteria	Readout / Duration	***Lot 4***	***Lot 12***	***Lot 13***	***Lot 18***
						440 Cut2.0 REG OFF	444 Cut1.0 REG OFF	448 Cut2.1 REG OFF	442 Cut1.0 REG OFF
Electrostatic discharge - Human Body Model									
ESD HBM	ANSI/ESDA/ JEDEC JS-001 JESD22-A114	1500 Ω, 100 pF	4x3	2kV class 2	2KV	0/3	0/3	0/3	0/3
Latch Up									
LU	JESD78	125°C, 100mA	3x6 1x3	A0/R1	125°C	0/6	0/6	0/6	0/3

Die Related Tests other products						Results		
Description	Test/Method	Conditions	Sample Size	Criteria	Readout / Duration	***Lot 19***	***Lot 20***	***Lot 22***
						422 Cut1.2 REG OFF	445 Cut1.0 REG OFF	438 Cut1.1 REG OFF
Electrostatic discharge - Human Body Model								
ESD HBM	ANSI/ESDA/ JEDEC JS-001 JESD22-A114	1500 Ω, 100 pF	3x3	2kV class 2	2KV	0/3	0/3	0/3
Latch Up								
LU	JESD78	125°C, 100mA	2x6 1x3	A0/R1	125°C	0/6	0/6	0/3

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Package oriented test results: ***ATP1***

Package Related Tests Products driver						Results			
Description	Test/Method	Conditions	Sample Size	Criteria	Readout / Duration	***Lot 2*** ***LQFP100***	***Lot 3*** ***LQFP100***	***Lot 13*** ***LQFP100***	***Lot 19*** ***LQFP100***
						422 Cut1.2 REGON	422 Cut1.2 REGON	448 Cut 2.1 REG OFF	422 Cut 1.2 REG OFF
Electrostatic discharge – Charge Device Model									
ESD CDM	ANSI/ESDA / JEDEC JS-002	N.A	4x3	500V Class 3	500V	0/3	0/3	0/3	0/3
Preconditioning: Moisture Sensitivity Level : MSL3									
PC	J-STD-020 JESD22-A113	24h bake @ 125°C 192h @ 30°C / 60% RH Reflow simulation (3 times) @ 260°C peak temperature	2x308	A0/R1	N.A	0/308	0/308		
High Temperature Storage Life after Preconditioning									
HTSL	JESD 22-A103	150°C	2x77	A0/R1 1000h	1000h	0/77	0/77		
Thermal Cycling after Preconditioning									
TC	JESD 22-A104	-65c/+150°c	2x77	A0/R1 500cy	500cy	0/77	0/77		
Unbiased HAST after Preconditioning									
UHAST	JESD 22-A118	130°C ,85% 2Atm RH	2x77	A0/R1 96h	96h	0/77	0/77		
Temperature Humidity Bias after Preconditioning									
THB	JESD 22-A110	85°C/85%RH Bias VDD=3v6	2x77	A0/R1 1000h	1000h	0/77	0/77		
Construction Analysis									
CA	Construction Analysis including - Solderability - Physical Dimension	JESD 22B102 JESDB100/ B108	50	No concern related to diffusion change		No concern			

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Package oriented test results: ***ATP3***

Description	Test/Method	Conditions	Sample Size	Criteria	Readout / Duration	***Lot 6*** **UFBGA64**
						440 Cut2.0
Electrostatic discharge – Charge Device Model						
ESD CDM	ANSI/ESD STM5.3.1	N.A	1x3	500V Class 3	500V	0/3
Preconditioning: Moisture Sensitivity Level : MSL3						
PC	J-STD-020 JESD22-A113	24h bake @ 125°C 192h @ 30°C / 60% RH Reflow simulation (3 times) @ 260°C peak temperature	1x231	A0/R1		0/231
High Temperature Storage Life after Preconditioning						
HTSL	JESD 22-A103	150°C	1x77	A0/R1 1000h	1000h	0/77
Thermal Cycling after Preconditioning						
TC	JESD 22-A104	-65c/+150°c	1x77	A0/R1 500cy	500cy	0/77
Biased Highly Accelerated temperature & humidity stress Test after Preconditioning						
HAST	JESD 22-A110	110°C, 85%RH 1.2atm Bias VDD=3v6	1x77	A0/R1 264h	264h	0/77
Construction Analysis						
CA	Construction Analysis	Internal ST specifications	50	No concern related to diffusion change		No concern

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Package oriented test results: ***LQFP ST Muar***

Description	Test/Method	Conditions	Sample Size	Criteria	Readout / Duration	***Lot 10 LQFP48***	***Lot 12 LQFP48***	***Lot 11 LQFP100***	***Lot 7 LQFP100***
						444 Cut 1.0 REGON	444 Cut 1.0 REG OFF	448 Cut 2.1 REGON	422 Cut1.2
Electrostatic discharge – Charge Device Model									
ESD CDM	ANSI/ESDA/ JEDEC JS-002	N.A	2x3	500V Class 3	500V			0/3	0/3
	ANSI/ESD STM5.3.1	N.A	2x3	250V Class 3	250V	0/3	0/3		
Preconditioning: Moisture Sensitivity Level : MSL3									
PC	J-STD-020 JESD22-A113	24h bake @ 125°C 192h @ 30°C / 60% RH Reflow simulation (3 times) @ 260°C peak temperature	3x308	A0/R1	N.A	0/308		0/308	0/308
High Temperature Storage Life after Preconditioning									
HTSL	JESD 22-A103	150°C	3x77	A0/R1 1000h	1000h	0/77		0/77	0/77
Thermal Cycling after Preconditioning									
TC	JESD 22-A104	-65c/+150°c	3x77	A0/R1 500cy	500cy	0/77		0/77	0/77
Unbiased HAST after Preconditioning									
UHAST	JESD 22-A118	130°C ,85% 2Atm RH	3x77	A0/R1 96h	96h	0/77		0/77	0/77
Temperature Humidity Bias after Preconditioning									
THB	JESD 22-A110	85°C/85%RH Bias VDD=3v6	3x77	A0/R1 1000h	1000h	0/77		0/77	0/77
Construction Analysis									
CA	Construction Analysis	Internal ST specifications	2x50	No concern related to diffusion change	N.A.	No concern		No concern	

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Package oriented test results: ***JSCC***

Package Related Tests Products driver						*Results*	
Description	Test/Method	Conditions	Sample Size	Criteria	Readout / Duration	***Lot 17*** ***LQFP100***	***Lot 18*** ***LQFP100***
						442 Cut1.0 REG ON	442 Cut1.0 REG OFF
Electrostatic discharge – Charge Device Model							
ESD CDM	ANSI/ESD STM5.3.1	N.A	2x3	250V Class 3	250V	0/3	0/3
Preconditioning: Moisture Sensitivity Level : MSL3							
PC	J-STD-020 JESD22-A113	24h bake @ 125°C 192h @ 30°C / 60% RH Reflow simulation (3 times) @ 260°C peak temperature	1x308	A0/R1	N.A	0/308	
High Temperature Storage Life after Preconditioning							
HTSL	JESD 22-A103	150°C	1x77	A0/R1 1000h	1000h	0/77	
Thermal Cycling after Preconditioning							
TC	JESD 22-A104	-65c/+150°c	1x77	A0/R1 500cy	500cy	0/77	
Unbiased HAST after Preconditioning							
UHAST	JESD 22-A118	130°C ,85% 2Atm RH	1x77	A0/R1 96h	96h	0/77	
Temperature Humidity Bias after Preconditioning							
THB	JESD 22-A110	85°C/85%RH Bias VDD=3v6	1x77	A0/R1 1000h	1000h	0/77	
Construction Analysis							
CA	Construction Analysis	Internal ST specifications	1x50	No concern related to diffusion change	N.A.	No concern	

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Package oriented test results: ***JSCC***

Package Related Tests Products driver						Results			
Description	Test/Method	Conditions	Sample Size	Criteria	Readout / Duration	***Lot 1*** ***LQFP64***	***Lot 4*** ***LQFP64***	***Lot 5*** ***UQFN48***	***Lot 14*** ***UQFN28***
						440 Cut2.0 REG ON	440 Cut2.0 REG OFF	440 Cut 2.0	444 Cut 1.0
Electrostatic discharge – Charge Device Model									
ESD CDM	ANSI/ESD STM5.3.1	N.A	4x3	250V Class 3	250V	0/3	0/3	0/3	0/3
Preconditioning: Moisture Sensitivity Level : MSL3									
PC	J-STD-020 JESD22-A113	24h bake @ 125°C 192h @ 30°C / 60% RH Reflow simulation (3 times) @ 260°C peak temperature	3x308	A0/R1	N.A	0/308		0/308	0/308
High Temperature Storage Life after Preconditioning									
HTSL	JESD 22-A103	150°C	3x77	A0/R1 1000h	1000h	0/77		0/77	0/77
Thermal Cycling after Preconditioning									
TC	JESD 22-A104	-65c/+150°c	3x77	A0/R1 500cy	500cy	0/77		0/77	0/77
Unbiased HAST after Preconditioning									
UHAST	JESD 22-A118	130°C ,85% 2Atm RH	3x77	A0/R1 96h	96h	0/77		0/77	0/77
Temperature Humidity Bias after Preconditioning									
THB	JESD 22-A110	85°C/85%RH Bias VDD=3v6	2x77	A0/R1 1000h	1000h	0/77		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	Internal ST specifications	3x50	No concern related to diffusion change	N.A.	No concern		No concern	No concern

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Package Related Tests Products driver						Results		
Description	Test/Method	Conditions	Sample Size	Criteria	Readout / Duration	***Lot 16*** ***LQFP48***	***Lot 20*** ***UQFN48***	***Lot 21*** ***LQFP64***
						445 Cut1.0 REG ON	445 Cut1.0 REG OFF	438 Cut1.1
Electrostatic discharge – Charge Device Model								
ESD CDM	ANSI/ESD STM5.3.1	N.A	3x3	500V class2	500V class2	0/3	0/3	0/3
Preconditioning: Moisture Sensitivity Level : MSL3								
PC	J-STD-020 JESD22-A113	24h bake @ 125°C 192h @ 30°C / 60% RH Reflow simulation (3 times) @ 260°C peak temperature	2x308	A0/R1	N.A	0/308		0/308
High Temperature Storage Life after Preconditioning								
HTSL	JESD 22-A103	150°C	2x77	A0/R1 1000h	1000h	0/77		0/77
Thermal Cycling after Preconditioning								
TC	JESD 22-A104	-65c/+150°c	2x77	A0/R1 500cy	500cy	0/77		0/77
Unbiased HAST after Preconditioning								
UHAST	JESD 22-A118	130°C ,85% 2Atm RH	2x77	A0/R1 96h	96h	0/77		0/77
Temperature Humidity Bias after Preconditioning								
THB	JESD 22-A110	85°C/85%RH Bias VDD=3v6	1x77	A0/R1 1000h	1000h			0/77
Temperature Humidity Bias after Preconditioning								
HAST	JESD 22-A110	110°C, 85%RH 1.2atm Bias VDD=3v6	1x77	A0/R1 264h	264h	0/77		
Construction Analysis								
CA	Construction Analysis	Internal ST specifications	2x50	No concern related to diffusion change	N.A.	No concern		No concern

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Package oriented test results: ***ASEKH***

Description	Test/Method	Conditions	Sample Size	Criteria	Readout / Duration	***Lot 8*** ***LQFP48***
						440 Cut2.0
Electrostatic discharge – Charge Device Model						
ESD CDM	ANSI/ESD STM5.3.1	N.A	1x3	500V Class 3	500V	0/3
Preconditioning: Moisture Sensitivity Level : MSL3						
PC	J-STD-020 JESD22-A113	24h bake @ 125°C 192h @ 30°C / 60% RH Reflow simulation (3 times) @ 260°C peak temperature	1x308	A0/R1	N.A	0/308
High Temperature Storage Life after Preconditioning						
HTSL	JESD 22-A103	150°C	1x77	A0/R1 1000h	1000h	0/77
Thermal Cycling after Preconditioning						
TC	JESD 22-A104	-65c/+150°c	1x77	A0/R1 500cy	500cy	0/77
Unbiased HAST after Preconditioning						
UHAST	JESD 22-A118	130°C ,85% 2Atm RH	1x77	A0/R1 96h	96h	0/77
Temperature Humidity Bias after Preconditioning						
THB	JESD 22-A110	85°C/85%RH Bias VDD=3v6	1x77	A0/R1 1000h	1000h	0/77
Construction Analysis						
CA	Construction Analysis	Internal ST specifications	50	No concern related to diffusion change	N.A.	No concern

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Package oriented test results: ***ST SHENZHEN***

Description	Test/Method	Conditions	Sample Size	Criteria	Readout / Duration	***Lot 15*** **TSSOP20**
						444 Cut1.0
Electrostatic discharge – Charge Device Model						
ESD CDM	ANSI/ESD STM5.3.1	N.A	1x3	250V Class 3	250V	0/3
Preconditioning: Moisture Sensitivity Level : MSL1						
PC	J-STD-020 JESD22-A113	24h bake @ 125°C 168h @ 85°C / 85% RH Reflow simulation (3 times) @ 260°C peak temperature	1x308	A0/R1	N.A	0/308
High Temperature Storage Life after Preconditioning						
HTSL	JESD 22-A103	150°C	1x77	A0/R1 1000h	1000h	0/77
Thermal Cycling after Preconditioning						
TC	JESD 22-A104	-65c/+150°c	1x77	A0/R1 500cy	500cy	0/77
Temperature Humidity Bias after Preconditioning						
THB	JESD 22-A101	85°C/85%RH Bias VDD=3v6	1x77	A0/R1 1000h	1000h	0/77
Construction Analysis						
CA	Construction Analysis	Internal ST specifications	50	No concern related to diffusion change	N.A	No concern

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Package oriented test results: ***WLCSP100 SCS***

Description	Test/Method	Conditions	Sample Size	Criteria	Readout / Duration	***Lot 9*** **WLCSP100**
						422 Cut1.2
Electrostatic discharge – Charge Device Model						
ESD CDM	ANSI/ESDA/ JEDEC JS-002	N.A	1x3	500V Class 3	500V	0/3
Preconditioning: Moisture Sensitivity Level : MSL1						
PC	J-STD-020 JESD22-A113	24h bake @ 125°C 168h @ 85°C / 85% RH Reflow simulation (3 times) @ 260°C peak temperature	1x308	A0/R1	N.A	0/308
High Temperature Storage Life after Preconditioning						
HTSL	JESD 22-A103	150°C	1x77	A0/R1 1000h	1000h	0/77
Thermal Cycling after Preconditioning						
TC	JESD 22-A104	-65c/+150°c	1x77	A0/R1 500cy	500cy	0/77
Unbiased HAST after Preconditioning						
UHAST	JESD 22-A118	130°C ,85% 2Atm RH	1x77	A0/R1 96h	96h	0/77
Temperature Humidity Bias after Preconditioning						
THB	JESD 22-A110	85°C/85%RH Bias VDD=3v6	1x77	A0/R1 1000h	1000h	0/77
Construction Analysis						
CA	Construction Analysis	Internal ST specifications	50	No concern related to diffusion change	N.A	No concern

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3 RELIABILITY TEST VEHICLES CHARACTERISTICS

3.1 Front-End information

Front-End	Diffusion FAB
Die	440, 422, 442, 444, 445, 448, 438
Wafer Fab Name	TSMC SSMC
Wafer Fab Location/ Address	70 Pasir Ris Drive 1 Singapore 51952
Process Technology Name	0.18 Generic Embedded Flash ULL option TSMC
Wafer Diameter	8 inch
Wafer Thickness	750 +/-25µm
Die Size	**440 :** X: 2738 um Y: 2752 um / 7.53 mm2 **422 :** X: 4236 um Y: 4698 um / 19.90 mm2 **442 :** X: 3382 um Y: 3620 um / 12.24 mm2 **444 :** X: 2458 um Y: 2360 um / 5.80 mm2 **445 :** X: 2640 um Y: 2738 um / 7.22 mm2 **448 :** X: 3312 um Y: 3144 um / 10.41 mm2 **438 :** X: 3914 um Y: 3760 um / 14.72 mm2
Technology Mask Number	34
Scribe Line size x/y:	80 x 80µm
Pad Die Size /Pad type:	65 x 70µm
Layer Under Metallization Material Thickness	1.18µm Oxide/0.2µm Nitride
Metal Layers Number Materials Thickness	Metal 1 Tin/AlCu/Tin 0.450 UM Metal 2 Tin/AlCu/Tin 0.450 UM Metal 3 Tin/AlCu/Tin 0.450 UM Metal 4 Tin/AlCu/Tin 0.450 UM Metal 5 Tin/AlCu/Tin 0.875 UM
Passivation Layers Number Materials Thickness	HDPox 10kA+SRO 1.5kA+PESIN 6kA
Back Metal Finishing Thickness	NA
Die overcoat: Material Thickness	NA
Other Device using same process	STM32F05x / STM32F30x family
FIT Level (Ea=0.7eV, C.L: 60%, 55°C)	FIT = 3.0 at qualification date

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Soft Error Rate Alpha SER [FIT/Mb] Neutron SER [FIT/Mb] Conditions	Alpha SER: 385 FIT/Mb Neutron SER: 939 FIT/Mb Condition: Alpha SER 0.001α/cm²/h Neutron = 125°C 14n/cm²/h
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)	 Yes Yes Yes Yes

3.2 Back-End information

Back-End	Package 1 LQFP48 7x7	Package 2 LQFP64 10x10	Package 3 UQFN48 7x7	Package 4 UQFN28 4x4 COL
Assembly Plant Location/ Address:	JSCC Plant Z8ZA STATS ChippPac Semi-conductor Jiangyin Co., Ltd. No. 78 Changshan Rd, Jiangyin Jiangsu 214437 China			
Die Thickness after Back grinding:	375µm +/- 25µm	375µm +/- 25µm	150µm +/- 25 um	150µm +/- 25 um
Die sawing method:	Step cut	Step cut	Step cut	Step cut
Die attach material: Type: Supplier:	Ablestik 3230	Ablestik 3230	Ablebond 8290	Ablestik 8006NS
Lead frame material: L/F Finishing Type: Die paddle size:	LQFP48L 210sq no slots STMP LF JSCC	LQFP64 236sq no slots STMP LF JSCC	UQFN 7x7 48L Sn PAD 5.2 MM SQ Groove	Rough mic PPF LF UQFN4x4 COL JSCC
Wire bonding: Type /Diameter:	Ag 96.5 wire 0.8 MIL	Ag 96.5 wire 0.8 MIL	Ag 96.5 wire 0.8 MIL	Au wire 0.8 MIL
Lead Plating Natures Thickness	Pure Tin (e3) Tolerance 7 to 20 µm	Pure Tin (e3) Tolerance 7 to 20 µm	Pure Tin (e3) Tolerance 7 to 20 µm	Nickel: 0.25µm min 1.3µm max Palladium: 0.005 µm min 0.05 µm max GoldSilver: 0.01 µm min 0.08 µm max
Balls Material & Diameter (BGA & CSP)	N.A	N.A	N.A	N.A
Routing Layer Material (CSP)	N.A	N.A	N.A	N.A
Passivation type (CSP)	N.A	N.A	N.A	N.A
Back side coating (CSP) Material Thickness	N.A	N.A	N.A	N.A
Molding Compound Supplier:	G631SHQ Sumitomo low alpha	G631SHQ Sumitomo low alpha	G770 Sumitomo	G770HCD Sumitomo
Package Moisture Sensitivity Level (JEDEC J-STD020D):	MSL 3	MSL 3	MSL 3	MSL3

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Back-End	Package 5 UFBGA64 5x5	Package 6 LQFP100 14x14	Package 7 LQFP48 7x7	Package 8 LQFP48 7x7
Assembly Plant Location/ Address:	AMKOR ATP3 119 North Science Avenue Special Economic Processing Zone Laguna Technopark, Binan Laguna PHILIPPINES 4024	ST MUAR Industrial center Muar, Tanjong Agas Industrial Area PO Box 28, 84007 Muar Johore, Malaysia		ASEKH No. 26, Chin 3rd Road, Nantze Export Processing Zone, Kaohsiung, Taiwan, R.O.C
Die Thickness after Back grinding:	75µm +/- 12µm	375µm +/- 25µm		375µm +/- 25µm
Die sawing method:	Step cut	Step cut		Step cut
Die attach material: **Type:** **Supplier:**	DAF Ablestik ATB130U	Henkel ABP8302	Hitachi EN4900	Sumitomo CRM 1076WA
Lead frame material: **L/F Finishing Type:** **Die paddle size:**	UFBGA 5X5 64L SID101388875	LQFP 100L 14SQ 5.2sqOpB RgAg+CuOx	FRAME LQFP 48L 7x7 3.6sq HD RTUPG uPPF	LQ48L DR Pur tin C7025 5q
Wire bonding: **Type /Diameter:**	Au wire 0.8 MIL	Ag 96.5 wire 0.8 MIL		Au wire 0.8 MIL
Lead Plating **Natures** **Thickness**	N.A	Pure Tin (e3) Tolerance 7 to 20 µm	Nickel: 0.25µm min 1.3µm max Palladium: 0.005 µm min 0.05 µm max GoldSilver: 0.01 µm min 0.08 µm max	Pure Tin (e3) Tolerance 7 to 20 µm
Balls Material & Diameter (BGA & CSP)	SN96.5 AG3.5% diam 200µm	N.A	N.A	N.A
Routing Layer Material (CSP)	N.A	N.A	N.A	N.A
Passivation type (CSP)	N.A	N.A	N.A	N.A
Back side coating (CSP) **Material** **Thickness**	N.A	N.A	N.A	N.A
Molding Compound Supplier:	GE100LFCS Nitto	EME-G700LS Sumitomo		EME-G631SH Sumitomo
Package Moisture Sensitivity Level (JEDEC J-STD020D):	MSL 3	MSL3	MSL3	MSL3

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Back-End	Package 9 LQFP100 14x14	Package 10 WLCSP100	Package 11 TSSOP20
Assembly Plant Location/ Address:	AMKOR ATP1 KM 22 East Service Road Special Economic Zone Cupang, Muntinlupa City PHILIPPINES 1702	SCS 5 Yishun Street 23, Singapore 768442	Shenzen STS Microelectronics co.,Ltd 16, Tao Hua Rd. Futian Free Trade Zone Shenzhen, P.R. China 518048
Die Thickness after Back grinding:	375µm +/- 25µm	355µm +/- 25µm	280µm +/- 20µm
Die sawing method:	Step cut	Step cut	Step cut
Die attach material: **Type:** **Supplier:**	Sumitomo Epoxy CRM 1076YB	N.A	Ablestik 8601S-25
Lead frame material: **L/F Finishing Type:** **Die paddle size:**	LQFP14x14 100L PPF 5.75sq SID#101384228	N.A	FRAME TSSOP 20L 3x4.20 HDMt OpB
Wire bonding: **Type /Diameter:**	Au wire 0.8 MIL	N.A	Ag 96.5 wire 0.8 MIL
Lead Plating Natures **Thickness**	Nickel: 0.4µm min 1.5µm max Palladium: 0.02 µm min 0.15 µm max Gold : 0.003 µm min 0.02 µm max	N.A	Nickel : 0.4µm min 1.5µm max Palladium : 0.02 µm min 0.15 µm max Gold : 0.003 µm min 0.02 µm max
Balls Material & Diameter (BGA & CSP)	N.A	SACN125 Diam 230µm	N.A
Routing Layer Material (CSP)	N.A	Cu	N.A
Passivation type (CSP)	N.A	HD4100	N.A
Back side coating (CSP) **Material** **Thickness**	N.A	Back side coating PET film 25µm	N.A
Molding Compound Supplier:	G631HQ Sumitomo	N.A	G700KC Sumitomo
Package Moisture Sensitivity Level (JEDEC J-STD020D):	MSL 3	MSL 1	MSL1

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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
JESD47	Stress-Test-Driven Qualification of Integrated Circuits
ANSI/ESDA/ JEDEC JS-001	Electrostatic discharge (ESD) sensitivity testing human body model (HBM)
ANSI/ESD STM5.3.1	Electrostatic discharge (ESD) sensitivity testing charge device model (CDM)
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-A101:	Temperature Humidity Bias
JESD22-A110:	Biased Highly Accelerated temperature & humidity stress Test

5 GLOSSARY AND TESTS DESCIPTION

HTOL	High Temperature Operating Life
EDR	Endurance and Data Retention
ELFR	Early Failure Rate
PC	Preconditioning (solder simulation)
THB	Temperature Humidity Bias
TC	Temperature cycling
uHAST	Unbiased Highly Accelerated Stress Test
HAST	Highly Accelerated temperature & humidity 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

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6 REVISION HISTORY

Version	Date	Author	Comment
1	10th September 2018	Genevieve BAYLE	Initial release – PCN10553
2	26th February 2019	Berengere ROUTIER-SCAPPUCCI Genevieve BAYLE	Update with die 444 & 448 – PCN10803
3	28th January 2020	Berengere ROUTIER-SCAPPUCCI Genevieve BAYLE	Update with : - die 445 + 442 Regoff – PCN10803 - die 442 PCN 10979 - REGON configuration
4	31st May 2021	Berengere ROUTIER-SCAPPUCCI	Update with die 438 – PCN12405

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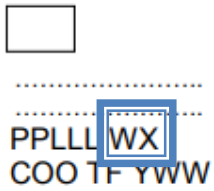
PRODUCT/PROCESS CHANGE NOTIFICATION
PCN 12405 – Additional information

TSMC Singapore Wafer Fab (SSMC) additional source for STM32F33x 64K listed products

MDG - Microcontrollers Division (MCD)

The standard marking is:



WX code indicates the diffusion traceability plant code.

Please refer to the DataSheet for marking details.

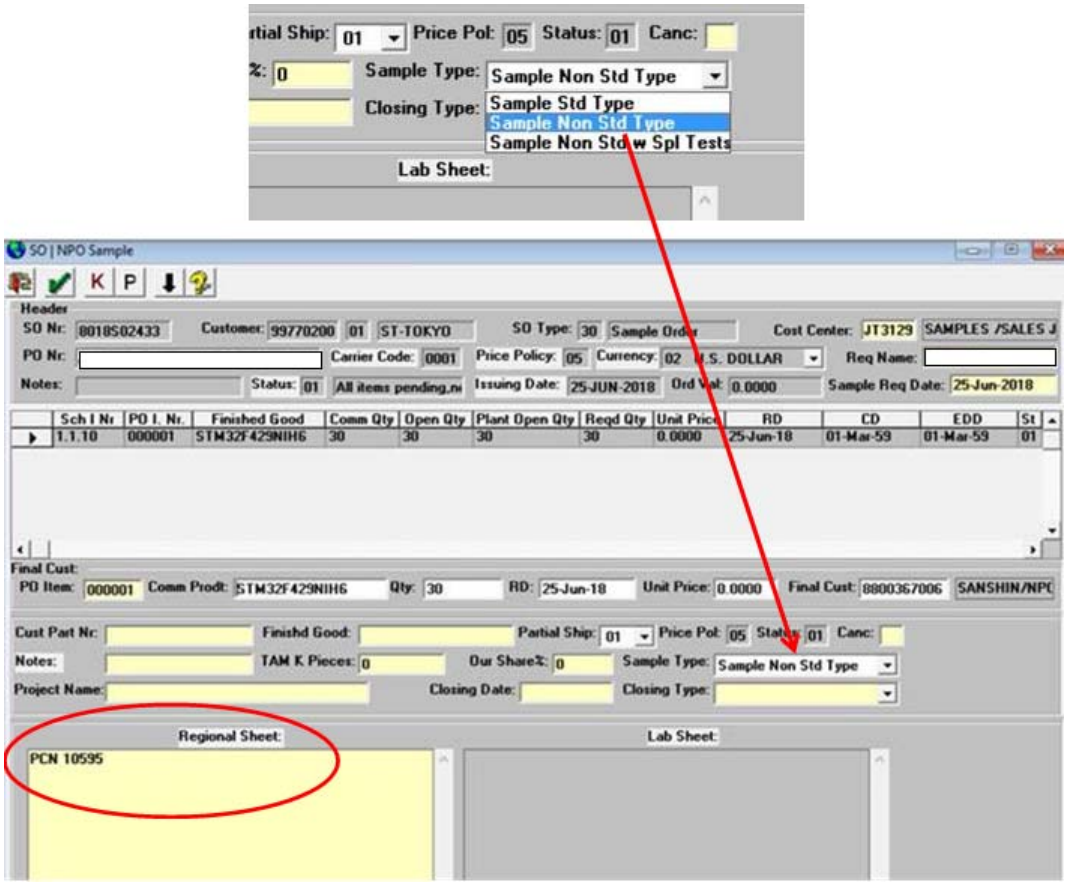
The marking is changing as follows:

Existing		Additional	
WX code	Fab	**WX** code	Fab
93	TSMC Taiwan Wafer Fab 3	9C	TSMC Singapore Wafer Fab (SSMC)

How to order samples?

For all samples request linked to this PCN, please:

- place a **Non-standard** sample order (choose Sample Non Std Type from pull down menu)
- insert the PCN number "**PCN12405**" 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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