# PRODUCT / PROCESS CHANGE NOTIFICATION

| 1. PCN basic data | |
|---|---|
| 1.1 Company | STMicroelectronics International N.V |
| 1.2 PCN No. | MICROCONTROLLERS/24/14731 |
| 1.3 Title of PCN | ASE KaoHsiung (Taiwan) LQFP24x24 package copper palladium bonding wire introduction on STM32H56x and STM32H57x on additional listed products. |
| 1.4 Product Category | STM32H56x,<br>STM32H57x |
| 1.5 Issue date | 2024-07-10 |

| 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 |
| Materials | Direct Material: Bond Wire - Metallurgy (metallic composition/ raw material) | ASE Kaohsiung (TAIWAN) |

| 4. Description of change | | |
|---|---|---|
| | Old | New |
| 4.1 Description | Current Wire bonding material:<br>- ASE KaoHsiung (Taiwan) gold wire | New Wire bonding material :<br>- ASE KaoHsiung (Taiwan) copper palladium wire |
| 4.2 Anticipated Impact on form,fit, function, quality, reliability or processability? | no impact on form, Fit, Function | |

| 5. Reason / motivation for change | |
|---|---|
| 5.1 Motivation | To improve service |
| 5.2 Customer Benefit | SERVICE IMPROVEMENT |

| 6. Marking of parts / traceability of change | |
|---|---|
| 6.1 Description | traceability ensured by ST Internal tools |

| 7. Timing / schedule | |
|---|---|
| 7.1 Date of qualification results | 2024-07-04 |
| 7.2 Intended start of delivery | 2024-07-10 |
| 7.3 Qualification sample available? | Upon Request |

| 8. Qualification / Validation | | | |
|---|---|---|---|
| 8.1 Description | 14731 MDG-GPM- RER2303-V2.0-PCN13840-PCN14731-ASEKH LQ24x24 Low cost wire introduction.pdf | | |
| 8.2 Qualification report and qualification results | Available (see attachment) | Issue Date | 2024-07-10 |

| 9. Attachments (additional documentations) |
|---|

14731 Public product.pdf
14731 MDG-GPM- RER2303-V2.0-PCN13840-PCN14731-ASEKH LQ24x24 Low cost wire introduction.pdf
14731 PCN14731_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 |
| | STM32H563IGT6 | |
| | STM32H563IIT3Q | |
| | STM32H563IIT6 | |
| | STM32H573IIT3Q | |
| | STM32H573IIT6 | |

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# Reliability Evaluation Report

# MDG-GPM-RER2303

## ASEKH LQFP24x24 Low cost wire introduction

(PCN13840-PCN14731)

| General Information | |
|---|---|
| Commercial Product | STM32F427IIT6, STM32H725IGT6 STM32F745IET7, STM32F217ZGT6, STM32H573IIT6 |
| Product Line | 419X66, 483X66, 449X66, 411X66, 484X66 |
| Die revision | 419 cut 2.2, 483 cut 1.1<br>449 cut 1.1, 411 cut 2.4, 484 cut 1.3 |
| Product Description | STM32F4xx, STM32H7xx STM32F7xx, STM32F2xx, STM32H5xx |
| Package | LQFP 176 24x24x1.4 |
| Silicon Technology | CMOSM40, CMOSM10 |
| Division | MDG-GPM |

| Traceability | |
|---|---|
| Diffusion Plant | Crolles 300<br>TSMC Fab14 DIFF |
| Assembly Plant | SC ASE - TAIWAN |

| Reliability Assessment | |
|---|---|
| Pass | X |
| Fail | |

| Release | Date | Author | Function |
|---|---|---|---|
| 1.0 | 02/06/2023 | Gabin BOSCO | GPM BE Q&R |
| 2.0 | 19/06/2024 | Celine Navarro | GPM BE Q&R |

## Approved by:

### Rev 1.0

| Name | Function | Location | Date |
|---|---|---|---|
| Berengere ROUTIER-SCAPPUCCI | GPM BE Q&R Manager | ROUSSET | 02/06/2023 |
| Pascal NARCHE | Subgroup Quality Manager | ROUSSET | 02/06/2023 |

### Rev2.0

| Name | Function | Location | Date |
|---|---|---|---|
| Berengere ROUTIER-SCAPPUCCI | GPM BE Q&R Manager | ROUSSET | 03/07/2024 |

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## RELIABILITY EVALUATION OVERVIEW

- **OBJECTIVE**

The aim of this report is to present the reliability evaluation performed for the qualification of ASEKH (Taiwan) LQFP24x24 with copper-palladium wires on M10 and M40 technos.

PCN13840 changes are described here below:

| | Existing back-end line | | Added back-end line | | |
|---|---|---|---|---|---|
| Assembly site | ASE KaoHsiung (Taiwan) | | | | |
| Wire | Gold 0.8mil | | CuPdAu 0.8mil | | |
| GLUE | Sumitomo CRM 1076WA | YIZTECH 8143 | Sumitomo CRM 1076WA | YIZTECH 8143 | HITACHI EN4900G |
| Marking composition | Without 2D | | With 2D Marking | | |

PCN14731 changes are described here below:

| | Existing back-end line | Added back-end line |
|---|---|---|
| Assembly site | ASE KaoHsiung (Taiwan) | |
| Wire | Gold 0.8mil | CuPdAu 0.8mil |
| GLUE | SUMITOMO CRM 1076WA | HITACHI EN4900G |
| Marking composition | Without 2D | With 2D Marking |

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- **CONCLUSION**

All reliability tests have been completed with positive results. Neither functional nor parametric rejects were detected at final electrical testing.

Package oriented tests have not put in evidence any criticality. Physical analysis performed on samples submitted to tests has not put in evidence any issue. ESD CDM are in accordance with ST spec.

Based on the overall results obtained, products below have positively passed reliability evaluation:

| Line code | Commercial product | Diff plant | Assy plant |
|---|---|---|---|
| 419X66 | STM32F427IIT6 | TSMC | ASEKH (TAIWAN) |
| 483X66 | STM32H725IGT6 | Crolles | |
| 449x66 | STM32F745IET7 | | |
| 411X66 | STM32F217ZGT6 | | |
| 484X66 | STM32H573IIT6 | | |

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 M10 and Crolles M10/M40, assembled in LQFP24x24 at ASEKH (Taiwan) in copper-palladium wires.

Refer to Section 3.0 for reliability test results.

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**TABLE OF CONTENT**



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# 1. RELIABILITY STRATEGY

Reliability trials performed as part of this reliability evaluation are in agreement with ST 0061692 specification, in full compliancy with the JESD-47 international standard.

For details on test conditions, generic data used and specifications references, refer to test results summary in section 3.

# 2. PRODUCT OR TEST VEHICLE CHARACTERISTICS

## 2.1. Generalities

| Package line | Device (Partial RawLine Code) | Diffusion process | Number of lots |
|---|---|---|---|
| LQFP 24x24x1.4 176L | 1T*419 | CMOSM10 TSMC | 1 |
| | 1T*483 | CMOSM40 Crolles | 1 |
| | 1T*449 | CMOSM10 Crolles | 1 |
| | 1T*411 | CMOSM10 Crolles | 1 |
| | 1T*484 | CMOSM40 Crolles | 1 |

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## 2.2. Traceability

### 2.2.1. Wafer Fab Information

**Die 419 - LQFP24x24**

| Wafer Fab Information | |
|---|---|
| **FAB1** | |
| Wafer fab name / location | TSMC Taiwan / TSMC Fab14 DIFF |
| Wafer diameter | 12 inches |
| Wafer thickness | 775±25 µm |
| Silicon process technology | CMOSM10 |
| Number of masks | 44 |
| Die finishing front side (passivation) materials/Thickness | USG+NITRIDE/1,1µm |
| Die finishing back side Materials | RAW SILICON |
| Die area (Stepping die size) | 25.43 mm² (5582, 4556) |
| Die pad size | **Geometry**: Rectangular; **Open(X,Y)**: 59,123 µm |
| Sawing street width (X,Y) | 80,80 µm |
| Metal levels/Materials/Thicknesses | |

| Wire bond pad metal | Composition | Thickness |
|---|---|---|
| 1 | TaN/Ta/CuSeed/Cu | 0.22 µm |
| 2 | TaN/Ta/CuSeed/Cu | 0.28 µm |
| 3 | TaN/Ta/CuSeed/Cu | 0.28 µm |
| 4 | TaN/Ta/CuSeed/Cu | 0.28 µm |
| 5 | TaN/Ta/CuSeed/Cu | 0.28 µm |
| 6 | Ta/TaN/AlCu | 0.73 µm |
| 7 | AlCu | 1.2 µm |

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## Die 483 - LQFP24x24

| Wafer Fab Information | |
|---|---|
| **FAB1** | |
| Wafer fab name / location | Crolles 300 / Crolles 300 12 |
| Wafer diameter | 12 inches |
| Wafer thickness | 775±25 µm |
| Silicon process technology | CMOSM40 |
| Number of masks | 51 |
| Die finishing front side (passivation) materials/Thickness | PSG+NITRIDE/1,1µm |
| Die finishing back side Materials | RAW SILICON |
| Die area (Stepping die size) | 15.66 mm² (3753, 4175) |
| Die pad size | **Geometry**: Rectangular; **Open(X,Y)**: 54.9,54.4 µm |
| Sawing street width (X,Y) | 80,80 µm |
| Metal levels/Materials/Thicknesses | |

| Wire bond pad metal | Composition | Thickness |
|---|---|---|
| 1 | Cu | 0.11 µm |
| 2 | Cu | 0.14 µm |
| 3 | Cu | 0.14 µm |
| 4 | Cu | 0.14 µm |
| 5 | Cu | 0.14 µm |
| 6 | Cu | 0.86 µm |
| 7 | Cu | 0.86 µm |
| 8 | Ta/TaN/AlCu | 1.525 µm |

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## Die 449 – LQFP24x24

| Wafer Fab Information | |
|---|---|
| **FAB1** | |
| Wafer fab name / location | Crolles 300 / Crolles 300 12 |
| Wafer diameter (inches) | 12 |
| Wafer thickness (µm) | 775 |
| Silicon process technology | CMOSM10 |
| Number of masks | 42 |
| Die finishing front side (passivation) materials | PSG NITRIDE |
| Die finishing back side Materials | RAW SILICON |
| Die area (Stepping die size) | 26.913416 mm² (5884, 4574) |
| Die pad size | **Geometry**: Rectangular; **Open(X,Y)**: 59,123 µm |
| Sawing street width (X,Y) (µm) | 80,80 |
| Metal levels/Materials/Thicknesses | |

| Wire bond pad metal | Composition | Thickness |
|---|---|---|
| 1 | TaN/CuSeed/Cu | 0.24 µm |
| 2 | TaN/CuSeed/Cu | 0.33 µm |
| 3 | TaN/CuSeed/Cu | 0.33 µm |
| 4 | TaN/CuSeed/Cu | 0.33 µm |
| 5 | TaN/CuSeed/Cu | 0.33 µm |
| 6 | TaN/CuSeed/Cu | 0.85 µm |
| 7 | AlCu/TinArc | 1.45 µm |

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### Die 411 – LQFP 24x24

| Wafer Fab Information | |
|---|---|
| **FAB1** | |
| Wafer fab name / location | Crolles 300 / Crolles 300 12 |
| Wafer diameter | 12 inches |
| Wafer thickness | 775±25 µm |
| Silicon process technology | CMOSM10 |
| Number of masks | 42 |
| Die finishing front side (passivation) materials/Thickness | PSG+NITRIDE/1.1µm |
| Die finishing back side Materials | RAW SILICON |
| Die area (Stepping die size) | 14.71 mm² (4006, 3674) |
| Die pad size | **Geometry** / **Open(X,Y)**<br>Rectangular / 59,123 µm<br>Rectangular / 63,73 µm |
| Sawing street width (X,Y) | 80,80 µm |
| Metal levels/Materials/Thicknesses | **Wire bond pad metal** / **Composition** / **Thickness**<br>1 / TaN/CuSeed/Cu / 0.24 µm<br>2 / TaN/CuSeed/Cu / 0.33 µm<br>3 / TaN/CuSeed/Cu / 0.33 µm<br>4 / TaN/CuSeed/Cu / 0.33 µm<br>5 / TaN/CuSeed/Cu / 0.33 µm<br>6 / TaN/CuSeed/Cu / 0.85 µm<br>7 / AlCu/TinArc / 1.45 µm |

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### Die 484 – LQFP 24x24

| Wafer Fab Information | |
|---|---|
| **FAB1** | |
| Wafer fab name / location | Crolles 300 / Crolles 300 12 |
| Wafer diameter | 12 inches |
| Wafer thickness | 775±25 µm |
| Silicon process technology | CMOSM40 |
| Number of masks | 51 |
| Die finishing front side (passivation) materials/Thickness | PSG+NITRIDE/1.1µm |
| Die finishing back side Materials | RAW SILICON |
| Die area (Stepping die size) | 11.5988 mm² (3518, 3297) |
| Die pad size | 54.9,54.9 µm |
| Sawing street width (X,Y) | 80,80 µm |
| Metal levels/Materials/Thicknesses | |

| Wire bond pad metal | Composition | Thickness |
|---|---|---|
| 1 | TaN/Ta/CuSeed/Cu | 0.110 µm |
| 2 | TaN/Ta/CuSeed/Cu | 0.140 µm |
| 3 | TaN/Ta/CuSeed/Cu | 0.140 µm |
| 4 | TaN/Ta/CuSeed/Cu | 0.140 µm |
| 5 | TaN/Ta/CuSeed/Cu | 0.140 µm |
| 6 | TaN/Ta/CuSeed/Cu | 0.850 µm |
| 7 | TaN/Ta/CuSeed/Cu | 0.850 µm |
| 8 | Ta/TaN/AlCu | 1.525 µm |

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### 2.2.2. Assembly Information

| Package: LQFP 176 24x24x1.4 | 483 | 449 | 411 & 419 | 484 |
|---|---|---|---|---|
| Assembly plant name / location | ASE TAIWAN / SC ASE - TAIWAN | | | |
| Pitch | 0.4mm | | | 0.5mm |
| Die thickness after back-grinding | 375+/-25µm | 300+/-25µm | | 375+/-25µm |
| Die sawing method | Laser groove + mechanical sawing | | | |
| **Bill of Material elements** | | | | |
| Lead frame/Substrate material/ reference | LF# A25472-0 LQ176L DR Pure tin C7025 SLOT PWB 6sq | LF# A19506-0 FOR LQ 176L WITH SLOT 243 sq | | |
| Lead frame finishing (material/thickness) | Pure Tin (e3): Tolerance 7 to 20µm | | | |
| Die attach material/type(glue)/supplier | GLUE SUMITOMO EPOXY CRM 1076WA | HITACHI EN4900G | GLUE YIZTECH 8143 | HITACHI EN4900G |
| Wire bonding material/diameter | Copper-palladium 0.8 mils | | | |
| Molding compound material/supplier/reference | MOLDING RESIN SUMITOMO EME-G631SH | | MOLDING RESIN SUMITOMO EME-G631H | MOLDING RESIN SUMITOMO EME-G631SH |
| Package Moisture Sensitivity Level (JEDEC J-STD020D) | 3 | | | |

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### 2.2.3. Reliability testing information

| Reliability Testing Information | |
|---|---|
| Reliability laboratory name / location | Grenoble Rel Lab, Rousset MDG Rel Lab, Shenzhen BE Lab ASE Rel lab, Muar BE Lab |

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. TEST RESULTS SUMMARY

### 3.1. Lot information

| Lot # | Diffusion Lot | Die Revision (Cut) | Trace Code | Raw Line | Package | Note |
|---|---|---|---|---|---|---|
| Lot 1 | 9R124619 | 419 cut 2.2 | AA140007 | 201T*419CSX5 | LQFP 176 24x24x1.4 | 1 Reliability lot |
| Lot 2 | VQ046607 | 483 cut 1.1 | AA137095 | 201T*483CSXZ | | 1 Reliability lot |
| Lot 3 | VQ205526 | 449 cut 1.1 | AA228001 | 2A1T*449QCXZ | | 1 Reliability lot |
| Lot 4 | VQ111287 | 411 cut 2.4 | AA140008 | 201T*411CSX2 | | 1 Reliability lot |
| Lot 5 | VQ316550 | 484 cut 1.2 | AA351005 | 211T*484QCXX | | 1 Reliability lot |

### 3.2. Test plan and results summary

**ACCELERATED ENVIRONMENT STRESS TESTS**

| Test code | Stress method | Stress Conditions | Lots Qty | S.S. | Total | Results/Lot Fail/S.S. | Comments:(N/A =Not Applicable) |
|---|---|---|---|---|---|---|---|
| PC | JSTD 020<br>JESD 22-A113<br>7191395 | 24h bake@125°C,<br>MSL3 (192h/30°C/60%RH)<br>3x Reflow simulation<br>Peak Reflow Temp= 260°C | 5 | 308 | 1540 | Lot 1: 0/308<br>Lot 2: 0/308<br>Lot 3: 0/308<br>Lot 4: 0/308<br>Lot 5: 0/308 | NA |
| HTSL | JESD22-A103 | Ta= 150°C<br>Duration= 1000hrs<br>☑ After PC | 5 | 77 | 385 | Lot 1: 0/77<br>Lot 2: 0/77<br>Lot 3: 0/77<br>Lot 4: 0/77<br>Lot 5: 0/77 | NA |
| TC | JESD22-A104 | Ta= -65/150°C<br>Cyc= 500<br>☑After PC | 5 | 77 | 385 | Lot 1: 0/77<br>Lot 2: 0/77<br>Lot 3: 0/77<br>Lot 4: 0/77<br>Lot 5: 0/77 | NA |
| THB | JESD22-A101 | Ta=85°C/85%RH<br>VDD=3v6<br>Duration= 1000hrs<br>☑After PC | 5 | 77 | 385 | Lot 1: 0/77<br>Lot 2: 0/77<br>Lot 3: 0/77<br>Lot 4: 0/77<br>Lot 5: 0/77 | NA |
| UHAST | JESD22-A118 | Ta=130°C ,85% RH, 2 Atm<br>Duration= 96hrs<br>☑ After PC | 5 | 77 | 385 | Lot 1: 0/77<br>Lot 2: 0/77<br>Lot 3: 0/77<br>Lot 4: 0/77<br>Lot 5: 0/77 | NA |

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**ELECTRICAL TEST VERIFICATION**

| Test code | Stress method | Stress Conditions | Lots Qty | S.S. | Total | Results/Lot Fail/S.S. | Comments:(N/A =Not Applicable) |
|---|---|---|---|---|---|---|---|
| CDM | JEDEC JS-002 | Voltage=500V for 411/484<br>Voltage=250V for 449/419/483 | 5 | 3 | 15 | Lot 1: 0/3<br>Lot 2: 0/3<br>Lot 3: 0/3<br>Lot 4: 0/3<br>Lot 5: 0/3 | NA |

**PACKAGE ASSEMBLY INTEGRITY TESTS**

| Test code | Stress method | Stress Conditions | Lots Qty | S.S. | Total | Results/Lot Fail/S.S. | Comments:(N/A =Not Applicable) |
|---|---|---|---|---|---|---|---|
| CA | Construction analysis including<br>-Wire bond shear<br>-Wire bond pull | ST internal specifications | 5 | 50 | 250 | Lot 1: 0/50<br>Lot 2: 0/50<br>Lot 3: 0/50<br>Lot 4: 0/50<br>Lot 5: 0/50 | NA |

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

## 4. APPLICABLE AND REFERENCE DOCUMENTS

| Reference | Short description |
|---|---|
| JESD47 | Stress-Test-Driven Qualification of Integrated Circuits |
| SOP2.4.4 | Record Management Procedure |
| SOP2.6.2 | Internal Change Management |
| SOP2.6.7 | Finished Good Maturity Management |
| SOP2.6.9 | Package & Process Maturity Management in BE |
| SOP2.6.11 | Program Management for Product Development |
| SOP2.6.17 | Management of Manufacturing Transfers |
| SOP2.6.19 | Front-End Technology Platform Development and Qualification |
| DMS 0061692 | Reliability Tests and Criteria for Product Qualification |
| 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-A101 | Temperature Humidity Bias |

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## 5. GLOSSARY

| | |
|---|---|
| **ESD - CDM** | Electrostatic Discharge - Charged device model |
| **CA** | Construction analysis |
| **HTSL** | Storage Life High temperature storage life |
| **PC** | Preconditioning |
| **TC** | Temperature Cycling |
| **THB** | Temperature Humidity Bias |
| **UHAST** | Unbiased HAST (Highly Accelerated Stress Test) |
| **DMS** | ST Advanced Documentation Controlled system/ Documentation Management system |

## 6. REVISION HISTORY

| Release | Date | Description |
|---|---|---|
| 1.0 | 02/02/2023 | Initial release |
| 2.0 | 18/06/2024 | Added die 484 |

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life.augmented

# PRODUCT/PROCESS CHANGE NOTIFICATION
# PCN14731 – Additional information

## ASE KaoHsiung (Taiwan) LQFP24x24 package copper palladium bonding wire introduction on STM32H56x and STM32H57x on additional listed products.

### MRDF – General Purpose Microcontrollers Division (GPM)

**What are the changes?**

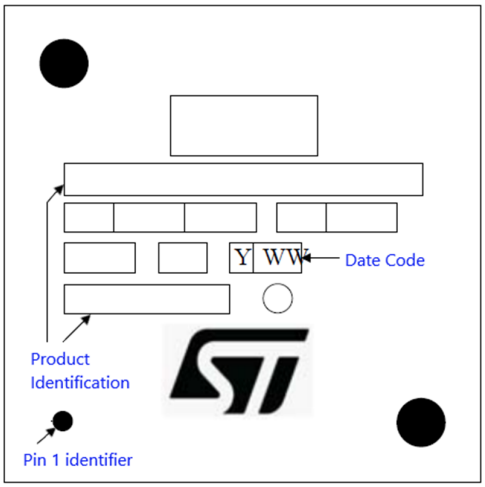
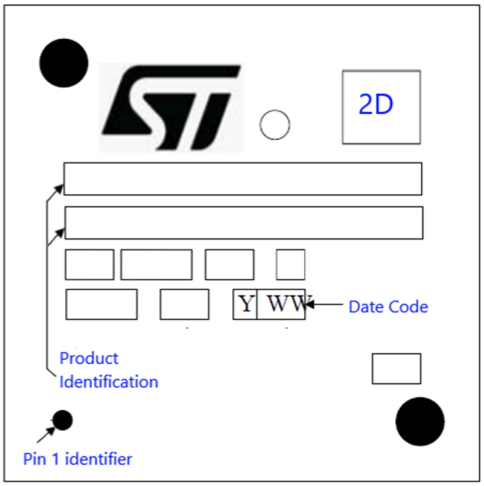
Changes described in table below:

| | Existing back-end line | Added back-end line |
|---|---|---|
| Assembly site | ASE KaoHsiung (Taiwan) | |
| Wire | Gold 0.8mil | CuPdAu 0.8mil |
| GLUE | SUMITOMO CRM 1076WA | HITACHI EN4900G |
| Marking composition | Without 2D | With 2D Marking |

**How can the change be seen?**

Package top view Marking will display the 2D marking

Examples in below table

| | Existing line | Added Line |
|---|---|---|
| LQFP 24x24 |  |  |

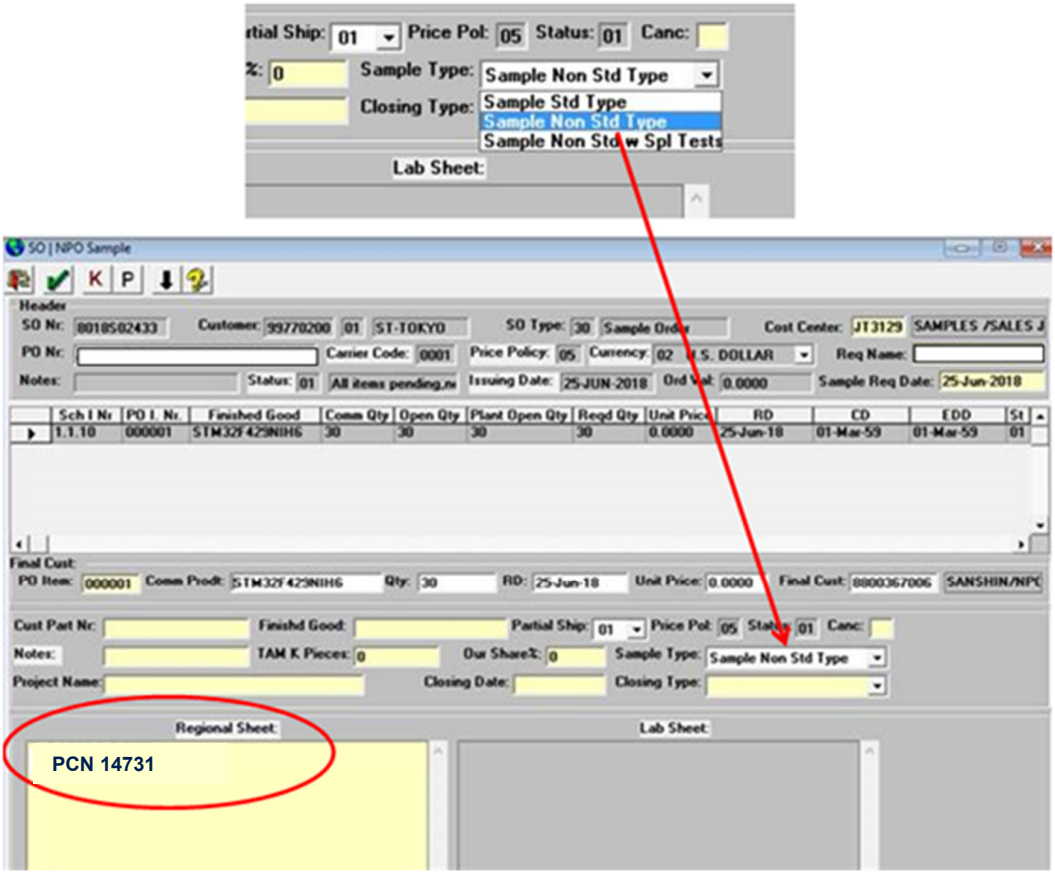
**Y WW :** Year Week (manufacturing date)

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 **Non-standard** sample order (choose Sample Non Std Type from pull down menu).
- insert the PCN number "**PCN14731**" 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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# 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 :*** ASE KaoHsiung (Taiwan) LQFP24x24 package copper palladium bonding wire introduction on STM32H56x and STM32H57x on additional listed products.
***PCN Reference :*** MICROCONTROLLERS/24/14731

***Subject :*** Public Products List

Dear Customer,

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

| | | |
|---|---|---|
| STM32H562IGT6 | STM32H563IIT3Q | STM32H562IIT6 |
| STM32H563IIT6 | STM32H573IIT3Q | STM32H573IIT6 |
| STM32H563IGT6 | | |

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