


# PRODUCT / PROCESS CHANGE NOTIFICATION

## 1. PCN basic data

1.1 Company		STMicroelectronics International N.V
1.2 PCN No.	ADG/23/14021	
1.3 Title of PCN	H <sup>2</sup> PAK-7 Leads Cropping Improvement - Shenzhen (China) - AUTOMOTIVE	
1.4 Product Category	Power MOSFET	
1.5 Issue date	2023-04-06	

## 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	Maurizio GIUDICE
2.1.2 Marketing Manager	Antonino PELLEGRINO
2.1.3 Quality Manager	Vincenzo MILITANO

## 3. Change

3.1 Category	3.2 Type of change	3.3 Manufacturing Location
Methods	Process flow chart: Revision change in Process like addition, deletion of process step	Shenzhen (China)

## 4. Description of change

	Old	New
4.1 Description	H <sup>2</sup> PAK-7 One step Leads Cropping	H <sup>2</sup> PAK-7 Dual step Leads Cropping
4.2 Anticipated Impact on form,fit, function, quality, reliability or processability?	processability	

## 5. Reason / motivation for change

5.1 Motivation	QUALITY IMPROVEMENT
5.2 Customer Benefit	QUALITY IMPROVEMENT

## 6. Marking of parts / traceability of change

6.1 Description	By internal traceability and dedicated FG code
-----------------	------------------------------------------------

## 7. Timing / schedule

7.1 Date of qualification results	2023-03-21
7.2 Intended start of delivery	2023-09-21
7.3 Qualification sample available?	Upon Request

## 8. Qualification / Validation

8.1 Description	14021 Reliability Report.pdf		
8.2 Qualification report and qualification results	Available (see attachment)	Issue Date	2023-04-06

## 9. Attachments (additional documentations)

14021 Public product.pdf 14021 14021 - H <sup>2</sup> PAK-7 Leads Cropping Improvement - Shenzhen - AUTO.pdf 14021 Reliability Report.pdf 14021 Details.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
	STH30N65DM6-7AG	

## **IMPORTANT NOTICE – PLEASE READ CAREFULLY**

Subject to any contractual arrangement in force with you or to any industry standard implemented by us, STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers' products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2022 STMicroelectronics – All rights reserved

# H<sup>2</sup>PAK-7 Leads Cropping Improvement

New assembly flow qualification on H<sup>2</sup>PAK-7 package in ST Shenzhen plant moving from one step to dual step cropping process.

# Change description

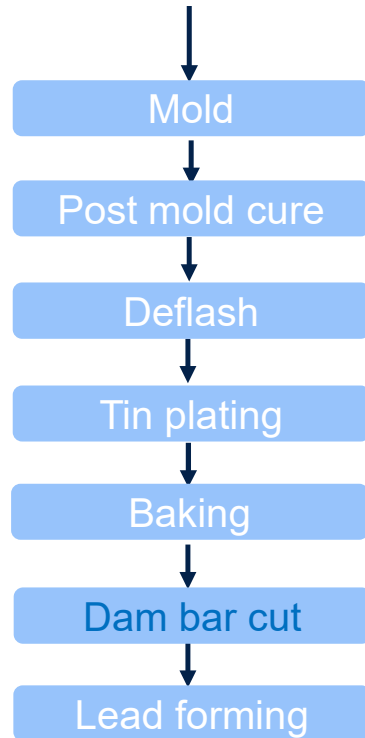
- Aim of this document is to describe the activity performed to qualify the new assembly flow on H<sup>2</sup>PAK-7 package moving from one step crop (exposed copper area in dam bar cut zone) to dual step crop (leads fully plated – no exposed copper).
- The H<sup>2</sup>PAK-7 package is assembled in STMicroelectronics Shenzhen (China) plant.
- Detailed qualification activity has been performed in order to qualify the new assembly flow for H<sup>2</sup>PAK-7 package.
- This report shows the positive results achieved. The new flow is ensuring the improvement of leads plating quality leaving unchanged the product electrical characteristics.
- All reliability tests have been completed with positive results.

# Selected Test Vehicles & impacted products

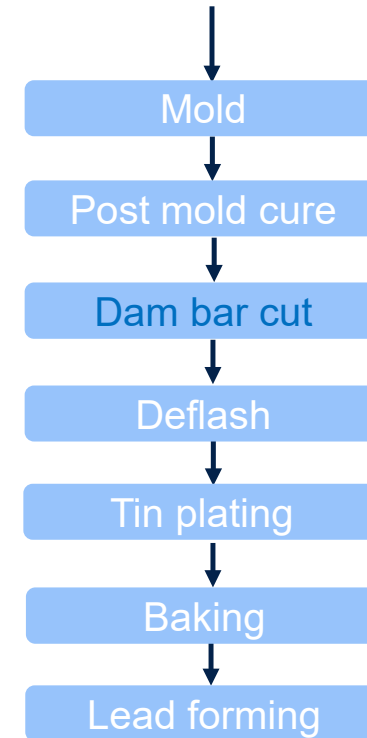
Involved Products	Package	Test Vehicle	End of Qualification	Qualification Remarks
STH30N65DM6-7AG STH65N045M9-7 STH65N050DM9-7AG	H <sup>2</sup> PAK-7	STH270N8F7-6 STH315N10F7-6 STH240N10F7-6	2/1/2023	Since this change involved PTsG, DFD and LGS, qualification has been done with LV MOSFET Test Vehicles

# Assembly Flow Comparison

Actual Assembly Flow  
Assy

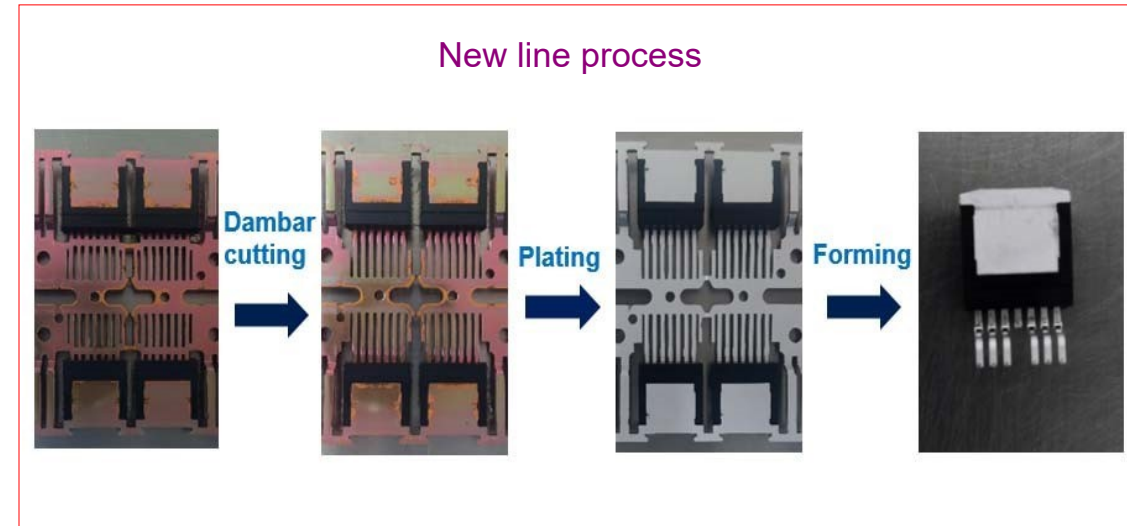
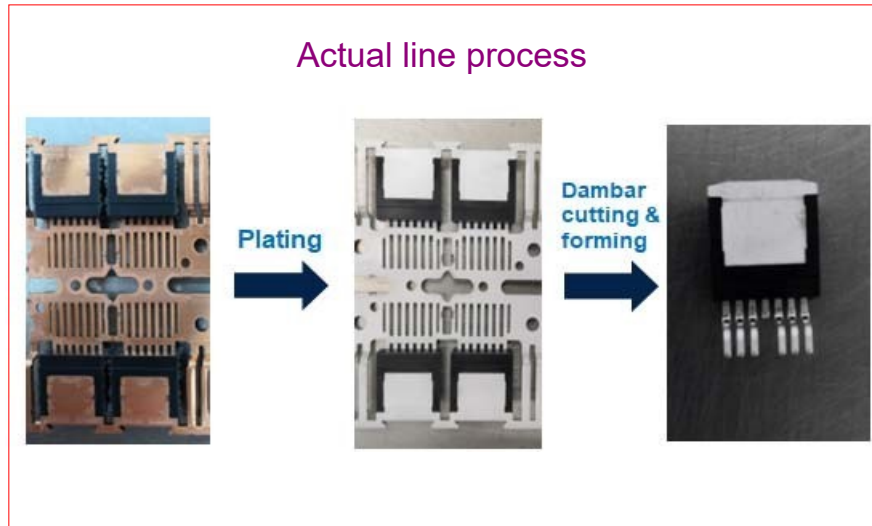


New Assembly Flow  
Assy



# Process line description

To eliminate exposed copper area in dam bar cut zone, firstly proceed dam bar cutting and then plating and forming.





# Conclusions

- Detailed qualification activity has been performed in order to qualify the new assembly flow on H<sup>2</sup>PAK-7 package in STMicroelectronics Shenzhen moving from one step crop (exposed copper area in dam bar cut zone) to dual step crop (leads fully plated – no exposed copper).
- All reliability tests have been completed with positive results (see attached reliability report).
- Neither functional nor parametric rejects were detected at final electrical test.
- The new flow is ensuring the improvement of leads plating quality leaving unchanged the product electrical characteristics.



## Public Products List

Public 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 :** H<sup>2</sup>PAK-7 Leads Cropping Improvement - Shenzhen (China) - AUTOMOTIVE

**PCN Reference :** ADG/23/14021

**Subject :** Public Products List

Dear Customer,

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

STH30N65DM6-7AG		
-----------------	--	--

**IMPORTANT NOTICE – PLEASE READ CAREFULLY**

Subject to any contractual arrangement in force with you or to any industry standard implemented by us, STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers' products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2022 STMicroelectronics – All rights reserved

# RELIABILITY EVALUATION REPORT

## Cropping process change for H2PAK 6/7L packages in ST SHENZHEN(China)

<table><tr><th>General Information</th></tr><tr><td>Commercial Product: STH270N8F7-6</td></tr><tr><td>Product Line: OD8L</td></tr><tr><td>Product Description: LVMOS</td></tr><tr><td>Package: H2PAK</td></tr><tr><td>Silicon Technology: PMOSFET OFT1</td></tr></table>	General Information	Commercial Product: STH270N8F7-6	Product Line: OD8L	Product Description: LVMOS	Package: H2PAK	Silicon Technology: PMOSFET OFT1	<table><tr><th>Traceability</th></tr><tr><td>Diffusion Plant: Singapore SG8</td></tr><tr><td>Assembly Plant: Shenzhen</td></tr><tr><td>Reliability Lab: Shenzhen</td></tr><tr><td>Passed</td></tr></table>	Traceability	Diffusion Plant: Singapore SG8	Assembly Plant: Shenzhen	Reliability Lab: Shenzhen	Passed
General Information												
Commercial Product: STH270N8F7-6												
Product Line: OD8L												
Product Description: LVMOS												
Package: H2PAK												
Silicon Technology: PMOSFET OFT1												
Traceability												
Diffusion Plant: Singapore SG8												
Assembly Plant: Shenzhen												
Reliability Lab: Shenzhen												
Passed												
<table><tr><th>General Information</th></tr><tr><td>Commercial Product:STH315N10F7-6</td></tr><tr><td>Product Line: OD0k</td></tr><tr><td>Product Description: LVMOS</td></tr><tr><td>Package: H2PAK</td></tr><tr><td>Silicon Technology: PMOSFET OFT1</td></tr></table>	General Information	Commercial Product:STH315N10F7-6	Product Line: OD0k	Product Description: LVMOS	Package: H2PAK	Silicon Technology: PMOSFET OFT1	<table><tr><th>Traceability</th></tr><tr><td>Diffusion Plant: Catania CTM8</td></tr><tr><td>Assembly Plant: Shenzhen</td></tr><tr><td>Reliability Lab: Shenzhen</td></tr><tr><td>Passed</td></tr></table>	Traceability	Diffusion Plant: Catania CTM8	Assembly Plant: Shenzhen	Reliability Lab: Shenzhen	Passed
General Information												
Commercial Product:STH315N10F7-6												
Product Line: OD0k												
Product Description: LVMOS												
Package: H2PAK												
Silicon Technology: PMOSFET OFT1												
Traceability												
Diffusion Plant: Catania CTM8												
Assembly Plant: Shenzhen												
Reliability Lab: Shenzhen												
Passed												
<table><tr><th>General Information</th></tr><tr><td>Commercial Product:STH240N10F7-6</td></tr><tr><td>Product Line: OD0J</td></tr><tr><td>Product Description: LVMOS</td></tr><tr><td>Package: H2PAK</td></tr><tr><td>Silicon Technology: PMOSFET OFT1</td></tr></table>	General Information	Commercial Product:STH240N10F7-6	Product Line: OD0J	Product Description: LVMOS	Package: H2PAK	Silicon Technology: PMOSFET OFT1	<table><tr><th>Traceability</th></tr><tr><td>Diffusion Plant: Singapore SG8</td></tr><tr><td>Assembly Plant: Shenzhen</td></tr><tr><td>Reliability Lab: Shenzhen</td></tr><tr><td>Passed</td></tr></table>	Traceability	Diffusion Plant: Singapore SG8	Assembly Plant: Shenzhen	Reliability Lab: Shenzhen	Passed
General Information												
Commercial Product:STH240N10F7-6												
Product Line: OD0J												
Product Description: LVMOS												
Package: H2PAK												
Silicon Technology: PMOSFET OFT1												
Traceability												
Diffusion Plant: Singapore SG8												
Assembly Plant: Shenzhen												
Reliability Lab: Shenzhen												
Passed												

**Disclaimer:** this report is a summary of the qualification plan results performed in good faith by STMicroelectronics to evaluate the electronic devices conformance to its specific mission profile for Automotive Application. This report and its contents shall not be disclosed to a third party, except in full, without previous written agreement by STMicroelectronics or under the approval of the author (see below)

### Revision history

Rev.	Changes description	Author	Date
1.0	Cropping process change for H2PAK 6/7L	Jian GUO	2023-02

### Approved by

Function	Location	Name	Date

# TABLE OF CONTENTS

1. Reliability Evaluation Overview .....	3
1.1. Objective .....	3
1.2. Reliability Strategy and Test Plan .....	3
1.2.1. Reliability strategy .....	3
1.2.2. Test Plan .....	3
1.3. Conclusion .....	3
2. Product Characteristics .....	3
2.1. Generalities .....	3
2.1.1. Test vehicle .....	3
2.2. Pin connection/bonding diagram .....	5
2.3. Traceability .....	6
2.3.1. Wafer Fab information .....	6
2.3.2. Assembly information .....	6
2.3.3. Reliability Testing information .....	6
3. Tests Results Summary .....	7
3.1. Lot Information .....	7
3.2. Test results summary .....	7

# 1. Reliability Evaluation Overview

## 1.1. Objective

Aim of this report is to present the results of the reliability evaluations performed on process change to release the new process for H2PAK 6/7L in production in H2PAK package in ST Shenzhen (China).

The process change is apply to eliminate Tin burr issue.

## 1.2. Reliability Strategy and Test Plan

### 1.2.1. Reliability strategy

Reliability trials performed as part of this reliability evaluation are in agreement with ST 0061692 and AEC-Q101 rev E specification, as below Test Plan. For details on test conditions, generic data used and specifications references, refer to test results summary in section 3.

### 1.2.2. Test Plan

#	Stress	Abrv	Reference	Data type	Comments
1	Pre and Post-Stress Electrical Test	TEST	User specification or supplier's standard Specification	Y	
2	External Visual	EV	JESD22B-101	Y	
3	Pre-conditioning	PC	JESD22A-113	Y	
4	Temperature Cycling	TC	JESD22A-104	Y	
5	Environmental Sequence	ES	DMS 0061692 Annex I	Y	

## 1.3. Conclusion

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

The CSAM and TSAM result are acceptable for H2PAK.

# 2. Product Characteristics

## 2.1. Generalities

### 2.1.1. Test vehicle

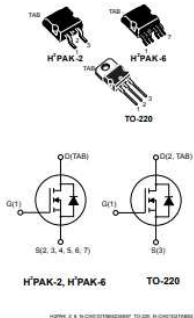
STH270N8F7-6(R2(4\*OD8L8B2))



STH270N8F7-2, STH270N8F7-6, STP270N8F7

Datasheet

N-channel 80 V, 0.0017  $\Omega$  typ., 180 A STripFET F7 Power MOSFETs in an H<sup>2</sup>PAK-2, H<sup>2</sup>PAK-6 and TO-220 packages



Features

Order codes	V <sub>DS</sub>	R <sub>DS(on)</sub> max.	I <sub>D</sub>
STH270N8F7-2	80 V	0.0021 $\Omega$	180 A
STH270N8F7-6		0.0025 $\Omega$	
STP270N8F7		0.0025 $\Omega$	

- Among the lowest R<sub>DS(on)</sub> on the market
- Excellent FoM (figure of merit)
- Low C<sub>iss</sub>/C<sub>oss</sub> ratio for EMI immunity
- High avalanche ruggedness

Applications

- Switching applications

Description

These N-channel Power MOSFETs utilize STripFET F7 technology with an enhanced trench gate structure that results in very low on-state resistance, while also reducing internal capacitance and gate charge for faster and more efficient switching.



Product status links
STH270N8F7-2
STH270N8F7-6
STP270N8F7

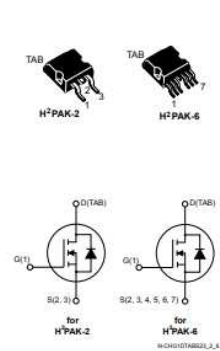
STH315N10F7-6(R2(4\*OD0K5A3))



STH315N10F7-2, STH315N10F7-6

Datasheet

Automotive-grade N-channel 100 V, 2.1 m $\Omega$  typ., 180 A STripFET F7 Power MOSFETs in an H<sup>2</sup>PAK-2 and H<sup>2</sup>PAK-6 packages



Features

Order code	V <sub>DS</sub>	R <sub>DS(on)</sub> max.	I <sub>D</sub>
STH315N10F7-2	100 V	2.3 m $\Omega$	180 A
STH315N10F7-6			

- AEC-Q101 qualified
- Among the lowest R<sub>DS(on)</sub> on the market
- Excellent FoM (figure of merit)
- Low C<sub>iss</sub>/C<sub>oss</sub> ratio for EMI immunity
- High avalanche ruggedness

Applications

- Switching applications

Description

These N-channel Power MOSFETs utilize STripFET F7 technology with an enhanced trench gate structure that results in very low on-state resistance, while also reducing internal capacitance and gate charge for faster and more efficient switching.

Product status	
STH315N10F7-2	
STH315N10F7-6	
Product summary	
Order code	STH315N10F7-2
Marking	315N10F7
Package	H <sup>2</sup> PAK-2
Packing	Tape and reel
Order code	STH315N10F7-6
Marking	315N10F7
Package	H <sup>2</sup> PAK-6
Packing	Tape and reel

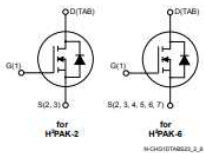
STH240N10F7-6 (R2(4\*OD0J8B2))



STH240N10F7-2, STH240N10F7-6

Datasheet

N-channel 100 V, 2 mΩ typ., 180 A STripFET™ F7 Power MOSFETs in an H<sup>2</sup>PAK-2 and H<sup>2</sup>PAK-6 packages



Features

Order code	V <sub>DS</sub>	R <sub>DS(on)</sub> max.	I <sub>D</sub>
STH240N10F7-2	100 V	2.5 mΩ	180 A
STH240N10F7-6			

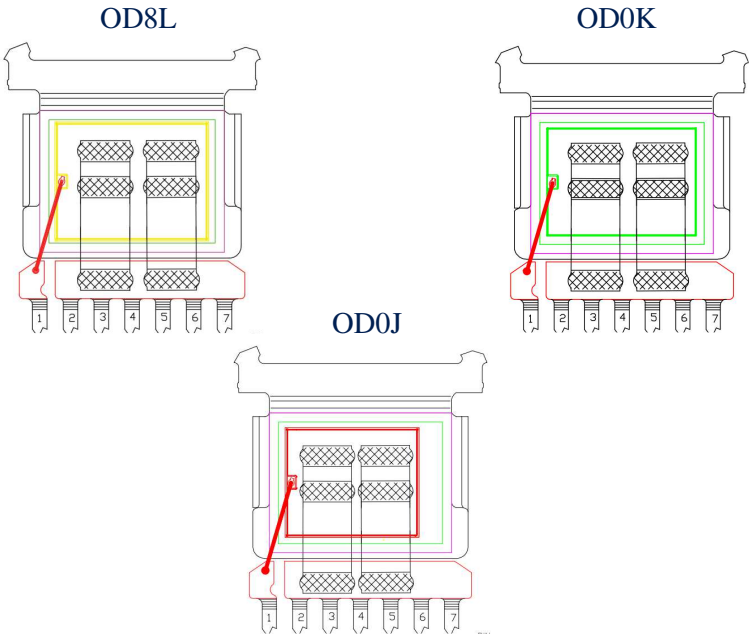
- Among the lowest R<sub>DS(on)</sub> on the market
- Excellent FoM (figure of merit)
- Low C<sub>iss</sub>/C<sub>oss</sub> ratio for EMI immunity
- High avalanche ruggedness

Description

These N-channel Power MOSFETs utilize STripFET™ F7 technology with an enhanced trench gate structure that results in very low on-state resistance, while also reducing internal capacitance and gate charge for faster and more efficient switching.

Product status	
STH240N10F7-2	
STH240N10F7-6	
Product summary	
Order code	STH240N10F7-2
Marking	240N10F7
Package	H <sup>2</sup> PAK-2
Packing	Tape and reel
Order code	STH240N10F7-6
Marking	240N10F7
Package	H <sup>2</sup> PAK-6
Packing	Tape and reel

2.2. Pin connection/bonding diagram





## 2.3. Traceability

### 2.3.1. Wafer information

Wafer fab information_OD8L	
Wafer fab name / location	Singapore
Wafer diameter (inches)	8"
Silicon process technology	PMOSFET OFT1
Die finishing front side	NO PASSIVATION
Die finishing back side	Ti-NiV-Ag
Die size (micron)	6340 x 4900
Metal levels/ materials/ thicknesses	Ti/TiN/TiAlCu 6.0um

Wafer fab information_OD0K	
Wafer fab name / location	Catania
Wafer diameter (inches)	8"
Silicon process technology	PMOSFET OFT1
Die finishing front side	TEOS/NITRIDE
Die finishing back side	Ti-NiV-Ag
Die size (micron)	6340 x 4600
Metal levels/ materials/ thicknesses	AlCu/Ti/TiN 6.1um

Wafer fab information_OD0J	
Wafer fab name / location	Singapore
Wafer diameter (inches)	8"
Silicon process technology	PMOSFET OFT1
Die finishing front side	NO PASSIVATION
Die finishing back side	Ti-NiV-Ag
Die size (micron)	5600 x 4590
Metal levels/ materials/ thicknesses	Ti/TiN/TiAlCu 4.5um

### 2.3.2. Assembly information

Assembly information_OD8L & OD0K & OD0J	
Assembly plant name / location	ST SHENZHEN (China)
Package description	D2PAK
Lead frame/Substrate	5FT86729
Die attach material	PREFORM Pb/Ag/Sn 95.5/2.5/2
Wire bonding material/diameter	RIBBON Al 80x10mils - WIRE Al-Mg D5
Molding compound material	RESIN SUMITOMO EME7026
Package Moisture Sensitivity Level (JEDEC J-STD020D)	Moisture Sensitivity 1 ( UNLIMITED at <=30C/85%RH )

### 2.3.3. Reliability Testing information

Reliability laboratory location	ST SHENZHEN (China)
---------------------------------	---------------------

### 3. Tests Results Summary

#### 3.1. Lot Information

Lot#	Commercial product	RL code	Diffusion Lot	Trace Code
Lot1	STH270N8F7-6	R2(4*OD8L8B2	VC0496E7	GK21418K
Lot2	STH315N10F7-6	R2(4*OD0K5A3	V5122MXN	GK214144
Lot3	STH240N10F7-6	R2(4*OD0J8B2	VC20510X	GK2140P1

#### 3.2. Test results summary

No	Test Name	Reference	Condition/ Method	Steps	Failure/SS		
					Lot 1	lot 2	lot 3
1	TEST	User specification	All qualification parts tested per the requirements of the appropriate device specification.		0/2000	0/2000	0/2000
2	EV	JESD22 B-101	All devices submitted for testing		0/2000	0/2000	0/2000
3	PC	JESD22A-113	Bake 24 hrs@ 125° C Soak 192 hrs@ 30° C / 60% RH Reflow Profile =J-STD-020D(Tmax= 260°C)	ATE	0/154	0/154	0/154
				TSAM	0/40	0/40	0/40
				CSAM DIE/LEAD	0/40	0/40	0/40
4	TC	JESD22A-104	TA = -65°C / +150° C 1000cycle	ATE	0/77	0/77	0/77
				TSAM	0/20	0/20	0/20
				CSAM DIE/LEAD	0/20	0/20	0/20
5	EnvSeq	DMS 0061692 Annex1	TA = -65°C / +150° C 100cycle PPT 96hrs@121°C/ 2Atm	ATE	0/77	0/77	0/77
				TSAM	0/20	0/20	0/20
				CSAM DIE/LEAD	0/20	0/20	0/20