

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 ² 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
2.2.2 Marketing Manager	Antonino PELLEGRINO
2.2.3 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 ² PAK-7 One step Leads Cropping	H ² 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
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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

9. Attachments (additional documentations)

14021 Public product.pdf 14021 14021 - H ² PAK-7 Leads Cropping Improvement - Shenzhen - AUTO.pdf 14021 Reliability Report.pdf 14021 Details.pdf
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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	

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H²PAK-7 Leads Cropping Improvement

New assembly flow qualification on H²PAK-7 package in ST Shenzhen plant moving from one step to dual step cropping process.

Change description

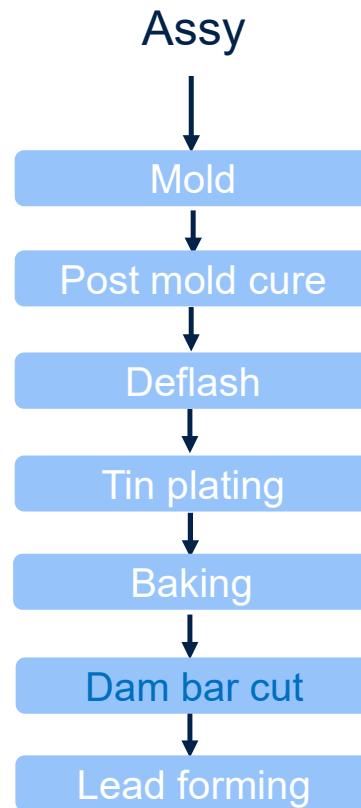
- Aim of this document is to describe the activity performed to qualify the new assembly flow on H²PAK-7 package moving from one step crop (exposed copper area in dam bar cut zone) to dual step crop (leads fully plated – no exposed copper).
- The H²PAK-7 package is assembled in STMicroelectronics Shenzhen (China) plant.
- Detailed qualification activity has been performed in order to qualify the new assembly flow for H²PAK-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 ² 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



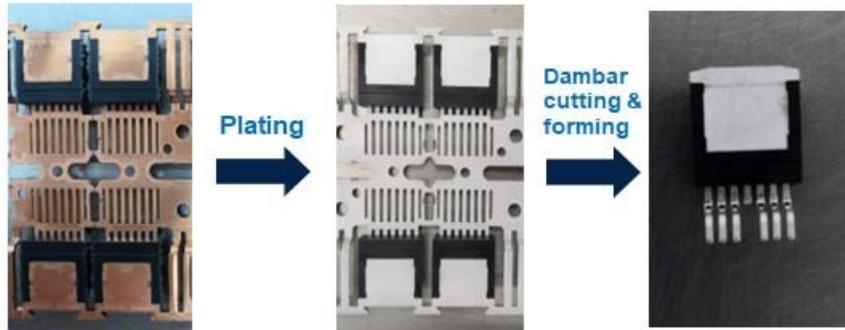
New Assembly Flow



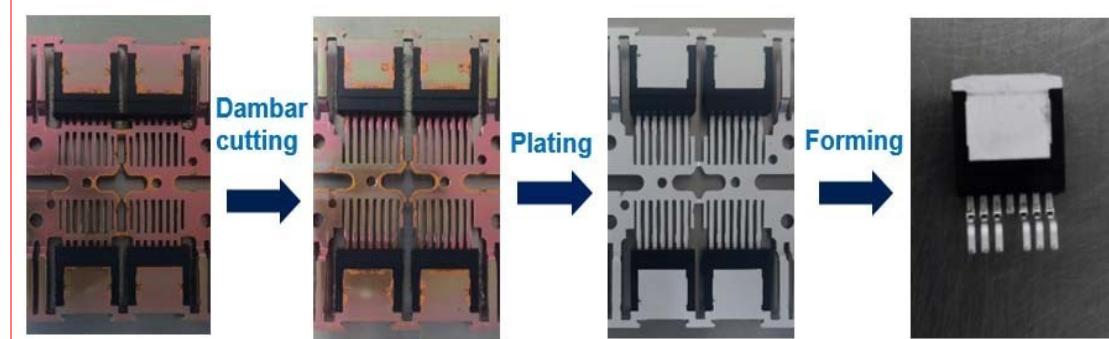
Process line description

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

Actual line process



New line process



Conclusions

- Detailed qualification activity has been performed in order to qualify the new assembly flow on H²PAK-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 : H²PAK-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		
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RELIABILITY EVALUATION REPORT

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

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

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

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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 Annex1	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

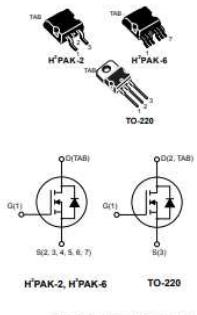
STH270N8F7-6(R2(4*OD8L8B2)



STH270N8F7-2, STH270N8F7-6, STP270N8F7

Datasheet

N-channel 80 V, 0.0017 Ω typ., 180 A SStripFET F7 Power MOSFETs in an H²PAK-2, H²PAK-6 and TO-220 packages



Features

Order codes	V _{DS}	R _{DS(on)} max.	I _D
STH270N8F7-2	80 V	0.0021 Ω	180 A
STH270N8F7-6		0.0025 Ω	
STP270N8F7			

- Among the lowest R_{DS(on)} on the market
- Excellent FoM (figure of merit)
- Low C_{iss}/C_{iss} ratio for EMI immunity
- High avalanche ruggedness

Applications

- Switching applications

Description

These N-channel Power MOSFETs utilize SStripFET 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

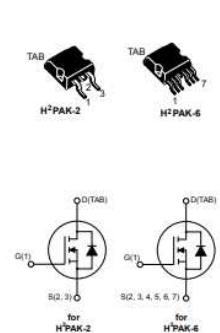
STH315N10F7-6(R2(4*OD0K5A3)



STH315N10F7-2, STH315N10F7-6

Datasheet

Automotive-grade N-channel 100 V, 2.1 m Ω typ., 180 A SStripFET F7 Power MOSFETs in an H²PAK-2 and H²PAK-6 packages



Features

Order code	V _{DS}	R _{DS(on)} max.	I _D
STH315N10F7-2	100 V	2.3 m Ω	180 A
STH315N10F7-6			

- AEC-Q101 qualified
- Among the lowest R_{DS(on)} on the market
- Excellent FoM (figure of merit)
- Low C_{iss}/C_{iss} ratio for EMI immunity
- High avalanche ruggedness

Applications

- Switching applications

Description

These N-channel Power MOSFETs utilize SStripFET 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 ² PAK-2
Packing	Tape and reel
Order code	STH315N10F7-6
Marking	315N10F7
Package	H ² PAK-6
Packing	Tape and reel

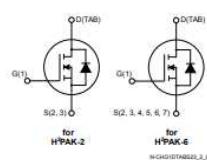
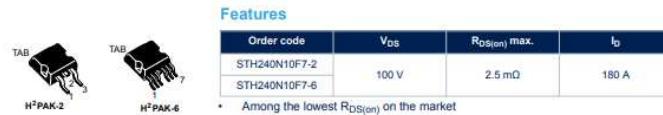
STH240N10F7-6 (R2(4*OD0J8B2)



STH240N10F7-2, STH240N10F7-6

Datasheet

N-channel 100 V, 2 mΩ typ., 180 A STriFET™ F7 Power MOSFETs in an H²PAK-2 and H²PAK-6 packages



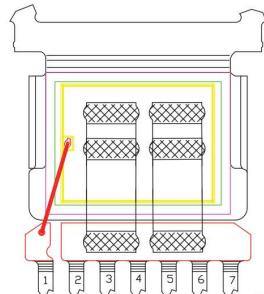
Description

These N-channel Power MOSFETs utilize STriFET™ 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.

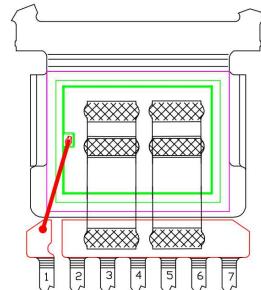
Product status	
STH240N10F7-2	
STH240N10F7-6	
Product summary	
Order code	STH240N10F7-2
Marking	240N10F7
Package	H2PAK-2
Packing	Tape and reel
Order code	STH240N10F7-6
Marking	240N10F7
Package	H2PAK-6
Packing	Tape and reel

2.2. Pin connection/bonding diagram

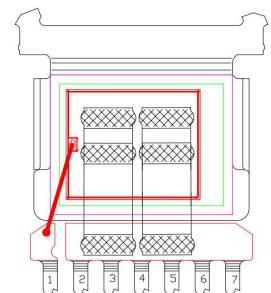
OD8L



OD0K



OD0J



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)
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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