PRODUCT / PROCESS CHANGE NOTIFICATION

1. PCN basic data	
1.1 Company	STMicroelectronics International N.V
1.2 PCN No.	POWER AND DISCRETE PRODUCTS/24/14867
1.3 Title of PCN	H2PAK Products: Activation of ATX (ASE Weihai) as Assy and Final Testing Location
1.4 Product Category	see list
1.5 Issue date	2024-07-19

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	Rosario RUGGERI
2.1.2 Marketing Manager	Anna RANIOLO
2.1.3 Quality Manager	Diego Maria FERRARI

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: Assembly site (SOP 2617)	ATX (ASE Weihai) China - receiving plant

4. Description of change		
	Old	New
4.1 Description	ST Shenzhen - China	ST Shenzhen and ATX (ASE Weihai) - China
4.2 Anticipated Impact on form,fit, function, quality, reliability or processability?	No Impact	

5. Reason / motivation for change	
5.1 Motivation	Capacity Increase
5.2 Customer Benefit	CAPACITY INCREASE

6. Marking of parts / traceability of change	
6.1 Description	Dedicated Finished Good Codes

7. Timing / schedule	
7.1 Date of qualification results	2024-07-05
7.2 Intended start of delivery	2024-10-31
7.3 Qualification sample available?	Upon Request

8. Qualification / Validation			
8.1 Description	14867 RERLVIP24025_1.0_STH315N10F7_STH310N10F7_OD0K_F7100V_CT8_SG8_H2PAK_ATX.pdf		
8.2 Qualification report and qualification results	Available (see attachment)	Issue Date	2024-07-19

9. Attachments (additional documentations)
14867 Public product.pdf 14867 Destails.pdf 14867 RERLVIP24025_1.0_STH315N10F7_STH310N10F7_OD0K_F7100V_CT8_SG8_H2PAK_ATX.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
	STH240N10F7-6	
	STH270N8F7-6	
	STH275N8F7-6AG	
	STH300NH02L-6	
	STH310N10F7-6	
	STH315N10F7-6	
	STH320N4F6-6	

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Product/process change notification:
H2PAK Products: Activation of ATX (ASE Weihai) as Assy and Final Testing Location
POWER AND DISCRETE PRODUCTS/24/14867

Product family	Technology	Package
See list	PMOS	H2PAK

(optional)

Description of the change
ATX (ASE Weihai) Chian, will be activated as additional Assembly and Final Testing location See below additional details

Reason
Capacity Increase

Date of implementation
Within October 2024

Impact of the change	
Form	No impact
Fit	No impact
Function	No impact
Reliability	No impact
Processibility	No impact

Qualification of the change
Included in this Notification

H2PAK activation in ATX (ASE Weihai) as Assembly and Final Testing location

Agenda

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Change description

- Aim of this document is to describe the assy and testing qualification activity of products: **STH310N10F7-6** and **STH315N10F7-6** by **H2PAK** package in **ATX** plant.
- H2PAK package is currently assembled and tested in STMicroelectronics Shenzhen plant.
- The TV identified are:
  - **OD0K01** (INDUSTRIAL)
  - **OD0KA1** (AUTOMOTIVE)
- This report shows the positive results achieved. The new materials are ensuring the same quality and electrical characteristics as the current products assembled/tested in STMicroelectronics Shenzhen plant.
- All reliability tests have been completed with positive results.

ZVEI Guidelines

- According to ZVEI recommendations, the notification is required.

	ID	Assessment of impact on Supply Chain regarding following aspects - contractual agreements - technical interface of processability/manufacturability of customer - form, fit, function, quality performance, reliability Type of change	Remaining risks within Supply Chain? No	Remaining risks within Supply Chain? Yes	Understanding of semiconductors experts	Examples to explain
		ANY				
		DATA SHEET				
		DESIGN				
		PROCESS - WAFER PRODUCTION				
		BARE DIE				
		PROCESS - ASSEMBLY				
x	SEM-PA-18	Move all or parts of production to a different assembly site.	P	P	Assembly transfer or relocation. Includes transfer as well as additional site.	e.g. dual source / fab strategy
x	SEM-TF-01	Move of all or part of electrical wafer test and/or final test to a different test site.	P	P	Tester transfer or relocation. Check impact on SEM-AN-01 Includes transfer as well as additional site.	Dual source strategy

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ATX Bill of material

Description	Material
Frame	H2PAK 7L NiNiP
Preform	Soft Solder Pb 95.5/ Sn 2.5/ Ag 2.5
Wire	5 mils
Ribbon	80x10 mils
Resin	Sumitomo EMEG700HF

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Test Vehicle selected

Commercial products		ST silicon line
STH310N10F7-6	→	OD0K01 (IND)
STH315N10F7-6	→	OD0KA1 (AUTO)

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Product list impacted

line	CP
4L2KA1	STH300NH02L-6
6D4KA1	STH320N4F6-6
OD0J01	STH240N10F7-6
OD0K01	STH310N10F7-6
OD0KA1	STH315N10F7-6
OD8L01	STH270N8F7-6
OD8LA1	STH275N8F7-6AG

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Qualification Plan strategy

Reliability trials performed are in agreement with **ST 0061692** and **AEC-Q101 rev.E** specification and are listed in related Qual Report.

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

Conclusions

- Detailed qualification activity has been performed to qualify the **STH310N10F7-6** and **STH315N10F7-6** (internal silicon line:

  OD0K01 and **OD0KA1**) assembled in **ATX** Weihai by **H2PAK** package.
- 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 materials are ensuring the same quality and electrical characteristics as the current products assembled in H2PAK

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Public Products List

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PCN Title : H2PAK Products: Activation of ATX (ASE Weihai) as Assy and Final Testing Location

PCN Reference : POWER AND DISCRETE PRODUCTS/24/14867

Subject : Public Products List

Dear Customer,

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

STH275N8F7-6AG	STH240N10F7-6	STH310N10F7-6
STH270N8F7-6	STH315N10F7-6	STH320N4F6-6
STH300NH02L-6		

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Reliability Evaluation Report
RERLVIP24025
H2PAK in ATX-Weihai subcon - F7 100V

General Information	
Commercial Product	STH315N10F7 (Automotive) STH310N10F7 (Industrial)
Product Line	OD0K
Product Description	N-Channel Power MOSFET
Silicon Technology	STripFET™ F7 100V
Package	H2PAK

Traceability	
Wafer Fab	ST CT8 Catania (Italy) ST SG8 Ang Mo Kio (Singapore)
Assembly Plant	ATX-Weihai (China) subcon

Release	Date	Author	Function
1.0	June 27th, 2024	A. Giuffrida	APMS – Q&R – Catania

This report is a summary of the reliability trials performed in good faith by STMicroelectronics. This report does not imply for STMicroelectronics expressly or implicitly any contractual obligations other than as set forth in STMicroelectronics General Terms and Conditions of Sale.

RELIABILITY EVALUATION OVERVIEW

- **OBJECTIVE**

Aim of this report is to present the reliability evaluations performed on **STH315N10F7** for the Automotive domain and on **STH310N10F7** for the Industrial domain (OD0K as ST internal silicon line on both cases) chosen as test vehicles to qualifiy the products designed in STripFET™ F7 100V Technology, diffused in both in ST CT8 Catania (Italy) and ST SG8 Ang Mo Kio (Singapore) 8” Wafer Fabs, assembled in package H2PAK in ATX-Weihai (China) subcon Assembly Plant.

- **CONCLUSION**

Based on the overall results obtained, the products **STH315N10F7** for the Automotive domain and on **STH310N10F7** for the Industrial domain (OD0K as ST internal silicon lineon both cases), chosen as test vehicles to qualifiy the products designed in STripFET™ F7 100V Technology, diffused in both in ST CT8 Catania (Italy) and ST SG8 Ang Mo Kio (Singapore) 8” Wafer Fabs, assembled in package H2PAK in ATX-Weihai (China) subcon Assembly Plant, has positively passed reliability evaluation performed in agreement with **ST 0061692** and **AEC-Q101 rev. E** specification.

TABLE OF CONTENTS

1. RELIABILITY STRATEGY

1.1. Reliability strategy

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

1.2. Test Plan

Table 1

TEST GROUP	TEST NAME	DESCRIPTION / COMMENTS	TEST FLAG
A Accelerated Environment Stress Tests	**PC**	Preconditioning	Yes
	H^{3}TRB	High Humidity High Temp. Reverse Bias	Yes
	AC	Autoclave	Yes
	TC	Temperature Cycling	Yes
	TCHT	Temperature Cycling Hot Test	Yes
	TCDT	TC Delamination Test	Yes
	IOL	Intermittent Operational Life	Yes
B Accelerated Lifetime Simulation Tests	**HTRB**	High Temperature Reverse Bias	Yes
	HTGB	High Temperature Gate Bias	Yes
C Package Assembly Integrity Tests	**DPA**	Destructive Physical Analysis	Yes
	PD	Physical Dimension	Yes
	WBP	Wire Bond Pull Strength	Yes
	WBS	Wire Bond Shear Strength	Yes
	RSH	Resistance to Solder Heat	Yes
	SD	Solderability	Yes
D Die Fabrication Reliability Tests	**DI**	Dielectric Integrity	Not Applicable
E Electrical Verification Tests	**EV**	External Visual	Yes
	TEST	Pre- and Post-Stress Electrical Test	Yes
	PV	Parametric Verification	Yes
	ESDH (HBM)	ESD HBM Characterization	Yes
	ESDC (CDM)	ESD CDM Characterization	Yes
	UIS	Unclamped Inductive Switching	Yes

2. PRODUCT OR TEST VEHICLE CHARACTERISTICS

2.1. Generalities

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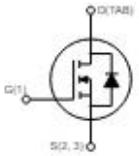
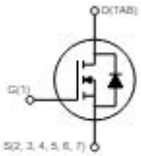
STH315N10F7-2, STH315N10F7-6

Datasheet

Automotive-grade N-channel 100 V, 2.1 mΩ typ., 180 A STripFET 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 mΩ	180 A
STH315N10F7-6			

- AEC-Q101 qualified
- Among the lowest $R_{DS(on)}$ on the market
- Excellent FoM (figure of merit)
- Low C_{rss}/C_{iss} 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	H²PAK-2
Packing	Tape and reel
Order code	STH315N10F7-6
Marking	315N10F7
Package	H²PAK-6
Packing	Tape and reel

STH310N10F7-2, STH310N10F7-6

N-channel 100 V, 1.9 mΩ typ.,180 A, STripFET™ F7 Power MOSFETs in H²PAK-2 and H²PAK-6 packages

Datasheet - production data

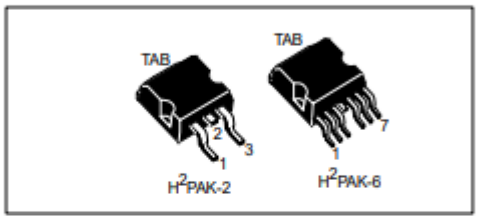
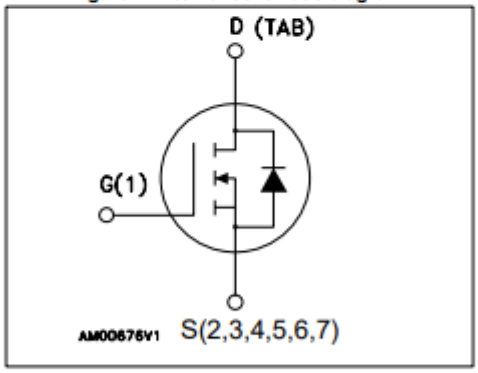


Figure 1: Internal schematic diagram



Features

Order code	V_{DS}	$R_{DS(on)}$ max.	I_D
STH310N10F7-2	100 V	2.3 mΩ	180 A
STH310N10F7-6			

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

Applications

- Switching applications

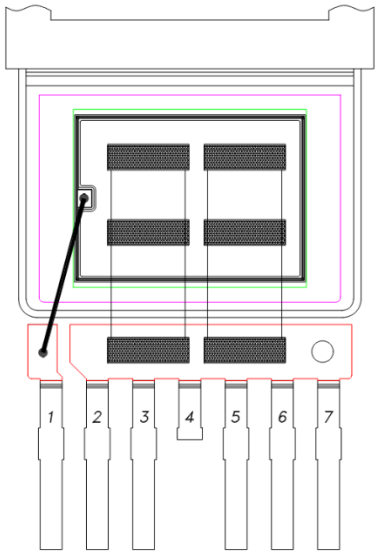
Description

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

Table 1: Device summary

Order code	Marking	Package	Packing
STH310N10F7-2	310N10F7	H²PAK-2	Tape and reel
STH310N10F7-6		H²PAK-6	

2.2. Pin connection / Bonding diagram



2.3. Traceability

2.3.1. Wafer Fab information

Wafer fab information	
Wafer Fab name / location	ST CT8 Catania (Italy) and ST SG8 Ang Mo Kio (Singapore)
Wafer diameter (inches)	8”
Wafer thickness (µm)	280 um
Silicon process technology	STripFET™ F7 100V
Die finishing front side materials/thicknesses	TEOS/SiN for the Automotive version No passivation for the Industrial version
Die finishing back side materials/thicknesses	Ti-NiV-Ag
Die size	6340 x 4600 um
Metal levels/Materials/Thicknesses	Ti/TiN/TiAlCu (6.0 um) for the Automotive version AlCu/Ti/TiN (4.6 um) for the Industrial version

2.3.2. Assembly Plant information

Assembly Information	
Assembly Plant name / location	ATX-Weihai (China) subcon
Package	H2PAK
Die attach	Soft Solder (Pb95.5Sn2Ag2.5 P)
Wire bonding	RIBBON 80X10 + Al 5 MILS
Molding compound	SUMITOMO EMEG700HF
Package Moisture Sensitivity Level (J-STD020D)	MSL1

2.3.3. Reliability testing information.

Reliability Testing Information	
Reliability laboratory location	ST CATANIA

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

3. TEST SUMMARY RESULT

3.1. Lot Information

Lot #	Commercial Product	Product line	Diffusion Lot	Diffusion Fab	Assy lot	Comment
1	STH315N10F7 Automotive domain	OD0K	C248H66V	SG8	GE347004	A234774YA
2			C248H52V		GE347005	A234775ZA
3					GE321062	A2347750A
4	STH310N10F7 Industrial domain		52240JYM01	CT8	GE346116	A23466YE
5			5224W11M02		GE321060	A23466YF
6					GE346117	A23466YG

3.2. Tests summary

TEST GROUP A – ACCELERATED ENVIRONMENT STRESS TESTS

Test	#	Reference	**AEC-Q101 (Group A)** STM Test Conditions	Lots	S.S.	Total	Results FAIL/SS/Lots	Comments
PC	A1	JEDEC/IPC J-STD-020 JESD22-A-113	MSL1 (168h@85C/85%RH) 3x Reflow simulation Peak Reflow Temp= 260°C	6	308	1848	0/308/6	All parts before H^3TRB, AC, TC and IOL tests
H^3TRB	A2 alt	JESD22A-101	1000h Ta=85°C, RH=85% Vds= 100V	6	77	462	0/77/6	
AC	A3 alt	JESD22 A-102	ES (Environmental Sequence) 100cy @ T=-55°C/+150°C 96h @ T=121°C, 2atm, 100%RH	6	77	462	0/77/6	
TC	A4	JESD22A-104 Appendix 6 J-STD-035	Ta=-55°C /+150°C, 1000cy	6	77	462	0/77/6	
TCHT	A4a		125°C TEST after TC					
TCDT	A4a alt		100% SAM inspection after TC					
IOL	A5	MIL-STD-750 Method 1037	15Kcy / ΔTj ≥ 100°C	6	77	462	0/77/6	

TEST GROUP B – ACCELERATED LIFETIME SIMULATION TESTS

Test	#	Reference	**AEC-Q101 (Group B)** STM Test Conditions	Lots	S.S.	Total	Results FAIL/SS/Lots	Comments
HTRB	B1	MIL-STD-750-1 M1038 Method A	1000h Ta=175°C, Vds= 100V	6	77	462	0/77/6	
HTGB	B2	JESD22 A-108	1000h Ta=175°C, Vgs= 20V	6	77	462	0/77/6	

TEST GROUP C – PACKAGE ASSEMBLY INTEGRITY TESTS

Test	#	Reference	**AEC-Q101 (Group C)** STM Test Conditions	Lots	S.S.	Total	Results FAIL/SS/Lots	Comments
DPA	C1	AECQ101-004 Section 4	-	2	4	8	Done	Devices after TC, H3TRB
PD	C2	JEDEC JESD22-B-100	-	2	30	60	Passed	From assembly data 1 Lot Automotive 1 Lot Industrial
WBP	C3	MIL-STD-750-2 Method 2037	-	10 bonds from min of 5 parts			Passed	From assembly data 1 Lot Automotive 1 Lot Industrial
WBS	C4	AEC Q101-003 JESD22 B116	-	10 bonds from min of 5 parts			Passed	From assembly data 1 Lot Automotive 1 Lot Industrial
RSH	C8	JESD22-A-111	-	2	30	60	Passed	From assembly data 1 Lot Automotive 1 Lot Industrial
SD	C10	JEDEC J-STD-002	-	2	10	20	Passed	From assembly data 1 Lot Automotive 1 Lot Industrial

TEST GROUP D – DIE FABRICATION RELIABILITY TESTS

Test	#	Reference	**AEC-Q101 (Group D)** STM Test Conditions	Lots	S.S.	Total	Results FAIL/SS/Lots	Comments
DI	D1	AEC Q101-004 Section 3	**-**	-	-	-	-	Not applicable

TEST GROUP E – ELECTRICAL VERIFICATION

Test	#	Reference	**AEC-Q101 (Group E)** STM Test Conditions	Lots	S.S.	Total	Results FAIL/SS/Lots	Comments
EV	E0	JEDEC JESD22-B101	All qualification parts submitted for testing	All qualification parts submitted for testing			Done	
TEST	E1		User specification or supplier's standard specification	All qualification parts			Done	
PV	E2		All parameters according to user specification	6	25	150	Done	
ESDH	E3	AEC-Q101-001	ESD HBM Characterization	2	30	60	Done	1 Lot Automotive 1 Lot Industrial
ESDM	E3	AEC-Q101-001	ESD CDM Characterization	2	30	60	Done	1 Lot Automotive 1 Lot Industrial
UIS	E5	AEC-Q101-004 Section 2		2	5	10	Done	1 Lot Automotive 1 Lot Industrial

4. REVISION HISTORY

Release	Date	Description
1.0	June 27th, 2024	Full set of data covered

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