

**PRODUCT / PROCESS CHANGE NOTIFICATION**

**1. PCN basic data**

<b>1.1 Company</b>		STMicroelectronics International N.V
<b>1.2 PCN No.</b>	CRP/20/12002	
<b>1.3 Title of PCN</b>	DISCONTINUATION OF TO220 BACK-END PRODUCTION LINE AT ST BOUSKOURA PLANT (MOROCCO)	
<b>1.4 Product Category</b>	All products currently in production at ST Bouskoura back-end plant (Morocco) on TO220 line	
<b>1.5 Issue date</b>	2020-02-13	

**2. PCN Team**

<b>2.1 Contact supplier</b>	
<b>2.1.1 Name</b>	KELLY MURPHY
<b>2.1.2 Phone</b>	
<b>2.1.3 Email</b>	kelly.murphy@st.com
<b>2.2 Change responsibility</b>	
<b>2.2.1 Process Owner</b>	Daniele Alfredo BRAMBILLA
<b>2.1.2 Corporate Quality Manager</b>	Gerard PETIT

**3. Change**

<b>3.1 Category</b>	<b>3.2 Type of change</b>	<b>3.3 Manufacturing Location</b>
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)	Bouskoura internal plant (Morocco)

**4. Description of change**

	<b>Old</b>	<b>New</b>
<b>4.1 Description</b>	TO220 produced at ST Bouskoura back-end plant (Morocco / 15% decreasing capacity) and ST Shenzhen back-end (China / 85%), including Test & Finishing	TO220 produced at ST Shenzhen back-end (China / 100%)
<b>4.2 Anticipated Impact on form,fit, function, quality, reliability or processability?</b>	Form : No impact Fit : No impact (mold compound is changed, refer to document PCN ADG/19/11736 ) Function : No impact expected (part of qualification) Reliability or Processability : No impact expected (part of qualification)	

**5. Reason / motivation for change**

<b>5.1 Motivation</b>	Obsolescence of Bouskoura TO220 BE line preventing guarantee of business continuity
<b>5.2 Customer Benefit</b>	QUALITY IMPROVEMENT

**6. Marking of parts / traceability of change**

<b>6.1 Description</b>	By internal traceability / dedicated FG
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**7. Timing / schedule**

<b>7.1 Date of qualification results</b>	2020-07-17
<b>7.2 Intended start of delivery</b>	2020-08-21
<b>7.3 Qualification sample available?</b>	Upon Request

**8. Qualification / Validation**

<b>8.1 Description</b>	12002 Rel01-2020_V3.pdf		
<b>8.2 Qualification report and qualification results</b>	Available (see attachment)	<b>Issue Date</b>	2020-02-13

**9. Attachments (additional documentations)**

12002 Public product.pdf  
 12002 PCN Notification for PTD and LGS Macro Division.pdf  
 12002 Rel01-2020\_V3.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
IRF630	IRF630	
STP10NK80Z	STP10NK80Z	
STP11NM60FD	STP11NM60FD	
	STP11NM60ND	
STP11NM80	STP11NM80	
STP120NF10	STP120NF10	
STP12NM50	STP12NM50	
STP14NF10	STP14NF10	
STP14NK50Z	STP14NK50Z	
	STP15N65M5	
	STP15N80K5	
	STP15N95K5	
	STP16N65M5	
STP16NF06	STP16NF06	
STP16NF06L	STP16NF06L	
	STP18N60M2	
	STP19NF20	
	STP20NF20	
STP20NM50	STP20NM50	
STP20NM50FD	STP20NM50FD	
	STP23NM50N	
STP24NF10	STP24NF10	
STP2NK90Z	STP2NK90Z	
	STP31N65M5	
	STP3N150	
STP40NF10L	STP40NF10L	
	STP40NF20	
STP45NF06	STP45NF06	
	STP4N150	
STP55NF06L	STP55NF06L	
STP5NK80Z	STP5NK80Z	
STP60NF06L	STP60NF06L	
STP62NS04Z	STP62NS04Z	
	STP6N95K5	
	STP75NF75C	
	STP7LN80K5	
STP80NF06	STP80NF06	
STP80NF55-08	STP80NF55-08	
	STP85N3LH5	
	STP8N80K5	
STP8NK100Z	STP8NK100Z	
	STP8NM50N	

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## 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 :** DISCONTINUATION OF TO220 BACK-END PRODUCTION LINE AT ST BOUSKOURA PLANT (MOROCCO)

**PCN Reference :** CRP/20/12002

**Subject :** Public Products List

Dear Customer,

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

STP8NK100Z	STP11NM80	STP40NF20
STP15N65M5	STP80NF06	STP14NF10
STP16NF06L	STP85N3LH5	STP4N150
STP20NF20	STP24NF10	STP8NM50N
STP9NK50Z	STP15NK50Z	STP55NF06L
STP15N95K5	STP20NF06L	STP6N62K3
STP120NF10	STP13NK60Z	STP14NK50Z
STP3N150	STP5NK50Z	STP20NM50
STP15N80K5	STP9NK70Z	STP18N55M5
STP6NK60Z	STP7N80K5	STP80NF55L-06
STP60NF06L	STP24NM60N	STP6N95K5
STP8N80K5	STP10NK80Z	STP3NK90Z
STP40NF12	STP16NF06	STP13N80K5
IRF630	STP2NK90Z	STP8NK80Z
STP7LN80K5	STP40NF10L	STP18N60M2
STP10P6F6	STP16N65M5	STP9NK90Z
STP80NF55-08	STP31N65M5	STP62NS04Z
STP12NM50	STP5NK80Z	STP19NM50N
STP4NK80Z	STP200NF03	STP11NK50Z
STP45NF06	STP19NF20	STP9NK65Z
STP11NK40Z	STP4NK60Z	STP23NM50N



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## CORPORATE PRODUCT/PROCESS CHANGE NOTIFICATION

**SUBJECT**      **DISCONTINUATION OF TO-220 BACK-END PRODUCTION LINE AT ST BOUSKOURA PLANT (MOROCCO)**

<b>IMPACTED PRODUCTS</b>	<p>All industrial products currently in production at ST Bouskoura back-end plant (Morocco) on standard TO-220 line and assembled in the following packages:</p> <ul style="list-style-type: none"> <li>✚ TO-220</li> </ul> <p>Products inside Low Voltage Solution Division inside Low Voltage and ST iGaN Solution Macro-Division and High Voltage Business Unit inside Power Transistor Macro-Division (ADG Group) are directly impacted.</p>
<b>MANUFACTURING STEP</b>	<p>Assembly and Test &amp; Finishing.</p>
<b>INVOLVED PLANT</b>	<p>ST Bouskoura internal plant (Morocco)</p>
<b>CHANGE REASON</b>	<p>In the frame of the back-end locations management, ST has already a qualified TO-220 line in its internal plant in Shenzhen (China).</p>
<b>CHANGE DESCRIPTION</b>	<p>Production discontinuation of TO-220 line at ST Bouskoura from W26/2020.</p> <p>ST has already engaged qualification of products still not released at new back-end lines.</p> <p>Production in Shenzhen (China) will be with New Molding compound as already announced by PCN ADG/19/11736.</p>
<b>TRACEABILITY</b>	<p>By internal traceability and dedicated FG code</p>



**VALIDATION**

Validation is based on required performances and market application requirements. Here following the qualification plan we will use to validate the change:

**Commercial Product**

STP4N150

STP13NM60ND

STP4N80K5

**Qualification Plan**

See attached document: **Rel01-2020\_V3.pdf**

**NOTIFICATION**

This document is intended to be the official notification to the customers

**REPORTS**

The qualification results will be shared according to plan reported inside the PCN notification.

**Reliability evaluation plan and results for**  
*TO-220 Power MOSFET Back-End line relocation*  
*from Bouskoura to Shenzhen (China) -*  
**INDUSTRIAL**  
*Package transfer*

General Information	
<b>Commercial Product</b>	: STP13NM60ND - STP4N80K5 STP4N150
<b>Silicon Line</b>	: F26301 - VJ8101 - MSAK01
<b>Product Description</b>	: Power MOSFET
<b>Package</b>	: TO-220
<b>Silicon Technology</b>	: FDmesh™ II - PowerMESH™ - MDmesh™ K5
<b>Division</b>	: Power Transistor Macro-Division

Traceability	
<b>Diffusion Plant</b>	: SG6" (Singapore) - CT8" Catania (Italy)
<b>Assembly Plant</b>	: ST Shenzhen (China)
<b>Reliability Lab</b>	: Catania (Italy)
Reliability Assessment	
<b>Passed</b>	<input checked="" type="checkbox"/>

**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. 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**

Version	Date	Author	Changes description
1.0	28 January 2020	A. SETTINIERI	Preliminary Report

**APPROVED BY:**  
 Corrado CAPPELLO  
 ADG Q&R department - Catania  
 STMicroelectronics

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# 1. RELIABILITY EVALUATION OVERVIEW

## 1.1 Objective

Reliability evaluation for TO-220 Power MOSFET Back-End line relocation from Bouskoura to Shenzhen (China) - INDUSTRIAL

## 1.2 Reliability Test Plan

Reliability tests performed on this device are in agreement with JESD47 and 0061692 internal spec Guidelines and are listed in the Test Plan.

For details on test conditions, generic data used and spec reference see test results summary at Par.3 .

#	Stress	Abrv	Reference	Test Flag	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	High Temperature Storage Life	HTSL	JESD22B-101	Y	
4	High Temperature Gate Bias	HTGB	JESD22A-108	Y	
5	High Temperature Reverse Bias	HTRB	JESD22A-108	Y	
6	Pre-conditioning	PC	JESD22A-113	Y	
7	Temperature Cycling	TC	JESD22A-104	Y	
8	Autoclave	AC	JESD22A-102	Y	
9	High Humidity High Temperature Reverse Bias	H3TRB	JESD22A-101	Y	
10	Intermittent Operational Life / Thermal Fatigue	IOL / TF	MIL-STD-750 Method 1037	Y	
11	ESD Characterization	ESD ( HBM, CDM )	ESDA-JEDEC JES-001 and AINSI-ESD S5.3.1	Y	
12	Solderability	SD	JESD22B-102	Y	
13	Resistance to solder heat	RSH	JESD2B-106	Y	

### 1.3 Interim results comment

Preliminary reliability tests have been completed with positive results. Neither functional nor parametric rejects were detected at final electrical testing. Parameter drift analysis performed on samples submitted to die and package oriented test showed a good stability of the main electrical monitored parameters. Package oriented tests have not put in evidence any criticality. ESD is accordance with ST spec.

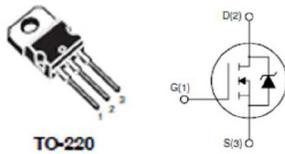
On the basis of the overall results obtained, we can give a positive judgment on the INTERIM reliability evaluation for TO-220 Power MOSFET Back-End line relocation from Bouskoura to Shenzhen (China) - in agreement with JESD47 and 0061692 internal spec.

## 2. DEVICE/TEST VEHICLE CHARACTERISTICS

### 2.1 Generalities

FDmesh™ II - MDmesh™ K5 - Power MOSFET HV

### 2.2 Pin Connection



### 2.3 Traceability

Reference “Product Baseline” document if existing, else provide following chapters/information:

**D.U.T.: STP13NM60ND**

**PACKAGE: TO-220**

Wafer fab information	
Wafer fab manufacturing location	SG6” (Singapore)
Wafer diameter (inches)	6”
Silicon process technology	FDmesh™ II
Die finishing front side (passivation)	SiN (Nitride)
Die finishing back side	Ti/Ni/Ag
Die area (Stepping die size)	3950 x 2930 μm <sup>2</sup>
Metal levels/Materials	1 / AISi

Assembly Information	
Assembly plant location	STS Shenzhen (China)
Package code description	TO-220
Lead frame/Substrate	FRAME TO220 Mon Ve1 OpD/H/L 20u PINi/NiP
Die attach material	Preform Pb/Ag/Sn
Wires bonding materials/diameters	Gate Al/Mg 5mils / Source: Al 10mils
Molding compound	Halogen free

**D.U.T.: STP4N80K5**
**PACKAGE: TO-220**

Wafer fab information	
Wafer fab manufacturing location	CT8" Catania (Italy)
Wafer diameter (inches)	8"
Silicon process technology	MDmesh™ K5
Die finishing front side (passivation)	TEOS + SiN (Nitride)
Die finishing back side	Ti/Ni/Ag
Die area (Stepping die size)	2620 x 2150 μm <sup>2</sup>
Metal levels/Materials	1 / AlCu

Assembly Information	
Assembly plant location	STS Shenzhen (China)
Package code description	TO-220
Lead frame/Substrate	FRAME TO220 Mon Cu OpH/N 20u BARE COPPER
Die attach material	Preform Pb/Ag/Sn
Wires bonding materials/diameters	Gate / Source Cu 2mils
Molding compound	Halogen free

**D.U.T.: STP4N150**
**PACKAGE: TO-220**

Wafer fab information	
Wafer fab manufacturing location	SG6" (Singapore)
Wafer diameter (inches)	6"
Silicon process technology	PowerMESH™
Die finishing front side (passivation)	SiN (Nitride)
Die finishing back side	Ti/Ni/Ag
Die area (Stepping die size)	6250 x 4630 μm <sup>2</sup>
Metal levels/Materials	1 / AISi

Assembly Information	
Assembly plant location	ST Shenzhen (China)
Package code description	TO-220
Lead frame/Substrate	FRAME TO220 Mon Ve1 OpD/H/L/N PINi/NiP
Die attach material	PREFORM Pb/Ag/Sn
Wires bonding materials/diameters	Gate: Al/Mg 5 mils - Source: Al/Mg 5 mils
Molding compound	Halogen Free

Reliability Testing Information	
Reliability laboratory location	Catania (Italy)
Electrical testing location	Catania (Italy)

### 3. TESTS RESULTS SUMMARY

#### 3.1 Lot Information

Lot #	Commercial Product	Silicon Line	Package	Wafer Fab	Assembly plant	Note
1	STP13NM60ND	F263	TO-220	SG6" (Singapore)	ST Shenzhen (China)	
2	STP4N80K5	VJ81				
3	STP4N150	MSAK				
4						
5						

#### 3.2 Test results summary

Test	P C	Std ref.	Conditions	SS	Steps	Failure/SS							
						Lot 1	Lot 2	Lot 3	Lot 4	Lot 5			
TEST		User specification	All qualification parts tested per the requirements of the appropriate device specification.		190	190	WK26	WK26	WK26				
External visual		JESD22 B-101	All devices submitted for testing		190	190							
<b>Silicon oriented tests</b>													
HTSL	N	JESD22B 101	TA = 150°C	135	1000 h								
HTRB	N	JESD22 A-108	Tj = 150°C, BIAS = 480V	45	1000 h	0/45							
			Tj = 150°C, BIAS = 640V	45						0/45			
			Tj = 150°C, BIAS = 1200V										
HTGB	N	JESD22 A-108	Tj = 150°C, BIAS = 25V	45	1000 h	0/45							
			Tj = 150°C, BIAS = 30V	45						0/45			
<b>Package oriented Tests</b>													
TC	Y	JESD22 A-104	TA=-55°C TO 150°C	50	500cy	0/25	0/25						
AC	N	JESD22 A-102	TA=121°C ; PA=2ATM	50	96h	0/25	0/25						
H3TRB	Y	JESD22 A-101	TA=85°C ; RH=85% BIAS= 100V	50	1000 h	0/25	0/25						
IOL	N	MIL-STD-750 Method 1037	ΔTj ≥100°C	50	10Kcy	0/25	0/25						
ESD		ESDA-JEDEC JES-001 ANSI – ESD S5.3.1	CDM / HBM	12		0/3 0/3	0/3 0/3						
SD		JESD22B-102		20		0/10	0/10						
RSH		JESD2B-106		24		0/12	0/12						