PRODUCT / PROCESS CHANGE NOTIFICATION

1. PCN basic data	
1.1 Company	STMicroelectronics International N.V
1.2 PCN No.	ADG/24/14592
1.3 Title of PCN	TO-220FP line transfer from Shenzhen to TFME Tongke (China)
1.4 Product Category	IGBT's
1.5 Issue date	2024-03-12

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	Angelo RAO
2.1.2 Marketing Manager	Natale Sandro D'ANGELO
2.1.3 Quality Manager	Vincenzo MILITANO

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)	TFME Tongke (China)

4. Description of change		
	Old	New
4.1 Description	TO-220FP products are manufactured in Shenzhen (China)	TO-220FP products are manufactured in TFME Tongke (China)
4.2 Anticipated Impact on form,fit, function, quality, reliability or processability?	processability	

5. Reason / motivation for change	
5.1 Motivation	TO-220FP Shenzhen line closure and equipment transfer to TFME Tongke
5.2 Customer Benefit	SERVICE CONTINUITY

6. Marking of parts / traceability of change	
6.1 Description	By dedicated FG codes

7. Timing / schedule	
7.1 Date of qualification results	2024-02-19
7.2 Intended start of delivery	2024-05-19
7.3 Qualification sample available?	Upon Request

8. Qualification / Validation			
8.1 Description	14592 RERPTD24010_1.0_TO220FP package Transfer from STS to Tongke subcon for IGBT and Bipolar transistor products.pdf		
8.2 Qualification report and qualification results	Available (see attachment)	Issue Date	2024-03-12

9. Attachments (additional documentations)

14592 Public product.pdf
14592 14592.pdf
14592 RERPTD24010_1.0_TO220FP package Transfer from STS to Tongke subcon for IGBT and Bipolar transistor products.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
	2STP535FP	
BDW93CFP	BDW93CFP	
BDW94CFP	BDW94CFP	
	BUL1102EFP	
	D45H11FP	
	STGF10H60DF	
	STGF10M65DF2	
STGF10NB60SD	STGF10NB60SD	
	STGF10NC60KD	
	STGF14NC60KD	
	STGF15H60DF	
	STGF15M65DF2	
	STGF19NC60KD	
	STGF20H60DF	
	STGF20H65DFB2	
	STGF20M65DF2	
	STGF30M65DF2	
	STGF3NC120HD	
	STGF4M65DF2	
	STGF5H60DF	
	STGF6M65DF2	
	STGF6NC60HD	
	STGF7H60DF	
	STGF7NB60SL	

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TO-220FP line transfer from Shenzhen to TFME Tongke (China)

ADG/24/14592

Product family	Technology	Package
IGBT BJT		TO-220FP TO-220FP

Description of the change

TO-220FP line transfer from Shenzhen to TFME Tongke (China).
TO-220FP products, manufactured in TFME Tongke, guarantee the same equipment, BOM (bill of materials), POA, quality and electrical characteristics as current production.

Reason

TO-220FP Shenzhen line closure and equipment transfer to TFME Tongke

Date of implementation

May, 19th, 2024

Impact of the change

Form	
Fit	
Function	
Reliability	
Processibility	X

Qualification of the change

See attached Preliminary Reliability Report.

APPENDIX 1: QUALIFICATION EXECUTION AND RESULT

#	Test name	Conditions	Sample size	Criteria	Result
1	IGBT	See attached report	See attached report	See attached report	See attached report
2	BJT	See attached report	See attached report	See attached report	See attached report
3					
4					
5					
…					

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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 : TO-220FP line transfer from Shenzhen to TFME Tongke (China)

PCN Reference : ADG/24/14592

Subject : Public Products List

Dear Customer,

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

STGF7H60DF	STGF14NC60KD	2STP535FP
BDW94CFP	STGF10H60DF	STGF10NB60SD
STGF15H60DF	STGF6M65DF2	STGF5H60DF
STGF19NC60KD	STGF4M65DF2	BUL1102EFP
STGF20H60DF	STGF20H65DFB2	STGF6NC60HD
STGF30H65DFB2	BDW93CFP	D45H11FP
STGF20M65DF2	STGF30M65DF2	STGF10M65DF2
STGF10NC60KD	STGF7NB60SL	STGF3NC120HD
STGF15M65DF2		

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TO220FP package Transfer from STS to Tongke assembly plant subcon for IGBT and Bipolar transistor products Industrial domain Interim Reliability Evaluation Report

Note: *this report is a summary of the reliability trials performed in good faith by STMicroelectronics in order to evaluate the electronic device conformance to its specific mission profile for Industrial Application. This report and its contents shall not be disclosed to a third party without previous written agreement from STMicroelectronics or under the approval of the author (see below).*

Revision history

Rev.	Changes description	Author	Date
1.0	First results	M. Panzarella	February 8th , 2024

Approved by

Function	Location	Name	Date
Division Reliability Manager	ST Catania (Italy)	M.De Tomasi	February 8th , 2024

Table of Contents

1. Reliability Evaluation Overview

1.1. Objective

Aim of this report is to present the results of the reliability evaluations performed on selected test vehicle to release in mass production the package TO220FP assembled in Tongke assembly plant.

The involved test vehicles are:

Commercial product	Silicon Line	Technology	Diffusion Wafer Fab	Die size (mm2)	Reliability Plan
STGF30M65DF2	KLF5+U66N	IGBT Trench gate Emitter Implant Field Stop LA	ST CT8 (Italy)	16.5	Full evaluation in agreement with ST 0061692 on 1 lot x CP
STGF6NC60HD(040Y	IV62+W89G	IGBT Planar	ST SG6 (Singapore)	4.4	
STGF3NC120HD	IVJ2+E47I	IGBT Planar	ST SG6 (Singapore)	10	
BUL1102EFP	BV47	Bipolar Planar	ST SG6 (Singapore)	6	
2STP535FP	B535	Bipolar Planar	ST SG6 (Singapore)	10.3	
BDW93CFP	BB03	Epitaxial Planar	ST SG6 (Singapore)	5.5	

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** specification and are listed in 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

Test Plan Table

#	TEST NAME	DESCRIPTION / COMMENTS	TEST FLAG
1	TEST	Pre- and Post- Stress Electrical Test	Yes
2	PC	Preconditioning	Not Applicable
3	EV	Eternal Visual	Yes
4	HTRB	High Temperature Reverse Bias	Yes
5	HTGB	High Temperature Gate Bias	Yes
6	TC	Temperature Cycling	Yes
7	AC	Autoclave	Yes
8	THB	Temperature Humidity Bias	Yes
9	IOL	Intermittent Operational Life	Yes
10	ESD	ESD Characterization	No

1.3. Conclusion

All reliability tests have been completed with positive results on **STGF6NC60HD(040Y**, **STGF3NC120HD**, **BUL1102EFP** , **2STP535FP** and **BDW93CFP**. Neither functional nor parametric rejects were detected at final electrical testing.

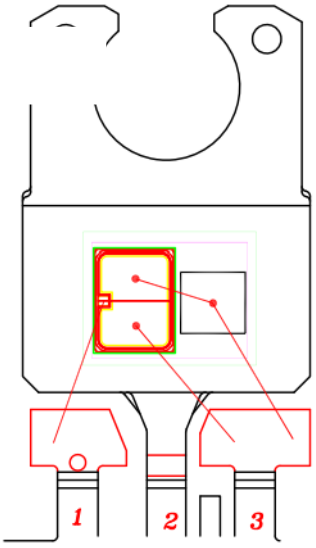
The final report will be issued once the THB and AC tests will be done on the product **STGF30M65DF2.**

2. Product Characteristics

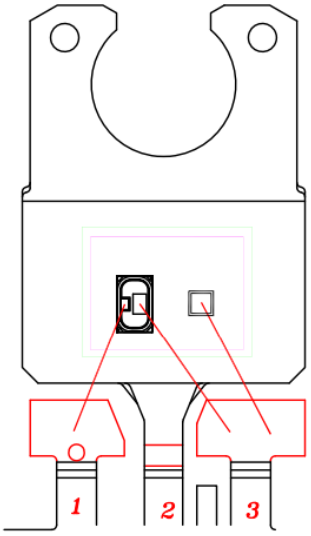
2.1. Generalities

2.1.1. Bonding diagram

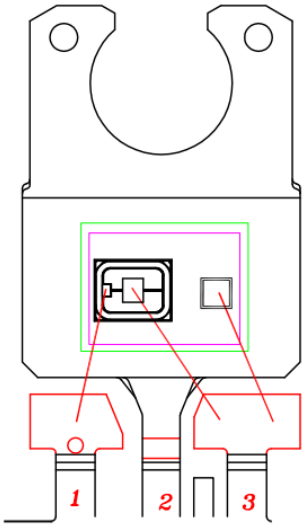
KLF5



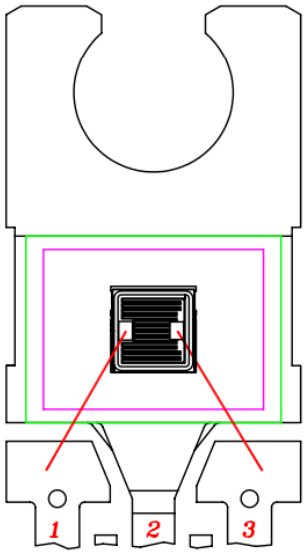
IV62



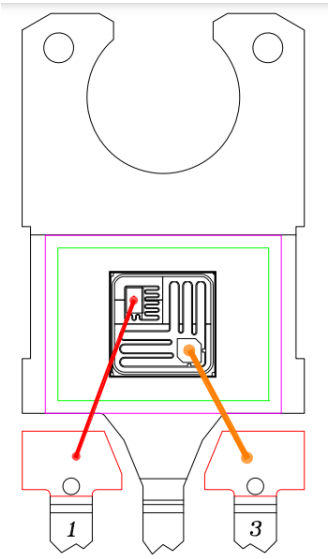
IVJ2



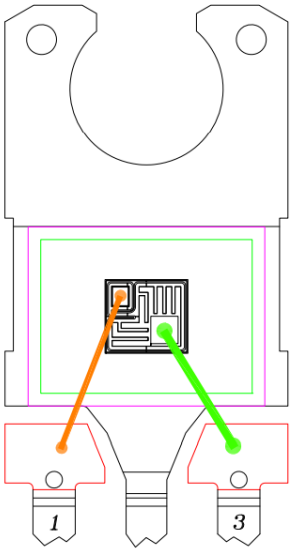
BV47



B535



BB03



2.2. Traceability

2.2.1. Wafer Fab information

CP	STGF30M65DF2
Wafer fab name / location	ST CT8 Catania (Italy)
Wafer diameter (inches)	8”
Silicon process technology	IGBT Trench gate field-stop Emitter Implant LA
Die finishing front side	SiN
Die finishing back side	Al/Ti/NiV/Ag
Die size (micron)	3600 x 4600 um^2
Metal levels/ materials/ thicknesses	1 level, AlCu/W 4.5um

CP	STGF6NC60HD(040Y
Wafer fab name / location	ST SG6 Ang Mo Kio (Singapore)
Wafer diameter (inches)	6”
Silicon process technology	IGBT Planar
Die finishing front side	SiN
Die finishing back side	Cr/Ni/Ag
Die size (micron)	1690 x 2620 um^2
Metal levels/ materials/ thicknesses	1 level, AlSi 4.5um

CP	STGF3NC120HD
Wafer fab name / location	ST SG6 Ang Mo Kio (Singapore)
Wafer diameter (inches)	6”
Silicon process technology	IGBT Planar
Die finishing front side	SiN
Die finishing back side	Cr/Ni/Ag
Die size (micron)	3550 x 2810 um^2
Metal levels/ materials/ thicknesses	1 level, AlSi 4.5um

CP	BUL1102EFP
Wafer fab name / location	ST SG6 Ang Mo Kio (Singapore)
Wafer diameter (inches)	6”
Silicon process technology	Bipolar Planar
Die finishing front side	SiN
Die finishing back side	Ti/Ni/Ag
Die size (micron)	2430 x 2460 um^2
Metal levels/ materials/ thicknesses	1 level, AlSi 3um

CP	2STP535FP
Wafer fab name / location	ST SG6 Ang Mo Kio (Singapore)
Wafer diameter (inches)	6”
Silicon process technology	Bipolar Planar
Die finishing front side	PSG
Die finishing back side	AuAs/Cr/Ni/Au
Die size (micron)	3210 x 3210 um^2
Metal levels/ materials/ thicknesses	1 level, Al 6um

CP	BDW93CFP
Wafer fab name / location	ST SG6 Ang Mo Kio (Singapore)
Wafer diameter (inches)	6”
Silicon process technolog	Epitaxial Planar
Die finishing front side	PSG
Die finishing back side	AuAs/Cr/Ni/Au
Die size (micron)	2490 x 2220 um^2
Metal levels/ materials/ thicknesses	1 level, AlSi 6um

2.2.2. Assembly information

Assembly plant name / location	TFME TongKe (China) subcon
Package descrition	TO220FP
Lead frame/Substrate	FRAME TO220 FP Ve4 IDF OpD 40u SelNi/NiP
Die attach material	PREFORM Pb/Ag/Sn 95.5/2.5/2 D.76mm SSD
Wire bonding material/diameter	Al 15 mils Source - Al-Mg 5 mils Gate (STGF30M65DF2) Al-Mg 5 mils Source - Al-Mg 5 mils Gate (STGF6NC60HD(040Y) Al 7 mils Source - Al-Mg 5 mils Gate (STGF3NC120HD) Al-Mg 5 mils Emitter - Al-Mg 5 mils Base (BUL1102EFP) Al 7 mils Emitter - Al-Mg 5 mils Base (2STP535FP) Al 10 mils Emitter - Al 7 mils Base (BDW93CFP)
Molding compound material	RESIN GE-400S D16mm W9.0g
Package Moisture Sensitivity Level (JEDEC J-STD020D)	Not Applicable

2.2.3. Reliability Testing information

Reliability laboratory location	STM Catania (Italy)

3. Tests Results Summary

3.1. Lot Information

Lot #		Diffusion Lot	Assembly Lot	Note
Lot1	STGF30M65DF2 (KLF5+U66N ST silicon line)	V524475R	GS318002	
Lot2	STGF6NC60HD(040Y (IV62+W89G ST Silicon line)	V6246LYT	GS318004	
Lot3	STGF3NC120HD (IVJ2+E47I ST Silicon line)	VW3090P6	GS321003	
Lot4	BUL1102EFP (BV47 Silicon line)	VW225N66	GS317004	
Lot5	2STP535FP (B535 Silicon line)	VW232L79	GS316010	
Lot6	BDW93CFP (BB03 Silicon line)	VW252E89	GS317001	

3.2. Test results summary (table)

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

Test	#	Reference	STM Test Conditions	Lots	S.S.	Total	Results FAIL/SS/Lots	Comments
TEST	1		User specification or supplier's standard specification	6	235	1140	0/235/6	All qualification parts
PC	2	–	–	–	–	–	–	
EV	3	JESD22B-101I	All qualification parts submitted for testing	6	235	1140	0/235/6	
HTRB	4	MIL-STD-750-1 M1038 Method A	Tj=175°C, Vces=520V, 1000h (KLF5) Tj=175°C, Vces=480V, 1000h (IV62) Tj=175°C, Vces=960V, 1000h (IVJ2) Tj=150°C, Vces=880V, 1000h (BV47) Tj=150°C, Vces=140V, 1000h (B535) Tj=150°C, Vces=80V, 1000h (BB03)	6	45	270	0/45/6	
HTGB	5a	JESD22 A-108	Tj=175°C, Vgs= 20V, 1000h	3	45	135	0/45/3	Performed on Lot#1,2,3
HTGB	5b	JESD22 A-108	Tj=175°C, Vgs= -20V, 1000h	3	45	135	0/45/3	Performed on Lot#1,2,3
TC	6	JESD22A-104	Ta=-55°C /+150°C, 1000cy	6	25	150	0/25/6	
AC	7	JESD22 A-102	Ta=121°C, Pa=2atm, RH=100%, 96 hours	6	25	150	0/25/5	To be performed on Lot#1 KLF5
THB	8	JESD22A-101	Ta=85°C, RH=85% Vds=100V, 1000h	6	25	150	0/25/5	To be performed on Lot#1 KLF5
IOL	9	MIL-STD-750 Method 1037	15Kcy @ Ta=25°C with parts powered to insure $\Delta Tj \geq 100°C$ (not to exceed absolute maximum ratings).	6	25	150	0/25/6	
ESD	10	JEDEC JS-001 & JS-002	–	–	–	–	–	–

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