PRODUCT / PROCESS CHANGE NOTIFICATION

1. PCN basic data	
1.1 Company	STMicroelectronics International N.V
1.2 PCN No.	ADG/21/13069
1.3 Title of PCN	IGBT/IPM TFS Technology Front End expansipon - External Samsung Foundry (Korea) - Industrial
1.4 Product Category	IGBT's/IPM
1.5 Issue date	2021-10-22

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
General	Wafer diameter modification	Samsung - Korea

4. Description of change		
	Old	New
4.1 Description	IGBT/IPM TFS products are manufactured in Catania (Italy) and Ang Mo Kio (Singapore)	IGBT/IPM TFS products will be manufactured in external Samsung Foundry (Korea)
4.2 Anticipated Impact on form,fit, function, quality, reliability or processability?	no impact	

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

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	2021-11-13
7.2 Intended start of delivery	2022-01-17
7.3 Qualification sample available?	Upon Request

8. Qualification / Validation			
8.1 Description	13069 Binder1.pdf		
8.2 Qualification report and qualification results	Available (see attachment)	Issue Date	2021-10-22

9. Attachments (additional documentations)
13069 Public product.pdf 13069 IGBT IPM TFS - Front end expansion to outsource (Samsung).pdf 13069 Binder1.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
	STGB10H60DF	
	STGB15H60DF	
	STGB20V60DF	
	STGB20V60F	
	STGB30H60DFB	
	STGB30H60DLFB	
	STGB30H65FB	
	STGB30V60DF	
	STGB30V60F	
	STGB40H65FB	
	STGB40V60F	
	STGB5H60DF	
	STGB7H60DF	
	STGD5H60DF	
	STGF10H60DF	
	STGF15H60DF	
	STGF5H60DF	
	STGF7H60DF	
	STGFW20H65FB	
	STGFW20V60DF	
	STGFW20V60F	
	STGFW30H65FB	
	STGFW30V60DF	
	STGFW30V60F	
	STGFW40H65FB	
	STGFW40V60DF	
	STGFW40V60F	
	STGIB10CH60TS-L	
	STGIB10CH60TS-LZ	
	STGIB10CH60TS-X	
	STGIB15CH60S-L	
	STGIB15CH60TS-E	
	STGIB15CH60TS-L	
	STGIB15CH60TS-LZ	
	STGIB15CH60TS-X	
	STGIF10CH60TS-L	
	STGIF5CH60TS-L	
	STGIF7CH60TS-L	
	STGIPQ4C60T-HZ	
	STGIPQ5C60T-HL	
	STGIPQ5C60T-HLS	
	STGIPQ5C60T-HZ	
	STGIPQ5C60T-HZS	
	STGIPQ8C60T-HZ	
	STGP10H60DF	
	STGP15H60DF	
	STGP20V60DF	

	STGP20V60F	
	STGP30H60DFB	
	STGP30V60DF	
	STGP30V60F	
	STGP40V60F	
	STGP5H60DF	
	STGP7H60DF	
	STGW20H65FB	
	STGW20V60DF	
	STGW20V60F	
	STGW30H60DFB	
	STGW30H60DLFB	
	STGW30H65FB	
	STGW30V60DF	
	STGW30V60F	
	STGW40H60DLFB	
	STGW40H65DFB	
	STGW40H65DFB-4	
	STGW40H65FB	
	STGW40V60DF	
	STGW40V60DLF	
	STGW40V60F	
	STGW60H60DLFB	
	STGW60H65DFB	
	STGW60H65DFB-4	
	STGW60H65FB	
	STGW60V60DF	
	STGW60V60F	
	STGW80H65DFB	
	STGW80H65DFB-4	
	STGW80H65FB	
	STGW80V60DF	
	STGW80V60F	
	STGWA30H65FB	
	STGWA40H60DLFB	
	STGWA40H65DFB	
	STGWA40H65FB	
	STGWA60H65DFB	
	STGWA60V60DF	
	STGWA80H65DFB	
	STGWA80H65FB	
	STGWT20H65FB	
	STGWT20HP65FB	
	STGWT30H60DFB	
	STGWT40H65DFB	
	STGWT40HP65FB	
	STGWT40V60DF	
	STGWT40V60DLF	
	STGWT60H65DFB	
	STGWT60V60DF	
	STGWT80H65DFB	

	STGWT80H65FB	

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IGBT Trench Gate FS Emitter Implant
Samsung Wafer Foundry Technology qualification

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Revision history

Rev.	Changes description	Author	Date
1.0	New release	M.Panzarella	September 20th , 2021

Approved by

Function	Location	Name	Date
Division Reliability Manager	ST Catania (Italy)	A. Marmoni	September 20th , 2021

Contents

1. Reliability Evaluation Overview

1.1. Objective and reliability strategy

Aim of this document is to present the qualification plan to be performed on a selected test vehicle to release in mass production the products designed in IGBT Trench Gate FS Emitter Implant Technology intended for standard application domain, diffused in Samsung Wafer Foundry.

The qualification activity will be performed on 3 diffusion lots assembled into 3 different packages:

Commercial product	Silicon line	Package	Assembly plant
STGW40H65DFB	EWF6	TO247	ST Shenzhen (China)
STGWA40HP65FB	EWF6	TO247-LL	TFME subcon (China)
STGWT40HP65FB	EWF6	TO3P	SPSEMI subcon (Korea)

The qualification plan is based on a full reliability stress test matrix according to **ST 0061692** specification for standard domain including Electrical Characterization and ESD Characterization.

Details of each stress test and relevant conditions are reported in the tables at section 1.2 and 2.

1.2. Test Plan

1.2.1. 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	External Visual	Yes
4	PV	Parametric Verification	Yes
5	HTRB	High Temperature Reverse Bias	Yes
6	HTGB	High Temperature Gate Bias	Yes
7	TC	Temperature Cycling	Yes
8	AC	Autoclave	Yes
9	THB	Temperature Humidity Bias	Yes
10	IOL	Intermittent Operational Life	Yes
11	ESD	ESD Characterization	Yes

2. Test summary details

2.1. Test 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	Comments
TEST	1		User specification or supplier's standard specification	3	241	723	All qualification parts
PC	2	-	-	-	-	-	Not applicable
EV	3	JESD22B-101I	All qualification parts submitted for testing	3	241	723	
PV	4	-	All parameters according to user specification at room, hot and cold temperature	3	25	75	
HTRB	5	MIL-STD-750-1 M1038 Method A	Tj=175°C, Vds=520V, 1000h	3	45	135	
HTGB	6 A	JESD22 A-108	Tj=175°C, Vgs= 20V, 1000h	3	45	135	
	6 B		Tj=175°C, Vgs= -20V, 1000h	3	45	135	
TC	7	JESD22A-104	Ta=-65°C /+150°C, 500cy	3	25	75	
AC	8	JESD22 A-102	Ta=121°C, Pa=2atm, RH=100%, 96h	3	25	75	
H3TRB	9	JESD22A-101	Ta=85°C, RH=85% Vds=100V, 1000h	3	25	75	
IOL	10	MIL-STD-750 Method 1037	10Kcy @ Ta=25°C with parts powered to ensure $\Delta Tj \geq 100°C$ (not to exceed absolute maximum ratings).	3	25	75	
ESD	11		HBM / CDM	1	6	6	3 for each configuration

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IGBT Trench Gate Emitter Implant
Samsung Wafer Foundry
Product transfer

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Revision history

Rev.	Changes description	Author	Date
1.0	New release	M.Panzarella	September 20th , 2021

Approved by

Function	Location	Name	Date
Division Reliability Manager	ST Catania (Italy)	A. Marmoni	September 20th , 2021

Contents

1. Reliability Evaluation Overview

1.1. Objective and reliability strategy

In order to release Samsung wafer Foundry as third source for product manufacturing design in IGBT Trench Gate FS Emitter Implant Technology intended for standard application domain, a qualification is now running by means a selected test vehicle assembled in 3 different packages:

Commercial product	Silicon line	Package	Assembly plant
STGW40H65DFB	EWF6	TO247	ST Shenzhen (China)
STGWA40HP65FB	EWF6	TO247-LL	TFME subcon (China)
STGWT40HP65FB	EWF6	TO3P	SPSEMI subcon (Korea)

Aim of this qualification plan is to present the reliability evaluation to be performed on selected test vehicles chosen as worst case based on maximum die size for all the other involved packages, see below the list matrix:

Commercial product	Silicon line	Package	Assembly plant
STGWA80H65DFB	EWFR	TO247 LL	TFME subcon (China)
STGB40H65FB	EWF6	D2PAK	ST Shenzhen (China)
STGW80H65DFB	EWFR	TO247	ST Shenzhen (China)
STGW80H65DFB-4	EWFR	TO247-4L	TFME subcon (China)
STGWT80H65DFB	EWFR	TO3P	SPSEMI subcon (Korea)
STGFW40V60DF	EVF6	TO3PF	SPSEMI subcon (Korea)
STGF20H60DF	EIFE	TO220FP	ST Shenzhen (China)
STGD5H60DF	EI62	DPAK	ST Shenzhen (China)
STGD5H60DFSF	EI62	DPAK	TFME subcon (China)

The qualification purpose will be addressed to verify the failure mode related to the Front-End (Silicon Technology) vs Back-End (Package Typology) interactions applying the path described here below:

1.2. Test Plan

1.2.1. Test Plan Table

#	TEST NAME	DESCRIPTION / COMMENTS	TEST FLAG
1	TEST	Pre- and Post- Stress Electrical Test	Yes
2	PC	Preconditioning	Yes
3	EV	External Visual	Yes
4	PV	Parametric Verification	Yes
5	HTRB	High Temperature Reverse Bias	Similarity (generic data)
6	HTGB	High Temperature Gate Bias	Similarity (generic data)
7	TC	Temperature Cycling	Yes
8	AC	Autoclave	Yes
9	THB	Temperature Humidity Bias	Yes
10	IOL	Intermittent Operational Life	Yes
11	ESD	ESD Characterization	Yes

2. Test summary details

2.1. Test 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	Comments
TEST	1		User specification or supplier's standard specification	1	106	106	All qualification parts
PC	2	JESD020E	24h bake@125°C MSL1 (168h@85C/85%RH) 3x Reflow simulation Peak Reflow Temp= 245°C or 260°C	1	100	100	All devices to be subjected to H3TRB, TC, AC and IOL Performed on 1 lot per each product mentioned in the table at pag3 of this report (If SMD package)
EV	3	JESD22B-101I	All qualification parts submitted for testing	1	106	106	Performed on 1 lot per each product mentioned in the table at pag3 of this report
PV	4	User Specification	All parameters according to user specification at room, hot and cold temperature	1	25	25	Performed on 1 lot per each product mentioned in the table at pag3 of this report
HTRB	5	MIL-STD-750-1 M1038 Method A	-	-	-	-	Family data
HTGB	6	JESD22 A-108	-	-	-	-	Family data
TC	7	JESD22A-104	Ta=-65°C /+150°C, 500cy	1	25	25	Performed on 1 lot per each product mentioned in the table at pag3 of this report
AC	8	JESD22 A-102	Ta=121°C, Pa=2atm, RH=100%, 96h	1	25	25	Performed on 1 lot per each product mentioned in the table at pag3 of this report
H3TRB	9	JESD22A-101	Ta=85°C, RH=85% Vds=100V, 1000h	1	25	25	Performed on 1 lot per each product mentioned in the table at pag3 of this report
IOL	10	MIL-STD-750 Method 1037	10Kcy @ Ta=25°C with parts powered to ensure $\Delta Tj \geq 100°C$ (not to exceed absolute maximum ratings).	1	25	25	Performed on 1 lot per each product mentioned in the table at pag3 of this report
ESD	11	JEDEC JS-001 & JS-002	HBM / CDM	1	6	6	Performed on 1 lot per each product mentioned in the table at pag3 of this report

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STGIB15CH60TS-L (RI64P1) / SDIP2B-26L
Intelligent Power Module
Samsung Wafer Foundry Product transfer

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Revision history

Rev.	Changes description	Author	Date
1.0		G. Carra'	07th October 2021

Approved by

Function	Location	Name	Date
Division Reliability Manager	ST Catania (Italy)	A. Marmoni	07th October 2021

Contents

1. Reliability Evaluation Overview

1.1. Objective and reliability strategy

In order to release Samsung wafer Foundry as third source for product manufacturing design in IGBT Trench Gate FS Emitter Implant Technology intended for standard application domain, a qualification plan is running on following vehicles:

Commercial product	Silicon line	Package	Assembly plant
STGW40H65DFB	EWF6	TO247	ST Shenzhen (China)
STGWA40HP65FB	EWF6	TO247-LL	TFME subcon (China)
STGWT40HP65FB	EWF6	TO3P	SPSEMI subcon (Korea)

Aim of this document is to present the qualification plan to release in mass production the Intelligent Power Module **STGIB15CH60TS-L** (RI64P1 as ST internal line) intended for Industrial application designed in IGBT Field Emitter Implant Trench MOSFET Technology, diffused in Samsung Foundry Wafer Fab and assembled in package SDIP2B-26L in ST Shenzhen (China) assembly plant.
The reliability evaluation will be performed according to **ST 0061692** specification.

Details of each stress test and relevant conditions are reported on section 2 table.

1.2. Test Plan

Test Plan Table

#	TEST NAME	TEST FLAG
1	Pre and Post Stress Electrical Test	Yes
2	External Visual	Yes
3	Preconditioning (PC)	No
4	Thermal Cycling (TC)	Yes
5	Vibration (V)	No
6	(Intermittent Operational Life/Thermal Fatigue) IOL/TF (PCmin)	Yes
7	PCsec (Pwcy)	No
8	AutoClave (AC)	Yes
9	High Temperature Storage (HTS)	No
10	Low Temperature Storage (LST)	No
11	High Temperature Reverse Bias (HTRB)	No
12	High Temperature Gate Bias (HTGB)	No
13	Temperature Humidity Bias (THB)	Yes

2. Test summary details

2.1. Test Summary table

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

Test #	Reference	Test name	STM Test Conditions	Lots	S.S.	Total	Comments
1		Pre and Post Stress Electrical Test	According to user specification or supplier's standard specification	1	30	30	All qualification parts before/after stress
2		External Visual		1	30	30	All qualification parts before/after stress
3	According to JESD22-A113 JSTD-020	Preconditioning	24h bake @125°C Store 168H @ TA=85°C RH=85% 3x IR Reflow @ 260°C	-	-	-	All qualification parts
4	According to JESD22 A-104	Thermal Cycling (TC)	Ta= -40°C/125°C, duration= 1000cy	1	6	6	
5		Vibration (V)		-	-	-	
6	MIL-STD-750 Method 1037	IOL/TF (PCmin)	ΔTj≥100°C, **cycles≥6K** cycle duration =2min	1	6	6	
7	MIL-STD-750 Method 1037	PCsec	ΔTj≥100°C, **cycles≥15K** cycle duration =7s	-	-	-	
8	According to JESD22 A-102	AutoClave	TA=121°C; PA=2ATM	1	6	6	
9	According to JESD22 A-103	High Temperature Storage (**HTS**)	Ta=150°C, duration=1000h	-	-	-	
10	According to JESD22 A-103	Low Temperature Storage (**LTS**)	Ta=-40°C, duration=1000h	-	-	-	
11	According to JESD22 A-108	High Temperature Reverse Bias (**HTRB**)	Vbias=0.8 Vdd, Ta=150°C, duration=1000h	-	-	-	
12	According to JESD22 A-108	High Temperature Gate Bias (**HTGB**)	Vbias=Vgs max, Ta=150°C, duration=1000h	-	-	-	
13	According to JESD22 A-101	Temperature Humidity Bias (**THB**)	Vbias=80V, Ta=85°C, RH=85%, duration=1000h	1	6	6	

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PCN ADG/21/13069

Catania, October 11th 2021

Automotive Discrete Group (ADG)
Power Transistor MACRO-Division
IGBT & IPM Business Unit

Process Change Notification

IGBT & IPM in Trench Field Stop Technology – Front end capacity Expansion to Samsung foundry

Dear Customer,

Following the continuous improvement of our service and in order to increase front-end capacity, this document is announcing the new 8" wafer line introduction at external foundry (Samsung – Korea) for IGBT Trench Field Stop Technology products listed in this PCN.
IGBT Trench Field Stop Technology manufactured in 8" wafer size at Samsung (Korea) foundry guarantees same quality and same electrical characteristics as per current production
The involved product series are listed in the table below:

Product Family	Technology	Test Vehicle type	Test vehicle Part numbers	Package	Implementation schedule
IGBT & IPM	IGBT Trench	Technology qualification (1 product in 3 package)	STGW40H65DFB	TO247	Wk02 2022
			STGWA40HP65FB	TO247 LL	Wk02 2022
			STGWT40HP65FB	TO3P	Wk02 2022
		Product qualification (1 test vehicle per package)	STGWA80H65DFB	TO247 LL	Wk16 2022
			STGW80H65DFB	TO247	Wk16 2022
			STGW80H65DFB-4	TO247-4L	Wk16 2022
			STGWT80H65DFB	TO3P	Wk16 2022
			STGB40H65FB	D2PAK	Wk16 2022
			STGFW40V60DF	TO3PF	Wk18 2022
			STGF20H60DF	TO220FP	Wk18 2022
			STGD5H60DF/DFSF	DPAK	Wk20 2022
			STGIB15CH60TS-L	SDIP2B-26L	Wk24 2022

Any other Product related to the above Product Family/Technology, even if not expressly included or partially mentioned in the attached table, is affected by this change.

Qualification program and results availability:

Technology and product reliability test plan reports are provided in attachment to this document.

Samples availability:

Samples of the technology test vehicle devices will be available upon request. Any other sample request will be processed and scheduled by IGBT&IPM Business Unit, upon request.

Change implementation schedule:

The production start and first shipments will be implemented as per above table.

Marking and traceability:

Unless otherwise stated by customer specific requirement, traceability of devices affected by this process change will be ensured by internal code (Finished Good) and Q.A. number.

Yours faithfully.

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 : IGBT/IPM TFS Technology Front End expansipon - External Samsung Foundry (Korea) - Industrial

PCN Reference : ADG/21/13069

Subject : Public Products List

Dear Customer,

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

STGIB10CH60TS-LZ	STGW60V60F	STGF10H60DF
STGB30H60DFB	STGWA30H65DFB	STGIF5CH60TS-L
STGWA80H65FB	STGB20V60F	STGD5H60DF
STGB40V60F	STGFW20V60DF	STGW30H60DLFB
STGWT40H65DFB	STGIPQ5C60T-HL	STGP15H60DF
STGWA60V60DF	STGWA30HP65FB	STGWT40HP65FB
STGB10H60DF	STGIPQ5C60T-HZ	STGIB15CH60TS-E
STGIB10CH60TS-E	STGW80H65DFB	STGW40H65DFB-4
STGIB15CH60TS-XZ	STGWT60H65DFB	STGW40V60F
STGIF10CH60TS-L	STGW60H65DFB-4	STGFW40V60DF
STGB20V60DF	STGW40V60DF	STGFW40H65FB
STGB30H60DLFB	STGWA40H65DFB	STGW60V60DF
STGIB10CH60S-L	STGWT30HP65FB	STGIPQ8C60T-HZ
STGWT30H60DFB	STGW80V60DF	STGWA80H65DFB
STGW20V60DF	STGIPQ4C60T-HZ	STGIF7CH60TS-L
STGW40V60DLF	STGIPQ5C60T-HZS	STGW60H65FB
STGWA40HP65FB	STGWT40V60DLF	STGF7H60DF
STGP10H60DF	STGW80H65FB	STGB40H65FB
STGP30V60DF	STGWT20H65FB	STGW40H60DLFB
STGW30V60F	STGFW30H65FB	STG80H65FBD7
STGP20V60DF	STGIB10CH60S-XZ	STGB7H60DF
STGP30H60DFB	STGW40H65DFB	STG40H65FBD7
STGW30H60DFB	STGP40V60F	STGW60H65DFB
STGIB15CH60TS-L	STGFW30V60F	STGIB15CH60S-XZ
STGF15H60DF	STGF5H60DF	STGWA40H60DLFB
STGW20V60F	STGFW20H65FB	STGB30H65FB
STGIB10CH60TS-L	STGW80V60F	STGP20V60F
STG30H65FBD7	STGB15H60DF	STGP7H60DF
STGIF5CH60TS-X	STGB30V60DF	STGW80H65DFB-4
STGIB15CH60S-L	STGWA20H65DFB	STGWT60H65FB
STGP5H60DF	STGWA60H65DFB	STGW30H65FB
STGFW40V60F	STGW40H65FB	STGWT80H65DFB
STGIPQ5C60T-HLS	STGIPQ4C60T-HL	STGWA40H65FB
STGIB15CH60TS-LZ	STGB30V60F	STGIB10CH60TS-XZ
STGFW20V60F	STGIB15CH60TS-X	STGWT40V60DF
STGFW30V60DF	STGWT60V60DF	STGW60H60DLFB

STGIF7CH60TS-X	STGB5H60DF	STGIF10CH60S-L
STGWT20HP65FB	STGP30V60F	STGWA30H65FB
STGWT80H65FB	STGIB10CH60TS-X	STGW30V60DF
STGW20H65FB		

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