Public Products List

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PCN Title : IPAK Al wire line relocation from Shenzhen to Tongfu Microelectronics (China)
PCN Reference : ADG/22/13788

Subject : Public Products List

Dear Customer,

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

STU5N95K3	STD2HNK60Z-1	STU13N60M2
STU2NK100Z	STU12N60M2	STD2NK90Z-1
STU7NM60N	STD5NM60-1	STU6N62K3
STD4NK80Z-1	STU8N80K5	STU6N95K5
STU16N65M2	STGD6NC60H-1	STU10NM60N
STU5N62K3	STU5N95K5	STU6N60DM2
STU7N60DM2	STU13NM60N	STU7N105K5

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PCN ADG/22/13788

Catania, November 21, 2022

Automotive & Discrete Group (ADG)
Power Transistor Sub-Group
High Voltage Business Unit
IGBT & IPM Business Unit

Process Change Notification

IPAK Al wire line relocation from Shenzhen to Tongfu Microelectronics (China) INDUSTRIAL

Dear Customer,

Following the continuous improvement of our service and with the aim of increasing production capacity, this document announces the closure of IPAK Shenzhen (China) line.

As results of the above-mentioned decision, all products assembled in IPAK with Al wires, will be relocated to our subcontractor Tongfu Microelectronics (China) named also TFME.

The IPAK Al wires products, manufactured in TFME, guarantees the same quality and electrical characteristics as per current production.

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

Qualification program and results availability:
The reliability test report plan is provided in attachment to this document.

Samples availability:
Samples of the test vehicle devices will be available on request starting from week 48 of 2022.
Any other sample request will be processed and scheduled by Power Transistor Sub-Group upon request.

Involved Products	Package	Test Vehicle	End of Qualification
Selected High Voltage Power MOSFET Selected IGBT	IPAK Al wire	STD4NK80Z-1 STU6N95K5 STU8N80K5 STGD6NC60H-1	Week 07/2023

Change implementation schedule:
The production start and first shipments will be implemented after week 13 of 2023 or earlier, upon agreement with the customer.

Marking and traceability:
Unless otherwise stated by customer specific requirement, traceability of products in IPAK Al wires, manufactured in TFME, will be ensured by internal code (Finished Good) and Q.A. number.

Yours faithfully.

Reliability Evaluation Report
STGD6NC60H-1
IPAK Al wires line transfer from STS to Tongfu Microelectronics
Industrial Domain

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	First release	M.Panzarella	November 11th , 2022

Approved by

Function	Location	Name	Date
Division Reliability Manager	ST Catania (Italy)	V.Giuffrida	November 11th , 2022

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1. Reliability Evaluation Overview

1.1. Objective

Aim of this report is to present the results of the reliability evaluation to release in mass production the product STGD6NC60H-1 (IV62 silicon line) in IPAK package with assembly line migration from ST Shenzhen to TFME (China) subcon

The product STGD6NC60H-1 (IV62 silicon line) is diffused in SG6 Ang Mo Kio (Singapore) wafer fab and is designed in IGBT Planar technology.

Reliability Strategy and Test Plan

1.1.1. Reliability strategy

Reliability trials performed as part of this reliability evaluation are in agreement with ST specification #**0061692** 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.

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1.1.2. 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	External 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

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1.2. Conclusion

Trials THB, AC, TC and IOL were completed with positive results. Neither functional nor parametric rejects were detected at final electrical testing.

The remaining trials are still running and the document will be updated once we will complete the evaluation

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2. Product Characteristics

Traceability

2.1.1. Wafer Fab information

Wafer fab name / location	ST SG6 – Ang Mo Kio (Singapore)
Wafer diameter (inches)	6”
Silicon process technology	IGBT Planar
Die finishing front side	SiN (nitride)
Die finishing back side	CHROMIUM/NICKEL/SILVER
Die size (micron)	1690x 2620 um2
Metal levels/ materials/ thicknesses	Metal 1/ AlSi / 4.5 UM

2.1.2. Assembly information

Assembly plant name / location	Tongfu Microelectronics -(CHINA) subcon
Package description	IPAK
Lead frame/Substrate	IK-TO251-3F(IL Ni) Rev1 DWG TO-LFM
Die attach material	SOFT SOLDER DIE ATTACH 95.5Pb/2Sn/2.5Ag
Wire bonding material/diameter	WIRE Al 7 MILS Source + Al 5 MILS Gate
Molding compound material	RESIN SUMITOMO EME-G620A
Package Moisture Sensitivity Level	MSL0

2.1.3. Reliability Testing information

Reliability laboratory location	STM Catania (Italy)

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3. Tests Results Summary

3.1. Lot Information

Lot #	CP	Diffusion Lot#	Trace code#	Note
Lot1	STGD6NC60H-1 (IV62 silicon line)	V6149F4X	GF229563	

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	1	539	539	0/539/1	
PC	2	JESD020E	-	-	-	-	-	
EV	3	JESD22B-101I	All qualification parts submitted for testing	1	539	539	Passed	
HTRB	5	MIL-STD-750-1 M1038 Method A	Tj=175°C, Vce=480V, 1000h	1	77	77	Running	
HTGB	6a	JESD22 A-108	Tj=175°C, Vge=20V, 1000h	1	77	77	Running	
	6b		Tj=175°C, Vge=-20V, 1000h	1	77	77	Running	
IOL	7	MIL-STD-750 Method 1037	15Kcy @ Ta=25°C with parts powered to insure ΔTj ≥ 100°C (not to exceed absolute maximum ratings).	1	77	77	0/77/1	
TC	8	JESD22A-104	Ta=-55°C /+150°C Duration= 1000cy	1	77	77	0/77/1	
AC	9	JESD22 A-102	Ta=121°C, Pa=2atm for 96 hours	1	77	77	0/77/1	
THB	10	JESD22A-101	1000h @ Ta=85°C, RH=85% Vds=100V	1	77	77	0/77/1	
ESD	11	Jedec JS-001 Jedec JS-002	HBM / CDM	-	-	-	-	

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Automotive and Discrete Group

Q&R Catania Team

IPAK Al wires line
Transfer from ST Shenzhen (China) to Tongfu Microelectronics (TFME) (China)
Reliability Evaluation Report

General Information			
Commercial product	STU6N95K5	STU8N80K5	STD4NK80Z-1
Product Line	VJL301	VJ8301	EZ8301
Diffusion Fab	ST Catania CT8"	ST Ang Mo Kio SG6"	ST Ang Mo Kio SG6"
Silicon process Technology	MDmesh K5		SuperMesh
Package	**IPAK**		

Note*: this document is a summary of the qualification plan that will be performed in good faith by STMicroelectronics to evaluate the electronic devices conformance to its specific mission profile and release them to mass production for Standard Application. This document 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 release with preliminary results	A. Settinieri	17th November 2022

Approved by

Function	Location	Name	Date
Division Reliability Manager	ST Catania (Italy)	V. Giuffrida	17th November 2022

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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 **STU6N95K5, STU8N80K5** and **STD4NK80Z-1** (VJL301- VJ8301 and EZ8301 as ST internal silicon lines) designed in MDmesh K5 and SuperMesh Technologies, diffused in ST Catania CT8 8" (Catania) and ST Ang Mo Kio SG6 6 " (Singapore) Wafer Fabs, to release the transfer of assembly line for IPAK package from ST Shenzhen to Tongfu Microelectronics (TFME) (China).

Reliability Strategy and Test Plan

1.2. 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.

1.2.1. 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	External Visual	Yes
4	HTRB	High Temperature Reverse Bias	Yes
5	HTGB	High Temperature Gate Bias	Yes
	HTGB(n)	High Temperature Gate Bias - negative	Yes
6	HTSL	High Temperature Storage Life	Yes
7	THB	Temperature Humidity bias	Yes
8	AC	Autoclave	Yes
9	TC	Temperature Cycling	Yes
10	IOL	Intermittent Operational Life	Yes
11	ESD -HBM	Human Body Model ESD	No
12	ESD - CDM	Charged Device Model ESD	No

1.3. Conclusion

The products STU6N95K5 and STU8N80K5 (VJL3 and VJ83 as ST internal silicon lines) have completed package oriented tests with positive results. The other items are still in progress and the report will be update once these items will be completed.

The Supermesh technology is already qualified in Tongfu Microelectronics (TFME) (China) (Reference report Rel 11-12). Consequently, the STD4NK80Z-1 product (EZ83 as ST internal silicon line) will be submitted only to a package oriented evaluation. This activity is running and the report will be updated once the evaluation will be completed.

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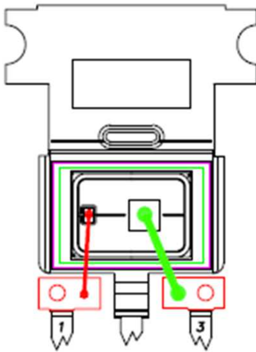
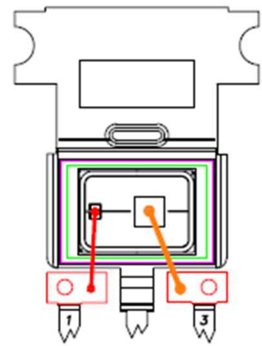
2. Product Characteristics

2.1. Pin Connection/Bonding Diagram

TXIK*VJL3B5F



TXIK*VJ83B6F



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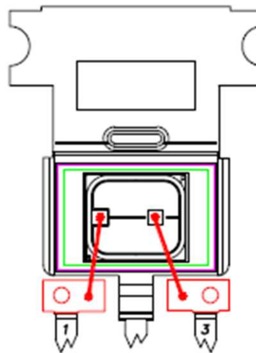

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2.2. Traceability

2.2.1. Wafer Fab information

Wafer fab name / location	ST Catania CT8 (Catania) (STU6N95K5) ST Ang Mo Kio SG6 (Singapore) (STU8N80K5, STD4NK80Z-1)
Wafer diameter (inches)	8" - 6"
Silicon process technology	MDmesh K5 (STU6N95K5 / STU8N80K5) Supermesh (STD4NK80Z-1)
Die finishing front side	TEOS +SiN (Nitride)
Die finishing back side	Ti-NiV-Ag (STU6N95K5) Ti-Ni-Ag (STU8N80K5, STD4NK80Z-1)
Die size (micron)	3950x2910 um (STU6N95K5, STU8N80K5) 3350x2890 um (STD4NK80Z-1)
Metal levels/ materials/ thicknesses	AlCu (4.5um) (STU6N95K5) AlSi (4.5um) (STU8N80K5) AlSi (3.2um) (STD4NK80Z-1)

2.2.2. Assembly Information

Assembly plant name / location	Tong Fu Microelectronics Co Ltd (TFME) - China
Package description	IPAK
Lead frame/Substrate	IK-TO251-3F(IL Ni) Rev1 DWG TO-LFM
Die attach material	SOFT SOLDER DIE ATTACH 95.5Pb/2Sn/2.5Ag
Wire bonding material/diameter	Wires Al 5mils (Gate) Al 10mils (Source) (STU6N95K5) Wires Al 5mils (Gate) Al 7mils (Source) (STU8N80K5) Al 5mils (STD4NK80Z-1)
Molding compound material	Sumitomo EME-G620A
Package Moisture Sensitivity Level (JEDEC J-STD020D)	Not available

2.2.3. Reliability Testing Information

Reliability laboratory location	STM Catania (Italy)

3. Test summary details

3.1. Lot Information:

Lot #	Product Line	Diffusion Lot	Assembly Lot	Note
Lot1	VJL301	V5209K12	GF229566	
Lot2	VJ8301	V6205T35	GF229562	
Lot3	EZ8301	VW227J6Y	GF237630	

3.2. Test Summary table results

Test	#	Reference	STM Test Conditions	Lots	S.S.	Total	Results FAIL/SS/Lots	Comments
TEST	1		User specification or supplier's standard specification	3	Lot1:280 Lot2:100 Lot3:100	480	0/480/3	All qualification parts
PC	2	JEDEC/IPC J-STD-020 JESD22-A-113	-	-	-	-	-	Not applicable
EV	3	JESD22 B -101	External Visual	3	Lot1:280 Lot2:100 Lot3:100	480	0/480/3	
HTRB	4	MIL-STD-750-1 M1038 Method A	Tj=150°C, Vds=760V, 1000h	1	45	45	To be start	Only first lot (VJL301)
HTGB	5	JESD22 A-108	HTGB + Tj=150°C Vgs= 30V, 1000h	1	45	45	To be start	
			HTGB - Tj=150°C Vgs= -30V, 1000h	1	45	45	To be start	
HTSL	6	JESD22A103	Ta=150°C, 1000h	1	45	45	To be start	
H3TRB	7	JESD22A-101	Ta=85°C, RH=85% Vds =100V, 1000h	3	25	75	Lot1: 0/25/1 Lot2: 0/25/1 Lot3: Running	
AC	8	JESD22 A-102	**ENV. SEQ. (ES)** **Environmental Sequence** TC: Ta=-55/150°C, 100cy + AC: Ta=121°C, RH100%, Pa=2atm for 96 hours	3	25	75	Lot1: 0/25/1 Lot2: 0/25/1 Lot3: Running	
TC	9	JESD22A-104 Appendix 6 J-STD-035	Ta=-55°C /+150°C, 1000cy	3	25	75	Lot1: 0/25/1 Lot2: 0/25/1 Lot3: Running	
IOL	10	MIL-STD-750 Method 1037	Ta=25°C ΔTj ≥ 100°C, 15Kcy	3	25	75	Lot1: 0/25/1 Lot2: 0/25/1 Lot3: Running	
ESD - CDM	11	CDM	Charge Device Model	-	-	-	-	Not included
ESD -HBM	12	HDM	Human Body Model	-	-	-	-	

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Comparison IPAK Shenzhen vs TFME

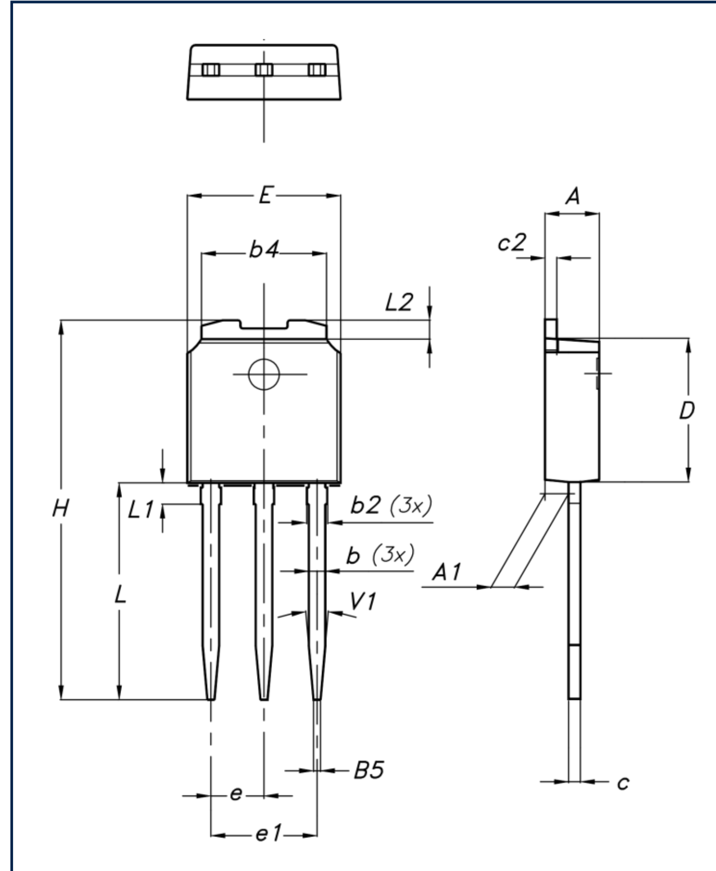
Shenzhen (type A)

Dim.	mm		
	Min.	Typ.	Max.
A	2.2		2.4
A1	0.9		1.1
b	0.64		0.9
b2			0.95
b4	5.2		5.4
B5		0.3	
c	0.45		0.6
c2	0.48		0.6
D	6		6.2
E	6.4		6.6
e		2.28	
e1	4.4		4.6
H		16.1	
L	9		9.4
L1	0.8		1.2
L2		0.8	1
V1		10°	

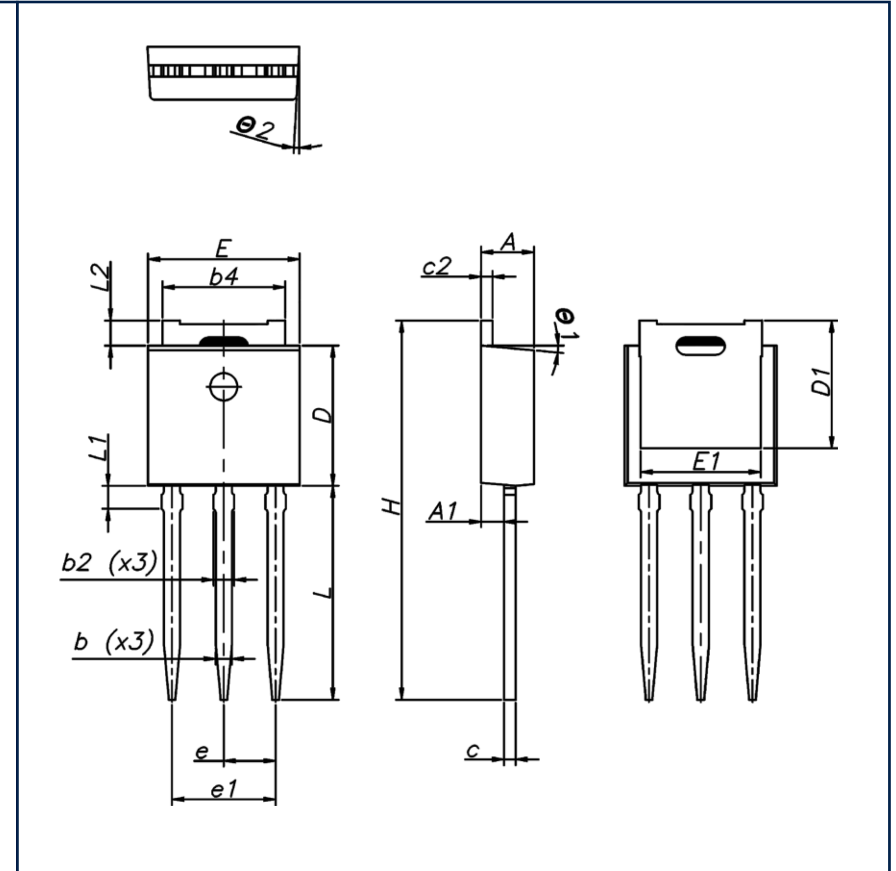
TFME (type E)

Dim.	mm		
	Min.	Typ.	Max.
A	2.2	2.3	2.35
A1	0.9	1	1.1
b	0.66		0.79
b2			0.9
b4	5.23	5.33	5.43
c	0.46		0.59
c2	0.46		0.59
D	6	6.1	6.2
D1	5.3	5.53	5.75
E	6.5	6.6	6.7
E1	5.05	5.23	5.4
e	2.2	2.25	2.3
e1	4.4	4.5	4.6
H	16.18	16.48	16.78
L	9	9.3	9.6
L1	0.8	1	1.2
L2	0.9	1.08	1.25
ϑ1	3°	5°	7°
ϑ2	1°	3°	5°

Shenzhen



TFME



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