

PRODUCT / PROCESS CHANGE NOTIFICATION

1. PCN basic data

1.1 Company		STMicroelectronics International N.V
1.2 PCN No.	ADG/19/11732	
1.3 Title of PCN	I2PAK, TO-220, TO-247 New Molding Compound Shenzhen (China) - Bouskoura (Marocco) AUTOMOTIVE	
1.4 Product Category	Power MOSFET Power BIPOLAR	
1.5 Issue date	2019-08-30	

2. PCN Team

2.1 Contact supplier	
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2.1.2 Marketing Manager	Anna MOTTESE,Michele SCUTO,Giuseppe BAZZANO
2.1.3 Quality Manager	Vincenzo MILITANO,Francesco MINERVA

3. Change

3.1 Category	3.2 Type of change	3.3 Manufacturing Location
Materials	New direct material part number (same supplier, different supplier or new supplier), Mold compound	BOUSKOURA B/E (Morocco) SHENZHEN (China)

4. Description of change

	Old	New
4.1 Description	Samsung SDI product termination of the following references of molding compound for I2PAK, TO-220, TO-247 packages.	Replacement of current mold compounds with alternative material. ST is already proceeding with new resins evaluation and qualification, to guarantee adequate products continuity.
4.2 Anticipated Impact on form,fit, function, quality, reliability or processability?	No impacts	

5. Reason / motivation for change

5.1 Motivation	Product discontinuance from current supplier
5.2 Customer Benefit	SERVICE CONTINUITY

6. Marking of parts / traceability of change

6.1 Description	by FG code and Q.A. number
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7. Timing / schedule

7.1 Date of qualification results	2019-08-22
7.2 Intended start of delivery	2020-03-30
7.3 Qualification sample available?	Upon Request

8. Qualification / Validation

8.1 Description	11732 Rel18-2019.pdf		
8.2 Qualification report and qualification results	Available (see attachment)	Issue Date	2019-08-30

9. Attachments (additional documentations)
11732 Public product.pdf 11732 New Molding compound - AUT.pdf 11732 Rel18-2019.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
BU931P	BU931P	
BU931T	BU931T	
BU941ZT	BU941ZT	
	STB80NF55-06-1	
	STI270N4F3	
	STI300N4F6	
	STI55NF03L	
	STI76NF75	
STP100NF04	STP100NF04	
	STP120N4F6	
	STP141NF55	
	STP150NF04	
	STP150NF55	
	STP185N55F3	
	STP190N55LF3	
	STP315N10F7	
STP36NF06L	STP36NF06L	
	STP410N4F7AG	
	STP45N40DM2AG	
	STP45N60DM2AG	
	STP46NF30	
	STP76NF75	
STP80NF55-08	STP80NF55-08	
	STP80NF55-08AG	
STP85NF55	STP85NF55	
	STW19NM60N	
	STW22N95K5	
	STW36NM60ND	
	STW37N60DM2AG	
	STW45N60DM2AG	
	STW46NF30	
	STW50N65DM2AG	
	STW58N60DM2AG	
	STW58N65DM2AG	
	STW62N65M5	
	STW65N65DM2AG	
	STW72N60DM2AG	
	STW78N65M5	

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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 : I2PAK, TO-220, TO-247 New Molding Compound Shenzhen (China) - Bouskoura (Marocco) AUTOMOTIVE

PCN Reference : ADG/19/11732

Subject : Public Products List

Dear Customer,

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

STP315N10F7	STI47N60DM6AG	STP120N4F6
STP100NF04	STW58N60DM2AG	STW19NM60N
STW65N65DM2AG	STW78N65M5	STP180NS04ZC
STP80NF55-08AG	STP95N4F3	STP45N40DM2AG
STW50N65DM2AG	STW36N60DM6AG	STI270N4F3
STW47N60DM6AG	STP150NF55	STP80NF55-08
STP410N4F7AG	STI55NF03L	STW58N65DM2AG
BU941ZT	STI300N4F6	STP141NF55
STW22N95K5	BU931P	STB130NS04ZB-1
STW46NF30	STB80NF55-06-1	STW62N65M5
STP76NF75	STP85NF55	STW72N60DM2AG
STP36NF06L	BU931T	STW37N60DM2AG
STI76NF75	STP185N55F3	STP46NF30
STW45N60DM2AG	STP150NF04	STP80N6F6
STP190N55LF3	STP45N60DM2AG	



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Automotive Discrete Group (ADG)
Power Transistor Macro-Division
LV & Body Smart Power Macro-Division

Process Change Notification

**I²PAK, TO-220, TO-247 New Molding Compound
Shenzhen (China) - Bouskoura (Marocco)
AUTOMOTIVE**

Dear Customer,

Following Samsung SDI production discontinuation announcement, followed by ST Corporate Advance Notification PCI CRP/19/11478, sent in April 2019, **this document is announcing the new molding compound for all products assembled in I²PAK, TO-220 and TO-247 package**, manufactured in the plant of Shenzhen (China) and Bouskoura (Marocco).

The new molding compound, guarantees the same quality and electrical characteristics as per current production, products is in full compliance with the ST ECOPACK®2 grade (Halogen Free).

The test vehicles involved in the qualification are listed in the following tables:

High Voltage Business Unit				
Technology	Test Vehicle	Package	Assy Plant	End of Qual.
MDmesh™ DM6	STI47N60DM6AG	I ² PAK	SHENZHEN B/E	Wk 44/19
MDmesh™ II	STW19NM60N	TO-247	SHENZHEN B/E	Wk 44/19
FDmesh™ II	STW36NM60ND	TO-247	SHENZHEN B/E	Wk 44/19
MDmesh™ DM2	STW65N65DM2AG	TO-247	SHENZHEN B/E	Wk 44/19
STripFET™ II	STW75NF30AG	TO-247	SHENZHEN B/E	Wk 44/19
MDmesh™ M5	STW78N65M5	TO-247	SHENZHEN B/E	Wk 44/19

Low Voltage Business Unit				
Technology	Test Vehicle	Package	Assy Plant	End of Qual.
STripFET™ II	STI55NF03L	I ² PAK	SHENZHEN B/E	Wk 44/19
STripFET™ II	STP100NF04	TO-220	SHENZHEN B/E	Wk 48/19
STripFET™ F6	STP120N4F6	TO-220	BOUSKOURA B/E	Wk 45/19
MESH OVERLAY™	STP130NS04ZB-MT	TO-220	BOUSKOURA B/E	Wk 45/19
STripFET™ F7	STP315N10F7	TO-220	SHENZHEN B/E	Wk 48/19
STripFET™ II	STP80NF55-08	TO-220	BOUSKOURA B/E	Wk 45/19
MESH OVERLAY™	STP80NS04ZB	TO-220	BOUSKOURA B/E	Wk 45/19
STripFET™ II	STP85NF55L-E	TO-220	BOUSKOURA B/E	Wk 45/19
STripFET™ F3	STP95N4F3	TO-220	BOUSKOURA B/E	Wk 45/19

IGBT & IPM Business Unit				
Technology	Test Vehicle	Package	Assy Plant	End of Qual.
Power BIPOLAR	BU941ZT	TO-220	SHENZHEN B/E	Wk 48/19

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 36-2019.
Any other sample request will be processed and scheduled by Power Transistor Division upon request.

Change implementation schedule:

The production start and first shipments will be implemented after week 9 of 2020, after stock depletion.
Delivery of current products will be done until stock depletion of old molding compound.

This is a very special Process Change, the PCN approval has to be as fast as possible. Due to the current market conditions and the large space occupied by the old resin, we are unable to do enough stock.

Marking and traceability:

Unless otherwise stated by customer specific requirement, traceability product assembled in with new molding compound, will be ensured by Q.A. number.

Yours faithfully.

Reliability evaluation results and plan for

New Molding Compound on I²PAK, TO-220, TO-247

manufactured in Shenzhen (China) and

Bouskoura (Morocco)

Automotive

Process change

General Information		Traceability	
Commercial Product:	STI47N60DM6AG,STW19NM60N,STW36NM60ND,STW65N65DM2AG,STW75NF30AG,STW78N65M5,STI55NF03L,STP100NF04,STP120N4F6,STP130NS04ZB-MT,STP80NS04ZB STP315N10F7,STP80NF55-08,STP85NF55L-E	Diffusion Plant:	SG6" - SG8" (Singapore) CT6" - CT8" Catania (Italy)
Product Line:	PQ6LA1,M264A1,F26LA1,FQF9A1,MM3MA1, M5F9A1, EDDA1, ED4JA1,6D4FA1,B64JA1,OD0KA1,AD5HA1,E35HA1,4D4FA1,B587A1	Assembly Plant:	STS Shenzhen (China) Bouskoura (Morocco)
Product Description:	Power MOSFET, Power BIPOLAR	Reliability Lab:	Catania (Italy)
Package:	I ² PAK, TO-220, TO-247		
Silicon Technology:	MDmesh™ DM6, MDmesh™ II,FDmesh™ II,MDmesh™ DM2STripFET™ II,MDmesh™ M5,STripFET™ F6,MESH OVERLAY™STripFET™ F7,STripFET™ F3, Power BIPOLAR	Passed	☒
Division:	Power Transistor Macro-Division		

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	13 August 2019	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 New Molding Compound on I²PAK, TO-220, TO-247 manufactured in Shenzhen (China) and Bouskoura (Morocco)

1.2 Reliability Test Plan

Reliability tests performed on this device are in agreement with ZVEI 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	Data type	Test flag	Comments
1	Pre and Post-Stress Electrical Test	TEST	User specification or supplier's standard Specification	1	Y	
2	External Visual	EV	JESD22B-101	1	Y	
3	Parametric Verification	PV	User specification	1	Y	
4	High Temperature Reverse Bias	HTRB	MIL-STD-750-1 M1038 Method A	1	Y	
5	High Temperature Gate Bias	HTGB	JESD 22A-108	1	Y	
6	Pre-conditioning	PC	JESD22A-113	1	Y	
7	Temperature Cycling	TC	JESD22A-104	1	Y	
7a	Temperature Cycling Hot Test	TCHT	JESD22A-104	1	Y	
7a alt	TC Delamination Test	TCDT	JESD22A-104	1	Y	
8	Autoclave	AC	JESD22A-102	1	Y	
9	High Humidity High Temperature Reverse Bias	H3TRB	JESD22A-101	1	Y	
10	Intermittent Operational Life / Thermal Fatigue	IOL / TF	MIL-STD-750 Method 1037	1	Y	
11	ESD Characterization	ESD (HBM,C DM)	AEC Q101-001 and 005	1	Y	
12	Destructive Physical Analysis	DPA	AEC-Q101-004 Section 4	1	Y	
13	Thermal Resistance	TR	JESD24-3, 24-4, 24-6 as appropriate	3	Y	
14	Wire Bond Strength	WBS	MIL-STD-750 Method 2037	3	Y	
15	Bond Shear	BS	AEC-Q101-003	3	Y	
16	Die Shear	DS	MIL-STD-750 Method 2017	3	Y	
17	Dielectric Integrity	DI	AEC-Q101-004 section 3	3	Y	

1.3 Conclusion

2. DEVICE/TEST VEHICLE CHARACTERISTICS

2.1 Generalities

MDmesh™ DM6, MDmesh™ II,FDmesh™ II,MDmesh™ DM2,STripFET™ II,MDmesh™ M5, STripFET™ F6,MESH OVERLAY™,STripFET™ F7,STripFET™ F3, Power BIPOLAR

2.2 Pin Connection



2.3 Traceability

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

D.U.T.: STI47N60DM6AG

PACKAGE: I²PAK

Wafer fab information	
Wafer fab manufacturing location	SG6" (Singapore)
Wafer diameter (inches)	6"
Silicon process technology	MDmesh™ DM6
Die finishing front side (passivation)	TEOS + SiN (Nitride)
Die finishing back side	Ti/Ni/Ag
Die area (Stepping die size)	6850 x 5080 μm^2
Metal levels/Materials	1 / AlCu

Assembly Information	
Assembly plant location	STS Shenzhen (China)
Package code description	I²PAK
Lead frame/Substrate	FRAME TO220 Mon Ve5 OpD/M/Q SelNi/NiP
Die attach material	Preform Pb/Ag/Sn
Wires bonding materials/diameters	Gate Al/Mq 5mils- Source: Al 15mils
Molding compound	Halogen free

D.U.T.: STW19NM60N
PACKAGE: TO-247

Wafer fab information	
Wafer fab manufacturing location	SG8" (Singapore)
Wafer diameter (inches)	8"
Silicon process technology	MDmesh™ II
Die finishing front side (passivation)	SiN (Nitride)
Die finishing back side	Ti/Ni/Ag
Die area (Stepping die size)	4400 x 3200 μm ²
Metal levels/Materials	1 / AISi

Assembly Information	
Assembly plant location	STS Shenzhen (China)
Package code description	TO-247
Lead frame/Substrate	FRAME TO247 3L Mon Ve6 OpA/Q SeNi/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.: STW36NM60ND
PACKAGE: TO-247

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)	6840 x 5050 μm ²
Metal levels/Materials	1 / AISi

Assembly Information	
Assembly plant location	STS Shenzhen (China)
Package code description	TO-247
Lead frame/Substrate	FRAME TO247 3L Mon Ve6 OpA/Q SeNi/NiP
Die attach material	Preform Pb/Ag/Sn
Wires bonding materials/diameters	Gate Al/Mg 5mils- Source: RIBBON Al 40x6 mils
Molding compound	Halogen free

D.U.T.: STW65N65DM2AG
PACKAGE: TO-247

Wafer fab information	
Wafer fab manufacturing location	SG6" (Singapore)
Wafer diameter (inches)	6"
Silicon process technology	MDmesh™ DM2
Die finishing front side (passivation)	TEOS + SiN (Nitride)
Die finishing back side	Ti/Ni/Ag
Die area (Stepping die size)	10390 x 6850 μm^2
Metal levels/Materials	1 / AISi

Assembly Information	
Assembly plant location	STS Shenzhen (China)
Package code description	TO-247
Lead frame/Substrate	FRAME TO247 3L Mon Ve6 OpA/Q SeI Ni/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.: STW75NF30AG
PACKAGE: TO-247

Wafer fab information	
Wafer fab manufacturing location	SG6" (Singapore)
Wafer diameter (inches)	6"
Silicon process technology	STripFET™ II
Die finishing front side (passivation)	SiN (Nitride)
Die finishing back side	Ti/Ni/Au
Die area (Stepping die size)	9520 x 6760 μm^2
Metal levels/Materials	1 / AISi

Assembly Information	
Assembly plant location	STS Shenzhen (China)
Package code description	TO-247
Lead frame/Substrate	FRAME TO247 3L Mon Ve6 OpA/Q SeI Ni/NiP
Die attach material	Preform Pb/Ag/Sn
Wires bonding materials/diameters	Gate Al 7mils- Source: RIBBON Al 60x8mils
Molding compound	Halogen free

D.U.T.: STW78N65M5
PACKAGE: TO-247

Wafer fab information	
Wafer fab manufacturing location	CT8" (Catania)
Wafer diameter (inches)	8"
Silicon process technology	MDmesh M5
Die finishing front side (passivation)	SiN (Nitride)
Die finishing back side	Ti/Ni/Ag
Die area (Stepping die size)	10410 x 6810 μm^2
Metal levels/Materials	1 / AISi

Assembly Information	
Assembly plant location	STS Shenzhen (China)
Package code description	TO-247
Lead frame/Substrate	FRAME TO247 3L Mon Ve6 OpA/Q Se/Ni/NiP
Die attach material	Preform Pb/Ag/Sn
Wires bonding materials/diameters	Gate Al/Mg 5mils- Source: RIBBON Al 60x8mils
Molding compound	Halogen free

D.U.T.: STI55NF03L
PACKAGE: I²PAK

Wafer fab information	
Wafer fab manufacturing location	CT6" (Catania)
Wafer diameter (inches)	6"
Silicon process technology	STripFET™ II
Die finishing front side (passivation)	No Passivation
Die finishing back side	Ti/NiV/Ag
Die area (Stepping die size)	2080 x 2510 μm^2
Metal levels/Materials	1 / AISi

Assembly Information	
Assembly plant location	STS Shenzhen (China)
Package code description	I ² PAK
Lead frame/Substrate	FRAME TO220 Mon Ve5 OpD/H/Q Se/Ni/NiP
Die attach material	Preform Pb/Ag/Sn
Wires bonding materials/diameters	Gate Al/Mg 5mils- Source: Al 15mils
Molding compound	Halogen free

D.U.T.: STP100NF04
PACKAGE: TO-220

Wafer fab information	
Wafer fab manufacturing location	SG6" (Singapore)
Wafer diameter (inches)	6"
Silicon process technology	STripFET™ II
Die finishing front side (passivation)	Al
Die finishing back side	Ti/Ni/Au
Die area (Stepping die size)	4630 x 5660 μm^2
Metal levels/Materials	1 / AlSi

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 15mils
Molding compound	Halogen free

D.U.T.: STP315N10F7
PACKAGE: TO-220
Wafer fab information

Wafer fab information	
Wafer fab manufacturing location	CT8" (Catania)
Wafer diameter (inches)	8"
Silicon process technology	STripFET™ F7
Die finishing front side (passivation)	TEOS + SiN (Nitride)
Die finishing back side	Ti/NiV/Ag
Die area (Stepping die size)	6340 x 4600 μm^2
Metal levels/Materials	1 / AlCu

Assembly information

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

D.U.T.: STP120N4F6
PACKAGE: TO-220
Wafer fab information

Wafer fab information	
Wafer fab manufacturing location	CT8" (Catania)
Wafer diameter (inches)	8"
Silicon process technology	STripFET™ F6
Die finishing front side (passivation)	TEOS + SiN (Nitride)
Die finishing back side	Ti/NiV/Au
Die area (Stepping die size)	2640 x 3860 μm^2
Metal levels/Materials	1 / AlCu

Assembly information

Assembly Information	
Assembly plant location	Bouskoura (Morocco)
Package code description	TO-220
Leadframe/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 15mils
Molding compound	Halogen free

D.U.T.: STP130NS04ZB-MT
PACKAGE: TO-220
Wafer fab information

Wafer fab information	
Wafer fab manufacturing location	CT6" (Catania)
Wafer diameter (inches)	6"
Silicon process technology	MESH OVERLAY™
Die finishing front side (passivation)	SiN (Nitride)
Die finishing back side	Ti/Ni/Au
Die area (Stepping die size)	5680 x 3860 μm^2
Metal levels/Materials	AlSi

Assembly information

Assembly Information	
Assembly plant location	Bouskoura (Morocco)
Package code description	TO-220
Leadframe/Substrate	FRAME TO220 Mon Ve4 OpD/M/N SelNi/NiP
Die attach material	PREFORM Pb/Ag/Sn
Wires bonding materials/diameters	Gate Al/Mg 5mils- Source: Al 15mils
Molding compound	Halogen free

D.U.T.: STP80NS04ZB
PACKAGE: TO-220
Wafer fab information

Wafer fab information	
Wafer fab manufacturing location	CT6" (Catania)
Wafer diameter (inches)	6"
Silicon process technology	MESH OVERLAY™
Die finishing front side (passivation)	SiN (Nitride)
Die finishing back side	Ti/Ni/Au
Die area (Stepping die size)	5680 x 3860 μm ²
Metal levels/Materials	AlSi

Assembly information

Assembly Information	
Assembly plant location	Bouskoura (Morocco)
Package code description	TO-220
Leadframe/Substrate	FRAME TO220 Mon Ve4 OpD/M/N SeI Ni/NiP
Die attach material	PREFORM Pb/Ag/Sn
Wires bonding materials/diameters	Gate Al/Mg 5mils- Source: Al 15mils
Molding compound	Halogen free

D.U.T.: STP80NF55-08
PACKAGE: TO-220
Wafer fab information

Wafer fab information	
Wafer fab manufacturing location	SG6" (Singapore)
Wafer diameter (inches)	6"
Silicon process technology	STripFET™ II
Die finishing front side (passivation)	NO PASSIVATION
Die finishing back side	Ti/Ni/Au
Die area (Stepping die size)	4100 x 5050 μm ²
Metal levels/Materials	AlSi

Assembly information

Assembly Information	
Assembly plant location	Bouskoura (Morocco)
Package code description	TO-220
Leadframe/Substrate	FRAME TO220 Mon Ver 1 Opt D/H/L/N SeI Ni/NiP
Die attach material	PREFORM Pb/Ag/Sn
Wires bonding materials/diameters	Gate Al/Mg 5mils- Source: Al 15mils
Molding compound	Halogen free

D.U.T.: STP85NF55L-E
PACKAGE: TO-220
Wafer fab information

Wafer fab information	
Wafer fab manufacturing location	SG6" (Singapore)
Wafer diameter (inches)	6"
Silicon process technology	STripFET™ II
Die finishing front side (passivation)	SiN (Nitride)
Die finishing back side	Ti/Ni/Ag
Die area (Stepping die size)	4460 x 5050 μm^2
Metal levels/Materials	AlSi

Assembly information

Assembly Information	
Assembly plant location	Bouskoura (Morocco)
Package code description	TO-220
Leadframe/Substrate	FRAME TO220 Mon Ve4 OpD/M/N SeI Ni/NiP
Die attach material	PREFORM Pb/Ag/Sn
Wires bonding materials/diameters	Gate Al/Mg 5mils- Source: Al 15mils
Molding compound	Halogen free

D.U.T.: STP95N4F3
PACKAGE: TO-220
Wafer fab information

Wafer fab information	
Wafer fab manufacturing location	CT8" Catania (Italy)
Wafer diameter (inches)	8"
Silicon process technology	STripFET™ F3
Die finishing front side (passivation)	TEOS+ SiN (Nitride)
Die finishing back side	Ti/Ni/Ag
Die area (Stepping die size)	3550 x 2890 μm^2
Metal levels/Materials	1 / AlCu

Assembly information

Assembly Information	
Assembly plant location	Bouskoura (Morocco)
Package code description	TO-220
Leadframe/Substrate	FRAME TO220 Mon Ver 1 Opt D/H/L/N SeI Ni/NiP
Die attach material	PREFORM Pb/Ag/Sn
Wires bonding materials/diameters	Gate Al/Mg 5mils- Source: Al 15mils
Molding compound	Halogen free

D.U.T.: BU941ZT
PACKAGE: TO-220

Wafer fab information	
Wafer fab manufacturing location	SG6" (Singapore)
Wafer diameter (inches)	6"
Silicon process technology	Power BIPOLAR
Die finishing front side (passivation)	PSG
Die finishing back side	Ti/Ni/Ag
Die area (Stepping die size)	4560 x 5560 μm^2
Metal levels/Materials	Al

Assembly Information	
Assembly plant location	STS Shenzhen (China)
Package code description	TO-220
Lead frame/Substrate	FRAME TO220 Mon Ver 1 Opt D/H 20u PINi/NiP
Die attach material	PREFORM Pb/Ag/Sn
Wires bonding materials/diameters	Gate Al/Mg 7mils- Source: Al 15mils
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

High Voltage Test Vehicles						
Lot #	Commercial Product	Silicon line	Package	Technology	Assembly plant	Note
1	STI47N60DM6AG	PQ6L	I ² PAK	MDmesh™ DM6	SHENZHEN B/E	
2						
3						
4	STW19NM60N	M264	TO-247	MDmesh™ II	SHENZHEN B/E	
5	STW36NM60ND	F26L	TO-247	FDmesh™ II	SHENZHEN B/E	
6	STW65N65DM2AG	FQF9	TO-247	MDmesh™ DM2	SHENZHEN B/E	
7	STW75NF30AG	MM3M	TO-247	STripFET™ II	SHENZHEN B/E	
8	STW78N65M5	M5F9	TO-247	MDmesh™ M5	SHENZHEN B/E	
Low Voltage Test Vehicles						
1	STI55NF03L	E33D	I ² PAK	STripFET™ II	SHENZHEN B/E	
2	STP100NF04	ED4J	TO-220	STripFET™ II	SHENZHEN B/E	
3						
4						
5	STP120N4F6	6D4F	TO-220	STripFET™ F6	BOUSKOURA B/E	
6	STP130NS04ZB-MT	B64J	TO-220	MESH OVERLAY™	BOUSKOURA B/E	
7	STP80NS04ZB	B64J	TO-220	MESH OVERLAY™	BOUSKOURA B/E	
8						
9						
10	STP315N10F7	OD0K	TO-220	STripFET™ F7	SHENZHEN B/E	
11						
12						
13	STP80NF55-08	AD5H	TO-220	STripFET™ II	BOUSKOURA B/E	
14	STP85NF55L-E	E35H	TO-220	STripFET™ II	BOUSKOURA B/E	
Power BIPOLAR Test Vehicles						
1	BU941ZT	B587	TO-220	Power BIPOLAR	SHENZHEN B/E	

3.2 Test results summary

High Voltage results:

Test	Std ref.	Conditions	SS	Steps	Failure/SS							
					Lot 1	Lot 2	Lot 3	Lot 4	Lot 5	Lot 6	Lot 7	Lot 8
TEST	User specification	All qualification parts tested per the requirements of the appropriate device specification.			462	77	77	231	462	462	462	462
External visual	JESD22 B-101	All devices submitted for testing			462	77	77	231	462	462	462	462
Silicon oriented Tests												
HTRB	JESD22 A-108	Tj = 150°C, BIAS = 600V	231	168 h	0/77	-	-	0/77	0/77	-	-	-
				500 h	0/77			0/77				
				1000 h	0/77			0/77				
		Tj = 150°C, BIAS = 520V	154	168 h	-	-	-	-	0/77	-	0/77	
				500 h					0/77			
				1000 h					0/77			
		Tj = 150°C, BIAS = 300V	77	168 h	-	-	-	-	-	0/77	-	
				500 h						0/77		
				1000 h						0/77		
HTGB	JESD22 A-108	Tj = 150°C, BIAS = 25V	231	168 h	-	-	-	-	0/77	0/77	0/77	
				500 h					0/77	0/77		
				1000 h					0/77	0/77		
		Tj = 150°C, BIAS = 20V	154	168 h	0/77	-	-	-	0/77	-	-	
				500 h	0/77				0/77			
				1000 h	0/77				0/77			
Package oriented Tests												
TC	JESD22 A-104	TA=-55°C TO 150°C	616	100cy	0/77	0/77	0/77	0/77	0/77	0/77	0/77	0/77
				500cy	0/77	0/77	0/77	0/77	0/77	0/77	0/77	
				1000cy								
TCHT	JESD22 A-104 Appendix 6	125°C TEST after TC	616									
		decap and wire pull for parts with internal bond wire sizes 5 mil diameter and less	40									
TCDT		100% C-SAM inspection after TC	616									
AC	JESD22 A-102	TA=121°C ; PA=2ATM	308	96h	0/77	-	-	-	0/77	0/77	0/77	0/77
H3TRB	JESD22 A-101	TA=85°C ; RH=85% BIAS= 100V	385	168 h	0/77	-	-	0/77	0/77	0/77	0/77	0/77
				500 h	0/77	-	-	0/77	0/77	0/77	0/77	
				1000 h	0/77	-	-	0/77	0/77	0/77	0/77	
IOL	MIL-STD-750 Method 1037	ΔTj ≥100°C	308	15Kcy	0/77	-	-	-	0/77	0/77	0/77	0/77
ESD	AEC Q101-001,002 and 005	CDM / HBM	480									
D.P.A.	AEC-Q101-004 Section 4	Devices after H3TRB - TC	32									
Thermal Resistance	JESD24-3, 24-4, 24-6 as appropriate		10 each Pre-post change									
Wire Bond Strength	MIL-STD-750 Method 2037		10 bonds from min of 5 devices									
Bond Shear	AEC-Q101-003		10 bonds from min of 5 devices									
Die Shear	MIL-STD-750 Method 2017		10									
Dielectric Integrity	AEC-Q101-004 section 3		10									

Final results available for HV products	Lot 1	Lot 2	Lot 3	Lot 4	Lot 5	Lot 6	Lot 7	Lot 8
	WK44							

Low Voltage results:

Test	Std ref.	Conditions	SS	Steps	Failure/SS								
					Lot 1	Lot 2	Lot 3	Lot 4	Lot 5	Lot 6	Lot 7	Lot 8	Lot 9
TEST	User specification	All qualification parts tested per the requirements of the appropriate device specification.			77	462	462	462	462	462	462	462	462
External visual	JESD22 B-101	All devices submitted for testing			77	462	462	462	462	462	462	462	462
Silicon oriented Tests													
HTRB	JESD22 A-108	Tj = 175°C, BIAS = 30V	-	-	-	-	-	-	-	-	-	-	-
		Tj = 175°C, BIAS = 40V	616	168 h		0/77	0/77	0/77	0/77	0/77			
				500 h		0/77	0/77	0/77	0/77	0/77			
				1000 h		0/77	0/77	0/77					
HTGB	JESD22 A-108	Tj = 175°C, BIAS = 55V	-	-	-	-	-	-	-	-	-	-	-
		Tj = 175°C, BIAS = 100V	-	-	-	-	-	-	-	-	-	-	-
		Tj = 175°C, BIAS = 15V	539	168 h	-	0/77	0/77	0/77		0/77			
				500 h	-	0/77	0/77	0/77		0/77			
TC	JESD22 A-104	TA=-55°C TO 150°C	693	100cy	0/77	0/77	0/77	0/77	0/77	0/77	0/77	0/77	0/77
				500cy	0/77	0/77	0/77	0/77	0/77	0/77	0/77	0/77	0/77
				1000cy									
TCHT	JESD22 A-104 Appendix 6	125°C TEST after TC	693										
		decap and wire pull for parts with internal bond wire sizes 5 mil diameter and less	45										
TCDT		100% C-SAM inspection after TC	693										
AC	JESD22 A-102	TA=121°C ; PA=2ATM	616	96h		0/77	0/77	0/77					
H3TRB	JESD22 A-101	TA=85°C ; RH=85% BIAS= 32V	385	168 h		0/77	0/77	0/77	0/77	0/77			
				500 h		0/77	0/77	0/77	0/77	0/77			
				1000 h		0/77	0/77	0/77					
		TA=85°C ; RH=85% BIAS= 80V	-	-	-	-	-	-	-	-	-	-	-
IOL	MIL-STD-750 Method 1037	ΔTj ≥100°C		15Kcy		0/77	0/77	0/77					
ESD	AEC Q101-001,002 and 005	CDM / HBM	300										
D.P.A.	AEC-Q101-004 Section 4	Devices after H3TRB - TC	36										
Thermal Resistance	JESD24-3, 24-4, 24-6 as appropriate		10 each Pre-post change										
Wire Bond Strength	MIL-STD-750 Method 2037		10 bonds from min of 5 devices										
Bond Shear	AEC-Q101-003		10 bonds from min of 5 devices 5										
Die Shear	MIL-STD-750 Method 2017		10										
Dielectric Integrity	AEC-Q101-004 section 3		10										

Q&R – ADG Automotive/Standard Discrete

ST147N60DM6AG, STW19NM60N, STW36NM60ND, STW65N65DM2AG, STW75NF30AG, STW78N65M5, ST155NF03L, STP100NF04
STP120N4F6, STP130NS04ZB-MT, STP80NS04ZB, STP315N10F7, STP80NF55-08, STP85NF55L-E, STP95N4F3, BU941ZT

Test	Std ref.	Conditions	SS	Steps	Failure/SS				
					Lot 10	Lot 11	Lot 12	Lot 13	Lot 14
TEST	User specification	All qualification parts tested per the requirements of the appropriate device specification.			462	462	462	462	462
External visual	JESD22 B-101	All devices submitted for testing			462	462	462	462	462
Silicon oriented Tests									
HTRB	JESD22 A-108	Tj = 175°C, BIAS = 30V	-	-	-	-	-	-	-
		Tj = 175°C, BIAS = 40V	-	-	-	-	-	-	-
		Tj = 175°C, BIAS = 55V	154	168 h	-	-	-	0/77	0/77
				500 h				0/77	0/77
				1000 h					
		Tj = 175°C, BIAS = 100V	231	168 h	0/77	0/77	0/77	-	-
500 h	0/77			0/77	0/77				
1000 h	0/77			0/77	0/77				
HTGB	JESD22 A-108	Tj = 175°C, BIAS = 15V	154	168 h	-	-	-	0/77	0/77
				500 h				0/77	0/77
				1000 h					
		Tj = 175°C, BIAS = 20V	231	168 h	0/77	0/77	0/77	-	-
				500 h	0/77	0/77	0/77		
				1000 h	0/77	0/77	0/77		
Package oriented Tests									
TC	JESD22 A-104	TA=-55°C TO 150°C	385	100cy	0/77	0/77	0/77	0/77	0/77
				500cy	0/77	0/77	0/77	0/77	0/77
				1000cy					
TCHT	JESD22 A-104 Appendix 6	125°C TEST after TC	385						
		decap and wire pull for parts with internal bond wire sizes 5 mil diameter and less	25						
TCDT		100% C-SAM inspection after TC	385						
AC	JESD22 A-102	TA=121°C ; PA=2ATM	385	96h	0/77	0/77	0/77	Wk35	Wk35
H3TRB	JESD22 A-101	TA=85°C ; RH=85% BIAS= 32V	-	1000 h	-	-	-	-	-
		TA=85°C ; RH=85% BIAS= 80V	231	168 h	0/77	0/77	0/77	-	-
				500 h	0/77	0/77	0/77		
				1000 h					
		TA=85°C ; RH=85% BIAS= 44V	154	168 h	-	-	-	0/77	0/77
				500 h				0/77	0/77
1000 h									
IOL	MIL-STD-750 Method 1037	ΔTj ≥100°C	385	15Kcy	0/77	0/77	0/77		
ESD	AEC Q101-001,002 and 005	CDM / HBM	300						
D.P.A.	AEC-Q101-004 Section 4	Devices after H3TRB - TC	20						
Thermal Resistance	JESD24-3, 24-4, 24-6 as appropriate		10 each Pre-post change						
Wire Bond Strength	MIL-STD-750 Method 2037		10 bonds from min of 5 devices						
Bond Shear	AEC-Q101-003		10 bonds from min of 5 devices 5						
Die Shear	MIL-STD-750 Method 2017		10						
Dielectric Integrity	AEC-Q101-004 section 3		10						

Final results available for LV products	Lot 1	Lot 2	Lot 3	Lot 4	Lot 5	Lot 6	Lot 7	Lot 8	Lot 9	Lot 10	Lot 11	Lot 12	Lot 13	Lot 14
	WK44	WK48			WK45	WK45	WK47			WK 48			WK45	WK45

Power BIPOLAR results:

Test	Std ref.	Conditions	SS	Steps	Failure/SS
					Lot 1
TEST	User specification	All qualification parts tested per the requirements of the appropriate device specification.			385
External visual	JESD22 B-101	All devices submitted for testing			385
Silicon oriented Tests					
HTRB	JESD22 A-108	Tj = 175°C, BIAS = 280V	77	168 h	0/77
				500 h	0/77
				1000 h	0/77
TC	JESD22 A-104	TA=-55°C TO 150°C	77	100cy	0/77
				500cy	0/77
				1000cy	
TCHT	JESD22 A-104 Appendix 6	125°C TEST after TC	77		
		decap and wire pull for parts with internal bond wire sizes 5 mil diameter and less	5		
TCDT		100% C-SAM inspection after TC	77		
AC	JESD22 A-102	TA=121°C ; PA=2ATM	77	96h	0/77
H3TRB	JESD22 A-101	TA=85°C ; RH=85% BIAS= 100V		1000 h	0/77
					0/77
					0/77
IOL	MIL-STD-750 Method 1037	ΔTj ≥100°C		15Kcy	0/77
ESD	AEC Q101-001,002 and 005	CDM / HBM		60	
D.P.A.	AEC-Q101-004 Section 4	Devices after H3TRB - TC		4	
Thermal Resistance	JESD24-3, 24-4, 24-6 as appropriate		10 each Pre-post change		
Wire Bond Strength	MIL-STD-750 Method 2037		10 bonds from min of 5 devices		
Bond Shear	AEC-Q101-003		10 bonds from min of 5 devices 5		
Die Shear	MIL-STD-750 Method 2017		10		
Dielectric Integrity	AEC-Q101-004 section 3		10		

Final results available for Power BIPOLAR product	Lot 1
	WK48