



Product/Process Change Notification: ADG/23/14056

ISOTOP New Molding compound - Bouskoura (Morocco) - INDUSTRIAL

Description of the change

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

Following the continuous improvement of our service and with the aim of rationalize production capacity, this document is announcing the new molding compound for all products assembled in ISOTOP® package, manufactured in the plant of Bouskoura (Morocco).

The new molding compound Sumitomo E590-HT, guarantees the same quality and electrical characteristics as per current production, products are full compliance with the ST ECOPACK®2 grade (Halogen Free).

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

Technology	Package	Test Vehicle	Samples Availability	End of Qualification
MDmesh	ISOTOP	STE48NM50 STE70NM60	5/17/2023	4/4/2023
IGBT Planar		STGE200NB60S	5/17/2023	4/4/2023

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.

Yours faithfully

Catania, 17 April 2023

Reason

Service Continuity

Date of implementation

July 17, 2023

Product/Process Change Notification:
ISOTOP New Molding compound - Bouskoura (Morocco) - INDUSTRIAL

ADG/23/14056

Impact of the change

Form	Not impacted
Fit	Not impacted
Function	Not impacted
Reliability	Impacted
Processibility	Not impacted

Qualification of the change

See attached Qualification report plan.

APPENDIX 3: QUALIFICATION EXECUTION AND RESULT:

See attached Qualification report.

Change implementation schedule:

The production start and first shipments will be implemented after July 17, 2023, or earlier, upon agreement with the customer.

Marking and traceability:

Unless otherwise stated by customer specific requirement, traceability of products assembled in ISOTOP package with new molding compound Sumitomo E590-HT, manufactured in the plant of Bouskoura (Morocco), will be ensured by internal code (Finished Good) and Q.A. number.

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PCN Title : ISOTOP New Molding Compound Bouskoura (Morocco) - INDUSTRIAL

PCN Reference : ADG/23/14056

Subject : Public Products List

Dear Customer,

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

STE70NM60	STE48NM50	STE40NC60
STE145N65M5	STGE200NB60S	STE53NC50
STE88N65M5		

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**New Molding Compound on ISOTOP
 package manufactured in ST Bouskoura
 (Morocco)
 Industrial domain
 Reliability Evaluation Report**

General Information related to Test Vehicle			
Commercial Product	STE48NM50	STE70NM60	STGE200NB60S
Product Line	MD5901	MD6N01	GHET01
Silicon process Technology	MDmesh™		IGBT Planar
Package	ISOTOP		

***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 Standard 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 release	A. Settineri	4 th April 2023

Approved by

Function	Location	Name	Date
Division Reliability Manager	ST Catania (Italy)	V. Giuffrida	4 th April 2023

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1. Reliability Evaluation Overview

1.1. Objective

Aim of this report is to present the results of the reliability evaluations to release the new molding compound E590HT on ISOTOP package. The test vehicle choose for this qualification are **STE48NM50**, **STE70NM60** and **STGE200NB60S** (MD5901, MD6N01 and GHET01 as ST internal silicon lines).

These products are designed in Power MOSFET MDmesh and in IGBT Planar Technologies, intended for Standard application, diffused in ST SG6 (Singapore) 6" Wafer Fab, assembled in package ISOTOP in ST Bouskoura (Morocco) Assembly Plant.

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 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	No
	HTGB(n)	High Temperature Gate Bias - negative	No
6	HTSL	High Temperature Storage Life	Yes
7	H3TRB	High Temperature Humidity bias	Yes
8	AC	Autoclave	Yes
9	TC	Temperature Cycling	Yes
10	IOL	Intermittent Operational Life	Yes
11	ESD Characterization	Human Body Model	No
12		Charged Device Model	No

1.3. Conclusion

All reliability tests have been completed with positive results. Neither functional nor parametric rejects were detected at final electrical testing.

Based on the overall results obtained, the new molding compound E590HT on ISOTOP package on the products **STE48NM50**, **STE70NM60** and **STGE200NB60S** (MD5901, MD6N01 and GHET01 as ST internal silicon lines) designed in Power MOSFET MDmesh and in IGBT Planar Technologies, intended for Standard application, has positively passed reliability evaluation performed in agreement with **ST 0061692** specification.

2. Product Characteristics

2.1. Test vehicle



STE48NM50

N-CHANNEL 550V @ Tjmax - 0.08Ω - 48A ISOTOP
 MDmesh™ MOSFET

Table 1: General Features

TYPE	V _{DSS} (@T _{jmax})	R _{DS(on)}	I _D
STE48NM50	550V	< 0.1Ω	48 A

- TYPICAL R_{DS(on)} = 0.08Ω
- HIGH dv/dt AND AVALANCHE CAPABILITIES
- 100% AVALANCHE TESTED
- LOW INPUT CAPACITANCE AND GATE CHARGE
- LOW GATE INPUT RESISTANCE
- TIGHT PROCESS CONTROL AND HIGH MANUFACTURING YIELDS

DESCRIPTION

The MDmesh™ is a new revolutionary MOSFET technology that associates the Multiple Drain process with the Company's PowerMESH™ horizontal layout. The resulting product has an outstanding low on-resistance, impressively high dv/dt and excellent avalanche characteristics. The adoption of the Company's proprietary strip technique yields overall dynamic performance that is significantly better than that of similar competition's products.

APPLICATIONS

The MDmesh™ family is very suitable for increasing power density of high voltage converters allowing system miniaturization and higher efficiencies.

Figure 1: Package



Figure 2: Internal Schematic Diagram

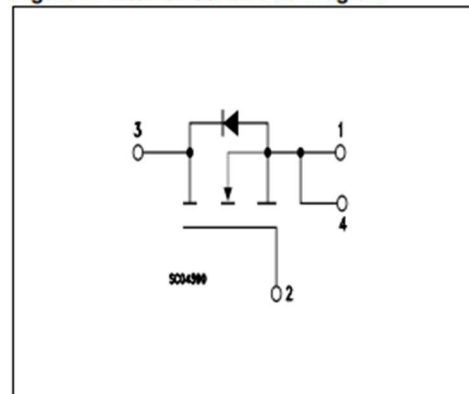


Table 2: Order Codes

SALES TYPE	MARKING	PACKAGE	PACKAGING
STE48NM50	E48NM50	ISOTOP	TUBE



STE70NM60

N-CHANNEL 600V - 0.050Ω - 70A ISOTOP Zener-Protected MDmesh™ Power MOSFET

TYPE	V _{DSS}	R _{DS(on)}	I _D
STE70NM60	600V	< 0.055Ω	70 A

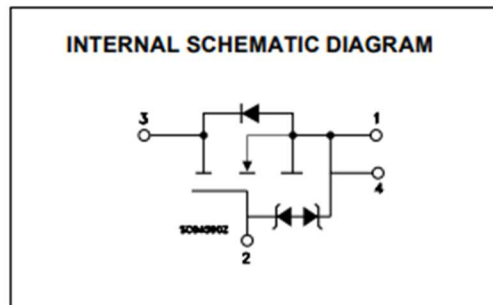
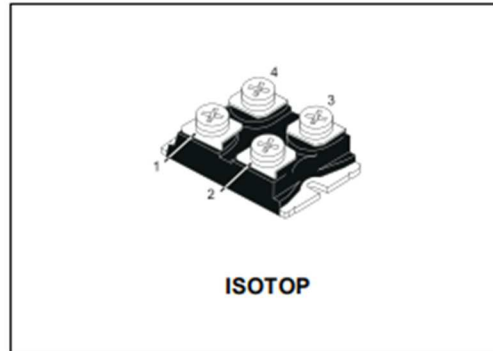
- TYPICAL R_{DS(on)} = 0.050Ω
- HIGH dv/dt AND AVALANCHE CAPABILITIES
- IMPROVED ESD CAPABILITY
- LOW INPUT CAPACITANCE AND GATE CHARGE
- LOW GATE INPUT RESISTANCE
- TIGHT PROCESS CONTROL
- INDUSTRY'S LOWEST ON-RESISTANCE

DESCRIPTION

The MDmesh™ is a new revolutionary MOSFET technology that associates the Multiple Drain process with the Company's PowerMESH™ horizontal layout. The resulting product has an outstanding low on-resistance, impressively high dv/dt and excellent avalanche characteristics. The adoption of the Company's proprietary strip technique yields overall dynamic performance that is significantly better than that of similar competition's products.

APPLICATIONS

The MDmesh™ family is very suitable for increasing power density of high voltage converters allowing system miniaturization and higher efficiencies.



ORDERING INFORMATION

SALES TYPE	MARKING	PACKAGE	PACKAGING
STE70NM60	E70NM60	ISOTOP	TUBE



STGE200NB60S

N-channel 150A - 600V - ISOTOP
 Low drop PowerMESH™ IGBT

General features

TYPE	V _{CES}	V _{CE(sat)} (typ.)	I _C	T _C
STGE200NB60S	600V	1.2V 1.3V	150A 200A	100°C 25°C

- High input impedance (voltage driven)
- Low on-voltage drop (Vcesat)
- Off losses include tail current
- Low gate charge
- High current capability



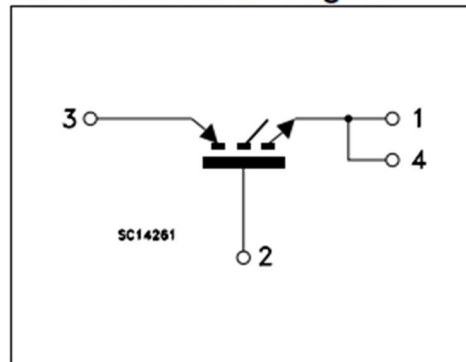
Description

Using the latest high voltage technology based on a patented strip layout, STMicroelectronics has designed an advanced family of IGBTs, the PowerMESH™ IGBTs, with outstanding performances. The suffix "S" identifies a family optimized to achieve very low VCE(sat) (@ max frequency of 1KHz).

Applications

- Low frequency motor controls
- Aluminum welding equipment

Internal schematic diagram

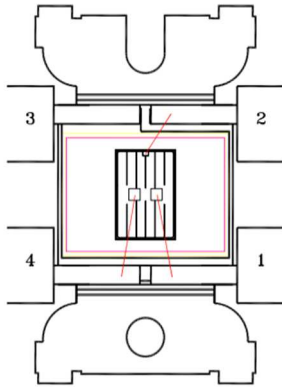


Order codes

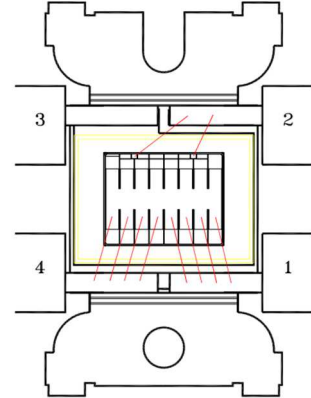
Part number	Marking	Package	Packaging
STGE200NB60S	GE200NB60S	ISOTOP	Tube

2.2. Pin Connection/Bonding Diagram

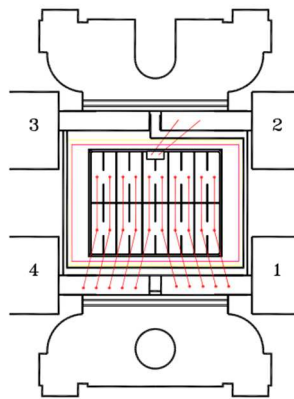
I1ZN*MD59B61



I1ZN*MD6NB61



I1ZN*GHET661



2.3. Traceability

2.3.1. Wafer Fab information

Wafer fab name / location	SG6" (Singapore)
Wafer diameter (inches)	6"
Silicon process technology	MDmesh (STE48NM50- STE70NM60) IGBT Planar (STGE200NB60S)
Die finishing front side	SiN (Nitride)
Die finishing back side	Ti/Ni/Ag (STE48NM50) Ti/Ni/Ag (STE70NM60) Cr/Ni/Ag (STGE200NB60S)
Die size (micron)	9560 x 6620 um (STE48NM50) 9610 x 12640 um (STE70NM60) 11120 x 13820 um (STGE200NB60S)
Metal levels/ materials/ thicknesses	AlSi (4.5µm)

2.3.2. Assembly Information

Assembly plant name / location	Bouskoura (Morocco)
Package description	ISOTOP®
Lead frame/Substrate	FRAME SLUG ISOTOP CuB2 4u PINi/NiP Ve2
Die attach material	Solder Paste Pb/Ag/Sn
Wire bonding material/diameter	Gate Al 7mils / Source: Al 15mils
Molding compound material	E590HT
Package Moisture Sensitivity Level (JEDEC J-STD020D)	Not available

2.3.3. Reliability Testing Information

Reliability laboratory location	STM Catania (Italy)
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3. Test summary details

3.1. Lot Information

Lot #	Product	Product line	Diffusion Lot	Trace code	Note
Lot1	STE48NM50	MD5901	V69032VY	CZ9120BK	
Lot2	STE70NM60	MD6N01	V68494P7	CZ91306P	All reliability trials with the exception of HTRB
Lot3			V6225VHK	CZ250G2R	
Lot4	STGE200NB60S	GHET	V690133E	CZ912067	

3.2. 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	Results FAIL/SS/Lots	Comments
TEST	1		User specification or supplier's standard specification	3	190	570	0/190/3	All qualification parts
PC	2	JEDEC/IPC J-STD-020 JESD22-A-113	-	-	-	-	-	Not applicable
EV	3	JESD22 B -101	External Visual	3	190	570	0/190/3	
HTRB	4	MIL-STD-750-1 M1038 Method A	Tj=150°C, Vds=400V, 1000h BVdss= 80%	3	45	135	0/45/3	(STE48NM50) product
			Tj=150°C, Vds=480V, 1000h BVdss= 80%					(STE70NM60) (STGE200NB60S) products
HTGB	5	JESD22 A-108	-	-	-	-	-	Not applicable
			-	-	-	-	-	
HTSL	6	JESD22A103	Ta=150°C, 1000h	3	45	135	0/45/3	
H3TRB	7	JESD22A-101	Ta=85°C, RH=85% Vds =100V, 1000h	3	25	75	0/25/3	
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	0/25/3	
TC	9	JESD22A-104 Appendix 6 J-STD-035	Ta=-55°C / +150°C, 1000cy	3	25	75	0/25/3	
IOL	10	MIL-STD-750 Method 1037	Ta=25°C ΔTj ≥ 100°C, 15Kcy	3	25	75	0/25/3	
ESD	11	ESDA-JEDEC JES-001	Charge Device Model (CDM)	-	-	-	-	Not included
	12	ANSI - ESD S5.3.1	Human Body Model (HBM)	-	-	-	-	

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PRODUCT / PROCESS CHANGE NOTIFICATION

1. PCN basic data

1.1 Company		STMicroelectronics International N.V
1.2 PCN No.	ADG/23/14056	
1.3 Title of PCN	ISOTOP New Molding Compound Bouskoura (Morocco) - INDUSTRIAL	
1.4 Product Category	Power MOSFET & IGBT	
1.5 Issue date	2023-04-17	

2. PCN Team

2.1 Contact supplier	
2.1.1 Name	NEMETH KRISZTINA
2.1.2 Phone	+49 89460062210
2.1.3 Email	krisztina.nemeth@st.com
2.2 Change responsibility	
2.2.1 Product Manager	Angelo RAO, Maurizio GIUDICE
2.1.2 Marketing Manager	Natale Sandro D'ANGELO, Paolo PETRALI
2.1.3 Quality Manager	Vincenzo MILITANO

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 (Morocco)

4. Description of change

	Old	New
4.1 Description	ISOTOP Package of Bouskoura (Morocco) is manufactured with Molding Compound KTMC-1050GR	ISOTOP Package of Bouskoura (Morocco) will be manufactured with Molding Compound Sumitomo E590-HT
4.2 Anticipated Impact on form, fit, function, quality, reliability or processability?	processability	

5. Reason / motivation for change

5.1 Motivation	PRODUCTION IMPROVEMENT
5.2 Customer Benefit	SERVICE CONTINUITY

6. Marking of parts / traceability of change

6.1 Description	By internal traceability and dedicated FG code
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7. Timing / schedule

7.1 Date of qualification results	2023-04-05
7.2 Intended start of delivery	2023-07-17
7.3 Qualification sample available?	Upon Request

8. Qualification / Validation

8.1 Description	14056 RERPTD23029_1.0_New Molding Compound on ISOTOP manufactured in ST Bouskoura_Industrial.pdf		
8.2 Qualification report and qualification results	Available (see attachment)	Issue Date	2023-04-17

9. Attachments (additional documentations)

14056 Public product.pdf
14056 14056 - ISOTOP New Molding compound - Bouskoura (Morocco) - IND.pdf
14056 RERPTD23029_1.0_New Molding Compound on ISOTOP manufactured in ST Bouskoura_ Industrial.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
STGE200NB60S	STGE200NB60S	

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