PRODUCT / PROCESS CHANGE NOTIFICATION

1. PCN basic data	
1.1 Company	STMicroelectronics International N.V
1.2 PCN No.	ADG/20/12291
1.3 Title of PCN	Max247 Long Leads Package Improvement Tongfu - Industrial
1.4 Product Category	STGYA120M65DF2
1.5 Issue date	2020-09-03

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
Materials	New direct material part number (same supplier, different supplier or new supplier), Lead frame base material	Tongfu (China)

4. Description of change		
	Old	New
4.1 Description	Max247 Long Leads Package is manufactured with current package design and Lead Frame	Max247 Long Leads Package will be manufactured with an optimised package design using a new mold chase and a new Lead Frame
4.2 Anticipated Impact on form,fit, function, quality, reliability or processability?	no impact	

5. Reason / motivation for change	
5.1 Motivation	to Improve Quality
5.2 Customer Benefit	SERVICE IMPROVEMENT

6. Marking of parts / traceability of change	
6.1 Description	by FG code or Q.A. number

7. Timing / schedule	
7.1 Date of qualification results	2020-08-03
7.2 Intended start of delivery	2020-11-03
7.3 Qualification sample available?	Upon Request

8. Qualification / Validation			
8.1 Description	12291 Reliability evaluation New Frame and Molding Chase on KLFI in MAX247 long leads package in TongFu_INDUSTRIAL.pdf		
8.2 Qualification report and qualification results	Available (see attachment)	Issue Date	2020-09-03

9. Attachments (additional documentations)
12291 Public product.pdf 12291 Max 247 LL PCN.pdf 12291 Reliability evaluation New Frame and Molding Chase on KLFI in MAX247 long leads package in TongFu_INDUSTRIAL.pdf 12291 Max247 LL Package improvement.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
	STGYA120M65DF2	

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PCN ADG/20/12291

Catania, July 28, 2020

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

Max247 Long Leads Package Improvement Tongfu (China)

Dear Customer,

Following the continuous improvement of our service and in order to be ready to support the market demand of IGBTs housed in Max247 Long Leads manufactured in our subcon Tongfu (China), the STGYA120M65DF2 will be produced with an optimised package with a new mold chase and a new Lead Frame.

The new mold chase and the new lead frame will improve the package robustness and service.

Optimised wire bonding positioning and change of the marking step from Assy to Testing have also been introduced, this latter to allow multi-binning testing capability.

The STGYA120M65DF2 affected by this process change, guarantees the same quality and electrical characteristics as per current production.

The involved product series are listed in the table below:

Product Family	Package	Involved Products	Test Vehicle Samples
IGBT TFS	Max247 long leads	STGYA120M65DF2	STGYA120M65DF2

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 is provided in attachment to this document.
New POA (Package Outline) and MBD (mount and bond diagram) are attached to this document.

Samples availability:
Samples of involved product are available.

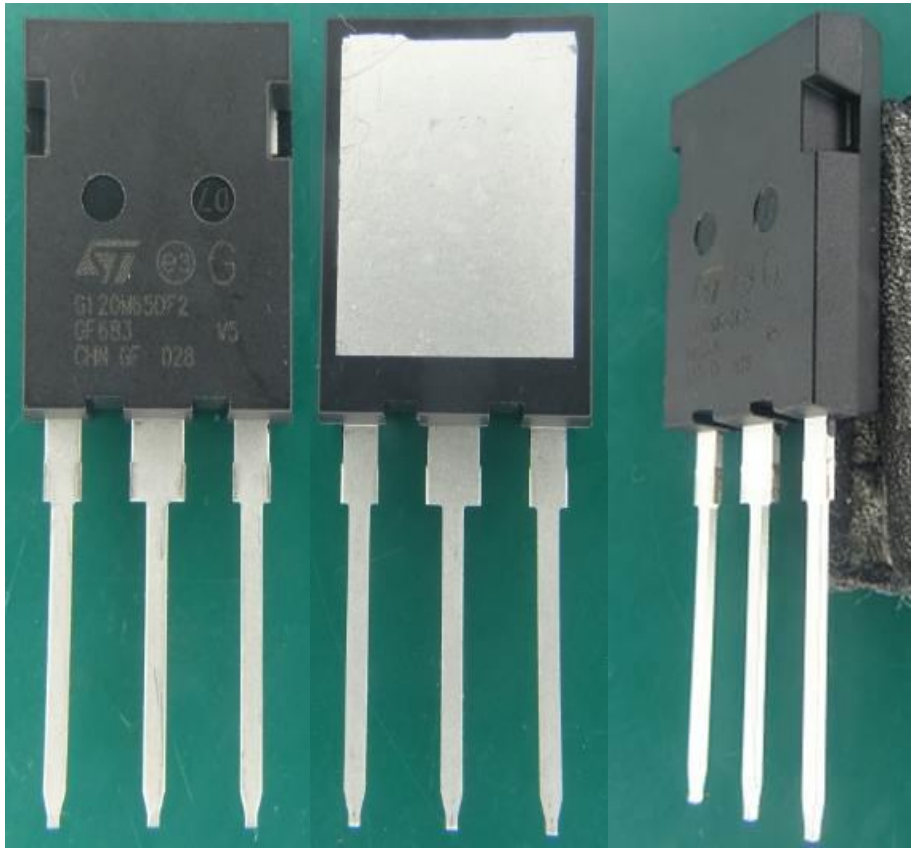
Change implementation schedule:
The production start and first shipments are expected to be implemented after week 43 of 2020.

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.

Max247 Long Leads Package Improvement

STGYA120M65DF2 - New Package picture



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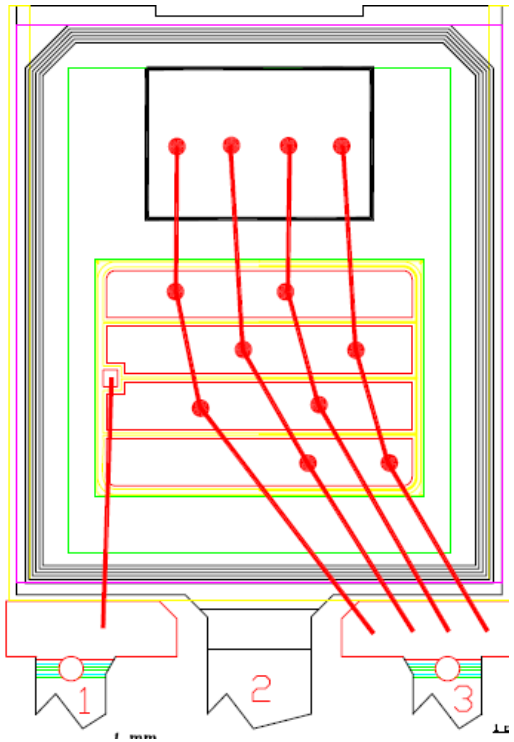
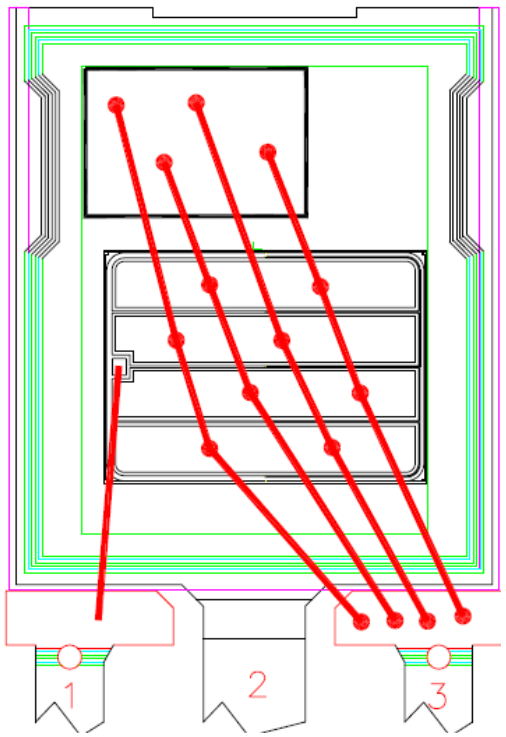
Max247 Long Leads Package Improvement

STGYA120M65DF2 - New Lead frame and optimized wire bonding position

Before



After



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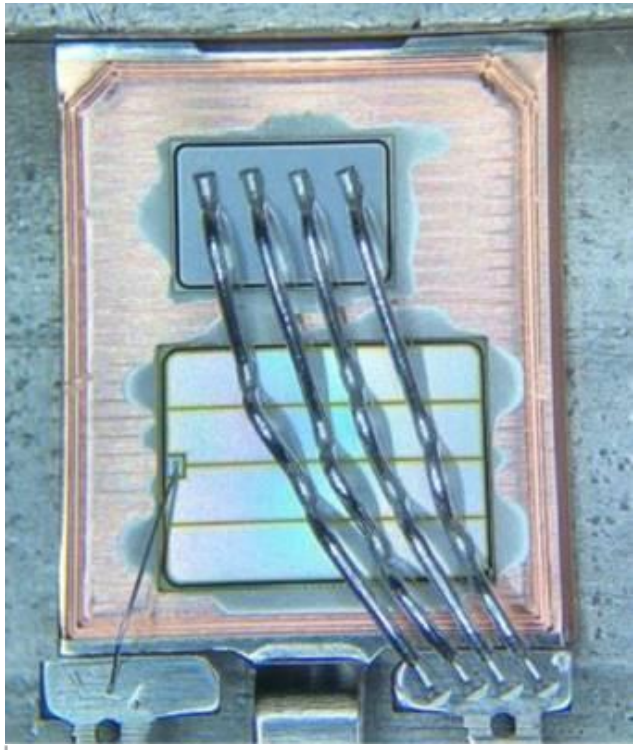
STPOWER

Max247 Long Leads Package Improvement

STGYA120M65DF2 - New Lead frame and optimized wire bonding position

Before



After

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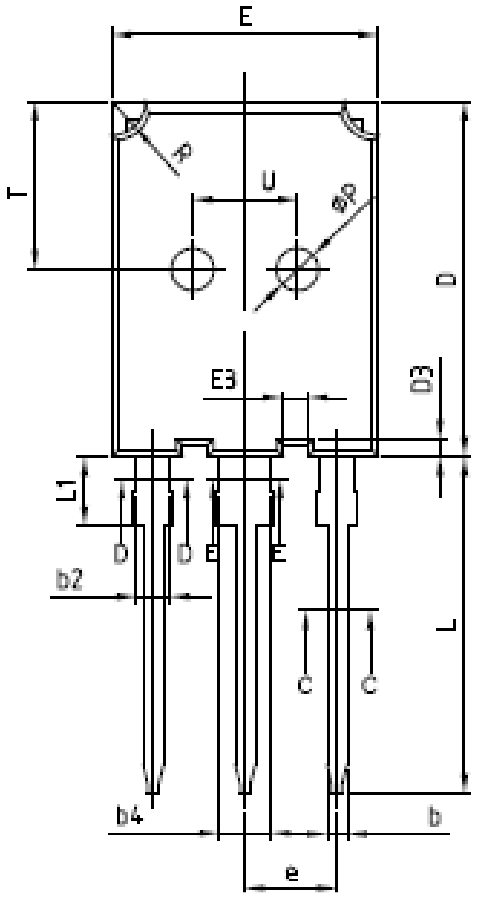
STPOWER

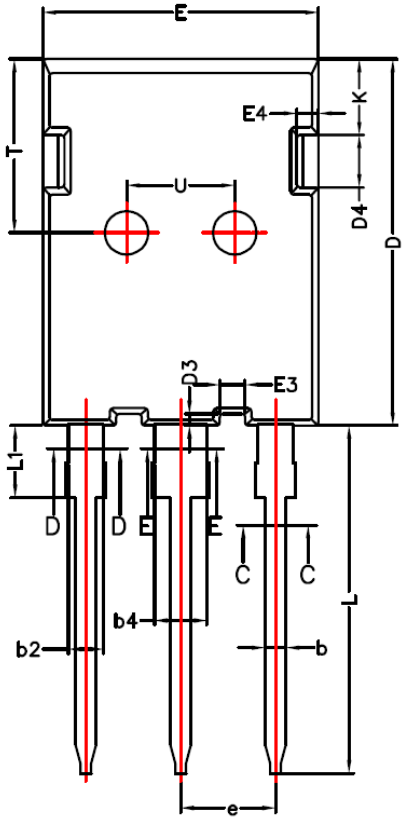
Max247 Long Leads Package Improvement

STGYA120M65DF2 - New Package Outline (POA)

Before



After



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Max247 Long Leads Package Improvement

STGYA120M65DF2 - New Package Outline (POA)

Before

SYMBOL	MIN.	NOM.	MAX.
A	4.90	5.00	5.10
A1	2.31	2.41	2.51
A2	1.90	2.00	2.10
a	0		0.15
a'	0		0.15
b	1.16		1.26
b1	1.15	1.20	1.22
b2	1.96		2.06
b3	1.95	2.00	2.02
b4	2.96		3.06
b5	2.95	3.00	3.02
b6			2.25
b7			3.25
c	0.59		0.66
c1	0.58	0.60	0.62
D	20.90	21.00	21.10
D1	16.25	16.55	16.85
D2	1.05	1.17	1.35
D3	0.75	1.00	1.25
E	15.70	15.80	15.90
E1	13.10	13.26	13.50
E3	1.35	1.45	1.55
e	5.34	5.44	5.54
L	19.80	19.92	20.10
L1			4.30
M	0.70		1.30
P	2.40	2.50	2.60
R	1.90	2.00	2.10
T	9.80		10.20
U	6.00		6.40

After

SYMBOL	MIN	NOM	MAX
A	4.90	5.00	5.10
A1	2.31	2.41	2.51
A2	1.90	2.00	2.10
a	0	–	0.15
a'	0	–	0.15
b	1.16	–	1.26
b1	1.15	1.2	1.22
b2	1.96	–	2.06
b3	1.95	2.00	2.02
b4	2.96	–	3.06
b5	2.95	3.00	3.02
b6	–	–	2.25
b7	–	–	3.25
c	0.59	–	0.66
c1	0.58	0.60	0.62
D	20.90	21.00	21.10
D1	16.25	16.55	16.85
D2	1.05	1.17	1.35
D3	0.58	0.68	0.78
D4	2.90	3.00	3.10
E	15.70	15.80	15.90
E1	13.10	13.26	13.50
E3	1.35	1.45	1.55
E4	1.14	1.24	1.34
e	5.34	5.44	5.54
K	4.25	4.35	4.45
L	19.80	19.92	20.10
L1	3.90	–	4.30
M	0.70	–	1.30
P	2.40	2.50	2.60
R1		0.30REF	
T	9.80	–	10.20
U	6.00	–	6.40

Main differences: D3, D4, E4

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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 : Max247 Long Leads Package Improvement Tongfu - Industrial

PCN Reference : ADG/20/12291

Subject : Public Products List

Dear Customer,

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

STGYA120M65DF2		

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RELIABILITY EVALUATION for new mold chase and lead frame qualification on STGYA120M65DF2 product manufactured in Tongfu Microelectronics Co Ltd (China)

INDUSTRIAL

General Information	
Commercial Product	STGYA120M65DF2
Product Line (Test Vehicle)	*KLFI01*
Product Description	Trench gate field-stop IGBT,
Package	*MAX247 long leads*
Silicon Technology	Emitter Implant Trench
Division	*Power Transistor Division*

Traceability	
Diffusion Plant	*Catania (Italy)*
Assembly Plant	*Tongfu Microelectronics Co Ltd (China)*

Reliability Assessment	
Passed	☒

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 for Automotive Application. 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	14 July 2020	A.SETTINIERI	Final Report

APPROVED BY:

Corrado CAPPELLO
ADG Q&R department - Catania
ST Microelectronics

TABLE OF CONTENTS

1. RELIABILITY EVALUATION OVERVIEW

1.1 Objective

Reliability evaluation for new mold chase and lead frame qualification on STGYA120M65DF2 product manufactured in Tongfu Microelectronics Co Ltd (China)

1.2 Reliability Test Plan

Reliability tests performed on this device are in agreement with JEDEC (JESD47) and internal spec 0061692 specification 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	Test Flag	Comments
1	Pre and Post-Stress Electrical Test	TEST	User specification or supplier's standard Specification	Y	
2	External Visual	EV	JESD22B-101	Y	
3	High Humidity High Temperature Reverse Bias	H3TRB	JESD22A-101	Y	
4	Temperature Cycling	TC	JESD22A-104	Y	
5	Intermittent Operational Life / Thermal Fatigue	IOL / TF	MIL-STD-750 Method 1037	Y	

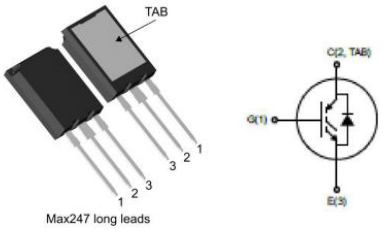
1.3 Conclusion

All reliability tests have been completed with acceptable results. No functional failure has been detected at final electrical testing. Parameter drift analysis performed on samples submitted to package oriented test showed a good stability of the main electrical monitored parameters.
Package oriented tests have not put in evidence any criticality.

On the basis of the overall results obtained, we can give a positive judgment on the reliability evaluation for new mold chase and lead frame qualification on STGYA120M65DF2 product manufactured in Tongfu Microelectronics Co Ltd (China)

2. DEVICE/TEST VEHICLE CHARACTERISTICS

2.1 Pin connection



2.2 Traceability

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

D.U.T.: *STGYA120M65DF2* **PACKAGE:** MAX*247 long leads*

Wafer fab information	
Wafer fab manufacturing location	Catania (Italy)
Wafer diameter (inches)	8”
Die finishing front side (passivation)	AlCu/W –
Die finishing back side	Al/Ti/NiV/Ag
Die area (Stepping die size)	9500 * 6870 µm2
Passivation	Nitride

Assembly Information	
Assembly plant location	Tongfu Microelectronics Co Ltd (China)
Leadframe/Substrate	TO247-3L LL Plus
Die attach material	Preform Sn/Ag/Sb
Wires bonding materials/diameters	Al wire 5mils (Gate) - Al wire 20mils (Source)
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

Lot #	Commercial Product	Product lines	Wafer Fab	Note
1	STGYA120M65DF2	KLFI	CT 8” (Catania)	
2				
3				

3.2 Test results summary

Test plan results are summarized in the following template.

#	Stress (Abrv)	PC	Std ref.	Conditions	Sample Size (S.S)	Steps	Failure/SS		
							Lot 1	Lot 2	Lot 3
1	**TEST**		User specification	All qualification parts tested per the requirements of the appropriate device specification.			75	75	75
2	**External visual**		JESD22 B-101	All devices submitted for testing			75	75	75
Package Oriented Tests									
3	**H3TRB**		JESD22 A-101	TA=85°C ; RH=85% BIAS= 100V	75	168h	0/25	0/25	0/25
						500h	0/25	0/25	0/25
						1000h	0/25	0/25	0/25
4	**TC**		JESD22 A-103	Ta= – 65°C / +150°C 1 h / cycle Air-to-air	75	100cy	0/25	0/25	0/25
						200cy	0/25	0/25	0/25
						500cy	0/25	0/25	0/25
						1000cy	0/25	0/25	0/25
5	**IOL/TF**		MIL-STD-750 Method 1037	ΔTj ≥ 100°C	75	5Kcy	0/25	0/25	0/25
						10Kcy	0/25	0/25	0/25