PCN ADG/20/12130

Catania, April 23, 2020

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

Process Change Notification

SDIP2F-26L SLLIMM™ - 2nd series IPM Package Improvement
Shenzhen (China) - INDUSTRIAL

Dear Customer,

Following the continuous improvement of our service and in order to be ready to support the market demand of IGBTs housed in SDIP2F-26L SLLIMM™ (IPM), products listed in the PCN, manufactured in Shenzhen (China) will be produced with a redesigned package with new molding compound SUMITOMO EME-G591A instead of current HITACHI GE-401SLM.

The new molding compound has better characteristics that will advantage in reducing the warpage, allowing UL1557 certification. In addition, the removal of the furrow has made the package more robust, reducing the risk of damage during heat sink screwing process made by the customer.

Devices in SDIP2F-26L, effected by this process change, guarantees the same fitting, 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
IPM - SLLIMM 2nd series	SDIP2F-26L	STGIF10CH60TS-E	---
		STGIF10CH60TS-L	STGIF10CH60TS-L
		STGIF5CH60TS-E	---
		STGIF5CH60TS-L	STGIF5CH60TS-L
		STGIF5CH60TS-X	---
		STGIF7CH60TS-E	---
		STGIF7CH60TS-L	---
		STGIF7CH60TS-X	---

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.

Samples availability:

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

Change implementation schedule:

The production start and first shipments will be implemented after week 30 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.

Reliability evaluation for

SDIP2F-26L Package Improvement
in Shenzhen (China)
INDUSTRIAL
Process change

General Information	
Commercial Product	: STGIF5CH60TS-L STGIF10CH60TS-L
Product Line (Test vehicle)	: EI62P1 - RI63P1
Product Description	: IPM (Intelligent power module)
Package	: SDIP2F-26L
Silicon Technology	: IGBT Trench
Division	: Power Transistor Macro-Division

Traceability	
Diffusion Plant	: CT 8" (Catania Italy)
Assembly Plant	: ST Shenzhen (China)
Reliability Lab	: Catania (Italy)

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. 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	07 April 2020	A.SETTINIERI	FINAL 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 SDIP2F-26L Package Improvement in Shenzhen (China)

1.2 Reliability Test Plan

Reliability tests performed on this device are in agreement with JESD47 and internal spec 0061692 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	High Temperature Storage Life	HTSL	JESD22A-103	1	Y	
4	High Temperature Reverse Bias	HTRB	JESD22A-108	1	Y	
4	Temperature Cycling	TC	JESD22A-104	1	Y	
5	Autoclave	AC	JESD22A-102	1	Y	
6	High Humidity High Temperature Reverse Bias	H3TRB	JESD22A-101	1	Y	

1.3 Conclusion

All reliability tests have been completed with positive results. Neither functional nor parametric rejects were detected at final electrical testing.
Parameter drift analysis performed on samples submitted to die and 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 reliability evaluation for SDIP2F-26L Package Improvement in Shenzhen (China)in agreement with JESD47 and internal spec 0061692 guidelines

2. DEVICE/TEST VEHICLE CHARACTERISTICS

2.1 Generalities

IGBT Trench

2.2 Traceability

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

D.U.T.: STGIF5CH60TS-L **PACKAGE: SDIP2F-26L**

Wafer fab information	
Wafer fab manufacturing location	IGBT: CT8” Catania (Italy) Diode: Tours (France) Driver1: Catania (Italy) Driver2: Agrate (Italy)
Wafer diameter (inches)	8”
Silicon process technology	IGBT Trench
Die finishing front side (passivation)	IGBT:SiN (Nitride) Diode: Al + PROBIMIDE Driver 1: TEOS/SiN/Polymide Driver 2: HDP/TEOS/Nitride
Die finishing back side	IGBT: Al/Ti/NiV/Ag Diode: Ti/Ni/Au Driver 1: Cr/Ni/Au Driver 2: Cr/NiV/Au
Die area (Stepping die size)	IGBT: 2510 x 1950 µm^2 Diode: 2200 x 2200 µm^2 DRIVER1: 2919 x 918 µm^2 DRIVER2: 4130 x 2180 µm^2
Metal levels/Materials	IGBT: Ti/AlCu/TiNARC Diode: Al Driver1: Ti/AlCu/TiNARC Driver2: Ti/AlCu/TiNARC/NiPd

Assembly Information	
Assembly plant location	ST Shenzhen (China)
Package code description	SDIP2F-26L
Leadframe/Substrate	FRAME SSDIP 25/26L
Die attach material	IGBT / Diode: SOLDER PASTE Sn/Ag Driver: Power GLUE
Wires bonding materials/diameters	Gate: Cu 2mils - Emitter: Al 7mils – NTC: Au 1mil
Molding compound	HF Molding compound

D.U.T.: STGIF10CH60TS-L PACKAGE: SDIP2F-26L

Wafer fab information	
Wafer fab manufacturing location	IGBT: CT8" (Italy) DIODE: Tours (France) Driver1: Catania (Italy) Driver2: Agrate (Italy)
Wafer diameter (inches)	8"
Silicon process technology	IGBT Trench
Die finishing front side (passivation)	IGBT : SiN (nitride) DIODE: Probimide DRIVER1: TEOS/Nitride/Polyimide DRIVER2: HDP/TEOS/Nitride
Die finishing back side	IGBT: Al/Ti/NiV/Ag DIODE: Ti/Ni/Au DRIVER1: Cr/Ni/Au DRIVER2: Cr/NiV/Au
Die area (Stepping die size)	IGBT:2590 x 2590 μm^2 DIODE: 2300 x 2300 μm^2 DRIVER1: 2919 x 918 μm^2 DRIVER2: 4130 x 2180 μm^2
Metal levels/Materials	IGBT: Ti/AlCu/TiNARC DIODE: Al Driver1: Ti/AlCu/TiNARC Driver2: Ti/AlCu/TiNARC/NiPd

Assembly Information	
Assembly plant location	Shenzhen (China)
Package code description	SDIP-2B 26L
Leadframe/Substrate	FRAME SSDIP 25/26L
Die attach material	IGBT / DIODE: SOLDER PASTE Pb/Sn/Ag DRIVER: Power GLUE
Wires bonding materials/diameters	Gate: Cu 2mils - Emitter: Al 12mils – NTC: Au 1mils
Molding compound	HF Molding compound

Reliability Testing Information	
Reliability laboratory location	Catania (Italy)
Electrical testing location	Catania (Italy)

3. TESTS RESULTS SUMMARY

3.1 Lot Information

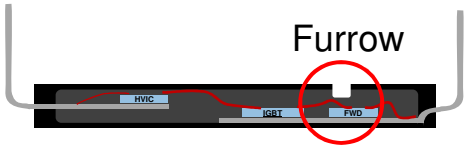
Lot #	Commercial Product	Silicon line	Package	Wafer Fab	Assembly plant	Note
1	STGIF5CH60TS-L	EI62	SDIP2F-26L	CT8" (Catania-Italy)	ST Shenzhen (China)	
2						
3	STGIF10CH60TS-L	RI63				

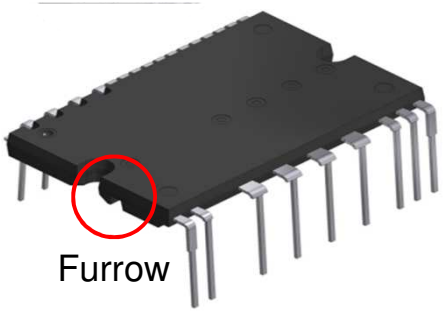
3.2 Test results summary

#	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.			50	50	50
2	**External visual**		JESD22 B-101	All devices submitted for testing			50	50	50
Silicon oriented tests									
3	**HTSL**	N	JESD22 A-103	Ta=125°C	30	1000H	0/10	0/10	0/10
4	**HTRB**	N	JESD22 A-108	T.A.= 125°C BIAS= 480V	30	1000H	0/10	0/10	0/10
Package oriented tests									
5	**TC**	N	JESD22 A-103	Ta= – 40°C / +125°C (air to air)	30	100cy	0/10	0/10	0/10
6	**AC**	N	JESD22 A-102	Ta=121°C , P=2atm RH=100%	30	96H	0/10	0/10	0/10
7	**H3TRB**	N	JESD22 A-101	T.A.=85°C RH=85%, BIAS= 100V	30	1000H	0/10	0/10	0/10

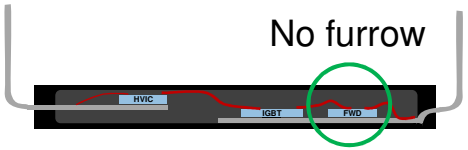
SDIP2F-26L SLLIMM™ - 2nd series IPM Package Comparison

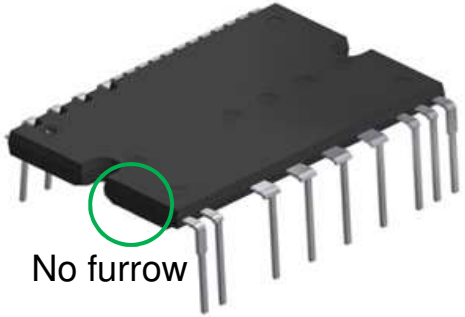
Current production





New production





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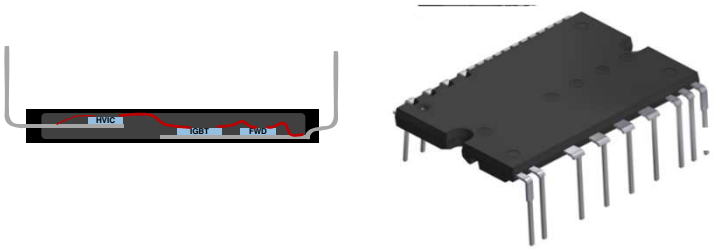
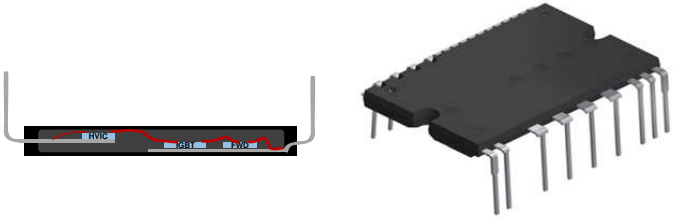
SDIP2F-26L SLLIMM™ - 2nd series IPM
Warpage evaluation



Current production range of warpage Values:
122 to 149um



New production range of warpage Values:
90 to 128um

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