



PRODUCT/PROCESS CHANGE NOTIFICATION

PCN APM-PWR/10/5868
Notification Date 09/02/2010

**TO-247 - Max247 ECOPACK 2 graded Moulding Compound
Assembly capacity expansion - LGG (China)**

Table 1. Change Implementation Schedule

Forecasted implementation date for change	25-Nov-2010
Forecasted availability date of samples for customer	26-Aug-2010
Forecasted date for STMicroelectronics change Qualification Plan results availability	26-Aug-2010
Estimated date of changed product first shipment	27-Nov-2010

Table 2. Change Identification

Product Identification (Product Family/Commercial Product)	see attached list
Type of change	Package assembly material change
Reason for change	improve service to Customers by increasing productivity as ECOPACK 2
Description of the change	Continuing in the program to introduce ECOPACK 2, graded Moulding Compound products and in the aim of a constant process improvement, please be informed that we re expanding our manufacturing assembly capability, for Power MOSFET, Power Bipolar and IGBTs products, of Power Transistor Division, housed in TO-247 and Max247 package, in our ST plant located in Longgang (China). TO-247 and Max247 graded Moulding Compound products, produced in Longgang (China), guarantee the same quality and electrical characteristics as reported in the relevant data sheets. Devices used for qualification are available as Samples.
Product Line(s) and/or Part Number(s)	See attached
Description of the Qualification Plan	See attached
Change Product Identification	by Week code
Manufacturing Location(s)	

Table 3. List of Attachments

Customer Part numbers list	
Qualification Plan results	



Customer Acknowledgement of Receipt		PCN APM-PWR/10/5868
Please sign and return to STMicroelectronics Sales Office		Notification Date 09/02/2010
<input type="checkbox"/> Qualification Plan Denied <input type="checkbox"/> Qualification Plan Approved <input type="checkbox"/> Change Denied <input type="checkbox"/> Change Approved	Name:	
	Title:	
	Company:	
	Date:	
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DOCUMENT APPROVAL

Name	Function
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Falcone, Giuseppe	Division Q.A. Manager

Dear Customer,

Continuing in the program to introduce ECOPACK[®]2, graded Moulding Compound products and in the aim of a constant process improvement, please be informed that we're expanding our manufacturing assembly capability, for Power MOSFET, Power Bipolar and IGBTs products, of Power Transistor Division, housed in TO-247 and Max247[™] package, in our ST plant located in Longgang (China). TO-247 and Max247[™] graded Moulding Compound products, produced in Longgang (China), guarantee the same quality and electrical characteristics as reported in the relevant data sheets. Devices used for qualification are available as Samples.

The involved product series and affected packages are listed in the table below:

BU Code	Product Family Description	Package	Commercial Product / Series
29, 02	Power MOSFET Transistors Power Bipolar Transistors IGBTs	TO-247 Max247 [™]	STWxxx STGWxxx 2STWxxx STGYxxx STYxxx

Any other Product related to the above series, manufactured in TO-247 and Max247[™] package, 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:

Samples of the test vehicle devices will be available on request starting from week 36-2010.
Any other sample request will be processed and scheduled by Power Transistor Division upon request.

BU Code	Product Family Description	Package	Part Number - Test Vehicle
29, 02	Power MOSFET Transistors Power Bipolar Transistors IGBTs	TO-247 Max247 [™]	STW9NK90Z STW120NF10 STY30NK90Z TIP35C



Change implementation schedule:

The production start and first shipments will be implemented according to our work in progress and materials availability:

Product Family	1st Shipments
Power MOSFET Transistors Power Bipolar Transistors IGBTs	From Week 48-2010

Lack of acknowledgement of the PCN within 30 days will constitute acceptance of the change. After acknowledgement, lack of additional response within the 90 days period will constitute acceptance of the change (Jedec Standard No. 46-C). In any case, first shipments may start earlier with customer written agreement.

Marking and traceability:

Unless otherwise stated by customer specific requirement, traceability of TO-247 and Max247™ graded Moulding Compound products, manufactured in Longgang (China), will be ensured by week code.

Sincerely Yours.



Reliability Report
 on
TO-247 - Max247™ ECOPACK®2
graded Moulding Compound
ST-Longgang (China)

General Information		Locations	
Product Lines	BA21-QD0K-EZ9K/EZ9N	Wafer fab	BA21 Ang MO Kio (Singapore)
Product Description	Power MOSFET Power BIPOLAR		EZ9K / QD0K/ EZ9N Catania (ITALY)
Commercial Products	TIP35C STW120NF10 STW9NK90Z STY30NK90Z	Assembly plant	LONGGANG (China)
Product Group	IMS – APM	Reliability Lab	IMS-APM Catania Reliability Lab
Product division	Power Transistor Division		
Package	TO-247 – Max247™		
Silicon Process technology	Power MOSFET Power BIPOLAR		

DOCUMENT INFORMATION

Version	Date	Pages	Prepared by	Approved by	Comment
1.0	May-2010	12	G.Montalto	G.Falcone	First issue

Note: This report is a summary of the reliability trials performed in good faith by STMicroelectronics in order to evaluate the potential reliability risks during the product life using a set of defined test methods.
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1 APPLICABLE AND REFERENCE DOCUMENTS

Document reference	Short description
JESD47	Stress-Test-Driven Qualification of Integrated Circuits

2 GLOSSARY

DUT	Device Under Test
SS	Sample Size

3 RELIABILITY EVALUATION OVERVIEW

3.1 Objectives

Qualifications of the ECOPACK®2 graded Moulding Compound for the TO-247 – Max247™ package.

3.2 Conclusion

The reliability tests have shown that the devices behave correctly against environmental tests (no failure). Moreover, the stability of electrical parameters during the accelerated tests demonstrates the ruggedness of the products and safe operation, which is consequently expected during their lifetime.



4 DEVICE CHARACTERISTICS

4.1 Device description

Power Bipolar, Power MOSFET technology.

4.2 Construction note

D.U.T.: TIP35C LINE: BA21 PACKAGE: TO-247

Wafer/Die fab. information	
Wafer fab manufacturing location	<i>AMK (Singapore)</i>
Technology	PLANAR NPN
Die finishing back side	AuAs/Cr/Ni/Au
Die size	4030 x 3680 μm^2
Metal	Al/Si
Passivation type	P-Vapox

Wafer Testing (EWS) information	
Electrical testing manufacturing location	<i>AMK (Singapore)</i>
Test program	According to specification

Assembly information	
Assembly site	<i>LONGGANG (China)</i>
Package description	TO-247
Molding compound	Epoxy Resin
Frame material	Raw Copper
Die attach process	Soft Solder
Die attach material	Pb/Sn/Ag
Wire bonding process	Ultrasonic
Wires bonding materials	Al/Mg Base / 7 mils Al Emitter / 15 mils
Lead finishing/bump solder material	Pure Tin

Final testing information	
Testing location	<i>LONGGANG (China)</i>
Tester	IP TEST



D.U.T.: STW120NF10 LINE: QD0K PACKAGE: TO-247

Wafer/Die fab. information	
Wafer fab manufacturing location	<i>Catania (ITALY)</i>
Technology	Power MOSFET STRipFET Technology
Die finishing back side	Ti-Ni-Au
Die size	4620x6330
Metal	Al/Si
Passivation type	None

Wafer Testing (EWS) information	
Electrical testing manufacturing location	<i>Catania (ITALY)</i>
Test program	According to specification

Assembly information	
Assembly site	<i>LONGGANG (China)</i>
Package description	TO-247
Molding compound	Epoxy Resin
Frame material	Raw Copper - Frame coating Ni/NiP
Die attach process	Soft Solder
Die attach material	Pb/Ag/Sn
Wire bonding process	Ultrasonic
Wires bonding materials	Al/Mg 5 mils Gate Pad – 15 mils Al Source Pad
Lead finishing/bump solder material	Pure Tin

Final testing information	
Testing location	<i>LONGGANG (China)</i>
Tester	IP TEST



D.U.T.: STW9NK90Z LINE: EZ9K PACKAGE: TO-247

Wafer/Die fab. information	
Wafer fab manufacturing location	<i>Catania (ITALY)</i>
Technology	Power MOSFET SuperMESH Technology
Die finishing back side	Ti-Ni-Au
Die size	6320x4620 um
Metal	Al/Si
Passivation type	Nitride

Wafer Testing (EWS) information	
Electrical testing manufacturing location	<i>Catania (ITALY)</i>
Test program	According to specification

Assembly information	
Assembly site	<i>LONGGANG (China)</i>
Package description	TO-247
Molding compound	Epoxy Resin
Frame material	Raw Copper - Frame coating Ni/NiP
Die attach process	Soft Solder
Die attach material	Pb/Ag/Sn
Wire bonding process	Ultrasonic
Wires bonding materials	Al/Mg 5 mils Gate Pad – 10 mils Al Source Pad
Lead finishing/bump solder material	Pure Tin

Final testing information	
Testing location	<i>LONGGANG (China)</i>
Tester	IP TEST



D.U.T.: STY30NK90Z LINE: EZ9N PACKAGE: Max247™

Wafer/Die fab. information	
Wafer fab manufacturing location	<i>Catania (ITALY)</i>
Technology	Power MOSFET SuperMESH Technology
Die finishing back side	Ti-Ni-Au
Die size	9480x12820 um
Metal	Al/Si
Passivation type	Nitride

Wafer Testing (EWS) information	
Electrical testing manufacturing location	<i>Catania (ITALY)</i>
Test program	According to specification

Assembly information	
Assembly site	<i>LONGGANG (China)</i>
Package description	<i>Max247™</i>
Molding compound	Epoxy Resin
Frame material	Raw Copper - Frame coating Ni/NiP
Die attach process	Soft Solder
Die attach material	Pb/Ag/Sn
Wire bonding process	Ultrasonic
Wires bonding materials	7 mils Al Gate Pad – 10 mils Al Source Pad
Lead finishing/bump solder material	Pure Tin

Final testing information	
Testing location	<i>LONGGANG (China)</i>
Tester	IP TEST



5 TESTS RESULTS SUMMARY

5.1 Test vehicle

Lot #	Process/ Package	Product Line	Comments
1	TIP35C	BA21	Power BIPOLAR
2	STW120NF10	QD0K	Power MOSFET
3	STW9NK90Z	EZ9K	Power MOSFET
4	STY30NK90Z	EZ9N	Power MOSFET

5.2 Reliability test plan and results summary

D.U.T.: TIP35C LINE: BA21 PACKAGE: TO-247

Test	PC	Std ref.	Conditions	SS	Steps	Failure/SS
HTRB	N	JEDD22 A-108	T.A.=150°C, Bias 80V	77	1000 H	0/77
HTSL	N	JESD22 A-103	TA=150°C	77	1000 H	0/77
AC	N	JESD22 A-102	Pa=2Atm / Ta=121°C	77	96 H	0/77
TC	N	JESD22 A-104	TA=-65°C TO +150°C	77	500 cy	0/77
THB	N	JESD22 A-101	TA=85°C, RH=85% BIAS 50V	77	1000H	0/77



D.U.T.: STW120NF10 LINE: QD0K PACKAGE: TO-247

Test	PC	Std ref.	Conditions	SS	Steps	Failure/SS
HTRB	N	JEDD22 A-108	TA = 150°C, Vbias=80V	77	1000 H	0/77
HTFB	N	JEDD22 A-108	Tj=150°C, Vbias=20V	77	1000 H	0/77
HTSL	N	JESD22 A-103	TA=150°C	77	1000 H	0/77
AC	N	JESD22 A-102	Pa=2Atm / Ta=121°C	77	96 H	0/77
TC	N	JESD22 A-104	TA=-65°C TO +150°C	77	500 cy	0/77
THB	N	JESD22 A-101	TA = 85°C, RH = 85%, Vbias=50V	77	1000H	0/77



D.U.T.: STW9NK90Z LINE: EZ9K PACKAGE: TO-247

Test	PC	Std ref.	Conditions	SS	Steps	Failure/SS
HTRB	N	JEDD22 A-108	TA = 150°C, Vbias=720V	77	1000 H	0/77
HTFB	N	JEDD22 A-108	Tj=150°C, Vbias=30V	77	1000 H	0/77
HTSL	N	JESD22 A-103	TA=150°C	77	1000 H	0/77
AC	N	JESD22 A-102	Pa=2Atm / Ta=121°C	77	96 H	0/77
TC	N	JESD22 A-104	TA=-65°C TO +150°C	77	500 cy	0/77
THB	N	JESD22 A-101	TA = 85°C, RH = 85%, Vbias=100V	77	1000H	0/77



D.U.T.: STY30NK90Z LINE: EZ9N PACKAGE: Max247™

Test	PC	Std ref.	Conditions	SS	Steps	Failure/SS
HTRB	N	JEDD22 A-108	TA = 150°C, Vbias=720V	77	1000 H	0/77
HTFB	N	JEDD22 A-108	Tj=150°C, Vbias=30V	77	1000 H	0/77
HTSL	N	JESD22 A-103	TA=150°C	77	1000 H	0/77
AC	N	JESD22 A-102	Pa=2Atm / Ta=121°C	77	96 H	0/77
TC	N	JESD22 A-104	TA=-65°C TO +150°C	77	500 cy	0/77
THB	N	JESD22 A-101	TA = 85°C, RH = 85%, Vbias=100V	77	1000H	0/77



ANNEXES 6.0

6.1 Tests Description

Test name	Description	Purpose
HTRB High Temperature Reverse Bias HTGB High Temperature Forward (Gate) Bias	The device is stressed in static configuration, trying to satisfy as much as possible the following conditions: <ul style="list-style-type: none">• low power dissipation;• max. supply voltage compatible with diffusion process and internal circuitry limitations;	To determine the effects of bias conditions and temperature on solid state devices over time. It simulates the devices' operating condition in an accelerated way. To maximize the electrical field across either reverse-biased junctions or dielectric layers, in order to investigate the failure modes linked to mobile contamination, oxide ageing, layout sensitivity to surface effects.
HTSL High Temperature Storage Life	The device is stored in unbiased condition at the max. temperature allowed by the package materials, sometimes higher than the max. operative temperature.	To investigate the failure mechanisms activated by high temperature, typically wire-bonds solder joint ageing, data retention faults, metal stress-voiding.
AC Auto Clave (Pressure Pot)	The device is stored in saturated steam, at fixed and controlled conditions of pressure and temperature.	To investigate corrosion phenomena affecting die or package materials, related to chemical contamination and package hermeticity.
TC Temperature Cycling	The device is submitted to cycled temperature excursions, between a hot and a cold chamber in air atmosphere.	To investigate failure modes related to the thermo-mechanical stress induced by the different thermal expansion of the materials interacting in the die-package system. Typical failure modes are linked to metal displacement, dielectric cracking, molding compound delamination, wire-bonds failure, die-attach layer degradation.
THB Temperature Humidity Bias	The device is biased in static configuration minimizing its internal power dissipation, and stored at controlled conditions of ambient temperature and relative humidity.	To evaluate the package moisture resistance with electrical field applied, both electrolytic and galvanic corrosion are put in evidence.

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