



PRODUCT/PROCESS CHANGE NOTIFICATION

PCN IPG-PWR/14/8552

Dated 23 Jun 2014

**DPAK Matrix Large Die Pad Back-End Capacity Extension -
Nantong Fujitsu Microelectronics (China)**

Table 1. Change Implementation Schedule

Forecasted implementation date for change	16-Jun-2014
Forecasted availability date of samples for customer	16-Jun-2014
Forecasted date for STMicroelectronics change Qualification Plan results availability	16-Jun-2014
Estimated date of changed product first shipment	22-Sep-2014

Table 2. Change Identification

Product Identification (Product Family/Commercial Product)	see attached list
Type of change	Package assembly process change
Reason for change	Improve service to Customers
Description of the change	Continuing in the aim of a constant process improvement, please be informed that we're going to use Automatic Assembly/Testing DPAK Matrix & Large Die Pad line for Selected Power BIPOLAR and Power MOSFET Transistors produced in Nantong Fujitsu Microelectronics (China). You may already receive products in DPAK Matrix & Large Die Pad line from Longgang or Shenzhen (China). DPAK device products, manufactured in Nantong Fujitsu Microelectronics (China), guarantee the same quality and electrical characteristics as reported in the relevant data sheets. Devices used for qualification are available as samples.
Change Product Identification	by data code.
Manufacturing Location(s)	

DOCUMENT APPROVAL

Name	Function
Mottese, Anna	Marketing Manager
Aleo, Mario-Antonio	Product Manager
Falcone, Giuseppe	Q.A. Manager

Dear Customer,

Continuing in the aim of a constant process improvement, please be informed that we're going to use Automatic Assembly/Testing DPAK Matrix & Large Die Pad line for Selected Power BIPOLAR and Power MOSFET Transistors produced in Nantong Fujitsu Microelectronics (China). You may already receive products in DPAK Matrix & Large Die Pad line from Longgang or Shenzhen (China). DPAK device products, manufactured in Nantong Fujitsu Microelectronics (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 attached file.

Any other Product related to the above series, manufactured in Nantong Fujitsu Microelectronics (China), 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 23-2014.

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

Product Family Description	Package	Part Number - Test Vehicle
Power MOSFET Transistors Power BIPOLAR Transistors	DPAK	STD5NK60ZT4 BUL742C

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	From Week 36-2014

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 shipment may start earlier with customer written agreement.



Marking and traceability:

Unless otherwise stated by customer specific requirement, traceability of Power BIPOLAR and Power MOSFET Transistors produced in Nantong Fujitsu Microelectronics (China) will be ensured by the Q.A. number marked on the package.

Sincerely Yours.

Reliability Report

*DPAK Matrix Large Die Pad Back-End Capacity
 Extension - Nantong Fujitsu Microelectronics (China)*

General Information		Locations	
Product Lines:	EZ63 – IV61	Wafer Diffusion Plants:	Ang Mo Kio (Singapore)
Product Families:	Power MOSFET (EZ63) Power BIPOLAR (IV61)	EWS Plants:	Ang Mo Kio (Singapore)
P/INs:	STD5NK60ZT4 (EZ63) BULD742CT4 (IV61)	Assembly and testing plant:	Nantong Fujitsu Microelectronics (NFME) (China)
Product Group:	IPG	Reliability Lab:	IPG-PTD Catania Reliability Lab.
Product division:	Power Transistor Division		
Package:	DPAK		
Silicon Process techn.:	Zener-Protected SuperMESH™ MOSFET Power BIPOLAR		

DOCUMENT INFORMATION

Version	Date	Pages	Prepared by	Approved by	Comment
1.0	June 2014	8	A. Settineri	C. Cappello	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.

This report does not imply for STMicroelectronics expressly or implicitly any contractual obligations other than as set forth in STMicroelectronics general terms and conditions of Sale. This report and its contents shall not be disclosed to a third party without previous written agreement from STMicroelectronics.

TABLE OF CONTENTS

1	APPLICABLE AND REFERENCE DOCUMENTS	3
2	GLOSSARY	3
3	RELIABILITY EVALUATION OVERVIEW.....	3
3.1	OBJECTIVES	3
3.2	CONCLUSION	3
4	DEVICE CHARACTERISTICS.....	4
4.1	DEVICE DESCRIPTION.....	4
4.2	CONSTRUCTION NOTE	4
5	TESTS RESULTS SUMMARY.....	6
5.1	TEST VEHICLE.....	6
5.2	RELIABILITY TEST PLAN SUMMARY	6
6	ANNEXES 6.0.....	8
6.1	TESTS DESCRIPTION	8

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
HF	Halogen Free

3 RELIABILITY EVALUATION OVERVIEW

3.1 Objectives

Reliability evaluation for assembly and testing DPAK Matrix Large Die Pad Back-End Capacity Extension - Nantong Fujitsu Microelectronics (China)

3.2 Conclusion

Qualification Plan requirements have been fulfilled without exception. It is stressed that 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

N-channel Power MOSFET
 Power BIPOLAR

4.2 Construction note

D.U.T.: STD5NK60ZT4

LINE: EZ63

PACKAGE: DPAK

Wafer/Die fab. Information	
Wafer fab manufacturing location	Ang Mo Kio (Singapore)
Technology	Zener-Protected SuperMESH™ MOSFET
Die finishing back side	Ti/Ni/Ag
Die size	3900 x 2890 μm^2
Metal	Al/Si
Passivation type	Nitride

Wafer Testing (EWS) information	
Electrical testing manufacturing location	Ang Mo Kio (Singapore)
Test program	WPIS

Assembly information	
Assembly site	Nantong Fujitsu Microelectronics (NFME)
Package description	DPAK
Molding compound	HF 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 Gate – Al Source
Lead finishing/bump solder material	Pure Tin

Final testing information	
Testing location	Nantong Fujitsu Microelectronics (NFME)
Tester	TESEC

D.U.T.: BULD742CT4
LINE: IV61
PACKAGE: DPAK

Wafer/Die fab. Information	
Wafer fab manufacturing location	Ang Mo Kio (Singapore)
Technology	NPN Power BIPOlar
Die finishing back side	Ti/Ni/Au
Die size	2430 x 2460 μm^2
Metal	Al/Si
Passivation type	PSG

Wafer Testing (EWS) information	
Electrical testing manufacturing location	Ang Mo Kio (Singapore)
Test program	WPIS

Assembly information	
Assembly site	Nantong Fujitsu Microelectronics (NFME)
Package description	DPAK
Molding compound	HF 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 Gate – Al Source
Lead finishing/bump solder material	Pure Tin

Final testing information	
Testing location	Nantong Fujitsu Microelectronics (NFME)
Tester	TESEC

5 TESTS RESULTS SUMMARY

5.1 Test vehicle

Lot #	Process/ Package	Product Line	Comments
1	STD5NK60ZT4	EZ63	Power MOSFET
2	BULD742CT4	IV61	Power BIPOLAR

5.2 Reliability test plan summary

Lot. 1 - D.U.T.: STD5NK60ZT4

LINE: EZ63

PACKAGE: DPAK

Test	PC	Std ref.	Conditions	SS	Steps	Failure/SS
						Lot 1
Die Oriented Tests						
HTRB	N	JESD22 A-108	T.A.=150°C Vdss=480V	77	168 H	0/77
					500 H	
					1000 H	
HTGB	N	JESD22 A-108	TA = 150°C Vgss= 30V	77	168 H	0/77
					500 H	
					1000 H	
HTS	N	JESD22 A-103	TA = 150°C	77	168 H	0/77
					500 H	
					1000 H	
Package Oriented Tests						
PC		JESD22 A-113	Drying 24 H @ 125°C Store 168 H @ Ta=85°C Rh=85% Over Reflow @ Tpeak=260°C 3 times	308	Final	0/308
H3TRB	Y	JESD22 A-101	Ta=85°C Rh=85%, Vdss=100V	77	168 H	0/77
					500 H	
					1000 H	
TC	Y	JESD22 A-104	TA=-65°C TO 150°C (1 HOUR/CYCLE)	77	100 cy	0/77
					200 cy	
					500 cy	
TF/IOL	Y	Mil-STD 750D Method 1037	ΔTC=105°C	77	5K cy	0/77
					10K cy	
AC	Y	JESD22 A-102	TA=121°C – PA=2 ATM	77	96 H	0/77

Lot. 2 - D.U.T.: BULD742CT4 LINE: IV61 PACKAGE: DPAK

Test	PC	Std ref.	Conditions	SS	Steps	Failure/SS
						Lot 2
Die Oriented Tests						
HTRB	N	JESD22 A-108	T.A.=150°C Vdss=480V	77	168 H	0/77
					500 H	
					1000 H	
HTS	N	JESD22 A-103	TA = 150°C	77	168 H	0/77
					500 H	
					1000 H	
Package Oriented Tests						
PC		JESD22 A-113	Drying 24 H @ 125°C Store 168 H @ Ta=85°C Rh=85% Over Reflow @ Tpeak=260°C 3 times	308	Final	0/308
H3TRB	Y	JESD22 A-101	Ta=85°C Rh=85%, Vdss=100V	77	168 H	0/77
					500 H	
					1000 H	
TC	Y	JESD22 A-104	TA=-65°C TO 150°C (1 HOUR/CYCLE)	77	100 cy	0/77
					200 cy	
					500 cy	
TF/IOL	Y	Mil-STD 750D Method 1037	ΔTC=105°C	77	5K cy	0/77
					10K cy	
AC	Y	JESD22 A-102	TA=121°C – PA=2 ATM	77	96 H	0/77

6 ANNEXES 6.0

6.1 Tests Description

Test name	Description	Purpose
Die Oriented Tests		
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: - 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.
Package Oriented Tests		
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.
TF / IOL Thermal Fatigue / Intermittent Operating Life	The device is submitted to cycled temperature excursions generated by power cycles (ON/OFF) at T ambient.	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.
H3TRB 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.



Public Products List

PCN Title : DPAK Matrix Large Die Pad Back-End Capacity Extension - Nantong Fujitsu Microelectronics (China)

PCN Reference : IPG-PWR/14/8552

PCN Created on : 16-JUN-2014

Subject : Public Products List

Dear Customer,

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

ST COMMERCIAL PRODUCT

BULD742CT4	MJD44H11T4	MJD45H11T4
STD10NM60M2	STD10NM50N	STD10NM60N
STD10NM65N	STD11N65M5	STD11NM50N
STD11NM65N	STD127DT4	STD12N65M5
STD13N60M2	STD13NM60N	STD15N65M5
STD16N65M5	STD16NF25	STD17NF25
STD18N55M5	STD18N65M5	STD20NF20
STD2NK100Z	STD2NK90ZT4	STD3LN62K3
STD3N62K3	STD3NK100Z	STD3NK80ZT4
STD3NK90ZT4	STD3PK50Z	STD4N62K3
STD4NK60ZT4	STD4NK80ZT4	STD5N52K3
STD5N52U	STD5N62K3	STD5N95K3
STD5N95K5	STD5NK50ZT4	STD5NK60ZT4
STD5NM60T4	STD6N52K3	STD6N62K3
STD6N80K5	STD6N95K5	STD6NK50ZT4
STD7N52DK3	STD7N52K3	STD7N80K5
STD7NK40ZT4	STD7NM60N	STD7NM64N
STD7NM80	STD7NS20T4	STD8N65M5
STD8N80K5	STD8NM50N	STD901T
STD9NM40N	STD9NM60N	

Please Read Carefully:

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND /OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

ST PRODUCTS ARE NOT DESIGNED OR AUTHORIZED FOR USE IN: (A) SAFETY CRITICAL APPLICATIONS SUCH AS LIFE SUPPORTING, ACTIVE IMPLANTED DEVICES OR SYSTEMS WITH PRODUCT FUNCTIONAL SAFETY REQUIREMENTS; (B) AERONAUTIC APPLICATIONS; (C) AUTOMOTIVE APPLICATIONS OR ENVIRONMENTS, AND/OR (D) AEROSPACE APPLICATIONS OR ENVIRONMENTS. WHERE ST PRODUCTS ARE NOT DESIGNED FOR SUCH USE, THE PURCHASER SHALL USE PRODUCTS AT PURCHASER'S SOLE RISK, EVEN IF ST HAS BEEN INFORMED IN WRITING OF SUCH USAGE, UNLESS A PRODUCT IS EXPRESSLY DESIGNATED BY ST AS BEING INTENDED FOR "AUTOMOTIVE, AUTOMOTIVE SAFETY OR MEDICAL" INDUSTRY DOMAINS ACCORDING TO ST PRODUCT DESIGN SPECIFICATIONS. PRODUCTS FORMALLY ESCC, QML OR JAN QUALIFIED ARE DEEMED SUITABLE FOR USE IN AEROSPACE BY THE CORRESPONDING GOVERNMENTAL AGENCY.

RESTRICTIONS OF USE AND CONFIDENTIALITY OBLIGATIONS:

THIS DOCUMENT AND ITS ANNEXES CONTAIN ST PROPRIETARY AND CONFIDENTIAL INFORMATION. THE DISCLOSURE, DISTRIBUTION, PUBLICATION OF WHATSOEVER NATURE OR USE FOR ANY OTHER PURPOSE THAN PROVIDED IN THIS DOCUMENT OF ANY INFORMATION CONTAINED IN THIS DOCUMENT AND ITS ANNEXES IS SUBMITTED TO ST PRIOR EXPRESS AUTHORIZATION. ANY UNAUTHORIZED REVIEW, USE, DISCLOSURE OR DISTRIBUTION OF SUCH INFORMATION IS EXPRESSLY PROHIBITED.

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners

© 2014 STMicroelectronics - All rights reserved.

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com