PRODUCT/PROCESS CHANGE NOTIFICATION

PCN APM-PMT/07/2634
Notification Date 06/27/2007

New Additional Assy-Testing to Subcontract PSI (Taguig, Philippines) for Package: D2PAK

PMT - POWER MOSFET

Table 1. Change Identification

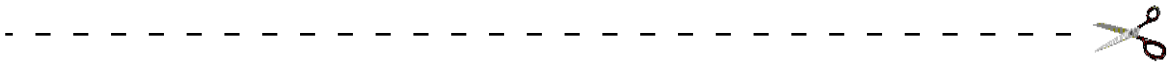
Product Identification (Product Family/Commercial Product)	See attached list
Type of change	Package assembly location change
Reason for change	Capacity Extension
Description of the change	Devices in D2PAK will be manufactured also in Subcontractor PSI (Taguig, Philippines)
Product Line(s) and/or Part Number(s)	See attached
Description of the Qualification Plan	See attached
Change Product Identification	1st two digits of the traceability code are 7P
Manufacturing Location(s)	

Table 2. Change Implementation Schedule

Forecasted implementation date for change	04-Sep-2007
Forecasted availabillity date of samples for customer	20-Jun-2007
Forecasted date for **STMicroelectronics** change Qualification Plan results availability	20-Jun-2007
Estimated date of changed product first shipment	26-Sep-2007

Table 3. List of Attachments

Customer Part numbers list	
Qualification Plan results	



Customer Acknowledgement of Receipt	**PCN APM-PMT/07/2634**
Please sign and return to STMicroelectronics Sales Office	**Notification Date 06/27/2007**

☐ Qualification Plan Denied	Name:
☐ Qualification Plan Approved	Title:
	Company:
☐ Change Denied	Date:
☐ Change Approved	Signature:

Remark

.....

.....

.....

.....

.....

.....

.....

.....

DOCUMENT APPROVAL

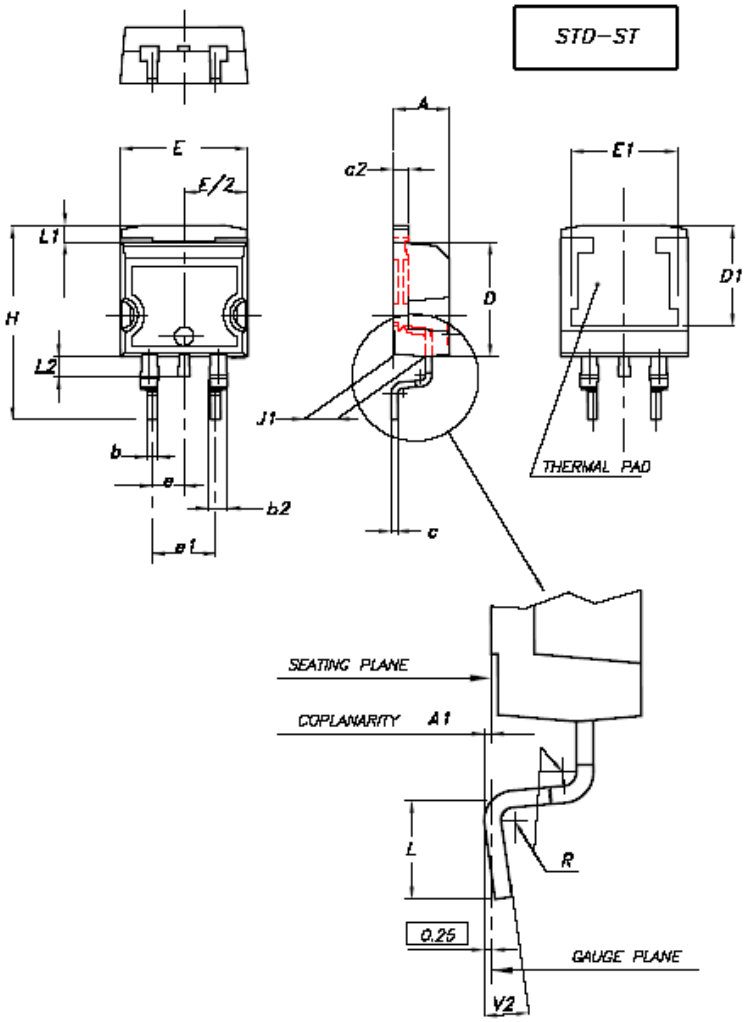
Name	Function
Giudice, Maurizio	Division Marketing Manager
Wilson, Ian	Division Product Manager
Falcone, Giuseppe	Division Q.A. Manager

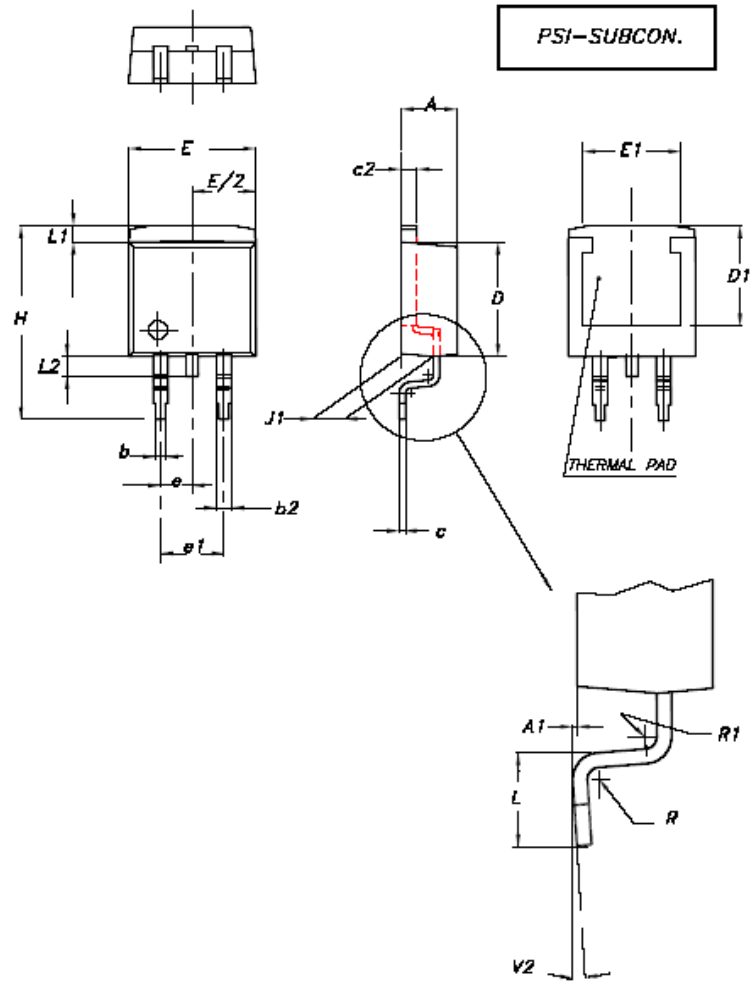
PACKAGE DIMENSIONAL COMPARISON
D2PAK
ST – PSI SUBCONTRACTOR

	STD-ST D2PAK DIMENSIONS			PSI SUBCON. D2PAK DIMENSIONS			
	DATA BOOK mm (NOTE)			DATA BOOK mm (NOTE)			
REF	**NOM**	**MIN**	**MAX**	**REF**	**NOM**	**MIN**	**MAX**
A		4.40	4.60	**A**		4.32	4.57
A1		0.03	0.23	**A1**	0.127	0.00	0.254
b		0.70	0.93	**b**		0.76	0.87
b2		1.14	1.70	**b2**		1.21	1.58
c		0.45	0.60	**c**	0.38 **(5)**	0.33 **(5)**	0.44 **(5)**
c2		1.23	1.36	**c2**	1.27	1.22	1.32
D		8.95	9.35	**D**	8.64	8.50	8.77
D1		7.50 **(1)**		**D1**		7.46 **(1)**	7.77 **(1)**
E		10	10.40	**E**		10	10.32
E1		8.50 **(1)**		**E1**		7.54 **(1)**	7.70 **(1)**
e	2.54			**e**	2.54		
e1		4.88	5.28	**e1**	5.08		
H		15	15.85	**H**	15.37	15.11	15.62
J1		2.49	2.69	**J1**		2.61	2.72
L		2.29 **(2)**	2.79 **(2)**	**L**		2.28 **(2)**	2.79 **(2)**
L1		1.27	1.40	**L1**		1.44	1.60
L2		1.30	1.75	**L2**		1.27 **(3)**	1.78 **(3)**
R	0.4			**R**	0.51		
				R1	0.76		
V2		0°	8°	**V2**		0°	5°

GENERAL PACKAGE PERFORMANCE

1 – “D1” and “E1” dimensions establish a minimum mounting surface for thermal pad.
2 – “L” is the terminal length for soldering.
3 – Solder finish uncontrolled in this area..
5 – “c” dimension a jedec is MIN 0.38


STD-ST
A
c2
E
E/2
E1
L1
H
D
D1
L2
J1
THERMAL PAD
b
e
b2
e1
c
SEATING PLANE
COPLANARITY A1
L
R
0.25
GAUGE PLANE
V2


PSI-SUBCON.
A
c2
E
E/2
E1
L1
H
D
D1
L2
J1
THERMAL PAD
b
e
b2
e1
c
A1
R1
L
R
V2

RELIABILITY EVALUATION

ON

PSI NEW ADDITIONAL ASSEMBLY

LOCATION FOR PACKAGE D²PAK

Table of Contents

Introduction

This report aims at the internal qualification of PSI as new additional assembly location for package D^2PAK.

The Qualification Reliability test trials have been performed in ST Catania Site.

The evaluation results meet ST products qualification targets, therefore PSI as the new additional assembly location for package D^2PAK is qualified.

Test Vehicles:

Product Line	Sales Type	Package
E33E	STB70NF3LL	D^2PAK
EZ56	STB11NK50Z	D^2PAK
EZ61	STB3NK60Z	D^2PAK

Failure Criteria :

A failed component is a device which becomes inoperative during the test or it fails on meeting the end limits foreseen in the device specification, for one or more than the parameters here below reported

Power MOSFET Main Parameters

Drain Leakage Current (Idss)
Gate Leakage Current (Igss)
Threshold Voltage (Vgs(th)
Forward On Voltage (Vsd)
Drain Source On Voltage (Vds(on))
Drain Source Breakdown Voltage (Bvdss)

Reliability Evaluation Plan and results

D.U.T.: STB70NF3LL Line: E33E Package: D^2PAK

Test	Conditions	S.S.	Requirement	Results
PRECONDITIONING OF SMD DEVICES BEFORE TC/THB/ENV. SEQ.	DRYNG 1H @ 125℃ STORE 168H @ TA=85℃ RH=85% Reflow @ 245℃ 3 times	204 x 1 Lot	Parameter deviation within spec. limits at end of preconditioning.	No parameter deviation out of spec. limits at end of precondi-tioning.
H.T.S.	TA=175℃	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation out of spec. limits at 1000 hours.
T.H.B.	D.U.T. SMD PRECONDITIONED TA=85℃ - RH=85% Vbias= 24V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation out of spec. limits at 1000 hours.
H.T.R.B.	T.A.=175℃ Vdd=24V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation out of spec. limits at 1000 hours.
H.T.F.B.	TA=150℃ Vgss=15V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	No parameter deviation out of spec. limits at 1000 hours.
PRESSURE POT	TA=121℃ - PA=2Atm	77 x 1 Lot	Parameter deviation within spec. limits at 168 hours.	No parameter deviation out of spec. limits at 168 hours.
THERMAL CYCLES AIR TO AIR	D.U.T. SMD PRECONDITIONED TA=-65℃ TO 150℃ 1 HOUR / CYCLE	77 x 1 Lot	Parameter deviation within spec. limits at 500 cycles.	No parameter deviation out of spec. limits at 500 cy
THERMAL FATIGUE	ΔTC=105℃ - Pd=3.8W	77 x 1 Lot	Parameter deviation within spec. limits at 10k cycles.	No parameter deviation out of spec. limits at 10Kcy.
ENVIRONMENTAL SEQUENCE	D.U.T. SMD PRECONDITIONED 100 THERMAL CYCLES + 96H PP	50 x 1 Lot	Parameter deviation within spec. limits at end of test.	No parameter deviation out of spec. limits at end of test.

Reliability Evaluation Plan and results

D.U.T.: STB11NK50Z Line: EZ56 Package: D^2PAK

Test	Conditions	S.S	Requirement	Results
PRECONDITIONING OF SMD DEVICES BEFORE TC/THB/ENV. SEQ.	DRYNG 1H @ 125℃ STORE 168H @ TA=85℃ RH=85% Reflow @ 245℃ 3 times	204 x 1 Lot	Parameter deviation within spec. limits at end of preconditioning.	No parameter deviation out of spec. limits at end of precondi-tioning.
H.T.S.	TA=150℃	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	*No parameter deviation out of spec. limits at 1000 hours.*
T.H.B.	D.U.T. SMD PRECONDITIONED TA=85℃ - RH=85% Vbias = 100V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	*No parameter deviation out of spec. limits at 1000 hours.*
H.T.R.B.	T.A.=150℃ Vdd=400V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	*No parameter deviation out of spec. limits at 1000 hours.*
H.T.F.B.	TA = 150℃ Vgss= 30V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	*No parameter deviation out of spec. limits at 1000 hours.*
PRESSURE POT	TA=121℃ - PA=2Atm	77 x 1 Lot	Parameter deviation within spec. limits at 96 hours.	*No parameter deviation out of spec. limits at 96 hours.*
THERMAL CYCLES AIR TO AIR	D.U.T. SMD PRECONDITIONED TA=-65℃ TO 150℃ 1 HOUR / CYCLE	77 x 1 Lot	Parameter deviation within spec. limits at 500 cycles.	*No parameter deviation out of spec. limits at 500 cy.*
THERMAL FATIGUE	ΔTC=105℃ - Pd=3.8W	77 x 1 Lot	Parameter deviation within spec. limits at 10k cycles.	*No parameter deviation out of spec. limits at 10 Kcy.*
ENVIRONMENTAL SEQUENCE	D.U.T. SMD PRECONDITIONED 100 THERMAL CYCLES + 96H PP	50 x 1 Lot	Parameter deviation within spec. limits at end of test.	*No parameter deviation out of spec. limits at end of test.*

Reliability Evaluation Plan and results

D.U.T.: STB3NK60Z Line: EZ61 Package: D^2PAK

Test	Conditions	S.S	Requirement	Results
PRECONDITIONING OF SMD DEVICES BEFORE TC/THB/ENV. SEQ.	DRYNG 1H @ 125℃ STORE 168H @ TA=85℃ RH=85% Reflow @ 245℃ 3 times	204 x 1 Lot	Parameter deviation within spec. limits at end of preconditioning.	No parameter deviation out of spec. limits at end of precondi-tioning.
H.T.S.	TA=150℃	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	*No parameter deviation out of spec. limits at 1000 hours.*
T.H.B.	D.U.T. SMD PRECONDITIONED TA=85℃ - RH=85% Vbias = 100V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	*No parameter deviation out of spec. limits at 1000 hours.*
H.T.R.B.	T.A.=150℃ Vdd=480V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	*No parameter deviation out of spec. limits at 1000 hours.*
H.T.F.B.	TA = 150℃ Vgss= 30V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	*No parameter deviation out of spec. limits at 1000 hours.*
PRESSURE POT	TA=121℃ - PA=2Atm	77 x 1 Lot	Parameter deviation within spec. limits at 96 hours.	*No parameter deviation out of spec. limits at 96 hours.*
THERMAL CYCLES AIR TO AIR	D.U.T. SMD PRECONDITIONED TA=-65℃ TO 150℃ 1 HOUR / CYCLE	77 x 1 Lot	Parameter deviation within spec. limits at 500 cycles.	*No parameter deviation out of spec. limits at 500 cy.*
THERMAL FATIGUE	ΔTC=105℃ - Pd=3.8W	77 x 1 Lot	Parameter deviation within spec. limits at 10k cycles.	*No parameter deviation out of spec. limits at 10 Kcy.*
ENVIRONMENTAL SEQUENCE	D.U.T. SMD PRECONDITIONED 100 THERMAL CYCLES + 96H PP	50 x 1 Lot	Parameter deviation within spec. limits at end of test.	*No parameter deviation out of spec. limits at end of test.*

Technological Characteristics

D.U.T.: STB70NF3LL Line: E33E Package: D^2PAK

DIE	*Technology:* STripFET II POWER MOSFET *Material:* Silicon *Metallization – Front :* Al/Si (1%) *- Back :* Ti-Ni-Au		*Passivation :* *Dimensions :*	No Passivation 2540 x 3550 µm^2
DIE ATTACH	Soft Solder	**FRAME**	*Frame and lead material:* *Frame coating :* *Lead coating :*	Copper Raw Copper Ni Spot on T-Post and Leads Sn
WIRE BOND	Ultrasonics	**WIRE**	*Material :* *Diameter :*	Al Gate Al Source 5 mils Gate 15 mils Source
SEALING	Molding	**PACKAGING**	*Material :*	Epoxy Resin

PRODUCTION PLACES: WAFER PROCESSING: SINGAPORE
ASSEMBLY LOCATION : PSI
Q.A. LOCATION : PSI

Technological Characteristics

D.U.T.: STB11NK50Z Line: EZ56 Package: D^{2}PAK

DIE	*Technology:* *Material:* *Metallization – Front :* *- Back :*	SuperMESH^{TM} MOSFET Silicon Al/Si (1%) Ti-Ni-Au	*Passivation :* *Dimensions :*	Nitride 5040 x 3800 µm^2
DIE ATTACH	Soft Solder	**FRAME**	*Frame and lead material:* *Frame coating :* *Lead coating :*	Copper Raw Copper Ni Spot on T-Post and Leads Sn
WIRE BOND	Ultrasonics	**WIRE**	*Material :* *Diameter :*	Al Gate Al Source 5 mils Gate 7 mils Source
SEALING	Molding	**PACKAGING**	*Material :*	Epoxy Resin

PRODUCTION PLACES: WAFER PROCESSING: SINGAPORE
ASSEMBLY LOCATION : PSI
Q.A. LOCATION : PSI

Technological Characteristics

D.U.T.: STB3NK60Z Line: EZ61 Package: D^2PAK

DIE	*Technology:* SuperMESH™ MOSFET *Material:* Silicon *Metallization – Front :* Al/Si (1%) *- Back :* Ti-Ni-Au		*Passivation :* *Dimensions :*	Nitride 2700 x 2170 µm²
DIE ATTACH	Soft Solder	**FRAME**	*Frame and lead material:* *Frame coating :* *Lead coating :*	Copper Raw Copper Ni Spot on T-Post and Leads Sn
WIRE BOND	Ultrasonics	**WIRE**	*Material :* *Diameter :*	Al Gate Al Source 5 mils Gate 5 mils Source
SEALING	Molding	**PACKAGING**	*Material :*	Epoxy Resin

PRODUCTION PLACES: WAFER PROCESSING: SINGAPORE
ASSEMBLY LOCATION : PSI
Q.A. LOCATION : PSI

Reliability Test Description

High Temperature Reverse Bias (HTRB)

This test is performed in order to demonstrate the quality and reliability of devices subjected to an elevated temperature and simultaneously reverse biased. The purpose of this test is to detect surface defects such as poor passivation, presence of contaminants, etc...

High Temperature Forward Bias (HTFB)

This test is performed in order to demonstrate the quality and reliability of devices subjected to an elevated temperature and simultaneously forward gate biased. The purpose of this test is to detect surface and gate oxide defects.

High Temperature Storage (HTS)

This stress test is performed to check the device life in a high temperature ambient. Specimens are put for a period of time inside a stove in free air. Detectable failure mechanisms are presence of contaminants and metal corrosion.

Thermal Cycles/Shocks

The purpose of this test is to determine the resistance of devices to exposure to extreme changes in temperature. Specimens are first placed in a suitable environment at a low temperature and then transferred to one at high temperature. Effects of thermal cycles/shocks include cracking of die, breaking of wire bonding, mechanical damage to the device case.

Reliability Test Description (continued)

Temperature Humidity Bias (THB)

This test is performed to check the device life in a high humidity ambient. Specimens are subjected to a permanent bias in a climatic chamber in the presence of steam. Detectable failure mechanisms are metal corrosion and moulding defects.

Pressure Pot

This test is performed in order to check device life in a high humidity ambient in an accelerated way. Specimens are subjected for a period of time inside an autoclave in the presence of steam and pressure. Detectable failure mechanism is metal corrosion.

Thermal Fatigue

This test is performed to demonstrate the quality and reliability of devices exposed to cyclic variation in electrical stress between "on" and "off" conditions and resultant cyclic variation in device and case temperatures (thermo-mechanical stress). The purpose of this test is to detect assembly defects : improper die-attach, bonding weakness and thermal mismatch among various components of the package.

Environmental Sequence

The purpose of this test is to study the influence of corrosion mechanism when the die/package system has already been stressed by temperature cycling.

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.

UNLESS EXPRESSLY APPROVED IN WRITING BY AN AUTHORIZED ST REPRESENTATIVE, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS ‘‘AUTOMOTIVE GRADE’’ MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER’S OWN RISK.

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

STMicroelectronics group of companies

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

www.st.com