PRODUCT/PROCESS CHANGE NOTIFICATION

PCN APM-PMT/07/2348
Notification Date 03/26/2007

New Additional Assy-Testing to Subcontract AimHigh Global Korea (ex Wooseok) for TO-220 Package

PMT - POWER MOSFET

Table 1. Change Identification

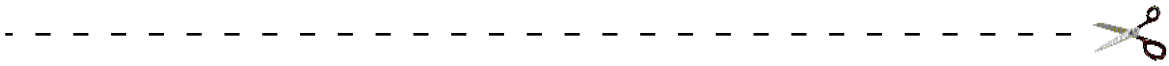
Product Identification (Product Family/Commercial Product)	See attached list
Type of change	Package assembly location change
Reason for change	Back-end Capacity Extension
Description of the change	Assy-Testing of devices in TO-220 Package may also be done to Subcontractor AimHigh Global Korea (ex Wooseok).
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 trace ability code are HW
Manufacturing Location(s)	

Table 2. Change Implementation Schedule

Forecasted implementation date for change	15-Jun-2007
Forecasted availabillity date of samples for customer	19-Mar-2007
Forecasted date for **STMicroelectronics** change Qualification Plan results availability	19-Mar-2007
Estimated date of changed product first shipment	25-Jun-2007

Table 3. List of Attachments

Customer Part numbers list	
Qualification Plan results	



Customer Acknowledgement of Receipt	**PCN APM-PMT/07/2348**
Please sign and return to STMicroelectronics Sales Office	**Notification Date 03/26/2007**

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

Remark

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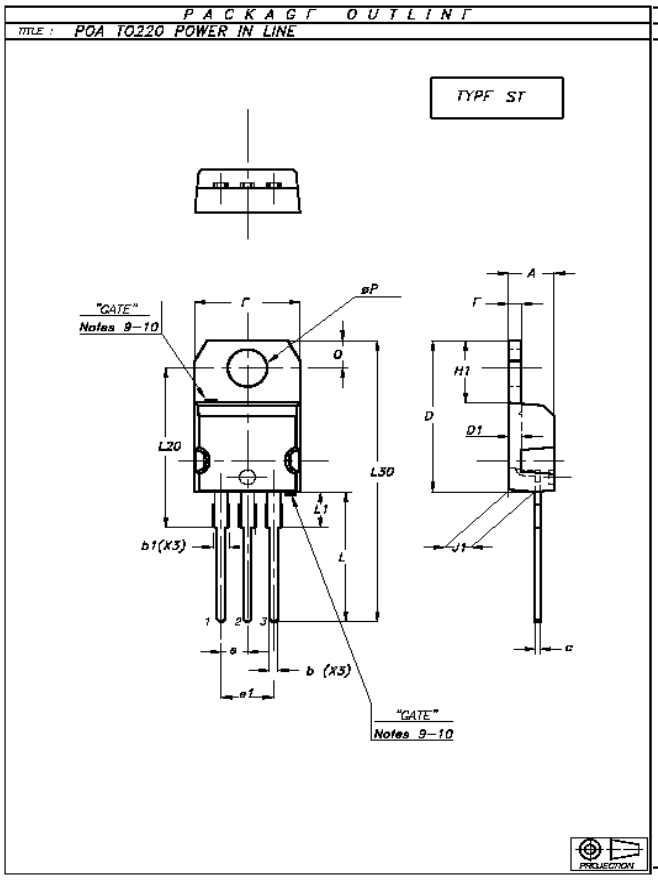
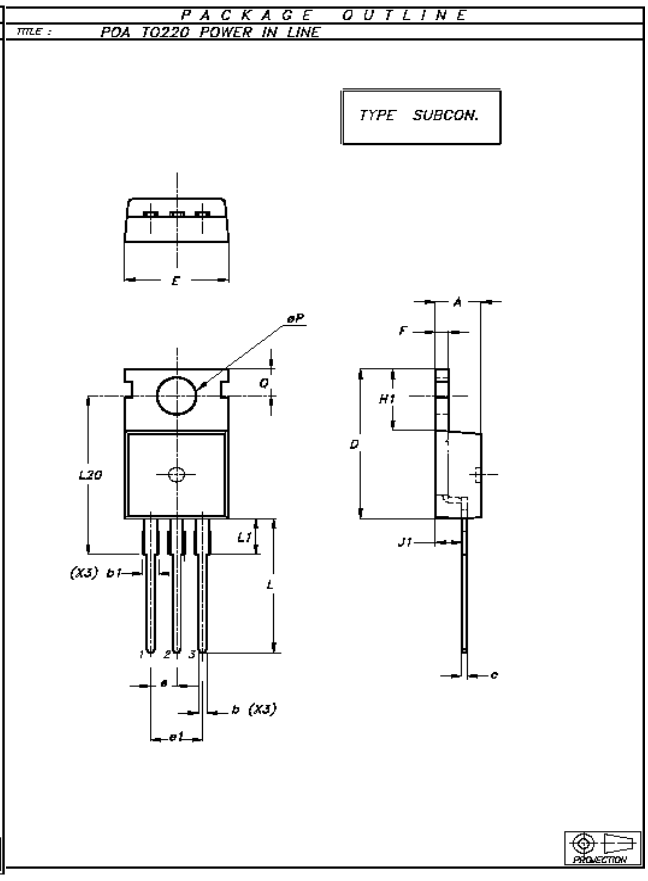
DOCUMENT APPROVAL

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

POA	ST dimensions			AimHigh Global dimensions		
	DIM [mm]			DIM [mm]		
ref. dim.	TYP	MIN	MAX	TYP	MIN	MAX
A		4.4	4.6		4.3	4.7
b		0.61	0.88		0.7	0.9
b1		1.14	1.7		1.42	1.62
c		0.49	0.7		0.45	0.6
D		15.25	15.75	15.7		
D1	1.27					
E		10	10.4		9.8	10.2
e		2.4	2.7	2.54		
e1		4.95	5.15	5.08		
F		1.23	1.32		1.25	1.39
H1		6.2	6.6	6.5		
J1		2.4	2.72		2.2	2.6
L		13	14		12.88	13.28
L1		3.5	3.93	3		
L20	16.4				15.7	16.1
L30	28.9					
ØP		3.75	3.85		3.5	3.7
Q		2.65	2.95		2.7	2.9
PACKAGE CODE: DE-DZ-8R-80-XZ						





Reliability evaluation on

TO-220 made in

New Additional Subcontractor

AimHigh Global Korea (ex Wooseok)

Table of Contents

Introduction

This report is aimed to qualify the package TO-220 made in New Additional Subcontractor AimHigh Global Korea (ex Wooseok).

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

The evaluation results meet ST products qualification targets, therefore the TO-220 package made in New Additional Subcontractor AimHigh Global Korea (ex Wooseok) is qualified.

Test Vehicles :

Product Line	Sales Type	Package
EZ62	STP4NK60Z	TO-220
EZ64	STP6NK60Z	TO-220
EHD7	STP75NF75	TO-220

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.: STP4NK60Z LINE: EZ62 PACKAGE: TO-220

Test	Conditions	S.S.	Requirement	Results
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.	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	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=4.8W	77 x 1 Lot	Parameter deviation within spec. limits at 10k cycles.	No parameter deviation out of spec. limits at 10Kcy.

Reliability Evaluation Plan and results

D.U.T.: STP6NK60Z LINE: EZ64 PACKAGE: TO-220

Test	Conditions	S.S.	Requirement	Results
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.	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	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=4.8W	77 x 1 Lot	Parameter deviation within spec. limits at 10k cycles.	No parameter deviation out of spec. limits at 10Kcy.

Reliability Evaluation Plan and results

D.U.T.: STP75NF75 LINE: ED7H PACKAGE: TO-220

Test	Conditions	S.S.	Requirement	Results
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.	TA=85℃ - RH=85% Vbias = 50V	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=60 V	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= 20V	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	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 cycles.
THERMAL FATIGUE	ΔTC=105℃ - Pd=4.8W	77 x 1 Lot	Parameter deviation within spec. limits at 10k cycles.	No parameter deviation out of spec. limits at 10Kcy.

Technological Characteristics

D.U.T.: STP4NK60Z LINE: EZ62 PACKAGE: TO-220

DIE	*Technology:* SuperMESH™ MOSFET *Material:* Silicon *Passivation :* Nitride *Metallization – Front :* Al/Si (1%) *Dimensions :* 3190 X 2660 µm² *- Back :* Ti-Ni-Au			
DIE ATTACH	Soft Solder	**FRAME**	*Frame and lead material:* *Frame coating :* *Lead coating :*	Raw copper Ni/Ni Plate Sn 100%
WIRE BOND	Ultrasonic	**WIRE**	*Material :* *Diameter :*	Gate: Al/Mg Source: Al/Mg 5 mils Gate 5 mils Source
SEALING	Molding	**PACKAGING**	*Material :*	Epoxy Resin

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

Technological Characteristics

D.U.T.: STP6NK60Z LINE: EZ64 PACKAGE: TO-220

DIE	*Technology:* SuperMESH™ MOSFET *Material:* Silicon *Metallization – Front :* Al/Si (1%) *- Back :* Ti-Ni-Au		*Passivation :* *Dimensions :*	Nitride 4180 X 3430 µm^2
DIE ATTACH	Soft Solder	**FRAME**	*Frame and lead material:* *Frame coating :* *Lead coating :*	Raw copper Ni/Ni Plate Sn 100%
WIRE BOND	Ultrasonic	**WIRE**	*Material :* *Diameter :*	Gate: Al/Mg Source: Al/Mg 5 mils Gate 5 mils Source
SEALING	Molding	**PACKAGING**	*Material :*	Epoxy Resin

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

Technological Characteristics

D.U.T.: STP75NF75 Line: ED7H Package: TO-220

DIE	*Technology:* N-CHANNEL STripFET™ II Power MOSFET *Material:* Silicon *Passivation :* None *Metallization – Front :* Al/Si (1%) *Dimensions :* 4460 x 5050 µm *- Back :* Ti-Ni-Au			
DIE ATTACH	Soft solder	**FRAME**	*Frame and lead material:* *Frame coating :* *Lead coating :*	Raw copper Ni/Ni Plate Sn 100%
WIRE BOND	Ultrasonic	**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: Shenzhen and Casablanca
Q.A. LOCATION: Shenzhen and Casablanca

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.

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