



# PRODUCT/PROCESS CHANGE NOTIFICATION

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PCN MPA-PMT/06/1947  
Notification Date 07/27/2006

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**New Subcontractor location (PSI-Philippines) for TO-247**

**PMT - POWER MOSFET**

**Table 1. Change Identification**

Product Identification (Product Family/Commercial Product)	Power MOSFET assembled in TO-247
Type of change	Package assembly location change
Reason for change	to extend capacity for TO-247 package
Description of the change	Power MOSFET Division has been decided to set up a new location for TO-247 package. New Assembly plant will be added to the current one. New location will be in PSI-Philippines. No change in process, except mechanical data comparison, reported in attached file.
Product Line(s) and/or Part Number(s)	See attached
Description of the Qualification Plan	See attached
Change Product Identification	See "7P" on Traceability code
Manufacturing Location(s)	

**Table 2. Change Implementation Schedule**

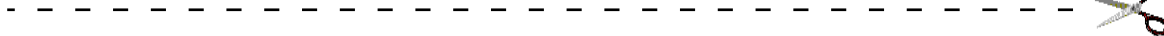
Forecasted implementation date for change	18-Oct-2006
Forecasted availability date of samples for customer	18-Jul-2006
Forecasted date for <b>STMicroelectronics</b> change Qualification Plan results availability	18-Jul-2006
Estimated date of changed product first shipment	18-Oct-2006

**Table 3. Change Responsibility**

	<b>Name</b>	<b>Signature</b>	<b>Date</b>
Division Product Manager	Ian Wilson		Jul.18 ,06
Division Q.A. Manager	Giuseppe Falcone		Jul.18 ,06
Division Marketing Manager	Maurizio Giudice		Jul.18 ,06

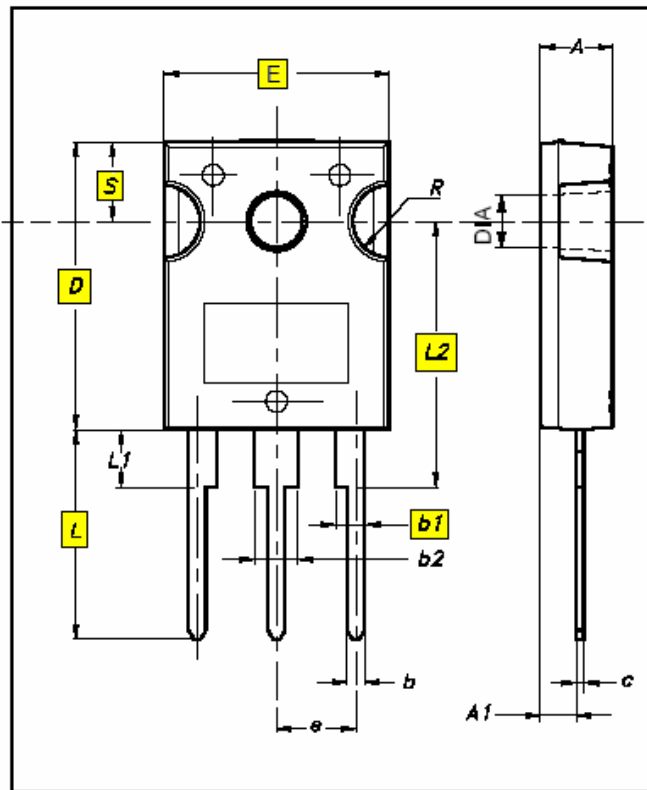
**Table 4. List of Attachments**

Customer Part numbers list	
Qualification Plan results	

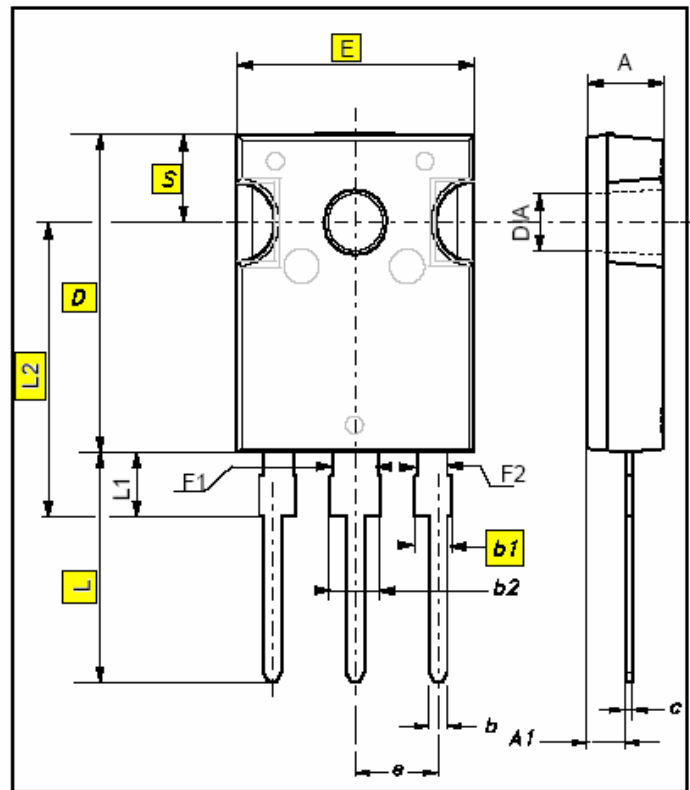


Customer Acknowledgement of Receipt		<b>PCN MPA-PMT/06/1947</b>
Please sign and return to STMicroelectronics Sales Office		<b>Notification Date 07/27/2006</b>
<input type="checkbox"/> Qualification Plan Denied <input type="checkbox"/> Qualification Plan Approved  <input type="checkbox"/> Change Denied <input type="checkbox"/> Change Approved	Name:	
	Title:	
	Company:	
	Date:	
	Signature:	
Remark ..... ..... ..... ..... .....		

## TO247 by ST




## TO247 by PSI



REF.	DATASHEET			DRAWING		
	TO247 by ST (mm)			TO247 by PSI (mm)		
	TYP	MIN	MAX	TYP	MIN	MAX
A		4.85	5.15		4.90	5.16
A1		2.20	2.60		2.35	2.45
b		1.0	1.40		1.20	1.33
b1		2.0	2.40		1.90	2.13
b2		3.0	3.40		3.04	3.20
F1				3		
F2				2		
c		0.40	0.80		0.6	0.76
D		19.85	20.15		20.83	21.09
E		15.45	15.75		15.77	16.03
e	5.45			5.45		
L		14.20	14.80		20.04	20.31
L1		3.70	4.30		3.93	4.45
L2	18.50				18.72	19.18
DIA		3.55	3.65		3.56	3.66
S	5.50				6.04	6.30
R		4.50	5.50			



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## **RELIABILITY EVALUATION**

**ON**

**TO-247 ASSEMBLED IN  
PSI SUBCONTRACTOR**

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### **Introduction**

This report aims at the internal qualification of the package TO-247 assembled in subcontractor PSI

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

The evaluation results meet ST products qualification targets, therefore the TO-247 package is qualified in PSI.

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**Test Vehicles:**

**Product Lines**

EZ57  
EZ98  
EZ9K

**Main Sales Types**

STW14NK50Z  
STW12NK90Z  
STW9NK90Z

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**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

**Parameter                      Power MOSFET**

- Drain Leakage Current (Idss)
- Gate Leakage Current (I<sub>gss</sub>)
- Threshold Voltage (V<sub>gs(th)</sub>)
- Forward On Voltage ( V<sub>sd</sub> )
- Drain Source On Voltage ( V<sub>ds(on)</sub> )
- Drain Source Breakdown Voltage ( B<sub>vdss</sub> )

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### Reliability Evaluation Plan and results

**D.U.T. : STW14NK50Z    LINE: EZ57    PACKAGE: TO-247**

<b>Test</b>	<b>Conditions</b>	<b>S.S.</b>	<b>Requirement</b>	<b>Results</b>
<b>H.T.S.</b>	TA=150°C	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	<i>No parameter deviation out of spec. limits at 1000 hours.</i>
<b>T.H.B.</b>	TA=85°C - RH=85% Vbias= 100V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	<i>No parameter deviation out of spec. limits at 1000 hours.</i>
<b>H.T.R.B.</b>	T.A.=150°C; Vces=400V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	<i>No parameter deviation out of spec. limits at 1000 hours.</i>
<b>H.T.F.B.</b>	TA = 150°C ; Vgss= 30V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	<i>No parameter deviation out of spec. limits at 1000 hours.</i>
<b>PRESSURE POT</b>	TA=121°C - PA=2Atm	77 x 1 Lot	Parameter deviation within spec. limits at 96 hours.	<i>No parameter deviation out of spec. limits at 96 hours.</i>
<b>THERMAL CYCLES AIR TO AIR</b>	TA=-55°C TO 150°C 1 HOUR / CYCLE	77 x 1 Lot	Parameter deviation within spec. limits at 500 cycles.	<i>No parameter deviation out of spec. limits at 500 cy</i>
<b>THERMAL SHOCKS LIQUID TO LIQUID</b>	TA=-55°C TO 150°C 10 MIN / SHOCK	77 x 1 Lot	Parameter deviation within spec. limits at 500 shocks.	<i>No parameter deviation out of spec. limits at 500 sh.</i>
<b>THERMAL FATIGUE</b>	TC=70°C - Pd=24W	77 x 1 Lot	Parameter deviation within spec. limits at 10k cycles.	<i>No parameter deviation out of spec. limits at 10Kcy.</i>
<b>ENVIRONMENTAL SEQUENCE</b>	100 THERMAL CYCLES + 96H PP	50 x 1 Lot	Parameter deviation within spec. limits at end of test.	<i>No parameter deviation out of spec. limits at end of test.</i>

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### Reliability Evaluation Plan and results

**D.U.T. : STW12NK90Z    LINE: EZ98    PACKAGE: TO-247**

<b>Test</b>	<b>Conditions</b>	<b>S.S.</b>	<b>Requirement</b>	<b>Results</b>
<b>H.T.S.</b>	TA=150°C	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	<i>No parameter deviation out of spec. limits at 1000 hours.</i>
<b>T.H.B.</b>	TA=85°C - RH=85% Vbias= 100V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	<i>No parameter deviation out of spec. limits at 1000 hours.</i>
<b>H.T.R.B.</b>	T.A.=150°C; Vces=720V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	<i>No parameter deviation out of spec. limits at 1000 hours.</i>
<b>H.T.F.B.</b>	TA = 150°C ; Vgss= 30V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	<i>No parameter deviation out of spec. limits at 1000 hours.</i>
<b>PRESSURE POT</b>	TA=121°C - PA=2Atm	77 x 1 Lot	Parameter deviation within spec. limits at 96 hours.	<i>No parameter deviation out of spec. limits at 96 hours.</i>
<b>THERMAL CYCLES AIR TO AIR</b>	TA=-55°C TO 150°C 1 HOUR / CYCLE	77 x 1 Lot	Parameter deviation within spec. limits at 500 cycles.	<i>No parameter deviation out of spec. limits at 500 cy</i>
<b>THERMAL SHOCKS LIQUID TO LIQUID</b>	TA=-55°C TO 150°C 10 MIN / SHOCK	77 x 1 Lot	Parameter deviation within spec. limits at 500 shocks.	<i>No parameter deviation out of spec. limits at 500 sh.</i>
<b>THERMAL FATIGUE</b>	TC=70°C - Pd=24W	77 x 1 Lot	Parameter deviation within spec. limits at 10k cycles.	<i>No parameter deviation out of spec. limits at 10Kcy.</i>
<b>ENVIRONMENTAL SEQUENCE</b>	100 THERMAL CYCLES + 96H PP	50 x 1 Lot	Parameter deviation within spec. limits at end of test.	<i>No parameter deviation out of spec. limits at end of test.</i>

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### Reliability Evaluation Plan and results

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

<b>Test</b>	<b>Conditions</b>	<b>S.S.</b>	<b>Requirement</b>	<b>Results</b>
<b>H.T.S.</b>	TA=150°C	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	<i>No parameter deviation out of spec. limits at 1000 hours.</i>
<b>T.H.B.</b>	TA=85°C - RH=85% Vbias= 100V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	<i>No parameter deviation out of spec. limits at 1000 hours.</i>
<b>H.T.R.B.</b>	T.A.=150°C; Vces=720V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	<i>No parameter deviation out of spec. limits at 1000 hours.</i>
<b>H.T.F.B.</b>	TA = 150°C ; Vgss= 30V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	<i>No parameter deviation out of spec. limits at 1000 hours.</i>
<b>PRESSURE POT</b>	TA=121°C - PA=2Atm	77 x 1 Lot	Parameter deviation within spec. limits at 96 hours.	<i>No parameter deviation out of spec. limits at 96 hours.</i>
<b>THERMAL CYCLES AIR TO AIR</b>	TA=-55°C TO 150°C 1 HOUR / CYCLE	77 x 1 Lot	Parameter deviation within spec. limits at 500 cycles.	<i>No parameter deviation out of spec. limits at 500 cy</i>
<b>THERMAL SHOCKS LIQUID TO LIQUID</b>	TA=-55°C TO 150°C 10 MIN / SHOCK	77 x 1 Lot	Parameter deviation within spec. limits at 500 shocks.	<i>No parameter deviation out of spec. limits at 500 sh.</i>
<b>THERMAL FATIGUE</b>	TC=70°C - Pd=24W	77 x 1 Lot	Parameter deviation within spec. limits at 10k cycles.	<i>No parameter deviation out of spec. limits at 10Kcy.</i>
<b>ENVIRONMENTAL SEQUENCE</b>	100 THERMAL CYCLES + 96H PP	50 x 1 Lot	Parameter deviation within spec. limits at end of test.	<i>No parameter deviation out of spec. limits at end of test.</i>

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**Technological Characteristics**

**D.U.T. : STW14NK50Z    LINE: EZ57    PACKAGE: TO-247**


<b>DIE</b>	<i>Technology:</i> SuperMESH™ MOSFET <i>Material:</i> Silicon <i>Passivation :</i> None <i>Metallization – Front :</i> Al/Si <i>Dimensions :</i> 5720 x 4580 µm <i>- Back :</i> Ti-Ni-Au			
	<b>DIE ATTACH</b>	Soft Solder	<b>FRAME</b>	<i>Frame and lead material:</i> Full Ni  <i>Lead coating :</i> Sn 100%
<b>WIRE BOND</b>	Ultrasonic	<b>WIRE</b>	<i>Material :</i> Al Gate Al Source  <i>Diameter :</i> 5 mils Gate 10 mils Source	
<b>SEALING</b>	Molding	<b>PACKAGING</b>	<i>Material :</i> Epoxy Resin	

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

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### 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.

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### 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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