



PRODUCT/PROCESS CHANGE NOTIFICATION

PCN MPA/06/2113
Notification Date 10/30/2006

New Molding compound for TO-220 (Samsung Cheil SI7200DXC)

MPA - MPA

Table 1. Change Identification

| | |
|---|---|
| Product Identification (Product Family/Commercial Product) | See attached list |
| Type of change | Package assembly material change |
| Reason for change | to have an alternative source |
| Description of the change | MPA Group is ready to announce in addition to the resin currently used, a new molding compound which will be used in internal Plant Casablanca and Shenzhen. The new molding compound (Samsung Cheil SI7200DXC) will be used in TO-220 assembly process and it will impact in Power Mosfet, Power Bipolar and Voltage Regulators devices produced in that package. ST ensures the traceability of new resin at lot level. No change in processes or performance, while in the meantime we will improve quality and service. |
| Product Line(s) and/or Part Number(s) | See attached |
| Description of the Qualification Plan | See attached |
| Change Product Identification | Traceability is ensured at lot level |
| Manufacturing Location(s) | 1]St Ain Sebaa - Morocco 2]St Shenzhen -China |

Table 2. Change Implementation Schedule

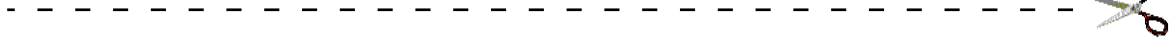
| | |
|--|-------------|
| Forecasted implementation date for change | 20-Jan-2007 |
| Forecasted availability date of samples for customer | 10-Oct-2006 |
| Forecasted date for STMicroelectronics change Qualification Plan results availability | 10-Oct-2006 |
| Estimated date of changed product first shipment | 20-Jan-2007 |

Table 3. Change Responsibility

| | Name | Signature | Date |
|----------------------------|--------------------|------------------|-------------|
| Division Product Manager | Porto/Pesce/Wilson | | Oct.24 ,06 |
| Division Q.A. Manager | Falcone/Vitali | | Oct.24 ,06 |
| Division Marketing Manager | Carlo Marino | | Oct.24 ,06 |

Table 4. List of Attachments

| | |
|----------------------------|--|
| Customer Part numbers list | |
| Qualification Plan results | |



| | | |
|--|------------|-------------------------------------|
| Customer Acknowledgement of Receipt | | PCN MPA/06/2113 |
| Please sign and return to STMicroelectronics Sales Office | | Notification Date 10/30/2006 |
| <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 | | |

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|  | MPA CATANIA RELIABILITY REPORT | Date: | May '06 |
| | | No | 01a/06 |

RELIABILITY EVALUATION ON

TO-220 made with

**Samsung Cheil SI7200DXC
Mold Compound**

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Introduction

This report is aimed to qualify the package TO-220 made in ST Shenzhen and Casablanca Plants with Samsung Cheil SI7200DXC Mold Compound.

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

The evaluation results met ST products qualification targets, therefore the TO-220 Package version with the mold compound Samsung Cheil SI7200DXC is qualified.

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Test Vehicles:

Product Lines Power Mos

EZ52
EZ62
MD65
ED7H
ED6F

Main Sales Types

STP5NK50Z
STP4NK60Z
STP11NM60
STP75NF75
STP60NF06

Product Lines Power Bipolar

B004
BV22

Main Sales Types

TIP122
BUL128

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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 MOS

- 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)

Parameter Power BIP

- Collector Leakage Current (Icbo or Iceo or Ices, etc...)
- Emitter Leakage (Iebo)
- H_{FE}, V_{cesat}, V_{besat}, V_f
- Breakdown Voltage (BVcbo, BVceo, V_{bces}, Bvebo)

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Reliability Evaluation Plan and results

D.U.T.: STP5NK50Z LINE: EZ52 PACKAGE: TO-220

| Test | Conditions | S.S. | Requirement | Results |
|--------------------------------------|-------------------------------------|---------------|--|---|
| H.T.S. | TA=150°C | 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°C - 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°C 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°C 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°C - 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°C TO 150°C 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°C - Pd=4.8W | 77 x 1 Lot | Parameter deviation within spec. limits at 10k cycles. | No parameter deviation out of spec. limits at 10Kcy. |

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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°C | 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°C - 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°C 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°C 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°C - 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°C TO 150°C 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°C - Pd=4.8W | 77 x 1 Lot | Parameter deviation within spec. limits at 10k cycles. | No parameter deviation out of spec. limits at 10Kcy. |

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Reliability Evaluation Plan and results

D.U.T.: STP11NM60 LINE: MD65 PACKAGE: TO-220

| Test | Conditions | S.S. | Requirement | Results |
|--------------------------------------|--------------------------------------|---------------|--|---|
| H.T.S | TA=150°C | 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°C - 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°C ; Vdd=480 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°C 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°C - 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°C TO +150°C 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°C - Pd=4.8W | 77 x 1 Lot | Parameter deviation within spec. limits at 10k cycles. | No parameter deviation out of spec. limits at 10Kcy. |

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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°C | 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°C - 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°C ; 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°C 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°C - 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°C TO +150°C 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°C - Pd=4.8W | 77 x 1 Lot | Parameter deviation within spec. limits at 10k cycles. | No parameter deviation out of spec. limits at 10Kcy. |

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Reliability Evaluation Plan and results

D.U.T.: STP60NF06 LINE: ED6F PACKAGE: TO-220

| Test | Conditions | S.S. | Requirement | Results |
|--------------------------------------|--------------------------------------|---------------|--|---|
| H.T.S | TA=175°C | 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°C - 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°C ; Vdd=48 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°C 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°C - 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°C TO +150°C 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°C - Pd=4.8W | 77 x 1 Lot | Parameter deviation within spec. limits at 10k cycles. | No parameter deviation out of spec. limits at 10Kcy. |

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Reliability Evaluation Plan and results

D.U.T.: TIP122

Line: B004

Package: TO220

| Test | Conditions | S.S. | Requirement | Results |
|--------------------------------------|--------------------------------------|-------------|--|---|
| H.T.R.B. | Ta=150°C - Vces=80V | 77x1 Lot | Parameter deviation within spec. limits at 1000 hours. | No parameter deviation out of spec. limits at 1000 hours. |
| H.T.S. | Ta=150°C | 77x1 Lot | Parameter deviation within spec. limits at 1000 hours. | No parameter deviation out of spec. limits at 1000 hours. |
| T.H.B. | Ta=85°C; Rh=85%; Vces= 50V | 77x1 Lot | Parameter deviation within spec. limits at 1000 hours. | No parameter deviation out of spec. limits at 1000 hours. |
| PRESSURE POT | Ta=121°C; Pa=2Atm | 77x1 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°C TO +150°C 1 HOUR / CYCLE | 77x1 Lot | Parameter deviation within spec. limits at 500 cycles. | No parameter deviation out of spec. limits at 500 cy |
| THERMAL FATIGUE | Δ TC=105°C - Pd=4.8W | 77x1 Lot | Parameter deviation within spec. limits at 10k cycles. | No parameter deviation out of spec. limits at 10Kcy. |

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Reliability Evaluation Plan and results

D.U.T.: BUL128 LINE: BV22 PACKAGE: TO-220

| Test | Conditions | S.S. | Requirement | Results |
|--------------------------------------|--|---------------|--|---|
| H.T.S. | Ta=150°C | 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°C - RH=85% Vbias= 100V (Vces) | 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. | Ta=125°C Vbias= 560V (Vces) | 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°C - 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°C TO 150°C 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°C - Pd=4.8W | 77 x 1 Lot | Parameter deviation within spec. limits at 10k cycles. | No parameter deviation out of spec. limits at 10Kcy. |

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Technological Characteristics

D.U.T.: TIP122 Line: B004 Package: TO220

| | | | | |
|-------------------|---|------------------|---|--|
| DIE | <i>Technology</i> : EPIBASE L.V. NPN <i>Material</i> : Silicon <i>Passivation</i> : P-Vapox <i>Metallization - Front</i> : Al <i>Dimensions</i> : 2510 x 2100 µm - Back : Ti-Ni-Au | | | |
| DIE ATTACH | Soft solder | FRAME | <i>Frame and lead material:</i> <i>Frame coating :</i> <i>Lead coating:</i> | Raw copper Ni/Ni Plated Sn 100% |
| WIRE BOND | Ultrasonic | WIRE | <i>Material</i> : <i>Diameter</i> : | Al/Mg - Base Al/Mg - Emitter 5 mils - Base 7 mils - Emitter |
| SEALING | Molding | PACKAGING | <i>Material</i> : | Epoxy Resin |

PRODUCTION PLACES : WAFER PROCESSING : SINGAPORE
ASSEMBLY LOCATION : Shenzhen and Casablanca
Q.A. LOCATION : Shenzhen and Casablanca

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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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MPA (Micro, Power, Analog) Group
Voltage Regulator, Interface, Advanced logic & Power RF
Quality Assurance & Reliability

Reliability Evaluation Plan and final results
on LM317

SI7200DXY Molding compound

REL-6337-098.06W

Line..... L317

Package... TO220

| Test | Conditions | S.S. | Requirement | Results |
|------------------------------------|-------------------------------------|---------------|--|---------------------------------------|
| H.T.S. | TA=150 °C | 77 x 1 Lot | Parameter deviation within spec. limits at 1000 hours. | No parameter deviation at 1000 hours. |
| T.H.B. | TA=85°C - RH=85% Vbias= 24V | 77 x 1 Lot | Parameter deviation within spec. limits at 1000 hours. | No parameter deviation at 1000 hours. |
| H.T.B. | TA=125°C - Vdd= 35V | 77 x 1 Lot | Parameter deviation within spec. limits at 1000 hours. | No parameter deviation at 1000 hours. |
| PRESSURE POT | TA=121°C - PA=2Atm | 77 x 1 Lot | Parameter deviation within spec. limits at 168 hours. | No parameter deviation at 168 hours. |
| THERMAL CYCLES AIR TO AIR | TA=-65°C TO 150°C 1 HOUR / CYCLE | 77 x 1 Lot | Parameter deviation within spec. limits at 500 cycles. | No parameter deviation at 500 cy |
| THERMAL SHOCKS LIQUID TO LIQUID | TA=-65°C TO 150°C 10 MIN / SHOCK | 77 x 1 Lot | Parameter deviation within spec. limits at 500 shocks. | No parameter deviation at 500 sh. |

Comments: The reliability tests results are positive

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