


PRODUCT / PROCESS CHANGE NOTIFICATION

1. PCN basic data

| | | |
|-----------------------------|---|--------------------------------------|
| 1.1 Company |  | STMicroelectronics International N.V |
| 1.2 PCN No. | AMS/15/9514 | |
| 1.3 Title of PCN | Product Change Notification on new material set in ST Bouskoura for AMS products in SO8 and SO14 packages | |
| 1.4 Product Category | See product list | |
| 1.5 Issue date | 2015-11-18 | |

2. PCN Team

| | |
|----------------------------------|--------------------------|
| 2.1 Contact supplier | |
| 2.1.1 Name | ROBERTSON HEATHER |
| 2.1.2 Phone | +1 8475853058 |
| 2.1.3 Email | heather.robertson@st.com |
| 2.2 Change responsibility | |
| 2.2.1 Product Manager | Andrea Mario ONETTI |
| 2.1.2 Marketing Manager | Lionel GRILLO |
| 2.1.3 Quality Manager | Jean-Marc BUGNARD |

3. Change

| | | |
|---------------------|--|-----------------------------------|
| 3.1 Category | 3.2 Type of change | 3.3 Manufacturing Location |
| Materials | New direct material part number (same supplier, different supplier or new supplier), lead frame, resin, wire, ...) | ST Bouskoura (Morocco) |

4. Description of change

| | | |
|---|--|------------------------------------|
| | Old | New |
| 4.1 Description | Molding compound = Sumitomo G700K / Sumitomo G630AY | Molding compound = Sumitomo G700KC |
| 4.2 Anticipated Impact on form, fit, function, quality, reliability or processability? | No impact on form, fit, function, reliability, or processability | |

5. Reason / motivation for change

| | |
|-----------------------------|---|
| 5.1 Motivation | Progressing on the activities related to quality improvement, ST is glad to announce a new material set for AMS products in SO8 and SO14 packages produced in ST Bouskoura. |
| 5.2 Customer Benefit | QUALITY IMPROVEMENT |

6. Marking of parts / traceability of change

| | |
|------------------------|------------------|
| 6.1 Description | Finish good code |
|------------------------|------------------|

7. Timing / schedule

| | |
|--|--------------|
| 7.1 Date of qualification results | 2015-11-05 |
| 7.2 Intended start of delivery | 2016-01-05 |
| 7.3 Qualification sample available? | Upon Request |

8. Qualification / Validation

| | | | |
|---|---------------------------------------|-------------------|------------|
| 8.1 Description | 9514_Qual report SO Bouskoura_new.pdf | | |
| 8.2 Qualification report and qualification results | Available (see attachment) | Issue Date | 2015-11-18 |

9. Attachments (additional documentations)

9514PpPrdtLst.pdf
 9514_ Qual report SO Bouskoura_new.pdf

10. Affected parts

| 10. 1 Current | | 10.2 New (if applicable) |
|-------------------------|-------------------------|--------------------------|
| 10.1.1 Customer Part No | 10.1.2 Supplier Part No | 10.1.2 Supplier Part No |
| LF247DT | LF247DT | |
| LF253DT | LF253DT | |
| LF351DT | LF351DT | |
| LF353DT | LF353DT | |
| LM124DT | LM124DT | |
| | LM139ADT | |
| | LM139DT | |
| | LM158DT | |
| | LM193DT | |
| LM201ADT | LM201ADT | |
| LM211DT | LM211DT | |
| LM219DT | LM219DT | |
| LM224DT | LM224DT | |
| LM234DT | LM234DT | |
| LM235DT | LM235DT | |
| LM239ADT | LM239ADT | |
| LM248DT | LM248DT | |
| LM258ADT | LM258ADT | |
| LM258DT | LM258DT | |
| | LM258WDT | |
| LM2901DT | LM2901DT | |
| LM2902DT | LM2902DT | |
| LM2903DT | LM2903DT | |
| | LM2903WDT | |
| LM2904DT | LM2904DT | |
| LM2904WHDT | LM2904WHDT | |
| LM293ADT | LM293ADT | |
| LM293DT | LM293DT | |
| LM311DT | LM311DT | |
| LM319DT | LM319DT | |
| LM324ADT | LM324ADT | |
| LM324DT | LM324DT | |
| LM334DT | LM334DT | |
| LM335DT | LM335DT | |
| LM339ADT | LM339ADT | |
| LM358ADT | LM358ADT | |
| LM358DT | LM358DT | |
| LM393ADT | LM393ADT | |
| LM393DT | LM393DT | |
| LM833DT | LM833DT | |
| LMV324IDT | LMV324IDT | |
| | LMV324LIDT | |
| | LMV339IDT | |
| LMV358IDT | LMV358IDT | |

| | | |
|---------------|-------------|--|
| | LMV358LIDT | |
| | LMV393IDT | |
| | LMV822AIDT | |
| | LMV822IDT | |
| | LMV824AIDT | |
| | LMV824IDT | |
| | LMX324IDT | |
| | LMX358IDT | |
| M41T00M6F | M41T00M6F | |
| M41T00SM6F | M41T00SM6F | |
| M41T0M6F | M41T0M6F | |
| M41T11M6F | M41T11M6F | |
| M41T56M6F | M41T56M6F | |
| M41T80M6F | M41T80M6F | |
| M41T81M6F | M41T81M6F | |
| M41T81SM6F | M41T81SM6F | |
| | M41T82RM6F | |
| | M41T82SM6F | |
| | M41T82ZM6F | |
| MC1458ID | MC1458ID | |
| MC3303DT | MC3303DT | |
| MC33078DT | MC33078DT | |
| MC33079DT | MC33079DT | |
| MC33171DT | MC33171DT | |
| MC33172DT | MC33172DT | |
| MC33174DT | MC33174DT | |
| MC3403DT | MC3403DT | |
| MC4558CDT | MC4558CDT | |
| MC4558IDT | MC4558IDT | |
| STLM75M2F-ND | STLM75M2F | |
| 497-3825-2-ND | STM690RM6F | |
| 497-3829-2-ND | STM703M6F | |
| 497-3832-2-ND | STM704SM6F | |
| 497-3833-2-ND | STM704TM6F | |
| 497-3834-2-ND | STM705M6F | |
| 497-3835-2-ND | STM706M6F | |
| | STM706PAM6F | |
| 497-3838-2-ND | STM706SM6F | |
| | STM706TAM6F | |
| 497-3839-2-ND | STM706TM6F | |
| | STM708RAM6F | |
| | STM708SAM6F | |
| 497-3843-2-ND | STM708SM6F | |
| 497-3845-2-ND | STM795RM6F | |
| 497-3852-2-ND | STM802TM6F | |
| 497-3863-2-ND | STM813LM6F | |
| 497-3864-2-ND | STM817LM6F | |
| 497-3867-2-ND | STM818MM6F | |
| | STTS75M2F | |
| | TL061CDT | |
| | TL061IDT | |

| | | |
|--|------------|--|
| | TL062ACDT | |
| | TL062CDT | |
| | TL064CDT | |
| | TL064IDT | |
| | TL071IDT | |
| | TL072ACDT | |
| | TL072BIDT | |
| | TL072CDT | |
| | TL072IDT | |
| | TL074ACDT | |
| | TL074CDT | |
| | TL081IDT | |
| | TL082BCDT | |
| | TL082CDT | |
| | TL082IDT | |
| | TL084ACDT | |
| | TL084AIDT | |
| | TL084BCDT | |
| | TL084BIDT | |
| | TL084CDT | |
| | TL084IDT | |
| | TS1852IDT | |
| | TS1854IDT | |
| | TS271CDT | |
| | TS272AIDT | |
| | TS272BIDT | |
| | TS272CDT | |
| | TS272IDT | |
| | TS274ACDT | |
| | TS274AIDT | |
| | TS27L2BIDT | |
| | TS27L2CDT | |
| | TS27L4AIDT | |
| | TS27L4IDT | |
| | TS27M2CDT | |
| | TS27M4CDT | |
| | TS3022IDT | |
| | TS332IDT | |
| | TS334IDT | |
| | TS339CDT | |
| | TS339IDT | |
| | TS3702CDT | |
| | TS3702IDT | |
| | TS3704CDT | |
| | TS3704IDT | |
| | TS372CDT | |
| | TS372IDT | |
| | TS374CDT | |
| | TS393CDT | |
| | TS393IDT | |
| | TS461CDT | |

| | | |
|--|-------------|--|
| | TS462CDT | |
| | TS464CDT | |
| | TS482IDT | |
| | TS512AIDT | |
| | TS514AIDT | |
| | TS514IDT | |
| | TS522IDT | |
| | TS524IDT | |
| | TS831-4IDT | |
| | TS831-5IDT | |
| | TS862IDT | |
| | TS884IDT | |
| | TS912AIDT | |
| | TS912BIDT | |
| | TS912IDT | |
| | TS921IDT | |
| | TS9222IDT | |
| | TS9224IDT | |
| | TS922AIDT | |
| | TS922IDT | |
| | TS924AIDT | |
| | TS924IDT | |
| | TS932IDT | |
| | TS934IDT | |
| | TS942AIDT | |
| | TS942IDT | |
| | TS944AIDT | |
| | TS952IDT | |
| | TS954IDT | |
| | TS971IDT | |
| | TS972IDT | |
| | TS974IDT | |
| | TSC1031IDT | |
| | TSC103IDT | |
| | TSH22IDT | |
| | TSH24IDT | |
| | TSV324IDT | |
| | TSV358AIDT | |
| | TSV358IDT | |
| | TSV612IDT | |
| | TSV6192AIDT | |
| | TSV6192IDT | |
| | TSV622AIDT | |
| | TSV6292AIDT | |
| | TSV6292IDT | |
| | TSV632AIDT | |
| | TSV632IDT | |
| | TSV6392AIDT | |
| | TSV6392IDT | |
| | TSV854AIDT | |
| | TSV854IDT | |

| | | |
|--|------------|--|
| | TSV912AIDT | |
| | TSV912IDT | |
| | TSV914AIDT | |
| | TSV914IDT | |
| | TSV992AIDT | |
| | TSV992IDT | |
| | TSX3702IDT | |
| | TSX922IDT | |
| | TSX9292IDT | |
| | UA741CDT | |
| | UA741IDT | |
| | TS556IDTTR | |

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**PRODUCT/PROCESS
CHANGE NOTIFICATION**

PCN AMS/15/9514

Analog, MEMS and Sensors Group

**New material set in ST Bouskoura for AMS
products in SO8 and SO14 packages**

WHAT:

Progressing on the activities related to quality continuous improvement, ST is glad to announce a new material set for AMS products in SO8 and SO14 packages produced in ST Bouskoura. Please find more information related to material change in the table here below.

| Material | Current process | Modified process | Comment |
|--------------------|---|--------------------------------|--|
| Diffusion location | ST Ang Mo Kio (Singapore)/ UMC | ST Ang Mo Kio (Singapore)/ UMC | No change |
| Assembly location | ST Bouskoura | ST Bouskoura | No change |
| Molding compound | Sumitomo G700K / Sumitomo G630AY | Sumitomo G700KC | To solve some sporadic delamination on lead issues seen in production. Move to High reliability compound |
| Die attach | Ablestick 8601-S25 | Ablestick 8601-S25 | No change |
| Leadframe | Copper preplated NiPdAgAu Copper preplated ag spot | Copper preplated ag spot | No change |
| Wire | Copper 1 mil | Copper 1 mil | No change |
| Plating | NiPdAgAu Sn | Sn | No change |

Samples of vehicle test are available now and other samples will be launched upon customer's request. Please submit requests for samples within 30 days of this notification.

WHY:

This material change will contribute to ST's continuous quality product improvement and ensure a consistent assembly process through all the SO production lines.

HOW:

The qualification program consists mainly of comparative electrical characterization and reliability tests.

You will find here after the qualification test plan which summarizes the various test methods and conditions that ST uses for this qualification program.

WHEN:

The new material set will be implemented for AMS products in Q1/2016 in Bouskoura.

Marking and traceability:

Unless otherwise stated by customer's specific requirement, the traceability of the parts assembled with the new material set will be ensured by new internal sales type, date code and lot number.

The changes here reported will not affect the electrical, dimensional and thermal parameters keeping unchanged all the information reported on the relevant datasheets.

There is -as well- no change in the packing process or in the standard delivery quantities.

Lack of acknowledgement of the PCN within 30 days will constitute acceptance of the change. After acknowledgement, lack of additional response within the 90 day period will constitute acceptance of the change (Jedec Standard No. 46-C).

Shipments may start earlier with the customer's written agreement.

Reliability Report

*New Halogen free material set for SO in
ST Bouskoura*

| General Information | |
|-----------------------------------|--|
| Product Line | <i>0393, 0339, 0084</i> |
| Product Description | <i>Dual comparator bipolar, Quad comparator bipolar, quad Jfetl op amp</i> |
| P/N | <i>LM2903YDT, LM2901YDT, TL084IYDT</i> |
| Product Group | <i>AMS</i> |
| Product division | <i>VMA</i> |
| Package | <i>SO8/14</i> |
| Silicon Process technology | <i>Bipolar,Jfet</i> |

| Locations | |
|------------------------|--------------------------------------|
| Wafer fab | <i>ST Singapore,</i> |
| Assembly plant | <i>ST Bouskoura (Morocco)</i> |
| Reliability Lab | <i>ST Grenoble, ST Bouskoura</i> |

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.

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1 APPLICABLE AND REFERENCE DOCUMENTS

| Document reference | Short description |
|---------------------------|--|
| AEC-Q100 | Stress test qualification for automotive grade integrated circuits |
| AEC-Q101 | Stress test qualification for automotive grade discrete semiconductors |
| JESD47 | Stress-Test-Driven Qualification of Integrated Circuits |
| | |

2 GLOSSARY

| | |
|------------|-----------------------|
| DUT | Device Under Test |
| PCB | Printed Circuit Board |
| SS | Sample Size |
| | |

3 RELIABILITY EVALUATION OVERVIEW

3.1 Objectives

To qualify a new molding compound for SO package in Bouskoura (Sumitomo G700KC which is an evolution of Sumitomo G700K already in use in Bouskoura) for AMS (Analog MemS & Sensor) group.


3.2 Conclusion

Qualification Plan requirements have been defined and today partially achieved. It is stressed that reliability tests have to show that the devices behave correctly against environmental tests (no failure). Moreover, the stability of electrical parameters during the accelerated tests have to demonstrate the ruggedness of the products and safe operation, which is consequently expected during their lifetime.

4 DEVICE CHARACTERISTICS

4.1 Device description

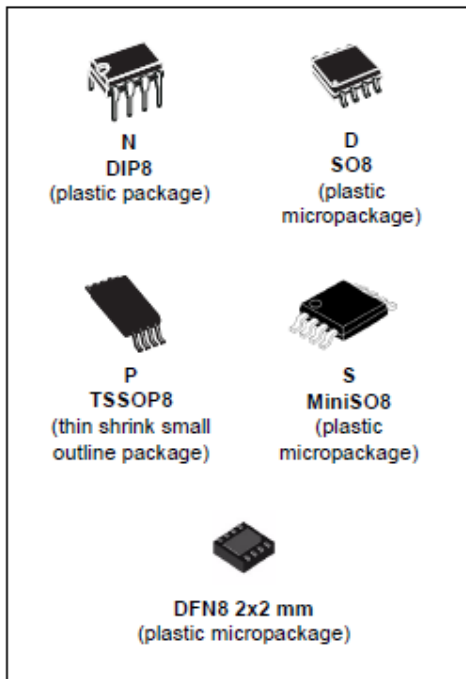
LM2903YDT


life.augmented

LM2903

Low-power dual voltage comparator

Datasheet - production data



- TTL, DTL, ECL, MOS, CMOS compatible outputs
- Automotive qualification

Related products

- See LM2903W for similar device with higher ESD performances
- See LM2903H for similar device with operating temperature up to 150 °C

Description

This device consists of two independent low-power voltage comparators designed specifically to operate from a single supply over a wide range of voltages. Operation from split power supplies is also possible.

In addition, the device has a unique characteristic in that the input common-mode voltage range includes the negative rail even though operated from a single power supply voltage.

Features

- Wide single supply voltage range or dual supplies +2 V to +36 V or ± 1 V to ± 18 V
- Very low supply current (0.4 mA) independent of supply voltage (1 mW/comparator at +5 V)
- Low input bias current: 25 nA typ.
- Low input offset current: ± 5 nA typ.
- Input common-mode voltage range includes negative rail
- Low output saturation voltage: 250 mV typ. ($I_O = 4$ mA)
- Differential input voltage range equal to the supply voltage

LM2901YDT,

**LM2901**

Low-power quad voltage comparator

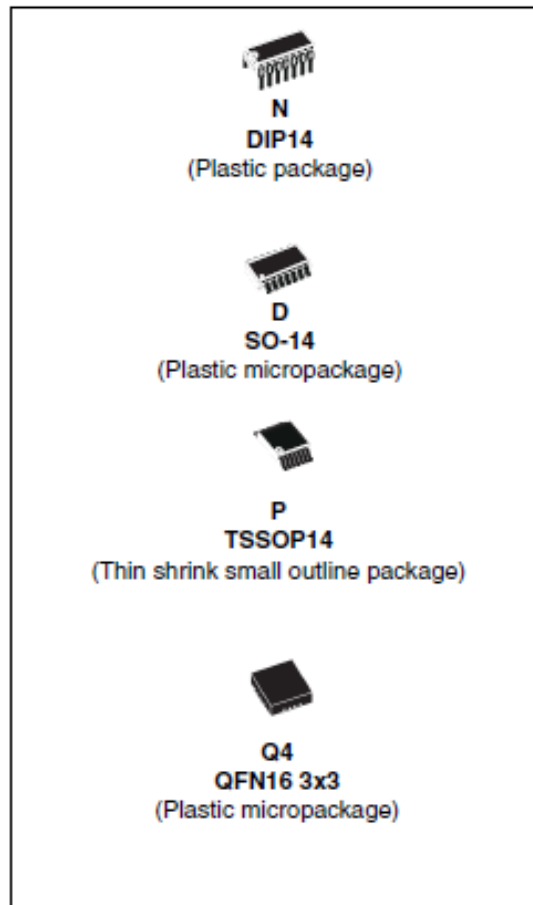
Features

- Wide single supply voltage range or dual supplies for all devices: +2 V to +36 V or ± 1 V to ± 18 V
- Very low supply current (1.1 mA) independent of supply voltage (1.4 mW/comparator at +5 V)
- Low input bias current: 25 nA typ.
- Low input offset current: ± 5 nA typ.
- Input common-mode voltage range includes negative rail
- Low output saturation voltage: 250 mV typ. ($I_O = 4$ mA)
- Differential input voltage range equal to the supply voltage
- TTL, DTL, ECL, MOS, CMOS compatible outputs

Description

This device consists of four independent precision voltage comparators, which are designed specifically to operate from a single supply over a wide range of voltages. Operation from split power supplies is also possible.

These comparators also have a unique characteristic in that the input common-mode voltage range includes the negative rail even though operated from a single power supply voltage.



TL084IYDT:



TL084, TL084A, TL084B

General purpose JFET quad operational amplifiers

Datasheet — production data

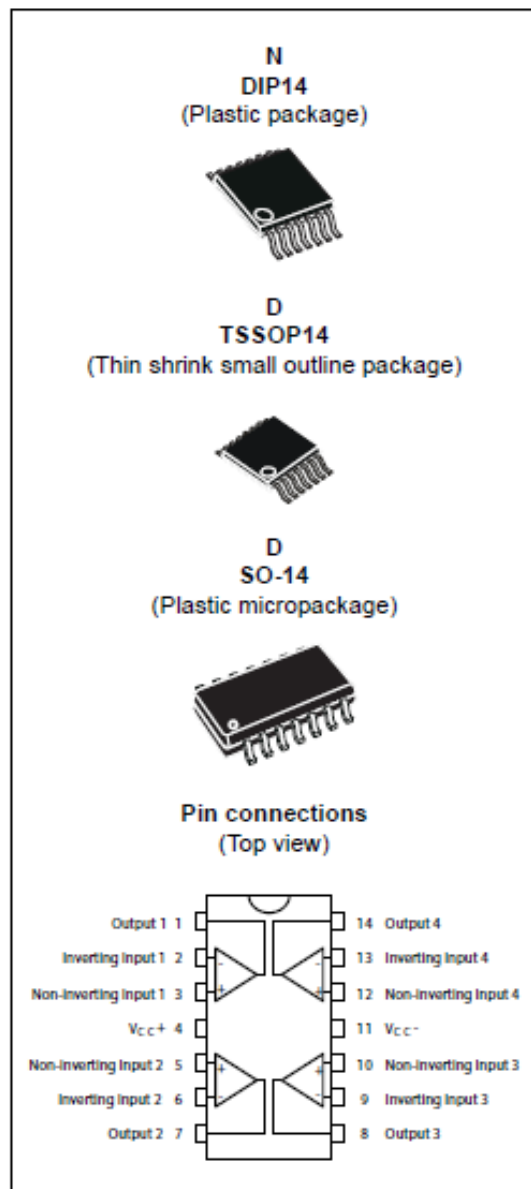
Features

- Wide common-mode (up to V_{CC}^+) and differential voltage range
- Low input bias and offset current
- Output short-circuit protection
- High input impedance JFET input stage
- Internal frequency compensation
- Latch up free operation
- High slew rate: 16 V/ μ s (typical)

Description

The TL084, TL084A, and TL084B are high-speed, JFET input, quad operational amplifiers incorporating well matched, high voltage JFET and bipolar transistors in a monolithic integrated circuit.

The devices feature high slew rates, low input bias and offset currents, and low offset voltage temperature coefficient.



4.2 Construction note

| | P/N <i>LM2903YDT</i> | P/N <i>LM2901YDT</i> | P/N <i>TL084IYDT</i> | |
|---|--------------------------|--------------------------|--------------------------|--|
| Wafer/Die fab. information | | | | |
| Wafer fab manufacturing location | ST Singapore | ST Singapore | ST Singapore | |
| Technology | Bipolar | Bipolar | JFet | |
| Die finishing back side | RAW SILICON | RAW SILICON | RAW SILICON | |
| Die size (microns) | 950 x 870 μm | 1370x1270 | 2480 x 1460 | |
| Bond pad metallization layers | AlSiCu | AlSiCu | AlSiCu | |
| Passivation type | Nitride | Nitride | P-VAPOX/NITRIDE | |
| Wafer Testing (EWS) information | | | | |
| Electrical testing manufacturing location | ST Singapore | ST Singapore | ST Singapore | |
| Tester | ASLIK | ASLIK | ASLIK | |
| Assembly information | | | | |
| Assembly site | ST Bouskoura | ST Bouskoura | ST Bouskoura | |
| Package description | SO8 | SO14 | SO14 | |
| Molding compound | EME G700KC | EME G700KC | EME G700KC | |
| Frame material | Cu | Cu | Cu | |
| Die attach process | Epoxy Glue | Epoxy Glue | Epoxy Glue | |
| Die attach material | 8601S-25 | 8601S-25 | 8601S-25 | |
| Wire bonding process | Thermosonic ball bonding | Thermosonic ball bonding | Thermosonic ball bonding | |
| Wires bonding materials/diameters | Cu 1 mil | Cu 1 mil | Cu 1 mil | |
| Lead finishing process | electroplating | electroplating | electroplating | |
| Lead finishing/bump solder material | Matte tin | Matte tin | Matte tin | |
| Final testing information | | | | |
| Testing location | ST Bouskoura | ST Bouskoura | ST Bouskoura | |
| Tester | ASLIK | ASLIK | ASLIK | |

5 TESTS RESULTS SUMMARY

5.1 Test vehicle

| Lot # | Process/ Package | Product Line | Comments |
|-------|------------------|--------------|-----------|
| 1 | Bipolar/SO8 | 0393 | CZ53005LR |
| 2 | Bipolar/SO14 | 0339 | CZ52405FR |
| 3 | JFet / So14 | 0084 | CZ53306W |
| | | | |
| | | | |

5.2 Test plan and results summary

| Test | PC | Std ref. | Conditions | SS | Steps | Failure/SS | | | | Note |
|-------------------------------|----|----------------------------------|--|----|--------|---------------|---------------|---------------|--|------|
| | | | | | | Lot 1 0393 | Lot 2 0339 | Lot 3 0084 | | |
| HTB | N | JESD22 A-108 | Tj = 150°C, BIAS | | 168 H | 0/78 | 0/78 | | | |
| | | | | | 500 H | 0/78 | 0/78 | | | |
| | | | | | 1000 H | 78 | 0/78 | | | |
| HTSL | N | JESD22 A-103 | Ta = 150°C | | 168 H | 6X0/77 | 3x0/77 | 77 | | (1) |
| | | | | | 500 H | 6X0/77 | 3x0/77 | 77 | | |
| | | | | | 1000 H | 6X77 | 3x0/77 | 77 | | |
| | | | | | 2000H | | | | | |
| 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 | | Final | PASS | PASS | PASS | | |
| AC | Y | JESD22 A-102 | Pa=2Atm / Ta=121°C | | 96 H | 6x0/77 | 3x0/77 | 77 | | (1) |
| TC | Y | JESD22 A-104 | Ta = -65°C to 150°C | | 100 cy | 6x0/77 | 3x0/77 | 77 | | (1) |
| | | | | | 200 cy | 6x0/77 | 3x0/77 | 77 | | |
| | | | | | 500 cy | 6x0/77 | 3x0/77 | 77 | | |
| THB | Y | JESD22 A-101 | Ta = 85°C, RH = 85%, BIAS | | 168 H | | 0/78 | | | |
| | | | | | 500 H | | 78 | | | |
| | | | | | 1000 H | | 78 | | | |
| Other Tests | | | | | | | | | | |
| ESD | N | AEC Q101- 001, 002 and 005 | CDM | | | 3 | 3 | 3 | | |
| SD | N | | After ageing 8h and 16h | | | X | X | | | |

(1) Additional split lot to cover the whole assembly variability

For reference, below the reliability assessment made on Sumitomo G700K

| | P/N LM324DT | P/N TSV632IDT | P/N TSx922IDT | P/N TSX3702IDT | P/N TSX393IDT | P/N TSX3702IDT | P/N LM358DT |
|---|--------------------------|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Wafer/Die fab. information | | | | | | | |
| Wafer fab manufacturing location | AMJ9 | Crolles | Agrate | Agrate | Agrate | Agrate | AMK6 |
| Technology | Bipolar | HC MOS5LA | HVG8A | HVG8A | HVG8A | HVG8A | Bipolar |
| Process family | Bipolar | HC MOS5LA | HVG8A | HVG8A | HVG8A | HVG8A | Bipolar |
| Die finishing back side | Raw silicon | Raw silicon | Raw silicon | Raw silicon | Raw silicon | Raw silicon | Raw silicon |
| Die size | 1430x 1360 μm | 1020 x 1090 μm | 1700x1400 μm | 1018x1238 μm | 1018x1238 μm | 1018x1238 μm | 1070x1010 μm |
| Bond pad metalization layers | AlSiCu | AlCu | AlCu | AlCu | AlCu | AlCu | AlSiCu |
| Passivation type | Nitride | PSG + NITRIDE + PIX | HDP/TEOS/SiN /Polyimide | HDP/TEOS/SiN /Polyimide | HDP/TEOS/SiN /Polyimide | HDP/TEOS/SiN /Polyimide | Nitride |
| Wafer Testing (EWS) information | | | | | | | |
| Electrical testing manufacturing location | ST Singapore | ST Singapore | ST Singapore | ST Singapore | ST Singapore | ST Singapore | ST Singapore |
| Tester | ASL1K | ASL1K | ASL1K | ASL1K | ASL1K | ASL1K | ASL1K |
| Assembly information | | | | | | | |
| Assembly site | Bouskoura | Bouskoura | Bouskoura | Bouskoura | Bouskoura | Bouskoura | Bouskoura |
| Package description | SO14 | SO8 | SO8 | SO8 | SO8 | SO8 | SO8 |
| Molding compound | Sumitomo G700K | Sumitomo G700K | Sumitomo G700K | Sumitomo G700K | Sumitomo G700K | Sumitomo G700K | Sumitomo G700K |
| Frame material | Cu | Cu | Cu | Cu | Cu | Cu | Cu |
| Die attach process | Glue | Glue | Glue | Glue | Glue | Glue | Glue |
| Die attach material | Abkestick 8601-S25 | Abkestick 8601-S25 | Abkestick 8601-S25 | Abkestick 8601-S25 | Abkestick 8601-S25 | Abkestick 8601-S25 | Abkestick 8601-S25 |
| Die pad size | 75 x 75 μm^2 | 75 x 75 μm^2 | 75 x 75 μm^2 | 75 x 75 μm^2 | 75 x 75 μm^2 | 75 x 75 μm^2 | 75 x 75 μm^2 |
| Wire bonding process | Thermosonic Ball bonding | Thermosonic Ball bonding | Thermosonic Ball bonding | Thermosonic Ball bonding | Thermosonic Ball bonding | Thermosonic Ball bonding | Thermosonic Ball bonding |
| Wires bonding materials/diameters | Cu 1 mil | Cu 1 mil | Cu 1 mil | Cu 1 mil | Cu 1 mil | Cu 1 mil | Cu 1 mil |
| Lead finishing process | preplated | preplated | preplated | preplated | preplated | preplated | preplated |
| Lead finishing/bump solder material | NiPdAgAu | NiPdAgAu | NiPdAgAu | NiPdAgAu | NiPdAgAu | NiPdAgAu | NiPdAgAu |
| Final testing information | | | | | | | |
| Testing location | Bouskoura | Bouskoura | Bouskoura | Bouskoura | Bouskoura | Bouskoura | Bouskoura |
| Tester | ASL1K | ASL1K | ASL1K | ASL1K | ASL1K | ASL1K | ASL1K |

| Test | PC | Std ref. | Conditions | Steps | Lot 1 | Lot 2 | Lot 3 | Lot 4 | Lot 5 | Lot 6 | Lot 7 | Note |
|-------------------------------|----|-----------------|--|---------|--------|--------|--------|--------|--------|--------|---------|--------|
| | | | | | | | | | | | | |
| Die Oriented Tests | | | | | | | | | | | | |
| HTB | N | JESD22 A-108 | Tj = 125°C, BIAS | 168 H | 0 / 78 | 0 / 78 | 0 / 78 | 0 / 78 | 0 / 78 | | 0 / 78 | |
| | | | | 500H | 0 / 78 | 0 / 78 | 0 / 78 | | 0 / 78 | 0 / 78 | | |
| | | | | 1000H | 0 / 78 | 0 / 78 | 0 / 78 | | 0 / 78 | 0 / 78 | | |
| HTSL | N | JESD22 A-103 | Ta=150°C | 168 H | 0 / 78 | 0 / 78 | | | 0 / 78 | | 0 / 76 | |
| | | | | 500H | 0 / 78 | 0 / 78 | | | 0 / 78 | | 0 / 76 | |
| | | | | 1000H | 0 / 78 | 0 / 78 | | | 0 / 78 | | 0 / 76 | |
| 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 | Final | PASS | PASS | PASS | PASS | PASS | PASS | PASS | |
| AC | Y | JESD22 A-102 | Pa=2Atm / Ta=121°C | 96 H | | | | | | | | |
| | | | | 168 H | 0 / 78 | 0 / 78 | | | 0 / 80 | | 0 / 116 | |
| TC | Y | JESD22 A-104 | Ta = -65°C to 150°C | 100 cy | | | | | | | | 0 / 77 |
| | | | | 500 cy | 0 / 78 | 0 / 78 | 0 / 78 | 0 / 80 | 0 / 78 | | 0 / 77 | |
| | | | | 1000 cy | | | | | | | 0 / 77 | |
| THB | Y | JESD22 A-101 | Ta = 85°C, RH = 85%, BIAS | 168H | 0 / 78 | 0 / 78 | | | 0 / 78 | | 0 / 78 | |
| | | | | 1000H | 0 / 78 | 0 / 78 | | | 0 / 78 | | 0 / 78 | |

| | P/N TSH95IDT | P/N HCF4093BMTR | P/N TS393IDT | P/N TS912IDT | P/N TSV912IDT | P/N TS924IDT |
|---|--|--|--|--|--|--|
| Wafer/Die fab. information | | | | | | |
| Wafer fab manufacturing location | AMK6 | AMK6 | AMK6 | AMK6 | UMC | AMK6 |
| Technology | HF2CMOS | Metal Gate | HC1PA | HC1PA | HF5CMOS | HF2CMOS |
| Process family | HF2CMOS | Metal Gate | HC1PA | HC1PA | HF5CMOS | HF2CMOS |
| Die finishing back side | Raw silicon | Raw silicon | Raw silicon | Raw silicon | Raw silicon | Raw silicon |
| Die size | 1990x2700 µm | 1480x930 µm | 1390x1010 µm | 2630x1980 µm | 1070x110 µm | 1980x2450 µm |
| Bond pad metallization layers | AlSiCu | AlSi | AlSi | AlSi | AlCu | AlSiCu |
| Passivation type | P-VAPOX(SiO ₂) / NITRIDE (SiN) | P-VAPOX(SiO ₂) / NITRIDE (SiN) | P-VAPOX(SiO ₂) / NITRIDE (SiN) | P-VAPOX(SiO ₂) / NITRIDE (SiN) | P-VAPOX(SiO ₂) / NITRIDE (SiN) | P-VAPOX(SiO ₂) / NITRIDE (SiN) |
| Wafer Testing (EWS) information | | | | | | |
| Electrical testing manufacturing location | ST Singapore | ST Singapore | ST Singapore | ST Singapore | ST Singapore | ST Singapore |
| Tester | ASL1K | ASL1K | ASL1K | ASL1K | ASL1K | ASL1K |
| Assembly information | | | | | | |
| Assembly site | Bouskoura | Bouskoura | Bouskoura | Bouskoura | Bouskoura | Bouskoura |
| Package description | SO16 | SO14 | SO8 | SO8 | SO8 | SO14 |
| Molding compound | Sumitomo G700K | Sumitomo G700K | Sumitomo G700K | Sumitomo G700K | Sumitomo G700K | Sumitomo G700K |
| Frame material | Cu | Cu | Cu | Cu | Cu | Cu |
| Die attach process | Glue | Glue | Glue | Glue | Glue | Glue |
| Die attach material | Abkestick 8601-S25 | Abkestick 8601-S25 | Abkestick 8601-S25 | Abkestick 8601-S25 | Abkestick 8601-S25 | Abkestick 8601-S25 |
| Wire bonding process | Thermosonic Ball bonding | Thermosonic Ball bonding | Thermosonic Ball bonding | Thermosonic Ball bonding | Thermosonic Ball bonding | Thermosonic Ball bonding |
| Wires bonding materials/diameters | Cu 1 mil | Cu 1 mil | Cu 1 mil | Cu 1 mil | Cu 1 mil | Cu 1 mil |
| Lead finishing process | preplated | preplated | preplated | preplated | preplated | preplated |
| Lead finishing/bump solder material | NiPdAgAu | NiPdAgAu | NiPdAgAu | NiPdAgAu | NiPdAgAu | NiPdAgAu |
| Final testing information | | | | | | |
| Testing location | Bouskoura | Bouskoura | Bouskoura | Bouskoura | Bouskoura | Bouskoura |
| Tester | ASL1K | ASL1K | ASL1K | ASL1K | ASL1K | ASL1K |

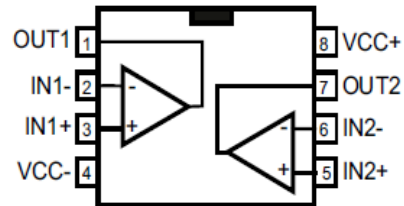
| Test | PC | Std ref. | Conditions | Steps | Failure/SS | | | | | | | Note |
|-------------------------------|----|-----------------|--|---------|------------|--------|--------|--------|--------|--------|---------|--------|
| | | | | | Lot 1 | Lot 2 | Lot 3 | Lot 4 | Lot 5 | Lot 6 | Lot 7 | |
| Die Oriented Tests | | | | | | | | | | | | |
| HTB | N | JESD22 A-108 | T _j = 125°C, BIAS | 168 H | 0 / 78 | 0 / 78 | 0 / 78 | 0 / 78 | 0 / 78 | 0 / 78 | 0 / 78 | |
| | | | | 500H | 0 / 78 | 0 / 78 | 0 / 78 | | 0 / 78 | 0 / 78 | | |
| | | | | 1000H | 0 / 78 | 0 / 78 | 0 / 78 | | 0 / 78 | | 0 / 78 | |
| HTSL | N | JESD22 A-103 | T _a =150°C | 168 H | 0 / 78 | 0 / 78 | | | 0 / 78 | | 0 / 76 | |
| | | | | 500H | 0 / 78 | 0 / 78 | | | 0 / 78 | | 0 / 76 | |
| | | | | 1000H | 0 / 78 | 0 / 78 | | | 0 / 78 | | 0 / 76 | |
| Package Oriented Tests | | | | | | | | | | | | |
| PC | | JESD22 A-113 | Drying 24 H @ 125°C Store 168 H @ T _a =85°C Rh=85% Over Reflow @ T _{peak} =260°C 3 times | Final | PASS | PASS | PASS | PASS | PASS | PASS | PASS | |
| AC | Y | JESD22 A-102 | P _a =2Atm / T _a =121°C | 96 H | | | | | | | | |
| | | | | 168 H | 0 / 78 | 0 / 78 | | | 0 / 80 | | 0 / 116 | |
| TC | Y | JESD22 A-104 | T _a = -65°C to 150°C | 100 cy | | | | | | | | 0 / 77 |
| | | | | 500 cy | 0 / 78 | 0 / 78 | 0 / 78 | 0 / 80 | 0 / 78 | | 0 / 77 | |
| | | | | 1000 cy | | | | | | | 0 / 77 | |
| THB | Y | JESD22 A-101 | T _a = 85°C, RH = 85%, BIAS | 168H | 0 / 78 | 0 / 78 | | | 0 / 78 | | 0 / 78 | |
| | | | | 1000H | 0 / 78 | 0 / 78 | | | 0 / 78 | | 0 / 78 | |

6 ANNEXES

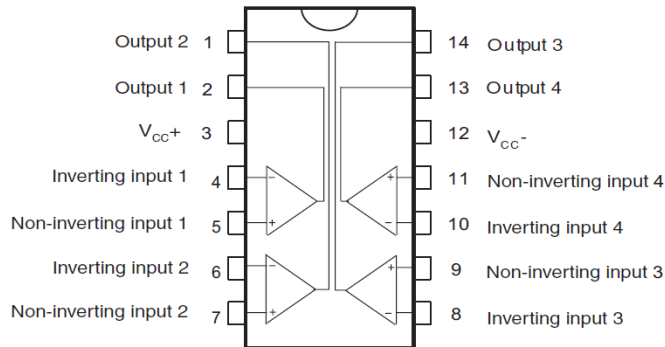
6.1 Device details

6.1.1 Pin connection

LM2903

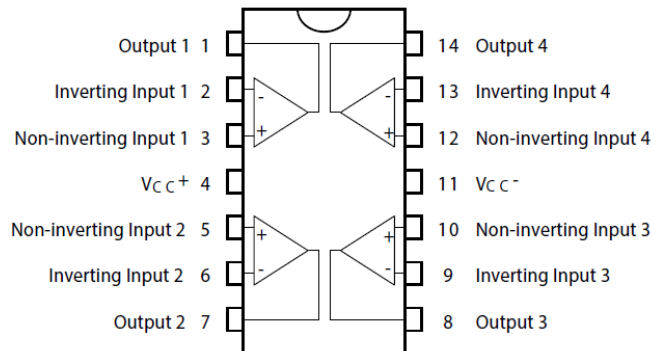


LM2901



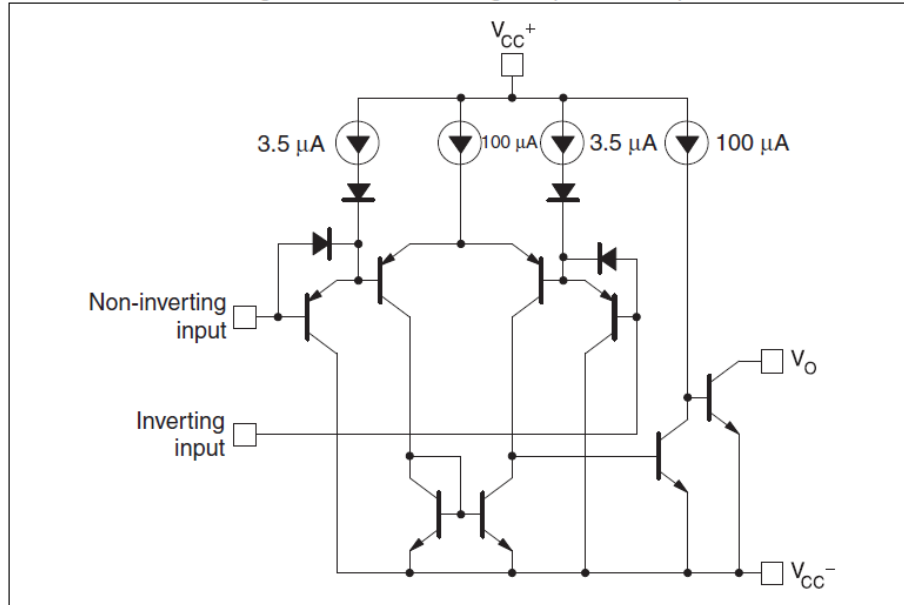
TL084

Pin connections (Top view)

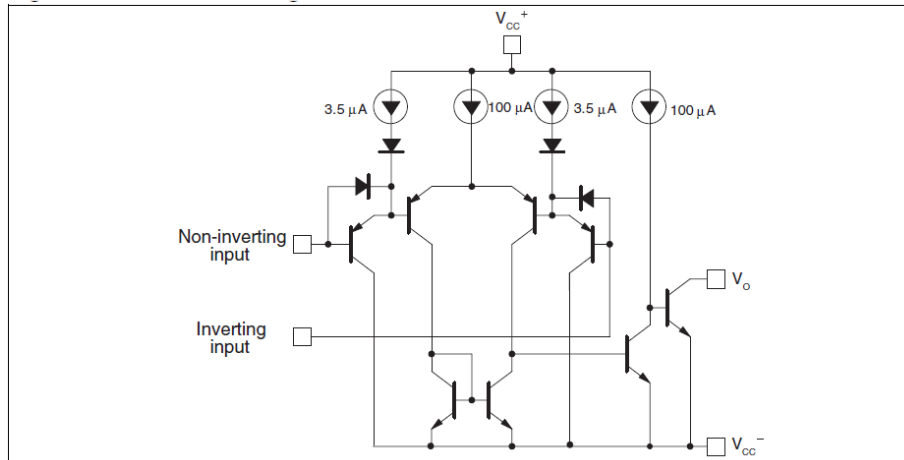


6.1.2 Block diagram

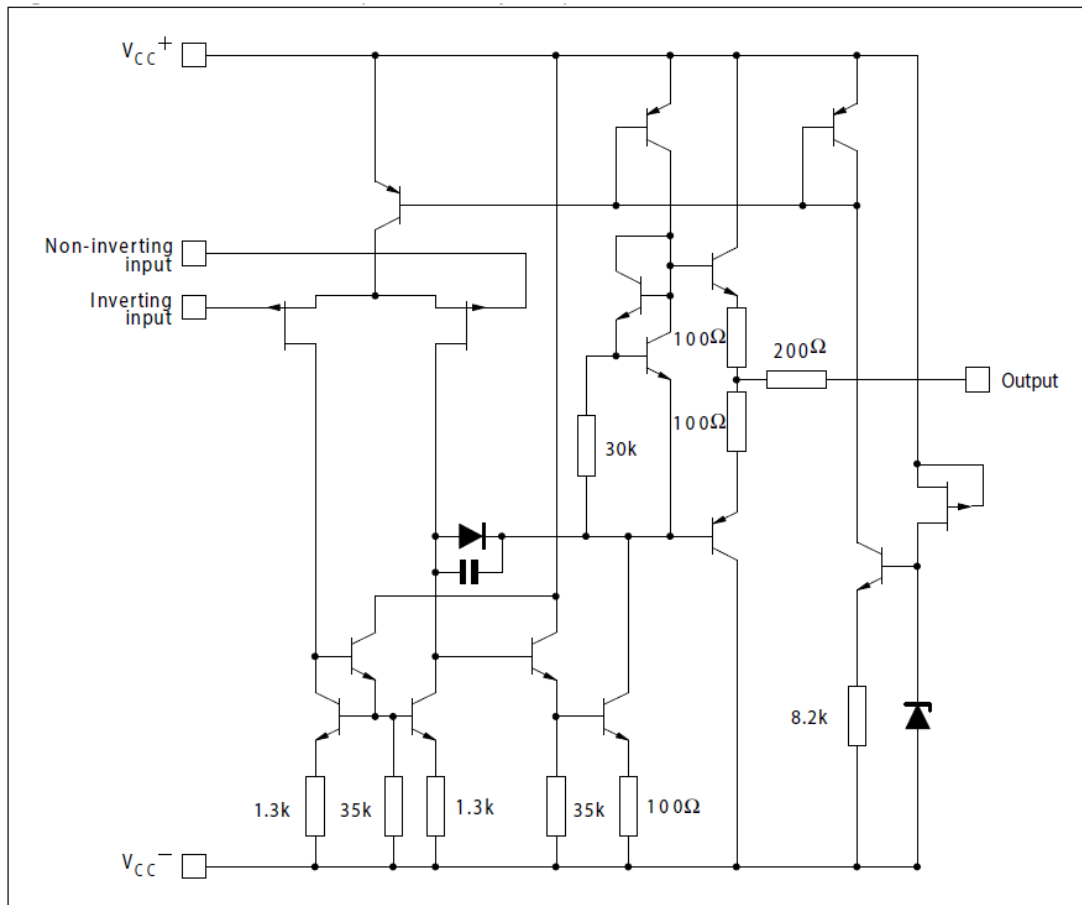
LM2903



LM2901



TL084



6.2 Tests Description

| Test name | Description | Purpose |
|--|--|--|
| Die Oriented | | |
| HTOL High Temperature Operating Life HTB High Temperature Bias | The device is stressed in static or dynamic configuration, approaching the operative max. absolute ratings in terms of junction temperature and bias condition. | 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. The typical failure modes are related to, silicon degradation, wire-bonds degradation, oxide faults. |
| HTRB High Temperature Reverse Bias HTFB / 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. |
| ELFR Early Life Failure Rate | The device is stressed in biased conditions at the max junction temperature. | To evaluate the defects inducing failure in early life. |
| Package Oriented | | |
| PC Preconditioning | The device is submitted to a typical temperature profile used for surface mounting devices, after a controlled moisture absorption. | As stand-alone test: to investigate the moisture sensitivity level. As preconditioning before other reliability tests: to verify that the surface mounting stress does not impact on the subsequent reliability performance. The typical failure modes are "pop corn" effect and delamination. |
| 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. |



| Test name | Description | Purpose |
|--|---|--|
| TF / IOL Thermal Fatigue / Intermittent Oper- ating Life | The device is submitted to cycled tem- perature 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 materi- als interacting in the die-package system. Typical failure modes are linked to metal displacement, dielectric cracking, molding compound delamination, wire-bonds fail- ure, die-attach layer degradation. |
| THB Temperature Humi- dity Bias | The device is biased in static configuration minimizing its internal power dissipation, and stored at controlled conditions of ambi- ent temperature and relative humidity. | To evaluate the package moisture resistance with electrical field applied, both electrolytic and galvanic corrosion are put in evidence. |
| Other | | |
| ESD Electro Static Dis- charge | The device is submitted to a high voltage peak on all his pins simulating ESD stress according to different simulation models. CBM: Charged Device Model HBM: Human Body Model MM: Machine Model | To classify the device according to his suscep- tibility to damage or degradation by exposure to electrostatic discharge. |
| LU Latch-Up | The device is submitted to a direct current forced/sunk into the input/output pins. Re- moving the direct current no change in the supply current must be observed. | To verify the presence of bulk parasitic effect inducing latch-up. |



Public Products List

PCN Title : Product Change Notification on new material set in ST Bouskoura for AMS products in SO8 and SO14 packages

PCN Reference : AMS/15/9514

PCN Created on : 06-Nov-2015

Subject : Public Products List

Dear Customer,

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

| | | |
|-------------|-------------|-------------|
| TS512IDT | LM324D | TS3704IDT |
| TS556IDTTR | LM201ADT | TS922ID |
| UA741CDT | TSV358IDT | STM818MM6F |
| TSV622IDT | LM239DT | MC3303DT |
| TS9224IDT | LM258D | TL082ID |
| LMV822AIDT | TL072CDT | TS27L4AIDT |
| LMX358IDT | LM393DT | LM2901DT |
| TS339IDT | TS462CDT | TL072CD |
| LM833DT | TSV6392AIDT | LM224D |
| LMV393IDT | TS339CDT | TS944IDT |
| LM358DT | TS912AIDT | TS922AIDT |
| TS831-4IDT | TL074ACDT | LM2903D |
| TL061CDT | TSV854AIDT | STM818LM6F |
| TSV992AIDT | MC4558CDT | TS861AIDT |
| LM2904D | LM2901D | LMV324IDT |
| TS951IDT | LM193DT | TS912BIDT |
| LM2902DT | LMV358IDT | TS1852IDT |
| LM2904DT | TSC102IDT | TL084CD |
| TS954IDT | TS27L2AIDT | TS272IDT |
| TL082CD | TS271CDT | TSV911AIDT |
| LM393WDT | LM293DT | TL084CDT |
| TS461CDT | TS393CDT | LM248DT |
| TS1871IDT | LM324DT | TSV854IDT |
| STM706PAM6F | TS912IDT | TS1872IDT |
| LMV824IDT | LM339AD | TL074BCDT |
| TS514AIDT | TL084AIDT | M41T81SM6F |
| TL062CD | TL074CD | STM708SAM6F |
| TSV912IDT | LM339D | TL071CDT |
| LM339EDT | LF353DT | LM324AD |
| LMV822IDT | TL084BIDT | TS1874AIDT |
| TS861IDT | TSV912AIDT | STM805TM6F |
| TS924IDT | TS27M4IDT | TS274AIDT |
| TS393IDT | M41T0M6F | TS514AID |
| LM334DT | LM319DT | TSV992IDT |
| TS921ID | TS3022IDT | TSH22IDT |
| TL082ACDT | TS27L4CDT | LM258WDT |
| M41T82SM6F | TL082IDT | LM293D |



Public Products List

| | | |
|------------|-------------|-------------|
| TS942IDT | TS1851IDT | TS274ACDT |
| TL064ACDT | LM211D | LF253DT |
| LM293ADT | LM358ADT | MC33171DT |
| TS831-3IDT | TSV6292IDT | TSV914AIDT |
| TS374CDT | TS932IDT | TS864IDT |
| STM707M6F | MC33172DT | TS922AID |
| TS912ID | TS272BIDT | LM219DT |
| LM224ADT | TS942AIDT | UA741IDT |
| TS924AIDT | TS27L2ACDT | TS3702IDT |
| TS512AIDT | M41T56M6F | TL062IDT |
| TS274IDT | TSV6392IDT | STM805SM6F |
| TL064CD | TJM4558CDT | LM358AD |
| TL074ID | MC33172D | TS972IDT |
| TS952IDT | LM224DT | LF347DT |
| TS27L2AID | TS831-5ID | MC3403DT |
| M41T00M6F | MC1458ID | TL072ACDT |
| LM235D | STM708TAM6F | TSV324IDT |
| TL084IDT | TL072IDT | TS272AIDT |
| TS3704CDT | TS921IDT | LMV824AIDT |
| TS27L2IDT | LM324ADT | STM805LM6F |
| TL081CDT | TS831-5IDT | TL082BCDT |
| TL064CDT | LM258DT | LM2904WHDT |
| MC33174DT | TSV358AIDT | LM235DT |
| TL061IDT | STM692AM6F | TSV612AIDT |
| TSV632AIDT | TS332IDT | MC33174D |
| TS27L4IDT | TL071IDT | TSC103IDT |
| TL074CDT | LM393D | TS27L2CD |
| LF247DT | STM819MM6F | STM706TAM6F |
| TS272CDT | LM2903DT | TS274CDT |
| LM311DT | TS884IDT | STM802TM6F |
| TSV632IDT | TL062ID | M41T81M6F |
| STM704RM6F | TSV622AIDT | TL072BIDT |
| MC33078D | TSX9292IDT | LM211DT |
| TL082CDT | M41T00SM6F | TSV994AIDT |
| TS934IDT | TS944AIDT | TS27M4CDT |
| TSV911IDT | TS1854IDT | TS272ACDT |
| TS971IDT | TL074IDT | TS924ID |
| TS522IDT | TL081IDT | MC33078DT |
| LM158WDT | TS922IDT | LM258ADT |
| STM804TM6F | LM324WDT | LF351DT |
| LM2903WDT | LM239ADT | LM335DT |
| TS862IDT | STM706M6F | STM690SM6F |
| MC4558IDT | LM339DT | LM2904WDT |
| TS1872AIDT | LM358D | MC33079DT |
| TS372IDT | LM335ADT | LM158DT |
| LM335D | LM393EDT | TL064IDT |
| TL062CDT | STTS75M2F | TL084BCDT |
| TS27M2CDT | LM311D | TS482IDT |
| TS3702CDT | LM2902D | LMV339IDT |
| UA741ID | TSV612IDT | TS464CDT |



Public Products List

| | | |
|-------------|-------------|-------------|
| TL062ACDT | TS514IDT | TL062BCDT |
| LM393ADT | STM690AM6F | STM708M6F |
| STM705M6F | M41T80M6F | TS507IDT |
| TS524IDT | LM324EDT | TSV6192AIDT |
| STM708SM6F | TS9222IDT | STM706RM6F |
| STM804RM6F | LF347D | LMV324LIDT |
| STM802SM6F | TS372CDT | LMX324IDT |
| TS931IDT | TSV914IDT | TL061ACDT |
| TSX3702IDT | STM704TM6F | TSC1031IDT |
| STM703M6F | LM358AWDT | TS334IDT |
| LM124DT | STM805RM6F | M41T82RM6F |
| STM806RM6F | TSV6192IDT | TSX922IDT |
| TS27L2CDT | TSV6292AIDT | LS204CDT |
| STM706TM6F | LM139ADT | STM806SM6F |
| STM706SM6F | TS974IDT | TS27L2BIDT |
| LM339ADT | LM234DT | M41T11M6F |
| TL084ACDT | STM706PM6F | STM804SM6F |
| STM690RM6F | LM239D | TSV994IDT |
| STM708RAM6F | LM139DT | MC1458DT |
| STM795TM6F | TSH24IDT | LM358WDT |
| M41T82ZM6F | TS374IDT | LMV358LIDT |
| STLM75M2F | TSV852AIDT | STM802LM6F |
| LM335AD | MC33079D | STM806TM6F |
| STM795RM6F | STM817LM6F | STM704SM6F |
| LF351D | UA741CD | STM802RM6F |
| STM795SM6F | TS555IDTTR | TS834-5IDT |
| STM706AM6F | M41T01M6F | LM258AWDT |
| TSV852IDT | STM704M6F | STM813LM6F |
| STM819LM6F | STM704M6E | STM708TM6F |
| STM817MM6F | STM708RM6F | STM690TM6F |
| STM802MM6F | STM706RAM6F | |



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