



# PRODUCT/PROCESS CHANGE NOTIFICATION

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PCN AMS-AAS/13/7796

Dated 25 Apr 2013

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**High Speed CMOS Technology transfer from 5'' to 6'' in ST Singapore**

**Table 1. Change Implementation Schedule**

|                                                                                              |             |
|----------------------------------------------------------------------------------------------|-------------|
| Forecasted implementation date for change                                                    | 18-Apr-2013 |
| Forecasted availability date of samples for customer                                         | 18-Apr-2013 |
| Forecasted date for <b>STMicroelectronics</b> change Qualification Plan results availability | 18-Apr-2013 |
| Estimated date of changed product first shipment                                             | 25-Jul-2013 |

**Table 2. Change Identification**

|                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Identification<br>(Product Family/Commercial Product) | See attached                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Type of change                                                | Waferfab process change                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Reason for change                                             | Production rationalization                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Description of the change                                     | Progressing on the activities related to high speed CMOS manufacturing processes, ST is glad to announce availability of 6 inches wafer production line, for AMS products in ST Ang Mo Kio (Singapore). Samples of M74HC4051RM13TR, M74HC04RM13TR, M74HC14RM13TR, M74HC151RM13TR, M74HC165RM13TR, M74HC4052RM13TR, M74HC4060RM13TR, M74HC4094RM13TR are available from now. Samples of other products will be available in the coming weeks upon customer request. |
| Change Product Identification                                 | Date code & lot number                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Manufacturing Location(s)                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

## DOCUMENT APPROVAL

| Name               | Function          |
|--------------------|-------------------|
| Grillo, Lionel     | Marketing Manager |
| De marco, Alberto  | Product Manager   |
| Bugnard, Jean-Marc | Q.A. Manager      |

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**PRODUCT/PROCESS  
CHANGE NOTIFICATION**

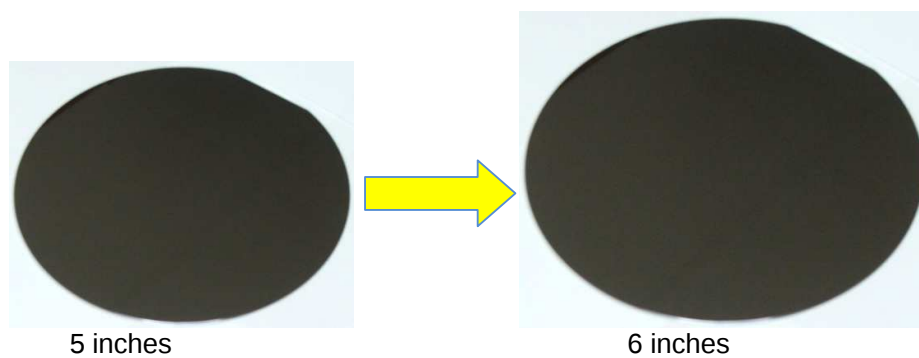
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PCN AMS-APD/13/7796

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***Analog, MEMS and Sensor Group***

**Wafer dimension change from 5 inches to 6 inches for High speed CMOS technology in ST Singapore**



**High speed CMOS**

**WHAT:**

Progressing on the activities related to high speed CMOS manufacturing processes, ST is glad to announce availability of 6 inches wafer production line, for AMS products.

| Material                            | Current process<br>5 inches       | Modified process<br>6 inches      | Comment                                                 |
|-------------------------------------|-----------------------------------|-----------------------------------|---------------------------------------------------------|
| diffusion location                  | ST Ang Mo Kio (Singapore) ST AMJ9 | ST Ang Mo Kio (Singapore) ST AMJ9 | No change                                               |
| Wafer dimension                     | 5 inches                          | 6 inches                          |                                                         |
| OCR (Optical character recognition) | NO                                | YES                               | Laser marking on wafer, which allow better traceability |
| Metallization                       | AlSi                              | AlSi                              | No change                                               |
| Passivation                         | Pvapox/Nitride                    | Pvapox/Nitride                    | No change                                               |
| EWS                                 | ST Singapore                      | ST Singapore                      | No change                                               |

For the complete list of part numbers affected by the change, please refer to the attached Product list. Samples of M74HC4051RM13TR, M74HC04RM13TR, M74HC14RM13TR, M74HC151RM13TR, M74HC165RM13TR, M74HC4052RM13TR, M74HC4060RM13TR, M74HC4094RM13TR are available from now. Samples of other products will be available in the coming weeks upon customer request.

**WHY:**

To upgrade manufacturing line from 5 inches to 6 inches in order to improve customer service.

**HOW:**

The change that covers AMS (Analog, Mems & Sensors) products is qualified based on qualification plan here attached.

Here below you'll find the details of qualification plan.

Qualification program and results:

The qualification program consists mainly of comparative electrical characterization and reliability tests. Please refer to Reliability evaluation plan for all the details.

**WHEN:**

Production in ST Singapore in 6 inches for AMS is forecasted week16 2013 for High Speed CMOS technology.

**Marking and traceability:**

Unless otherwise stated by customer specific requirement, the traceability of the parts assembled with the new material set will be ensured by datecode and lot number.

The changes here reported will not affect the electrical, dimensional and thermal parameters keeping unchanged all 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).

In any case, first shipments may start earlier with customer's written agreement.

## Change Qualification Plan

### *High speed CMOS transfer 5 to 6 inches*

| Test vehicle                   |                                                                                                                                                             | Locations                      |                     |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|---------------------|
| <b>Product Lines:</b>          | <i>R595, Z460, Z494, Z451</i>                                                                                                                               | <b>Wafer Diffusion Plants:</b> | <i>ST Singapore</i> |
| <b>Product Families:</b>       | 8 bit shift register without output latches (3 state), Single 8-Channel Analog Multiplexer/Demultiplexer, Single 8-Channel Analog Multiplexer/Demultiplexer | <b>EWS Plants:</b>             | <i>ST Singapore</i> |
| <b>P/Ns:</b>                   | <i>M74HC595YRM13TR, M74HC4060YRM13TR, M74HC4094YRM13TR, M74HC4051RM13TR</i>                                                                                 | <b>Assembly Plants:</b>        | <i>ST Bouskoura</i> |
| <b>Product Groups:</b>         | <i>AMS</i>                                                                                                                                                  | <b>T&amp;F Plants:</b>         | <i>ST Bouskoura</i> |
| <b>Product Divisions:</b>      | <i>Analog &amp; Audio System</i>                                                                                                                            | <b>Reliability Lab.:</b>       | <i>ST Catania</i>   |
| <b>Packages:</b>               | <i>SO16</i>                                                                                                                                                 |                                |                     |
| <b>Silicon Process techn.:</b> | <i>High speed CMOS</i>                                                                                                                                      |                                |                     |

### DOCUMENT INFORMATION

| Version | Date        | Pages | Prepared by | Comment     |
|---------|-------------|-------|-------------|-------------|
| 1.0     | 05-Apr-2013 | 15    | JM Bugnard  | First issue |
|         |             |       |             |             |
|         |             |       |             |             |

#### Reference document :

REL-6043-055-13 / FLG-018, April 2013, author Giuseppe Failla and Angelo Basile Approved By Giovanni Presti  
REL-6043-100.BSA.013.13, April 2013, author Giuseppe Failla and Angelo Basile Approved By Giovanni Presti  
REL-6043-101.BSA.032-13, April 2013, author Giuseppe Failla and Angelo Basile Approved By Giovanni Presti

Note: This report is a summary of the qualification trials performed in good faith by STMicroelectronics in order to evaluate the potential qualification 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  |
| AEC-Q001           | Guidelines for part average testing                                     |
| AEC-Q003           | Guidelines for Characterizing the Electrical Performance of IC Products |
| JESD47             | Stress-Test-Driven Qualification of Integrated Circuits                 |
|                    |                                                                         |

## **2 GLOSSARY**

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

## **3 QUALIFICATION EVALUATION OVERVIEW**

### **3.1 Objectives**

Through this qualification plan, the high speed CMOS technology transfer is evaluated, to be diffused at ST Singapore in 6 inches instead of 5 inches.

### **3.2 Conclusion**

Qualification Plan requirements must be fulfilled without exception. It is stressed that reliability tests must show that the devices behave correctly against environmental tests (no failure). Moreover, the stability of electrical parameters during the accelerated tests must demonstrate the ruggedness of the products and safe operation, which is consequently expected during their lifetime.

## 4 CHANGE CHARACTERISTICS

### 4.1 Change description

Transfer of High Speed CMOS technology from 5 inches to 6 inches.

### 4.2 Change details

| Material                            | Current process<br>5 inches       | Modified process<br>6 inches      | Comment                                                 |
|-------------------------------------|-----------------------------------|-----------------------------------|---------------------------------------------------------|
| diffusion location                  | ST Ang Mo Kio (Singapore) ST AMJ9 | ST Ang Mo Kio (Singapore) ST AMJ9 | No change                                               |
| Wafer dimension                     | 5 inches                          | 6 inches                          |                                                         |
| OCR (Optical character recognition) | NO                                | YES                               | Laser marking on wafer, which allow better traceability |
| Metallization                       | AlSi                              | AlSi                              | No change                                               |
| Passivation                         | Pvapox/Nitride                    | Pvapox/Nitride                    | No change                                               |
| EWS                                 | ST Singapore                      | ST Singapore                      | No change                                               |

### 4.3 Test vehicles description

|                                           | P/N<br>M74HC595YRM13TR   | P/N<br>M74HC4060YRM13TR  | P/N<br>M74HC4094YRM13TR  | P/N<br>M74HC4051RM13TR   |
|-------------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <b>Wafer/Die fab. information</b>         |                          |                          |                          |                          |
| Wafer fab manufacturing location          | ST Singapore             | ST Singapore             | ST Singapore             | ST Singapore             |
| Technology                                | High speed CMOS          | High speed CMOS          | High speed CMOS          | High speed CMOS          |
| Process family                            | NHSFII_HSCMOS            | NHSFII_HSCMOS            | NHSFII_HSCMOS            | NHSFII_HSCMOS            |
| Die finishing back side                   | Lapped silicon           | Lapped silicon           | Lapped silicon           |                          |
| Die size (microns)                        | 2144x1412                | 2284x1794                | 1778x1274                | 1778x1726                |
| Bond pad metallization layers             | AlSi                     | AlSi                     | AlSi                     | AlSi                     |
| Passivation type                          | Pvapox+Nitride           | Pvapox+Nitride           | Pvapox+Nitride           | Pvapox+Nitride           |
| <b>Wafer Testing (EWS) information</b>    |                          |                          |                          |                          |
| Electrical testing manufacturing location | ST Singapore             | ST Singapore             | ST Singapore             | ST Singapore             |
| Tester                                    | ASL1000                  | ASL1000                  | ASL1000                  | ASL1000                  |
| <b>Assembly information</b>               |                          |                          |                          |                          |
| Assembly site                             | ST Bouskoura             | ST Bouskoura             | ST Bouskoura             | ST Bouskoura             |
| Package description                       | SO16                     | SO16                     | SO16                     | SO16                     |
| Molding compound                          | Sumitomo G700K           | Sumitomo G700K           | Sumitomo G700K           | Sumitomo G700K           |
| Frame material                            | Copper                   | Copper                   | Copper                   | Copper                   |
| Die attach process                        | Epoxy glue               | Epoxy glue               | Epoxy glue               | Epoxy glue               |
| Die attach material                       | Abklestick 8601-S25      | Abklestick 8601-S25      | Abklestick 8601-S25      | Abklestick 8601-S25      |
| Wire bonding process                      | Thermosonic ball bonding | Thermosonic ball bonding | Thermosonic ball bonding | Thermosonic ball bonding |
| Wires bonding materials/diameters         | Copper 1 mil             | Copper 1 mil             | Copper 1 mil             | Copper 1 mil             |
| Lead finishing process                    | Preplated frame          | Preplated frame          | Preplated frame          | Preplated frame          |
| Lead finishing/bump solder material       | NiPdAgAu                 | NiPdAgAu                 | NiPdAgAu                 | NiPdAgAu                 |
| <b>Final testing information</b>          |                          |                          |                          |                          |
| Testing location                          | ST Bouskoura             | ST Bouskoura             | ST Bouskoura             | ST Bouskoura             |
| Tester                                    | ASL1K                    | ASL1K                    | ASL1K                    | ASL1K                    |

## 5 TESTS RESULTS SUMMARY

### 5.1 Test vehicles

| Lot # | P/N              | Process/ Package        | Product Line | Comments                |
|-------|------------------|-------------------------|--------------|-------------------------|
| 1     | M74HC595YRM13TR  | High speed CMOS/SO16    | R595         | Diffusion lot VW235NL92 |
| 2     | M74HC4060YRM13TR | High speed CMOS/SO16    | Z460         | Diffusion lot VW241KPF  |
| 3     | M74HC4094YRM13TR | High speed CMOS/SO16    | Z494         | Assy lot CZ2440LT01     |
| 4     | M74HC4051RM13TR  | High speed CMOS/TSSOP16 | Z451         | Diffusion lot VW241KPHE |

### 5.2 Test plan and results summary

| Test                             | PC | Std ref.                  | Conditions                                                                               | SS | Steps          | Failure/SS   |              |       |              | Note    |
|----------------------------------|----|---------------------------|------------------------------------------------------------------------------------------|----|----------------|--------------|--------------|-------|--------------|---------|
|                                  |    |                           |                                                                                          |    |                | Lot 1        | Lot 2        | Lot 3 | Lot4         |         |
| Die Oriented Tests               |    |                           |                                                                                          |    |                |              |              |       |              |         |
| HTB<br>High Temp. Bias           | N  | JESD22<br>A-108           | Tj = 125°C, BIAS                                                                         |    | 168H<br>1000H  | 0/77<br>0/77 | 0/77<br>0/77 | (1)   | 0/77<br>0/77 |         |
| HTSL<br>High Temp. Storage Life  | N  | JESD22<br>A-103           | Ta = 150°C                                                                               |    | 168H<br>1000 H | 0/45<br>0/45 | 0/45<br>0/45 | (1)   | 0/45<br>0/45 |         |
| ELFR<br>Early Life Failure Rate  | N  | AEC Q100 - 008            | Ta=125°C                                                                                 |    | 48H            | 0/800        | 0/800        | (1)   | 0/800        |         |
| Package oriented test            |    |                           |                                                                                          |    |                |              |              |       |              |         |
| PC<br>Preconditioning            |    | JESD22<br>A-113           | Drying 24 H @ 125°C<br>Store 168 H @ Ta=85°C Rh=85%<br>Oven Reflow @ Tpeak=260°C 3 times |    | Final          | Pass         | Pass         | (1)   | Pass         | MSL1    |
| AC<br>Auto Clave (Pressure Pot)  | Y  | JESD22<br>A-102           | Pa=2Atm / Ta=121°C                                                                       |    | 168 H          | 0/77         | 0/77         | (1)   | 0/77         |         |
| TC<br>Temperature Cycling        | Y  | JESD22<br>A-104           | Ta = -65°C to 150°C                                                                      |    | 100cy<br>500cy | 0/77<br>/077 | 0/77<br>/077 | (1)   | 1/77<br>1/77 | note(2) |
| THB<br>Temperature Humidity Bias | Y  | JESD22<br>A-101           | Ta = 85°C, RH = 85%, BIAS                                                                |    | 168H<br>500 H  | 0/77<br>0/77 | 0/77<br>0/77 | (1)   | 0/77<br>0/77 |         |
| Other Tests                      |    |                           |                                                                                          |    |                |              |              |       |              |         |
| ESD<br>Electro Static Dis-charge | -  | AEC Q101-001, 002 and 005 | HBM                                                                                      |    | 2kV            | 0/3          | 0/3          | (1)   | 0/3          |         |
|                                  |    |                           | CDM                                                                                      |    |                | 200V(0/3)    | 200V(0/3)    | (1)   | 750V(0/3)    |         |
|                                  |    |                           | MM                                                                                       |    |                | 750V(0/3)    | 1kV(0/3)     | (1)   |              |         |
| LU<br>Latch up                   | N  | AEC Q100-004              | LU                                                                                       |    |                | 0/12         | 0/12         | (1)   |              |         |

- (1) Electrical characterization only  
 (2) 1 reject in thermal cycling due to broken stitch, handling issue not linked with present diffusion qualification.

## 6 ANNEXES

### 6.1 Comparison Data Results

#### 6.1.1 Electrical Data

Part Number: M74HC4060YRM13TR (Final test)

| Symbol          | Parameter                               | Test Condition         |                         | Value                 |      |      |             |      |              | Unit |      |
|-----------------|-----------------------------------------|------------------------|-------------------------|-----------------------|------|------|-------------|------|--------------|------|------|
|                 |                                         | V <sub>CC</sub><br>(V) |                         | T <sub>A</sub> = 25°C |      |      | -40 to 85°C |      | -55 to 125°C |      |      |
|                 |                                         |                        |                         | Min.                  | Typ. | Max. | Min.        | Max. | Min.         |      | Max. |
| V <sub>OH</sub> | High Level Output Voltage<br>(Q Output) | 2.0                    | I <sub>O</sub> =-20 μA  | 1.9                   | 2.0  |      | 1.9         |      | 1.9          |      | V    |
|                 |                                         | 4.5                    | I <sub>O</sub> =-20 μA  | 4.4                   | 4.5  |      | 4.4         |      | 4.4          |      |      |
|                 |                                         | 6.0                    | I <sub>O</sub> =-20 μA  | 5.9                   | 6.0  |      | 5.9         |      | 5.9          |      |      |
|                 |                                         | 4.5                    | I <sub>O</sub> =-4.0 mA | 4.18                  | 4.31 |      | 4.13        |      | 4.10         |      |      |
|                 |                                         | 6.0                    | I <sub>O</sub> =-5.2 mA | 5.68                  | 5.8  |      | 5.63        |      | 5.60         |      |      |

| Parameter                                                        | Results |      |               |       |              |       |         |
|------------------------------------------------------------------|---------|------|---------------|-------|--------------|-------|---------|
|                                                                  |         |      | Before Change |       | After Change |       | Note    |
| test parameter                                                   | Out     | Unit | Avg           | Cpk   | Avg          | Cpk   | Note    |
| VOH (High Level Output Voltage) at Vcc=2V Iout=-20uA             | Q12     | V    | 1.99          | >2    | 1.99         | >2    | conform |
| VOH (High Level Output Voltage) at Vcc=2V Iout=-20uA             | Q13     | V    | 1.99          | >2    | 1.99         | >2    | conform |
| VOH (High Level Output Voltage) at Vcc=2V Iout=-20uA             | Q14     | V    | 1.99          | >2    | 1.99         | >2    | conform |
| VOH (High Level Output Voltage) at Vcc=2V Iout=-20uA             | Q6      | V    | 1.99          | >2    | 1.99         | >2    | conform |
| VOH (High Level Output Voltage) at Vcc=2V Iout=-20uA             | Q5      | V    | 1.99          | >2    | 1.99         | >2    | conform |
| VOH (High Level Output Voltage) at Vcc=2V Iout=-20uA             | Q7      | V    | 1.99          | >2    | 1.99         | >2    | conform |
| VOH (High Level Output Voltage) at Vcc=2V Iout=-20uA             | Q4      | V    | 1.99          | >2    | 1.99         | >2    | conform |
| VOH (High Level Output Voltage) at Vcc=2V Iout=-20uA             | Q9      | V    | 1.99          | >2    | 1.99         | >2    | conform |
| VOH (High Level Output Voltage) at Vcc=2V Iout=-20uA             | Q8      | V    | 1.99          | >2    | 2.00         | >2    | conform |
| VOH (High Level Output Voltage) at Vcc=2V Iout=-20uA             | Q10     |      | 1.99          | >2    | 2.00         | >2    | conform |
| VOH (High Level Output Voltage) at Vcc=4.5V Iout=-4mA            | Q12     | V    | 4.32          | >2    | 4.28         | >2    | conform |
| VOH (High Level Output Voltage) at Vcc=4.5V Iout=-4mA            | Q13     | V    | 4.32          | >2    | 4.28         | >2    | conform |
| VOH (High Level Output Voltage) at Vcc=4.5V Iout=-4mA            | Q14     | V    | 4.31          | >2    | 4.28         | >2    | conform |
| VOH (High Level Output Voltage) at Vcc=4.5V Iout=-4mA            | Q6      | V    | 4.30          | >2    | 4.27         | >2    | conform |
| VOH (High Level Output Voltage) at Vcc=4.5V Iout=-4mA            | Q5      | V    | 4.30          | >2    | 4.26         | >2    | conform |
| VOH (High Level Output Voltage) at Vcc=4.5V Iout=-4mA            | Q7      | V    | 4.30          | >2    | 4.27         | >2    | conform |
| VOH (High Level Output Voltage) ) at Vcc=4.5V Iout=-4mA          | Q4      | V    | 4.30          | >2    | 4.26         | >2    | conform |
| VOH (High Level Output Voltage) ) at Vcc=4.5V Iout=-4mA          | Q9      | V    | 4.31          | >2    | 4.27         | >2    | conform |
| VOH (High Level Output Voltage) ) at Vcc=4.5V Iout=-4mA          | Q8      | V    | 4.31          | >1.66 | 4.26         | >1.66 | conform |
| VOH (High Level Output Voltage) at Vcc=4.5V Iout=-4mA            | Q10     | V    | 4.31          | >2    | 4.27         | >2    | conform |
| VOH (High Level Output Voltage) at Vcc=6V Iout=-5.2mA            | Q12     | V    | 5.85          | >2    | 5.82         | >2    | conform |
| VOH (High Level Output Voltage) at Vcc=6V Iout=-5.2mA            | Q13     | V    | 5.85          | >2    | 5.82         | >2    | conform |
| VOH (High Level Output Voltage) at Vcc=6V Iout=-5.2mA            | Q14     | V    | 5.84          | >2    | 5.82         | >2    | conform |
| VOH (High Level Output Voltage) at Vcc=6V Iout=-5.2mA            | Q6      | V    | 5.84          | >2    | 5.81         | >2    | conform |
| VOH (High Level Output Voltage) at Vcc=6V Iout=-5.2mA            | Q5      | V    | 5.84          | >2    | 5.80         | >2    | conform |
| VOH (High Level Output Voltage) at Vcc=6V Iout=-5.2mA            | Q7      | V    | 5.83          | >2    | 5.81         | >2    | conform |
| VOH (High Level Output Voltage) at Vcc=6V Iout=-5.2mA            | Q4      | V    | 5.83          | >2    | 5.80         | >2    | conform |
| VOH (High Level Output Voltage)) at Vcc=6V Iout=-5.2mA           | Q9      | V    | 5.83          | >2    | 5.80         | >2    | conform |
| VOH (High Level Output Voltage) (Q Output) at Vcc=6V Iout=-5.2mA | Q8      | V    | 5.84          | >2    | 5.80         | >2    | conform |
| VOH (High Level Output Voltage) (Q Output) at Vcc=6V Iout=-5.2mA | Q10     | V    | 5.84          | >2    | 5.81         | >2    | conform |

| Symbol          | Parameter                           | Test Condition         |                        | Value                 |      |      |             |      |              | Unit |      |
|-----------------|-------------------------------------|------------------------|------------------------|-----------------------|------|------|-------------|------|--------------|------|------|
|                 |                                     | V <sub>CC</sub><br>(V) |                        | T <sub>A</sub> = 25°C |      |      | -40 to 85°C |      | -55 to 125°C |      |      |
|                 |                                     |                        |                        | Min.                  | Typ. | Max. | Min.        | Max. | Min.         |      | Max. |
| V <sub>OL</sub> | Low Level Output Voltage (Q Output) | 2.0                    | I <sub>O</sub> =20 μA  |                       | 0.0  | 0.1  |             | 0.1  |              | 0.1  | V    |
|                 |                                     | 4.5                    | I <sub>O</sub> =20 μA  |                       | 0.0  | 0.1  |             | 0.1  |              | 0.1  |      |
|                 |                                     | 6.0                    | I <sub>O</sub> =20 μA  |                       | 0.0  | 0.1  |             | 0.1  |              | 0.1  |      |
|                 |                                     | 4.5                    | I <sub>O</sub> =4.0 mA |                       | 0.17 | 0.26 |             | 0.33 |              | 0.40 |      |
|                 |                                     | 6.0                    | I <sub>O</sub> =5.2 mA |                       | 0.18 | 0.26 |             | 0.33 |              | 0.40 |      |

| Parameter                                           |            | Results |        |               |        |              |         |
|-----------------------------------------------------|------------|---------|--------|---------------|--------|--------------|---------|
|                                                     |            |         |        | Before Change |        | After Change |         |
| test parameter                                      | Out        | Unit    | Avg    | Cpk           | Avg    | Cpk          |         |
| VOL (Low Level Output Voltage) at Vcc=2V Iout=20uA  | Vol pin 1  | mV      | 14.49  | >2            | 49.72  | >2           | conform |
| VOL (Low Level Output Voltage) at Vcc=2V Iout=20uA  | Vol pin 2  | mV      | 0.72   | >2            | 2.60   | >2           | conform |
| VOL (Low Level Output Voltage) at Vcc=2V Iout=20uA  | Vol pin 3  | mV      | 0.13   | >2            | 1.47   | >2           | conform |
| VOL (Low Level Output Voltage) at Vcc=2V Iout=20uA  | Vol pin 4  | mV      | 0.50   | >2            | 1.64   | >2           | conform |
| VOL (Low Level Output Voltage) at Vcc=2V Iout=20uA  | Vol pin 5  | mV      | 0.14   | >2            | 1.60   | >2           | conform |
| VOL (Low Level Output Voltage) at Vcc=2V Iout=20uA  | Vol pin 6  | mV      | 0.46   | >2            | 1.42   | >2           | conform |
| VOL (Low Level Output Voltage) at Vcc=2V Iout=20uA  | Vol pin 7  | mV      | 0.60   | >2            | 1.60   | >2           | conform |
| VOL (Low Level Output Voltage) at Vcc=2V Iout=20uA  | Vol pin 13 | mV      | 0.64   | >2            | 1.41   | >2           | conform |
| VOL (Low Level Output Voltage) at Vcc=2V Iout=20uA  | Vol pin 14 | mV      | 0.77   | >2            | 1.76   | >2           | conform |
| VOL (Low Level Output Voltage) at Vcc=2V Iout=20uA  | Vol pin 15 | mV      | 0.30   | >2            | 1.71   | >2           | conform |
| VOL (Low Level Output Voltage) at Vcc=4.5V Iout=4mA | Vol pin 1  | V       | 0.14   | >2            | 0.16   | >2           | conform |
| VOL (Low Level Output Voltage) at Vcc=4.5V Iout=4mA | Vol pin 2  | V       | 0.14   | >2            | 0.16   | >2           | conform |
| VOL (Low Level Output Voltage) at Vcc=4.5V Iout=4mA | Vol pin 3  | V       | 0.14   | >2            | 0.16   | >2           | conform |
| VOL (Low Level Output Voltage) at Vcc=4.5V Iout=4mA | Vol pin 4  | V       | 0.14   | >2            | 0.16   | >2           | conform |
| VOL (Low Level Output Voltage) at Vcc=4.5V Iout=4mA | Vol pin 5  | V       | 0.14   | >2            | 0.16   | >2           | conform |
| VOL (Low Level Output Voltage) at Vcc=4.5V Iout=4mA | Vol pin 6  | V       | 0.14   | >2            | 0.16   | >2           | conform |
| VOL (Low Level Output Voltage) at Vcc=4.5V Iout=4mA | Vol pin 7  | V       | 0.14   | >2            | 0.16   | >2           | conform |
| VOL (Low Level Output Voltage) at Vcc=4.5V Iout=4mA | Vol pin 13 | V       | 0.14   | >2            | 0.16   | >2           | conform |
| VOL (Low Level Output Voltage) at Vcc=4.5V Iout=4mA | Vol pin 14 | V       | 0.14   | 2             | 0.16   | 2            | conform |
| VOL (Low Level Output Voltage) at Vcc=4.5V Iout=4mA | Vol pin 15 | V       | 0.14   | >2            | 0.17   | >2           | conform |
| VOL (Low Level Output Voltage) at Vcc=6V Iout=5.2mA | Vol pin 1  | mV      | 140.77 | >2            | 158.64 | >2           | conform |
| VOL (Low Level Output Voltage) at Vcc=6V Iout=5.2mA | Vol pin 2  | mV      | 140.39 | >2            | 155.65 | >2           | conform |
| VOL (Low Level Output Voltage) at Vcc=6V Iout=5.2mA | Vol pin 3  | mV      | 135.53 | >2            | 156.09 | >2           | conform |
| VOL (Low Level Output Voltage) at Vcc=6V Iout=5.2mA | Vol pin 4  | mV      | 135.00 | >2            | 160.77 | >2           | conform |
| VOL (Low Level Output Voltage) at Vcc=6V Iout=5.2mA | Vol pin 5  | mV      | 133.22 | >2            | 152.94 | >2           | conform |
| VOL (Low Level Output Voltage) at Vcc=6V Iout=5.2mA | Vol pin 6  | mV      | 132.22 | >2            | 153.47 | >2           | conform |
| VOL (Low Level Output Voltage) at Vcc=6V Iout=5.2mA | Vol pin 7  | mV      | 134.56 | >2            | 152.37 | >2           | conform |
| VOL (Low Level Output Voltage) at Vcc=6V Iout=5.2mA | Vol pin 13 | mV      | 137.00 | >2            | 159.62 | >2           | conform |
| VOL (Low Level Output Voltage) at Vcc=6V Iout=5.2mA | Vol pin 14 | mV      | 135.55 | >2            | 154.01 | >2           | conform |
| VOL (Low Level Output Voltage) at Vcc=6V Iout=5.2mA | Vol pin 15 | mV      | 138.80 | >2            | 165.62 | >2           | conform |

| Symbol         | Parameter             | Test Condition         |                                         | Value                 |      |       |             |      |              | Unit |      |
|----------------|-----------------------|------------------------|-----------------------------------------|-----------------------|------|-------|-------------|------|--------------|------|------|
|                |                       | V <sub>CC</sub><br>(V) |                                         | T <sub>A</sub> = 25°C |      |       | -40 to 85°C |      | -55 to 125°C |      |      |
|                |                       |                        |                                         | Min.                  | Typ. | Max.  | Min.        | Max. | Min.         |      | Max. |
| I <sub>I</sub> | Input Leakage Current | 6.0                    | V <sub>I</sub> = V <sub>CC</sub> or GND |                       |      | ± 0.1 |             | ± 1  |              | ± 1  | μA   |

| Parameter                  | Results |               |     |              |     |         |
|----------------------------|---------|---------------|-----|--------------|-----|---------|
|                            | Unit    | Before Change |     | After Change |     | Note    |
| test parameter             |         | Avg           | Cpk | Avg          | Cpk |         |
| IL (Input Leakage current) | nA      | 3.07          | >2  | 2.3          | >2  | conform |
| IL (Input Leakage current) | nA      | 5.51          | >2  | 2.8          | >2  | conform |
| IL (Input Leakage current) | nA      | 18.06         | >2  | 12.9         | >2  | conform |
| IL (Input Leakage current) | nA      | 5.99          | >2  | 4.2          | >2  | conform |

| Symbol          | Parameter                | Test Condition         |                                         | Value                 |      |      |             |      |              | Unit |      |
|-----------------|--------------------------|------------------------|-----------------------------------------|-----------------------|------|------|-------------|------|--------------|------|------|
|                 |                          | V <sub>CC</sub><br>(V) |                                         | T <sub>A</sub> = 25°C |      |      | -40 to 85°C |      | -55 to 125°C |      |      |
|                 |                          |                        |                                         | Min.                  | Typ. | Max. | Min.        | Max. | Min.         |      | Max. |
| I <sub>CC</sub> | Quiescent Supply Current | 6.0                    | V <sub>I</sub> = V <sub>CC</sub> or GND |                       |      | 4    |             | 40   |              | 80   | μA   |

| Parameter                              | Results |               |     |              |     |         |
|----------------------------------------|---------|---------------|-----|--------------|-----|---------|
|                                        | Unit    | Before Change |     | After Change |     | Note    |
| test parameter                         |         | Avg           | Cpk | Avg          | Cpk |         |
| ICC1 (Quiescent Supply Current) Vcc=6V | uA      | 0.21          | >2  | 0.13         | >2  | conform |
| ICC2 (Quiescent Supply Current) Vcc=6V | uA      | 0.02          | >2  | 0.01         | >2  | conform |
| ICC3 (Quiescent Supply Current) Vcc=6V | uA      | 0.27          | >2  | 0.30         | >2  | conform |
| ICC4 (Quiescent Supply Current) Vcc=6V | uA      | 0.00          | >2  | 0.04         | >2  | conform |

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| Symbol          | Parameter                 | Test Condition         |                         | Value                 |      |      |             |      |              | Unit |      |
|-----------------|---------------------------|------------------------|-------------------------|-----------------------|------|------|-------------|------|--------------|------|------|
|                 |                           | V <sub>CC</sub><br>(V) |                         | T <sub>A</sub> = 25°C |      |      | -40 to 85°C |      | -55 to 125°C |      |      |
|                 |                           |                        |                         | Min.                  | Typ. | Max. | Min.        | Max. | Min.         |      | Max. |
| V <sub>OH</sub> | High Level Output Voltage | 2.0                    | I <sub>O</sub> =-20 μA  | 1.9                   | 2.0  |      | 1.9         |      | 1.9          |      | V    |
|                 |                           | 4.5                    | I <sub>O</sub> =-20 μA  | 4.4                   | 4.5  |      | 4.4         |      | 4.4          |      |      |
|                 |                           | 6.0                    | I <sub>O</sub> =-20 μA  | 5.9                   | 6.0  |      | 5.9         |      | 5.9          |      |      |
|                 |                           | 4.5                    | I <sub>O</sub> =-4.0 mA | 4.18                  | 4.31 |      | 4.13        |      | 4.10         |      |      |
|                 |                           | 6.0                    | I <sub>O</sub> =-5.2 mA | 5.68                  | 5.8  |      | 5.63        |      | 5.60         |      |      |

| Parameter                                             | Results    |      |               |     |              |     |         |
|-------------------------------------------------------|------------|------|---------------|-----|--------------|-----|---------|
|                                                       | Pins       | Unit | Before Change |     | After Change |     | Note    |
|                                                       |            |      | Avg           | Cpk | Avg          | Cpk |         |
| test parameter                                        |            |      |               |     |              |     |         |
| VOH (High Level Output Voltage) at Vcc=4.5V Iout=-4mA | VoH pin 4  | V    | 4.29          | >2  | 4.28         | >2  | conform |
| VOH (High Level Output Voltage) at Vcc=4.5V Iout=-4mA | VoH Pin 5  | V    | 4.29          | >2  | 4.28         | >2  | conform |
| VOH (High Level Output Voltage) at Vcc=4.5V Iout=-4mA | VoH pin 6  | V    | 4.29          | >2  | 4.28         | >2  | conform |
| VOH (High Level Output Voltage) at Vcc=4.5V Iout=-4mA | VoH pin 7  | V    | 4.29          | >2  | 4.28         | >2  | conform |
| VOH (High Level Output Voltage) at Vcc=4.5V Iout=-4mA | VoH pin 14 | V    | 4.29          | >2  | 4.28         | >2  | conform |
| VOH (High Level Output Voltage) at Vcc=4.5V Iout=-4mA | VoH pin 13 | V    | 4.30          | >2  | 4.28         | >2  | conform |
| VOH (High Level Output Voltage) at Vcc=4.5V Iout=-4mA | VoH pin 12 | V    | 4.29          | >2  | 4.28         | >2  | conform |
| VOH (High Level Output Voltage) at Vcc=4.5V Iout=-4mA | VoH pin 11 | V    | 4.29          | >2  | 4.28         | >2  | conform |
| VOH (High Level Output Voltage) at Vcc=4.5V Iout=-4mA | VoH pin 10 | V    | 4.29          | >2  | 4.28         | >2  | conform |
| VOH (High Level Output Voltage) at Vcc=4.5V Iout=-4mA | VoH pin 9  | V    | 4.30          | >2  | 4.29         | >2  | conform |
| VOH (High Level Output Voltage) at Vcc=6V Iout=-5.2mA | VoH pin 4  | V    | 5.78          | >2  | 5.77         | >2  | conform |
| VOH (High Level Output Voltage) at Vcc=6V Iout=-5.2mA | VoH pin 5  | V    | 5.78          | >2  | 5.77         | >2  | conform |
| VOH (High Level Output Voltage) at Vcc=6V Iout=-5.2mA | VoH pin 6  | V    | 5.79          | >2  | 5.77         | >2  | conform |
| VOH (High Level Output Voltage) at Vcc=6V Iout=-5.2mA | VoH pin 7  | V    | 5.78          | >2  | 5.77         | >2  | conform |
| VOH (High Level Output Voltage) at Vcc=6V Iout=-5.2mA | VoH pin 14 | V    | 5.78          | >2  | 5.77         | >2  | conform |
| VOH (High Level Output Voltage) at Vcc=6V Iout=-5.2mA | VoH pin 13 | V    | 5.79          | >2  | 5.77         | >2  | conform |
| VOH (High Level Output Voltage) at Vcc=6V Iout=-5.2mA | VoH pin 12 | V    | 5.78          | >2  | 5.77         | >2  | conform |
| VOH (High Level Output Voltage) at Vcc=6V Iout=-5.2mA | VoH pin 11 | V    | 5.78          | >2  | 5.77         | >2  | conform |
| VOH (High Level Output Voltage) at Vcc=6V Iout=-5.2mA | VoH pin 10 | V    | 5.78          | >2  | 5.78         | >2  | conform |
| VOH (High Level Output Voltage) at Vcc=6V Iout=-5.2mA | VoH pin 9  | V    | 5.79          | >2  | 5.78         | >2  | conform |

| Symbol          | Parameter                | Test Condition         |                        | Value                 |      |      |             |      |              | Unit |      |
|-----------------|--------------------------|------------------------|------------------------|-----------------------|------|------|-------------|------|--------------|------|------|
|                 |                          | V <sub>CC</sub><br>(V) |                        | T <sub>A</sub> = 25°C |      |      | -40 to 85°C |      | -55 to 125°C |      |      |
|                 |                          |                        |                        | Min.                  | Typ. | Max. | Min.        | Max. | Min.         |      | Max. |
| V <sub>OL</sub> | Low Level Output Voltage | 2.0                    | I <sub>O</sub> =20 μA  |                       | 0.0  | 0.1  |             | 0.1  |              | 0.1  | V    |
|                 |                          | 4.5                    | I <sub>O</sub> =20 μA  |                       | 0.0  | 0.1  |             | 0.1  |              | 0.1  |      |
|                 |                          | 6.0                    | I <sub>O</sub> =20 μA  |                       | 0.0  | 0.1  |             | 0.1  |              | 0.1  |      |
|                 |                          | 4.5                    | I <sub>O</sub> =4.0 mA |                       | 0.17 | 0.26 |             | 0.33 |              | 0.40 |      |
|                 |                          | 6.0                    | I <sub>O</sub> =5.2 mA |                       | 0.18 | 0.26 |             | 0.33 |              | 0.40 |      |

| Parameter                                           | Results    |      |               |     |              |     |         |
|-----------------------------------------------------|------------|------|---------------|-----|--------------|-----|---------|
|                                                     | Pins       | Unit | Before Change |     | After Change |     | Note    |
|                                                     |            |      | Avg           | Cpk | Avg          | Cpk |         |
| test parameter                                      |            |      |               |     |              |     |         |
| VOL (Low Level Output Voltage) at Vcc=4.5V Iout=4mA | VoL pin 4  | mV   | 151           | >2  | 151          | >2  | conform |
| VOL (Low Level Output Voltage) at Vcc=4.5V Iout=4mA | VoL pin 5  | mV   | 150           | >2  | 151          | >2  | conform |
| VOL (Low Level Output Voltage) at Vcc=4.5V Iout=4mA | VoL pin 6  | mV   | 149           | >2  | 150          | >2  | conform |
| VOL (Low Level Output Voltage) at Vcc=4.5V Iout=4mA | VoL pin 7  | mV   | 148           | >2  | 150          | >2  | conform |
| VOL (Low Level Output Voltage) at Vcc=4.5V Iout=4mA | VoL pin 14 | mV   | 153           | >2  | 154          | >2  | conform |
| VOL (Low Level Output Voltage) at Vcc=4.5V Iout=4mA | VoL pin 13 | mV   | 152           | >2  | 154          | >2  | conform |
| VOL (Low Level Output Voltage) at Vcc=4.5V Iout=4mA | VoL pin 12 | mV   | 152           | >2  | 153          | >2  | conform |
| VOL (Low Level Output Voltage) at Vcc=4.5V Iout=4mA | VoL pin 11 | mV   | 152           | >2  | 152          | >2  | conform |
| VOL (Low Level Output Voltage) at Vcc=4.5V Iout=4mA | VoL pin 10 | mV   | 152           | >2  | 153          | >2  | conform |
| VOL (Low Level Output Voltage) at Vcc=4.5V Iout=4mA | VoL pin 9  | mV   | 152           | >2  | 158          | >2  | conform |
| VOL (Low Level Output Voltage) at Vcc=6V Iout=5.2mA | VoL pin 4  | mV   | 152           | >2  | 151          | >2  | conform |
| VOL (Low Level Output Voltage) at Vcc=6V Iout=5.2mA | VoL pin 5  | mV   | 150           | >2  | 151          | >2  | conform |
| VOL (Low Level Output Voltage) at Vcc=6V Iout=5.2mA | VoL pin 6  | mV   | 149           | >2  | 149          | >2  | conform |
| VOL (Low Level Output Voltage) at Vcc=6V Iout=5.2mA | VoL pin 7  | mV   | 148           | >2  | 149          | >2  | conform |
| VOL (Low Level Output Voltage) at Vcc=6V Iout=5.2mA | VoL pin 14 | mV   | 153           | >2  | 155          | >2  | conform |
| VOL (Low Level Output Voltage) at Vcc=6V Iout=5.2mA | VoL pin 13 | mV   | 153           | >2  | 154          | >2  | conform |
| VOL (Low Level Output Voltage) at Vcc=6V Iout=5.2mA | VoL pin 12 | mV   | 152           | >2  | 154          | >2  | conform |
| VOL (Low Level Output Voltage) at Vcc=6V Iout=5.2mA | VoL pin 11 | mV   | 152           | >2  | 153          | >2  | conform |
| VOL (Low Level Output Voltage) at Vcc=6V Iout=5.2mA | VoL pin 10 | mV   | 151           | >2  | 153          | >2  | conform |
| VOL (Low Level Output Voltage) at Vcc=6V Iout=5.2mA | VoL pin 9  | mV   | 152           | >2  | 158          | >2  | conform |

| Symbol         | Parameter             | Test Condition         |                                         | Value                 |      |       |             |      |              | Unit |      |
|----------------|-----------------------|------------------------|-----------------------------------------|-----------------------|------|-------|-------------|------|--------------|------|------|
|                |                       | V <sub>CC</sub><br>(V) |                                         | T <sub>A</sub> = 25°C |      |       | -40 to 85°C |      | -55 to 125°C |      |      |
|                |                       |                        |                                         | Min.                  | Typ. | Max.  | Min.        | Max. | Min.         |      | Max. |
| I <sub>I</sub> | Input Leakage Current | 6.0                    | V <sub>I</sub> = V <sub>CC</sub> or GND |                       |      | ± 0.1 |             | ± 1  |              | ± 1  | μA   |

| Parameter                  | Results            |      |               |     |              |     |         |
|----------------------------|--------------------|------|---------------|-----|--------------|-----|---------|
|                            | Pins               | Unit | Before Change |     | After Change |     | Note    |
|                            |                    |      | Avg           | Cpk | Avg          | Cpk |         |
| IL (Input Leakage current) | In Leak High PIN1  | nA   | 1.3           | >2  | 3.3          | >2  | conform |
| IL (Input Leakage current) | In Leak HighPIN2   | nA   | 0.4           | >2  | 0.6          | >2  | conform |
| IL (Input Leakage current) | In Leak High PIN3  | nA   | 1.1           | >2  | 1.7          | >2  | conform |
| IL (Input Leakage current) | In Leak High PIN15 | nA   | 3.9           | >2  | 4.3          | >2  | conform |
| IL (Input Leakage current) | In Leak Low PIN1   | nA   | 2.3           | >2  | 5.5          | >2  | conform |
| IL (Input Leakage current) | In Leak Low PIN2   | nA   | 4.4           | >2  | 3.6          | >2  | conform |
| IL (Input Leakage current) | In Leak Low PIN3   | nA   | 4.0           | >2  | 4.2          | >2  | conform |
| IL (Input Leakage current) | In Leak Low PIN15  | nA   | 5.9           | >2  | 9.0          | >2  | conform |

| Symbol          | Parameter                | Test Condition         |                                         | Value                 |      |      |             |      |              | Unit |      |
|-----------------|--------------------------|------------------------|-----------------------------------------|-----------------------|------|------|-------------|------|--------------|------|------|
|                 |                          | V <sub>CC</sub><br>(V) |                                         | T <sub>A</sub> = 25°C |      |      | -40 to 85°C |      | -55 to 125°C |      |      |
|                 |                          |                        |                                         | Min.                  | Typ. | Max. | Min.        | Max. | Min.         |      | Max. |
| I <sub>CC</sub> | Quiescent Supply Current | 6.0                    | V <sub>I</sub> = V <sub>CC</sub> or GND |                       |      | 4    |             | 40   |              | 80   | μA   |

| Parameter                                          | Results             |      |               |     |              |     |         |
|----------------------------------------------------|---------------------|------|---------------|-----|--------------|-----|---------|
|                                                    | Pins                | Unit | Before Change |     | After Change |     | Note    |
| test parameter                                     |                     |      | Avg           | Cpk | Avg          | Cpk |         |
| ICC (Quiescent Supply Current) V <sub>CC</sub> =6V | I <sub>CC</sub> @6V | uA   | 0.14          | >2  | 0.12         | >2  | conform |

| Symbol          | Parameter                             | Test Condition         |                                                                                                | Value                 |      |       |             |      |              | Unit |      |
|-----------------|---------------------------------------|------------------------|------------------------------------------------------------------------------------------------|-----------------------|------|-------|-------------|------|--------------|------|------|
|                 |                                       | V <sub>CC</sub><br>(V) |                                                                                                | T <sub>A</sub> = 25°C |      |       | -40 to 85°C |      | -55 to 125°C |      |      |
|                 |                                       |                        |                                                                                                | Min.                  | Typ. | Max.  | Min.        | Max. | Min.         |      | Max. |
| I <sub>OZ</sub> | High Impedance Output Leakage Current | 6.0                    | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub><br>V <sub>O</sub> = V <sub>CC</sub> or GND |                       |      | ± 0.5 |             | ± 5  |              | ± 10 | μA   |

| Parameter                                   | Results |      |               |     |              |     |         |
|---------------------------------------------|---------|------|---------------|-----|--------------|-----|---------|
|                                             | Pins    | Unit | Before Change |     | After Change |     | Note    |
| test parameter                              |         |      | Avg           | Cpk | Avg          | Cpk |         |
| IOZ (High Impedance Output Leakage Current) | IOZH Q1 | nA   | 23.17         | >2  | 28.62        | >2  | conform |
| IOZ (High Impedance Output Leakage Current) | IOZH Q2 | nA   | 2.5           | >2  | 2.6          | >2  | conform |
| IOZ (High Impedance Output Leakage Current) | IOZH Q3 | nA   | 0.9           | >2  | 0.5          | >2  | conform |
| IOZ (High Impedance Output Leakage Current) | IOZH Q4 | nA   | 2.1           | >2  | 2.5          | >2  | conform |
| IOZ (High Impedance Output Leakage Current) | IOZH Q5 | nA   | 7.4           | >2  | 14.1         | >2  | conform |
| IOZ (High Impedance Output Leakage Current) | IOZH Q6 | nA   | 2.2           | >2  | 2.8          | >2  | conform |
| IOZ (High Impedance Output Leakage Current) | IOZH Q7 | nA   | 2.3           | >2  | 3.0          | >2  | conform |
| IOZ (High Impedance Output Leakage Current) | IOZH Q8 | nA   | 1.2           | >2  | 1.2          | >2  | conform |
| IOZ (High Impedance Output Leakage Current) | IOZL Q1 | nA   | 6             | >2  | 6            | >2  | conform |
| IOZ (High Impedance Output Leakage Current) | IOZL Q2 | nA   | 2             | >2  | 3            | >2  | conform |
| IOZ (High Impedance Output Leakage Current) | IOZL Q3 | nA   | 3             | >2  | 1            | >2  | conform |
| IOZ (High Impedance Output Leakage Current) | IOZL Q4 | nA   | 0             | >2  | 1            | >2  | conform |
| IOZ (High Impedance Output Leakage Current) | IOZL Q5 | nA   | 8             | >2  | 0            | >2  | conform |
| IOZ (High Impedance Output Leakage Current) | IOZL Q6 | nA   | 0             | >2  | 2            | >2  | conform |
| IOZ (High Impedance Output Leakage Current) | IOZL Q7 | nA   | 0             | >2  | 2            | >2  | conform |
| IOZ (High Impedance Output Leakage Current) | IOZL Q8 | nA   | 1             | >2  | 1            | >2  | conform |

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| Symbol<br>I     | Parameter     | Test condition         |                        |                                                                                                                                          | Value                  |     |     |                 |     |                  | Unit |     |
|-----------------|---------------|------------------------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-----|-----|-----------------|-----|------------------|------|-----|
|                 |               | V <sub>CC</sub><br>(V) | V <sub>EE</sub><br>(V) |                                                                                                                                          | T <sub>A</sub> = 25 °C |     |     | -40 to<br>85 °C |     | -55 to<br>125 °C |      |     |
|                 |               |                        |                        |                                                                                                                                          | Min                    | Typ | Max | Min             | Max | Min              |      | Max |
| R <sub>ON</sub> | ON resistance | 4.5                    | GND                    | V <sub>I</sub> = V <sub>IHC</sub> or V <sub>ILC</sub><br>V <sub>I/O</sub> = V <sub>CC</sub> to V <sub>EE</sub><br>I <sub>I/O</sub> ≤2mA  |                        | 85  | 180 |                 | 225 |                  | 270  | W   |
|                 |               | 4.5                    | -4.5                   |                                                                                                                                          |                        | 55  | 120 |                 | 150 |                  | 180  |     |
|                 |               | 6.0                    | -6.0                   |                                                                                                                                          |                        | 50  | 100 |                 | 125 |                  | 150  |     |
|                 |               | 2.0                    | GND                    | V <sub>I</sub> = V <sub>IHC</sub> or V <sub>ILC</sub><br>V <sub>I/O</sub> = V <sub>CC</sub> or V <sub>EE</sub><br>I <sub>I/O</sub> ≤2 mA |                        | 150 |     |                 |     |                  |      |     |
|                 |               | 4.5                    | GND                    |                                                                                                                                          |                        | 70  | 150 |                 | 190 |                  | 230  |     |
|                 |               | 4.5                    | -4.5                   |                                                                                                                                          |                        | 50  | 100 |                 | 125 |                  | 150  |     |
|                 |               | 6.0                    | -6.0                   |                                                                                                                                          |                        | 45  | 80  |                 | 100 |                  | 120  |     |

| Parameter   | Unit | Before Change |     | After Change |     | Note    |
|-------------|------|---------------|-----|--------------|-----|---------|
|             |      | Avg           | Cpk | Avg          | Cpk |         |
| RON Vcc GND | OHM  | 79.25         | >2  | 76.54        | >2  | conform |
| RON STEP    | OHM  | 97.28         | >2  | 90.35        | >2  | conform |

| Symbol<br>I      | Parameter                                       | Test condition         |                        |                                                                                                                                               | Value                  |     |       |                 |      |                  | Unit |     |
|------------------|-------------------------------------------------|------------------------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-----|-------|-----------------|------|------------------|------|-----|
|                  |                                                 | V <sub>CC</sub><br>(V) | V <sub>EE</sub><br>(V) |                                                                                                                                               | T <sub>A</sub> = 25 °C |     |       | -40 to<br>85 °C |      | -55 to<br>125 °C |      |     |
|                  |                                                 |                        |                        |                                                                                                                                               | Min                    | Typ | Max   | Min             | Max  | Min              |      | Max |
| I <sub>OFF</sub> | Input/output<br>leakage current<br>(switch off) | 6.0                    | GND                    | V <sub>OS</sub> = V <sub>CC</sub> or GND<br>V <sub>IS</sub> = GND or V <sub>CC</sub><br>V <sub>I</sub> = V <sub>ILC</sub> or V <sub>IHC</sub> |                        |     | ±0.06 |                 | ±0.6 |                  | ±1.2 | μA  |
|                  |                                                 | 6.0                    | -6.0                   |                                                                                                                                               |                        |     | ±0.1  |                 | ±1   |                  | ±2   |     |

| Parameter   | Unit | Before Change |     | After Change |     | Note    |
|-------------|------|---------------|-----|--------------|-----|---------|
|             |      | Avg           | Cpk | Avg          | Cpk |         |
| IOFF3_pin13 | nA   | -4.64         | >2  | -32.19       | >2  | conform |
| IOFF3_pin14 | nA   | 7.30          | >2  | -14.21       | >2  | conform |
| IOFF3_pin15 | nA   | -5.36         | >2  | -46.21       | >2  | conform |
| IOFF3_pin12 | nA   | -4.30         | >2  | -29.06       | >2  | conform |
| IOFF3_pin1  | nA   | -5.33         | >2  | -34.57       | >2  | conform |
| IOFF3_pin5  | nA   | -5.37         | >2  | -33.66       | >2  | conform |
| IOFF3_pin2  | nA   | -4.86         | >2  | -28.10       | >2  | conform |
| IOFF3_pin4  | nA   | -4.59         | >2  | -27.77       | >2  | conform |
| IOFF7_pin3  | nA   | 0.01          | >2  | -4.15        | >2  | conform |
| IOFF6_pin13 | nA   | 0.67          | >2  | 15.21        | >2  | conform |
| IOFF6_pin14 | nA   | 1.76          | >2  | 26.35        | >2  | conform |
| IOFF6_pin15 | nA   | 1.00          | >2  | 17.30        | >2  | conform |
| IOFF6_pin12 | nA   | 1.60          | >2  | 29.86        | >2  | conform |
| IOFF6_pin1  | nA   | -4.04         | >2  | -23.05       | >2  | conform |
| IOFF6_pin5  | nA   | -4.20         | >2  | -22.87       | >2  | conform |
| IOFF6_pin2  | nA   | -4.36         | >2  | -24.09       | >2  | conform |
| IOFF6_pin4  | nA   | -4.46         | >2  | -23.65       | >2  | conform |
| IOFF10_pin3 | nA   | 4.66          | >2  | 24.67        | >2  | conform |

| Symbol<br>I    | Parameter             | Test condition         |                        |                                         | Value                  |     |      |              |      |               | Unit |     |
|----------------|-----------------------|------------------------|------------------------|-----------------------------------------|------------------------|-----|------|--------------|------|---------------|------|-----|
|                |                       | V <sub>CC</sub><br>(V) | V <sub>EE</sub><br>(V) |                                         | T <sub>A</sub> = 25 °C |     |      | -40 to 85 °C |      | -55 to 125 °C |      |     |
|                |                       |                        |                        |                                         | Min                    | Typ | Max  | Min          | Max  | Min           |      | Max |
| I <sub>I</sub> | Input leakage current | 6.0                    | GND                    | V <sub>I</sub> = V <sub>CC</sub> or GND |                        |     | ±0.1 |              | ±0.1 |               | ±1   | μA  |

| Parameter      |      |               |      |              |     |         |
|----------------|------|---------------|------|--------------|-----|---------|
| test parameter | Unit | Before Change |      | After Change |     | Note    |
|                |      | Avg           | Cpk  | Avg          | Cpk |         |
| ILH_Inp A      | nA   | 3.76          | >1.3 | 31.52        | >2  | conform |
| ILH_Inp B      | nA   | -2.13         | >2   | 20.35        | >2  | conform |
| ILH_Inp_C      | nA   | 5.46          | >2   | 28.00        | >2  | conform |
| ILH_Inp INH    | nA   | 7.43          | >2   | 13.27        | >2  | conform |
| ILL_Inp A      | nA   | -5.01         | >2   | -17.41       | >2  | conform |
| ILL_Inp_B      | nA   | -3.12         | >2   | -10.08       | >2  | conform |
| ILL_Inp_C      | nA   | -6.32         | >2   | -19.65       | >2  | conform |
| ILL_Inp_INH    | nA   | 6.56          | >2   | 6.52         | >2  | conform |

| Symbol<br>I     | Parameter                   | Test condition         |                        |                                         | Value                  |     |     |                 |     |                  | Unit |     |
|-----------------|-----------------------------|------------------------|------------------------|-----------------------------------------|------------------------|-----|-----|-----------------|-----|------------------|------|-----|
|                 |                             | V <sub>CC</sub><br>(V) | V <sub>EE</sub><br>(V) |                                         | T <sub>A</sub> = 25 °C |     |     | -40 to<br>85 °C |     | -55 to<br>125 °C |      |     |
|                 |                             |                        |                        |                                         | Min                    | Typ | Max | Min             | Max | Min              |      | Max |
| I <sub>CC</sub> | Quiescent supply<br>current | 6.0                    | GND                    | V <sub>I</sub> = V <sub>CC</sub> or GND |                        |     | 4   |                 | 40  |                  | 80   | μA  |
|                 |                             | 6.0                    | -6.0                   |                                         |                        |     | 8   |                 | 80  |                  | 160  |     |

| Parameter                               |                                 |      |               |     |              |     |         |
|-----------------------------------------|---------------------------------|------|---------------|-----|--------------|-----|---------|
| test parameter                          |                                 | unit | Before Change |     | After Change |     | Note    |
|                                         |                                 |      | Avg           | Cpk | Avg          | Cpk |         |
| I <sub>CC</sub> (V <sub>EE</sub> _HIGH) | V <sub>I</sub> =V <sub>Ih</sub> | uA   | -0.01         | >2  | -0.01        | >2  | conform |
| I <sub>CC</sub> (V <sub>EE</sub> _LOW)  | V <sub>I</sub> =V <sub>Il</sub> | uA   | -0.01         | >2  | -0.01        | >2  | conform |
| I <sub>CC</sub> (V <sub>EE</sub> _HIGH) | V <sub>I</sub> =V <sub>Ih</sub> | uA   | -0.01         | >2  | 0.06         | >2  | conform |
| I <sub>CC</sub> (V <sub>EE</sub> _LOW)  | V <sub>I</sub> =V <sub>Il</sub> | uA   | 0.00          | >2  | 0.07         | >2  | conform |

Conclusion: New version in line with requirements.

## Tests Description

| Test name                                                                                                      | Description                                                                                                                                                                                                                                                                                 | Purpose                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Die Oriented</b>                                                                                            |                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>HTOL</b><br>High Temperature Operating Life<br><br><b>HTB</b><br>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.<br>The typical failure modes are related to, silicon degradation, wire-bonds degradation, oxide faults.                                                                                                                         |
| <b>HTRB</b><br>High Temperature Reverse Bias<br><br><b>HTFB / HTGB</b><br>High Temperature Forward (Gate) Bias | The device is stressed in static configuration, trying to satisfy as much as possible the following conditions: <ul style="list-style-type: none"> <li>low power dissipation;</li> <li>max. supply voltage compatible with diffusion process and internal circuitry limitations;</li> </ul> | 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.<br>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. |
| <b>HTSL</b><br>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.                                                                                                                                                                                                                                        |
| <b>ELFR</b><br>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.                                                                                                                                                                                                                                                                                                                                            |
| <b>Package Oriented</b>                                                                                        |                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>PC</b><br>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.<br>As preconditioning before other reliability tests: to verify that the surface mounting stress does not impact on the subsequent reliability performance.<br>The typical failure modes are "pop corn" effect and delamination.                                                                                               |
| <b>AC</b><br>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.                                                                                                                                                                                                                                                                  |
| <b>TC</b><br>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.                                                              |
| <b>THB</b><br>Temperature Humidity Bias                                                                        | The device is biased in static configuration minimizing its internal power dissipation, and stored at controlled conditions of ambient temperature and relative humidity.                                                                                                                   | To evaluate the package moisture resistance with electrical field applied, both electrolytic and galvanic corrosion are put in evidence.                                                                                                                                                                                                                                                           |
| <b>THS</b><br>Temperature Humidity Storage                                                                     | The device is stored at controlled conditions of ambient temperature and relative humidity.                                                                                                                                                                                                 | To investigate corrosion phenomena affecting die or package materials, related to chemical contamination and package hermeticity.                                                                                                                                                                                                                                                                  |

| Test name                                 | Description                                                                                                                                                                                                                                                                                                       | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>PTC</b><br>Power & Temperature Cycling | The power and temperature cycling test is performed to determine the ability of a device to withstand alternate exposures at high and low temperature extremes with operating biases periodically applied and removed.                                                                                            | It is intended to simulate worst case conditions encountered in typical applications. Typical failure modes are related to parametric limits and functionality. Mechanical damage such as cracking, or breaking of the package will also be considered a failure provided such damage was not induced by fixturing or handling.                                                                                                                                            |
| <b>EV</b><br>External Visual              | Inspect device construction, marking and workmanship                                                                                                                                                                                                                                                              | To verify visual defects on device (form, marking,...).                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>LI</b><br>Lead Integrity               | Various tests allow determining the integrity lead/package interface and the lead itself when the lead(s) are bent due to faulty board assembly followed by rework of the part for reassembly.                                                                                                                    | This test is applicable to all throughhole devices and surface-mount devices requiring lead forming by the user.                                                                                                                                                                                                                                                                                                                                                           |
| <b>WBP</b><br>Wire Bond Pull              | The wire is submitted to a pulling force (approximately normal to the surface of the die) able to achieve wire break or interface separation between ball/pad or stitch/lead.                                                                                                                                     | To investigate and measure the integrity and robustness of the interface between wire and die or lead metallization                                                                                                                                                                                                                                                                                                                                                        |
| <b>WBS</b><br>Wire Bond Shear             | The ball bond is submitted to a shear force (parallel to the pad area) able to cause the separation of the bonding surface between ball bond and pad area.                                                                                                                                                        | To investigate and measure the integrity and robustness of the bonding surface between ball bond and pad area.                                                                                                                                                                                                                                                                                                                                                             |
| <b>DS</b><br>Die Shear                    | This determination is based on a measure of force applied to the die, the type of failure resulting from this application of force (if failure occurs) and the visual appearance of the residual die attach media and substrate/header metallization.                                                             | The purpose of this test is to determine the integrity of materials and procedures used to attach semiconductor die or surface mounted passive elements to package headers or other substrates.                                                                                                                                                                                                                                                                            |
| <b>PD</b><br>Physical Dimension           | All physical dimension quoted in datasheet of the device are measured.                                                                                                                                                                                                                                            | Verify physical dimensions to the applicable user device packaging specification for dimensions and tolerances.                                                                                                                                                                                                                                                                                                                                                            |
| <b>SD</b><br>Solderability                | This evaluation is made on the basis of the ability of these terminations to be wetted and to produce a suitable fillet when coated by tin lead eutectic solder. A preconditioning test is included in this test method, which degrades the termination finish to provide a guard band against marginal finishes. | The purpose of this test method is to provide a referee condition for the evaluation of the solderability of terminations (including leads up to 0.125 inch in diameter) that will be assembled using tin lead eutectic solder. These procedures will test whether the packaging materials and processes used during the manufacturing operations process produce a component that can be successfully soldered to the next level assembly using tin lead eutectic solder. |
| <b>Other</b>                              |                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>ESD</b><br>Electro Static Discharge    | The device is submitted to a high voltage peak on all his pins simulating ESD stress according to different simulation models.<br><b>CBM:</b> Charged Device Model<br><b>HBM:</b> Human Body Model<br><b>MM:</b> Machine Model                                                                                    | To classify the device according to his susceptibility to damage or degradation by exposure to electrostatic discharge.                                                                                                                                                                                                                                                                                                                                                    |
| <b>LU</b><br>Latch-Up                     | The device is submitted to a direct current forced/sunk into the input/output pins. Removing 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 : High Speed CMOS Technology transfer from 5" to 6" in ST Singapore

PCN Reference : AMS-AAS/13/7796

PCN Created on : 30-APR-2013

Subject : Public Products List

Dear Customer,

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

### ST COMMERCIAL PRODUCT

|                |                |                |
|----------------|----------------|----------------|
| 74H1G66STR     | M74HC00B1R     | M74HC00RM13TR  |
| M74HC00TTR     | M74HC02B1R     | M74HC02RM13TR  |
| M74HC02TTR     | M74HC03RM13TR  | M74HC03TTR     |
| M74HC04B1R     | M74HC04RM13TR  | M74HC04TTR     |
| M74HC08B1R     | M74HC08RM13TR  | M74HC08TTR     |
| M74HC107RM13TR | M74HC109RM13TR | M74HC10RM13TR  |
| M74HC123B1R    | M74HC123TTR    | M74HC125B1R    |
| M74HC125RM13TR | M74HC125TTR    | M74HC126RM13TR |
| M74HC126TTR    | M74HC132B1R    | M74HC132RM13TR |
| M74HC132TTR    | M74HC138B1R    | M74HC138RM13TR |
| M74HC138TTR    | M74HC139B1R    | M74HC139RM13TR |
| M74HC139TTR    | M74HC148B1R    | M74HC148RM13TR |
| M74HC148TTR    | M74HC14B1R     | M74HC14RM13TR  |
| M74HC14TTR     | M74HC151B1R    | M74HC151RM13TR |
| M74HC151TTR    | M74HC153TTR    | M74HC157B1R    |
| M74HC157RM13TR | M74HC160RM13TR | M74HC161B1R    |
| M74HC161RM13TR | M74HC161TTR    | M74HC163RM13TR |
| M74HC164B1R    | M74HC164RM13TR | M74HC164TTR    |
| M74HC165B1R    | M74HC165RM13TR | M74HC165TTR    |
| M74HC174B1R    | M74HC174RM13TR | M74HC174TTR    |
| M74HC175B1R    | M74HC175RM13TR | M74HC175TTR    |
| M74HC191RM13TR | M74HC20RM13TR  | M74HC221B1R    |
| M74HC221RM13TR | M74HC238B1R    | M74HC238RM13TR |
| M74HC238TTR    | M74HC240RM13TR | M74HC241RM13TR |
| M74HC244RM13TR | M74HC244TTR    | M74HC245RM13TR |
| M74HC245TTR    | M74HC251B1R    | M74HC251RM13TR |
| M74HC251TTR    | M74HC253RM13TR | M74HC257B1R    |
| M74HC257RM13TR | M74HC259B1R    | M74HC259RM13TR |
| M74HC259TTR    | M74HC266RM13TR | M74HC273RM13TR |
| M74HC273TTR    | M74HC27RM13TR  | M74HC27TTR     |
| M74HC280RM13TR | M74HC283RM13TR | M74HC299RM13TR |
| M74HC32B1R     | M74HC32RM13TR  | M74HC32TTR     |
| M74HC365B1R    | M74HC365RM13TR | M74HC365TTR    |
| M74HC367B1R    | M74HC367RM13TR | M74HC367TTR    |
| M74HC368B1R    | M74HC368RM13TR | M74HC373RM13TR |



## Public Products List

PCN Title : High Speed CMOS Technology transfer from 5" to 6" in ST Singapore

PCN Reference : AMS-AAS/13/7796

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### ST COMMERCIAL PRODUCT

|                 |                 |                 |
|-----------------|-----------------|-----------------|
| M74HC373TTR     | M74HC374RM13TR  | M74HC377RM13TR  |
| M74HC390B1R     | M74HC390RM13TR  | M74HC393B1R     |
| M74HC393RM13TR  | M74HC393TTR     | M74HC4017B1R    |
| M74HC4017RM13TR | M74HC4020B1R    | M74HC4020RM13TR |
| M74HC4024B1R    | M74HC4024RM13TR | M74HC4040B1R    |
| M74HC4040RM13TR | M74HC4040TTR    | M74HC4049B1R    |
| M74HC4049RM13TR | M74HC4050B1R    | M74HC4050RM13TR |
| M74HC4050TTR    | M74HC4051B1R    | M74HC4051RM13TR |
| M74HC4051TTR    | M74HC4052B1R    | M74HC4052RM13TR |
| M74HC4052TTR    | M74HC4053B1R    | M74HC4053RM13TR |
| M74HC4053TTR    | M74HC4060B1R    | M74HC4060RM13TR |
| M74HC4060TTR    | M74HC4066B1R    | M74HC4066RM13TR |
| M74HC4066TTR    | M74HC4075B1R    | M74HC4075RM13TR |
| M74HC4078B1R    | M74HC4078RM13TR | M74HC4094B1R    |
| M74HC4094RM13TR | M74HC4094TTR    | M74HC4316B1R    |
| M74HC4316RM13TR | M74HC4316TTR    | M74HC4518B1R    |
| M74HC4520B1R    | M74HC4520RM13TR | M74HC4538B1R    |
| M74HC4538RM13TR | M74HC4538TTR    | M74HC4543B1R    |
| M74HC4543RM13TR | M74HC51B1R      | M74HC51RM13TR   |
| M74HC533RM13TR  | M74HC540RM13TR  | M74HC541RM13TR  |
| M74HC563RM13TR  | M74HC564RM13TR  | M74HC573RM13TR  |
| M74HC573TTR     | M74HC574RM13TR  | M74HC574TTR     |
| M74HC590B1R     | M74HC590RM13TR  | M74HC590TTR     |
| M74HC592B1R     | M74HC592TTR     | M74HC595B1R     |
| M74HC595RM13TR  | M74HC595TTR     | M74HC597B1R     |
| M74HC597RM13TR  | M74HC688RM13TR  | M74HC688TTR     |
| M74HC7266B1R    | M74HC7266RM13TR | M74HC73RM13TR   |
| M74HC73TTR      | M74HC74B1R      | M74HC74RM13TR   |
| M74HC74TTR      | M74HC86B1R      | M74HC86RM13TR   |
| M74HC86TTR      | M74HCT00B1R     | M74HCT00RM13TR  |
| M74HCT00TTR     | M74HCT04RM13TR  | M74HCT08B1R     |
| M74HCT08RM13TR  | M74HCT132B1R    | M74HCT132TTR    |
| M74HCT138RM13TR | M74HCT14B1R     | M74HCT14RM13TR  |
| M74HCT14TTR     | M74HCT157RM13TR | M74HCT244RM13TR |
| M74HCT244TTR    | M74HCT273RM13TR |                 |



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### ST COMMERCIAL PRODUCT

|                  |                 |                  |
|------------------|-----------------|------------------|
| M74HCT32B1R      | M74HCT32RM13TR  | M74HCT367RM13TR  |
| M74HCT373RM13TR  | M74HCT373TTR    | M74HCT374RM13TR  |
| M74HCT4051RM13TR | M74HCT4051TTR   | M74HCT4053RM13TR |
| M74HCT4053TTR    | M74HCT540RM13TR | M74HCT541RM13TR  |
| M74HCT573RM13TR  | M74HCT573TTR    | M74HCT574RM13TR  |
| M74HCT574TTR     | M74HCT640RM13TR | M74HCT652RM13TR  |
| M74HCT7007RM13TR | M74HCT74RM13TR  | M74HCT74TTR      |
| M74HCU04RM13TR   | M74HCU04TTR     |                  |

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