RELIABILITY REPORT

FOR

MAX9034AUD+

PLASTIC ENCAPSULATED DEVICES

May 24, 2013

**MAXIM INTEGRATED**

160 RIO ROBLES

SAN JOSE, CA 95134

| **Approved by** |
|---|
| Sokhom Chum |
| Quality Assurance |
| Reliability Engineer |

## Conclusion

The MAX9034AUD+ successfully meets the quality and reliability standards required of all Maxim Integrated products. In addition, Maxim Integrated's continuous reliability monitoring program ensures that all outgoing product will continue to meet Maxim Integrated's quality and reliability standards.

## Table of Contents

## I. Device Description

### A. General

The MAX9030/MAX9031/MAX9032/MAX9034 single/dual/quad comparators are optimized for single-supply applications from +2.5V to +5.5V but can also be operated from dual supplies. These comparators have a 188ns propagation delay and consume 35µA of supply current per comparator over the -40°C to +125°C operating temperature range. The combination of low-power, single-supply operation down to +2.5V, and ultra-small footprint makes these devices ideal for portable applications. The MAX9030 is a low-cost single comparator with shutdown. The MAX9031, MAX9032, and MAX9034 are low-cost single, dual, and quad comparators without shutdown, respectively. The comparators' 4mV of built-in hysteresis provides noise immunity and prevents oscillations even with a slow-moving input signal. The input common-mode range extends from the negative supply to within 1.1V of the positive supply. The design of the comparator output stage substantially reduces switching current during output transitions, virtually eliminating power-supply glitches. The MAX9030 single comparator with shutdown is available in the space-saving 6-pin SC70 and SOT23 packages. The MAX9031 single comparator is available in tiny 5-pin SC70 and SOT23 packages. The MAX9032 dual comparator is available in 8-pin SOT23 and µMAX® packages, and the MAX9034 quad comparator is available in a 14-pin TSSOP package.

## II. Manufacturing Information

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|---|---|
| A. Description/Function: | Low-Cost, Ultra-Small, Single/Dual/Quad Single-Supply Comparators |
| B. Process: | S12 |
| C. Number of Device Transistors: | |
| D. Fabrication Location: | Oregon, California or Texas |
| E. Assembly Location: | Philippines, Thailand, Or Malaysia |
| F. Date of Initial Production: | October 21, 2000 |

## III. Packaging Information

| | |
|---|---|
| A. Package Type: | 14-pin TSSOP |
| B. Lead Frame: | Copper |
| C. Lead Finish: | 100% matte Tin |
| D. Die Attach: | Conductive |
| E. Bondwire: | Au (1 mil dia.) |
| F. Mold Material: | Epoxy with silica filler |
| G. Assembly Diagram: | #05-1501-0208 |
| H. Flammability Rating: | Class UL94-V0 |
| I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C | Level 1 |
| J. Single Layer Theta Ja: | 110°C/W |
| K. Single Layer Theta Jc: | 30°C/W |
| L. Multi Layer Theta Ja: | 100.4°C/W |
| M. Multi Layer Theta Jc: | 30°C/W |

## IV. Die Information

| | |
|---|---|
| A. Dimensions: | 54 X 62 mils |
| B. Passivation: | $Si_3N_4/SiO_2$ (Silicon nitride/ Silicon dioxide) |
| C. Interconnect: | Al/0.5%Cu with Ti/TiN Barrier |
| D. Backside Metallization: | None |
| E. Minimum Metal Width: | 1.2 microns (as drawn) |
| F. Minimum Metal Spacing: | 1.2 microns (as drawn) |
| G. Bondpad Dimensions: | |
| H. Isolation Dielectric: | $SiO_2$ |
| I. Die Separation Method: | Wafer Saw |

## V. Quality Assurance Information

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|---|---|
| A. Quality Assurance Contacts: | Richard Aburano (Manager, Reliability Engineering)<br>Don Lipps (Manager, Reliability Engineering)<br>Bryan Preeshl (Vice President of QA) |
| B. Outgoing Inspection Level: | 0.1% for all electrical parameters guaranteed by the Datasheet.<br>0.1% For all Visual Defects. |
| C. Observed Outgoing Defect Rate: | < 50 ppm |
| D. Sampling Plan: | Mil-Std-105D |

## VI. Reliability Evaluation

### A. Accelerated Life Test

The results of the 135C biased (static) life test are shown in Table 1. Using these results, the Failure Rate ($\lambda$) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 80 \times 2}$$

(Chi square value for MTTF upper limit)

(where 4340 = Temperature Acceleration factor assuming an activation energy of 0.8eV)

$\lambda = 13.7 \times 10^{-9}$

$\lambda$ = 13.7 F.I.T. (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim Integrated's reliability monitor program. Maxim Integrated performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at http://www.maximintegrated.com/qa/reliability/monitor. Cumulative monitor data for the S12 Process results in a FIT Rate of 0.02 @ 25C and 0.33 @ 55C (0.8 eV, 60% UCL)

### B. E.S.D. and Latch-Up Testing (lot N4VABQ001B, D/C 0509)

The CM53 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250mA.

**Table 1**

Reliability Evaluation Test Results

**MAX9034AUD+**

| TEST ITEM | TEST CONDITION | FAILURE IDENTIFICATION | SAMPLE SIZE | NUMBER OF FAILURES | COMMENTS |
|---|---|---|---|---|---|
| **Static Life Test** (Note 1) | Ta = 135°C<br>Biased<br>Time = 192 hrs. | DC Parameters & functionality | 80 | 0 | I4VAAQ001E, D/C 0030 |

Note 1: Life Test Data may represent plastic DIP qualification lots.