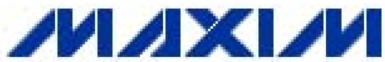



RELIABILITY REPORT

FOR

MAX306EQI+

PLASTIC ENCAPSULATED DEVICES

January 26, 2010

**MAXIM INTEGRATED PRODUCTS**

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

| Approved by |
|---|
| Ken Wendel |
| Quality Assurance |
| Director, Reliability Engineering |

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**Conclusion**

The MAX306EQI+ successfully meets the quality and reliability standards required of all Maxim products. In addition, Maxim"s continuous reliability monitoring program ensures that all outgoing product will continue to meet Maxim"s quality and reliability standards.

**Table of Contents**


I. ........Device Description

II. ........Manufacturing Information

III. .......Packaging Information

.....Attachments

V. ........Quality Assurance Information

VI. .......Reliability Evaluation

IV. .......Die Information


**I. Device Description**

A. General

The MAX306/MAX307 precision, monolithic, CMOS analog multiplexers (muxes) offer low on-resistance (less than 100 ), which is matched to within 5 between channels and remains flat over the specified analog signal range (7  max). They also offer low leakage over temperature (INO(OFF) less than 2.5nA at +85°C) and fast switching speeds (tTRANS less than 250ns). The MAX306 is a single-ended 1-of-16 device, and the MAX307 is a differential 2-of-8 device. The MAX306/MAX307 are fabricated with Maxim's improved 44V silicon-gate process. Design improvements yield extremely low charge injection (less than 10pC) and guarantee electrostatic discharge (ESD) protection greater than 2000V. These muxes operate with a single +4.5V to +30V supply, or bipolar ±4.5V to ±20V supplies, while retaining TTL/CMOS-logic input compatibility and fast switching. CMOS inputs provide reduced input loading. These improved parts are plug-in upgrades for the industry-standard DG406, DG407, DG506A, and DG507A.

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**II. Manufacturing Information**

| | |
|---|---|
| A. Description/Function: | Precision, 16-Channel/Dual 8-Channel, High-Performance, CMOS Analog Multiplexers |
| B. Process: | S5 |
| C. Number of Device Transistors: | |
| D. Fabrication Location: | Oregon |
| E. Assembly Location: | Philippines |
| F. Date of Initial Production: | 7/27/2002 |

**III. Packaging Information**

| | |
|---|---|
| A. Package Type: | 28-pin PLCC |
| B. Lead Frame: | Copper |
| C. Lead Finish: | 100% matte Tin |
| D. Die Attach: | Conductive |
| E. Bondwire: | Au (1.3 mil dia.) |
| F. Mold Material: | Epoxy with silica filler |
| G. Assembly Diagram: | #05-0301-0642 |
| 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: | 95°C/W |
| K. Single Layer Theta Jc: | 25°C/W |

**IV. Die Information**

| | |
|---|---|
| A. Dimensions: | 98 X 184 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: | 5.0 microns (as drawn) |
| F. Minimum Metal Spacing: | 5.0 microns (as drawn) |
| G. Bondpad Dimensions: | 5 mil. Sq. |
| H. Isolation Dielectric: | $SiO_2$ |
| I. Die Separation Method: | Wafer Saw |

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**V. Quality Assurance Information**

A. Quality Assurance Contacts: Ken Wendel (Director, Reliability Engineering)
Bryan Preeshl (Managing Director of QA)

B. Outgoing Inspection Level: 0.1% for all electrical parameters guaranteed by the Datasheet.
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 135°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate ($\lambda$) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{8.351}{192 \times 4340 \times 965 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 5.07 \times 10^{-9}$

$\lambda$ = 5.07 F.I.T. (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim"s reliability monitor program. Maxim performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at http://www.maxim-ic.com/qa/reliability/monitor. Cumulative monitor data for the S5 Process results in a FIT Rate of 0.09 @ 25C and 1.55 @ 55C (0.8 eV, 60% UCL)

B. Moisture Resistance Tests

The industry standard 85°C/85%RH or HAST testing is monitored per device process once a quarter.

C. E.S.D. and Latch-Up Testing

The AG60 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2000 V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-250 mA.

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**Table 1**
Reliability Evaluation Test Results

**MAX306EQI+**

| TEST ITEM | TEST CONDITION | FAILURE IDENTIFICATION | SAMPLE SIZE | NUMBER OF FAILURES |
|---|---|---|---|---|
| **Static Life Test** (Note 1) | | | | |
| | Ta = 135°C<br>Biased<br>Time = 192 hrs. | DC Parameters<br>& functionality | 965 | 3 |
| **Moisture Testing** (Note 2) | | | | |
| HAST | Ta = 130°C<br>RH = 85%<br>Biased<br>Time = 96hrs. | DC Parameters<br>& functionality | 77 | 0 |
| **Mechanical Stress** (Note 2) | | | | |
| Temperature<br>Cycle | -65°C/150°C<br>1000 Cycles<br>Method 1010 | DC Parameters<br>& functionality | 77 | 0 |

Note 1: Life Test Data may represent plastic DIP qualification lots.
Note 2: Generic Package/Process data

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