

RELIABILITY REPORT  
FOR  
DG509AAK/883B  
PLASTIC ENCAPSULATED DEVICES

July 1, 2013

**MAXIM INTEGRATED**

160 RIO ROBLES  
SAN JOSE, CA 95134

Approved by
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## Conclusion

The DG509AAK/883B 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	IV. ....Die Information
II. ....Manufacturing Information	V. ....Quality Assurance Information
III. ....Packaging Information	VI. ....Reliability Evaluation
.....Attachments	

### I. Device Description

#### A. General

Maxim's DG508A and DG509A are monolithic CMOS analog multiplexers (muxes): the DG508A is a single 8-channel (1-of-8) mux, and the DG509A is a differential 4-channel (2-of-8) mux. Both devices guarantee break-before-make switching. Maxim guarantees these muxes will not latch up if the power supplies are turned off with the input signals still present. Maxim also guarantees continuous operation when these devices are powered by supplies ranging from  $\pm 4.5\text{V}$  to  $\pm 18\text{V}$ . The DG508A/DG509A are plug-in upgrades for the industry-standard DG508A/DG509A, respectively. Maxim's parts have faster enable switching times and significantly lower leakage currents. The DG508A/DG509A also consume significantly lower power, making them ideal for portable equipment.

## II. Manufacturing Information

A. Description/Function:	Monolithic CMOS Analog Multiplexers
B. Process:	M6H
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Philippines
F. Date of Initial Production:	Pre 1997

## III. Packaging Information

A. Package Type:	16-pin CDIP
B. Lead Frame:	Alloy42
C. Lead Finish:	63Sn/37Pb
D. Die Attach:	Agglass
E. Bondwire:	Al (1.25 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-0301-0315
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:	100°C/W
K. Single Layer Theta Jc:	14°C/W
L. Multi Layer Theta Ja:	N/A
M. Multi Layer Theta Jc:	N/A

## IV. Die Information

A. Dimensions:	93 X 119 mils
B. Passivation:	Si <sub>3</sub> N <sub>4</sub> /SiO <sub>2</sub> (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/1.0%Si
D. Backside Metallization:	None
E. Minimum Metal Width:	Metal1 = 0.5 microns (as drawn)
F. Minimum Metal Spacing:	Metal1 = 0.45 microns (as drawn)
G. Bondpad Dimensions:	
H. Isolation Dielectric:	SiO <sub>2</sub>
I. Die Separation Method:	Wafer Saw

## V. Quality Assurance Information

- |                                   |  |
|-----------------------------------|--|
| 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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{1000 \times 4340 \times 77 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 2.7 \times 10^{-9}$$

$$\lambda = 2.7 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 M6H Process results in a FIT Rate of 0.22 @ 25C and 3.83 @ 55C (0.8 eV, 60% UCL).

### B. E.S.D. and Latch-Up Testing (lot NRPCC2074B D/C 0610)

The AG41-2 die type has been found to have all pins able to withstand a HBM transient pulse of +/-400V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250mA.

**Table 1**  
Reliability Evaluation Test Results

**DG509AAK/883B**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
<b>Static Life Test</b> (Note 1)	Ta = 135C	DC Parameters & functionality	77	0	NRPCC2074B, 0610
	Biased				
	Time = 1000 hrs.				

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