



RELIABILITY REPORT  
FOR  
MAX9503GEEE+  
PLASTIC ENCAPSULATED DEVICES

December 22, 2010

**MAXIM INTEGRATED PRODUCTS**

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<b>Approved by</b>
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## Conclusion

The MAX9503GEEE+ 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.

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### I. Device Description

#### A. General

The MAX9503 filters and amplifies standard-definition video signals. Maxim's DirectDrive technology eliminates large output-coupling capacitors and sets the video black level to ground. The input of the MAX9503 can be directly connected to the output of a video digital-to-analog converter (DAC). The MAX9503 provides a compact, integrated, and low-power solution. An internal reconstruction filter smooths the steps and reduces the spikes on the video signal from the DAC. The reconstruction filter typically has 3dB attenuation at 9MHz and 50dB attenuation at 27MHz, and  $\pm 1$ dB passband flatness to 5.5MHz. Maxim's DirectDrive uses an integrated charge pump and a linear regulator to create a clean negative power supply to drive the sync below ground. The charge pump injects so little noise into the video output that the picture is visibly flawless. The MAX9503 is available with +6dB (MAX9503G) and +12dB (MAX9503M) gains. The device operates from a 2.7V to 3.6V single supply and features a 10nA low-power shutdown mode. The MAX9503 is offered in space-saving 16-pin QSOP and 16-pin TQFN packages and is specified over the  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  extended temperature range.

## II. Manufacturing Information

A. Description/Function:	DirectDrive® Video Amplifier with Reconstruction Filter
B. Process:	C6
C. Number of Device Transistors:	345688
D. Fabrication Location:	California
E. Assembly Location:	Thailand
F. Date of Initial Production:	April 23, 2005

## III. Packaging Information

A. Package Type:	16-pin QSOP
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:	#05-9000-1666
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:	120°C/W
K. Single Layer Theta Jc:	37°C/W
L. Multi Layer Theta Ja:	103.7°C/W
M. Multi Layer Theta Jc:	37°C/W

## IV. Die Information

A. Dimensions:	60 X 61 mils
B. Passivation:	Si <sub>3</sub> N <sub>4</sub> /SiO <sub>2</sub> (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/0.5%Cu with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	0.6 microns (as drawn)
F. Minimum Metal Spacing:	0.6 microns (as drawn)
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	SiO <sub>2</sub>
I. Die Separation Method:	Wafer Saw

## V. Quality Assurance Information

A. Quality Assurance Contacts:	Don Lipps (Manager, Reliability Engineering) Bryan Preeshl (Vice President 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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 47 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 23.4 \times 10^{-9}$$
$$\lambda = 23.4 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 C6 Process results in a FIT Rate of 0.43 @ 25C and 7.50 @ 55C (0.8 eV, 60% UCL)

### B. E.S.D. and Latch-Up Testing (lot SU1ACQ001C D/C 0513)

The VA43 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

**MAX9503GEEE+**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
<b>Static Life Test</b> (Note 1)	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	47	0	SU1CCQ001B, D/C 0513

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