

RELIABILITY REPORT  
FOR  
MAX9504BELT+  
(MAX9504A/MAX9504B)  
PLASTIC ENCAPSULATED DEVICES

February 18, 2009

**MAXIM INTEGRATED PRODUCTS**

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## Conclusion

The MAX9504BELT+ 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 MAX9504A/MAX9504B 3V/5V, ground-sensing amplifiers with a fixed gain of 6dB provide high output current while consuming only 10nA of current in shutdown mode. The MAX9504A/MAX9504B are ideal for amplifying DC-coupled video inputs from current digital- to-analog converters (DACs). The output can drive two DC-coupled 150 back-terminated video loads in portable media players, security cameras, and automotive video applications. The MAX9504B features an internal 160mV input offset to prevent output sync tip clipping when the input signal is close to ground. The MAX9504A/MAX9504B have -3dB large-signal bandwidth of 42MHz and -3dB small-signal bandwidth of 47MHz. The MAX9504A/MAX9504B operate from a single +2.7V to +5.5V supply and consume only 5mA of supply current. The low-power shutdown mode reduces supply current to 10nA, making the MAX9504A/MAX9504B ideal for low-voltage, battery-powered video applications. The MAX9504A/MAX9504B are available in tiny 6-pin  $\mu$ DFN (2mm x 2mm) and 6-pin SOT23 packages, and are specified over the -40°C to +85°C extended temperature range.

## II. Manufacturing Information

A. Description/Function:	3V/5V, 6dB Video Amplifiers with High Output-Current Capability
B. Process:	B6
C. Number of Device Transistors:	
D. Fabrication Location:	California
E. Assembly Location:	Hana Thailand
F. Date of Initial Production:	July 23, 2005

## III. Packaging Information

A. Package Type:	6-pin uDFN
B. Lead Frame:	Substrate C.
Lead Finish:	Gold
D. Die Attach:	Non-conductive Epoxy
E. Bondwire:	Gold (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-1723
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1
J. Multi Layer Theta Ja:	223.6°C/W
K. Multi Layer Theta Jc:	122.1°C/W

## IV. Die Information

A. Dimensions:	31 X 31 mils
B. Passivation:	Si <sub>3</sub> N <sub>4</sub> /SiO <sub>2</sub> (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Aluminum/Si (Si = 1%)
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: 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 pending. Using these results, the Failure Rate ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 48 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 22.4 \times 10^{-9}$$

$\lambda = 22.4$  F.I.T. (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly 1000 hour life test monitors on its processes. This data is published in the Product Reliability Report found at <http://www.maxim-ic.com/>. Current monitor data for the B6 Process results in a FIT Rate of 0.8 @ 25C and 14.2 @ 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 VA18-2 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500 V per JEDEC JESD22-A114-D. Latch-Up testing has shown that this device withstands a current of +/-250 mA.

**Table 1**  
Reliability Evaluation Test Results

**MAX9504BELT+**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
<b>Static Life Test</b> (Note 1)	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	48	0
<b>Moisture Testing</b> (Note 2) 85/85	Ta = 85°C RH = 85% Biased Time = 1000hrs.	DC Parameters & functionality	77	0
<b>Mechanical Stress</b> (Note 2) Temperature Cycle	-55°C/125°C 1000 Cycles Method 1010	DC Parameters & functionality	77	0

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

Note 2: Generic Package/Process data