RELIABILITY REPORT

FOR

MAX9502GAALT+T / MAX9502GAAXK+T / MAX9502GELT+T /

MAX9502GEXK+T / MAX9502MEXK+T

PLASTIC ENCAPSULATED DEVICES

March 19, 2013

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

Approved by
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Quality Assurance
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Conclusion

The MAX9502GAALT+T / MAX9502GAAXK+T / MAX9502GELT+T / MAX9502GEXK+T / MAX9502MEXK+T 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.

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I. Device Description

A. General

The MAX9502 small, low-power video amplifier with integrated reconstruction filter operates from a supply voltage as low as 2.5V. The small size and the low minimum supply voltage make the MAX9502 ideal for portable applications or small, low-power applications. The MAX9502 DC-couples the input and the output, resulting in a very small solution. The MAX9502 input can be directly connected to the output of a video digital-to-analog converter (DAC). The reconstruction filter is implemented as a 4th-order Chebyshev with a minimum passband of 5.5MHz, 3dB attenuation at 8MHz, and 55dB attenuation at 27MHz. The output amplifier provides a closed-loop gain of +6dB (MAX9502G) or +12dB (MAX9502M), and can drive a 2V P-P video signal into a 150 load to ground. The output signal is level-shifted so the sync tip is 110mV (typ) above ground. The MAX9502 operates from a 2.5V to 3.6V single supply and consumes only 5.3mA quiescent supply current. An active-low shutdown mode reduces the supply current to 0.01µA. The MAX9502 is available in tiny 6-pin µDFN (1mm x 1.5mm x 0.8mm) and 5-pin SC70 packages. The device is specified over the -40°C to +85°C extended and -40°C to +125°C automotive temperature ranges.

II. Manufacturing Information

A. Description/Function:	2.5V Video Amplifier with Reconstruction Filter	
B. Process:	S4	
C. Number of Device Transistors:		
D. Fabrication Location:	USA	
E. Assembly Location:	Taiwan and Thailand	Malaysia and Thailand
F. Date of Initial Production:	April 23, 2005	

III. Packaging Information

A. Package Type:	6-pin uDFN	5-pin SC70
B. Lead Frame:	Substrate	Copper
C. Lead Finish:	Gold	100% matte Tin
D. Die Attach:	Non-conductive	Conductive
E. Bondwire:	Au (1 mil dia.)	Au (1 mil dia.)
F. Mold Material:	Epoxy with silica filler	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-1686	#05-9000-1687
H. Flammability Rating:	Class UL94-V0	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1	Level 1
J. Single Layer Theta Ja:	°C/W	324°C/W
K. Single Layer Theta Jc:	°C/W	115°C/W
L. Multi Layer Theta Ja:	477°C/W	324°C/W
M. Multi Layer Theta Jc:	122°C/W	115°C/W

IV. Die Information

A. Dimensions:	31 X 30 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:	0.6 microns (as drawn)
F. Minimum Metal Spacing:	0.4 microns (as drawn)
G. Bondpad Dimensions:	
H. Isolation Dielectric:	SiO_2
I. Die Separation Method:	Wafer Saw

V. Quality Assurance Information

A. Quality Assurance Contacts:	Richard Aburano (Manager, Reliability Engineering) 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 (λ) is calculated as follows:

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

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

$\lambda = 22.9 \times 10^{-9}$

$\lambda = 22.9$ 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 S4 Process results in a FIT Rate of 0.04 @ 25C and 0.69 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot SX1AAZ001D, D/C 0505)

The VA42 die type has been found to have all pins able to withstand a HBM transient pulse of +/- 2500V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of 250mA.

Table 1

Reliability Evaluation Test Results

MAX9502GAALT+T / MAX9502GAAXK+T / MAX9502GELT+T / MAX9502GEXK+T / MAX9502MEXK+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	48	0	SX1AAZ001D, D/C 0505

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