

RELIABILITY REPORT  
FOR  
MAX7450ESA+T  
PLASTIC ENCAPSULATED DEVICES

December 4, 2011

**MAXIM INTEGRATED PRODUCTS**

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## Conclusion

The MAX7450ESA+T 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 MAX7450/MAX7451/MAX7452 complete front-end video-signal conditioners are designed to improve the quality of standard-definition video signals. The devices restore the DC level of the video input, correct for amplitude errors up to  $\pm 6\text{dB}$ , detect fault conditions, and filter out-of-band noise. The MAX7450/MAX7451/MAX7452 optimize the signal quality for further video processing through a crosspoint switch or video decoder (ADC). Each device integrates an input video clamp, automatic gain control (AGC), loss-of-sync (LOS) detector, and an out-of-band noise/lowpass filter. These devices also incorporate a user-selectable buffer gain (0 or +6dB) and an AGC-disable function. The MAX7450 and MAX7451 operate from dual power supplies of  $\pm 5\text{V}$  or  $\pm 3.3\text{V}$  respectively, and they restore the video blanking level to GND. The MAX7452 operates from a single +5V supply and features a user-adjustable clamp level. The devices are available in an 8-pin SO package with an exposed pad and are specified for operation over the extended ( $-40^\circ\text{C}$  to  $+85^\circ\text{C}$ ) temperature range.

**II. Manufacturing Information**

A. Description/Function:	Video-Signal Conditioners with AGC and Back-Porch Clamp
B. Process:	B6
C. Number of Device Transistors:	6893
D. Fabrication Location:	USA
E. Assembly Location:	Philippines and Thailand
F. Date of Initial Production:	April 24, 2004

**III. Packaging Information**

A. Package Type:	8-pin SOIC
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:	#05-9000-0979
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:	66°C/W
K. Single Layer Theta Jc:	5°C/W
L. Multi Layer Theta Ja:	53°C/W
M. Multi Layer Theta Jc:	5°C/W

**IV. Die Information**

A. Dimensions:	80 X 80 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
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:	
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)  
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 135C biased (static) life test are shown in Table 1. Using these results, the Failure Rate ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 93 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 11.8 \times 10^{-9}$$

$$\lambda = 11.8 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 B6 Process results in a FIT Rate of 0.8 @ 25C and 14.2 @ 55C (0.8 eV, 60% UCL)

### B. E.S.D. and Latch-Up Testing (lot SPS0BQ002B, D/C 0416)

The VP03 die type has been found to have all pins able to withstand a HBM transient pulse of +/- 200V 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

**MAX7450ESA+T**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
<b>Static Life Test</b> (Note 1)	Ta = 135C	DC Parameters	45	0	SPS0BQ002B, D/C 0416
	Biased	& functionality	48	0	SPS0BQ002C, D/C 0416
	Time = 192 hrs.				

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