

RELIABILITY REPORT  
FOR  
MAX4886ETO+  
PLASTIC ENCAPSULATED DEVICES

November 3, 2009

**MAXIM INTEGRATED PRODUCTS**

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## Conclusion

The MAX4886ETO+ 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 MAX4886 high-speed analog switch is ideal for HDMI(tm)/DVI(tm) switching applications, permitting 2:1 or 1:2 switching. The MAX4886 contains four differential pairs of 1:2 or 2:1 switches for RGB and clocking signals. The MAX4886 connects either one monitor to one of two digital video signals, or one HDMI/DVI source to one of two loads (sink). The MAX4886 set of differential switches is based on an nFET architecture with internal charge pump for gate overdrive. This advanced architecture results in an extremely low capacitance and on-resistance needed for the excellent return loss requirements for digital switching. An efficient internal charge-pump design offers very low quiescent current for power-sensitive notebook designs. The MAX4886 features 8 (typ) on-resistance and 2.5pF on-capacitance switches for routing RGB and CLK video signals. The MAX4886 is a high-frequency companion device to the MAX4929. These two devices combined perform the full 2:1 HDMI/DVI switching function. The MAX4886 is available in a space-saving, 42-pin, 3.5mm x 9.0mm TQFN package and operates over the extended -40°C to +85°C temperature range.

## II. Manufacturing Information

A. Description/Function:	Quad, High-Speed HDMI/DVI 2:1 Digital Video Switch
B. Process:	S45
C. Number of Device Transistors:	
D. Fabrication Location:	California, Texas or Japan
E. Assembly Location:	Thailand
F. Date of Initial Production:	April 21, 2007

## III. Packaging Information

A. Package Type:	42-pin TQFN 3.5x9
B. Lead Frame:	
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive Epoxy
E. Bondwire:	Gold (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#31-4826
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:	39°C/W
K. Single Layer Theta Jc:	1.5°C/W
L. Multi Layer Theta Ja:	28°C/W
M. Multi Layer Theta Jc:	1.5°C/W

## IV. Die Information

A. Dimensions:	40 x 113 mil Sq.
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:	Metal1 = 0.5 / Metal2 = 0.6 / Metal3 = 0.6 microns (as drawn)
F. Minimum Metal Spacing:	Metal1 = 0.45 / Metal2 = 0.5 / Metal3 = 0.6 microns (as drawn)
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	SiO <sub>2</sub>
I. Die Separation Method:	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 shown in Table 1. Using these results, the Failure Rate ( $\lambda$ ) is calculated as follows:

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

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

$$\lambda = 22.4 \times 10^{-9}$$
$$\lambda = 22.4 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 S45 Process results in a FIT Rate of @ 25C and @ 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 AJ24 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500 V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250 mA.

**Table 1**  
Reliability Evaluation Test Results

**MAX4886ETO+**

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)				
HAST	Ta = 130°C RH = 85% Biased Time = 96hrs.	DC Parameters & functionality	77	0
<b>Mechanical Stress</b> (Note 2)				
Temperature Cycle	-65°C/150°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