RELIABILITY REPORT

FOR

MAX14998ETO+

PLASTIC ENCAPSULATED DEVICES

October 6, 2010

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
Don Lipps
Quality Assurance
Manager, Reliability Engineering

Conclusion

The MAX14998ETO+ 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.

Table of Contents

I. Device Description

A. General

The MAX4998/MAX14998 high-speed passive switches route DisplayPort(tm) between two possible destinations or vice versa in laptop or desktop PCs. The MAX4998/MAX14998 are intended to be used where ultra-high-speed performance and minimal input capacitance is required. The MAX4998 has three double-pole/double-throw (DPDT) switches and one single-pole/double-throw (SPDT) switch. Two DPDT switches are for high-frequency switching, one DPDT switch is for AUX, and one SPDT switch is for HPD. The two high-frequency switches are selected by SEL1, and the AUX/HPD are selected by SEL2. This part is suitable for two-lane DisplayPort switching. The MAX14998 has six double-pole/double-throw (DPDT) switches. Four DPDT switches are for high-frequency switching, and two DPDT switches are for AUX and HPD. The four high-frequency switches are selected by SEL1, and the AUX/HPD are selected by SEL2. This part is suitable for four-lane DisplayPort switching. The MAX4998/MAX14998 are fully specified to operate from a single +3.3V (typ) power supply. The MAX4998 is available in a 3.5mm x 5.5mm, 28-pin TQFN package with exposed pad, and the MAX14998 is available in a 3.5mm x 9mm, 42-pin TQFN package with exposed pad. Both devices operate over the -40°C to +85°C extended temperature range.

II. Manufacturing Information

A. Description/Function:	Two-Lane and Four-Lane DisplayPort Passive Switches with Separate AUX/HPD Control
B. Process:	TS18
C. Number of Device Transistors:	625
D. Fabrication Location:	Taiwan
E. Assembly Location:	Thailand
F. Date of Initial Production:	August 31, 2010

III. Packaging Information

A. Package Type:	42-pin TQFN 3.5x9
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (1.2 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-3948
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:	40°C/W
K. Single Layer Theta Jc:	2°C/W
L. Multi Layer Theta Ja:	29°C/W
M. Multi Layer Theta Jc:	2°C/W

IV. Die Information

A. Dimensions:	39.15 X 152.3 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:	0.18µm F.
Minimum Metal Spacing:	0.18µm
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	SiO_2
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 (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"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 TS18 Process results in a FIT Rate of 0.24 @ 25C and 4.14 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot QTWZAQ001A, D/C 0847)

The AJ77-4 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 and overvoltage per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results

MAX14998ETO+

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	QTWZAQ001A, D/C 0847

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