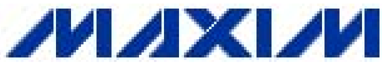

RELIABILITY REPORT

FOR

MAX4899EETE+

PLASTIC ENCAPSULATED DEVICES

June 9, 2011

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Conclusion

The MAX4899EETE+ 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**
- **II. ....Manufacturing Information**
- **III. ....Packaging Information**
- **.....Attachments**
- **IV. ....Die Information**
- **V. ....Quality Assurance Information**
- **VI. ....Reliability Evaluation**

I. Device Description

A. General

The MAX4899E/MAX4899AE analog multiplexers combine the low on-capacitance (CON) and low on-resistance (RON) necessary for high-performance switching applications. These devices are designed for USB 2.0 high-speed applications at 480Mbps. The MAX4899E/MAX4899AE also handle all the requirements for USB low- and full-speed signaling. The MAX4899E is a dual 3:1 multiplexer whereas the MAX4899AE is a dual 4:1 multiplexer. The MAX4899E/MAX4899AE feature two digital inputs, C0 and C1, to control the analog signal path. Typical applications include switching a USB connector between USB and other operations such as serial communications, audio, and video. An enable input (active-low EN) is provided to disable all channels and place the device into a high-impedance (off) state, as well as reducing power consumption. The MAX4899E/MAX4899AE operate from a 2.7V to 3.6V power-supply voltage and are protected against +5.5V shorts to COMA- and COMA+. In addition, COMA+ and COMA- are normally connected to outside circuitry and feature ±15kV ESD protection. The MAX4899E/MAX4899AE are available in a 3mm x 3mm, 16-pin TQFN package and operate over the -40°C to +85°C temperature range.

II. Manufacturing Information

A. Description/Function:	USB 2.0 High-Speed, Fault-Tolerant 3:1, 4:1 Multiplexers
B. Process:	S45
C. Number of Device Transistors:	
D. Fabrication Location:	Texas
E. Assembly Location:	China, Malaysia, Philippines, Thailand
F. Date of Initial Production:	July 22, 2006

III. Packaging Information

A. Package Type:	16-pin TQFN 3x3
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:	#05-9000-2414
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:	64°C/W
K. Single Layer Theta Jc:	7°C/W
L. Multi Layer Theta Ja:	48°C/W
M. Multi Layer Theta Jc:	7°C/W

IV. Die Information

A. Dimensions:	59 X 61 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:	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_2
I. Die Separation Method:	Wafer Saw

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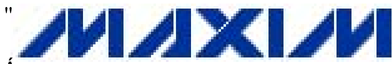

V. Quality Assurance Information

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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{196 \times 4340 \times 48 \times 2}$$ (Chi square value for MTTF upper limit)

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

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

λ = 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 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 0.49 @ 25C and 8.49 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (ESD lot S701AQ003F D/C 1029, Latch-Up lot T701BQ001A D/C 1040)

The AS84 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.

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Table 1
Reliability Evaluation Test Results

MAX4899EETE+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C Biased Time = 196 hrs.	DC Parameters & functionality	48	0	S700AQ001C, D/C 0616

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

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