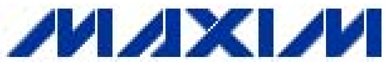

RELIABILITY REPORT

FOR

MAX14508EEVB+

PLASTIC ENCAPSULATED DEVICES

October 13, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Quality Assurance
Director, Reliability Engineering

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Conclusion

The MAX14508EEVB+ 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 MAX14508E-MAX14511E/MAX14509AE high-ESD-protected DPDT switches multiplex Hi-Speed (480Mbps) USB and analog signals such as AC-coupled audio or video. These devices combine the low on-capacitance (CON) and low on-resistance (RON) necessary for high-performance switching applications in portable electronics, and include an internal negative supply to pass audio signals that swing below ground (down to VCC - 5.0V). The MAX14508E-MAX14511E/MAX14509AE also handle USB low-/full-speed signaling and operate from a +2.7V to +5.0V supply. The MAX14508E-MAX14511E feature +5.5V fault protection on COM1 and COM2, making these devices compliant with the USB 2.0 fault-protection specification. The MAX14510E/MAX14511E feature a VBUS detection input (VB) to automatically switch to the USB signal path upon detection of a valid VBUS signal. The MAX14508E/MAX14510E feature internal shunt resistors on the audio path to reduce clicks and pops heard at the output. The MAX14508E/MAX14509E/MAX14509AE have an enable input (EN) to reduce supply current and set all channels to high impedance when driven low. The MAX14508E-MAX14511E/MAX14509AE are available in a space-saving, 10-pin, 1.4mm x 1.8mm UTQFN package, and operate over the -40°C to +85°C temperature range.

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II. Manufacturing Information

A. Description/Function:	USB 2.0 Hi-Speed and Audio Switches with Negative Signal Capability
B. Process:	S45
C. Number of Device Transistors:	687
D. Fabrication Location:	California, Texas or Japan
E. Assembly Location:	Thailand
F. Date of Initial Production:	4/26/2008

III. Packaging Information

A. Package Type:	10-pin µTQFN
B. Lead Frame:	Copper Alloy
C. Lead Finish:	NiPd Plate
D. Die Attach:	Non-conductive
E. Bondwire:	Au (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-3162
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:	°C/W
K. Single Layer Theta Jc:	°C/W
L. Multi Layer Theta Ja:	143.2°C/W
M. Multi Layer Theta Jc:	20.1°C/W

IV. Die Information

A. Dimensions:	47 X 31 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: 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 (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)

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

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. 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 AJ41 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, 1.5x VCCMax Overvoltage per JESD78.

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Table 1
Reliability Evaluation Test Results

MAX14508EEVB+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)				
	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	48	0
Moisture Testing (Note 2)				
HAST	Ta = 130°C RH = 85% Biased Time = 96hrs.	DC Parameters & functionality	77	0
Mechanical Stress (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

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