RELIABILITY REPORT

FOR

MAX14536EEVB+

PLASTIC ENCAPSULATED DEVICES

July 20, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
Ken Wendel
Quality Assurance
Director, Reliability Engineering

Conclusion

The MAX14536EEVB+ 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 MAX14535E-MAX14539E are low on-resistance and high ESD-protected DPDT switches that multiplex 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 -1.5V). The MAX14535E/MAX14537E/MAX14539E feature internal shunt resistors on the normally open path (and normally closed path, (MAX14539E)) to reduce clicks and pops heard at the output. The MAX14535E-MAX14539E have an enable input (EN) to reduce supply current and set all channels to high-impedance when driven low. When EN is driven low, the MAX14537E/MAX14538E have the lowest possible current consumption but cannot withstand negative rail signals. The MAX14535E/MAX14536E/MAX14539E can still withstand a negative signal to NC_, NO_, or COM_ from -1.5V to min(VCC, 3V). The MAX14535E-MAX14539E operate from a +2.4V to +5.5V supply. These devices can be powered from the typical analog supply voltage in a cell phone (+2.5V to +2.8V) or a lithium-ion (Li+) battery (about 4.3V max). The MAX14535E-MAX14539E have high ESD protection, up to ±15kV on COM_, and the NC_, NO_, and COM_ voltage can go up to 3.6V when VCC = 0V without damaging the devices. All devices are offered in a space-saving 10-pin, 1.4mm x 1.8mm UTQFN package, and operate over the -40°C to +85°C extended temperature range.

II. Manufacturing Information

A. Description/Function:	Low-Resistance DPDT Switches with Negative Rail
B. Process:	S4
C. Number of Device Transistors:	570
D. Fabrication Location:	California, Texas or Japan
E. Assembly Location:	Thailand
F. Date of Initial Production:	April 25, 2009

III. Packaging Information

A. Package Type:	10-pin µTQFN
B. Lead Frame:	Copper Alloy C.
Lead Finish:	Matte Sn Plate
D. Die Attach:	Non-conductive
E. Bondwire:	Au (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-3553
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1
J. Multi Layer Theta Ja:	143.2°C/W
K. Multi Layer Theta Jc:	20.1°C/W

IV. Die Information

A. Dimensions:	31 X 47 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al 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

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 pending. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 95 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 11.3 \times 10^{-9}$

λ = 11.3 F.I.T. (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly 1000 hour life test monitors on its processes. This data is published in the Product Reliability Report found at http://www.maxim-ic.com/. Current monitor data for the S4 Process results in a FIT Rate of 0.28 @ 25C and 4.85 @ 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 AJ82-1 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500 v per JEDEC JESD22-A114-D. Latch-Up testing has shown that this device withstands a current of +/-250 mA, 1.5x VCCMax per JESD78.

Table 1
Reliability Evaluation Test Results

MAX14536EEVB+

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	95	0
Moisture Testing (Note 2)				
85/85	Ta = 85°C RH = 85% Biased Time = 1000hrs.	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