RELIABILITY REPORT

FOR

MAX4613EUE+T

PLASTIC ENCAPSULATED DEVICES

October 13, 2016

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

Approved by
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Quality Assurance
Reliability Engineer

Conclusion

The MAX4613EUE+T successfully meets the quality and reliability standards required of all Maxim Integrated products. In addition, Maxim Integrated's continuous reliability monitoring program ensures that all outgoing product will continue to meet Maxim Integrated's quality and reliability standards.

Table of Contents

I. Device Description

A. General

The MAX4613 quad analog switch features on-resistance matching (4 max) between switches and guarantees on-resistance flatness over the signal range (9 max). This low on-resistance switch conducts equally well in either direction. It guarantees low charge injection (10pC max), low power consumption (35µW max), and an electrostatic discharge (ESD) tolerance of 2000V minimum per Method 3015.7. The new design offers lower off leakage current over temperature (less than 5nA at +85°C). The MAX4613 quad, single-pole/single-throw (SPST) analog switch has two normally closed switches and the two normally open switches. Switching times are less than 250ns for t_{ON} and less than 70ns for t_{OFF}. Operation is from a single +4.5V to +40V supply or bipolar ±4.5V to ±20V supplies.

II. Manufacturing Information

A. Description/Function:	Quad, SPST Analog Switch
B. Process:	S5
C. Fabrication Location:	USA
D. Assembly Location:	Malaysia, Philippines, Thailand
E. Date of Initial Production:	April 25, 1998

III. Packaging Information

A. Package Type:	16-pin TSSOP
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (1.3 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-0301-0864
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:	106°C/W
K. Single Layer Theta Jc:	27°C/W
L. Multi Layer Theta Ja:	90°C/W
M. Multi Layer Theta Jc:	27°C/W

IV. Die Information

A. Dimensions:	71X91 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:	5.0 microns (as drawn)
F. Minimum Metal Spacing:	5.0 microns (as drawn)
G. Bondpad Dimensions:	
H. Isolation Dielectric:	SiO_2
I. Die Separation Method:	Wafer Saw

V. Quality Assurance Information

A. Quality Assurance Contacts:	Eric Wright (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 135C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 80 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 13.7 \times 10^{-9}$

$\lambda = 13.7$ F.I.T. (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim Integrated's reliability monitor program. Maxim Integrated performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at http://www.maximintegrated.com/qa/reliability/monitor. Cumulative monitor data for the S5 Process results in a FIT Rate of 0.09 @ 25C and 1.55 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing

The AG52-4 die type has been found to have all pins able to withstand an HBM transient pulse of +/-2000V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-250mA and overvoltage per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results

MAX4613EUE+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)					
	Ta = 135C Biased Time = 192 hrs.	DC Parameters & functionality	80	0	

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