RELIABILITY REPORT

FOR

MAX4652EUE+T

PLASTIC ENCAPSULATED DEVICES

May 15, 2017

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

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Conclusion

The MAX4652EUE+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.

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I. Device Description

A. General

The MAX4651/MAX4652/MAX4653 quad analog switches feature 4 max on-resistance (RON) when operating from a single +5V supply. RON is matched between switches to 0.2 (max) and is flat (0.8 max) over the specified signal range. Each switch can handle rail-to-rail analog signals. Off-leakage current is 0.1nA at +25°C. These switches are ideal in low-distortion applications and are the preferred solution over mechanical relays in automated test equipment or applications where current switching is required. They have low power requirements, require less board space, and are more reliable than mechanical relays. The MAX4651/MAX4652/MAX4653 operate from a single +1.8V to +5.5V supply, making them ideal for use in battery-powered applications. The MAX4651 has four normally closed (NC) switches, the MAX4652 has four normally open (NO) switches, and the MAX4653 has two NO and two NC switches. These devices are available in 16-pin QFN, TSSOP and SO packages, as well as 20-pin QFN package.

II. Manufacturing Information

A. Description/Function:	Low-Voltage, 4 Ohm, Quad, SPST, CMOS Analog Switches
B. Process:	TS50
C. Fabrication Location:	Taiwan
D. Assembly Location:	Philippines, Thailand, Malaysia
E. Date of Initial Production:	April 20, 2000

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 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-1201-0154
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:	54X54 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. Isolation Dielectric:	SiO_2
F. Die Separation Method:	Wafer Saw

V. Quality Assurance Information

A. Quality Assurance Contacts:	Eric Wright (Reliability Engineering) Brian Standley (Manager, Reliability) 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 TS50 Process results in a FIT Rate of 0.25 @ 25C and 6.11 @ 55C (0.8 eV, 60% UCL)

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

The AH39-1 die type has been found to have all pins able to withstand an HBM transient pulse of <100V 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

MAX4652EUE+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.