RELIABILITY REPORT

FOR

MAX9053AEUB+T

PLASTIC ENCAPSULATED DEVICES

February 18, 2014

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

Approved by
Sokhom Chum
Quality Assurance
Reliability Engineer

Conclusion

The MAX9053AEUB+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 MAX9038-MAX9043 and MAX9050-MAX9053 feature combinations of low-power comparators and precision voltage references. Their operating voltage range makes them ideal for both 3V and 5V systems. The MAX9039/MAX9040/MAX9041/MAX9050/MAX9051 have a single comparator and reference consuming only 40µA of supply current. The MAX9042/MAX9043/MAX9052/MAX9053 have dual comparators and one reference, and consume only 55µA of supply current. Low-voltage operation and low supply current make these devices ideal for battery-operated systems. The comparators feature rail-to-rail inputs and outputs, with a common-mode input voltage range that extends 250mV beyond the supply rails. Input bias current is typically 1.0pA, and input offset voltage is typically 0.5mV. Internal hysteresis ensures clean output switching, even with slow-moving input signals. The output stage features a unique design that limits supply current surges while switching, virtually eliminating supply glitches typical of many other comparators. This design also minimizes overall power consumption under dynamic conditions. The comparator outputs have rail-to- rail, push-pull output stages except the MAX9038 has an open-drain output that sinks and sources up to 8mA. The propagation delay is 400ns, even with the low-operating supply current. The reference output voltage is set to 1.23V in the MAX9038/MAX9039, to 2.048V in the MAX9040-MAX9043, and to 2.500V in the MAX9050-MAX9053. The MAX9040-MAX9043 and the MAX9050-MAX9053 are offered in two grades: an A grade with 0.4% initial accuracy and 6ppm/°C tempco, and a B grade with 1% initial accuracy (except MAX9038/MAX9039 have an initial accuracy of ±0.4%) and 100ppm/°C tempco. The voltage references feature a proprietary curvature-correction circuit and laser-trimmed thin-film resistors. These series-mode references can sink or source up to 500µA of load current.

II. Manufacturing Information

A. Description/Function:	Micropower, Single-Supply, UCSP/SOT23 Comparator + Precision Reference ICs
B. Process:	S12
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon, California or Texas
E. Assembly Location:	Philippines, Thailand, Malaysia
F. Date of Initial Production:	October 23, 1999

III. Packaging Information

A. Package Type:	10-pin uMAX
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:	#05-1501-0167
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:	180°C/W
K. Single Layer Theta Jc:	41.9°C/W
L. Multi Layer Theta Ja:	113.1°C/W
M. Multi Layer Theta Jc:	41.9°C/W

IV. Die Information

A. Dimensions:	57X59 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:	1.2 microns (as drawn)
F. Minimum Metal Spacing:	1.2 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:	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 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 S12 Process results in a FIT Rate of 0.03 @ 25C and 0.51 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot I4NBBA005A, D/C 0120)

The CM58-1 die type has been found to have all pins able to withstand a 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.

Table 1
Reliability Evaluation Test Results

MAX9053AEUB+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	80	0	I4NABA005A, D/C 0019

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