RELIABILITY REPORT

FOR

MAX9027EBT+T

CHIP SCALE PACKAGE

July 18, 2014

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

Approved by
Eric Wright
Quality Assurance
Reliability Engineering

Maxim Integrated. All rights reserved.

Conclusion

The MAX9027EBT+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 MAX9025-MAX9028 nanopower comparators in space-saving chip-scale (UCSP(tm)) packages feature Beyond-the-Rails(tm) inputs and are guaranteed to operate down to +1.8V. The MAX9025/MAX9026 feature an on-board 1.236V ±1% reference and draw an ultra-low supply current of only 1µA, while the MAX9027/MAX9028 (without reference) require just 0.6µA of supply current. These features make the MAX9025-MAX9028 family of comparators ideal for all 2-cell battery-monitoring/management applications. The unique design of the output stage limits supply-current surges while switching, virtually eliminating the supply glitches typical of many other comparators. This design also minimizes overall power consumption under dynamic conditions. The MAX9025/MAX9027 have a push-pull output stage that sinks and sources current. Large internal-output drivers allow rail-to-rail output swing with loads up to 5mA. The MAX9026/MAX9028 have an open-drain output stage that makes them suitable for mixed-voltage system design. All devices are available in the miniature 6-bump UCSP packages. Refer to the MAX9117 data sheet for similar comparators in 5-pin SC70 packages and the MAX9017 data sheet for similar dual comparators in 8-pin SOT23 packages.

Maxim Integrated. All rights reserved.

II. Manufacturing Information

A. Description/Function:	UCSP, 1.8V, Nanopower, Beyond-the-Rails Comparators With/Without Reference
B. Process:	B8
C. Number of Device Transistors:	108
D. Fabrication Location:	USA
E. Assembly Location:	USA
F. Date of Initial Production:	April 20, 2004

III. Packaging Information

A. Package Type:	6-pin UCSP
B. Lead Frame:	N/A
C. Lead Finish:	N/A
D. Die Attach:	N/A
E. Bondwire:	N/A
F. Mold Material:	N/A
G. Assembly Diagram:	#05-9000-0967
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:	N/A
K. Single Layer Theta Jc:	N/A
L. Multi Layer Theta Ja:	259.5°C/W
M. Multi Layer Theta Jc:	N/A

IV. Die Information

A. Dimensions:	42 X 62 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:	0.8 microns (as drawn)
G. Bondpad Dimensions:	
H. Isolation Dielectric:	SiO_2
I. Die Separation Method:	Wafer Saw

Maxim Integrated. All rights reserved.

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 135°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 50 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 22.0 \times 10^{-9}$

$\lambda = 22.0$ 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 B8 Process results in a FIT Rate of 0.06 @ 25°C and 0.99 @ 55°C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot SOY2AQ001B, D/C 0348)

The CM91-2 die type has been found to have all pins able to withstand an HBM transient pulse of +/-2500V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250mA and overvoltage per JEDEC JESD78.

Maxim Integrated. All rights reserved.

Table 1

Reliability Evaluation Test Results

MAX9027EBT+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	50	0	

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

Maxim Integrated. All rights reserved.