RELIABILITY REPORT FOR

MAX40000ANTxx+T / MAX40000AUTxx+T

PLASTIC ENCAPSULATED DEVICES

February 17, 2017

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

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Conclusion

The MAX40000ANTxx+T / MAX40000AUTxx+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 MAX40000/MAX40001 are tiny, single comparators with built-in voltage references that are ideal for a wide variety of portable electronics applications, such as cell phones, portable instruments, and notebooks that have extremely tight board space and power constraints. The MAX40000/MAX40001 are available in a 6-bump wafer-level package (WLP) with 1.11mm x 0.76mm footprint and a 6-pin SOT23 package. The MAX40000 has a push-pull output and the MAX40001 has an open-drain output. The devices offer a supply voltage range from 1.7V to 5.5V and consume only 0.9µA of supply current. They also feature internal filtering to provide high RF immunity, important in many portable applications. The devices have a high-precision integrated reference that is factory trimmed to an initial accuracy of 1% and better than 2.5% over the entire temperature range. Internal reference voltage options include 1.252V, 1.66V, 1.94V, and 2.22V. See Ordering Information for help with ordering a MAX40000/MAX40001 with a particular voltage reference value and package type. The reference output is stable for capacitive loads up to 100pF. These devices are fully specified over -40°C to +125°C automotive temperature range.

II. Manufacturing Information

A. Description/Function:	1.7V, nanoPower Comparators with Built-in Reference	
B. Process:	S18	
C. Number of Device Transistors:	4863	
D. Fabrication Location:	USA	
E. Assembly Location:	Taiwan	Thailand
F. Date of Initial Production:	September 14, 2016	

III. Packaging Information

A. Package Type:	6-bump thin WLP	6-pin SOT23
B. Lead Frame:	N/A	Copper
C. Lead Finish:	N/A	100% matte Tin
D. Bondwire:	N/A (N/A mil dia.)	Au (1 mil dia.)
E. Mold Material:	None	epoxy with silica filler
F. Assembly Diagram:	#05-100342	#05-100334
G. Flammability Rating:	Class UL94-V0	Class UL94-V0
H. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1	Level 1
I. Single Layer Theta Ja:	N/A°C/W	N/A°C/W
J. Single Layer Theta Jc:	N/A°C/W	80°C/W
K. Multi Layer Theta Ja:	98.06°C/W	115°C/W
L. Multi Layer Theta Jc:	N/A°C/W	80°C/W

IV. Die Information

A. Dimensions:	43.7008X29.9213 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:	0.23 microns (as drawn)
F. Minimum Metal Spacing:	0.23 microns (as drawn)
G. Isolation Dielectric:	SiO_2
H. 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 S18 Process results in a FIT Rate of 0.40 @ 25C and 6.96 @ 55C (0.8 eV, 60% UCL)

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

The CC03-0 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.

Table 1

Reliability Evaluation Test Results

MAX40000ANTxx+T / MAX40000AUTxx+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.