RELIABILITY REPORT

FOR

MAX4403ASD+, MAX4403ASD+T,
MAX4403AUD+, MAX4403AUD+T,

June 23, 2020

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

Ryan Wall
Manager, Reliability

Conclusion

The MAX4403 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 MAX4400–MAX4403 low-cost, general-purpose op amps offer rail-to-rail outputs, draw only 320µA of quiescent current, and operate from a single +2.5V to +5.5V supply. For additional power conservation, the MAX4401 offers a low-power shutdown mode that reduces supply current to 1µA (max) and puts the amplifier's output in a high-impedance state. These devices deliver ±1.4mA of output current and are unity-gain stable with a 1MHz gain-bandwidth product driving capacitive loads up to 400pF. The MAX4400–MAX4403 are specified to +125°C, making them suitable for use in a variety of harsh environments, such as automotive applications.

II. Manufacturing Information

A. Description/Function:	Single/Dual/Quad, Low-Cost, Single-Supply, Rail-to-Rail Op Amps with Shutdown
B. Process:	B8
C. Device Count:	N/A
D. Fabrication Location:	USA
E. Assembly Location:	Philippines, Malaysia, Thailand
F. Date of Initial Production:	July 2000

III. Packaging Information

A. Package Type:	14L SOIC	14L TSSOP
B. Lead Frame:	Cu	Cu
C. Lead Finish:	Matte Tin	Matte Tin
D. Die Attach:	AB8290, 84-1LMISR4	AB8290, AB8200T, QMI-519
E. Bondwire:	1 mil Au	1 mil Au
F. Mold Material:	G600, G600C	G700K, G605L, CEL8240HF10-LXC
G. Flammability Rating:	UL-94 (V-0 Rating)	UL-94 (V-0 Rating)
H. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1	Level 1
I. Single Layer Theta Ja:	120 °C/W	110 °C/W
J. Single Layer Theta Jc:	37 °C/W	30 °C/W
K. Multi Layer Theta Ja:	84 °C/W	100.4 °C/W
L. Multi Layer Theta Jc:	34 °C/W	30 °C/W

IV. Die Information

A. Dimensions:	57 x 50 mils
B. Passivation:	SiN/SiO2

V. Quality Assurance Information

A. Quality Assurance Contacts:	Ryan Wall (Manager, Reliability) Michael Cairnes (Executive Director, Reliability) Bryan Preeshl (SVP 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 125C biased (static) life test are shown in Table 1. Using these results, the Failure Rate λ is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192\ x\ 2454\ x\ 77\ x\ 2}$$ (Chi square value for MTTF upper limit)

(where 2454 = Temperature Acceleration factor assuming an activation energy of 0.8eV)

$$\lambda = 25.2\ x\ 10^{-9}$$

$$\lambda = 25.2\ FITs\ (60\%\ confidence\ level\ @25°C)$$

Maxim Integrated performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at https://www.maximintegrated.com/en/support/qa-reliability/reliability/reliability-monitor-program.html.

B8 cumulative process data:

$$\lambda = 0.10\ FITs\ (60\%\ confidence\ level\ @25°C)$$
$$\lambda = 1.16\ FITs\ (60\%\ confidence\ level\ @55°C)$$

B. ESD and Latch-Up Testing

The MAX4403 has been found to have all pins able to withstand an HBM transient pulse of ±2500 V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands ±250 mA current injection and supply overvoltage per JEDEC JESD78.

Table 1

Reliability Evaluation Test Results

MAX4403AUD+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 125°C Biased Time = 192 hrs.	DC parameters & functionality	77	0	

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