

RELIABILITY REPORT
FOR
MAX44251AKA+T / MAX44251AUA+T
PLASTIC ENCAPSULATED DEVICES

May 9, 2012

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.
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Conclusion

The MAX44251AKA+T / MAX44251AUA+T successfully meets the quality and reliability standards required of all Maxim products. In addition, Maxim's continuous reliability monitoring program ensures that all outgoing product will continue to meet Maxim's quality and reliability standards.

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I. Device Description

A. General

The MAX44251/MAX44252 are 20V, ultra-precision, low-noise, low-drift amplifiers that offer near-zero DC offset and drift through the use of patented autocorrelating zeroing techniques. This method constantly measures and compensates the input offset, eliminating drift over time and temperature and the effect of 1/f noise. These dual and quad devices feature rail-to-rail outputs, operate from a single 2.7V to 20V supply, and consume only 1.15mA per channel, while providing 5.9nV/ input-referred voltage noise. The ICs are unity-gain stable with a gain-bandwidth product of 10MHz. With excellent specifications such as offset voltage of 6 μ V (max), drift of 19nV/ $^{\circ}$ C (max), and 123nVP-P noise in 0.1Hz to 10Hz, the ICs are ideally suited for applications requiring ultra-low noise and DC precision such as interfacing with pressure sensors, strain gauges, precision weight scales, and medical instrumentation. The ICs are available in 8-pin SOT23, 8-pin μ MAX $^{\circ}$, and 14-pin SOIC packages and are rated over the -40 $^{\circ}$ C to +125 $^{\circ}$ C temperature range.

II. Manufacturing Information

A. Description/Function:	20V, Ultra-Precision, Low-Noise Op Amps	
B. Process:	S18	
C. Number of Device Transistors:	2102	
D. Fabrication Location:	USA	
E. Assembly Location:	Malaysia and Thailand	Philippines and Thailand
F. Date of Initial Production:	September 16, 2011	

III. Packaging Information

A. Package Type:	8-pin SOT23	8-pin uMAX
B. Lead Frame:	Copper	Copper
C. Lead Finish:	100% matte Tin	100% matte Tin
D. Die Attach:	Conductive	Conductive
E. Bondwire:	Au (0.8 mil dia.)	Au (0.8 mil dia.)
F. Mold Material:	Epoxy with silica filler	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-4332	#05-9000-4333
H. Flammability Rating:	Class UL94-V0	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1	Level 1
J. Single Layer Theta Ja:	°C/W	221°C/W
K. Single Layer Theta Jc:	°C/W	42°C/W
L. Multi Layer Theta Ja:	196°C/W	206.3°C/W
M. Multi Layer Theta Jc:	70°C/W	42°C/W

IV. Die Information

A. Dimensions:	76.77 X 23.62 mils
B. Passivation:	Si ₃ N 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:	Metal1 = 0.23 / Metal2-3 = 0.28 / Metal 4 = 2.6 microns (as drawn)
F. Minimum Metal Spacing:	Metal1 = 0.23 / Metal2-3 = 0.28 / Metal 4 = 3.0 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: Richard Aburano (Manager, Reliability Engineering)
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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 80 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 13.7 \times 10^{-9}$$

$$\lambda = 13.7 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at <http://www.maxim-ic.com/qa/reliability/monitor>. Cumulative monitor data for the S18 Process results in a FIT Rate of 0.06 @ 25C and 1.05 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot SW1ZCQ001D, D/C 1124)

The OY63 die type has been found to have all pins able to withstand a 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
MAX44251AKA+T / MAX44251AUA+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	SW1ZCQ001D, D/C 1124

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