

RELIABILITY REPORT
FOR
MAX44250AUK+
PLASTIC ENCAPSULATED DEVICES

May 20, 2014

MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

Approved by
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Quality Assurance
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Conclusion

The MAX44250AUK+ 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 MAX44250/MAX44251/MAX44252 are 20V, ultra-precision, low-noise, low-drift amplifiers that offer nearzero DC offset and drift through the use of patented auto-correlating 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 single, dual, and quad devices feature rail-to-rail outputs, operate from a single 2.7V to 20V supply or dual $\pm 1.35V$ to $\pm 10V$ supplies 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 μV (max), drift of 19nV/°C (max), and 123nV P-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 5-pin SOT23, 8-pin SOT23, 8-pin μMAX ®, and 14-pin SO packages and are rated over the -40°C to +125°C temperature range.

II. Manufacturing Information

A. Description/Function:	20V, Ultra-Precision, Low-Noise Op Amps
B. Process:	S18
C. Number of Device Transistors:	1898
D. Fabrication Location:	California
E. Assembly Location:	Malaysia, Thailand
F. Date of Initial Production:	September 21, 2012

III. Packaging Information

A. Package Type:	5-pin SOT23
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (0.8 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-4945
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:	324.3°C/W
K. Single Layer Theta Jc:	82°C/W
L. Multi Layer Theta Ja:	255.9°C/W
M. Multi Layer Theta Jc:	81°C/W

IV. Die Information

A. Dimensions:	35.8268X31.4961 mils
B. Passivation:	Si ₃ N ₄ /SiO ₂ (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	0.18um
F. Minimum Metal Spacing:	0.18um
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:

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

(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 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 0.05 @ 25C and 0.93 @ 55C (0.8 eV, 60% UCL).

B. E.S.D. and Latch-Up Testing (lot SAFB4Q001D, D/C 1213)

The OY62-0 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 +/-100mA and overvoltage per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results

MAX44250AUK+

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	SAFB4Q001DQ, D/C 1213

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