

RELIABILITY REPORT
FOR
MAX4238ASA+
PLASTIC ENCAPSULATED DEVICES

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MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

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Conclusion

The MAX4238ASA+ 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 MAX4238/MAX4239 are low-noise, low-drift, ultra-high precision amplifiers that offer near-zero DC offset and drift through the use of 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. Both devices feature rail-to-rail outputs, operate from a single 2.7V to 5.5V supply, and consume only 600 μ A. An active-low shutdown mode decreases supply current to 0.1 μ A. The MAX4238 is unity-gain stable with a gain-bandwidth product of 1MHz, while the decompensated MAX4239 is stable with $A_V \geq 10V/V$ and a GBWP of 6.5MHz. The MAX4238/MAX4239 are available in 8-pin narrow SO, 6-pin TDFN and SOT23 packages.

II. Manufacturing Information

A. Description/Function:	Ultra-Low Offset/Drift, Low-Noise, Precision SOT23 Amplifiers
B. Process:	B8
C. Number of Device Transistors:	
D. Fabrication Location:	California or Texas
E. Assembly Location:	Malaysia, Philippines, or Thailand
F. Date of Initial Production:	April 27, 2002

III. Packaging Information

A. Package Type:	8-pin SOIC (N)
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-2501-0192
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:	170 °C/W
K. Single Layer Theta Jc:	40 °C/W
L. Multi Layer Theta Ja:	132 °C/W
M. Multi Layer Theta Jc:	38 °C/W

IV. Die Information

A. Dimensions:	90X45 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:	0.8 microns (as drawn)
F. Minimum Metal Spacing:	0.8 microns (as drawn)
G. Bondpad Dimensions:	5 mil. Sq.
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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 160 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 6.9 \times 10^{-9}$$

$$\lambda = 6.9 \text{ F.I.T. (60\% confidence level @ 25}^\circ\text{C)}$$

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 0.01 @ 25C and 0.26 @ 55C (0.8 eV, 60% UCL).

B. E.S.D. and Latch-Up Testing (lot I5G0BQ001C, D/C 0151)

The OX60 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-250mA.

Table 1
Reliability Evaluation Test Results

MAX4238ASA+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C	DC Parameters	80	0	S5G0CU003C, D/C 0417
	Biased	& functionality	80	0	I5G1BQ001D, D/C 0202
	Time = 192 hrs.				

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