RELIABILITY REPORT
FOR
MAX4242EUA+
PLASTIC ENCAPSULATED DEVICES

April 28, 2015

MAXIM INTEGRATED
160 RIO ROBLES
SAN JOSE, CA 95134

Approved by

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<th>Sokhom Chum</th>
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<tr>
<td>Quality Assurance</td>
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<td>Reliability Engineer</td>
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Conclusion

The MAX4242EUA+ 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 MAX4240-MAX4244 family of micropower op amps operate from a single +1.8V to +5.5V supply or dual ±0.9V to ±2.75V supplies and have Beyond-the-Rails (tm) inputs and rail-to-rail output capabilities. These amplifiers provide a 90kHz gain-bandwidth product while using only 10µA of supply current per amplifier. The MAX4241/MAX4243 have a low-power shutdown mode that reduces supply current to less than 1µA and forces the output into a high-impedance state. Although the minimum operating voltage is specified at +1.8V, these devices typically operate down to +1.5V. The combination of ultra-low-voltage operation, Beyond-the-Rails inputs, rail-to-rail outputs, and ultra-low power consumption makes these devices ideal for any portable/two-cell battery-powered system. These amplifiers have an input common-mode range that extends 200mV beyond each rail, and their outputs typically swing to within 9mV of the rails with a 100kΩ load. Beyond-the-Rails input and rail-to-rail output characteristics allow the full power-supply voltage to be used for signal range. The combination of low input offset voltage, low input bias current, and high open-loop gain makes them suitable for low-power/low-voltage precision applications. The MAX4240 is offered in a space-saving 5-pin SOT23 package. All specifications are guaranteed over the -40°C to +85°C extended temperature range.
II. Manufacturing Information

A. Description/Function: Single/Dual/Quad, +1.8V/10µA, SOT23, Beyond-the-Rails Op Amps
B. Process: CB2
C. Number of Device Transistors: 
D. Fabrication Location: Oregon
E. Assembly Location: Philippines, Malaysia, Thailand
F. Date of Initial Production: March 13, 1998

III. Packaging Information

A. Package Type: 8-pin uMAX
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: #05-3001-0121
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: 221°C/W
K. Single Layer Theta Jc: 41.9°C/W
L. Multi Layer Theta Ja: 206.3°C/W
M. Multi Layer Theta Jc: 41.9°C/W

IV. Die Information

A. Dimensions: 76X58 mils
B. Passivation: Si3N4 (Silicon nitride)
C. Interconnect: Au
D. Backside Metallization: None
E. Minimum Metal Width: 2 microns (as drawn)
F. Minimum Metal Spacing: 2 microns (as drawn)
G. Bondpad Dimensions: 
H. Isolation Dielectric: SiO2
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 135°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate ($\lambda$) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{1000 \times 4340 \times 77 \times 2}$$

(Chi square value for MTTF upper limit)

(Chisquare value for an activation energy of 0.8eV)

$$\lambda = 2.74 \times 10^{-9}$$

$$\lambda = 2.74 \text{ F.I.T. (60% confidence level @ 25°C)}$$

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 CB2 Process results in a FIT Rate of 0.06 @ 25°C and 0.95 @ 55°C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot NM8AC1007Y, D/C 9919)

The OP64 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2000V 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  
MAX4242EUA+

<table>
<thead>
<tr>
<th>TEST ITEM</th>
<th>TEST CONDITION</th>
<th>FAILURE IDENTIFICATION</th>
<th>SAMPLE SIZE</th>
<th>NUMBER OF FAILURES</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Static Life Test</td>
<td>Ta = 135°C</td>
<td>DC Parameters &amp; functionality</td>
<td>77</td>
<td>0</td>
<td>NM8AC310B, D/C 0521</td>
</tr>
<tr>
<td></td>
<td>Biased</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Time = 1000 hrs.</td>
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Note 1: Life Test Data may represent plastic DIP qualification lots.