



RELIABILITY REPORT
FOR
MAX4471EKA+T
PLASTIC ENCAPSULATED DEVICES

November 8, 2010

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.
SUNNYVALE, CA 94086

Approved by
Don Lipps
Quality Assurance
Manager, Reliability Engineering

Conclusion

The MAX4471EKA+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.

Table of Contents

I.Device Description	V.Quality Assurance Information
II.Manufacturing Information	VI.Reliability Evaluation
III.Packaging Information	IV.Die Information
.....Attachments	

I. Device Description

A. General

The MAX4464/MAX4470/MAX4471/MAX4472/MAX4474 family of micropower op amps operate from a single +1.8V to +5.5V supply and draw only 750nA of supply current. The MAX4470 family feature ground-sensing inputs and rail-to-rail output. The ultra-low supply current, low-operating voltage, and rail-to-rail output capabilities make these operational amplifiers ideal for use in single lithium ion (Li+), or two-cell NiCd or alkaline battery systems. The rail-to-rail output stage of the MAX4464/MAX4470/MAX4471/MAX4472/MAX4474 amplifiers is capable of driving the output voltage to within 4mV of the rail with a 100k load, and can sink and source 11mA with a +5V supply. These amplifiers are available in both fully compensated and decompensated versions. The single MAX4470, dual MAX4471, and the quad MAX4472 are unity-gain stable. The single MAX4464 and the dual MAX4474 are stable for closed-loop gain configurations of $\geq +5V/V$. These amplifiers are available in space-saving WLP, SC70, SOT23, μ MAX®, and TSSOP packages.

II. Manufacturing Information

A. Description/Function:	Single/Dual/Quad, +1.8V/750nA, SC70, Rail-to-Rail Op Amps
B. Process:	B8
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Malaysia, Thailand
F. Date of Initial Production:	April 28, 2001

III. Packaging Information

A. Package Type:	8-pin SOT23
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:	#05-2501-0083
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1
J. Single Layer Theta Jb:	110°C/W
K. Single Layer Theta Jc:	80°C/W
L. Multi Layer Theta Ja:	N/A°C/W
M. Multi Layer Theta Jc:	N/A°C/W

IV. Die Information

A. Dimensions:	71 X 24 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 135°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 130 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 8.5 \times 10^{-9}$$

$\lambda = 8.5$ 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 B8 Process results in a FIT Rate of 0.06 @ 25C and 0.99 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (ESD lot I09ABQ002A D/C 0108, Latchup lot S09ADQ001A D/C 0441)

The OX02 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

MAX4471EKA+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C	DC Parameters	80	0	I09BCQ003D, DC 0141
	Biased	& functionality	50	0	S09ADQ001A, DC 0441
	Time = 192 hrs.				

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