RELIABILITY REPORT

FOR

MAX4130EUK

PLASTIC ENCAPSULATED DEVICES

October 13, 2002

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Written by

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Conclusion

The MAX4130 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

A. General

The MAX4130 operational amplifier combines 10MHz gain-bandwidth product and excellent DC accuracy with rail-to-rail operation at the input and output. This device requires only 900µA per amplifier, and operates from either a single supply (+2.7V to +6.5V) or dual supplies (±1.35V to ±3.25V) with a commonmode voltage range that extends 250mV beyond V_{EE} and V_{CC}. It is capable of driving 250Ω loads and is unity-gain stable.

With its rail-to-rail input common-mode range and output swing, the MAX4130 is ideal for low-voltage, single-supply operation. Although the minimum operating voltage is specified at 2.7V, this device typically operates down to 1.8V. In addition, low offset voltage and high speed make it the ideal signal-conditioning stage for precision, low-voltage data acquisition systems.

B. Absolute Maximum Ratings

Item	Rating
Supply Voltage (V_{CC} - V_{EE})	7.5V
IN+, IN-, /SHDN Voltage	(V_{CC} + 0.3V) to (V_{EE} - 0.3V)
Output Short-Circuit Duration (Note 1)	Continuous (short to either supply)
Storage Temp.	-65°C to +160°C
Lead Temp. (10 sec.)	+300°C
Continuous Power Dissipation (TA = +70°C)	
5-Lead SOT23	571mW
Derates above +70°C	
5-Lead SOT23	7.1mW/°C

Note 1: Provided that the maximum package power dissipation rating is met.

II. Manufacturing Information

A. Description/Function:	Single, Wide-Bandwidth, Low-Power, Single-Supply, Rail-to-Rail I/O Op Amp
B. Process:	CB2 - Complementary Bipolar Process
C. Number of Device Transistors:	170
D. Fabrication Location:	Oregon, USA
E. Assembly Location:	Malaysia or Thailand
F. Date of Initial Production:	September, 1996

III. Packaging Information

A. Package Type:	**5 Lead SOT-23**
B. Lead Frame:	Copper
C. Lead Finish:	Solder Plate
D. Die Attach:	Silver-filled Epoxy
E. Bondwire:	Gold (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	Buildsheet # 05-0601-0463
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard JESD22-A112:	Level 1

IV. Die Information

A. Dimensions:	55 X 36 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Gold
D. Backside Metallization:	None
E. Minimum Metal Width:	2 microns (as drawn)
F. Minimum Metal Spacing:	2 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: Jim Pedicord (Manager-Reliability Operations)
Bryan Preeshl (Executive Director of QA)
Kenneth Huening (Vice President)

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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4389 \times 320 \times 2}$$

(Chi square value for MTTF upper limit)

Temperature Acceleration factor assuming an activation energy of 0.8eV

$\lambda = 3.39 \times 10^{-9}$ $\lambda = 3.39$ F.I.T. (60% confidence level @ 25°C)

This low failure rate represents data collected from Maxim's reliability qualification and monitor programs. Maxim also performs weekly Burn-In on samples from production to assure reliability of its processes. The reliability required for lots which receive a burn-in qualification is 59 F.I.T. at a 60% confidence level, which equates to 3 failures in an 80 piece sample. Maxim performs failure analysis on rejects from lots exceeding this level. The attached Burn-In Schematic (#06-5438) shows the static circuit used for this test. Maxim also performs 1000 hour life test monitors quarterly for each process. This data is published in the Product Reliability Report (**RR-1M**).

B. Moisture Resistance Tests

Maxim evaluates pressure pot stress from every assembly process during qualification of each new design. Pressure Pot testing must pass a 20% LTPD for acceptance. Additionally, industry standard 85°C/85%RH or HAST tests are performed quarterly per device/package family.

C. E.S.D. and Latch-Up Testing

The OA75-2 die type has been found to have all pins able to withstand a transient pulse of ±1500V, per Mil-Std-883 Method 3015 (reference attached ESD Test Circuit). Latch-Up testing has shown that this device withstands a current of ±250mA.

Table 1
Reliability Evaluation Test Results

MAX4130EUK

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	PACKAGE	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)					
	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality		320	0
Moisture Testing (Note 2)					
Pressure Pot	Ta = 121°C P = 15 psi. RH= 100% Time = 168hrs.	DC Parameters & functionality	SOT	77	0
85/85	Ta = 85°C RH = 85% Biased Time = 1000hrs.	DC Parameters & functionality		77	0
Mechanical Stress (Note 2)					
Temperature Cycle	-65°C/150°C 1000 Cycles Method 1010	DC Parameters (generic test vehicle)		77	0

Note 1: Life Test Data may represent plastic D.I.P. qualification lots.
Note 2: Generic Process/Package Data

Attachment #1

TABLE II. Pin combination to be tested. 1/ 2/

	Terminal A (Each pin individually connected to terminal A with the other floating)	Terminal B (The common combination of all like-named pins connected to terminal B)
1.	All pins except V_{PS1} 3/	All V_{PS1} pins
2.	All input and output pins	All other input-output pins

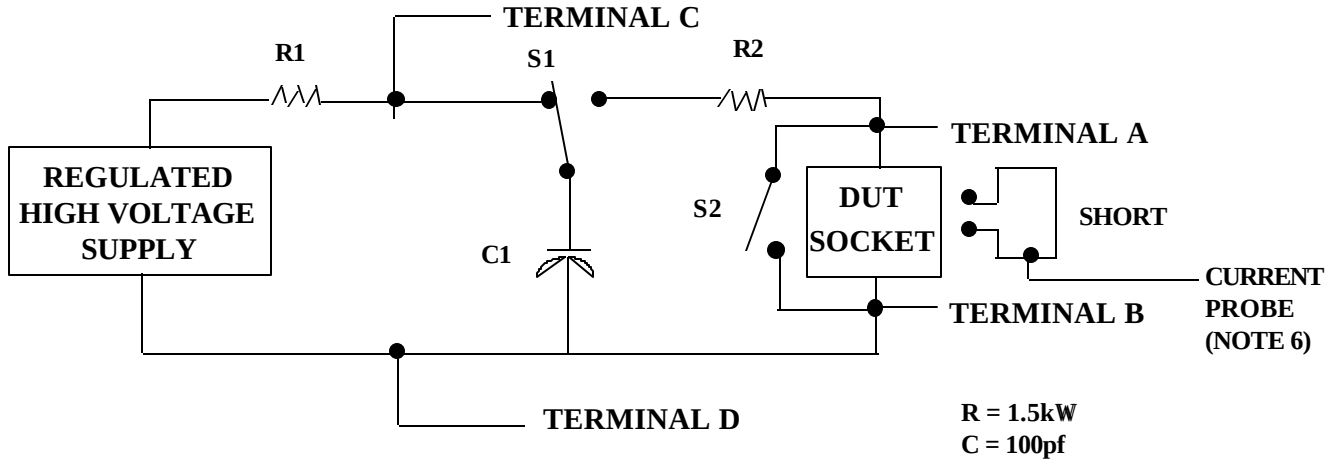
1/ Table II is restated in narrative form in 3.4 below.
2/ No connects are not to be tested.
3/ Repeat pin combination I for each named Power supply and for ground (e.g., where V_{PS1} is V_{DD}, V_{CC}, V_{SS}, V_{BB}, GND, $+V_S$, $-V_S$, V_{REF}, etc).

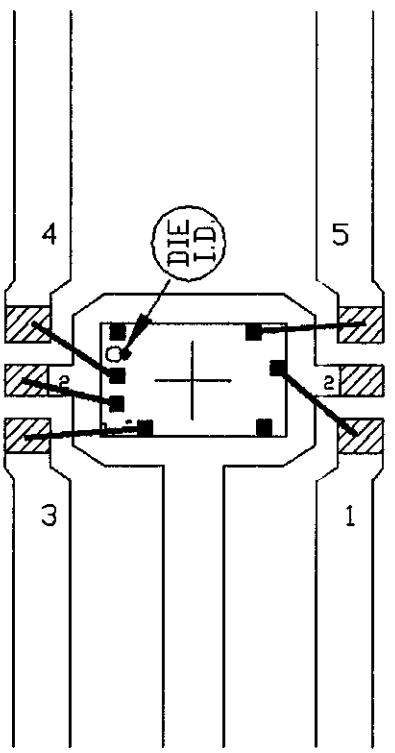
3.4 Pin combinations to be tested.

a. Each pin individually connected to terminal A with respect to the device ground pin(s) connected to terminal B. All pins except the one being tested and the ground pin(s) shall be open.

b. Each pin individually connected to terminal A with respect to each different set of a combination of all named power supply pins (e.g., V_{SS1}, or V_{SS2} or V_{SS3} or V_{CC1}, or V_{CC2}) connected to terminal B. All pins except the one being tested and the power supply pin or set of pins shall be open.

c. Each input and each output individually connected to terminal A with respect to a combination of all the other input and output pins connected to terminal B. All pins except the input or output pin being tested and the combination of all the other input and output pins shall be open.

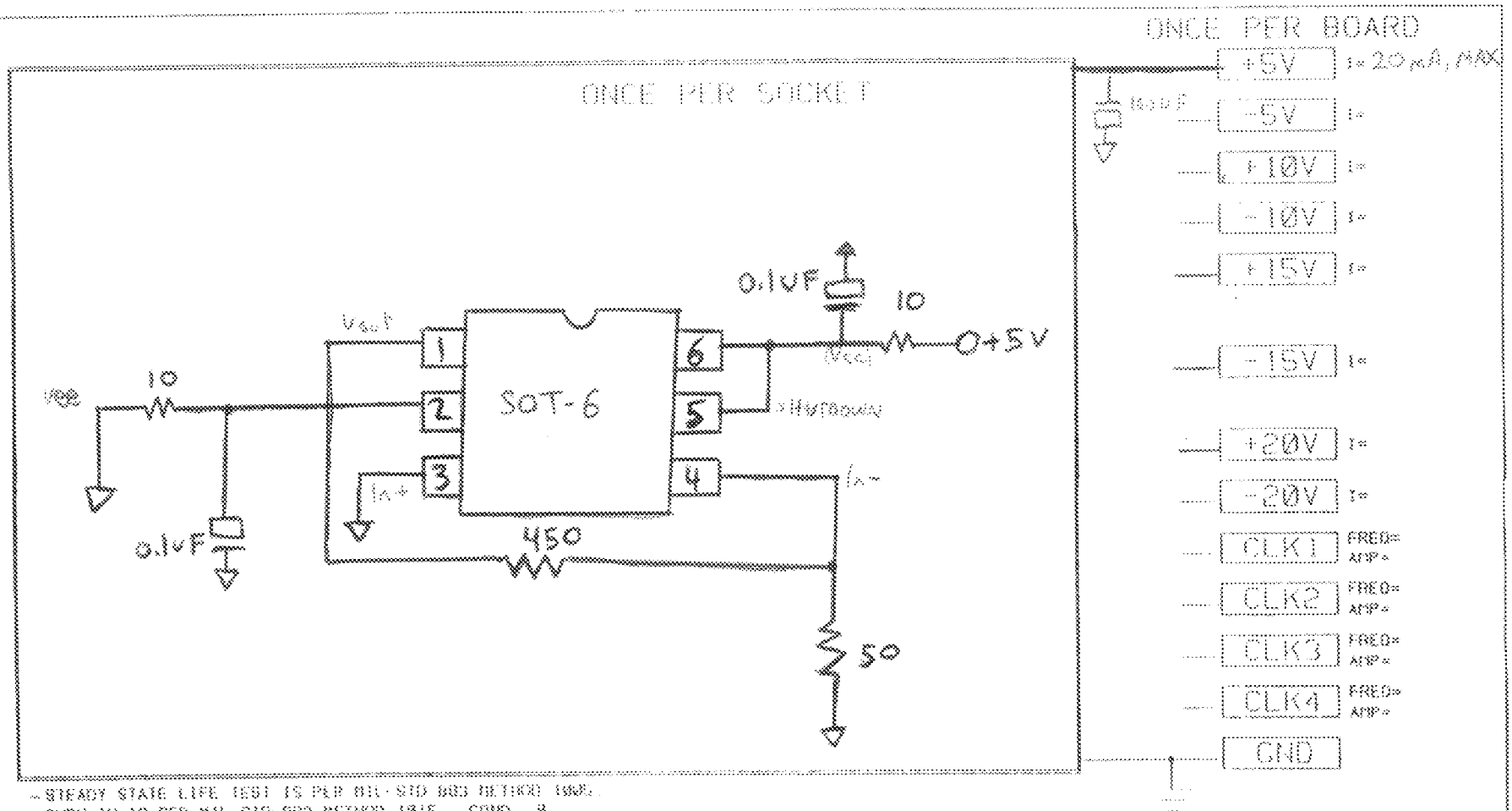




▨- BONDING AREA

NOTE: CAVITY DOWN

PKG.CODE: U5-1		APPROVALS	DATE	MAXIM
CAV./PAD SIZE: 64X45	PKG. DESIGN			BUILDSHEET NUMBER: 05-0601-0463 / REV.: A



- STEADY STATE LIFE TEST IS PER MIL-STD 883 METHOD 1005.
- BURN-IN IS PER MIL-STD-883 METHOD 1015, COND. B

NOTES:

TEMPERATURE: 125C OR EQUIVALENT
TIME: 168 HOURS MIN. OR EQUIVALENT
ALL COMPONENTS AND MATERIAL MUST STAND 150C CONTINUOUS
APPROVED FOR [X] COMMERCIAL
[ ] MR/883

SPEC. 06-5438 REV. A

DATE: 3/30/99

DRAWN BY:

MAXIM BURN-IN SCHEMATIC

DEVICE TYPE: MAX 4123