



RELIABILITY REPORT
FOR
MAX4042ESA+
PLASTIC ENCAPSULATED DEVICES

November 24, 2008

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.
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Approved by
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Conclusion

The MAX4042ESA+ 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.

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I. Device Description

A. General

The MAX4040-MAX4044 family of micropower op amps operates from a single +2.4V to +5.5V supply or dual $\pm 1.2\text{V}$ to $\pm 2.75\text{V}$ supplies and have rail-to-rail input and output capabilities. These amplifiers provide a 90kHz gain-bandwidth product while using only 10 μA of supply current per amplifier. The MAX4041/MAX4043 have a low-power shutdown mode that reduces supply current to less than 1 μA and forces the output into a high-impedance state. The combination of low-voltage operation, rail-to-rail inputs and outputs, and ultra-low power consumption makes these devices ideal for any portable/battery-powered system. These amplifiers have outputs that typically swing to within 10mV of the rails with a 100k load. Rail-to-rail input and 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 MAX4040 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, Low-Cost, SOT23, Micropower Rail-to-Rail I/O Op Amps
B. Process:	CB2
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Carsem Malaysia, UTL Thailand, Unisem Malaysia
F. Date of Initial Production:	June 19, 1998

III. Packaging Information

A. Package Type:	8-pin SOIC (N)
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive Epoxy
E. Bondwire:	Gold (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-3001-0118
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:	136°C/W
M. Multi Layer Theta Jc:	38°C/W

IV. Die Information

A. Dimensions:	58 X 76 mils
B. Passivation:	Si ₃ N ₄ (Silicon nitride)
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:	Ken Wendel (Director, Reliability Engineering) Bryan Preeshl (Managing Director 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 150°C biased (static) life test are pending. 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)

$$\lambda = 6.7 \times 10^{-9}$$

$$\lambda = 6.7 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly 1000 hour life test monitors on its processes. This data is published in the Product Reliability Report found at <http://www.maxim-ic.com/>. Current monitor data for the CB20 Process results in a FIT Rate of 0.14 @ 25C and 2.14 @ 55C (0.8 eV, 60% UCL)

B. Moisture Resistance Tests

The industry standard 85°C/85%RH or HAST testing is monitored per device process once a quarter.

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

The OP64-1 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500 V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/- 250 mA.

Table 1
Reliability Evaluation Test Results

MAX4042ESA+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)	Ta = 150°C Biased Time = 192 hrs.	DC Parameters & functionality	160	0
Moisture Testing (Note 2) 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 & functionality	77	0

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

Note 2: Generic Package/Process data