



RELIABILITY REPORT  
FOR  
MAX4322ESA+  
PLASTIC ENCAPSULATED DEVICES

July 9, 2012

**MAXIM INTEGRATED PRODUCTS**

120 SAN GABRIEL DR.  
SUNNYVALE, CA 94086

<b>Approved by</b>
Sokhom Chum
Quality Assurance
Reliability Engineer

## Conclusion

The MAX4322ESA+ 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 MAX4322/MAX4323/MAX4326/MAX4327/MAX4329 family of operational amplifiers combines wide bandwidth and excellent DC accuracy with rail-to-rail operation at the inputs and outputs. These devices consume only 650 $\mu$ A per amplifier and operate from either a single supply (2.4V to 6.5V) or dual supplies ( $\pm$ 1.2V to  $\pm$ 3.25V). These unity-gain-stable amplifiers are capable of driving 250 loads and have a 5MHz gain-bandwidth product. The MAX4323 and MAX4327 feature a low-power shutdown mode that reduces supply current to 25 $\mu$ A and places the outputs in a high-impedance state. With their rail-to-rail input common-mode range and output swing, these amplifiers are ideal for low-voltage, single-supply operation. In addition, low offset voltage and high speed make them the ideal signal-conditioning stages for precision, low-voltage data-acquisition systems. The MAX4323 is offered in a small 6-bump chip-scale package (UCSP(tm)). The MAX4322/MAX4323 are also available in space-saving SOT23 packages.

**II. Manufacturing Information**

A. Description/Function:	Single/Dual/Quad, Low-Cost, UCSP/SOT23, Low-Power, Rail-to-Rail I/O Op Amps
B. Process:	CB20
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Thailand, Malaysia
F. Date of Initial Production:	June 2, 1998

**III. Packaging Information**

A. Package Type:	150 mil 8L SOIC
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:	#05-0601-0521 / B
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	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:	55 X 36 mils
B. Passivation:	Si <sub>3</sub> N <sub>4</sub> (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:	SiO <sub>2</sub>
I. Die Separation Method:	Wafer Saw

## V. Quality Assurance Information

- A. Quality Assurance Contacts: Richard Aburano (Manager, Reliability Engineering)  
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 biased (static) life test are shown in Table 1. Using these results, the Failure Rate ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{1000 \times 4340 \times 158 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 1.3 \times 10^{-9}$$

$$\lambda = 1.3 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly 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 CB20 Process results in a FIT Rate of 0.14 @ 25C and 2.48 @ 55C (0.8 eV, 60% UCL)

### B. E.S.D. and Latch-Up Testing (lot NJWDH2068D D/C 0051)

The OA75-3 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

**MAX4322ESA+**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
<b>Static Life Test</b> (Note 1)					
	Ta = 135°C	DC Parameters	79	0	NJWDH2115C, D/C 0146
	Biased Time = 1000 hrs.	& functionality	79	0	NJWDH2114D, D/C 0147

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