

RELIABILITY REPORT  
FOR  
MAX158AEAI+  
PLASTIC ENCAPSULATED DEVICES

May 18, 2011

**MAXIM INTEGRATED PRODUCTS**

120 SAN GABRIEL DR.  
SUNNYVALE, CA 94086

<b>Approved by</b>
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Quality Assurance
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## Conclusion

The MAX158AEAI+ 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 MAX154/MAX158 are high-speed multi-channel analog-to-digital converters (ADCs). The MAX154 has four analog input channels while the MAX158 has eight channels. Conversion time for both devices is 2.5 $\mu$ s. The MAX154/MAX158 also feature a 2.5V on-chip reference, forming a complete high-speed data acquisition system. Both converters include a built-in track/hold, eliminating the need for an external track/hold. The analog input range is 0V to +5V, although the ADC operates from a single +5V supply. Microprocessor interfaces are simplified by the ADC's ability to appear as a memory location or I/O port without the need for external logic. The data outputs use latched, three-state buffer circuitry to allow direct connection to a microprocessor data bus or system input port.

## II. Manufacturing Information

A. Description/Function:	CMOS High-Speed, 8-Bit ADCs with Multiplexer and Reference
B. Process:	SG5
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Malaysia, Philippines
F. Date of Initial Production:	Pre 1997

## III. Packaging Information

A. Package Type:	28-pin SSOP
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (1.3 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-0101-0369
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:	110°C/W
K. Single Layer Theta Jc:	25°C/W
L. Multi Layer Theta Ja:	67.1°C/W
M. Multi Layer Theta Jc:	25°C/W

## IV. Die Information

A. Dimensions:	124 X 131 mils
B. Passivation:	Si <sub>3</sub> N <sub>4</sub> /SiO <sub>2</sub> (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/0.5%Cu with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	5.0 microns (as drawn)
F. Minimum Metal Spacing:	5.0 microns (as drawn)
G. Bondpad Dimensions:	5 mil. Sq.
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 135°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 240 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 4.6 \times 10^{-9}$$

$$\lambda = 4.6 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 SG5 Process results in a FIT Rate of 0.12 @ 25C and 2.04 @ 55C (0.8 eV, 60% UCL)

### B. E.S.D. and Latch-Up Testing (lot NASEDA007C D/C 9924)

The AD19-4 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 +/-100mA.

**Table 1**  
Reliability Evaluation Test Results

**MAX158AEAI+**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
<b>Static Life Test</b> (Note 1)	Ta = 135°C	DC Parameters	80	0	XASEBQ002Q, D/C 9324
	Biased	& functionality	80	0	MASDJB061A, D/C 9102
	Time = 192 hrs.		80	0	MASDJN059A, D/C 9044

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