

RELIABILITY REPORT  
FOR  
MAX1407CAI+  
PLASTIC ENCAPSULATED DEVICES

November 13, 2014

**MAXIM INTEGRATED**

160 RIO ROBLES  
SAN JOSE, CA 95134

<b>Approved by</b>
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**Conclusion**

The MAX1407CAI+ successfully meets the quality and reliability standards required of all Maxim Integrated products. In addition, Maxim Integrated's continuous reliability monitoring program ensures that all outgoing product will continue to meet Maxim Integrated's quality and reliability standards.

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**I. Device Description****A. General**

The MAX1407/MAX1408/MAX1409/MAX1414 are low-power, general-purpose, multichannel data-acquisition systems (DAS). These devices are optimized for low-power applications. All the devices operate from a single +2.7V to +3.6V power supply and consume a maximum of 1.15mA in Run mode and only 2.5 $\mu$ A in Sleep mode. The MAX1407/MAX1408/MAX1414 feature a differential 8:1 input multiplexer to the ADC, a programmable three-state digital output, an output to shutdown an external power supply, and a data ready output from the ADC. The MAX1408 has eight auxiliary analog inputs, while the MAX1407/MAX1414 include four auxiliary analog inputs and two 10-bit force/sense DACs. The MAX1414 features a 50mV trip threshold for the signal-detect comparator while the others have a 0mV trip threshold. The MAX1409 is a 20-pin version of the DAS family with a differential 4:1 input multiplexer to the ADC, one auxiliary analog input, and one 10-bit force/sense DAC. The MAX1407/MAX1408/MAX1414 are available in space-saving 28-pin SSOP packages, while the MAX1409 is available in a 20-pin SSOP package.

## II. Manufacturing Information

A. Description/Function:	Low-Power, 16-Bit Multichannel DAS with Internal Reference, 10-Bit DACs, and RTC
B. Process:	C6Y
C. Number of Device Transistors:	66080
D. Fabrication Location:	Japan
E. Assembly Location:	Philippines, Malaysia
F. Date of Initial Production:	October 26, 2001

## 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 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-3259
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:	168X140 mils
B. Passivation:	Si <sub>3</sub> N <sub>4</sub> /SiO <sub>2</sub> (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	0.6 microns (as drawn)
F. Minimum Metal Spacing:	0.6 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:    | Don Lipps (Manager, Reliability Engineering)<br>Bryan Preeshl (Vice President of QA)            |
| B. Outgoing Inspection Level:     | 0.1% for all electrical parameters guaranteed by the Datasheet.<br>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 135C biased (static) life test are shown in Table 1. Using these results, the Failure Rate ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{1000 \times 4340 \times 90 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 2.35 \times 10^{-9}$$

$$\lambda = 2.35 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

The following failure rate represents data collected from Maxim Integrated's reliability monitor program. Maxim Integrated performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at <http://www.maximintegrated.com/qa/reliability/monitor>. Cumulative monitor data for the C6Y Process results in a FIT Rate of 0.04 @ 25C and 0.73 @ 55C (0.8 eV, 60% UCL).

### B. E.S.D. and Latch-Up Testing (lot I001CZ004A, D/C 0143)

The AC25-1 die type has been found to have all pins able to withstand a HBM transient pulse of +/-1500V 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

**MAX1407CAI+**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
<b>Static Life Test</b> (Note 1)	Ta = 135°C Biased Time = 1000 hrs.	DC Parameters & functionality	90	0	E001KQ002Q, D/C 1024

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