

RELIABILITY REPORT  
FOR  
MAX1202  
PLASTIC ENCAPSULATED DEVICES

December 6, 2016

**MAXIM INTEGRATED**

160 RIO ROBLES  
SAN JOSE, CA 95134

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## Conclusion

The MAX1202 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 MAX1202/MAX1203 are 12-bit data-acquisition systems specifically designed for use in applications with mixed +5V (analog) and +3V (digital) supply voltages. They operate with a single +5V analog supply or dual  $\pm 5V$  analog supplies, and combine an 8-channel multiplexer, high-bandwidth track/hold, and serial interface with high conversion speed and low power consumption. A 4-wire serial interface connects directly to SPI/MICROWIRE<sup>®</sup> devices without external logic, and a serial strobe output allows direct connection to TMS320-family digital signal processors. The MAX1202/MAX1203 use either the internal clock or an external serial-interface clock to perform successive approximation analog-to-digital conversions. The serial interface operates at up to 2MHz. The MAX1202 features an internal 4.096V reference, while the MAX1203 requires an external reference. Both parts have a reference-buffer amplifier that simplifies gain trim. They also have a VL pin that is the power supply for the digital outputs. Output logic levels (3V, 3.3V, or 5V) are determined by the value of the voltage applied to this pin. These devices provide a hard-wired active-low SHDN pin and two software-selectable power-down modes. Accessing the serial interface automatically powers up the devices. A quick turn-on time enables the MAX1202/MAX1203 to be shut down between conversions, allowing the user to optimize supply currents. By customizing power-down between conversions, supply current can drop below 10 $\mu$ A at reduced sampling rates. The MAX1202/MAX1203 are available in 20-pin SSOP and PDIP packages, and are specified for the commercial and extended temperature ranges.

## II. Manufacturing Information

A. Description/Function:	5V, 8-Channel, Serial, 12-Bit ADCs with 3V Digital Interface
B. Process:	S3
C. Fabrication Location:	USA
D. Assembly Location:	Philippines, Malaysia
E. Date of Initial Production:	March 5, 1997

## III. Packaging Information

A. Package Type:	20-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:	#05-0101-0446
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:	125°C/W
K. Single Layer Theta Jc:	33°C/W
L. Multi Layer Theta Ja:	83°C/W
M. Multi Layer Theta Jc:	33°C/W

## IV. Die Information

A. Dimensions:	125X155 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:	3.0 microns (as drawn)
F. Minimum Metal Spacing:	3.0 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: Eric Wright (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 135C biased (static) life test are shown in Table 1. Using these results, the Failure Rate ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 80 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 13.7 \times 10^{-9}$$

$$\lambda = 13.7 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 S3 Process results in a FIT Rate of 0.04 @ 25C and 0.69 @ 55C (0.8 eV, 60% UCL)

### B. E.S.D. and Latch-Up Testing

The AD91 die type has been found to have all pins able to withstand an HBM transient pulse of +/-1500V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250mA and overvoltage per JEDEC JESD78.

**Table 1**  
Reliability Evaluation Test Results

**MAX1202**

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

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