RELIABILITY REPORT

FOR

MAX1377ATP+
(MAX1377/MAX1379/MAX1383)

PLASTIC ENCAPSULATED DEVICES

January 22, 2009

MAXIM INTEGRATED PRODUCTS
120 SAN GABRIEL DR.
SUNNYVALE, CA 94086

Approved by

<table>
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<tr>
<th>Ken Wendel</th>
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<tr>
<td>Quality Assurance</td>
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<tr>
<td>Director, Reliability Engineering</td>
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</table>
Conclusion

The MAX1377ATP+ 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.

Table of Contents

I. ........Device Description                      V. ........Quality Assurance Information
II. ........Manufacturing Information              VI. .......Reliability Evaluation
III. .......Packaging Information                 IV. .......Die Information
       .....Attachments

I. Device Description

A. General

The MAX1377/MAX1379/MAX1383 feature two simultaneous-sampling, low-power, 12-bit ADCs with serial interface and internal voltage reference. Fast sampling rate, low power dissipation, and excellent dynamic performance make the MAX1377/MAX1379/MAX1383 ideal for industrial process control, motor control, and RF applications. Conversion results are available through a SPI(tm)/QSPI(tm)/MICROWIRE(tm)/DSP-compatible interface with independent serial digital outputs for each channel. The serial outputs allow twice as much data to be transferred at the given clock rate. The conversion results for both ADCs can also be output on a single digital output for microcontrollers (µCs) and DSPs with only a single serial input available. The MAX1377 operates from a 2.7V to 3.6V analog supply and the MAX1379/MAX1383 operate from a 4.75V to 5.25V analog supply. A separate 1.8V to AVDD digital supply allows interfacing to low voltage logic without the use of level translators. Two power-down modes, partial and full, allow the MAX1377/MAX1379 and MAX1383 (full power-down only) to save power between conversions. Partial power-down mode reduces the supply current to 2mA while leaving the reference enabled for quick power-up. Full powerdown mode reduces the supply current to 1µA. The MAX1377/MAX1379 inputs accept voltages between zero and the reference voltage or ±VREF/2. The MAX1383 offers an input voltage range of ±10V, which is ideal for industrial and motor-control applications. The input to each of the ADCs supports either a true-differential input or two single-ended inputs. The MAX1377/MAX1379/MAX1383 are available in a 20-pin TQFN package, and are specified for the automotive (-40°C to +125°C) temperature range.
II. Manufacturing Information

A. Description/Function: Dual, 12-Bit, 1.25 Msps, Simultaneous-Sampling ADCs with Serial Interface
B. Process: B6
C. Number of Device Transistors: 
D. Fabrication Location: California
E. Assembly Location: ASAT China, UTL Thailand
F. Date of Initial Production: 7/22/2008

III. Packaging Information

A. Package Type: 20-pin TQFN 5x5
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: #05-9000-1458
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: 48°C/W
K. Single Layer Theta Jc: 2.1°C/W
L. Multi Layer Theta Ja: 30°C/W
M. Multi Layer Theta Jc: 2.1°C/W

IV. Die Information

A. Dimensions: 114 X 124 mils
B. Passivation: Si3N4/SiO2 (Silicon nitride/ Silicon dioxide
C. Interconnect: Aluminum/Si (Si = 1%)
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: 5 mil. Sq.
H. Isolation Dielectric: SiO2
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 135°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate ($\lambda$) is calculated as follows:

$$
\frac{1}{\lambda} = \frac{1.83}{192 \times 4340 \times 48 \times 2}
$$

(Chi square value for MTTF upper limit)

$\lambda = 22.4 \times 10^{-9}$

$\lambda = 22.4$ 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 B6 Process results in a FIT Rate of 0.8 @ 25C and 14.2 @ 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 AC62 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500 V per JEDEC JESD22-A114-D. Latch-Up testing has shown that this device withstands a current of +/-250 mA, 1.5xVCCmax OverVoltage per JESD78.
<table>
<thead>
<tr>
<th>TEST ITEM</th>
<th>TEST CONDITION</th>
<th>FAILURE IDENTIFICATION</th>
<th>SAMPLE SIZE</th>
<th>NUMBER OF FAILURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Static Life Test (Note 1)</td>
<td>Ta = 135°C Biased Time = 192 hrs.</td>
<td>DC Parameters &amp; functionality</td>
<td>48</td>
<td>0</td>
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<td>Moisture Testing (Note 2)</td>
<td>Ta = 85°C RH = 85% Biased Time = 1000hrs.</td>
<td>DC Parameters &amp; functionality</td>
<td>77</td>
<td>0</td>
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<td>Mechanical Stress (Note 2)</td>
<td>Temperature Cycle</td>
<td>DC Parameters &amp; functionality</td>
<td>77</td>
<td>0</td>
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</table>

Note 1: Life Test Data may represent plastic DIP qualification lots.
Note 2: Generic Package/Process data