RELIABILITY REPORT

FOR

MAX1286ETA+T

PLASTIC ENCAPSULATED DEVICES

February 18, 2011

**MAXIM INTEGRATED PRODUCTS**

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

| **Approved by** |
|---|
| Richard Aburano |
| Quality Assurance |
| Manager, Reliability Operations |

**Conclusion**

The MAX1286ETA+T 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**

A. General

The MAX1286-MAX1289 are low-cost, micropower, serial output 12-bit analog-to-digital converters (ADCs) available in a tiny 8-pin SOT23 and an 8-pin TDFN. The MAX1286/MAX1288 operate with a single +5V supply. The MAX1287/MAX1289 operate with a single +3V supply. The devices feature a successive-approximation ADC, automatic shutdown, fast wakeup (1.4µs), and a high-speed 3-wire interface. Power consumption is only 0.5mW (VDD = +2.7V) at the maximum sampling rate of 150ksps. AutoShutdown™ (0.2µA) between conversions results in reduced power consumption at slower throughput rates. The MAX1286/MAX1287 provide 2-channel, single-ended operations and accept input signals from 0 to V REF. The MAX1288/MAX1289 accept true-differential inputs ranging from 0 to VREF. Data is accessed using an external clock through the 3-wire SPI™-/QSPI™-/MICROWIRE™-compatible serial interface. Excellent dynamic performance, low power, ease of use, and small package size make these converters ideal for portable battery-powered data-acquisition applications, and for other applications that demand low power consumption and minimal space.

## II. Manufacturing Information

| | |
|---|---|
| A. Description/Function: | 150ksps, 12-Bit, 2-Channel Single-Ended, and 1-Channel True-Differential ADCs |
| B. Process: | C6Y |
| C. Number of Device Transistors: | 6119 |
| D. Fabrication Location: | Japan |
| E. Assembly Location: | China, Malaysia, Philippines, Thailand |
| F. Date of Initial Production: | October 26, 2001 |

## III. Packaging Information

| | |
|---|---|
| A. Package Type: | 8-pin TDFN 3x3 |
| 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: | #05-2101-0048 |
| 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: | 54°C/W |
| K. Single Layer Theta Jc: | 8.3°C/W |
| L. Multi Layer Theta Ja: | 41°C/W |
| M. Multi Layer Theta Jc: | 8.3°C/W |

## IV. Die Information

| | |
|---|---|
| A. Dimensions: | 90 X 45 mils |
| B. Passivation: | $Si_3N_4/SiO_2$ (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: | 5 mil. Sq. |
| H. Isolation Dielectric: | $SiO_2$ |
| I. Die Separation Method: | Wafer Saw |

**V. Quality Assurance Information**

| | |
|---|---|
| A. Quality Assurance Contacts: | Richard Aburano (Manager, Reliability Operations)<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 135°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate ($\lambda$) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 134 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 8.2 \times 10^{-9}$

$\lambda$ = 8.2 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 C6Y Process results in a FIT Rate of 0.90 @ 25C and 15.55 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot E0B2GA007C, D/C 0952)

The AC13-2 die type has been found to have all pins able to withstand a HBM transient pulse of +/- 2500V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/- 100mA and overvoltage per JEDEC JESD78.

**Table 1**
Reliability Evaluation Test Results

**MAX1286ETA+T**

| TEST ITEM | TEST CONDITION | FAILURE IDENTIFICATION | SAMPLE SIZE | NUMBER OF FAILURES | COMMENTS |
|---|---|---|---|---|---|
| **Static Life Test** (Note 1) | | | | | |
| | Ta = 135°C<br>Biased<br>Time = 192 hrs. | DC Parameters & functionality | 134 | 0 | I0B2DA016Q, D/C 0622 |

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