RELIABILITY REPORT

FOR

MAX7058ATG+

PLASTIC ENCAPSULATED DEVICES

March 24, 2009

**MAXIM INTEGRATED PRODUCTS**

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

| **Approved by** |
| --- |
| Ken Wendel |
| Quality Assurance |
| Director, Reliability Engineering |

**Conclusion**

The MAX7058ATG+ 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 MAX7058 UHF transmitter alternatively transmits ASK/OOK data at 315MHz or 390MHz using a single crystal. The MAX7058 has internal tuning capacitors at the output of the power amplifier that can be programmed for matching to the antenna or load. The MAX7058 can transmit at a data rate up to 100kbps NRZ (50kbps Manchester coded). Typical transmitted power into a 50  load is +10dBm. The MAX7058 operates from +2.1V to +3.6V and draws under 8.0mA of current. The standby current is less than 1µA at room temperature. A 15MHz crystal is used as the reference for 315MHz and 390MHz operation by selecting synthesizer-divide ratios of 21 and 26, respectively.  The MAX7058 is available in a 4mm × 4mm, 24-pin thin QFN package and is specified to operate in the â€"40°C to +125°C automotive temperature range.

## II. Manufacturing Information

| | |
|---|---|
| A. Description/Function: | 315MHz/390MHz Dual-Frequency ASK Transmitter |
| B. Process: | 0.35 um |
| C. Number of Device Transistors: | |
| D. Fabrication Location: | Taiwan |
| E. Assembly Location: | ASAT China, UTL Thailand |
| F. Date of Initial Production: | January 26, 2008 |

## III. Packaging Information

| | |
|---|---|
| A. Package Type: | 24-pin TQFN 4x4 |
| B. Lead Frame: | Copper |
| C. Lead Finish: | 100% matte Tin |
| D. Die Attach: | Conductive Epoxy |
| E. Bondwire: | Au (1.0 mil dia.) |
| F. Mold Material: | Epoxy with silica filler |
| G. Assembly Diagram: | # |
| 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: | 2.7°C/W |
| L. Multi Layer Theta Ja: | 36°C/W |
| M. Multi Layer Theta Jc: | 2.7°C/W |

## IV. Die Information

| | |
|---|---|
| A. Dimensions: | 64 X 64 mils |
| B. Passivation: | Silicon Dioxide/Silicon Nitride |
| C. Interconnect: | Al/Cu |
| D. Backside Metallization: | None |
| E. Minimum Metal Width: | 0.35 um |
| F. Minimum Metal Spacing: | 0.35 um |
| G. Bondpad Dimensions: | 5 mil. Sq. |
| H. Isolation Dielectric: | Silicon Dioxide |
| I. Die Separation Method: | Saw |

**V. Quality Assurance Information**

| | |
|---|---|
| A. Quality Assurance Contacts: | Ken Wendel (Director, Reliability Engineering)<br>Bryan Preeshl (Managing Director 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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 48 \times 2}$$ (Chi square value for MTTF upper limit)

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

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

$\lambda = 22.4$ 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 TS352P3M Process results in a FIT Rate of 0.43 @ 25C and 7.50 @ 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 LF08 die type has been found to have all pins able to withstand a HBM transient pulse of 2500 per JEDEC JESD22-A114-D. Latch-Up testing has shown that this device withstands a current of 250.

**Table 1**
Reliability Evaluation Test Results

**MAX7058ATG+**

| TEST ITEM | TEST CONDITION | FAILURE IDENTIFICATION | SAMPLE SIZE | NUMBER OF FAILURES |
|---|---|---|---|---|
| **Static Life Test** (Note 1) | | | | |
| | Ta = 135°C<br>Biased<br>Time = 192 hrs. | DC Parameters & functionality | 48 | 0 |
| **Moisture Testing** (Note 2) | | | | |
| 85/85 | Ta = 85°C<br>RH = 85%<br>Biased<br>Time = 1000hrs. | DC Parameters & functionality | 77 | 0 |
| **Mechanical Stress** (Note 2) | | | | |
| Temperature Cycle | -65°C/150°C<br>1000 Cycles<br>Method 1010 | DC Parameters & functionality | 77 | 0 |

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