RELIABILITY REPORT

FOR

MAX7049ATI+

PLASTIC ENCAPSULATED DEVICES

October 9, 2011

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Conclusion

The MAX7049ATI+ 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
II. ....Manufacturing Information
III. ....Packaging Information
.....Attachments
V. ....Quality Assurance Information
VI. ....Reliability Evaluation
IV. ....Die Information

I. Device Description

A. General

The MAX7049 high-performance, single-chip, ultra-low-power ASK/FSK UHF transmitter operates in the industrial, scientific, medical (ISM) band at 288MHz to 945MHz carrier frequencies. The IC also includes a low phase noise fractional-N synthesizer for precise tuning, fast frequency agility, and low out-of-band power. To support narrow-band applications, the IC has both amplitude-shaping and frequency-shaping functions that enable the user to optimize spectral efficiency. The IC offers Tx power up to +15dBm. These features make the transmitter ideally suited for long-range applications. Additional system-level features of the IC include a digital temperature sensor and a number of flexible GPOs for monitoring radio status and for the control of external functions. A complete transmitter system can be built using a low-end microprocessor control unit (MCU), the IC, a crystal, and a small number of passive components. The IC is available in a small, 5mm x 5mm, 28-pin TQFN package with an exposed pad. It is specified to operate in the -40°C to +125°C automotive temperature range.

II. Manufacturing Information

A. Description/Function:	High-Performance, 288MHz to 945MHz ASK/FSK ISM Transmitter
B. Process:	MB3
C. Number of Device Transistors:	35824
D. Fabrication Location:	USA
E. Assembly Location:	China, Taiwan and Thailand
F. Date of Initial Production:	June 21, 2011

III. Packaging Information

A. Package Type:	28-pin TQFN
B. Lead Frame:	Copper
C. Lead Finish:	100% Matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (0.8 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-4160
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:	47°C/W
K. Single Layer Theta Jc:	2°C/W
L. Multi Layer Theta Ja:	29°C/W
M. Multi Layer Theta Jc:	2°C/W

IV. Die Information

A. Dimensions:	97.64 X 97.64 mils
B. Passivation:	BCB
C. Interconnect:	Al with top layer 100% Cu
D. Backside Metallization:	None
E. Minimum Metal Width:	0.35µm
F. Minimum Metal Spacing:	0.35µm
G. Bondpad Dimensions:	
H. Isolation Dielectric:	SiO_2
I. Die Separation Method:	Wafer Saw

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V. Quality Assurance Information

A. Quality Assurance Contacts: Richard Aburano (Manager, Reliability Engineering)
Don Lipps (Manager, 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 135 biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 157 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 7.0 \times 10^{-9}$

λ = 7.0 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 MB3 Process results in a FIT Rate of 0.08 @ 25C and 1.33 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot SL1ZBQ002D, D/C 1102)

The LF54 die type has been found to have all pins able to withstand a HBM transient pulse of +/- 1500V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/- 100mA and overvoltage per JEDEC JESD78.

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Table 1

Reliability Evaluation Test Results

MAX7049ATI+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)					
	Ta = 135	DC Parameters	80	0	SL1ZBQ002E, D/C 1103
	Biased	& functionality	77	0	SL1ZBQ002F, D/C 1102
	Time = 192 hrs.				

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

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