



RELIABILITY REPORT  
FOR  
MAX7044AKA+  
PLASTIC ENCAPSULATED DEVICES

January 26, 2012

**MAXIM INTEGRATED PRODUCTS**

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<b>Approved by</b>
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## Conclusion

The MAX7044AKA+ 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.

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### I. Device Description

#### A. General

The MAX7044 crystal-referenced phase-locked-loop (PLL) VHF/UHF transmitter is designed to transmit OOK/ASK data in the 300MHz to 450MHz frequency range. The MAX7044 supports data rates up to 100kbps, and provides output power up to +13dBm into a 50  $\Omega$  load while only drawing 7.7mA at 2.7V. The crystal-based architecture of the MAX7044 eliminates many of the common problems with SAW-based transmitters by providing greater modulation depth, faster frequency settling, higher tolerance of the transmit frequency, and reduced temperature dependence. The MAX7044 also features a low supply voltage of +2.1V to +3.6V. These improvements enable better overall receiver performance when using the MAX7044 together with a superheterodyne receiver such as the MAX1470 or MAX1473. A simple, single-input data interface and a buffered clock-out signal at 1/16th the crystal frequency make the MAX7044 compatible with almost any microcontroller or code-hopping generator. The MAX7044 is available in an 8-pin SOT23 package and is specified over the -40°C to +125°C automotive temperature range.

## II. Manufacturing Information

A. Description/Function:	300MHz to 450MHz High-Efficiency, Crystal-Based +13dBm ASK Transmitter
B. Process:	TS35
C. Number of Device Transistors:	
D. Fabrication Location:	Taiwan
E. Assembly Location:	Thailand
F. Date of Initial Production:	January 30, 2004

## III. Packaging Information

A. Package Type:	8L SOT23
B. Lead Frame:	NiPdAu
C. Lead Finish:	NiPdAu
D. Die Attach:	Non-conductive
E. Bondwire:	Au (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-0852 / D
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	1
J. Single Layer Theta Ja:	N/A
K. Single Layer Theta Jc:	80°C/W
L. Multi Layer Theta Ja:	180°C/W
M. Multi Layer Theta Jc:	60°C/W

## IV. Die Information

A. Dimensions:	52 X 32 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:	0.35μm
F. Minimum Metal Spacing:	0.35μm
G. Bondpad Dimensions:	
H. Isolation Dielectric:	SiO <sub>2</sub>
I. Die Separation Method:	Wafer Saw

**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 biased (static) life test are shown in Table 1. Using these results, the Failure Rate ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{1000 \times 4340 \times 47 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 4.5 \times 10^{-9}$$

$$\lambda = 4.5 \text{ F.I.T. (60\% confidence level @ 25}^\circ\text{C)}$$

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 TS35 Process results in a FIT Rate of 0.11 @ 25C and 1.93 @ 55C (0.8 eV, 60% UCL)

**B. E.S.D. and Latch-Up Testing (lot QNC0BQ003I D/C 0612)**

The SC34 die type has been found to have all pins able to withstand a transient pulse of:

ESD-HBM:	+/-1500V per JEDEC JESD22-A114	(lot QNC0BQ002I D/C 0612)
ESD-CDM:	+/- 500V per JEDEC JESD22-C101	(lot QNC0BQ003I D/C 0612)

Latch-Up testing has shown that this device withstands a current of +/- 100mA.

**Table 1**  
Reliability Evaluation Test Results

**MAX7044AKA+**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
<b>Static Life Test</b> (Note 1)	Ta = 135°C Biased Time = 1000 hrs.	DC Parameters & functionality	47	0	QNC0BQ0031, D/C 0612

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