

RELIABILITY REPORT  
FOR  
MAX2769ETI+  
PLASTIC ENCAPSULATED DEVICES

December 4, 2008

**MAXIM INTEGRATED PRODUCTS**

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## Conclusion

The MAX2769ETI+ 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 MAX2769 is the industry's first global navigation satellite system (GNSS) receiver covering GPS, GLONASS\*, and Galileo navigation satellite systems on a single chip. This single-conversion, low-IF GNSS receiver is designed to provide high performance for a wide range of consumer applications, including mobile handsets. Designed on Maxim's advanced, low-power SiGe BiCMOS process technology, the MAX2769 offers the highest performance and integration at a low cost. Incorporated on the chip is the complete receiver chain, including a dual-input LNA and mixer, followed by the image-rejected filter, PGA, VCO, fractional-N frequency synthesizer, crystal oscillator, and a multibit ADC. The total cascaded noise figure of this receiver is as low as 1.4dB. The MAX2769 completely eliminates the need for external IF filters by implementing on-chip monolithic filters and requires only a few external components to form a complete low-cost GPS receiver solution. The MAX2769 is the most flexible receiver on the market. The integrated delta-sigma fractional-N frequency synthesizer allows programming of the IF frequency within a  $\pm 40\text{Hz}$  accuracy while operating with any reference or crystal frequencies that are available in the host system. The integrated ADC outputs 1 or 2 quantized bits for both I and Q channels, or up to 3 quantized bits for the I channel. Output data is available either at the CMOS logic or at the limited differential logic levels. The MAX2769 is packaged in a compact 5mm x 5mm, 28-pin thin QFN package with an exposed paddle. The part is also available in die form. Contact the factory for further information.

## II. Manufacturing Information

A. Description/Function:	Universal GPS Receiver
B. Process:	MB3H
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	ASAT China, UTL Thailand, Unisem Malaysia
F. Date of Initial Production:	April 20, 2007

## III. Packaging Information

A. Package Type:	28-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:	#05-9000-2197
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:	2.1°C/W
L. Multi Layer Theta Ja:	29°C/W
M. Multi Layer Theta Jc:	2.1°C/W

## IV. Die Information

A. Dimensions:	92 X 85 mils
B. Passivation:	Si <sub>3</sub> N <sub>4</sub> /SiO <sub>2</sub> (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Aluminum/Cu (Cu = 0.5%)
D. Backside Metallization:	None
E. Bondpad Opening Dimensions:	4 mil. Sq.
F. Isolation Dielectric:	SiO <sub>2</sub>
G. 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 xx biased (static) life test are pending. Using these results, the Failure Rate ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 50 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 21.5 \times 10^{-9}$$
$$\lambda = 21.5 \text{ F.I.T. (60\% confidence level @ 25}^\circ\text{C)}$$

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly 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 MB3H Process results in a FIT Rate of 0.7 @ 25C and 11.5 @ 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 WV10-1 die type has been found to have all pins able to withstand a HBM transient pulse of +/-500 V per JEDEC JESD22-A114-D. Latch-Up testing has shown that this device withstands a current of +/-250 mA.

**Table 1**  
Reliability Evaluation Test Results

**MAX2769ETI+**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
<b>Static Life Test</b> (Note 1)	Ta = xx Biased Time = 192 hrs.	DC Parameters & functionality	50	0
<b>Moisture Testing</b> (Note 2) 85/85	Ta = 85°C RH = 85% Biased Time = 1000hrs.	DC Parameters & functionality	77	0
<b>Mechanical Stress</b> (Note 2) Temperature Cycle	-65°C/150°C 1000 Cycles Method 1010	DC Parameters & functionality	77	0

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

Note 2: Generic Package/Process data