

RELIABILITY REPORT  
FOR  
MAX7036GTP+  
PLASTIC ENCAPSULATED DEVICES

June 12, 2009

**MAXIM INTEGRATED PRODUCTS**

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

The MAX7036GTP+ 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 MAX7036 low-cost receiver is designed to receive amplitude-shift-keyed (ASK) and on-off-keyed (OOK) data in the 300MHz to 450MHz frequency range. The receiver has an RF input signal range of -109dBm to 0dBm.

The MAX7036 requires few external components and has a power-down pin to put it in a low-current sleep mode, making it ideal for cost- and power-sensitive applications. The low-noise amplifier (LNA), phase-locked loop (PLL), mixer, IF filter, received-signal-strength indicator (RSSI), and baseband sections are all on-chip. The MAX7036 uses very-low intermediate frequency (VLIF) architecture. The MAX7036 integrates the IF filter on-chip and therefore eliminates an external ceramic filter, reducing the bill-of-materials cost. The device also contains an on-chip automatic gain control (AGC) that reduces the LNA gain by 30dB when the input signal power is large. The MAX7036 operates from either a 5V or a 3.3V power supply and draws 5.5mA (typ) of current.

The MAX7036 is available in a 20-pin thin QFN package with an exposed pad and is specified over the AEC-Q100 Level 2 (-40°C to +105°C) temperature range.

## II. Manufacturing Information

A. Description/Function:	300MHz to 450MHz ASK Receiver with Internal IF Filter
B. Process:	
C. Number of Device Transistors:	3657
D. Fabrication Location:	Taiwan
E. Assembly Location:	ASAT China, UTL Thailand
F. Date of Initial Production:	January 15, 2009

## III. Packaging Information

A. Package Type:	20-pin TQFN 5x5
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:	2.1°C/W
L. Multi Layer Theta Ja:	32°C/W
M. Multi Layer Theta Jc:	2.7°C/W

## IV. Die Information

A. Dimensions:	75 X 55 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)  
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 135°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 49 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

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

$\lambda$  = 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 LF06 die type has been found to have all pins able to withstand a HBM transient pulse of +/-1000 V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250 mA, 1.5x VCCMax Overvoltage per JESD78.

**Table 1**  
Reliability Evaluation Test Results

**MAX7036GTP+**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
<b>Static Life Test</b> (Note 1)	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	49	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