

RELIABILITY REPORT
FOR
MAX2821ETM+
PLASTIC ENCAPSULATED DEVICES

September 24, 2009

MAXIM INTEGRATED PRODUCTS

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Approved by
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Quality Assurance
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Conclusion

The MAX2821ETM+ 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 MAX2820/MAX2820A and MAX2821/MAX2821A single-chip zero-IF transceivers are designed for the 802.11b (11Mbps) applications operating in the 2.4GHz to 2.5GHz ISM band. The transceivers are nearly identical, except the MAX2821 and MAX2821A also provide a low-power shutdown mode and an analog voltage reference output. The MAX2820A/MAX2821A are cost-reduced versions, virtually identical in pinout and performance to the MAX2820/MAX2821. The transceivers include all the circuitry required to implement an 802.11b RF-to-baseband transceiver solution, providing a fully integrated receive path, transmit path, VCO, frequency synthesis, and baseband/control interface. Only a PA, RF switch, RF BPF, and a small number of passive components are needed to form the complete radio front-end solution. The ICs eliminate the need for external IF and baseband filters by utilizing a direct-conversion radio architecture and monolithic baseband filters for both receiver and transmitter. They are specifically optimized for 802.11b (11Mbps CCK) applications. The baseband filtering and Rx and Tx signal paths support the CCK modulation scheme for BER = 10⁻⁵ at the required sensitivity levels. The devices are suitable for the full range of 802.11b data rates (1Mbps, 2Mbps, 5.5Mbps, and 11Mbps) and also the higher-rate 22Mbps PBCC standard. The MAX2820 and MAX2821 are available in a 7mm x 7mm 48-lead QFN package. The MAX2820, MAX2821, MAX2820A, and MAX2821A are available in a 48-lead thin QFN package.

II. Manufacturing Information

A. Description/Function:	2.4GHz 802.11b Zero-IF Transceivers
B. Process:	G4
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Thailand, Malaysia
F. Date of Initial Production:	January 21, 2003

III. Packaging Information

A. Package Type:	48-pin TQFN 7x7
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:	#05-9000-0097
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:	37°C/W
K. Single Layer Theta Jc:	1.3°C/W
L. Multi Layer Theta Ja:	26°C/W
M. Multi Layer Theta Jc:	1°C/W

IV. Die Information

A. Dimensions:	142 X 166 mils
B. Passivation:	Si ₃ N ₄
C. Interconnect:	Au
D. Backside Metallization:	None
E. Minimum Metal Width:	1.2 microns (as drawn) Metal 1, 2 & 3 5.6 microns (as drawn) Metal 4
F. Minimum Metal Spacing:	1.6 microns (as drawn) Metal 1, 2 & 3, 4.2 microns (as drawn) Metal 4
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	SiO ₂
I. 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 150°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 45 \times 2} \text{ (Chi square value for MTTF upper limit)}$$

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

$$\lambda = 10.6 \times 10^{-9}$$

$$\lambda = 10.6 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 G4 Process results in a FIT Rate of 0.02 @ 25C and 0.37 @ 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 WD05-1 die type has been found to have all pins able to withstand a HBM transient pulse of +/-200 V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-200 mA.

Table 1
Reliability Evaluation Test Results

MAX2821ETM+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)				
	Ta = 150°C Biased Time = 192 hrs.	DC Parameters & functionality	45	0
Moisture Testing (Note 2)				
HAST	Ta = 130°C RH = 85% Biased Time = 96hrs.	DC Parameters & functionality	77	0
Mechanical Stress (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