

RELIABILITY REPORT
FOR
MAX2838ETM+
PLASTIC ENCAPSULATED DEVICES

January 26, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.
SUNNYVALE, CA 94086

Approved by
Ken Wendel
Quality Assurance
Director, Reliability Engineering

Conclusion

The MAX2838ETM+ 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	V.Quality Assurance Information
II.Manufacturing Information	VI.Reliability Evaluation
III.Packaging Information	IV.Die Information
.....Attachments	

I. Device Description

A. General

The MAX2838 direct-conversion, zero-IF, RF transceiver is designed specifically for 3.3GHz to 3.9GHz wireless broadband systems. The MAX2838 completely integrates all circuitry required to implement the RF transceiver function, providing RF-to-baseband receive path, baseband-to-RF transmit path, VCO, frequency synthesizer, and baseband/control interface. The device includes a fast-settling sigma-delta RF synthesizer with smaller than 29Hz frequency steps. The MAX2838 supports 2Tx, 2Rx MIMO applications with a master device providing coherent LO to the slave device. The transceiver IC also integrates circuits for on-chip DC-offset cancellation, I/Q error, and carrier-leakage detection circuits. Only an RF bandpass filter (BPF), TCXO, RF switch, PA, and a small number of passive components are needed to form a complete wireless broadband RF radio solution. The MAX2838 completely eliminates the need for an external SAW filter by implementing on-chip monolithic filters for both the receiver and transmitter. The baseband filters along with the Rx and Tx signal paths are optimized to meet the stringent noise figure and linearity specifications. The device supports up to 2048-FFT OFDM and implements programmable channel filters for 1.5MHz to 28MHz RF channel bandwidths. The transceiver requires only 2 μ s Tx-Rx switching time. The IC is available in a small 48-pin thin QFN package measuring only 6mm x 6mm x 0.8mm.

II. Manufacturing Information

A. Description/Function:	3.3GHz to 3.8GHz Wireless Broadband RF Transceiver
B. Process:	MB3H
C. Number of Device Transistors:	75223
D. Fabrication Location:	Sunnyvale
E. Assembly Location:	UTL Thailand
F. Date of Initial Production:	Pre 1997

III. Packaging Information

A. Package Type:	48-pin TQFN 6x6
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:	38°C/W
K. Single Layer Theta Jc:	1.4°C/W
L. Multi Layer Theta Ja:	27°C/W
M. Multi Layer Theta Jc:	1.4°C/W

IV. Die Information

A. Dimensions:	141 X 144 mils
B. Passivation:	BCB
C. Interconnect:	2 x Aluminum/Cu (Cu = 0.5%), top layer 100% 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:	SiO ₂
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 (λ) is calculated as follows:

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

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

$$\lambda = 23.3 \times 10^{-9}$$

$$\lambda = 23.3 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly 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 WD33-6 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2000 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

MAX2838ETM+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	45	0
Moisture Testing (Note 2) 85/85	Ta = 85°C RH = 85% Biased Time = 1000hrs.	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