RELIABILITY REPORT

FOR MAX2599ELB+T

PLASTIC ENCAPSULATED DEVICES

May 26, 2010

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Quality Assurance
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Conclusion

The MAX2599ELB+T 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 MAX2599 complete monolithic direct-conversion I/Q transmitter is designed for WCDMA/HSPA femto basestation transmitter applications. The device is TS25.104 compliant in the 2110MHz to 2170MHz band. The unique bits-to-RF architecture of the MAX2599 integrates a power amplifier (PA), a quadrature mixer, variable-gain RF and baseband amplifiers, baseband filters, I and Q digital-to-analog converters (DACs), and a fractional-N frequency synthesizer for local oscillator (LO) generation. Data is transferred from the baseband/DSP to the radio by a digital 1-bit sigma-delta modulated I and Q bitstream through an LVDS-like interface. The operating mode of the radio is fully programmable by a 3-wire serial interface. The MAX2599 is specified for operation in the extended -40°C to +85°C temperature range and is available in a 9mm x 9mm x 1.4mm fcLGA package with exposed paddle (EP).

II. Manufacturing Information

A. Description/Function:	Femto Basestation Bits-to-RF Radio Transmitter
B. Process:	MB3
C. Number of Device Transistors:	
D. Fabrication Location:	California
E. Assembly Location:	Japan and Malaysia
F. Date of Initial Production:	February 13, 2008

III. Packaging Information

A. Package Type:	64-pin Flipchip LGA
B. Lead Frame:	N/A
C. Lead Finish:	N/A
D. Die Attach:	None
E. Bondwire:	N/A (N/A mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-2888
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 3
J. Single Layer Theta Ja:	°C/W
K. Single Layer Theta Jc:	°C/W
L. Multi Layer Theta Ja:	33.6°C/W
M. Multi Layer Theta Jc:	16.5°C/W

IV. Die Information

A. Dimensions:	144.9 X 193.7 mils
B. Passivation:	BCB
C. Interconnect:	Al with top layer 100% Cu
D. Backside Metallization:	None
E. Minimum Metal Width:	0.35µm
F. Minimum Metal Spacing:	0.35µm
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:	Richard Aburano (Manager, Reliability Operations) 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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 268 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 4.1 \times 10^{-9}$

$\lambda = 4.1$ 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 MB3 Process results in a FIT Rate of 0.08 @ 25C and 1.33 @ 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.

B. E.S.D. and Latch-Up Testing

The WC39-7 die type has been found to have all pins able to withstand a HBM transient pulse of +/- 1000V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of 250mA.

Table 1
Reliability Evaluation Test Results

MAX2599ELB+T

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	268	0
Moisture Testing (Note 2)				
HAST	Ta = 130°C RH = 85% Biased Time = 96hrs.	DC Parameters & functionality	45	0
Mechanical Stress (Note 2)				
Temperature Cycle	-55ºC/125ºC 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