MAX9985ETX
Rev. A

RELIABILITY REPORT

FOR

MAX9985ETX

PLASTIC ENCAPSULATED DEVICES

January 30, 2008

MAXIM INTEGRATED PRODUCTS

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Conclusion

The MAX9985 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 MAX9985 high-linearity, dual-channel downconversion mixer is designed to provide approximately 6dB gain, +28.5dBm of IIP3, and 10.5dB of noise figure (NF) ideal for diversity receiver applications. With a 700MHz to 1000MHz RF frequency range and a 570MHz to 865MHz LO frequency range, this mixer is ideal for low-side LO injection architectures. In addition, the broad frequency range makes the MAX9985 ideal for GSM 850/950, 2G/2.5G EDGE, WCDMA, cdma2000®, and iDEN® base-station applications.

The MAX9985 dual-channel downconverter achieves ahigh level of component integration. The MAX9985 integrates two double-balanced active mixer cores, two LO buffers, a dual-input LO selectable switch, and a pair of differential IF output amplifiers. In addition, integrated on-chip baluns at the RF and LO ports allow for single-ended RF and single-ended LO inputs. The MAX9985 requires a typical 0dBm LO drive. Supply current is adjustable up to 400mA.

The MAX9985 is available in a 36-pin thin QFN package (6mm x 6mm) with an exposed paddle. Electrical performance is guaranteed over the extended temperature range, from T_C = -40°C to +85°C.

B. Absolute Maximum Ratings

Item	Rating
VCC to GND	-0.3V to +5.5V
LO1, LO2 to GND	±0.3V
Any Other Pins to GND	-0.3V to (VCC + 0.3V)
RFMAIN, RFDIV, and LO_ Input Power	+20dBm
RFMAIN, RFDIV Current (RF is DC shorted to GND through balun)	50mA
Continuous Power Dissipation (TC = +70°C) (Note A)	
36-Pin Thin QFN (derate 26mW/°C above +70°C)	10.8W
Operating Temperature Range	-40°C to +85°C
Maximum Junction Temperature Range	+150°C
θJA	+38°C/W
θJC	7.4°C/W
Storage Temperature Range	-65°C to +150°C
Lead Temperature (soldering, 10s)	+300°C

Note A: TC is the temperature on the exposed paddle of the package.

II. Manufacturing Information

A. Description/Function: Dual, SiGe, High-Linearity, 700MHz to 1000MHz Downconversion Mixer with LO Buffer/Switch

B. Process: GST4

C. Number of Device Transistors: 3027

D. Fabrication Location: Oregon, USA

E. Assembly Location: Thailand

F. Date of Initial Production: January, 2007

III. Packaging Information

A. Package Type: **36-Pin Thin QFN (6x6)**

B. Lead Frame: Copper

C. Lead Finish: Solder Plate

D. Die Attach: Silver-filled epoxy

E. Bondwire: Gold (1.0 mil dia.)

F. Mold Material: Epoxy with silica filler

G. Assembly Diagram: Buildsheet # 05-9000-2774

H. Flammability Rating: Class: UL94-V0

I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C: Level 1

IV. Die Information

A. Dimensions: 131 x 131mils

B. Passivation: Si_3N_4 (Silicon nitride)

C. Interconnect: Au

D. Backside Metallization: None

E. Minimum Metal Width: Metal1: 1.2; Metal2: 1.2; Metal3: 1.2; Metal4: 5.6 microns (as drawn)

F. Minimum Metal Spacing: Metal1: 1.6; Metal2: 1.6; Metal3: 1.6; Metal4: 4.2 microns (as drawn)

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: Jim Pedicord (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 150°C biased (static) life test are shown in **Table 1**. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 9706 \times 48 \times 2}$$ (Chi square value for MTTF upper limit)

Temperature Acceleration factor assuming an activation energy of 0.8eV

$\lambda = 10.24 \times 10^{-8}$ λ = 10.24 F.I.T. (60% confidence level @ 25°C)

This low failure rate represents data collected from Maxim's reliability qualification and monitor programs. Maxim also performs weekly Burn-In on samples from production to assure reliability of its processes. The reliability required for lots which receive a burn-in qualification is 59 F.I.T. at a 60% confidence level, which equates to 3 failures in an 80 piece sample. Maxim performs failure analysis on rejects from lots exceeding this level. The Burn-In Schematic (Spec.# 06-7247) shows the static circuit used for this test. Maxim also performs 1000 hour life test monitors quarterly for each process. This data is published in the Product Reliability Reports (**RR-1M** & **RR-B3A**). Current monitor data for the GST4 Process results in a FIT Rate of 0.10 @ 25C and 1.70 @ 55C (0.8 eV, 60% UCL)

B. Moisture Resistance Tests

Maxim evaluates pressure pot stress from every assembly process during qualification of each new design. Pressure Pot testing must pass a 20% LTPD for acceptance. Additionally, industry standard 85°C/85%RH or HAST tests are performed quarterly per device/package family.

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

The CR35 die type has been found to have all pins able to withstand a transient pulse of +/-1500V, per JEDEC JESD22-A114-E. Latch-Up testing has shown that this device withstands a current of ±250mA.

Table 1
Reliability Evaluation Test Results

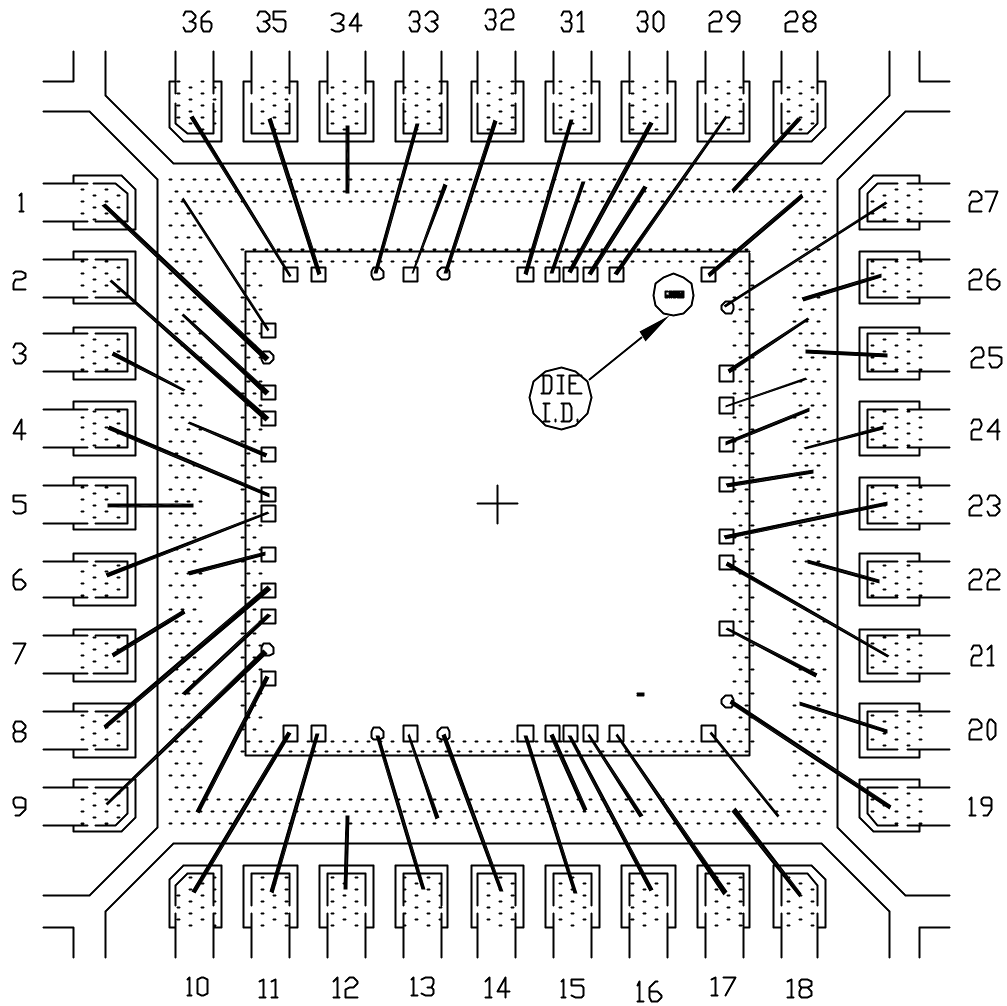
MAX9985ETX

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	48	0
Moisture Testing (Note 2)				
Pressure Pot	Ta = 121°C P = 15 psi. RH= 100% Time = 168hrs.	DC Parameters & functionality	77	0
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

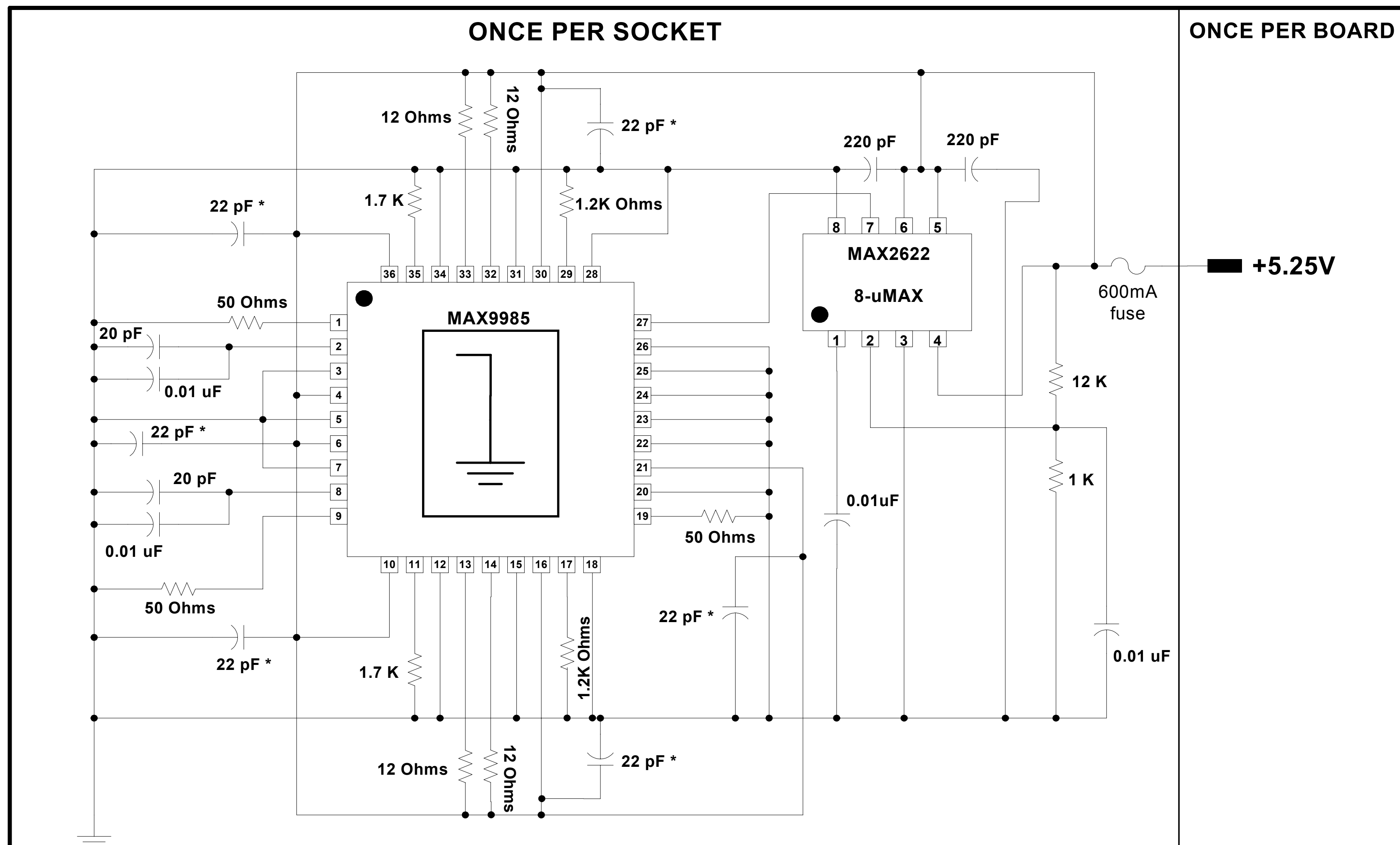
Note 1: Life Test Data may represent plastic DIP qualification lots.
Note 2: Generic process/package data.

6x6x0.8mm THIN QFN PKG.

EXPOSED PAD PKG.



PKG. CODE: T3666-2		SIGNATURES	DATE	MAXIM CONFIDENTIAL & PROPRIETARY	
CAV./PAD SIZE: 177x177	PKG.			BOND DIAGRAM #: 05-9000-2124	REV: A
	DESIGN				



DEVICES: MAX 9985 (CR35)
PACKAGE: 36-QFN (6x6) THIN
MAX. EXPECTED CURRENT = 380mA

NOTES: * Place 22pF caps as close as possible to the device. MAX2622 should be placed as close as possible with minimum length from pin 7 to pin 27 of MAX9985. The trace width should be w=1.6xh, where h is height of the substrate.
Exposed Pad must be grounded.
All resistors are 5% accurate, 1/4 watt power rated.