RELIABILITY REPORT

FOR

MAX2608EUT

PLASTIC ENCAPSULATED DEVICES

January 7, 2003

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

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Conclusion

The MAX2608 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 MAX2608 is a compact, high-performance intermediate-frequency (IF) voltage-controlled oscillator (VCO) designed specifically for demanding portable wireless communication systems. It combines monolithic construction with low-noise, low-power operation in a tiny 6-pin SOT23 package.

This low-noise VCO features an on-chip varactor and feedback capacitors that eliminate the need for external tuning elements, making the MAX2608 ideal for portable systems. Only an external inductor is required to set the oscillation frequency. In addition, an integrated differential output buffer is provided for driving a mixer or prescaler. The buffer output is capable of supplying up to -8dBm (differential) with a simple power match. It also provides isolation from load impedance variations.

The MAX2608 operates from a single +2.7V to +5.5V supply and offers low current consumption. This IF oscillator can cover the 45MHz to 650MHz frequency range.

B. Absolute Maximum Ratings

Item	Rating
VCC to GND	-0.3V to +6V
IND to GND	-0.6V to (VCC + 0.3V)
TUNE to GND	-0.3V to (VCC + 0.3V)
OUT+, OUT- to GND	-0.3V to (VCC + 0.6V)
Operating Temperature Range	-40°C to +85°C
Junction Temperature	+150°C
Storage Temperature Range	-65°C to +150°C
Lead Temperature (soldering, 10s)	+300°C
Continuous Power Dissipation (TA = +70°C)	
6-Pin SOT23	696mW
Derates above +70°C	
6-Pin SOT23	8.7mW/°C

II. Manufacturing Information

A. Description/Function:	45MHz to 650MHz, Integrated IF VCOs with Differential Output
B. Process:	MB10 Bi-CMOS Process
C. Number of Device Transistors:	158
D. Fabrication Location:	Oregon, USA
E. Assembly Location:	Thailand or Malaysia
F. Date of Initial Production:	April, 2000

III. Packaging Information

A. Package Type:	**6-Pin SOT23**
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:	# 05-2201-0011
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard JESD22-A112:	Level 1

IV. Die Information

A. Dimensions:	49 x 33 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Au
D. Backside Metallization:	None
E. Minimum Metal Width:	1.2 microns (as drawn) Metal 1&2, 2.8 microns (as drawn) Metal 3
F. Minimum Metal Spacing:	1.6 microns (as drawn) Metal 1&2, 2.8 microns (as drawn) Metal 3
G. Bondpad Dimensions:	3 mil. Octagonal
H. Isolation Dielectric:	SiO_2
I. Die Separation Method:	Wafer Saw

V. Quality Assurance Information

A. Quality Assurance Contacts: Jim Pedicord (Reliability Lab Manager)
Bryan Preeshl (Executive Director of QA)
Kenneth Huening (Vice President)

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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{1000 \times 9823 \times 32 \times 2}$$

(Chi square value for MTTF upper limit)

Temperature Acceleration factor assuming an activation energy of 0.8eV

$\lambda = 15.16 \times 10^{-9}$ $\lambda = 15.16$ 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. Maxim also performs 1000 hour life test monitors quarterly for each process. This data is published in the Product Reliability Report (**RR-B2A**).

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 WR50-4 die type has been found to have all pins able to withstand a transient pulse of 500V, per Mil-Std-883 Method 3015 (reference attached ESD Test Circuit).

Latch-Up testing has shown that this device withstands a current of ±250mA.

Table 1
Reliability Evaluation Test Results

MAX2608EUT

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	32	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	77	0

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

Attachment #1

TABLE II. Pin combination to be tested. 1/ 2/

	Terminal A (Each pin individually connected to terminal A with the other floating)	Terminal B (The common combination of all like-named pins connected to terminal B)
1.	All pins except V_{PS1} 3/	All V_{PS1} pins
2.	All input and output pins	All other input-output pins

1/ Table II is restated in narrative form in 3.4 below.
2/ No connects are not to be tested.
3/ Repeat pin combination I for each named Power supply and for ground

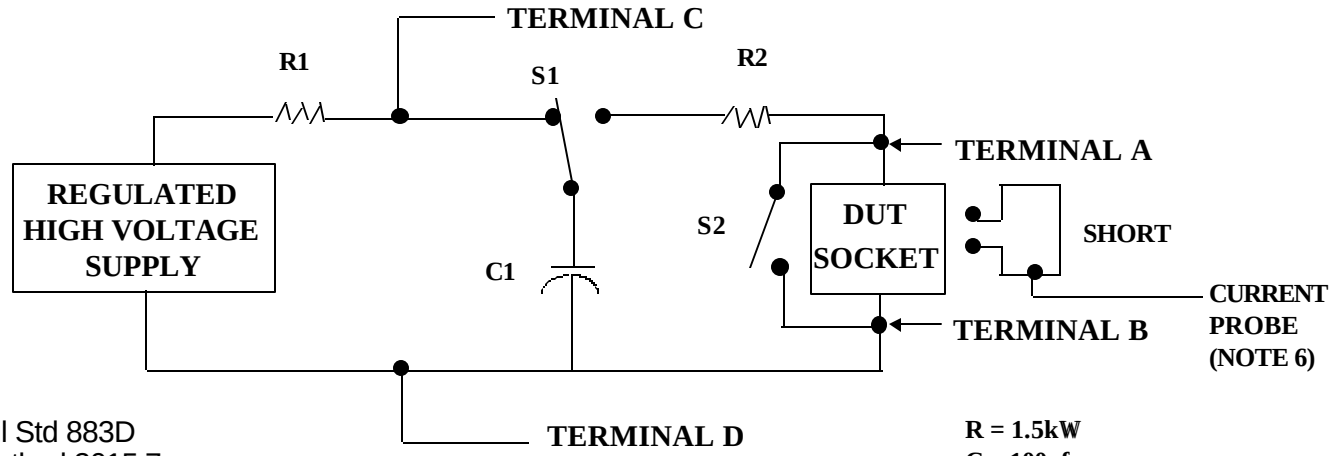
(e.g., where V_{PS1} is V_{DD}, V_{CC}, V_{SS}, V_{BB}, GND, $+V_S$, $-V_S$, V_{REF}, etc).

3.4 Pin combinations to be tested.

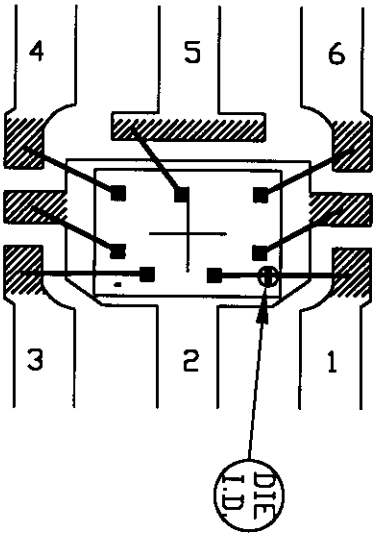
a. Each pin individually connected to terminal A with respect to the device ground pin(s) connected to terminal B. All pins except the one being tested and the ground pin(s) shall be open.

b. Each pin individually connected to terminal A with respect to each different set of a combination of all named power supply pins (e.g., V_{SS1}, or V_{SS2} or V_{SS3} or V_{CC1}, or V_{CC2}) connected to terminal B. All pins except the one being tested and the power supply pin or set of pins shall be open.

c. Each input and each output individually connected to terminal A with respect to a combination of all the other input and output pins connected to terminal B. All pins except the input or output pin being tested and the combination of all the other input and output pins shall be open.



Mil Std 883D
Method 3015.7
Notice 8



NOTE: CAVITY DOWN

PKG.CODE: U6-4		APPROVALS	DATE	MAXIM
CAV./PAD SIZE: 64x38	PKG. DESIGN			BUILDSHEET NUMBER: 05-2201-0011 / REV.: A