



RELIABILITY REPORT  
FOR  
MAX2750AUA+  
PLASTIC ENCAPSULATED DEVICES

April 9, 2010

**MAXIM INTEGRATED PRODUCTS**

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## Conclusion

The MAX2750AUA+ 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 MAX2750AUA is a self-contained voltage-controlled oscillator (VCO) intended for use over the 2370MHz to 2470MHz frequency range. The IC combines a fully integrated oscillator and output buffer in a miniature 8-pin  $\mu$ MAX® package. The inductor and varactor elements of the tank are integrated on-chip, greatly simplifying application of the part. The only required external components are a couple of supply bypass capacitors. The IC provides direct connection to the VCO tuning voltage input and the VCO buffer output. The tuning voltage input range is +0.4V to +2.4V, and the oscillator frequency tuning range is factory adjusted to provide guaranteed limits. The output signal is buffered by an amplifier stage (internally matched to 50  $\Omega$ ) to provide higher output power and isolate the device from load impedance variations. The MAX2750AUA operates over a +2.7V to +5.5V supply voltage range. Internal regulation of the oscillator supply voltage eliminates the need for an external LDO regulator for the VCO. The IC also provides a digitally controlled shutdown mode to permit implementation of sophisticated power-supply management. In shutdown, the supply current is reduced to less than 2 $\mu$ A.

## II. Manufacturing Information

A. Description/Function:	2.4GHz Monolithic Voltage-Controlled Oscillator for Automotive
B. Process:	GST3
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Thailand
F. Date of Initial Production:	October 21, 2000

## III. Packaging Information

A. Package Type:	8-pin uMAX
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (1 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:	221°C/W
K. Single Layer Theta Jc:	41.9°C/W
L. Multi Layer Theta Ja:	206.3°C/W
M. Multi Layer Theta Jc:	41.9°C/W

## IV. Die Information

A. Dimensions:	57 X 41 mils
B. Passivation:	Si <sub>3</sub> N <sub>4</sub> (Silicon nitride)
C. Interconnect:	Au
D. Backside Metallization:	None
E. Minimum Metal Width:	Metal1 = 0.5 / Metal2 = 0.6 / Metal3 = 0.6 microns (as drawn)
F. Minimum Metal Spacing:	Metal1 = 0.45 / Metal2 = 0.5 / Metal3 = 0.6 microns (as drawn)
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	SiO <sub>2</sub>
I. Die Separation Method:	Wafer Saw

## V. Quality Assurance Information

- A. Quality Assurance Contacts: Don Lipps (Manager, 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 ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{1000 \times 4340 \times 50 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 4.2 \times 10^{-9}$$

$\lambda = 4.2$  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 GST3 Process results in a FIT Rate of 0.06 @ 25C and 1.12 @ 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 WR43-1 die type has been found to have all pins able to withstand a HBM transient pulse of +/-500V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250mA.

**Table 1**  
Reliability Evaluation Test Results

**MAX2750AUA+**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
<b>Static Life Test</b> (Note 1)				
	Ta = 150°C Biased Time = 192 hrs.	DC Parameters & functionality	50	0
<b>Moisture Testing</b> (Note 2)				
HAST	Ta = 130°C RH = 85% Biased Time = 96hrs.	DC Parameters & functionality	77	0
<b>Mechanical Stress</b> (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