

RELIABILITY REPORT
FOR
MAX2640EUT+
PLASTIC ENCAPSULATED DEVICES

September 3, 2010

MAXIM INTEGRATED PRODUCTS

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Approved by
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Quality Assurance
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Conclusion

The MAX2640EUT+ 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 MAX2640/MAX2641 are low-cost, ultra-low-noise amplifiers designed for applications in the cellular, PCS, GPS, and 2.4GHz ISM frequency bands. Operating from a single +2.7V to +5.5V supply, these devices consume only 3.5mA of current while providing a low noise figure, high gain, high input IP3, and an operating frequency range that extends from 300MHz to 2500MHz. The MAX2640 is optimized for 300MHz to 1500MHz applications, with a typical performance of 15.1dB gain, input IP3 of -10dBm, and a noise figure of 0.9dB at 900MHz. The MAX2641 is optimized for 1400MHz to 2500MHz applications, with a typical performance of 14.4dB gain, an input IP3 of -4dBm, and a noise figure of 1.3dB at 1900MHz. These devices are internally biased, eliminating the need for external bias resistors and chokes. In a typical application, the only external components needed are a two-element input match, input and output blocking capacitors, and a VCC bypass capacitor. The MAX2640/MAX2641 are designed on a high-frequency, low-noise, advanced silicon-germanium process and are offered in the space-saving 6-pin SOT23 package.

II. Manufacturing Information

A. Description/Function:	300MHz to 2500MHz SiGe Ultra-Low-Noise Amplifiers
B. Process:	GST3
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Malaysia, Philippines, Thailand
F. Date of Initial Production:	October 22, 1998

III. Packaging Information

A. Package Type:	6-pin SOT23
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:	#05-7001-0331
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1
J. Single Layer Theta Jb:	115°C/W
K. Single Layer Theta Jc:	80°C/W
L. Multi Layer Theta Ja:	N/A
M. Multi Layer Theta Jc:	N/A

IV. Die Information

A. Dimensions:	28 X 34 mils
B. Passivation:	Si ₃ N ₄ (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 ₂
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 (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{700 \times 4340 \times 77 \times 2} \text{ (Chi square value for MTTF upper limit)}$$

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

$$\lambda = 3.9 \times 10^{-9}$$

$$\lambda = 3.9 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly 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. E.S.D. and Latch-Up Testing (lot NT3BD3085FA, D/C 0836)

The WR36-1 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 +/-50mA.

Table 1
Reliability Evaluation Test Results

MAX2640EUT+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C Biased Time = 700 hrs.	DC Parameters & functionality	77	0	NT3BD3085FA, D/C 0836

Note 1: Life Test Data may represent plastic DIP qualification lots.