

RELIABILITY REPORT
FOR
MAX2042ETP+
PLASTIC ENCAPSULATED DEVICES

November 15, 2011

MAXIM INTEGRATED PRODUCTS

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Conclusion

The MAX2042ETP+ 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 MAX2042 single, high-linearity upconversion/downconversion mixer provides +36dBm IIP3, 7.3dB noise figure, and 7.2dB conversion loss for 2000MHz to 3000MHz WCS, LTE, WiMAX(tm), and MMDS wireless infrastructure applications. With a wide LO frequency range of 1800MHz to 2800MHz, this particular mixer is ideal for low-side LO injection receiver and transmitter architectures. High-side LO injection is supported by the MAX2042A, which is pin-pin and functionally compatible with the MAX2042. In addition to offering excellent linearity and noise performance, the MAX2042 also yields a high level of component integration. This device includes a double-balanced passive mixer core, an LO buffer, and on-chip baluns that allow for single-ended RF and LO inputs. The MAX2042 requires a nominal LO drive of 0dBm, and supply current is typically 138mA at V_{CC} = +5.0V or 120mA at V_{CC} = +3.3V. The MAX2042 is pin compatible with the MAX2042A 2000MHz to 3900MHz mixer. The device is also pin similar with the MAX2029/MAX2031 650MHz to 1000MHz mixers, the MAX2039/MAX2041 1700MHz to 3000MHz mixers, and the MAX2044/MAX2044A 3000MHz to 4000MHz mixers, making this entire family of up/downconverters ideal for applications where a common PCB layout is used for multiple frequency bands. The MAX2042 is available in a compact 20-pin thin QFN (5mm x 5mm) package with an exposed pad. Electrical performance is guaranteed over the extended -40°C to +85°C temperature range.

II. Manufacturing Information

A. Description/Function:	SiGe High-Linearity, 2000MHz to 3000MHz Upconversion/Downconversion Mixer with LO Buffer
B. Process:	G4
C. Number of Device Transistors:	
D. Fabrication Location:	USA
E. Assembly Location:	China, Taiwan and Thailand
F. Date of Initial Production:	July 24, 2009

III. Packaging Information

A. Package Type:	20-pin TQFN 5x5
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:	#05-9000-2904
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:	48°C/W
K. Single Layer Theta Jc:	2°C/W
L. Multi Layer Theta Ja:	32°C/W
M. Multi Layer Theta Jc:	3°C/W

IV. Die Information

A. Dimensions:	91 X 80 mils
B. Passivation:	Si ₃ N ₄
C. Interconnect:	Au
D. Backside Metallization:	None
E. Minimum Metal Width:	Metal1-3 = 1.2 / Metal 4 = 5.6 microns (as drawn)
F. Minimum Metal Spacing:	Metal1-3 = 1.6 / Metal 4 = 4.2 microns (as drawn)
G. Bondpad Dimensions:	
H. Isolation Dielectric:	SiO ₂
I. Die Separation Method:	Wafer Saw

V. Quality Assurance Information

- A. Quality Assurance Contacts: Richard Aburano (Manager, Reliability Engineering)
Don Lipps (Manager, Reliability Engineering)
Bryan Preeshl (Vice President 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 135C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 96 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 11.5 \times 10^{-9}$$

$$\lambda = 11.5 \text{ F.I.T. (60\% confidence level @ 25}^\circ\text{C)}$$

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 G4 Process results in a FIT Rate of 0.02 @ 25C and 0.37 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot NHVWBQ002B, D/C 0906)

The CR43-3 die type has been found to have all pins able to withstand a HBM transient pulse of +/- 2000V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/- 250mA and overvoltage per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results

MAX2042ETP+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135C	DC Parameters	48	0	NHVWBQ002C, D/C 0906
	Biased	& functionality	48	0	NHVYBQ002B, D/C 0809
	Time = 192 hrs.				

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