

RELIABILITY REPORT
FOR
MAX2170ETL+T
PLASTIC ENCAPSULATED DEVICES

June 16, 2011

MAXIM INTEGRATED PRODUCTS

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Conclusion

The MAX2170ETL+T 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 MAX2170/MAX2171 direct-conversion to low-IF tuners are designed for Digital Audio Broadcast (DAB) and Terrestrial Digital Multimedia Broadcast (T-DMB) applications, covering an input frequency range of 168MHz to 240MHz (VHF-III), 1452MHz to 1492MHz (L-Band), and also 87MHz to 108MHz (FM). The MAX2170/MAX2171 achieve a high level of component integration, allowing low-power, tuner-on-board designs. The direct-conversion to low-IF architecture eliminates the need for an IF-SAW filter while providing a balanced 2.048MHz center frequency baseband output to the demodulator. The MAX2170 provides a buffered reference clock at the crystal frequency, while the MAX2171 outputs a reference at 1/3rd of the crystal frequency. A sigma-delta fractional-N synthesizer is incorporated to optimize both close-in and wideband phase noise performances for OFDM applications where sensitivity to both 1kHz phase noise and wideband phase noise related to strong adjacents can be a problem. The MAX2170/MAX2171 are available in a 40-pin thin QFN package (6mm x 6mm) with an exposed paddle. Electrical performance is guaranteed over the extended -40°C to +85°C temperature range.

II. Manufacturing Information

A. Description/Function:	Direct-Conversion to Low-IF Tuners for Digital Audio Broadcast
B. Process:	MB3
C. Number of Device Transistors:	
D. Fabrication Location:	California
E. Assembly Location:	China and Thailand
F. Date of Initial Production:	December 28, 2006

III. Packaging Information

A. Package Type:	40-pin TQFN 6x6
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:	#05-9000-2089
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:	39°C/W
K. Single Layer Theta Jc:	2°C/W
L. Multi Layer Theta Ja:	28°C/W
M. Multi Layer Theta Jc:	2°C/W

IV. Die Information

A. Dimensions:	117 X 110 mils
B. Passivation:	BCB
C. Interconnect:	Al with top layer 100% Cu
D. Backside Metallization:	None
E. Minimum Metal Width:	0.35µm
F. Minimum Metal Spacing:	0.35µm
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 135°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

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

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

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

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

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 MB3 Process results in a FIT Rate of 0.08 @ 25C and 1.33 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot SO00JZ038B, D/C 0808)

The WG37 die type has been found to have all pins able to withstand a HBM transient pulse of +/- 2500V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/- 100mA per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results

MAX2170ETL+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C	DC Parameters	48	0	SO00I3024C, D/C 0719
	Biased	& functionality	48	0	SO00HZ005B, D/C 0648
	Time = 192 hrs.				

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