

RELIABILITY REPORT
FOR
MAX2850ITK+
PLASTIC ENCAPSULATED DEVICES

April 8, 2011

MAXIM INTEGRATED PRODUCTS

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Approved by
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Conclusion

The MAX2850ITK+ 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 MAX2850 is a single-chip, 4-channel RF transmitter IC designed for 5GHz wireless HDMI applications. The IC includes all circuitry required to implement the complete 4-channel MIMO RF transmitter function and crystal oscillator, providing a fully integrated transmit path, VCO, frequency synthesis, and baseband/control interface. It includes a fast-settling, sigma-delta RF fractional synthesizer with 76Hz frequency programming step size. The IC also integrates on-chip I/Q amplitude and phase-error calibration circuits. Dynamic on/off control of four external PAs is implemented with programmable precision voltages. A 4-to-1 analog mux routes external PA power-detect voltages to the RSSI pin. On-chip monolithic filters are included for transmitter I/Q baseband signal reconstruction to support both 20MHz and 40MHz RF channels. The baseband filtering and Tx signal paths are optimized to meet stringent WHDI requirements. The upconverter local oscillator is coherent among all the transmitter channels. The reverse-link control channel uses an on-chip 5GHz OFDM receiver. It shares the RF synthesizer and LO generation circuit with the MIMO transmitters. The receiver includes both an in-channel RSSI and an RF RSSI. The MIMO transmitter chip is housed in a small, 68-pin thin QFN leadless plastic package with exposed pad.

II. Manufacturing Information

A. Description/Function:	5GHz, 4-Channel MIMO Transmitter
B. Process:	MB3
C. Number of Device Transistors:	135037
D. Fabrication Location:	California
E. Assembly Location:	Thailand
F. Date of Initial Production:	October 23, 2009

III. Packaging Information

A. Package Type:	68-pin TQFN 10x10
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (1.3 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-3634
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 3
J. Single Layer Theta Ja:	34°C/W
K. Single Layer Theta Jc:	0.5°C/W
L. Multi Layer Theta Ja:	20°C/W
M. Multi Layer Theta Jc:	0.5°C/W

IV. Die Information

A. Dimensions:	167.7 X 178.3 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:	5 mil. Sq.
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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 46 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 23.9 \times 10^{-9}$$

$$\lambda = 23.9 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 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 SVFYB3002E D/C 0927)

The WD40-1 die type has been found to have all pins able to withstand a HBM transient pulse of +/-1500V 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

MAX2850ITK+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C	DC Parameters	31	0	SVFYB3002F, D/C 0927
	Biased	& functionality	15	0	SVFYB3002G, D/C 0927
	Time = 192 hrs.				

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