RELIABILITY REPORT

FOR

MAX14830ETM+

PLASTIC ENCAPSULATED DEVICES

June 10, 2011

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
Sokhom Chum
Quality Assurance
Reliability Engineer

Conclusion

The MAX14830ETM+ 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.

Table of Contents

I. Device Description

A. General

The MAX14830 is an advanced quad universal asynchronous receiver-transmitter (UART), each UART having 128 words of receive and transmit first-in/first-out (FIFO) and a high-speed serial peripheral interface (SPI™) or I²C controller interface. A PLL and fractional baud-rate generators allow a high degree of flexibility in baud-rate programming and reference clock selection.

Each of the four UARTs is selected by in-band SPI/I²C addressing. Logic-level translation on the transceiver and controller interfaces allows ease of interfacing to microcontrollers, FPGAs, and transceivers that are powered by differing supply voltages.

Extensive features simplify transceiver control in half-duplex communication applications. The MAX14830 features the ability to synchronize the start of individual UART's transmission by SPI-based triggering. On-board timers allow programming of delays between transmitters as well as clock generation on GPIOs. The 128-word FIFOs have advanced FIFO control reducing host processor data flow management.

The MAX14830 is available in a 48-pin TQFN (7mm x 7mm) package and is specified to operate over the extended -40°C to +85°C temperature range.

II. Manufacturing Information

A. Description/Function:	Quad Serial UART with 128-Word FIFOs and Internal Oscillator
B. Process:	TS18
C. Number of Device Transistors:	575469
D. Fabrication Location:	Taiwan
E. Assembly Location:	China
F. Date of Initial Production:	September 24, 2010

III. Packaging Information

A. Package Type:	48-pin TQFN 7x7
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:	#05-9000-4031 / A
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:	37°C/W
K. Single Layer Theta Jc:	1°C/W
L. Multi Layer Theta Ja:	26°C/W
M. Multi Layer Theta Jc:	1°C/W

IV. Die Information

A. Dimensions:	98 X 96 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/0.5%Cu with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	0.18µm
F. Minimum Metal Spacing:	0.18µm
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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 48 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 22.9 \times 10^{-9}$

$\lambda = 22.9$ 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 TS18 Process results in a FIT Rate of 0.24 @ 25C and 4.14 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot QH4ZCQ002B D/C 1049)

The RU47 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 and overvoltage per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results

MAX14830ETM+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	48	0	QH4ZBQ002C, D/C 1028

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