RELIABILITY REPORT

FOR

MAX19538ETL+

PLASTIC ENCAPSULATED DEVICES

November 5, 2008

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
Ken Wendel
Quality Assurance
Director, Reliability Engineering

Conclusion

The MAX19538ETL+ 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 MAX19538 is a 3.3V, 12-bit, 95Msps analog-to-digital converter (ADC) featuring a fully differential wideband track-and-hold (T/H) input amplifier, driving a low-noise internal quantizer. The analog input accepts single-ended or differential signals. The MAX19538 is optimized for low power, small size, and high dynamic performance. Excellent dynamic performance is maintained from baseband to input frequencies of 175MHz and beyond, making the MAX19538 ideal for intermediate frequency (IF) sampling applications. Powered from a single 3.3V supply, the MAX19538 consumes only 492mW while delivering a typical 68.4dB signal-to-noise ratio (SNR) performance at a 175MHz input frequency. In addition to low operating power, the MAX19538 features a 63µW power-down mode to conserve power during idle periods. A flexible reference structure allows the MAX19538 to use the internal 2.048V bandgap reference or accept an externally applied reference. The reference structure allows the full-scale analog input range to be adjusted from ±0.35V to ±1.10V. The MAX19538 provides a common-mode reference to simplify design and reduce external component count in differential analog input circuits. The MAX19538 supports either a single-ended or differential input clock drive. The internal clock duty-cycle equalizer accepts a wide range of clock duty cycles. Analog-to-digital conversion results are available through a 12-bit, parallel, CMOS-compatible output bus. The digital output format is pin selectable to be either two's complement or Gray code. A data-valid indicator eliminates external components that are normally required for reliable digital interfacing. A separate digital power input accepts a wide 1.7V to 3.6V supply allowing the MAX19538 to interface with various logic levels. The MAX19538 is available in a 6mm x 6mm x 0.8mm, 40-pin thin QFN package with exposed paddle (EP), and is specified for the extended industrial (-40°C to +85°C) temperature range. See a parametric table of the complete family of pin-compatible, 12-/14-bit high-speed ADCs.

II. Manufacturing Information

A. Description/Function:	12-Bit, 95Msps, 3.3V ADC
B. Process:	CMOS 1 layer Poly 4 layer Metal
C. Number of Device Transistors:	
D. Fabrication Location:	Taiwan
E. Assembly Location:	UTL Thailand
F. Date of Initial Production:	October 20, 2004

III. Packaging Information

A. Package Type:	40-pin TQFN 6x6
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive Epoxy
E. Bondwire:	Gold (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-1745
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:	38°C/W
K. Single Layer Theta Jc:	1.4°C/W
L. Multi Layer Theta Ja:	27°C/W
M. Multi Layer Theta Jc:	1.4°C/W

IV. Die Information

A. Dimensions:	134 X 124 mils
B. Passivation:	SiO_2/Si_3N_4 (Silicon dioxide/Silicon Nitride)
C. Interconnect:	Al/Cu (0.5 %)
D. Backside Metallization:	None
E. Minimum Metal Width:	0.18um
F. Minimum Metal Spacing:	0.18um
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:	Ken Wendel (Director, 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 biased (static) life test are pending. Using these results, the Failure Rate (λ) is calculated as follows:

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

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

$\lambda = 11.2 \times 10^{-9}$

λ = 11.2 F.I.T. (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly 1000 hour life test monitors on its processes. This data is published in the Product Reliability Report found at http://www.maxim-ic.com/. Current monitor data for the TSMC 0.18um Process results in a FIT Rate of 0.8 @ 25C and 13.1 @ 55C (0.8 eV, 60% UCL)

B. Moisture Resistance Tests

The industry standard 85°C/85%RH or HAST testing is monitored per device process once a quarter.

C. E.S.D. and Latch-Up Testing

The CA15 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500 V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of 250 mA.

Table 1
Reliability Evaluation Test Results

MAX19538ETL+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)				
	Ta = Biased Time = 192 hrs.	DC Parameters & functionality	96	0
Moisture Testing (Note 2)				
85/85	Ta = 85°C RH = 85% Biased Time = 1000hrs.	DC Parameters & functionality	77	0
Mechanical Stress (Note 2)				
Temperature Cycle	-65°C/150°C 1000 Cycles Method 1010	DC Parameters & functionality	77	0

Note 1: Life Test Data may represent plastic DIP qualification lots.
Note 2: Generic Package/Process data