RELIABILITY REPORT

FOR

MAX1181ECM+

PLASTIC ENCAPSULATED DEVICES

November 1, 2017

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

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Conclusion

The MAX1181ECM+ successfully meets the quality and reliability standards required of all Maxim Integrated products. In addition, Maxim Integrated's continuous reliability monitoring program ensures that all outgoing product will continue to meet Maxim Integrated's quality and reliability standards.

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I. Device Description

A. General

The MAX1181 is a 3V, dual 10-bit, analog-to-digital converter (ADC) featuring fully-differential wideband track-and-hold (T/H) inputs, driving two pipelined, nine stage ADCs. The MAX1181 is optimized for low-power, high-dynamic performance applications in imaging, instrumentation, and digital communication applications. The MAX1181 operates from a single 2.7V to 3.6V supply, consuming only 246mW, while delivering a typical signal-to-noise ratio (SNR) of 59dB at an input frequency of 20MHz and a sampling rate of 80Msps. The T/H driven input stages incorporate 400MHz (-3dB) input amplifiers. The converters may also be operated with single-ended inputs. In addition to low operating power, the MAX1181 features a 2.8mA sleep mode, as well as a 1ìA power-down mode to conserve power during idle periods. An internal 2.048V precision bandgap reference sets the full-scale range of the ADC. A flexible reference structure allows the use of the internal or external reference, if desired for applications requiring increased accuracy or a different input voltage range. The MAX1181 features parallel, CMOS-compatible three-state outputs. The digital output format is set to two's complement or straight offset binary through a single control pin. The device provides for a separate output power supply of 1.7V to 3.6V for flexible interfacing. The MAX1181 is available in a 7mm ✕ 7mm, 48-pin TQFP package, and is specified for the extended industrial (-40°C to +85°C) temperature range. Pin-compatible higher and lower speed versions of the MAX1181 are also available. Please refer to the MAX1180 datasheet for 105Msps, the MAX1182 datasheet for 65Msps, the MAX1183 datasheet for 40Msps, and the MAX1184 datasheet for 20Msps. In addition to these speed grades, this family includes a 20Msps multiplexed output version (MAX1185), for which digital data is presented time-interleaved on a single, parallel 10-bit output port.

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II. Manufacturing Information

A. Description/Function:	Dual 10-Bit, 80Msps, 3V, Low-Power ADC with Internal Reference and Parallel Outputs
B. Process:	TS35
C. Fabrication Location:	Taiwan
D. Assembly Location:	Korea, Taiwan, Philippines
E. Date of Initial Production:	July 27, 2001

III. Packaging Information

A. Package Type:	48-pin TQFP
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Da_8361j
E. Bondwire:	Au (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-1211
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:	N/A°C/W
K. Single Layer Theta Jc:	N/A°C/W
L. Multi Layer Theta Ja:	32.9°C/W
M. Multi Layer Theta Jc:	2°C/W

IV. Die Information

A. Dimensions:	101X139 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:	0.35 microns (as drawn)
F. Minimum Metal Spacing:	0.35 microns (as drawn)
G. Isolation Dielectric:	SiO_2
H. Die Separation Method:	Wafer Saw

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V. Quality Assurance Information

A. Quality Assurance Contacts: Eric Wright (Reliability Engineering)
Brian Standley (Manager, Reliability)
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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 106 \times 2}$$

(Chi square value for MTTF upper limit)

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

$\lambda = 10.37 \times 10^{-9}$

λ = 10.37 F.I.T. (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim Integrated's reliability monitor program. Maxim Integrated performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at http://www.maximintegrated.com/qa/reliability/monitor. Cumulative monitor data for the TS35 Process results in a FIT Rate of 0.11 @ 25C and 1.93 @ 55C (0.8 eV, 60% UCL)

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

The AC26 die type has been found to have all pins able to withstand an 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.

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Table 1
Reliability Evaluation Test Results

MAX1181ECM+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)					
	Ta = 135C Biased Time = 192 hrs.	DC Parameters & functionality	106	0	

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

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