

RELIABILITY REPORT
FOR
MAX1185ECM+
PLASTIC ENCAPSULATED DEVICES

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MAXIM INTEGRATED

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Conclusion

The MAX1185ECM+D 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.

Table of Contents

I.Device Description	IV.Die Information
II.Manufacturing Information	V.Quality Assurance Information
III.Packaging Information	VI.Reliability Evaluation
.....Attachments	

I. Device Description

A. General

The MAX1185 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 MAX1185 is optimized for low-power, high dynamic performance applications in imaging, instrumentation, and digital communication applications. This ADC operates from a single 2.7V to 3.6V supply, consuming only 105mW while delivering a typical signal-to-noise ratio (SNR) of 59.5dB at an input frequency of 7.5MHz and a sampling rate of 20Msps. Digital outputs A and B are updated alternating on the rising (CHA) and falling (CHB) edge of the clock. 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 MAX1185 features a 2.8mA sleep mode as well as a 1 μ A 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 this internal or an externally derived reference, if desired for applications requiring increased accuracy or a different input voltage range. The MAX1185 features parallel, multiplexed, CMOS-compatible three-state outputs. The digital output format can be 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 MAX1185 is available in a 7mm x 7mm, 48-pin TQFP package, and is specified for the extended industrial (-40°C to +85°C) temperature range. Pin-compatible, nonmultiplexed, high-speed versions of the MAX1185 are also available. Refer to the MAX1180 data sheet for 105Msps, the MAX1181 data sheet for 80Msps, the MAX1182 data sheet for 65Msps, the MAX1183 data sheet for 40Msps, and the MAX1184 data sheet for 20Msps.

II. Manufacturing Information

A. Description/Function:	Dual 10-Bit, 20Msps, +3V, Low-Power ADC with Internal Reference and Multiplexed Parallel Outputs
B. Process:	TS35
C. Number of Device Transistors:	
D. Fabrication Location:	Taiwan
E. Assembly Location:	Korea
F. Date of Initial Production:	October 25, 2001

III. Packaging Information

A. Package Type:	48-pin TQFP
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:	#05-9000-1211
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
K. Single Layer Theta Jc:	N/A
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 ₃ N 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:	0.35um
F. Minimum Metal Spacing:	0.35um
G. Bondpad Dimensions:	
H. Isolation Dielectric:	SiO ₂
I. Die Separation Method:	Wafer Saw

V. Quality Assurance Information

- A. Quality Assurance Contacts: 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 135C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 50 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 21.99 \times 10^{-9}$$

$$\lambda = 21.99 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 1.80 @ 55C (0.8 eV, 60% UCL).

B. E.S.D. and Latch-Up Testing (lot Q60CEA011H, D/C 1022)

The AC26-2 die type has been found to have all pins able to withstand a transient pulse of:

ESD-HBM:	+/- 1500V per JEDEC JESD22-A114
ESD-CDM:	+/- 750V per JEDEC JESD22-C101

Latch-Up testing has shown that this device withstands a current of +/- 100mA and overvoltage per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results

MAX1185ECM+D

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	50	0	Q60FCQ002A, D/C 0431

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