RELIABILITY REPORT

FOR

MAX1190ECM+D

PLASTIC ENCAPSULATED DEVICES

May 12, 2015

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

Approved by
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Quality Assurance
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Conclusion

The MAX1190ECM+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.

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I. Device Description

A. General

The MAX1190 is a 3.3V, dual 10-bit analog-to-digital converter (ADC) featuring fully differential wideband track-and-hold (T/H) inputs, driving two ADCs. The MAX1190 is optimized for low power, small size, and high-dynamic performance for applications in imaging, instrumentation, and digital communications. This ADC operates from a single 3.1V to 3.6V supply, consuming only 492mW while delivering a typical signal-to-noise and distortion (SINAD) of 57dB at an input frequency of 60MHz and a sampling rate of 120Msps. The T/H driven input stages incorporate 400MHz (-3dB) input amplifiers. The converters can also be operated with single-ended inputs. In addition to low operating power, the MAX1190 features a 3mA sleep mode, as well as a 1µA 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 applied reference, if desired, for applications requiring increased accuracy or a different input voltage range. The MAX1190 features parallel, 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 with various logic families. The MAX1190 is available in a 7mm x 7mm, 48-pin TQFP-EP package, and is specified for the extended industrial (-40°C to +85°C) temperature range. Pin-compatible lower speed versions of the MAX1190 are also available. Refer to the MAX1180–MAX1184 data sheets for 105Msps/80Msps/65Msps/40Msps. In addition to these speed grades, this family includes two multiplexed output versions (MAX1185/MAX1186 for 20Msps/40Msps), for which digital data is presented time-interleaved and on a single, parallel 10-bit output port. For lower speed, pin-compatible, 8-bit versions of the MAX1190, refer to the MAX1195–MAX1198 data sheets.

II. Manufacturing Information

A. Description/Function:	Dual 10-Bit, 120Msps, 3.3V, Low-Power ADC with Internal Reference and Parallel Outputs
B. Process:	TS35
C. Number of Device Transistors:	36305
D. Fabrication Location:	Taiwan
E. Assembly Location:	Korea, Taiwan
F. Date of Initial Production:	July 26, 2002

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 (1.2 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-2101-0031
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_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:	0.35um
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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 106 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 10.3 \times 10^{-9}$

$\lambda = 10.3$ 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 (ESD lot QAOL6A029C D/C 1335, Latch-Up lot Q60ABQ002F D/C 0223)

The AC26 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 +/-250mA.

Table 1

Reliability Evaluation Test Results

MAX1190ECM+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 56	0 0	Q60FCQ002A, D/C 0431 Q60ABQ001A, D/C 0111

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