RELIABILITY REPORT

FOR

MAX11190ATE+T

PLASTIC ENCAPSULATED DEVICES

February 26, 2018

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

Eric Wright Reliability Engineer	Brian Standley Manager, Reliability

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Conclusion

The MAX11190ATE+T 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 MAX11190 is a 4-channel, dual, multiplexed, 12-bit, compact, high-speed, low-power, successive approximation analog-to-digital converter (ADC). This high performance dual ADC includes high-dynamic range sample-and-holds and a high-speed serial interface. This ADC accepts a full-scale input from 0V to the reference voltage. The device features two dual, single-ended analog inputs connected to two ADC cores using 2:1 MUXs. The device also includes a separate supply input for data interface and dedicated inputs for reference voltage. This device operates from a 2.2V to 3.6V supply and consumes only 10.5mW at 3Msps. The device includes full power-down mode and fast wake-up for optimal power management and a high-speed 3-wire serial interface. The 3-wire serial interface directly connects to SPI, QSPI™, and MICROWIRE® devices without external logic. Each of the two internal ADCs has its own dedicated DOUTA/DOUTB for faster data communication. Excellent dynamic performance, low voltage, low power, ease of use, and small package size make this converter ideal for simultaneous data-acquisition applications, and for other applications that demand low power consumption and minimal space. The device is available in a 3mm x 3mm, 16-pin TQFN package and operates over the -40ºC to +125ºC temperature range.

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II. Manufacturing Information

A. Description/Function:	4-Channel, Dual, Simultaneous Sampling, 2.2V to 3.6V, 12-Bit, 3Msps SAR ADC in Tiny 3mm x 3mm TQFN Package
B. Process:	TS18
C. Fabrication Location:	Taiwan
D. Assembly Location:	Taiwan, Thailand
E. Date of Initial Production:	August 8, 2013

III. Packaging Information

A. Package Type:	16-pin TQFN
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Bondwire:	Au (1 mil dia.)
E. Mold Material:	Epoxy with silica filler
F. Assembly Diagram:	#31-4892
G. Flammability Rating:	Class UL94-V0
H. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 3
I. Single Layer Theta Ja:	68°C/W
J. Single Layer Theta Jc:	10°C/W
K. Multi Layer Theta Ja:	48°C/W
L. Multi Layer Theta Jc:	10°C/W

IV. Die Information

A. Passivation:	Si_3N_4/SiO_2
B. Interconnect:	Al/0.5%Cu
C. Minimum Metal Width:	0.23 microns (as drawn)
D. Minimum Metal Spacing:	0.23 microns (as drawn)
E. Isolation Dielectric:	SiO_2
F. 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 125C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{500 \times 4340 \times 240 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 3.11 \times 10^{-9}$

λ = 3.11 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 TS18 Process results in a FIT Rate of 0.1@ 25C and 1.9@ 55C (0.8 eV, 60% UCL)

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

The AC93-0 die type has been found to have all pins able to withstand an HBM transient pulse of +/-1000V 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

MAX11190ATE+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)					
	Ta = 125C Biased Time = 500 hrs.	DC Parameters & functionality	240	0	

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

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