RELIABILITY REPORT

FOR

MAX11647EUA+

PLASTIC ENCAPSULATED DEVICES

August 9, 2012

MAXIM INTEGRATED PRODUCTS

160 Rio Robles

San Jose, CA 95134

Approved by
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Conclusion

The MAX11647EUA+ 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.

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I. Device Description

A. General

The MAX11646/MAX11647 low-power, 10-bit, 1-/2-channel analog-to-digital converters (ADCs) feature internal track/hold (T/H), voltage reference, a clock, and an I²C-compatible 2-wire serial interface. These devices operate from a single supply of 2.7V to 3.6V (MAX11647) or 4.5V to 5.5V (MAX11646) and require only 6µA at a 1ksps sample rate. AutoShutdown(tm) powers down the devices between conversions, reducing supply current to less than 1µA at lower throughput rates. The MAX11646/MAX11647 each measure two single-ended or one differential input. The fully differential analog inputs are software configurable for unipolar or bipolar and single-ended or differential operation. The full-scale analog input range is determined by the internal reference or by an externally applied reference voltage ranging from 1V to VDD. The MAX11647 features a 2.048V internal reference and the MAX11646 features a 4.096V internal reference. The MAX11646/MAX11647 are available in an ultra-tiny 1.9mm x 2.2mm WLP package and an 8-pin µMAX® package. These ADCs are guaranteed over the extended temperature range (-40°C to +85°C). For pin-compatible 12-bit parts, refer to the MAX11644/MAX11645 data sheet.

II. Manufacturing Information

A. Description/Function:	Low-Power, 1-/2-Channel, I^{2}C, 10-Bit ADCs in Ultra-Tiny 1.9mm x 2.2mm Package
B. Process:	C6
C. Number of Device Transistors:	12033
D. Fabrication Location:	Japan
E. Assembly Location:	Thailand
F. Date of Initial Production:	January 23, 2010

III. Packaging Information

A. Package Type:	3x3 mm 8L UMAX
B. Lead Frame:	NiPdAu
C. Lead Finish:	NiPdAu
D. Die Attach:	Non-conductive
E. Bondwire:	Au (0.8 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-4071 / A
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	1
J. Single Layer Theta Ja:	170°C/W
K. Single Layer Theta Jc:	8°C/W
L. Multi Layer Theta Ja:	170°C/W
M. Multi Layer Theta Jc:	8°C/W

IV. Die Information

A. Dimensions:	75 X 88 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	0.6 microns (as drawn)
F. Minimum Metal Spacing:	0.6 microns (as drawn)
G. Bondpad Dimensions:	
H. Isolation Dielectric:	SiO_2
I. Die Separation Method:Wafer	Saw

V. Quality Assurance Information

A. Quality Assurance Contacts:	Richard Aburano (Manager, Reliability Engineering) 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 biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 143 \times 2} \quad \text{(Chi square value for MTTF upper limit)}$$

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

$\lambda = 7.7 \times 10^{-9}$

λ = 7.7 F.I.T. (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at http://www.maxim-ic.com/qa/reliability/monitor. Cumulative monitor data for the C6 Process results in a FIT Rate of 0.90 @ 25C and 15.55 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot E2B8EA007C D/C 0951)

The AC30-8 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 and overvoltage per JEDEC JESD78.

Table 1

Reliability Evaluation Test Results

MAX11647EUA+

TEST ITEM	**TEST CONDITION**	**FAILURE IDENTIFICATION**	**SAMPLE SIZE**	**NUMBER OF FAILURES**	**COMMENTS**
Static Life Test (Note 1)					
	Ta = 135°C	DC Parameters	48	0	E2B6EA007B, D/C 0951
	Biased	& functionality	50	0	E2B0GQ001A, D/C 0903
	Time = 192 hrs.		45	0	S2B1FQ001B, D/C 0538

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