RELIABILITY REPORT

FOR

MAX11604EEE+

PLASTIC ENCAPSULATED DEVICES

January 11, 2011

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Quality Assurance
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Conclusion

The MAX11604EEE+ 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 MAX11600-MAX11605 low-power, 8-bit, multichannel, analog-to-digital converters (ADCs) feature internal track/hold (T/H), voltage reference, clock, and an I²C-compatible 2-wire serial interface. These devices operate from a single supply and require only 350µA at the maximum sampling rate of 188ksps. AutoShutdown(tm) powers down the devices between conversions, reducing supply current to less than 1µA at low throughput rates. The MAX11600/MAX11601 provide 4 analog input channels each, the MAX11602/MAX11603 provide 8 analog input channels each while the MAX11604/MAX11605 provide 12 analog input channels. The analog inputs are software configurable for unipolar or bipolar and single-ended or pseudo-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 MAX11601/MAX11603/MAX11605 feature a 2.048V internal reference and the MAX11600/MAX11602/MAX11604 feature a 4.096V internal reference. The MAX11600/MAX11601 are available in 8-pin SOT23 packages. The MAX11602-MAX11605 are available in 16-pin QSOP packages. The MAX11600-MAX11605 are guaranteed over the extended industrial temperature range (-40°C to +85°C). Refer to the MAX11606-MAX11611 for 10-bit devices and to the MAX11612-MAX11617 for 12-bit devices.

II. Manufacturing Information

A. Description/Function:	2.7V to 3.6V and 4.5V to 5.5V, Low-Power, 4-/8-/12-Channel, 2-Wire Serial 8-Bit ADCs
B. Process:	C6Y
C. Number of Device Transistors:	7237
D. F abrication Location:	Japan
E. Assembly Location:	Thailand
F. Date of Initial Production:	July 24, 2009

III. Packaging Information

A. Package Type:	16-pin QSOP
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:	#05-9000-3656
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1
J. Single Layer Theta Ja:	120°C/W
K. Single Layer Theta Jc:	37°C/W
L. Multi Layer Theta Ja:	103.7°C/W
M. Multi Layer Theta Jc:	37°C/W

IV. Die Information

A. Dimensions:	67 X 63 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:	5 mil. Sq.
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. S ampling Plan:	Mil-Std-105D

VI. Reliability Evaluation

A. Accelerated Life Test

The results of the 135°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 205 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 5.4 \times 10^{-9}$

λ = 5.4 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 C6Y 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 E2G0GQ001C, D/C 0912)

The AC33 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

MAX11604EEE+

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	47 79 0 79	0 0	S2G1EQ003A, DC 0529 I2G1CQ002B, DC 0225 I2G0BQ002B, DC 0214

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