



RELIABILITY REPORT
FOR MAX11046ETN+
PLASTIC ENCAPSULATED DEVICES

October 13, 2010

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.
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Approved by
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Conclusion

The MAX11046ETN+ 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 MAX11044/MAX11045/MAX11046 16-bit and MAX11054/MAX11055/MAX11056 14-bit ADCs offer 4, 6, or 8 independent input channels. Featuring independent track and hold (T/H) and SAR circuitry, these parts provide simultaneous sampling at 250ksps for each channel. The MAX11044/MAX11045/MAX11046 and MAX11054/MAX11055/MAX11056 accept a $\pm 5V$ input. All inputs are overrange protected with internal $\pm 20mA$ input clamps providing overrange protection with a simple external resistor. Other features include a 4MHz T/H input bandwidth, internal clock, and internal or external reference. A 20MHz, bidirectional, parallel interface provides the conversion results and accepts digital configuration inputs. The MAX11044/MAX11045/MAX11046 and MAX11054/MAX11055/MAX11056 operate with a 4.75V to 5.25V analog supply and a separate flexible 2.7V to 5.25V digital supply for interfacing with the host without a level shifter. The MAX11044/MAX11045/MAX11046 are available in a 56-pin TQFN and 64-pin TQFP packages while the MAX11054/MAX11055/MAX11056 are available in TQFP only and operate over the extended $-40^{\circ}C$ to $+85^{\circ}C$ temperature range.

II. Manufacturing Information

A. Description/Function:	4-/6-/8-Channel, 16-/14-Bit, Simultaneous-Sampling ADCs
B. Process:	S45
C. Number of Device Transistors:	166153
D. Fabrication Location:	California, Texas or Japan
E. Assembly Location:	China and Thailand
F. Date of Initial Production:	October 24, 2009

III. Packaging Information

A. Package Type:	56-pin TQFN 8x8
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:	#05-9000-4078
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:	35°C/W
K. Single Layer Theta Jc:	0.6°C/W
L. Multi Layer Theta Ja:	21°C/W
M. Multi Layer Theta Jc:	0.6°C/W

IV. Die Information

A. Dimensions:	171 X 228 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:	Metal1 = 0.5 / Metal2 = 0.6 / Metal3 = 0.6 microns (as drawn)
F. Minimum Metal Spacing:	Metal1 = 0.45 / Metal2 = 0.5 / Metal3 = 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:	Richard Aburano (Manager, Reliability Operations) 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 135°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 96 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 11.5 \times 10^{-9}$$
$$\lambda = 11.5 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 S45 Process results in a FIT Rate of 0.49 @ 25C and 8.49 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot SHZZDQ001A, D/C 0931)

The AC80 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

MAX11046ETN+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)					
	Ta = 135°C	DC Parameters	48	0	SHZZBQ002B, D/C 0817
	Biased Time = 192 hrs.	& functionality	48	0	SHZZDQ001A, D/C 0931

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