RELIABILITY REPORT

FOR

MAX1032AEUG+

PLASTIC ENCAPSULATED DEVICES

November 30, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Quality Assurance
Director, Reliability Engineering

Conclusion

The MAX1032AEUG+ 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 MAX1032/MAX1033 multirange, low-power, 14-bit, successive-approximation, analog-to-digital converters (ADCs) operate from a single +5V supply and achieve throughput rates up to 115ksps. A separate digital supply allows digital interfacing with 2.7V to 5.25V systems using the SPI™-/QSPI™-/MICROWIRE™-compatible serial interface. Partial power-down mode reduces the supply current to 1.3mA (typ). Full power-down mode reduces the power-supply current to 1µA (typ). The MAX1032 provides eight (single-ended) or four (true differential) analog input channels. The MAX1033 provides four (single-ended) or two (true differential) analog input channels. Each analog input channel is independently software programmable for seven single-ended input ranges (0 to +6V, -6V to 0, 0 to +12V, -12V to 0, ±3V, ±6V, and ±12V), and three differential input ranges (±6V, ±12V, ±24V).

An on-chip +4.096V reference offers a small convenient ADC solution. The MAX1032/MAX1033 also accept an external reference voltage between 3.800V and 4.136V.

The MAX1032 is available in a 24-pin TSSOP package and the MAX1033 is available in a 20-pin TSSOP package. Each device is specified for operation from -40°C to +85°C.

II. Manufacturing Information

A. Description/Function:	8-/4-Channel, ±12V Multirange Inputs, Serial 14-Bit ADCs
B. Process:	C6Y
C. Number of Device Transistors:	29149
D. Fabrication Location:	Japan
E. Assembly Location:	Philippines, Thailand
F. Date of Initial Production:	1/20/2005

III. Packaging Information

A. Package Type:	24-pin TSSOP
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive Epoxy
E. Bondwire:	Au (1.0 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-0558
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:	82°C/W
K. Single Layer Theta Jc:	15°C/W
L. Multi Layer Theta Ja:	72°C/W
M. Multi Layer Theta Jc:	13°C/W

IV. Die Information

A. Dimensions:	108 X 179 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:	Ken Wendel (Director, Reliability Engineering) Bryan Preeshl (Managing Director 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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 48 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 22.4 \times 10^{-9}$

$\lambda = 22.4$ 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. Moisture Resistance Tests

The industry standard 85°C/85%RH or HAST testing is monitored per device process once a quarter.

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

The AC57 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500 V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250 mA.

Table 1

Reliability Evaluation Test Results

MAX1032AEUG+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)				
	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	48	0
Moisture Testing (Note 2)				
HAST	Ta = 130°C RH = 85% Biased Time = 96hrs.	DC Parameters & functionality	77	0
Mechanical Stress (Note 2)				
Temperature Cycle	-65°C/150°C 1000 Cycles Method 1010	DC Parameters & functionality	77	0

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

Note 2: Generic Package/Process data