RELIABILITY REPORT

FOR

MAX1133BEAP+

PLASTIC ENCAPSULATED DEVICES

November 16, 2011

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

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Approved by
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Conclusion

The MAX1133BEAP+ 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 MAX1132/MAX1133 are 200ksps, 16-bit ADCs. These serially interfaced ADCs connect directly to SPI(tm), QSPI(tm), and MICROWIRE(tm) devices without external logic. They combine an input scaling network, internal track/hold, clock, a +4.096V reference, and three general-purpose digital output pins (for external multiplexer or PGA control) in a 20-pin SSOP package. The excellent dynamic performance (SINAD $\geq$ 85dB), high-speed (200ksps), and low power (7.5mA) of these ADCs, make them ideal for applications such as industrial process control, instrumentation, and medical applications. The MAX1132 accepts input signals of 0 to +12V (unipolar) or ±12V (bipolar), while the MAX1133 accepts input signals of 0 to +4.096V (unipolar) or ±4.096V (bipolar). Operating from a single +4.75V to +5.25V analog supply and a +4.75V to +5.25V digital supply, power-down modes reduce current consumption to 1mA at 10ksps and further reduce supply current to less than 20µA at slower data rates. A serial strobe output (SSTRB) allows direct connection to the TMS320 family of digital signal processors. The MAX1132/MAX1133 user can select either the internal clock, or an external serial-interface clock for the ADC to perform analog-to-digital conversions. The MAX1132/MAX1133 feature internal calibration circuitry to correct linearity and offset errors. On-demand calibration allows the user to optimize performance. Three user-programmable logic outputs are provided for the control of an 8-channel mux or a PGA.

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II. Manufacturing Information

A. Description/Function:	16-Bit ADC, 200ksps, 5V Single-Supply with Reference
B. Process:	S12
C. Number of Device Transistors:	
D. Fabrication Location:	California
E. Assembly Location:	Thailand
F. Date of Initial Production:	July 28, 2001

III. Packaging Information

A. Package Type:	20L SSOP
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (1.3 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-0101-0502 / B
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	1
J. Single Layer Theta Ja:	125°C/W
K. Single Layer Theta Jc:	33°C/W
L. Multi Layer Theta Ja:	83°C/W
M. Multi Layer Theta Jc:	33°C/W

IV. Die Information

A. Dimensions:	144 X 203 mils
B. Passivation:	Si_3N_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:	1.2 microns (as drawn)
F. Minimum Metal Spacing:	1.2 microns (as drawn)
G. Bondpad Dimensions:	
H. Isolation Dielectric:	SiO_2
I. Die Separation Method:	Wafer Saw

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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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{1000 \times 4340 \times 144 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 1.5 \times 10^{-9}$

λ = 1.5 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 S12 Process results in a FIT Rate of 0.17 @ 25C and 3.00 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot I5LBBQ001F D/C 0116)

The AD93-1 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2000V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-250mA.

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Table 1
Reliability Evaluation Test Results

MAX1133BEAP+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)					
	Ta = 135°C	DC Parameters	48	0	N5LAEA008Q3, D/C 0943
	Biased	& functionality	48	0	N5LAEA008Q2, D/C 0943
	Time = 1000 hrs.		48	0	N5LAEA008Q1, D/C 0943

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

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