RELIABILITY REPORT

FOR

MAX1068BCEG+
(MAX1067, MAX1068)

PLASTIC ENCAPSULATED DEVICES

January 6, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Quality Assurance
Director, Reliability Engineering

Conclusion

The MAX1068BCEG+ 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 MAX1067/MAX1068 low-power, multichannel, 14-bit analog-to-digital converters (ADCs) feature a successive-approximation ADC, integrated +4.096V reference, a reference buffer, an internal oscillator, automatic power-down, and a high-speed SPI(tm)/QSPI(tm)/MICROWIRE(tm)-compatible interface. The MAX1067/MAX1068 operate with a single +5V analog supply and feature a separate digital supply, allowing direct interfacing with +2.7V to +5.5V digital logic. The MAX1067/MAX1068 consume only 3.6mA (AVDD = DVDD = +5V) at 200ksps when using an external reference. AutoShutdown(tm) reduces the supply current to 185µA at 10ksps and to less than 10µA at reduced sampling rates. The MAX1067 includes a 4-channel input multiplexer, and the MAX1068 accepts up to eight analog inputs. In addition, digital signal processor (DSP)-initiated conversions are simplified with the DSP frame-sync input and output featured in the MAX1068. The MAX1068 includes a data-bit transfer input to select between 8-bit-wide or 16-bit-wide data-transfer modes. Both devices feature a scan mode that converts each channel sequentially or one channel continuously. Excellent dynamic performance and low power, combined with ease of use and an integrated reference, make the MAX1067/MAX1068 ideal for control and data-acquisition operations or for other applications with demanding power consumption and space requirements. The MAX1067 is available in a 16-pin QSOP package, and the MAX1068 is available in a 24-pin QSOP package. Both devices are guaranteed over the commercial (0°C to +70°C) and extended (-40°C to +85°C) temperature ranges. Use the MAX1168 evaluation kit to evaluate the MAX1068.

II. Manufacturing Information

    A. Description/Function: Multichannel, 14-Bit, 200ksps Analog-to-Digital Converters

    B. Process: B6

    C. Number of Device Transistors:

    D. Fabrication Location: California

    E. Assembly Location: Carsem Malaysia, ATP Philippines, UTL Thailand

    F. Date of Initial Production: July   25, 2003

III. Packaging Information

    A. Package Type: 24-pin QSOP

    B. Lead Frame: Copper

    C. Lead Finish: 100% matte Tin

    D. Die Attach: Conductive Epoxy

    E. Bondwire: Gold (1 mil dia.)

    F. Mold Material: Epoxy with silica filler

    G. Assembly Diagram: #05-9000-2693

    H. Flammability Rating: Class UL94-V0

    I. Classification of Moisture Sensitivity per   Level 1
JEDEC standard J-STD-020-C

    J. Single Layer Theta Ja: 105°C/W

    K. Single Layer Theta Jc: 34°C/W

    L. Multi Layer Theta Ja: 88°C/W

    M. Multi Layer Theta Jc: 34°C/W

IV. Die Information

    A. Dimensions: 86 X 124 mils

    B. Passivation: Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide

    C. Interconnect: Aluminum/Si (Si = 1%)

    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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 40 \times 2} \quad \text{(Chi square value for MTTF upper limit)}$$

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

$$\lambda = 26.8 \times 10^{-9}$$

$$\lambda = 26.8 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

        The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly 1000 hour life test monitors on its processes. This data is published in the Product Reliability Report found at http://www.maxim-ic.com/. Current monitor data for the B6 Process results in a FIT Rate of 0.8 @ 25C and 14.2 @ 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 AC24 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500 V per JEDEC JESD22-A114-D. Latch-Up testing has shown that this device withstands a current of +/-250 mA and a voltage pulse of 1.5X VccMax.

Table 1
Reliability Evaluation Test Results

MAX1068BCEG+

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	40	0
Moisture Testing (Note 2) 85/85	Ta = 85°C RH = 85% Biased Time = 1000hrs.	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