

RELIABILITY REPORT

FOR

MAX1169BEUD+

MAX1169BEUD+T

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MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134


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Conclusion

The MAX1169 successfully meets the quality and reliability standards required of all Maxim Integrated products. In addition, Maxim Integrated's continuous reliability monitoring program ensures that all outgoing product will continue to meet Maxim Integrated's quality and reliability standards.

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I. Device Description

A. General

The MAX1169 is a low-power, 16-bit successive approximation analog-to-digital converter (ADC). The device features automatic power-down, an on-chip 4MHz clock, a +4.096V internal reference, and an I2C-compatible 2-wire serial interface capable of both fast and high-speed modes.

The MAX1169 operates from a single supply and consumes 5mW at the maximum conversion rate of 58.6ksps. AutoShutdown™ powers down the device between conversions, reducing supply current to less than 50μA at a 1ksps throughput rate. The option of a separate digital supply voltage allows direct interfacing with +2.7V to +5.5V digital logic.

The MAX1169 performs a unipolar conversion on its single analog input using its internal 4MHz clock. The full-scale analog input range is determined by the internal reference or by an externally applied reference voltage ranging from 1V to VAVDD.

The four address select inputs (ADD0 to ADD3) allow up to 16 MAX1169 devices on the same bus.

The MAX1169 is packaged in a 14-pin TSSOP and operates over an extended temperature range. Refer to the MAX1069 data sheet for a 14-bit device in a pin compatible package.

II. Manufacturing Information

A. Description/Function:	58.6ksps, 16-Bit, 2-Wire Serial ADC in a 14-Pin TSSOP
B. Process:	C6
C. Device Count:	17061
D. Fabrication Location:	USA
E. Assembly Location:	Thailand/Malaysia/Taiwan
F. Date of Initial Production:	October 26, 2002

III. Packaging Information

A. Package Type:	TSSOP
B. Lead Frame:	Cu194
C. Lead Finish:	Matte Tin
D. Die Attach:	QMI-519/AB8200T/EN4900GC
E. Bondwire:	1.00 mil Au
F. Mold Material:	CEL8240HF10-LXC/G605L/G700H
G. Assembly Diagram:	05-9000-4040
H. Flammability Rating:	UL-94 (V-0 Rating)
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1
J. Single Layer Theta Ja:	110 °C/W
K. Single Layer Theta Jc:	30 °C/W
L. Multi Layer Theta Ja:	100.40 °C/W
M. Multi Layer Theta Jc:	30 °C/W

IV. Die Information

A. Dimensions:	87X105 mils
B. Passivation:	N/A

V. Quality Assurance Information

A. Quality Assurance Contacts:	Ryan Wall (Manager, Reliability) Michael Cairnes (Executive Director, Reliability) Bryan Preeshl (SVP 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 125C biased (static) life test are shown in Table 1. Using these results, the Failure Rate λ is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 2454 \times 45 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

(where 2454 = Temperature Acceleration factor assuming an activation energy of 0.8eV)

$$\lambda = 43.21 \times 10^{-9}$$

$$\lambda = 43.21 \text{ FITs (60\% confidence level @25°C)}$$

Maxim Integrated performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at <https://www.maximintegrated.com/en/support/qa-reliability/reliability/reliability-monitor-program.html>.

C6 cumulative process Fit

$$\lambda = 0.29 \text{ FITs (60\% confidence level @25°C)}$$

$$\lambda = 3.51 \text{ FITs (60\% confidence level @55°C)}$$

B. ESD and Latch-Up Testing

The MAX1169 has been found to have all pins able to withstand an HBM transient pulse of ± 2000 V per JEDEC / ESDA JS-001. Latch-Up testing has shown that this device withstands ± 250 mA current injection and supply overvoltage per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results
MAX1169BEUD+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 125°C Biased Time = 192 hrs.	DC parameters & functionality	45	0	

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