

RELIABILITY REPORT

FOR

MAX166ACPP+, MAX166BCWP+,
MAX166CCPP+

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MAXIM INTEGRATED

160 RIO ROBLES
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Conclusion

The MAX166 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.

Table of Contents

I.Device Description	IV.Die Information
II.Manufacturing Information	V.Quality Assurance Information
III.Packaging Information	VI.Reliability Evaluation
.....Attachments	

I. Device Description

A. General

The MAX165/MAX166 are high speed (5 μ) microprocessor (μ P0 – compatible, 8-bit ADCs with track/hold (T/H). The T/H function allows full-scale signals up to 50Khz (386 mV/ μ s slew rate) to be acquired and digitalized accurately. Both ADCs use a successive approximations technique to achieve fast conversions and low power dissipation. The MAX165/166 operate with a +5V supply and an internal or external +1.23V reference, and accept single-ended (MAX165) or differential (MAX166) voltages ranging from 0V to 2VREF.

The MAX165/MAX166 are easily interfaced to all popular 8-bit μ Ps through standard CS and RD control signals. These signals control the start of conversions and data access. A BUSY signal indicated the beginning and end of conversions. Since all the data outputs are latched and the three-state buffered, the MAX165/MAX166 can be directly tied to a μ P data bus or system input/output port.

The MAX165 is a plug-in replacement for the MX7575, with the addition of an internal 1.23V reference. For applications that require a differential analog input and an internal reference, the MAX166 is recommended.

II. Manufacturing Information

A. Description/Function:	CMOS μ P-Compatible, 5 μ s, 8-bit ADCs
B. Process:	SG5
C. Device Count:	N/A
D. Fabrication Location:	USA
E. Assembly Location:	Philippines
F. Date of Initial Production:	1992

III. Packaging Information

A. Package Type:	PDIP	Wide SOIC
B. Lead Frame:	Cu194	Cu194
C. Lead Finish:	Matte Tin	Matte Tin
D. Die Attach:	84-1LMISR4	AB8290, EN4900G, QMI-519, AB8200T
E. Bondwire:	1.3 mil Au	1.3 mil Au
F. Mold Material:	G600	G600, G700LA, G605L, CEL8240HF10-LXC
G. Assembly Diagram:	05-0101-0324	05-0101-0326
H. Flammability Rating:	UL-94 (V-0 Rating)	UL-94 (V-0 Rating)
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1	Level 1
J. Single Layer Theta Ja:	90 °C/W	100 °C/W
K. Single Layer Theta Jc:	30 °C/W	20 °C/W
L. Multi Layer Theta Ja:	N/A	65.80 °C/W
M. Multi Layer Theta Jc:	N/A	20 °C/W

IV. Die Information

A. Dimensions:	130X85 mils
B. Passivation:	SiO ₂ / SiN

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 125°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate λ is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{186 \times 2454 \times 20 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 100.36 \times 10^{-9}$$

$$\lambda = 100.36 \text{ FITs (60\% confidence level @25°C)}$$

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>.

SG5 cumulative process data:

$$\lambda = 0.58 \text{ FITs (60\% confidence level @25°C)}$$

$$\lambda = 6.99 \text{ FITs (60\% confidence level @55°C)}$$

B. ESD and Latch-Up Testing

The MAX166 has been found to have all pins able to withstand an HBM transient pulse of ± 1500 V per JEDEC / ESDA JS-001. Latch-Up testing has shown that this device withstands ± 100 mA current injection and supply overvoltage per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results
MAX166CCPP

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 125°C Biased Time = 186 hrs.	DC parameters & functionality	20	0	

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