



RELIABILITY REPORT FOR
MAX233AEMP+G36 / MAX233AEP+G36
PLASTIC ENCAPSULATED DEVICES

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MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

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Conclusion

The MAX233AEWP+G36 / MAX233AEPP+G36 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 MAX220-MAX249 family of line drivers/receivers is intended for all EIA/TIA-232E and V.28/V.24 communications interfaces, particularly applications where $\pm 12V$ is not available. These parts are especially useful in battery-powered systems, since their low-power shutdown mode reduces power dissipation to less than $5\mu W$. The MAX225, MAX233, MAX235, and MAX245/MAX246/MAX247 use no external components and are recommended for applications where printed circuit board space is critical.

II. Manufacturing Information

A. Description/Function:	+5V-Powered, Multichannel RS-232 Drivers/Receivers
B. Process:	M6
C. Fabrication Location:	USA
D. Assembly Location:	Philippines
E. Date of Initial Production:	Pre 1997

III. Packaging Information

A. Package Type:	20-pin SOIC (W)	20-pin PDIP
B. Lead Frame:	Copper	Copper
C. Lead Finish:	100% matte Tin	100% matte Tin
D. Die Attach:	Conductive	Conductive
E. Bondwire:	Au (1.3 mil dia.)	Au (1.3 mil dia.)
F. Mold Material:	Epoxy with silica filler	Epoxy with silica filler
G. Assembly Diagram:	#31-4711	#31-4835
H. Flammability Rating:	Class UL94-V0	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1	Level 1
J. Single Layer Theta Ja:	100°C/W	90°C/W
K. Single Layer Theta Jc:	20°C/W	30°C/W
L. Multi Layer Theta Ja:	67°C/W	N/A°C/W
M. Multi Layer Theta Jc:	23°C/W	N/A°C/W

IV. Die Information

A. Passivation:	Si ₃ N ₄ /SiO ₂ (Silicon nitride/ Silicon dioxide)
B. Interconnect:	Al/1.0%Si
C. Minimum Metal Width:	Metal1 = 0.5 microns (as drawn)
D. Minimum Metal Spacing:	Metal1 = 0.45 microns (as drawn)
E. Isolation Dielectric:	SiO ₂
F. Die Separation Method:	Wafer Saw

V. Quality Assurance Information

- A. Quality Assurance Contacts: Eric Wright (Reliability Engineering)
 Brian Standley (Manager, Reliability)
 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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 80 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 13.7 \times 10^{-9}$$

$$\lambda = 13.7 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

The following failure rate represents data collected from Maxim Integrated's reliability monitor program. Maxim Integrated performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at <http://www.maximintegrated.com/qa/reliability/monitor>. Cumulative monitor data for the M6 Process results in a FIT Rate of 0.38 @ 25C and 6.48 @ 55C (0.8 eV, 60% UCL)

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

The PS38 die type has been found to have all pins able to withstand an HBM transient pulse of +/-1500V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-100mA and overvoltage per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results

MAX233AEWP+G36 / MAX233AEPP+G36

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	80	0	BYLOXABQ

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