

RELIABILITY REPORT
FOR
MAX232AESE+
PLASTIC ENCAPSULATED DEVICES

June 19, 2015

MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

Approved by
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Quality Assurance
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Conclusion

The MAX232AESE+ 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.

The MAX225, MAX233, MAX235, and MAX245/MAX246/MAX247 use no external components and are recommended for applications where printed circuit board space is critical.

The MAX220-MAX249 are offered in 26 different packages with temperatures from 0 to +70°C up to -55°C to +125°C. See ordering information table at the end of the data sheet for all package and temperature options.

II. Manufacturing Information

A. Description/Function:	+5V-Powered, Multichannel RS-232 Drivers/Receivers
B. Process:	SG5
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Malaysia, Philippines, Thailand
F. Date of Initial Production:	Pre 1997

III. Packaging Information

A. Package Type:	16-pin SOIC (N)
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:	#05-0701-0486
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1
J. Single Layer Theta Ja:	115°C/W
K. Single Layer Theta Jc:	32°C/W
L. Multi Layer Theta Ja:	75°C/W
M. Multi Layer Theta Jc:	24°C/W

IV. Die Information

A. Dimensions:	70X109 mils
B. Passivation:	Si ₃ N 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:	5.0 microns (as drawn)
F. Minimum Metal Spacing:	5.0 microns (as drawn)
G. Bondpad Dimensions:	
H. Isolation Dielectric:	SiO ₂
I. Die Separation Method:	Wafer Saw

V. Quality Assurance Information

- A. Quality Assurance Contacts: 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 135C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{1000 \times 4340 \times 628 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 0.34 \times 10^{-9}$$

$$\lambda = 0.34 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 SG5 Process results in a FIT Rate of 0.11 @ 25C and 1.96 @ 55C (0.8 eV, 60% UCL).

B. E.S.D. and Latch-Up Testing (lot NQS0AA801B D/C 0637)

The PS20 die type has been found to have all pins able to withstand a HBM transient pulse of +/-500V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-100mA.

Table 1
Reliability Evaluation Test Results

MAX232AESE+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C Biased Time = 1000 hrs.	DC Parameters & functionality	77	0	NQS4AA805G, D/C 0640
			77	0	NQS0AA696A, D/C 0522
			77	0	NQS0AA681A, D/C 0510
			77	0	NQS0AA752B, D/C 0612
			80	0	NQS0AA840A, D/C 0701
			80	0	NQS0AA807C, D/C 0640
			80	0	NQS0AA730A, D/C 0548
			80	0	NQS0AA864A, D/C 0722

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