

RELIABILITY REPORT
FOR
MAX218EAP+
PLASTIC ENCAPSULATED DEVICES

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MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

Approved by
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Conclusion

The MAX218EAP+ 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 MAX218 RS-232 transceiver is intended for battery-powered EIA/TIA-232E and V.28/V.24 communications interfaces that need two drivers and two receivers with minimum power consumption. It provides a wide +1.8V to +4.25V operating voltage range while maintaining true RS-232 and EIA/TIA-562 voltage levels. The MAX218 runs from two alkaline, NiCd, or NiMH cells without any form of voltage regulator. A shutdown mode reduces current consumption to 1 μ A, extending battery life in portable systems. While shut down, all receivers can remain active or can be disabled under logic control, permitting a system incorporating the CMOS MAX218 to monitor external devices while in low-power shutdown mode. A guaranteed 120kbps data rate provides compatibility with popular software for communicating with personal computers. Three-state drivers are provided on all receiver outputs so that multiple receivers, generally of different interface standards, can be wire-ORed at the UART. The MAX218 is available in 20-pin DIP, SO, and SSOP packages.

II. Manufacturing Information

A. Description/Function:	1.8V to 4.25V Powered, True RS-232 Dual Transceiver
B. Process:	S3
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Philippines or Malaysia
F. Date of Initial Production:	Pre 1997

III. Packaging Information

A. Package Type:	20-pin SSOP
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:	#05-1901-0100
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:	125°C/W
K. Single Layer Theta Jc:	33°C/W
L. Multi Layer Theta Ja:	84°C/W
M. Multi Layer Theta Jc:	32°C/W

IV. Die Information

A. Dimensions:	101 X 122 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:	3.0 microns (as drawn)
F. Minimum Metal Spacing:	3.0 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: Richard Aburano (Manager, Reliability Engineering)
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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 274 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 4.0 \times 10^{-9}$$

$$\lambda = 4.0 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 S3 Process results in a FIT Rate of 0.03 @ 25C and 0.5 @ 55C (0.8 eV, 60% UCL).

B. E.S.D. and Latch-Up Testing (ESD lot XGVBBQ001B D/C 9515, Latch-Up lot NGVBCQ001B D/C 9848)

The RS27-1 die type has been found to have all pins able to withstand a HBM transient pulse of +/-400V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-250mA.

Table 1
Reliability Evaluation Test Results

MAX218EAP+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C	DC Parameters & functionality	80	0	XGVBBQ001A, D/C 9515
	Biased		34	0	XGVABM001C, D/C 9449
	Time = 192 hrs.		80	0	XGVACQ001A, D/C 9513
			80	0	XGQDBQ001C, D/C 9449

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