

Conclusion

The MAX3218EAP+ 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 MAX3218 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 from a single low-voltage supply. It provides a wide +1.8V to +4.25V operating voltage range while maintaining true RS-232 and EIA/TIA-562 voltage levels. The MAX3218 runs from two alkaline, NiCd, or NiMH cells without any form of voltage regulator. A guaranteed 120kbps data rate provides compatibility with popular software for communicating with personal computers. Supply current is reduced to 1μA with Maxim's new AutoShutdown feature. When the MAX3218 does not sense a valid signal level on the receiver inputs, the on-board power-supply and drivers shut down. This occurs if the RS-232 cable is disconnected or if the transmitters of the connected peripheral are turned off. The system turns on again when a valid level is applied to either RS-232 receiver input. As a result, the system saves power without changes to the existing software. Additionally, the MAX3218 can be forced into or out of shutdown, under logic control. While shut down, all receivers can remain active or can be disabled under logic control, permitting a system incorporating the CMOS MAX3218 to monitor external devices while in low-power shutdown. Three-state drivers are provided on both receiver outputs so that multiple receivers, generally of different interface standards, can be on the same bus. The MAX3218 is available in 20-pin DIP and SSOP packages.

II. Manufacturing Information

A. Description/Function:	1µA, 1.8V to 4.25V RS-232 Transceiver with AutoShutdown(tm)
B. Process:	S3
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:	20L 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:	#05-1901-0096 / A
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	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 Dielectri	SiO ₂
I. Die Separation Method	Wafer Saw

V. Quality Assurance Information

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|-----------------------------------|--|
| 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 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)

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

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

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 0.51 @ 25C and 8.79 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot NLVADQ001A D/C 9817)

The RS27 die type has been found to have all pins able to withstand a HBM transient pulse of +/-1500V 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

MAX3218EAP+

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

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