

RELIABILITY REPORT FOR MAX3319ECAE+

PLASTIC ENCAPSULATED DEVICES

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MAXIM INTEGRATED PRODUCTS

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Approved by
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Conclusion

The MAX3319ECAE+ successfully meets the quality and reliability standards required of all Maxim products. In addition, Maxim's continuous reliability monitoring program ensures that all outgoing product will continue to meet Maxim's quality and reliability standards.

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I. Device Description

A. General

The MAX3316E-MAX3319E are 2.5V powered RS-232 compatible transceivers. These devices feature shutdown (MAX3317E), AutoShutdown Plus™ (MAX3318E/MAX3319E), and enhanced electrostatic discharge (ESD) protection integrated into the chip. All transmitter outputs and receiver inputs are protected to ±15kV using the IEC 1000-4-2 Air-Gap Discharge method, ±8kV using the IEC 1000-4-2 Contact Discharge method, and ±15kV using the Human Body Model. All devices are guaranteed at a data rate of 460kbps. The transceivers have a proprietary low-dropout transmitter output stage enabling RS-232 compatible operation from a +2.25V to +3.0V supply with a dual charge pump. The charge pump requires only four 0.1µF capacitors. The MAX3318E/MAX3319E feature a logic-level output (READY) that asserts when the charge pump is regulating and the device is ready to begin transmitting. The MAX3318E/MAX3319E achieve a 1µA supply current using Maxim's revolutionary AutoShutdown Plus feature. These devices automatically enter a low-power shutdown mode when the RS-232 cable is disconnected or the transmitter or preceiver input. AutoShutdown Plus saves power without changes to the existing BIOS or operating system. The MAX3317E also features a 1µA shutdown mode that can be entered by driving active-low SHDN low. The MAX3317E's receivers remain active while in shutdown mode, allowing external devices such as modems to be monitored using only 1µA supply current. These devices are available in space-saving packages: MAX3316E (16-pin SSOP and 20-pin TSSOP), MAX3317E/ MAX3318E (20-pin SSOP and 20-pin TSSOP), and MAX3319E (16-pin SSOP).



II. Manufacturing Information

A. Description/Function: ±15kV ESD-Protected, 2.5V, 1µA, 460kbps, RS-232-Compatible Transceivers

В3

349

Oregon

Philippines

January 21, 2000

- B. Process:
- C. Number of Device Transistors:
- D. Fabrication Location:
- E. Assembly Location:
- F. Date of Initial Production:

III. Packaging Information

A. Package Type:	16L 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:	#05-2601-0004 / 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:	140°C/W
K. Single Layer Theta Jc:	34°C/W
L. Multi Layer Theta Ja:	86°C/W
M. Multi Layer Theta Jc:	33°C/W

IV. Die Information

A.	Dimensions:	159X91 mils
В.	Passivation:	Si_3N_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
١.	Die Separation Method:	Wafer Saw



V. Quality Assurance Information

Α.	Quality Assurance Contacts:	Richard Aburano (Manager, Reliability Engineering)			
		Don Lipps (Manager, Reliability Engineering)			
		Bryan Preeshl (Vice President of QA)			
В.	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:

 $\lambda = \underbrace{1}_{\text{MTTF}} = \underbrace{1.83}_{\text{1000 x 4340 x 80 x 2}} \text{ (Chi square value for MTTF upper limit)}$ $\lambda = 2.6 \text{ x } 10^{-9}$ $\lambda = 2.6 \text{ F.I.T. (60\% confidence level @ 25°C)}$

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at http://www.maxim-ic.com/qa/reliability/monitor.

Cumulative monitor data for the B3 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 I3PDAQ001A D/C 0001)

The RT05-3 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500V 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

MAX3319ECAE+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note	e 1) Ta = 135°C Biased Time = 1000 hrs.	DC Parameters & functionality	80	0	N3PABQ003E, D/C 0713

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