

RELIABILITY REPORT FOR MAX3060EEKA#G16

PLASTIC ENCAPSULATED DEVICES

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# **MAXIM INTEGRATED**

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#### Conclusion

The MAX3060EEKA#G16 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

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The MAX3060E/MAX3061E/MAX3062E high-speed transceivers for RS-485/RS-422 communication contain one driver and one receiver. These devices feature fail-safe circuitry, which guarantees a logic-high receiver output when the receiver inputs are open or shorted. This means that the receiver output is a logic high if all transmitters on a terminated bus are disabled (high impedance). These devices also feature hot-swap circuitry that eliminates data glitches during hot insertion. The MAX3060E features slew-rate-limited drivers that minimize EMI and reduce reflections caused by improperly terminated cables, allowing error-free data transmission up to 115kbps. The MAX3061E, also slew-rate limited, transmits up to 500kbps. The MAX3062E driver is not slew-rate limited, allowing transmit speeds up to 20Mbps. All transmitter outputs are protected to ±15kV using the Human Body Model. These transceivers typically draw 910µA of supply current when unloaded, or 790µA when fully loaded with the drivers disabled. All devices have a 1/8-unit-load receiver input impedance that allows up to 256 transceivers on the bus. These devices are intended for half-duplex communication.

## II. Manufacturing Information



A.	Description/Function:	±15kV ESD-Protected, Fail-Safe, 20Mbps, Slew-Rate-Limited RS-485/RS-422 Transceivers in a SOT
В.	Process:	BCD8
C.	Number of Device Transistors:	
D.	Fabrication Location:	Oregon
E.	Assembly Location:	Taiwan or Thailand
F.	Date of Initial Production:	July 27, 2002

## III. Packaging Information

A. Package Type:	8-pin SOT23
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	None
E. Bondwire:	N/A
F. Mold Material:	N/A
G. Assembly Diagram:	#05-9000-2444
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1
J. Single Layer Theta Jb:	N/A
K. Single Layer Theta Jc:	N/A
L. Multi Layer Theta Ja:	196°C/W
M. Multi Layer Theta Jc:	70°C/W

#### IV. Die Information

Α.	Dimensions:	45 X 90 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:	
Н.	Isolation Dielectric:	SiO <sub>2</sub>
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)
В.	Outgoing Inspection Level:	<ul><li>0.1% for all electrical parameters guaranteed by the Datasheet.</li><li>0.1% For all Visual Defects.</li></ul>
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 ( $\lambda$ ) is calculated as follows:

$$\lambda = 1 = 1.83$$
 (Chi square value for MTTF upper limit)  
MTTF = 1.83 (Chi square value for MTTF upper limit)  
(where 4340 x 90 x 2  
(where 4340 = Temperature Acceleration factor assuming an activation energy of 0.8eV)  
$$\lambda = 12.2 \times 10^{-9}$$

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 BCD8 Process results in a FIT Rate of 0.04 @ 25C and 0.71 @ 55C (0.8 eV, 60% UCL).

#### B. E.S.D. and Latch-Up Testing (lot N7X3CA004A, D/C 0324)

The RT10-3 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

# MAX3060EEKA#G16

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note	e 1)				
	Ta = 135°C	DC Parameters	45	0	N7X5CA004A, D/C 0324
	Biased Time = 192 hrs.	& functionality	45	0	I7X3BZ002C, D/C 0225

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