

RELIABILITY REPORT  
FOR  
MAX3182EEUK+T  
PLASTIC ENCAPSULATED DEVICES

December 8, 2011

**MAXIM INTEGRATED PRODUCTS**

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## Conclusion

The MAX3182EEUK+T 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 MAX3180E-MAX3183E single RS-232 receivers in a SOT23-5 package are designed for space- and cost-constrained applications requiring minimal RS-232 communications. The receiver inputs are protected to  $\pm 15\text{kV}$  using IEC 1000-4-2 Air-Gap Discharge, to  $\pm 8\text{kV}$  using IEC 1000-4-2 Contact Discharge, and to  $\pm 15\text{kV}$  per the Human Body Model, ensuring compliance with international standards. The devices minimize power and heat dissipation by consuming only  $0.5\mu\text{A}$  supply current from a +3.0V to +5.5V supply, and they guarantee true RS-232 performance up to a 1.5Mbps data rate. The MAX3180E/MAX3182E feature a three-state TTL/CMOS receiver output that is controlled by an active-low EN logic input. The MAX3181E/MAX3183E feature an active-low INVALID output that indicates valid RS-232 signals at the receiver input for applications requiring automatic system wake-up. The MAX3182E/MAX3183E have a noninverting output, while the MAX3180E/MAX3181E have a standard inverting output.

## II. Manufacturing Information

A. Description/Function:	±15kV ESD-Protected, 0.5µA, +3V to +5.5V, 1.5Mbps RS-232 Receivers in SOT23-5
B. Process:	M5
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Thailand
F. Date of Initial Production:	April 24, 1999

## III. Packaging Information

A. Package Type:	5L SOT23
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-1901-0200 / 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:	324.3°C/W
K. Single Layer Theta Jc:	82°C/W
L. Multi Layer Theta Ja:	255.9°C/W
M. Multi Layer Theta Jc:	81°C/W

## IV. Die Information

A. Dimensions:	57 X 38 mils
B. Passivation:	Si <sub>3</sub> N <sub>4</sub> /SiO <sub>2</sub> (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Aluminum/0.5% Cu
D. Backside Metallization:	None
E. Minimum Metal Width:	Metal1 = 0.5 / Metal2 = 0.6 / Metal3 = 0.6 microns (as drawn)
F. Minimum Metal Spacing:	Metal1 = 0.45 / Metal2 = 0.5 / Metal3 = 0.6 microns (as drawn)
G. Bondpad Dimensions:	
H. 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)
- 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 ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 230 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 4.8 \times 10^{-9}$$

$$\lambda = 4.8 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 M5 Process results in a FIT Rate of 3.2 @ 25C and 54.8 @ 55C (0.8 eV, 60% UCL)

### B. E.S.D. and Latch-Up Testing (lot N8DCBQ002B D/C 0127)

The RS78-2 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 +/-150mA.

**Table 1**  
Reliability Evaluation Test Results

**MAX3182EEUK+T**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
<b>Static Life Test</b> (Note 1)	Ta = 135°C	DC Parameters	80	0	N8DBBQ002E, D/C 9924
	Biased	& functionality	80	0	N8DDBQ002E, D/C 9924
	Time = 192 hrs.		70	0	N8DAAN001A, D/C 9907

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