



RELIABILITY REPORT  
FOR  
MAX9310AEUP+T  
PLASTIC ENCAPSULATED DEVICES

December 4, 2011

**MAXIM INTEGRATED PRODUCTS**

120 SAN GABRIEL DR.  
SUNNYVALE, CA 94086

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## Conclusion

The MAX9310AEUP+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 MAX9310A is a fast, low-skew 1:5 differential driver with selectable LVPECL inputs and LVDS outputs, designed for clock distribution applications. This device features an ultra-low propagation delay of 340ps with 48mA of supply current. The MAX9310A operates from a 3V to 3.6V power supply for use in 3.3V systems. A 2:1 input multiplexer is used to select one of two differential inputs. The input selection is controlled through the CLKSEL pin. This device features a synchronous enable function. The MAX9310A LVPECL inputs can be driven by either a differential or single-ended signal. A VBB reference voltage output is provided for use with single-ended inputs. The device can also accept differential HSTL signals. The MAX9310A is offered in a space-saving 20-pin TSSOP package and operates over the extended temperature range from -40°C to +85°C.

**II. Manufacturing Information**

A. Description/Function:	1:5 Clock Driver with Selectable LVPECL Inputs/Single-Ended Inputs and LVDS Outputs
B. Process:	GST2
C. Number of Device Transistors:	
D. Fabrication Location:	USA
E. Assembly Location:	Malaysia, Philippines and Thailand
F. Date of Initial Production:	July 27, 2002

**III. Packaging Information**

A. Package Type:	20-pin TSSOP
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:	#05-3601-0052
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:	91°C/W
K. Single Layer Theta Jc:	20°C/W
L. Multi Layer Theta Ja:	73.8°C/W
M. Multi Layer Theta Jc:	20°C/W

**IV. Die Information**

A. Dimensions:	50 X 70 mils
B. Passivation:	Si <sub>3</sub> N <sub>4</sub> (Silicon nitride)
C. Interconnect:	Au
D. Backside Metallization:	None
E. Minimum Metal Width:	2 microns (as drawn)
F. Minimum Metal Spacing:	2 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 135C biased (static) life test are shown in Table 1. Using these results, the Failure Rate ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 90 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 12.2 \times 10^{-9}$$

$$\lambda = 12.2 \text{ F.I.T. (60\% confidence level @ 25}^\circ\text{C)}$$

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 GST2 Process results in a FIT Rate of 0.06 @ 25C and 1.10 @ 55C (0.8 eV, 60% UCL)

### B. E.S.D. and Latch-Up Testing (lot NKW1BQ001B, D/C 0245)

The EC23-1 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

**MAX9310AEUP+T**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
<b>Static Life Test</b> (Note 1)	Ta = 135C	DC Parameters	45	0	NKW1AQ001B, D/C 0219
	Biased	& functionality	45	0	NKW0BQ001A, D/C 0245
	Time = 192 hrs.				

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