

RELIABILITY REPORT  
FOR  
MAX9180EXT+  
PLASTIC ENCAPSULATED DEVICES

October 24, 2008

**MAXIM INTEGRATED PRODUCTS**

120 SAN GABRIEL DR.  
SUNNYVALE, CA 94086

<b>Approved by</b>
Ken Wendel
Quality Assurance
Director, Reliability Engineering

## Conclusion

The MAX9180EXT+ 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 MAX9180 is a 400Mbps, low-voltage differential signaling (LVDS) repeater, which accepts a single LVDS input and duplicates the signal at a single LVDS output. Its low-jitter, low-noise performance makes it ideal for buffering LVDS signals sent over long distances or noisy environments, such as cables and backplanes. The MAX9180's tiny size makes it especially suitable for minimizing stub lengths in multidrop backplane applications. The SC70 package (half the size of a SOT23) allows the MAX9180 to be placed close to the connector, thereby minimizing stub lengths and reflections on the bus. The point-to-point connection between the MAX9180 output and the destination IC, such as an FPGA or ASIC, allows the destination IC to be located at greater distances from the bus connector. Ultra-low, 23psP-P added deterministic jitter and 0.6psRMS added random jitter ensure reliable communication in high-speed links that are highly sensitive to timing errors, especially those incorporating clock-and-data recovery, PLLs, serializers, or deserializers. The MAX9180's switching performance guarantees a 400Mbps data rate, but minimizes radiated noise by guaranteeing 0.5ns minimum output transition time. The MAX9180 has fail-safe circuitry that sets the output high for undriven open, short, or terminated inputs. The MAX9180 operates from a single 3.3V supply and consumes only 10mA over a -40°C to +85°C temperature range. Refer to the MAX9129 data sheet for a quad bus LVDS (BLVDS) driver, and to the MAX9181 data sheet for a low-jitter, low-noise 400Mbps LVPECL-to-LVDS level translator in an SC70 package.

## II. Manufacturing Information

A. Description/Function:	400Mbps, Low-Jitter, Low-Noise LVDS Repeater in an SC70 Package
B. Process:	0.35UM 2 Poly 3 Metal CMOS
C. Number of Device Transistors:	
D. Fabrication Location:	TSMC
E. Assembly Location:	Carsem Malaysia, NSEB/UTL Thailand, Unisem Malaysia
F. Date of Initial Production:	April 27, 2002

## III. Packaging Information

A. Package Type:	6-pin SC70
B. Lead Frame:	Cu Alloy
C. Lead Finish:	100% matte Tin
D. Die Attach:	Ag Filled Epoxy
E. Bondwire:	Au (1.0 mil dia.)
F. Mold Material:	Epoxy with silica filler
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:	326°C/W
K. Single Layer Theta Jc:	115°C/W

## IV. Die Information

A. Dimensions:	32 X 31 mils
B. Passivation:	Silicon Dioxide/Silicon Nitride
C. Interconnect:	Al/Cu
D. Backside Metallization:	None
E. Minimum Metal Width:	0.35 um
F. Minimum Metal Spacing:	0.35 um
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	Silicon Dioxide
I. Die Separation Method:	Saw

## V. Quality Assurance Information

- A. Quality Assurance Contacts: Ken Wendel (Director, Reliability Engineering)  
Bryan Preeshl (Managing Director 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 135 biased (static) life test are pending. Using these results, the Failure Rate ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 79 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 13.59 \times 10^{-9}$$

$$\lambda = 13.59 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly 1000 hour life test monitors on its processes. This data is published in the Product Reliability Report found at <http://www.maxim-ic.com/>. Current monitor data for the TS352P3M Process results in a FIT Rate of 0.43 @ 25C and 7.50 @ 55C (0.8 eV, 60% UCL)

### B. Moisture Resistance Tests

The industry standard 85°C/85%RH or HAST testing is monitored per device process once a quarter.

### C. E.S.D. and Latch-Up Testing

The HS15 die type has been found to have all pins able to withstand a HBM transient pulse of > 2500 V per JEDEC JESD22-A114-D. Latch-Up testing has shown that this device withstands a current of 200 mA.

**Table 1**  
Reliability Evaluation Test Results

**MAX9180EXT+**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
<b>Static Life Test</b> (Note 1)	Ta = 135 Biased Time = 192 hrs.	DC Parameters & functionality	79	0
<b>Moisture Testing</b> (Note 2) 85/85	Ta = 85°C RH = 85% Biased Time = 1000hrs.	DC Parameters & functionality	77	0
<b>Mechanical Stress</b> (Note 2) Temperature Cycle	-65°C/150°C 1000 Cycles Method 1010	DC Parameters & functionality	77	0

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

Note 2: Generic Package/Process data