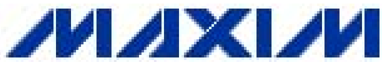

RELIABILITY REPORT

FOR

MAX9177EUB+

PLASTIC ENCAPSULATED DEVICES

August 27, 2012

MAXIM INTEGRATED PRODUCTS

160 Rio Robles

San Jose, CA 95134

Approved by
Sokhom Chum
Quality Assurance
Reliability Engineer

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Conclusion

The MAX9177EUB+ 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 MAX9176/MAX9177 are 670MHz, low-jitter, low-skew, 2:1 multiplexers ideal for protection switching, loopback, and clock distribution. The devices feature ultra-low 68ps peak-to-peak deterministic jitter that ensures reliable operation in high-speed links that are highly sensitive to timing errors. The MAX9176 has fail-safe LVDS inputs and an LVDS output. The MAX9177 has "anything" differential inputs (CML/LVDS/LVPECL) and an LVDS output. The output can be put into high impedance using the power-down input. The MAX9176 features fail-safe circuits that drive the output high when a selected input is open, undriven and shorted, or undriven and terminated. The MAX9177 has bias circuits that force the output high when a selected input is open. The mux select and power-down inputs are compatible with standard LVTTL/LVCMOS logic. The select and power-down inputs tolerate -1V undershoot and VCC + 1V overshoot. The MAX9176/MAX9177 are available in 10-pin µMAX and 10-pin thin QFN packages, and operate from a single 3.3V supply over the -40°C to +85°C temperature range.

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II. Manufacturing Information

A. Description/Function:	670MHz, LVDS-to-LVDS and Anything-to-LVDS, 2:1 Multiplexers
B. Process:	TS35
C. Number of Device Transistors:	
D. Fabrication Location:	Taiwan
E. Assembly Location:	Philippines, Thailand, Malaysia
F. Date of Initial Production:	January 25, 2003

III. Packaging Information

A. Package Type:	10L uMAX
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:	#05-9000-0363 / 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:	180°C/W
K. Single Layer Theta Jc:	36°C/W
L. Multi Layer Theta Ja:	113.1°C/W
M. Multi Layer Theta Jc:	36°C/W

IV. Die Information

A. Dimensions:	60 X 60 mils
B. 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:	0.35µm
F. Minimum Metal Spacing:	0.35µm
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	SiO_2
I. Die Separation Method:	Wafer Saw

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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 (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 48 \times 2}$$

(Chi square value for MTTF upper limit)

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

$\lambda = 22.9 \times 10^{-9}$

λ = 22.9 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 TS35 Process results in a FIT Rate of 0.11 @ 25C and 1.93 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot QDF0BQ001A D/C 0302)

The HS26-1 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.

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Table 1

Reliability Evaluation Test Results

MAX9177EUB+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)					
	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	48	0	QDF0BQ001A, D/C 0302

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

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