

RELIABILITY REPORT
FOR
MAX9378EUA+
(MAX9377)
PLASTIC ENCAPSULATED DEVICES

November 30, 2008

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.
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Approved by
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Conclusion

The MAX9378EUA+ 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 MAX9377/MAX9378 are fully differential, high-speed, low-jitter anything-to-LVPECL and anything-to-LVDS translators, respectively, with a selectable divide-by-four function. Low propagation delay and high speed make them ideal for various high-speed network routing and backplane applications at speeds up to 2GHz in nondivide mode. The MAX9377/MAX9378 accept any differential input signal within the supply rails and with minimum amplitude of 100mV. Inputs are fully compatible with the LVDS, LVPECL, HSTL, and CML differential signaling standards. The MAX9377 outputs are LVPECL and have sufficient current to drive 50 transmission lines. The MAX9378 outputs are LVDS and conform to the ANSI EIA/TIA-644 LVDS standard. The MAX9377/MAX9378 are available in 8-pin μ MAX packages and operate from a single +3.3V supply over the -40°C to +85°C temperature range.

II. Manufacturing Information

A. Description/Function:	Anything-to-LVPECL/LVDS Translators with Pin-Selectable Divide-by-Four
B. Process:	GST2
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	ATP Philippines, UTL Thailand, Unisem Malaysia
F. Date of Initial Production:	July 26, 2003

III. Packaging Information

A. Package Type:	8-pin uMAX
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive Epoxy
E. Bondwire:	Gold (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-0511
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:	221°C/W
K. Single Layer Theta Jc:	41.9°C/W
L. Multi Layer Theta Ja:	206.3°C/W
M. Multi Layer Theta Jc:	41.9°C/W

IV. Die Information

A. Dimensions:	40 X 57 mils
B. Passivation:	Si ₃ N ₄ (Silicon nitride)
C. Interconnect:	Poly / Au
D. Backside Metallization:	None
E. Minimum Metal Width:	2 microns (as drawn)
F. Minimum Metal Spacing:	2 microns (as drawn)
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	SiO ₂
I. Die Separation Method:	Wafer 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 150°C biased (static) life test are pending. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 95 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 11.3 \times 10^{-9}$$

$\lambda = 11.3$ 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 GS2 Process results in a FIT Rate of 1.0 @ 25C and 17.8 @ 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 EC34-3 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500 V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-250 mA.

Table 1
Reliability Evaluation Test Results

MAX9378EUA+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)	Ta = 150°C Biased Time = 192 hrs.	DC Parameters & functionality	95	0
Moisture Testing (Note 2) 85/85	Ta = 85°C RH = 85% Biased Time = 1000hrs.	DC Parameters & functionality	77	0
Mechanical Stress (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