RELIABILITY REPORT

FOR

MAX9169ESE+
(MAX9170)

PLASTIC ENCAPSULATED DEVICES

October 29, 2008

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Quality Assurance
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Conclusion

The MAX9169ESE+ 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 MAX9169/MAX9170 low-jitter, low-voltage differential signaling LVDS/LVTTL-to-LVDS repeaters are ideal for applications that require high-speed data or clock distribution while minimizing power, space, and noise. The devices accept a single LVDS (MAX9169) or LVTTL (MAX9170) input and repeat the input at four LVDS outputs. Each differential output drives 100Ω, allowing point-to-point distribution of signals on transmission lines with 100Ω termination at the receiver input. The MAX9169 and MAX9170 are pin compatible with the SN65LVDS104 and SN65LVDS105, respectively, and offer improved pulse-skew performance.

Ultra-low 150ps (max) pulse skew and $200ps_{P-P}$ (max) added deterministic jitter ensure reliable communication in high-speed links that are highly sensitive to timing error, especially those incorporating clock-and-data recovery or serializers and deserializers. The high-speed switching performance guarantees 630Mbps data rate and less than 120ps channel-to-channel skew over the 3.0V to 3.6V operating supply range.

Supply current is 30mA (max) for the MAX9169, and 25mA (max) for the MAX9170. LVDS inputs and outputs conform to the ANSI EIA/TIA-644 standard. A fail-safe feature on the MAX9169 sets the output high when the input is undriven and open, terminated, or shorted. The MAX9169/MAX9170 are offered in 16-pin TSSOP and SO packages, and operate over an extended -40°C to +85°C temperature range.

Refer to the MAX9130 data sheet for an LVDS line receiver in an SC70 package.

II. Manufacturing Information

A. Description/Function:	4-Port LVDS and LVTTL-to-LVDS Repeaters
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:	October 25, 2002

III. Packaging Information

A. Package Type:	16-pin SOIC (N)
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Ag Filled Epoxy
E. Bondwire:	1.0 (mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1
J. Multi Layer Theta Ja:	82.2°C/W
K. Multi Layer Theta Jc:	32°C/W

IV. Die Information

A. Dimensions:	58 X 64 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 biased (static) life test are pending. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 80 \times 2}$$ (Chi square value for MTTF upper limit)

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

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

$\lambda = 13.59$ 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 HS22Z die type has been found to have all pins able to withstand a HBM transient pulse of 16KV per pin. Latch-Up testing has shown that this device withstands a current of 250 mA.

Table 1
Reliability Evaluation Test Results

MAX9169ESE+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)				
	Ta = Biased Time = 192 hrs.	DC Parameters & functionality	80	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