

RELIABILITY REPORT  
FOR  
MAX9242EUM+  
(MAX9244, MAX9446, MAX9254)  
PLASTIC ENCAPSULATED DEVICES

October 29, 2008

**MAXIM INTEGRATED PRODUCTS**

120 SAN GABRIEL DR.  
SUNNYVALE, CA 94086

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

## Conclusion

The MAX9242EUM+ 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 MAX9242/MAX9244/MAX9246/MAX9254 deserialize three LVDS serial-data inputs into 21 single-ended LVCMOS/LVTTL outputs. A separate parallel-rate LVDS clock provides the timing for deserialization. The MAX9242/MAX9244/MAX9246/MAX9254 feature spread-spectrum capability, allowing the output data and clock frequency to spread over a specified range to reduce EMI. The single-ended data and clock outputs are programmable for a frequency spread of  $\pm 2\%$ ,  $\pm 4\%$ , or no spread. The spread-spectrum function is also available when the MAX9242/MAX9244/MAX9246/MAX9254 operate in non-DC-balanced mode. The modulation rate of the spread is 32kHz for a 33MHz LVDS clock input and scales linearly with frequency. The single-ended outputs have a separate supply, allowing +1.8V to +5V output logic levels.

The MAX9254 features high output drive current for both data and clock outputs for faster transition times in the presence of heavy capacitive loads.

The MAX9242/MAX9244/MAX9246/MAX9254 feature programmable DC balance, allowing isolation between a serializer and deserializer using AC-coupling. The MAX9242/MAX9244/MAX9246/MAX9254 operate with the MAX9209/MAX9213 serializers and are available with a rising-edge strobe (MAX9242) or falling-edge strobe (MAX9244/MAX9246/MAX9254). The LVDS inputs meet ISO 10605 ESD specifications with  $\pm 30\text{kV}$  Air-Gap Discharge and  $\pm 6\text{kV}$  Contact Discharge ratings.

## II. Manufacturing Information

A. Description/Function:	21-Bit Deserializers with Programmable Spread Spectrum and DC Balance
B. Process:	0.35UM 2 Poly 4 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:	48-pin TSSOP
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:	91.0°C/W
K. Multi Layer Theta Jc:	20.0°C/W

## IV. Die Information

A. Dimensions:	108 x 159 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 ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 77 \times 2} \text{ (Chi square value for MTTF upper limit)}$$

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

$$\lambda = 13.95 \times 10^{-9}$$

$$\lambda = 13.95 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 TS352P4M 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 HS60Z die types have shown the following ESD performance per pin:

HBM	2.5KV
IEC Contact	8KV
IEC Air	15KV
ISO Contact	6KV
ISO Air	30KV

Latch-Up testing has shown that this device withstands a current of 250 mA.

**Table 1**  
Reliability Evaluation Test Results

**MAX9242EUM+**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
<b>Static Life Test</b> (Note 1)	Ta = Biased Time = 192 hrs.	DC Parameters & functionality	77	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