

RELIABILITY REPORT
FOR
MAX9209EUM+
(MAX9211, MAX9213, MAX9215)
PLASTIC ENCAPSULATED DEVICES

October 29, 2008

MAXIM INTEGRATED PRODUCTS

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Conclusion

The MAX9209EUM+ 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.

Table of Contents

I.Device Description	V.Quality Assurance Information
II.Manufacturing Information	VI.Reliability Evaluation
III.Packaging Information	IV.Die Information
.....Attachments	

I. Device Description

A. General

The MAX9209/MAX9213 serialize 21 bits of LVTTTL/LVCMOS parallel input data to three LVDS outputs. A parallel rate clock on a fourth LVDS output provides timing for deserialization.

The MAX9209/MAX9213 feature programmable DC balance, which allows isolation between the serializer and deserializer using AC-coupling. The DC balance circuits on each channel code the data, limiting the imbalance of transmitted ones and zeros to a defined range. The companion MAX9210/MAX9214 deserializers decode the data. When DC balance is not programmed, the serializers are compatible with non-DC-balanced, 21-bit serializers such as the DS90CR215 and DS90CR217.

Two frequency ranges and two DC-balance default conditions are available for maximum replacement flexibility and compatibility with existing non-DC-balanced serializers.

The MAX9209/MAX9213 are available in TSSOP and space-saving thin QFN packages.

II. Manufacturing Information

A. Description/Function:	4-Port LVDS and LVTTTL-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:	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:	88 x 117 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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 45 \times 2} \text{ (Chi square value for MTTF upper limit)}$$

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

$$\lambda = 23.86 \times 10^{-9}$$

$$\lambda = 23.86 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 HS30Z die types have shown the following ESD performance per pin:

HBM	2KV
IEC Contact	8KV
IEC Air	15KV
ISO Contact	8KV
ISO Air	25KV

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

Table 1
Reliability Evaluation Test Results

MAX9209EUM+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)	Ta = Biased Time = 192 hrs.	DC Parameters & functionality	45	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