

RELIABILITY REPORT
FOR
MAX9234EUM+
(MAX9236, MAX9238)
PLASTIC ENCAPSULATED DEVICES

October 29, 2008

MAXIM INTEGRATED PRODUCTS

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Conclusion

The MAX9234EUM+ 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 MAX9234/MAX9236/MAX9238 deserialize three LVDS serial-data inputs into 21 single-ended LVCMOS/LVTTL outputs. A parallel-rate LVDS clock received with the LVDS data streams provides timing for deserialization. The outputs have a separate supply, allowing 1.8V to 5V output logic levels. All these devices are hot-swappable and allow "on-the-fly" frequency programming.

The MAX9234/MAX9236/MAX9238 feature DC balance, which allows isolation between a serializer and deserializer using AC-coupling. Each deserializer decodes data transmitted by one of the MAX9209/MAX9211/MAX9213/MAX9215 serializers.

The MAX9234 has a rising-edge output strobe. The MAX9236/MAX9238 have a falling-edge output strobe. The MAX9234/MAX9236/MAX9238 operate in DC-balanced mode only.

The MAX9234/MAX9236 operate with a parallel input clock of 8MHz to 34MHz, while the MAX9238 operates from 16MHz to 66MHz. The transition time of the single-ended outputs is increased on the low-frequency version parts (MAX9234/MAX9236) for reduced EMI. The LVDS inputs meet ISO 10605 ESD specification, $\pm 25\text{kV}$ for Air-Gap Discharge and $\pm 8\text{kV}$ Contact Discharge.

The MAX9234/MAX9236/MAX9238 are available in 48-pin TSSOP packages and operate over the -40°C to $+85^{\circ}\text{C}$ temperature range.

II. Manufacturing Information

A. Description/Function:	Hot-Swappable, 21-Bit, DC-Balanced LVDS Deserializers
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:	97 x 139 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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 49 \times 2} \text{ (Chi square value for MTTF upper limit)}$$

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

$$\lambda = 21.91 \times 10^{-9}$$

$$\lambda = 21.91 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 HS37Z die types have shown the following ESD performance per pin:

HBM	5KV
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

MAX9234EUM+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)	Ta = Biased Time = 192 hrs.	DC Parameters & functionality	49	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