

RELIABILITY REPORT
FOR
MAX9247ECM+T
PLASTIC ENCAPSULATED DEVICES

April 20, 2012

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.
SUNNYVALE, CA 94086

Approved by
Richard Aburano
Quality Assurance
Manager, Reliability Engineering

Conclusion

The MAX9247ECM+T 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 MAX9247 digital video parallel-to-serial converter serializes 27 bits of parallel data into a serial-data stream. Eighteen bits of video data and 9 bits of control data are encoded and multiplexed onto the serial interface, reducing the serial-data rate. The data-enable input determines when the video or control data is serialized. The MAX9247 pairs with the MAX9248/MAX9250 deserializers to form a complete digital video serial link. Interconnect can be controlled-impedance PCB traces or twisted-pair cable. Proprietary data encoding reduces EMI and provides DC balance. DC balance allows AC-coupling, providing isolation between the transmitting and receiving ends of the interface. The LVDS output is internally terminated with 100 . For operating frequencies less than 35MHz, the MAX9247 can also pair with the MAX9218 deserializer. ESD tolerance is specified for ISO 10605 with $\pm 10\text{kV}$ Contact Discharge and $\pm 30\text{kV}$ Air-Gap Discharge. The MAX9247 operates from a +3.3V core supply and features a separate input supply for interfacing to 1.8V to 3.3V logic levels. This device is available in a 48-lead LQFP package and is specified from -40°C to $+85^{\circ}\text{C}$ or -40°C to $+105^{\circ}\text{C}$.

II. Manufacturing Information

A. Description/Function:	27-Bit, 2.5MHz-to-42MHz DC-Balanced LVDS Serializer
B. Process:	TS35
C. Number of Device Transistors:	
D. Fabrication Location:	Taiwan
E. Assembly Location:	Korea, Malaysia and Taiwan
F. Date of Initial Production:	January 21, 2006

III. Packaging Information

A. Package Type:	48-pin LQFP 7x7
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-2189
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:	°C/W
K. Single Layer Theta Jc:	°C/W
L. Multi Layer Theta Ja:	48°C/W
M. Multi Layer Theta Jc:	10°C/W

IV. Die Information

A. Dimensions:	99 X 119 mils
B. Passivation:	Si ₃ N ₄ /SiO ₂ (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/0.5%Cu
D. Backside Metallization:	None
E. Minimum Metal Width:	Metal1 = 0.5 / Metal2-4 = 0.6 micron (as drawn)
F. Minimum Metal Spacing:	Metal1 = 0.45 / Metal2-3 = 0.5 / Metal4 = 0.6 micron (as drawn)
G. Bondpad Dimensions:	
H. Isolation Dielectric:	SiO ₂
I. Die Separation Method:	Wafer Saw

V. Quality Assurance Information

- A. Quality Assurance Contacts: Richard Aburano (Manager, Reliability Engineering)
Don Lipps (Manager, Reliability Engineering)
Bryan Preeshl (Vice President 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 135C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 48 \times 2} \text{ (Chi square value for MTTF upper limit)}$$

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

$$\lambda = 22.9 \times 10^{-9}$$

$$\lambda = 22.9 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at <http://www.maxim-ic.com/qa/reliability/monitor>. Cumulative monitor data for the TS35 Process results in a FIT Rate of 0.10 @ 25C and 1.8 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing

The HS47 die type has been found to have all pins able to withstand a transient pulse of:

- ESD-HBM: +/- 3000V per JEDEC JESD22-A114 (lot QS40AA015A, D/C 1129)
- ESD-CDM: +/- 750V per JEDEC JESD22-C101 (lot QS40AQ001B, D/C 0545)
- ESD-MM: +/- 250V per JEDEC JESD22-A115 (lot QS40AA015A, D/C 1129)
- ESD gun (contact): +/- 10kV LVDS pins per ISO10605, +/-10kV LVDS pins per IEC61000-4-2
- ESD gun (air gap): +/- 30kV LVDS pins per ISO10605, +/- 15kV LVDS pins per IEC61000-4-2

Latch-Up testing has shown that this device withstands a current of +/- 100mA and overvoltage per JEDEC JESD78 (lot QS40AA012C, D/C 1112).

Table 1
Reliability Evaluation Test Results

MAX9247ECM+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135C Biased Time = 192 hrs.	DC Parameters & functionality	48	0	

Note 1: Life Test Data may represent plastic DIP qualification lots.