



RELIABILITY REPORT
FOR
MAX9249GCM+T
PLASTIC ENCAPSULATED DEVICES

January 24, 2012

MAXIM INTEGRATED PRODUCTS

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Conclusion

The MAX9249GCM+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.

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I. Device Description

A. General

The MAX9249 serializer with LVDS system interface utilizes Maxim's Gigabit multimedia serial link (GMSL) technology. The MAX9249 serializer pairs with any GMSL deserializer to form a complete digital serial link for joint transmission of high-speed video, audio, and control data. The MAX9249 allows a maximum serial payload data rate of 2.5Gbps for a 15m shielded twisted-pair (STP) cable. The serializer operates up to a maximum clock rate of 104MHz (3-channel LVDS) or 78MHz (4-channel LVDS). This serial link supports display panels from QVGA (320 x 240) to WXGA (1280 x 800) and higher with 24-bit color. The 3-channel mode handles three lanes of LVDS data (21 bits), UART control signals, and three audio signals. The 4-channel mode handles four lanes of LVDS data (28 bits), UART control signals, three audio signals, and/or up to three auxiliary parallel inputs. The three audio inputs form a standard I²S interface, supporting sample rates from 8kHz to 192kHz and audio word lengths of 4 to 32 bits. The embedded control channel forms a full-duplex, differential, 100kbps to 1Mbps UART link between the serializer and deserializer. The electronic control unit (ECU), or microcontroller (μC), can be located on the MAX9249 side of the link (typical for video display), on the deserializer side of the link (typical for image sensing), or on both sides. In addition, the control channel enables ECU/μC control of peripherals on the remote side, such as backlight control, grayscale Gamma correction, camera module, and touch screen. Base-mode communication with peripherals uses either I²C or the GMSL UART format. A bypass mode enables full-duplex communication using custom UART formats. The MAX9249 serializer driver preemphasis, along with the channel equalizer on the GMSL deserializer, extends the link length and enhances the link reliability. Spread spectrum is available on the MAX9249 to reduce EMI on the serial link and the parallel output of the GMSL deserializer. The serial output complies with ISO 10605 and IEC 61000-4-2 ESD protection standards. The core supply for the MAX9249 is 1.8V. The I/O supply ranges from 1.8V to 3.3V. The MAX9249 is available in a 48-pin TQFP package (7mm x 7mm) with an exposed pad. Electrical performance is guaranteed over the -40°C to +105°C automotive temperature range.

II. Manufacturing Information

A. Description/Function:	Gigabit Multimedia Serial Link Serializer with LVDS System Interface
B. Process:	TS18
C. Number of Device Transistors:	183550
D. Fabrication Location:	Taiwan
E. Assembly Location:	Korea
F. Date of Initial Production:	January 22, 2010

III. Packaging Information

A. Package Type:	48-pin TQFP
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (0.8 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-3859
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 3
J. Single Layer Theta Ja:	°C/W
K. Single Layer Theta Jc:	°C/W
L. Multi Layer Theta Ja:	27.6°C/W
M. Multi Layer Theta Jc:	2°C/W

IV. Die Information

A. Dimensions:	159.8 X 139.8 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 = 0.23 / Metal2-5 = 0.28 / Metal6 = 0.44 micron (as drawn)
F. Minimum Metal Spacing:	Metal1 = 0.23 / Metal2-5 = 0.28 / Metal6 = 0.46 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 Operations) 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 135°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

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

(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 TS18 Process results in a FIT Rate of 0.24 @ 25C and 4.14 @ 55C (0.8 eV, 60% UCL)

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

The HS68 die type has been found to have all pins able to withstand a transient pulse of

ESD-HBM:	+/- 2500V per JEDEC JESD22-A114 (+/- 3000V pins only to supply/ground) (lot QZZZBQ001A, D/C 0947) +/- 8000V per JEDEC JESD22-A114 (RXIN_, RXCLKIN_ and OUT_ pins only to ground) (lot QZZZBQ001A, D/C 0947)
ESD-CDM:	+/- 750V per JEDEC JESD22-C101 (lot QZZZBQ002B, D/C 1027)
ESD-MM:	+/- 250V per JEDEC JESD22-A115 (lot QZZZBQ002A, D/C 1018)
ESD gun (contact):	+/- 10kV CML pins per ISO10605, +/- 10kV CML pins per IEC61000-4-2 +/- 6kV LVDS pins per ISO10605, +/- 4kV LVDS pins per IEC61000-4-2
ESD gun (air gap):	+/- 30kV CML pins per ISO10605, +/- 12kV CML pins per IEC61000-4-2 +/- 20kV LVDS pins per ISO10605, +/- 8kV LVDS pins per IEC61000-4-2

Latch-Up testing has shown that this device withstands a current of +/- 250mA and overvoltage per JEDEC JESD78 (lot QZZZBQ001A, D/C 0947).

Table 1
Reliability Evaluation Test Results

MAX9249GCM+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	48	0	QZZZBQ001A, D/C 0947

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