

RELIABILITY REPORT
FOR
MAX9268GCM/V+T
PLASTIC ENCAPSULATED DEVICES

November 29, 2011

MAXIM INTEGRATED PRODUCTS

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Conclusion

The MAX9268GCM/V+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 MAX9268 deserializer utilizes Maxim's gigabit multimedia serial link (GMSL) technology. The MAX9268 deserializer features an LVDS system interface for reduced pin count and a smaller package, and pairs with any GMSL serializer to form a complete digital serial link for joint transmission of high-speed video, audio, and bidirectional control data. The MAX9268 allows a maximum serial payload data rate of 2.5Gbps for a 15m shielded twisted-pair (STP) cable. The deserializer operates up to a maximum output 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 outputs an LVDS clock, three lanes of LVDS data (21 bits), UART control signals, and one I²S audio channel consisting of three signals. The 4-channel mode outputs an LVDS clock, four lanes of LVDS data (28 bits), UART control signals, an I²S audio channel, and auxiliary control outputs. The three audio outputs 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. An electronic control unit (ECU), or microcontroller (μ C), can be located on the serializer side of the link (typical for video display), on the MAX9268 side of the link (typical for image sensing), or on both sides. In addition, the control channel enables ECU/ μ C 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. In addition, the MAX9268 features a bypass mode that enables full-duplex communication using custom UART formats. The GMSL serializer driver preemphasis, along with the MAX9268 channel equalizer, extends the link length and enhances the link reliability. Spread spectrum is available to reduce EMI on the LVDS and control outputs of the MAX9268. The serial line inputs comply with ISO 10605 and IEC 61000-4-2 ESD protection standards. The core supply for the MAX9268 is 3.3V. The I/O supply ranges from 1.8V to 3.3V. The MAX9268 is available in a 48-pin TQFP package (7mm x 7mm) with an exposed pad, and is specified over the -40°C to +105°C automotive temperature range.

II. Manufacturing Information

A. Description/Function:	Gigabit Multimedia Serial Link Deserializer with LVDS System Interface
B. Process:	0.18 μ m CMOS
C. Number of Device Transistors:	344222
D. Fabrication Location:	Taiwan
E. Assembly Location:	Korea
F. Date of Initial Production:	April 19, 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:	#05-9000-4090
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:	$^{\circ}$ C/W
K. Single Layer Theta Jc:	$^{\circ}$ C/W
L. Multi Layer Theta Ja:	27.6 $^{\circ}$ C/W
M. Multi Layer Theta Jc:	2 $^{\circ}$ C/W

IV. Die Information

A. Dimensions:	166.1 X 139.8 mils
B. Passivation:	Si ₃ N ₄ /SiO ₂ (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Au/0.5%Cu
D. Backside Metallization:	None
E. Minimum Metal Width:	Metal1 = 0.23 / Metal 2-5 = 0.28 / Metal6 = 0.44 micron (as drawn)
F. Minimum Metal Spacing:	Metal1 = 0.23 / Metal 2-5 = 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 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 125 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)

$$\lambda = 40.5 \times 10^{-9}$$

$$\lambda = 40.5 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 Process results in a FIT Rate of 0.7 @ 25C and 12.3 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lots QJ1ZAQ001D, D/C 1030; QJ1ZAQ003B, D/C 1133; QJ1ZAQ001B, D/C1003)

The HS70 die type has been found to have all pins able to withstand a transient pulse of:

- ESD-HBM: +/- 4000V all pins per JEDEC JESD22-A114, +/- 8000V CML/LVDS pins to AGND
- ESD-CDM: +/- 750V per JEDEC JESD22-C101
- ESD-MM: +/- 200V per JEDEC JESD22-A115
- ESD gun (contact): +/- 8kV CML/LVDS pins per ISO10605, +/- 10kV CML and +/- 8kV LVDS pins per IEC61000-4-2
- ESD gun (air gap): +/- 15kV CML and +/- 30kV LVDS pins per ISO10605, +/- 12kV CML and +/- 20kV LVDS pins per IEC61000-4-2

Latch-Up testing has shown that this device withstands a current of +/- 100mA and overvoltage per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results

MAX9268GCM/V+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 125 Biased Time = 192 hrs.	DC Parameters & functionality	48	0	QJ1ZAQ001A, D/C 1011

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