

RELIABILITY REPORT
FOR
MAX9271GTJ+
PLASTIC ENCAPSULATED DEVICES

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MAXIM INTEGRATED

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SAN JOSE, CA 95134

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Conclusion

The MAX9271GTJ+ successfully meets the quality and reliability standards required of all Maxim Integrated products. In addition, Maxim Integrated's continuous reliability monitoring program ensures that all outgoing product will continue to meet Maxim Integrated's quality and reliability standards.

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I. Device Description

A. General

The MAX9271 compact serializer is designed to drive 50 coax or 100 shielded twisted-pair (STP) cable. The device pairs with the MAX9272 deserializer. The parallel input is programmable for single or double input. Double input allows higher pixel clock input frequency by registering two pixels of typical image-sensor video data before serializing. This doubles the maximum pixel clock frequency compared to single input. The device features an embedded control channel that operates at 9.6kbps to 1Mbps in UART and mixed UART/I²C modes, and up to 400kbps in I²C mode. Using the control channel, a microcontroller (μ C) is capable of programming serializer, deserializer, and camera (or any peripheral) registers at any time, independent of video timing. There is one dedicated GPIO, four optional GPIOs, and a GPO output, allowing remote power-up of a camera module, camera frame synchronization, and other uses. Error-detection and correction coding are programmable. For driving longer cables, the device has programmable pre/deemphasis. Programmable spread spectrum is available on the serial output. The serial output meets ISO 10605 and IEC 61000-4-2 ESD standards. The core supply range is 1.7V to 1.9V and the I/O supply range is 1.7V to 3.6V. The device is available in a 32-pin (5mm x 5mm) TQFN-EP package with 0.5mm lead pitch and operates over the -40°C to +105°C temperature range.

II. Manufacturing Information

A. Description/Function:	16-Bit GMSL Serializer with Coax or STP Cable Drive
B. Process:	TS18
C. Number of Device Transistors:	296918
D. Fabrication Location:	Taiwan
E. Assembly Location:	China, Taiwan and Thailand
F. Date of Initial Production:	June 29, 2012

III. Packaging Information

A. Package Type:	32-pin TQFN 5x5
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:	#05-9000-4834
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:	47°C/W
K. Single Layer Theta Jc:	1.7°C/W
L. Multi Layer Theta Ja:	29°C/W
M. Multi Layer Theta Jc:	1.7°C/W

IV. Die Information

A. Dimensions:	109.8425 X 109.8425 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:	0.23 microns (as drawn)
F. Minimum Metal Spacing:	0.23 microns (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 135°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 159 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 6.9 \times 10^{-9}$$

$$\lambda = 6.9 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

The following failure rate represents data collected from Maxim Integrated's reliability monitor program. Maxim Integrated performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at <http://www.maximintegrated.com/qa/reliability/monitor>. Cumulative monitor data for the TS18 Process results in a FIT Rate of 0.05 @ 25°C and 0.86 @ 55°C (0.8 eV, 60% UCL)

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

The HS51-0 die type has been found to have all pins able to withstand a transient pulse of:

ESD-HBM:	+/- 2500V per JEDEC JESD22-A114 (lot QAFZ9Q002I, D/C 1308)
ESD-CDM:	+/- 750V per JEDEC JESD22-C101 (lot QAFZ9Q002I, D/C 1308)
ESD-MM:	+/- 250V per JEDEC JESD22-A115 (lot QAFZ9Q002I, D/C 1308)

Latch-Up testing has shown that this device withstands a current of +/-250mA and overvoltage per JEDEC JESD78 (lot QAFZ9Q001D, D/C 1221).

Table 1
Reliability Evaluation Test Results

MAX9271GTJ+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C	DC Parameters	79	0	QAFZ9Q001D, D/C 1221
	Biased	& functionality	80	0	QAFZ9Q002G, D/C 1302
	Time = 192 hrs.				

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