

RELIABILITY REPORT
FOR
MAX207CNG+
PLASTIC ENCAPSULATED DEVICES

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MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

Approved by
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Conclusion

The MAX207CNG+ 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 MAX200-MAX209/MAX211/MAX213 transceivers are designed for RS-232 and V.28 communication interfaces where $\pm 12V$ supplies are not available. On-board charge pumps convert the +5V input to the $\pm 10V$ needed for RS-232 output levels. The MAX201 and MAX209 operate from +5V and +12V, respectively, and contain a +12V to -12V charge-pump voltage converter. The MAX200-MAX209/MAX211/MAX213 drivers and receivers meet all EIA/TIA-232E and CCITT V.28 specifications at a 20kbps data rate. The drivers maintain the $\pm 5V$ EIA/TIA-232E output signal levels at data rates in excess of 120kbps when loaded in accordance with the EIA/TIA-232E specification. The 5 μ W shutdown mode of the MAX200, MAX205, MAX206, and MAX211 conserves energy in battery-powered systems. The MAX213 has an active-low shutdown and an active-high receiver enable control. Two receivers of the MAX213 are active, allowing the ring indicator (RI) to be monitored easily using only 75 μ W power. The MAX211 and MAX213 are available in a 28-pin, wide small-outline (SO) package and a 28-pin shrink small-outline (SSOP) package, which occupies only 40% of the area of the SO. The MAX207 is now available in a 24-pin SO package and a 24-pin SSOP. The MAX203 and MAX205 use no external components and are recommended for applications with limited circuit board space.

II. Manufacturing Information

A. Description/Function:	+5V, RS-232 Transceivers with 0.1 μ F External Capacitors
B. Process:	M6
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Philippines
F. Date of Initial Production:	Pre 1997

III. Packaging Information

A. Package Type:	24-pin PDIP
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (1.3 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-0701-0443
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:	75°C/W
K. Single Layer Theta Jc:	30°C/W
L. Multi Layer Theta Ja:	N/A
M. Multi Layer Theta Jc:	N/A

IV. Die Information

A. Dimensions:	138X155 mils
B. Passivation:	Si ₃ N ₄ /SiO ₂ (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/1.0%Si
D. Backside Metallization:	None
E. Minimum Metal Width:	Metal1 = 0.5 microns (as drawn)
F. Minimum Metal Spacing:	Metal1 = 0.45 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: 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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 240 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 4.58 \times 10^{-9}$$

$$\lambda = 4.58 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 M6 Process results in a FIT Rate of 0.38 @ 25C and 6.48 @ 55C (0.8 eV, 60% UCL).

B. E.S.D. and Latch-Up Testing (lot XYCAXB093B, D/C 9405)

The PS29 die type has been found to have all pins able to withstand a HBM transient pulse of +/-1000V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-200mA.

Table 1
Reliability Evaluation Test Results

MAX207CNG+

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	240	0	XLSDBQ003A, 9615

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