

RELIABILITY REPORT
FOR
MAX3222CUP+T
PLASTIC ENCAPSULATED DEVICES

May 14, 2012

MAXIM INTEGRATED PRODUCTS

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Conclusion

The MAX3222CUP+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 MAX3222/MAX3232/MAX3237/MAX3241 transceivers have a proprietary low-dropout transmitter output stage enabling true RS-232 performance from a 3.0V to 5.5V supply with a dual charge pump. The devices require only four small 0.1 μ F external charge-pump capacitors. The MAX3222, MAX3232, and MAX3241 are guaranteed to run at data rates of 120kbps while maintaining RS-232 output levels. The MAX3237 is guaranteed to run at data rates of 250kbps in the normal operating mode and 1Mbps in the MegaBaud(tm) operating mode, while maintaining RS-232 output levels. The MAX3222/MAX3232 have 2 receivers and 2 drivers. The MAX3222 features a 1 μ A shutdown mode that reduces power consumption and extends battery life in portable systems. Its receivers remain active in shutdown mode, allowing external devices such as modems to be monitored using only 1 μ A supply current. The MAX3222 and MAX3232 are pin, package, and functionally compatible with the industry-standard MAX242 and MAX232, respectively. The MAX3241 is a complete serial port (3 drivers/5 receivers) designed for notebook and subnotebook computers. The MAX3237 (5 drivers/3 receivers) is ideal for fast modem applications. Both these devices feature a shutdown mode in which all receivers can remain active while using only 1 μ A supply current. Receivers R1 (MAX3237/MAX3241) and R2 (MAX3241) have extra outputs in addition to their standard outputs. These extra outputs are always active, allowing external devices such as a modem to be monitored without forward biasing the protection diodes in circuitry that may have VCC completely removed. The MAX3222, MAX3232, and MAX3241 are available in space-saving TSSOP and SSOP packages.

II. Manufacturing Information

A. Description/Function:	3.0V to 5.5V, Low-Power, up to 1Mbps, True RS-232 Transceivers Using Four 0.1 μ F External Capacitors
B. Process:	C3
C. Number of Device Transistors:	242
D. Fabrication Location:	USA
E. Assembly Location:	Malaysia, Philippines and Thailand
F. Date of Initial Production:	January 24, 1998

III. Packaging Information

A. Package Type:	20-pin TSSOP
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:	#05-9000-4765
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:	91°C/W
K. Single Layer Theta Jc:	20°C/W
L. Multi Layer Theta Ja:	73.8°C/W
M. Multi Layer Theta Jc:	20°C/W

IV. Die Information

A. Dimensions:	123X87 mils
B. Passivation:	Si ₃ N ₄ /SiO ₂ (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/0.5%Cu with Ti/TiW Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	Metal1 = 0.8/Metal 2 = 1.2 microns (as drawn)
F. Minimum Metal Spacing:	Metal1-2 = 1.2 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 135C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 398 \times 2} \text{ (Chi square value for MTTF upper limit)}$$

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

$$\lambda = 2.8 \times 10^{-9}$$

$$\lambda = 2.8 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 C3 Process results in a FIT Rate of 0.78 @ 25C and 13.4 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot JABA2Q001A, D/C 1140)

The RU60 die type has been found to have all pins able to withstand a transient pulse of:

- ESD-HBM: +/- 2500V per JEDEC JESD22-A114
- ESD-CDM: +/- 750V per JEDEC JESD22-C101

Latch-Up testing has shown that this device withstands a current of +/- 250mA and overvoltage per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results

MAX3222CUP+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	80	0	J2DZAQ001Y, D/C 1112
			80	0	J2DZAQ002A, D/C 1115
			80	0	J2DZAQ003B, D/C 1117
			78	0	JABA2Q001A, D/C 1140
			80	0	J2DVBQ001A, D/C 1140

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