RELIABILITY REPORT

FOR

MAX3230ECPP+
(MAX3231E)

PLASTIC ENCAPSULATED DEVICES

November 7, 2008

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Conclusion

The MAX3230ECPP+ 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 MAX3230E/MAX3231E are +2.5V to +5.5V powered EIA/TIA-232 and V.28/V.24 communications interfaces with low power requirements, high data-rate capabilities, and enhanced electrostatic discharge (ESD) protection, in a chip-scale package (UCSP™). All transmitter outputs and receiver inputs are protected to ±15kV using IEC 1000-4-2 Air-Gap Discharge, ±8kV using IEC 1000-4-2 Contact Discharge, and ±15kV using the Human Body Model. The MAX3230E/MAX3231E achieve a 1µA supply current with Maxim's AutoShutdown™ feature. They save power without changing the existing BIOS or operating systems by entering low-power shutdown mode when the RS-232 cable is disconnected, or when the transmitters of the connected peripherals are off. The transceivers have a proprietary low-dropout transmitter output stage, delivering RS-232-compliant performance from a +3.1V to +5.5V supply, and RS-232- compatible performance with a supply voltage as low as +2.5V. The dual charge pump requires only four, small 0.1µF capacitors for operation from a +3.0V supply. Each device is guaranteed to run at data rates of 250kbps while maintaining RS-232 output levels. The MAX3230E/MAX3231E offer a separate power-supply input for the logic interface, allowing configurable logic levels on the receiver outputs and transmitter inputs. Operating over a +1.65V to VCC range, VL provides the MAX3230E/MAX3231E compatibility with multiple logic families. The MAX3231E contains one receiver and one transmitter. The MAX3230E contains two receivers and two transmitters. The MAX3230E/MAX3231E are available in tiny chip-scale packaging and are specified across the extended industrial (-40°C to +85°C) temperature range.

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II. Manufacturing Information

A. Description/Function:	±15kV ESD-Protected +2.5V to +5.5V RS-232 Transceivers in UCSP
B. Process:	S3
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Hana Thailand, ATP Philippines, Unisem Malaysia
F. Date of Initial Production:	2004

III. Packaging Information

A. Package Type:	20-pin PDIP
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive Epoxy
E. Bondwire:	Au (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#
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:	90°C/W
K. Single Layer Theta Jc:	30°C/W

IV. Die Information

A. Dimensions:	123 X 103 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide
C. Interconnect:	Aluminum/Si (Si = 1%)
D. Backside Metallization:	None
E. Minimum Metal Width:	3.0 microns (as drawn)
F. Minimum Metal Spacing:	3.0 microns (as drawn)
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	SiO_2
I. Die Separation Method:	Wafer Saw

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V. Quality Assurance Information

A. Quality Assurance Contacts:	Ken Wendel (Director, Reliability Engineering) Bryan Preeshl (Managing Director 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 pending. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 80 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 13.4 \times 10^{-9}$

λ = 13.4 F.I.T. (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly 1000 hour life test monitors on its processes. This data is published in the Product Reliability Report found at http://www.maxim-ic.com/. Current monitor data for the S3 Process results in a FIT Rate of 3.6 @ 25C and 66.0 @ 55C (0.8 eV, 60% UCL)

B. Moisture Resistance Tests

The industry standard 85°C/85%RH or HAST testing is monitored per device process once a quarter.

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

The RT30 die type has been found to have all pins able to withstand a HBM transient pulse of +/-1000 V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of 250 mA.

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Table 1
Reliability Evaluation Test Results

MAX3230ECPP+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)				
	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	80	0
Moisture Testing (Note 2)				
85/85	Ta = 85°C RH = 85% Biased Time = 1000hrs.	DC Parameters & functionality	77	0
Mechanical Stress (Note 2)				
Temperature Cycle	-65°C/150°C 1000 Cycles Method 1010	DC Parameters & functionality	77	0

Note 1: Life Test Data may represent plastic DIP qualification lots.
Note 2: Generic Package/Process data

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