



RELIABILITY REPORT  
FOR  
MAX3208EAUB+  
PLASTIC ENCAPSULATED DEVICES

February 18, 2010

**MAXIM INTEGRATED PRODUCTS**

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## Conclusion

The MAX3208EAUB+ 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 MAX3205E/MAX3207E/MAX3208E low-capacitance,  $\pm 15\text{kV}$  ESD-protection diode arrays with an integrated transient voltage suppressor (TVS) clamp are suitable for high-speed and general-signal ESD protection. Low input capacitance makes these devices ideal for ESD protection of signals in HDTV, PC monitors (DVI(tm), HDMI(tm)), PC peripherals (FireWire®, USB 2.0), server interconnect (PCI Express®, Infiniband®), Datacomm, and Inter-Chassis Interconnect. Each channel consists of a pair of diodes that steer ESD current pulses to VCC or GND. The MAX3205E/MAX3207E/MAX3208E protect against ESD pulses up to  $\pm 15\text{kV}$  Human Body Model,  $\pm 8\text{kV}$  Contact Discharge, and  $\pm 15\text{kV}$  Air-Gap Discharge, as specified in IEC 61000-4-2. An integrated TVS ensures that the voltage rise seen on VCC during an ESD event is clamped to a known voltage. These devices have a 2pF input capacitance per channel, and a channel-to-channel capacitance variation of only 0.05pF, making them ideal for use on high-speed, single-ended or differential signals. The MAX3207E is a two-channel device suitable for USB 1.1, USB 2.0 (480Mbps), and USB OTG applications. The MAX3208E is a four-channel device for Ethernet and FireWire applications. The MAX3205E is a six-channel device for cell phone connectors and SVGA video connections. The MAX3205E is available in 9-pin, tiny chip-scale (UCSP(tm)), and 16-pin, 3mm x 3mm, thin QFN packages. The MAX3207E is available in a small 6-pin, SOT23 package. The MAX3208E is available in 10-pin  $\mu\text{MAX}^\circledR$  and 16-pin, 3mm x 3mm TQFN packages. All devices are specified for the  $-40^\circ\text{C}$  to  $+125^\circ\text{C}$  automotive operating temperature range.

**II. Manufacturing Information**

A. Description/Function:	Dual, Quad, and Hex High-Speed Differential ESD-Protection ICs
B. Process:	BCD8
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Malaysia, Philippines, Thailand
F. Date of Initial Production:	October 23, 2004

**III. Packaging Information**

A. Package Type:	10-pin uMAX
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:	#05-9000-1423
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:	180°C/W
K. Single Layer Theta Jc:	41.9°C/W
L. Multi Layer Theta Ja:	113.1°C/W
M. Multi Layer Theta Jc:	41.9°C/W

**IV. Die Information**

A. Dimensions:	42 X 41 mils
B. Passivation:	Si <sub>3</sub> N <sub>4</sub> /SiO <sub>2</sub> (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/0.5%Cu with Ti/TiN Barrier
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 <sub>2</sub>
I. Die Separation Method:	Wafer Saw

## 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 shown in Table 1. Using these results, the Failure Rate ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 50 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 21.5 \times 10^{-9}$$

$$\lambda = 21.5 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 BCD8 Process results in a FIT Rate of 0.06 @ 25C and 1.08 @ 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 RT92 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500 V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-250 mA.

**Table 1**  
Reliability Evaluation Test Results

**MAX3208EAUB+**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
<b>Static Life Test</b> (Note 1)				
	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	50	0
<b>Moisture Testing</b> (Note 2)				
HAST	Ta = 130°C RH = 85% Biased Time = 96hrs.	DC Parameters & functionality	77	0
<b>Mechanical Stress</b> (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