

RELIABILITY REPORT  
FOR  
MAX3301EETJ+  
PLASTIC ENCAPSULATED DEVICES

May 16, 2011

**MAXIM INTEGRATED PRODUCTS**

120 SAN GABRIEL DR.  
SUNNYVALE, CA 94086

<b>Approved by</b>
Sokhom Chum
Quality Assurance
Reliability Engineer

## Conclusion

The MAX3301EETJ+ 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.

## Table of Contents

<b>I. ....Device Description</b>	<b>IV. ....Die Information</b>
<b>II. ....Manufacturing Information</b>	<b>V. ....Quality Assurance Information</b>
<b>III. ....Packaging Information</b>	<b>VI. ....Reliability Evaluation</b>
<b>.....Attachments</b>	

### I. Device Description

#### A. General

The MAX3301E/MAX3302E fully integrated USB On-the-Go (OTG) transceivers and charge pumps allow mobile devices such as PDAs, cellular phones, and digital cameras to interface directly with USB peripherals and each other without the need of a host PC. Use the MAX3301E/MAX3302E with an embedded USB host to directly connect to peripherals such as printers or external hard drives. The MAX3301E/MAX3302E integrate a USB OTG transceiver, a VBUS charge pump, a linear regulator, and an I<sup>2</sup>C-compatible, 2-wire serial interface. An internal level shifter allows the MAX3301E/MAX3302E to interface with +1.65V to +3.6V logic supply voltages. The MAX3301E/MAX3302E's OTG-compliant charge pump operates with +3V to +4.5V input supply voltages, and supplies an OTG-compatible output on VBUS while sourcing more than 8mA of output current. The MAX3301E/MAX3302E enable USB OTG communication from highly integrated digital devices that cannot supply or tolerate the +5V VBUS levels that USB OTG requires. The device supports USB OTG session-request protocol (SRP) and host-negotiation protocol (HNP). The MAX3301E/MAX3302E provide built-in ±15kV electrostatic-discharge (ESD) protection for the VBUS, ID\_IN, D+, and D- terminals. The MAX3301E/MAX3302E are available in 25-bump chip-scale (UCSP(tm)), 25-bump WLP package, 28-pin TQFN, and 32-pin TQFN packages and operate over the extended -40°C to +85°C temperature range.

## II. Manufacturing Information

A. Description/Function:	USB On-the-Go Transceivers and Charge Pumps
B. Process:	B8
C. Number of Device Transistors:	9974
D. Fabrication Location:	Oregon
E. Assembly Location:	China, Malaysia, Thailand
F. Date of Initial Production:	April 23, 2004

## 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 (1.3 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-1034
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:	100 X 100 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:	0.8 microns (as drawn)
F. Minimum Metal Spacing:	0.8 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: 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 ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{528 \times 4340 \times 78 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 5.1 \times 10^{-9}$$

$$\lambda = 5.1 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 B8 Process results in a FIT Rate of 0.06 @ 25C and 0.99 @ 55C (0.8 eV, 60% UCL)

### B. E.S.D. and Latch-Up Testing (lot JQW0FZ001G D/C 0830)

The RT77 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250mA.

**Table 1**  
Reliability Evaluation Test Results

**MAX3301EETJ+**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
<b>Static Life Test</b> (Note 1)	Ta = 135°C Biased Time = 528 hrs.	DC Parameters & functionality	78	0	JQW0FZ001G, D/C 0830

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