

RELIABILITY REPORT  
FOR  
MAX3355EEUD+  
PLASTIC ENCAPSULATED DEVICES

July 31, 2009

**MAXIM INTEGRATED PRODUCTS**

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Quality Assurance
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## Conclusion

The MAX3355EEUD+ 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 MAX3355E integrates a charge pump and comparators to enable a system with an integrated USB On-the-Go (OTG) dual-role transceiver to function as a USB OTG dual-role device. USB OTG facilitates the direct connection of peripherals and mobile devices such as PDAs, cellular phones, MP3 players, and digital cameras to one another without a host PC. The MAX3355E's internal charge pump supplies VBUS power and signaling that is required by the transceiver as defined in On-the-Go Supplement to the USB 2.0 Specification, Revision 1.0. The MAX3355E features ID detection and internal comparators for monitoring VBUS. The VBUS status outputs are used during negotiation for the USB according to the session request protocol (SRP) and host negotiation protocol (HNP). The MAX3355E operates with logic supply voltages (VL) as low as 1.65V, ensuring compatibility with low-voltage ASICs. The device also features a logic-selectable 1 $\mu$ A shutdown mode. The MAX3355E has built-in  $\pm$ 15kV ESD-protection circuitry to protect the VBUS and ID\_IN pins. The device is available in a miniature 4 x 3 chip-scale package (UCSP&#8482), as well as a 14-pin TSSOP package, and is specified for operation over the -40°C to +85°C extended temperature range.

**II. Manufacturing Information**

A. Description/Function:	±15kV ESD-Protected USB On-the-Go Charge Pump and Comparators in UCSP
B. Process:	B8
C. Number of Device Transistors:	
D. Fabrication Location:	California or Texas
E. Assembly Location:	Phillippines, Thailand, Malaysia
F. Date of Initial Production:	April 25, 2003

**III. Packaging Information**

A. Package Type:	14-pin TSSOP
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive Epoxy
E. Bondwire:	Gold (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-2601-0089
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:	110°C/W
K. Single Layer Theta Jc:	30°C/W
L. Multi Layer Theta Ja:	100.4°C/W
M. Multi Layer Theta Jc:	30°C/W

**IV. Die Information**

A. Dimensions:	61 X 80 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: 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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 96 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 11.2 \times 10^{-9}$$

$\lambda = 11.2$  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 B8 Process results in a FIT Rate of 1.86 @ 25C and 22.5 @ 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 RT49 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500 V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250 mA.

**Table 1**  
Reliability Evaluation Test Results

**MAX3355EEUD+**

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	96	0
<b>Moisture Testing</b> (Note 2) 85/85	Ta = 85°C RH = 85% Biased Time = 1000hrs.	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