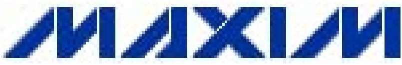

RELIABILITY REPORT

FOR

MAX3353EEUE+

PLASTIC ENCAPSULATED DEVICES

September 10, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Quality Assurance
Director, Reliability Engineering

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Conclusion

The MAX3353EEUE+ 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

I. ....Device Description **V. ....Quality Assurance Information**
II. ....Manufacturing Information **VI. ....Reliability Evaluation**
III. ....Packaging Information **IV. ....Die Information**
.....Attachments

I. Device Description

A. General

The MAX3353E I²C-compatible USB On-the-Go (OTG) regulated charge pump with switchable pullup/pulldown resistors allows peripherals and mobile devices such as PDAs, cellular phones, and digital cameras to be interconnected without a host PC. The MAX3353E enables a system with an integrated USB dual-role transceiver to function as a USB OTG dual-role device. The charge pump in the MAX3353E supplies VBUS power and signaling that is required by the transceiver as defined in *On-the-Go Supplement: USB 2.0, Revision 1.0*. The MAX3353E provides the switchable pullup and pulldown resistors on D+ and D-required for a dual-role device. The MAX3353E integrates a regulated charge pump, switchable pullup/pulldown resistors, and an I²C-compatible 2-wire serial interface. The device provides a detector to monitor ID status and operates with logic supply voltages (VL) between +1.65V and VCC and charge-pump supply voltages (VCC) from +2.6V to +5.5V. The charge pump supplies an OTG-compatible output on VBUS while sourcing 8mA output current. The MAX3353E enables USB OTG communication between digital logic parts that cannot supply or tolerate the +5V VBUS levels that USB OTG requires. By controlling and measuring VBUS using internal comparators, this device supports USB OTG session request protocol (SRP) and host negotiation protocol (HNP). The MAX3353E has built-in ±15kV ESD protection circuitry to guard VBUS, ID_IN, D+, and D-. The MAX3353E is available in a 5 x 4 chip-scale package (UCSP(tm)) and 16-pin TSSOP package.

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II. Manufacturing Information

A. Description/Function:	USB On-the-Go Charge Pump with Switchable Pullup/Pulldown Resistors
B. Process:	B8
C. Number of Device Transistors:	
D. Fabrication Location:	California or Texas
E. Assembly Location:	Philippines, Thailand, Malaysia
F. Date of Initial Production:	April 25, 2003

III. Packaging Information

A. Package Type:	16-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:	#05-2601-0097
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:	106°C/W
K. Single Layer Theta Jc:	27°C/W
L. Multi Layer Theta Ja:	90°C/W
M. Multi Layer Theta Jc:	27°C/W

IV. Die Information

A. Dimensions:	83 X 103 mils
B. Passivation:	Si_3N_4/SiO_2 (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_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 shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

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

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

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

λ = 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 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. 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 RT48 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, 1.5x VCCMax Overvoltage per JESD78.

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Table 1
Reliability Evaluation Test Results

MAX3353EEUE+

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	96	0
Moisture Testing (Note 2)				
HAST	Ta = 130°C RH = 85% Biased Time = 96hrs.	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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