

RELIABILITY REPORT  
FOR  
MAX333CWP+  
PLASTIC ENCAPSULATED DEVICES

September 30, 2011

**MAXIM INTEGRATED PRODUCTS**

120 SAN GABRIEL DR.  
SUNNYVALE, CA 94086

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

## Conclusion

The MAX333CWP+ 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 MAX333 is a quad single-pole-double-throw (SPDT) analog switch. These four independent switches can be operated with bipolar power supplies ranging from  $\pm 5V$  to  $\pm 18V$ , or single-ended power supplies of  $+10V$  to  $+30V$ . The MAX333 has break-before-make switching, (200ns typical), a maximum turn-off time of 500ns, and a maximum turn-on time of 1000ns. The MAX333 is ideal for portable operation since quiescent current is only 250 $\mu$ A maximum with all inputs high, and less with all inputs low. Logic inputs are fully TTL and CMOS compatible and guaranteed over a  $+0.8V$  to  $+2.4V$  range. regardless of supply voltage, Logic inputs and switched analog signals can range anywhere between the supply voltages without damage. The MAX333 is a low-cost replacement for a DG211/DG212 pair when used as a quad SPDT switch.

**II. Manufacturing Information**

A. Description/Function:	Quad, SPDT, CMOS Analog Switch
B. Process:	M6
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Malaysia
F. Date of Initial Production:	Pre 1997

**III. Packaging Information**

A. Package Type:	300 mil 20L SOIC
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:	#05-0301-0337 / B
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	1
J. Single Layer Theta Ja:	100°C/W
K. Single Layer Theta Jc:	20°C/W
L. Multi Layer Theta Ja:	67°C/W
M. Multi Layer Theta Jc:	23°C/W

**IV. Die Information**

A. Dimensions:	85 X 120 mils
B. Passivation:	Si <sub>3</sub> N <sub>4</sub> /SiO <sub>2</sub> (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/1.0%Si
D. Backside Metallization:	None
E. Minimum Metal Width:	Metal1 = 0.5 / Metal2 = 0.6 / Metal3 = 0.6 microns (as drawn)
F. Minimum Metal Spacing:	Metal1 = 0.45 / Metal2 = 0.5 / Metal3 = 0.6 microns (as drawn)
G. Bondpad Dimensions:	
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 biased (static) life test are shown in Table 1. Using these results, the Failure Rate ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 480 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 2.3 \times 10^{-9}$$

$$\lambda = 2.3 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 M6H Process results in a FIT Rate of 0.30 @ 25C and 5.17 @ 55C (0.8 eV, 60% UCL)

### B. E.S.D. and Latch-Up Testing (lot NRFABQ001A D/C 9931)

The AG32 die type has been found to have all pins able to withstand a HBM transient pulse of +/-400V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-250mA.

**Table 1**  
Reliability Evaluation Test Results

**MAX333CWP+**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
<b>Static Life Test</b> (Note 1)	Ta = 135°C	DC Parameters & functionality	80	0	NRFABQ001A, D/C 9931
	Biased		80	0	XRFAJN045D, D/C N/A
	Time = 192 hrs.		80	0	XRFAAA039A, D/C N/A
			80	0	XRFAAA034A, D/C N/A
			80	0	WRFAAW001A, D/C N/A
			80	0	XRFAAI030A, D/C N/A

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