

RELIABILITY REPORT  
FOR  
MAX4800ACCM+  
PLASTIC ENCAPSULATED DEVICES

April 29, 2009

**MAXIM INTEGRATED PRODUCTS**

120 SAN GABRIEL DR.  
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<b>Approved by</b>
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Quality Assurance
Director, Reliability Engineering

## Conclusion

The MAX4800ACCM+ 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 MAX4800A/MAX4802A provide high-voltage switching on eight channels for ultrasonic imaging and printer applications. The devices utilize BCDMOS process technology to provide eight high-voltage low-charge-injection SPST switches, controlled by a 20MHz serial interface. Data is clocked into an internal 8-bit shift register and retained by a programmable latch with enable and clear inputs. A power-on reset function ensures that all switches are open on power-up. The MAX4800A/MAX4802A operate with a wide range of high-voltage supplies including: VPP/VNN = +100V/-100V, +185V/-15V, and +40V/-160V. The digital interface operates from a separate VDD supply from +2.7V to +6V. Digital inputs DIN, CLK, active-low LE, and CLR are +6V tolerant, independent of the VDD supply voltage. The MAX4802A provides integrated 35k bleed resistors on each switch terminal to discharge capacitive loads. The MAX4800A/MAX4802A are drop-in replacements for the Supertex HV22C3 and HV2303. The devices are available in the 48-pin TQFP, 26-bump CSBGA, and 28-pin PLCC packages. All devices are specified for the commercial 0°C to +70°C temperature range.

## II. Manufacturing Information

A. Description/Function:	Low-Charge-Injection, 8-Channel, High-Voltage Analog Switches with 20MHz Serial Interface
B. Process:	BCD250
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	ATP Philippines
F. Date of Initial Production:	April 22, 2009

## III. Packaging Information

A. Package Type:	48-pin LQFP
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	
E. Bondwire:	Au (1.0 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1
J. Multi Layer Theta Ja:	44°C/W
K. Multi Layer Theta Jc:	10°C/W

## IV. Die Information

A. Dimensions:	158 X 184 mils
B. Passivation:	Silicon Dioxide/Silicon Nitride
C. Interconnect:	Al/0.5% Cu
D. Backside Metallization:	None
E. Minimum Metal Width:	1.3 um (mask)
F. Minimum Metal Spacing:	1.7 um (mask)
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)<br>Bryan Preeshl (Managing Director of QA)       |
| B. Outgoing Inspection Level:     | 0.1% for all electrical parameters guaranteed by the Datasheet.<br>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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 48 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 22.4 \times 10^{-9}$$

$$\lambda = 22.4 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly 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 BCD250 Process results in a FIT Rate of 0.59 @ 25C and 10.1 @ 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 AJ23 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, 1.5x VCCMax Overvoltage per JESD78.

**Table 1**  
Reliability Evaluation Test Results

**MAX4800ACCM+**

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	48	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