



RELIABILITY REPORT  
FOR  
MAX4521CSE+  
PLASTIC ENCAPSULATED DEVICES

October 6, 2011

**MAXIM INTEGRATED PRODUCTS**

120 SAN GABRIEL DR.  
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<b>Approved by</b>
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Quality Assurance
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## Conclusion

The MAX4521CSE+ 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 MAX4521/MAX4522/MAX4523 are quad, low-voltage, single-pole/single-throw (SPST) analog switches. On-resistance (100  $\Omega$  max) is matched between switches to 4  $\Omega$  max, and is flat (12  $\Omega$  max) over the specified signal range. Each switch can handle rail-to-rail analog signals. The off-leakage current is only 1nA at +25°C and 10nA at +85°C. The MAX4521 has four normally closed (NC) switches, and the MAX4522 has four normally open (NO) switches. The MAX4523 has two NC switches and two NO switches. These CMOS switches can operate with dual power supplies ranging from  $\pm 2\text{V}$  to  $\pm 6\text{V}$  or a single supply between +2V and +12V. They are fully specified for single +2.7V operation. All digital inputs have +0.8V and +2.4V logic thresholds, ensuring TTL/CMOS-logic compatibility when using  $\pm 5\text{V}$  or a single +5V supply.

**II. Manufacturing Information**

A. Description/Function:	Quad, Low-Voltage SPST Analog Switches
B. Process:	S3
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:	SOIC (N) 16L
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-0301-0786 / 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:	115°C/W
K. Single Layer Theta Jc:	32°C/W
L. Multi Layer Theta Ja:	75°C/W
M. Multi Layer Theta Jc:	24°C/W

**IV. Die Information**

A. Dimensions:	57 X 46 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:	3.0 microns (as drawn)
F. Minimum Metal Spacing:	3.0 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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 230 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 4.8 \times 10^{-9}$$

$$\lambda = 4.8 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 S3 Process results in a FIT Rate of 0.04 @ 25C and 0.69 @ 55C (0.8 eV, 60% UCL)

### B. E.S.D. and Latch-Up Testing (lot NC5AAX001B D/C 9633)

The AG87 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2000V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-100mA.

**Table 1**  
Reliability Evaluation Test Results

**MAX4521CSE+**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
<b>Static Life Test</b> (Note 1)					
	Ta = 135°C	DC Parameters	70	0	NC5CAX001B, D/C N/A
	Biased	& functionality	80	0	NC5AAX001B, D/C N/A
	Time = 192 hrs.		80	0	NC5BAX001B, D/C N/A

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