

RELIABILITY REPORT
FOR
MAX314LCSE+
PLASTIC ENCAPSULATED DEVICES

November 24, 2009

MAXIM INTEGRATED PRODUCTS

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Conclusion

The MAX314LCSE+ 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

Maxim's MAX312L/MAX313L/MAX314L analog switches feature low on-resistance ($10 \text{ } \Omega$ max) and $1.5 \text{ } \Omega$ on-resistance matching between channels. These switches are +3V logic compatible when powered from $\pm 15\text{V}$ or $+12\text{V}$ supplies. The switches conduct equally well in either direction, and offer low leakage over temperature (2.5nA at $+85^\circ\text{C}$). The MAX312L/MAX313L/MAX314L are quad, single-pole/single-throw (SPST) analog switches. The MAX312L is normally closed (NC), and the MAX313L is normally open (NO). The MAX314L has two NC switches and two NO switches. All three devices operate from a single $+4.5\text{V}$ to $+36\text{V}$ supply or from dual $\pm 4.5\text{V}$ to $\pm 20\text{V}$, and are available in 16-pin TSSOP, SO, and DIP packages.

II. Manufacturing Information

A. Description/Function:	10 , Quad, SPST, +3V Logic-Compatible Analog Switches
B. Process:	S5
C. Number of Device Transistors:	0
D. Fabrication Location:	Oregon
E. Assembly Location:	Malaysia, Philippines, Thailand
F. Date of Initial Production:	October 11, 2001

III. Packaging Information

A. Package Type:	16-pin SOIC (N)
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:	#05-1201-0253
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:	115°C/W
K. Single Layer Theta Jc:	32°C/W

IV. Die Information

A. Dimensions:	85 X 140 mils
B. Passivation:	Si ₃ N 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:	5.0 microns (as drawn)
F. Minimum Metal Spacing:	5.0 microns (as drawn)
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	SiO ₂
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 (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 225 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 4.77 \times 10^{-9}$$
$$\lambda = 4.77 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 S5 Process results in a FIT Rate of 0.09 @ 25C and 1.55 @ 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 AH78-2 die type has been found to have all pins able to withstand a HBM transient pulse of $\pm 400 \text{ V}$ per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of $\pm 250 \text{ mA}$.

Table 1
Reliability Evaluation Test Results

MAX314LCSE+

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	225	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