

RELIABILITY REPORT FOR MAX319CSA+ PLASTIC ENCAPSULATED DEVICES

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# **MAXIM INTEGRATED**

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#### Conclusion

The MAX319CSA+ successfully meets the quality and reliability standards required of all Maxim Integrated products. In addition, Maxim Integrated's continuous reliability monitoring program ensures that all outgoing product will continue to meet Maxim Integrated's quality and reliability standards.

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I. Device Description

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A. General

The MAX317/MAX318/MAX319 are precision, CMOS, monolithic analog switches. The single-pole single-throw (SPST) MAX317 is normally closed (NC), the SPST MAX318 is normally open (NO), and the single-pole double-throw (SPDT) MAX319 has one normally open and one normally closed switch. All three parts offer low on resistance (less than 35), guaranteed to match within 2 between channels and to remain flat over the analog signal range (3 max). They also offer low leakage (less than 250pA at +25°C and less than 6nA at +85°C) and fast switching (turn-on time less than 175ns and turn-off time less than 145ns). The MAX317/MAX318/MAX319 are fabricated with Maxim's new improved silicon-gate process. Design improvements guarantee extremely low charge injection (10pC), low power consumption (35µW), and electrostatic discharge (ESD) greater than ±2000V. The 44V maximum breakdown voltage allows rail-to-rail analog signal handling capability.



- A. Description/Function: Precision, SPST, CMOS Analog SwitchesB. Process: S5C. Number of Device Transistors:
- D. Fabrication Location:OregonE. Assembly Location:Malaysia, Philippines, ThailandF. Date of Initial Production:Pre 1997

## III. Packaging Information

A. Package Type:	8-pin SOIC (N)		
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:	#05-0301-0611		
H. Flammability Rating:	Class UL94-V0		
I. Classification of Moisture Sensitivity per Level 1 JEDEC standard J-STD-020-C			
J. Single Layer Theta Ja:	170°C/W		
K. Single Layer Theta Jc:	40°C/W		
L. Multi Layer Theta Ja:	132°C/W		
M. Multi Layer Theta Jc:	38°C/W		

# IV. Die Information

Α.	Dimensions:	76X58 mils
В.	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:	5.0 microns (as drawn)
F.	Minimum Metal Spacing:	5.0 microns (as drawn)
G.	Bondpad Dimensions:	
Н.	Isolation Dielectric:	SiO <sub>2</sub>
Ι.	Die Separation Method:	Wafer Saw





#### V. Quality Assurance Information

A.	Quality Assurance Contacts:	Don Lipps (Manager, Reliability Engineering) Bryan Preeshl (Vice President of QA)
B.	Outgoing Inspection Level:	<ul><li>0.1% for all electrical parameters guaranteed by the Datasheet.</li><li>0.1% for all Visual Defects.</li></ul>
C.	Observed Outgoing Defect Rate:	< 50 ppm
D.	Sampling Plan:	Mil-Std-105D

#### VI. Reliability Evaluation

## A. Accelerated Life Test

The results of the 135C biased (static) life test are shown in Table 1. Using these results, the Failure Rate  $(\lambda)$  is calculated as follows:

$$\lambda = \underbrace{1}_{\text{MTTF}} = \underbrace{1.83}_{\text{192 x 4340 x 160 x 2}} \text{ (Chi square value for MTTF upper limit)}$$

$$\lambda = 6.9 \text{ x } 10^{-9}$$

$$\lambda = 6.9 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

The following failure rate represents data collected from Maxim Integrated's reliability monitor program. Maxim Integrated performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at http://www.maximintegrated.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. E.S.D. and Latch-Up Testing (lot XSYACB045B, D/C9637)

The AG55 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2000V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-100mA.



# Table 1 Reliability Evaluation Test Results

# MAX319CSA+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note	e 1)				
	Ta = 135°C	DC Parameters	80	0	NSYAD4001A, D/C 9914
	Biased Time = 192 hrs.	& functionality	80	0	XSYABY001A, D/C 9331

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