

RELIABILITY REPORT  
FOR  
MAX819LCPA+  
(MAX817L – MAX819L)  
PLASTIC ENCAPSULATED DEVICES

December 16, 2008

**MAXIM INTEGRATED PRODUCTS**

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## Conclusion

The MAX819LCPA+ 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 MAX817/MAX818/MAX819 microprocessor ( $\mu$ P) supervisory circuits simplify power-supply monitoring, battery control, and chip-enable gating in  $\mu$ P systems by reducing the number of components required. These devices are designed for use in +5V-powered systems. Low supply current (11 $\mu$ A typical) and small package size make these devices ideal for portable applications. The MAX817/MAX818/MAX819 are specifically designed to ignore fast transients on VCC. Other supervisory functions include active-low reset, backup-battery switchover, watchdog input, battery freshness seal, and chip-enable gating. The Selector Guide below lists the specific functions available from each device. These devices offer two pretrimmed reset threshold voltages for  $\pm 5\%$  or  $\pm 10\%$  power supplies: 4.65V for the L versions and 4.40V for the M versions. The MAX817/ MAX818/MAX819 are available in space-saving  $\mu$ MAX<sup>®</sup> packages, as well as 8-pin DIP/SO.

## II. Manufacturing Information

A. Description/Function:	+5V Microprocessor Supervisory Circuits
B. Process:	S12
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Hana Thailand, ATP Philippines, UTL Thailand
F. Date of Initial Production:	Pre 1997

## III. Packaging Information

A. Package Type:	8-pin PDIP
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive Epoxy
E. Bondwire:	Gold (1.3 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-1601-0011
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:	110°C/W
K. Single Layer Theta Jc:	40°C/W

## IV. Die Information

A. Dimensions:	54 X 55 mils
B. Passivation:	Si <sub>3</sub> N <sub>4</sub> /SiO <sub>2</sub> (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Aluminum/Si (Si = 1%)
D. Backside Metallization:	None
E. Minimum Metal Width:	1.2 microns (as drawn)
F. Minimum Metal Spacing:	1.2 microns (as drawn)
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) 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 complete. Using these results, the Failure Rate ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 880 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 1.22 \times 10^{-9}$$

$$\lambda = 1.22 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 S12 Process results in a FIT Rate of 0.09 @ 25C and 1.48 @ 55C, data limited (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 MS03-4 die type has been found to have all pins able to withstand a HBM transient pulse of +/-800 V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-100 mA.

**Table 1**  
Reliability Evaluation Test Results

**MAX819LCPA+**

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	880	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