

RELIABILITY REPORT
FOR
MAX821SUS+
(MAX821/MAX822)
PLASTIC ENCAPSULATED DEVICES

February 2, 2009

MAXIM INTEGRATED PRODUCTS

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Conclusion

The MAX821SUS+ 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 MAX821/MAX822 microprocessor (μ P) supervisory circuits monitor power supplies in μ P and digital systems. They provide excellent circuit reliability and low cost by eliminating external components and adjustments when used with 5V-powered or 3V-powered circuits. The MAX821/MAX822 also provide a power-on reset timeout delay that is pin selectable to 1ms (max), 20ms (min), or 100ms (min). These devices perform a single function: they assert a reset signal whenever the VCC supply voltage falls below a preset threshold, and they keep reset asserted for the pin-selected reset timeout delay after VCC has risen above the reset threshold. The only difference between the two devices is that the MAX821 has an active-low RESET output (which is guaranteed to be in the correct state for VCC down to 1V), while the MAX822 has an active-high RESET output. The reset comparator is designed to ignore fast transients on VCC. Reset thresholds suitable for operation with a variety of supply voltages are available. Low supply current makes the MAX821/MAX822 ideal for use in portable equipment. These devices come in a 4-pin SOT143 package.

II. Manufacturing Information

A. Description/Function:	4-Pin, μ P Voltage Monitors with Pin-Selectable Power-On Reset Timeout Delay
B. Process:	S12
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Carsem Malaysia, UTL Thailand, Unisem Malaysia
F. Date of Initial Production:	Pre 1997

III. Packaging Information

A. Package Type:	4-pin SOT
B. Lead Frame:	Alloy42
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive Epoxy
E. Bondwire:	Gold (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-1601-0007
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1
J. Single Layer Theta Jb:	250°C/W
K. Single Layer Theta Jc:	130°C/W

IV. Die Information

A. Dimensions:	44 X 31 mils
B. Passivation:	$\text{Si}_3\text{N}_4/\text{SiO}_2$ (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_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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 240 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 9.9 \times 10^{-9}$$

$\lambda = 9.9 \text{ F.I.T. (60\% confidence level @ 25°C)}$

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 MS04-3 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2000 V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-250 mA.

Table 1
Reliability Evaluation Test Results

MAX821SUS+

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	240	1
Moisture Testing (Note 2) 85/85	Ta = 85°C RH = 85% Biased Time = 1000hrs.	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