

RELIABILITY REPORT
FOR
MAX6896AAZT+
PLASTIC ENCAPSULATED DEVICES

October 17, 2008

MAXIM INTEGRATED PRODUCTS

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Conclusion

The MAX6896AAZT+ 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.

Table of Contents

I.Device Description	V.Quality Assurance Information
II.Manufacturing Information	VI.Reliability Evaluation
III.Packaging Information	IV.Die Information
.....Attachments	

I. Device Description

A. General

The MAX6895-MAX6899 is a family of small, low-power, voltage-monitoring circuits with sequencing capability. These miniature devices offer tremendous flexibility with an adjustable threshold capable of monitoring down to 0.5V and an external capacitor-adjustable time delay. These devices are ideal for use in power-supply sequencing, reset sequencing, and power-switching applications. Multiple devices can be cascaded for complex sequencing applications. A high-impedance input with a 0.5V threshold allows an external resistive divider to set the monitored threshold. The output asserts (OUT = high or active-low OUT = low) when the input voltage rises above the 0.5V threshold and the enable input is asserted (ENABLE = high or active-low ENABLE = low). When the voltage at the input falls below 0.5V or when the enable input is deasserted (ENABLE = low or active-low ENABLE = high), the output deasserts (OUT = low or active-low OUT = high). All devices provide a capacitor-programmable delay time from when the input rises above 0.5V to when the output is asserted. The MAX689_A versions provide the same capacitor-adjustable delay from when enable is asserted to when the output asserts. The MAX689_P devices have a 1 μ s propagation delay from when enable is asserted to when the output asserts. The MAX6895A/P offers an active-high enable input and an active-high push-pull output. The MAX6896A/P offers an active-low enable input and an active-low push-pull output. The MAX6897A/P offers an active-high enable input and an active-high open-drain output. Finally, the MAX6898A/P offers an active-low enable input and an active-low open-drain output. The MAX6899A/P offers an active-low enable with an active-high push-pull output. All devices operate from a 1.5V to 5.5V supply voltage and are fully specified over the -40°C to +125°C operating temperature range. These devices are available in ultra-small 6-pin μ DFN (1.0mm x 1.5mm) and thin SOT23 (1.60mm x 2.90mm) packages.

II. Manufacturing Information

A. Description/Function:	Ultra-Small, Adjustable Sequencing/Supervisory Circuits
B. Process:	B8
C. Number of Device Transistors:	
D. Fabrication Location:	Texas
E. Assembly Location:	ATP
F. Date of Initial Production:	April 23, 2005

III. Packaging Information

A. Package Type:	6-pin TSOT
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Ag Filled Epoxy
E. Bondwire:	Au (1.0 mil mil dia.) F.
Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#
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:	365.1°C/W
K. Single Layer Theta Jc:	75°C/W

IV. Die Information

A. Dimensions:	31 X 30 mils
B. Passivation:	Si ₃ N ₄ /SiO ₂ (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Aluminum/Cu (Cu = 0.5%)
D. Backside Metallization:	None
E. Minimum Metal Width:	0.8 microns (as drawn)
F. Minimum Metal Spacing:	0.8 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 pending. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 46 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 23.34 \times 10^{-9}$$

$$\lambda = 23.34 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 B8 Process results in a FIT Rate of 2.51 @ 25C and 17.30 @ 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 MS95-1 die type has been found to have all pins able to withstand a HBM transient pulse of 2000 V per JEDEC JESD22-A114-D. Latch-Up testing has shown that this device withstands a current of 250 mA.

Table 1
Reliability Evaluation Test Results

MAX6896AAZT+

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	46	0
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	-55°C/125°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