

RELIABILITY REPORT
FOR
MAX6707AxKA
PLASTIC ENCAPSULATED DEVICES

September 3, 2003

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Written by



Jim Pedicord
Quality Assurance
Reliability Lab Manager

Reviewed by



Bryan J. Preeshl
Quality Assurance
Executive Director

Conclusion

The MAX6707A 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

The MAX6707A microprocessor (μP) supervisory circuit reduces the complexity and components required to monitor power-supply functions in μP systems. This device significantly improves system reliability and accuracy compared to separate ICs or discrete components.

The MAX6707A provides four functions: a reset output during power-up, power-down and brownout conditions; an independent watchdog output that goes low if the watchdog input has not been toggled within 1.6s; a 0.62V threshold detector for power-fail warning; and an active-low manual reset input.

The MAX6707A monitors a single-supply voltage to drive a single reset output and include an independent adjustable power-fail-in/power-fail-out comparator, a manual reset input, and a watchdog timer with an independent output.

B. Absolute Maximum Ratings

| <u>Item</u> | <u>Rating</u> |
|--|-----------------------|
| VCC | -0.3V to +6V |
| Open-Drain /RESET, /WDO, /PFO | -0.3V to +6V |
| /MR,WDI,PFI,RST_IN1,RST_in2 | -0.3V to (VCC + 0.3V) |
| Input Current (VCC) | 20mA |
| Output Current (/RESET, RESET, /PFO, /WDO) | 20mA |
| Operating Temp Range | -40°C to +125°C |
| Storage Temp Range | -65°C to +150°C |
| Lead Temp Range (soldering, 10s) | +300°C |
| Power Dissipation | |
| 8-Pin SOT23 | 714mW |
| Derates above +70°C | |
| 8-Pin SOT23 | 8.9mW/°C |

II. Manufacturing Information

| | |
|----------------------------------|--|
| A. Description/Function: | Low Voltage Supervisor with Power Fail In/Out and Manual Reset & |
| B. Process: | S8 |
| C. Number of Device Transistors: | 716 |
| D. Fabrication Location: | California, USA |
| E. Assembly Location: | Malaysia |
| F. Date of Initial Production: | January, 2001 |

III. Packaging Information

| | |
|---|---------------------------|
| A. Package Type: | 8-Lead SOT23 |
| B. Lead Frame: | Copper |
| C. Lead Finish: | Solder Plate |
| D. Die Attach: | Non-Conductive Epoxy |
| E. Bondwire: | Gold (1.0 mil dia.) |
| F. Mold Material: | Epoxy with silica filler |
| G. Assembly Diagram: | Buildsheet # 05-1601-0136 |
| H. Flammability Rating: | Class UL94-V0 |
| I. Classification of Moisture Sensitivity per JEDEC standard JESD22-A112: | Level 1 |

IV. Die Information

| | |
|----------------------------|---|
| A. Dimensions: | 62 x 24 mils |
| B. Passivation: | Si ₃ N ₄ /SiO ₂ (Silicon nitride/ Silicon dioxide) |
| C. Interconnect: | Aluminum/Copper/Silicon |
| D. Backside Metallization: | None |
| E. Minimum Metal Width: | .8 microns (as drawn) |
| F. Minimum Metal Spacing: | .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:

Jim Pedicord (Reliability Lab Manager)
Bryan Preeshl (Executive Director of QA)
Kenneth Huening (Vice President)

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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4389 \times 160 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

└ Thermal acceleration factor assuming a 0.8eV activation energy

$$\lambda = 6.79 \times 10^{-9} \quad \lambda = 6.79 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

This low failure rate represents data collected from Maxim's reliability qualification and monitor programs. Maxim also performs weekly Burn-In on samples from production to assure the reliability of its processes. The reliability required for lots which receive a burn-in qualification is 59 F.I.T. at a 60% confidence level, which equates to 3 failures in an 80 piece sample. Maxim performs failure analysis on lots exceeding this level. The following Burn-In Schematic (Spec. #06-5687) shows the static circuit used for this test. Maxim also performs 1000 hour life test monitors quarterly for each process. This data is published in the Product Reliability Report (**RR-1M**).

B. Moisture Resistance Tests

Maxim evaluates pressure pot stress from every assembly process during qualification of each new design. Pressure Pot testing must pass a 20% LTPD for acceptance. Additionally, industry standard 85°C/85%RH or HAST tests are performed quarterly per device/package family.

C. E.S.D. and Latch-Up Testing

The MS51-10 die type has been found to have all pins able to withstand a transient pulse of 2000V, per Mil-Std-883 Method 3015 (reference attached ESD Test Circuit). Latch-Up testing has shown that this device withstands a current of $\pm 250\text{mA}$.

Table 1
Reliability Evaluation Test Results

MAX6707xKA

| 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 | 80 | 0 |
| Moisture Testing (Note 2) | | | | |
| Pressure Pot | Ta = 121°C P = 15 psi. RH= 100% Time = 168hrs. | DC Parameters & functionality | 77 | 0 |
| 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 | 77 | 0 |

Note 1: Life Test Data may represent plastic D.I.P. qualification lots.

Note 2: Generic package/process data

Attachment #1

TABLE II. Pin combination to be tested. 1/ 2/

| | Terminal A (Each pin individually connected to terminal A with the other floating) | Terminal B (The common combination of all like-named pins connected to terminal B) |
|----|---|---|
| 1. | All pins except V_{PS1} 3/ | All V_{PS1} pins |
| 2. | All input and output pins | All other input-output pins |

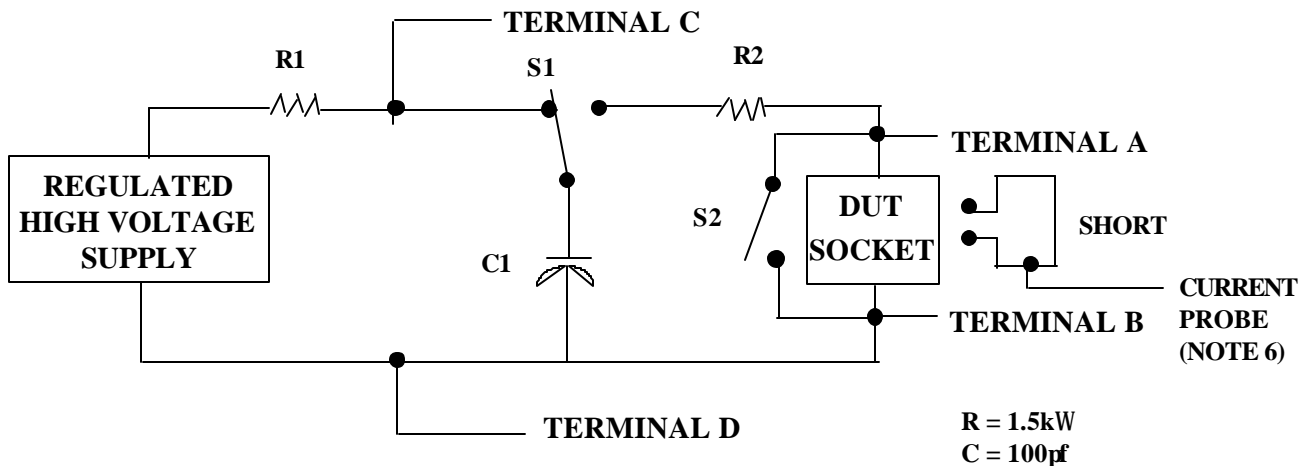
1/ Table II is restated in narrative form in 3.4 below.

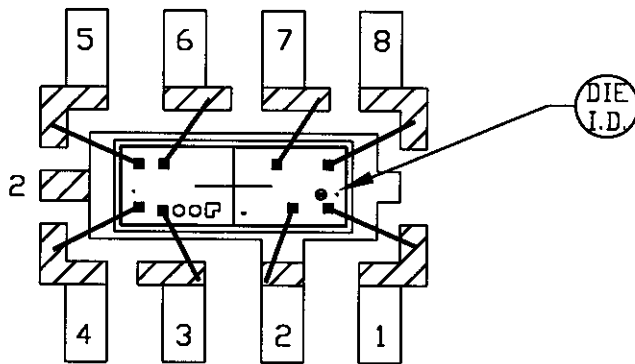
2/ No connects are not to be tested.

3/ Repeat pin combination I for each named Power supply and for ground (e.g., where V_{PS1} is V_{DD} , V_{CC} , V_{SS} , V_{BB} , GND, $+V_S$, $-V_S$, V_{REF} , etc).

3.4 Pin combinations to be tested.

- a. Each pin individually connected to terminal A with respect to the device ground pin(s) connected to terminal B. All pins except the one being tested and the ground pin(s) shall be open.
- b. Each pin individually connected to terminal A with respect to each different set of a combination of all named power supply pins (e.g., V_{SS1} , or V_{SS2} or V_{SS3} or V_{CC1} , or V_{CC2}) connected to terminal B. All pins except the one being tested and the power supply pin or set of pins shall be open.
- c. Each input and each output individually connected to terminal A with respect to a combination of all the other input and output pins connected to terminal B. All pins except the input or output pin being tested and the combination of all the other input and output pins shall be open.





USE NON-CONDUCTIVE EPOXY

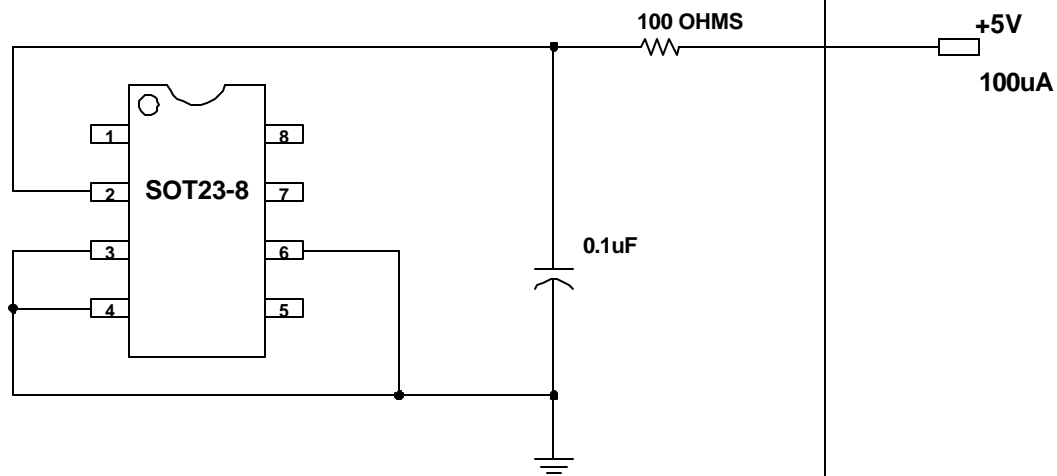
NOTE: CAVITY DOWN

 BONDABLE AREA

| | | | | | |
|-------------------------|----------------|------------|------|---|--|
| PKG. CODE: K8-2 | | SIGNATURES | DATE |  CONFIDENTIAL & PROPRIETARY | |
| CAV./PAD SIZE: 75x28 | PKG. DESIGN | | | | |

ONCE PER SOCKET

ONCE PER BOARD



DEVICES: MAX 6705/6708

MAX. EXPECTED CURRENT = 100uA

DRAWN BY: HAK TAN

NOTES: