



RELIABILITY REPORT
FOR
MAX690ACPA+
PLASTIC ENCAPSULATED DEVICES

December 3, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.
SUNNYVALE, CA 94086

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|-----------------------------------|
| Approved by |
| Ken Wendel |
| Quality Assurance |
| Director, Reliability Engineering |

Conclusion

The MAX690ACPA+ 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 MAX690A/MAX692A/MAX802L/MAX802M/MAX805L reduce the complexity and number of components required for power-supply monitoring and battery-control functions in microprocessor (μ P) systems. They significantly improve system reliability and accuracy compared to separate ICs or discrete components. These parts provide four functions: 1) A reset output during power-up, power-down, and brownout conditions. 2) Battery-backup switching for CMOS RAM, CMOS μ P, or other low-power logic. 3) A reset pulse if the optional watchdog timer has not been toggled within 1.6sec. 4) A 1.25V threshold detector for power-fail warning or low-battery detection, or to monitor a power supply other than +5V. The parts differ in their reset-voltage threshold levels and reset outputs. The MAX690A/MAX802L/MAX805L generate a reset pulse when the supply voltage drops below 4.65V, and the MAX692A/MAX802M generate a reset below 4.40V. The MAX802L/MAX802M guarantee power-fail accuracies to $\pm 2\%$. The MAX805L is the same as the MAX690A except that RESET is provided instead of active-low RESET. All parts are available in 8-pin DIP and SO packages. The MAX690A/MAX802L are pin compatible with the MAX690 and MAX694. The MAX692A/MAX802M are pin compatible with the MAX692.

II. Manufacturing Information

| | |
|----------------------------------|-------------------------------------|
| A. Description/Function: | Microprocessor Supervisory Circuits |
| B. Process: | S3 |
| C. Number of Device Transistors: | |
| D. Fabrication Location: | Oregon |
| E. Assembly Location: | Malaysia, Philippines, 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 |
| E. Bondwire: | Au (1.3 mil dia.) |
| F. Mold Material: | Epoxy with silica filler |
| G. Assembly Diagram: | #05-1701-0141 |
| 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: | 61 X 78 mils |
| B. Passivation: | Si ₃ N 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: | 3.0 microns (as drawn) |
| F. Minimum Metal Spacing: | 3.0 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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 640 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 3.70 \times 10^{-9}$$
$$\lambda = 3.70 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at <http://www.maxim-ic.com/qa/reliability/monitor>. Cumulative monitor data for the S3 Process results in a FIT Rate of 0.04 @ 25C and 0.69 @ 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 PW07 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 +/-50 mA.

Table 1
Reliability Evaluation Test Results

MAX690ACPA+

| 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 | 640 | 1 |
| Moisture Testing (Note 2) | | | | |
| HAST | Ta = 130°C RH = 85% Biased Time = 96hrs. | 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