RELIABILITY REPORT

FOR

MAX5091AASA+, MAX5091AASA+T
MAX5091AATA+, MAX5091AATA+T
MAX5091BASA+

September 22, 2020

**MAXIM INTEGRATED**

160 RIO ROBLES

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## Conclusion

The MAX5091 successfully meets the quality and reliability standards required of all Maxim Integrated products. In addition, Maxim Integrated's continuous reliability monitoring program ensures that all outgoing product will continue to meet Maxim Integrated's quality and reliability standards.

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## I. Device Description

### A. General

The MAX5091 high-voltage linear regulator is designed to operate from a +5V to +28V input voltage, and withstands up to 40V transients. The device consumes only 45µA of quiescent current at 100µA output current. The MAX5091 delivers up to 100mA of output current with low 50mV maximum dropout voltage. The MAX5091 provides an active-low open-drain microprocessor RESET output. The reset timeout period is programmable and can be set with an external capacitor. The MAX5091 includes an uncommitted comparator for input voltage monitoring/powerfail indication. The device is available with a fixed +5V (MAX5091A) or +3.3V (MAX5091B) output. The MAX5091 is short-circuit protected and includes thermal shutdown.

The MAX5091 operates over the -40°C to +125°C automotive temperature range and is available in 8-pin, thermally enhanced TDFN-EP and SO-EP packages.

## II. Manufacturing Information

| | | |
|---|---|---|
| **A.** | Description/Function: | 28V, 100mA, Low-Quiescent-Current LDO with Reset and Power-Fail Input/Output |
| **B.** | Process: | BCD80 |
| **C.** | Device Count: | 666 |
| **D.** | Fabrication Location: | USA |
| **E.** | Assembly Location: | Philippines, Thailand, China, Taiwan |
| **F.** | Date of Initial Production: | October 21, 2006 |

## III. Packaging Information

| | | | |
|---|---|---|---|
| **A.** | Package Type: | 8L SOIC (N) | 8L TDFN |
| **B.** | Lead Frame: | CU194 | CU194 |
| **C.** | Lead Finish: | Matte Tin | Matte Tin |
| **D.** | Die Attach: | AB2200D/AB8290 | EN4900G/AB8200T |
| **E.** | Bondwire: | 1 mil Au | 1 mil Au |
| **F.** | Mold Material: | G600 | G770HJ/G770HCD |
| **G.** | Assembly Diagram: | 05-9000-1895 | 05-9000-1896 |
| **H.** | Flammability Rating: | UL-94 (V-0 Rating) | UL-94 (V-0 Rating) |
| **I.** | Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C | Level 1 | Level 1 |
| **J.** | Single Layer Theta Ja: | 52 °C/W | 54 °C/W |
| **K.** | Single Layer Theta Jc: | 6 °C/W | 8 °C/W |
| **L.** | Multi Layer Theta Ja: | 41 °C/W | 41 °C/W |
| **M.** | Multi Layer Theta Jc: | 7 °C/W | 8 °C/W |

## IV. Die Information

| | | |
|---|---|---|
| **A.** | Dimensions: | 70X94 mils |
| **B.** | Passivation: | SiO2/SiN |

## V. Quality Assurance Information

| | |
|---|---|
| **A.** Quality Assurance Contacts: | Ryan Wall (Manager, Reliability)<br>Michael Cairnes (Executive Director, Reliability)<br>Bryan Preeshl (SVP of QA) |
| **B.** Outgoing Inspection Level: | 0.1% for all electrical parameters guaranteed by the Datasheet.<br>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 125C biased (static) life test are shown in Table 1. Using these results, the Failure Rate $\lambda$ is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192\ x\ 2454\ x\ 48\ x\ 2}$$ (Chi square value for MTTF upper limit)

(where 2454 = Temperature Acceleration factor assuming an activation energy of 0.8eV)

$$\lambda = 40.51\ x\ 10^{-9}$$

$$\lambda = 40.51\ FITs\ (60\%\ confidence\ level\ @25°C)$$

Maxim Integrated performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at https://www.maximintegrated.com/en/support/qa-reliability/reliability/reliability-monitor-program.html.

BCD80 cumulative process Fit

$$\lambda = 0.38\ FITs\ (60\%\ confidence\ level\ @25°C)$$

$$\lambda = 4.52\ FITs\ (60\%\ confidence\ level\ @55°C)$$

**B.** ESD and Latch-Up Testing

The MAX5091 has been found to have all pins able to withstand an HBM transient pulse of ±2000 V per JEDEC / ESDA JS-001. Latch-Up testing has shown that this device withstands ±250 mA current injection and supply overvoltage per JEDEC JESD78.

**Table 1**

Reliability Evaluation Test Results

**MAX5091BASA+**

| TEST ITEM | TEST CONDITION | FAILURE IDENTIFICATION | SAMPLE SIZE | NUMBER OF FAILURES | COMMENTS |
|---|---|---|---|---|---|
| Static Life Test (Note 1) | Ta = 125°C<br>Biased<br>Time = 192 hrs. | DC parameters & functionality | 48 | 0 | |

Note 1: Life Test Data may represent plastic DIP qualification lots.