

RELIABILITY REPORT
FOR
MAXM17761ALI+T
PLASTIC ENCAPSULATED DEVICES

January 11, 2018

MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

| | |
|--|--|
|  Eric Wright Reliability Engineer |  Brian Standley Manager, Reliability |
|--|--|

Conclusion

The MAXM17761ALI+T 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.

Table of Contents

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

I. Device Description

A. General

The Himalaya series of voltage regulator ICs and Power Modules enable cooler, smaller, and simpler power supply solutions. The MAXM17761 is an easy-to-use power module that combines a synchronous step-down DC-DC converter with integrated FETs, a fully shielded inductor, and the compensation components into a low-profile, thermally-efficient, system-in-package (SiP). The device operates over a wide input voltage range of 4.5V to 76V and delivers up to 1A continuous output current with excellent line and load regulation over an output voltage range of 0.8V to 5V. The device only requires five external components to complete the total power solution. The high level of integration significantly reduces design complexity, manufacturing risks, and offers a true plug-and-play power supply solution, reducing time-to-market. The device offers resistor programmable switching frequency, RESET output voltage monitoring, adjustable input undervoltage lockout and programmable soft-start. The device also features robust overload protection and a thermal shutdown function. The MAXM17761 is available in a low-profile, highly thermal-emissive, compact, 28-pin 6.5mm x 10mm x 2.92mm SiP package that reduces power dissipation in the package and enhances efficiency. The package is easily soldered onto a printed circuit board and is suitable for automated circuit board assembly. The device can operate over the full industrial temperature range from -40°C to +125°C.

II. Manufacturing Information

| | |
|--------------------------------|---|
| A. Description/Function: | 4.5V to 76V, 1A High-Efficiency DC-DC Step-Down Power Module with Integrated Inductor |
| B. Process: | S18 |
| C. Fabrication Location: | USA |
| D. Assembly Location: | Taiwan |
| E. Date of Initial Production: | July 7, 2017 |

III. Packaging Information

| | |
|--|--------------------------|
| A. Package Type: | 28-pad LGA |
| B. Lead Frame: | N/A |
| C. Lead Finish: | N/A |
| D. Bondwire: | Au (1.3 mil dia.) |
| E. Mold Material: | Epoxy with silica filler |
| F. Assembly Diagram: | #05-100605 |
| G. Flammability Rating: | Class UL94-V0 |
| H. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C | Level |
| I. Single Layer Theta Ja: | N/A°C/W |
| J. Single Layer Theta Jc: | N/A°C/W |
| K. Multi Layer Theta Ja: | 22.5°C/W |
| L. Multi Layer Theta Jc: | N/A°C/W |

IV. Die Information

| | |
|---------------------------|---|
| A. Passivation: | Si ₃ N ₄ /SiO ₂ (Silicon nitride/ Silicon dioxide) |
| B. Interconnect: | Al/0.5%Cu with Ti/TiN Barrier |
| C. Minimum Metal Width: | 0.23 microns (as drawn) |
| D. Minimum Metal Spacing: | 0.23 microns (as drawn) |
| E. Isolation Dielectric: | SiO ₂ |
| F. Die Separation Method: | Wafer Saw |

V. Quality Assurance Information

| | |
|-----------------------------------|--|
| A. Quality Assurance Contacts: | Eric Wright (Reliability Engineering) Brian Standley (Manager, Reliability) Bryan Preeshl (Vice President 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 135C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{1000 \times 4340 \times 96 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 2.2 \times 10^{-9}$$

$$\lambda = 2.2 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

The following failure rate represents data collected from Maxim Integrated's reliability monitor program. Maxim Integrated performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at <http://www.maximintegrated.com/qa/reliability/monitor>. Cumulative monitor data for the S18 Process results in a FIT Rate of 0.05@ 25C and 0.93@ 55C (0.8 eV, 60% UCL)

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

The PI62-0 die type has been found to have all pins able to withstand an HBM transient pulse of +/-2500V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250mA and overvoltage per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results

MAXM17761ALI+T

| TEST ITEM | TEST CONDITION | FAILURE IDENTIFICATION | SAMPLE SIZE | NUMBER OF FAILURES | COMMENTS |
|----------------------------------|--|----------------------------------|-------------|--------------------|----------|
| Static Life Test (Note 1) | Ta = 135C Biased Time = 1000 hrs. | DC Parameters & functionality | 96 | 0 | |

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