RELIABILITY REPORT

FOR

MAX1744EUB+

PLASTIC ENCAPSULATED DEVICES

September 25, 2009

**MAXIM INTEGRATED PRODUCTS**

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

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

**Conclusion**

The MAX1744EUB+ 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**

A. General

The MAX1744/MAX1745 are step-down DC-DC controllers capable of handling up to 36V inputs. These parts use a proprietary current-limited control scheme for excellent light- and full-load efficiency, while their 330kHz (max) switching frequency permits small external components for space-critical applications. Operation to 100% duty cycle permits the lowest possible dropout voltage. The MAX1744 contains an internal feedback network that provides a pin-selectable output voltage of either 3.3V or 5V. The MAX1745 uses an external feedback network to generate an adjustable output voltage between 1.25V and 18V. The MAX1744/MAX1745 are available in a space-saving 10-pin µMAX® package.

## II. Manufacturing Information

| | |
|---|---|
| A. Description/Function: | High-Voltage, Step-Down DC-DC Controller in µMAX |
| B. Process: | B3 |
| C. Number of Device Transistors: | |
| D. Fabrication Location: | Oregon |
| E. Assembly Location: | Thailand |
| F. Date of Initial Production: | July 22, 2000 |

## III. Packaging Information

| | |
|---|---|
| A. Package Type: | 10-pin uMAX |
| B. Lead Frame: | Copper |
| C. Lead Finish: | 100% Matte Sn |
| D. Die Attach: | Non-conductive |
| E. Bondwire: | Au (1 mil dia.) |
| F. Mold Material: | Epoxy with silica filler |
| G. Assembly Diagram: | #05-1101-0146 |
| 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: | 180°C/W |
| K. Single Layer Theta Jc: | 41.9°C/W |
| L. Multi Layer Theta Ja: | 113.1°C/W |
| M. Multi Layer Theta Jc: | 41.9°C/W |

## IV. Die Information

| | |
|---|---|
| A. Dimensions: | 88 X 75 mils |
| B. Passivation: | $Si_3N_4/SiO_2$ (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)<br>Bryan Preeshl (Managing Director 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 135°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate ( $\lambda$) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 72 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 14.9 \times 10^{-9}$

$\lambda = 14.9$ 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 B3 Process results in a FIT Rate of 0.51 @ 25C and 8.79 @ 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 PX98 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500 V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250 mA.

**Table 1**
Reliability Evaluation Test Results

**MAX1744EUB+**

| TEST ITEM | TEST CONDITION | FAILURE IDENTIFICATION | SAMPLE SIZE | NUMBER OF FAILURES |
|---|---|---|---|---|
| **Static Life Test** (Note 1) | | | | |
| | Ta = 135°C<br>Biased<br>Time = 192 hrs. | DC Parameters<br>& functionality | 72 | 0 |
| **Moisture Testing** (Note 2) | | | | |
| HAST | Ta = 130°C<br>RH = 85%<br>Biased<br>Time = 96hrs. | DC Parameters<br>& functionality | 77 | 0 |
| **Mechanical Stress** (Note 2) | | | | |
| Temperature Cycle | -65°C/150°C<br>1000 Cycles<br>Method 1010 | DC Parameters<br>& functionality | 77 | 0 |

Note 1: Life Test Data may represent plastic DIP qualification lots.
Note 2: Generic Package/Process data