RELIABILITY REPORT

FOR

MAX1852EXT+
(MAX1852/MAX1853)

PLASTIC ENCAPSULATED DEVICES

December 23, 2008

**MAXIM INTEGRATED PRODUCTS**

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

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

**Conclusion**

The MAX1852EXT+ 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 MAX1852/MAX1853 monolithic, CMOS charge-pump voltage inverters in the ultra-small SC70 package feature a low 15 output resistance, permitting loads up to 30mA with maximum efficiency. The MAX1852/MAX1853 are available with operating frequencies of 50kHz and 200kHz, respectively, allowing optimization of supply current or external component size. Small external components and micropower shutdown mode make these devices ideal for both battery-powered and board-level voltage conversion applications. Oscillator control circuitry and four power-MOSFET switches are included on-chip. Applications include generating a negative supply from a +5V or +3.3V logic supply to power analog circuitry. Both versions come in a 6-pin SC70 package that is 40% smaller than a SOT23.

## II. Manufacturing Information

| | |
|---|---|
| A. Description/Function: | SC70 Inverting Charge Pumps with Shutdown |
| B. Process: | B8 |
| C. Number of Device Transistors: | |
| D. Fabrication Location: | Texas |
| E. Assembly Location: | Carsem Malaysia, UTL Thailand |
| F. Date of Initial Production: | September 20, 2000 |

## III. Packaging Information

| | |
|---|---|
| A. Package Type: | 6-pin SC70 |
| B. Lead Frame: | |
| C. Lead Finish: | 100% matte Tin |
| D. Die Attach: | Non Conductive Epoxy |
| E. Bondwire: | Au (1.0 mil dia.) |
| F. Mold Material: | Epoxy with silica filler |
| G. Assembly Diagram: | # |
| 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: | 326°C/W |
| K. Single Layer Theta Jc: | 115°C/W |

## IV. Die Information

| | |
|---|---|
| A. Dimensions: | 32 X 31 mils |
| B. Passivation: | $Si_3N_4/SiO_2$ (Silicon nitride/ Silicon dioxide |
| C. Interconnect: | Aluminum/Si (Si = 1%) |
| D. Backside Metallization: | None |
| E. Minimum Metal Width: | 0.8 microns (as drawn) |
| F. Minimum Metal Spacing: | 0.8 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: | 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 pending. Using these results, the Failure Rate ($\lambda$) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 79 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 13.6 \times 10^{-9}$

$\lambda$ = 13.6 F.I.T. (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly 1000 hour life test monitors on its processes. This data is published in the Product Reliability Report found at http://www.maxim-ic.com/. Current monitor data for the B8 Process results in a FIT Rate of 2.71 @ 25C and 17.30 @ 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 PY67 die type has been found to have all pins able to withstand a HBM transient pulse of +/-400 V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-250 mA.

**Table 1**
Reliability Evaluation Test Results

**MAX1852EXT+**

| 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 & functionality | 79 | 0 |
| **Moisture Testing** (Note 2) | | | | |
| 85/85 | Ta = 85°C<br>RH = 85%<br>Biased<br>Time = 1000hrs. | DC Parameters & functionality | 77 | 0 |
| **Mechanical Stress** (Note 2) | | | | |
| Temperature Cycle | -65°C/150°C<br>1000 Cycles<br>Method 1010 | DC Parameters & functionality | 77 | 0 |

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