



RELIABILITY REPORT  
FOR  
MAX8900CEWV+  
WAFER LEVEL PRODUCT

February 10, 2011

**MAXIM INTEGRATED PRODUCTS**

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<b>Approved by</b>
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## Conclusion

The MAX8900CEWV+ 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 MAX8900\_ is a high-frequency, switch-mode charger for a one-cell lithium ion (Li+) or lithium polymer (Li-Poly) battery. It delivers up to 1.2A of current to the battery from 3.4V to 6.3V (MAX8900A) or 3.4V to 8.7V (MAX8900B). The 3.25MHz switch-mode charger is ideally suited to small portable devices such as headsets and ultra-portable media players because it minimizes component size and heat. Several features make the MAX8900\_ perfect for high-reliability systems. The MAX8900\_ is protected against input voltages as high as +22V and as low as -22V. Battery protection features include low voltage prequalification, charge fault timer, die temperature monitoring, and battery temperature monitoring. The battery temperature monitoring adjusts the charge current and termination voltage as described in the JEITA\* specification for safe use of secondary lithium-ion batteries. Charge parameters are easily adjustable with external components. An external resistance adjusts the charge current from 50mA to 1200mA. Another external resistance adjusts the prequalification and done current thresholds from 10mA to 200mA. The done current threshold is very accurate achieving  $\pm 1\text{mA}$  at the 10mA level. The charge timer is adjustable with an external capacitor. The MAX8900\_ is available in a 0.4mm pitch 2.44mm x 2.67mm x 0.64mm WLP package.

## II. Manufacturing Information

A. Description/Function:	1.2A Switch-Mode Li+ Chargers with $\pm 22V$ Input Rating and JEITA Battery Temperature Monitoring
B. Process:	S45
C. Number of Device Transistors:	12424
D. Fabrication Location:	Texas
E. Assembly Location:	Japan
F. Date of Initial Production:	January 31, 2011

## III. Packaging Information

A. Package Type:	30-bump WLP 5x6 array
B. Lead Frame:	N/A
C. Lead Finish:	N/A
D. Die Attach:	None
E. Bondwire:	N/A (N/A mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-3738
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	1
J. Single Layer Theta Ja:	N/A
K. Single Layer Theta Jc:	N/A
L. Multi Layer Theta Ja:	49°C/W
M. Multi Layer Theta Jc:	9°C/W

## IV. Die Information

A. Dimensions:	105 X 96 mils
B. Passivation:	Si <sub>3</sub> N <sub>4</sub> /SiO <sub>2</sub> (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/0.5%Cu with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	Metal1 = 0.5 / Metal2 = 0.6 / Metal3 = 0.6 microns (as drawn)
F. Minimum Metal Spacing:	Metal1 = 0.45 / Metal2 = 0.5 / Metal3 = 0.6 microns (as drawn)
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	SiO <sub>2</sub>
I. Die Separation Method:	Wafer Saw

## V. Quality Assurance Information

- A. Quality Assurance Contacts: Don Lipps (Manager, Reliability Engineering)  
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 135°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 46 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 23.9 \times 10^{-9}$$

$\lambda = 23.9$  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 S45 Process results in a FIT Rate of 0.49 @ 25C and 8.49 @ 55C (0.8 eV, 60% UCL)

### B. E.S.D. and Latch-Up Testing (lot TWFDZQ001J D/C 1006)

The PQ30 die type has been found to have all pins able to withstand a HBM transient pulse of +/-1000 V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-100mA and overvoltage per JDEC JESD78.

**Table 1**  
Reliability Evaluation Test Results

**MAX8900CEWV+T**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
<b>Static Life Test</b> (Note 1)	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	46	0	TWFZDQ001J, D/C 1006

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