



RELIABILITY REPORT  
FOR MAX8922LETB+T  
PLASTIC ENCAPSULATED DEVICES

September 14, 2010

**MAXIM INTEGRATED PRODUCTS**

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## Conclusion

The MAX8922LETB+T 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 MAX8922L linear battery charger safely charges a single-cell lithium-ion (Li+) battery. Charging rate is optimized to accommodate the thermal characteristics of a given application. There is no need to reduce the maximum charge current at the worst-case charger power dissipation. Charging is optimized for a single Li+ cell using a control algorithm that includes low-battery precharging, voltage and current-limited fast charging, and top-off charging, while continuously monitoring for input overvoltage and device die-temperature conditions. The fast-charge current and top-off current thresholds are programmable by a simple 1-Wire® serial interface. The charger status and valid input power are indicated by two open-drain outputs (active-low CHG and active-low POK). The fast-charge current is defaulted to 400mA and programmable through the 1-Wire interface (active-low EN/SET). The MAX8922L also can be programmable to GSM test mode through the 1-Wire interface. The MAX8922L is available in a tiny (3mm x 2mm x 0.8mm) 10-pin TDFN package.

**II. Manufacturing Information**

A. Description/Function:	30V Li+ Linear Battery Charger with GSM Test Mode in 3mm x 2mm TDFN
B. Process:	S45
C. Number of Device Transistors:	568
D. Fabrication Location:	California, Texas or Japan
E. Assembly Location:	Thailand
F. Date of Initial Production:	October 24, 2009

**III. Packaging Information**

A. Package Type:	10-pin TDFN 3x2
B. Lead Frame:	Cu
C. Lead Finish:	NiPdAu
D. Die Attach:	Non-conductive
E. Bondwire:	Au (1.3 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-3548
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:	°C/W
K. Single Layer Theta Jc:	°C/W
L. Multi Layer Theta Ja:	67.3°C/W
M. Multi Layer Theta Jc:	°C/W

**IV. Die Information**

A. Dimensions:	40 X 102 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:	Richard Aburano (Manager, Reliability Operations) Bryan Preeshl (Managing Director 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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 37 \times 2} \text{ (Chi square value for MTTF upper limit)}$$

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

$$\lambda = 29.7 \times 10^{-9}$$
$$\lambda = 29.7 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 TUIYCA007D, D/C 1005)

The PR46-1 die type has been found to have all pins able to withstand a HBM transient pulse of +/- 2500V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/- 100mA and overvoltage per JEDEC JESD78.

**Table 1**  
Reliability Evaluation Test Results

**MAX8922LETB+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	37	0	TUIYAA004D, D/C 0926

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