RELIABILITY REPORT

FOR MAX8934AETI+

PLASTIC ENCAPSULATED DEVICES

August 31, 2010

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
Richard Aburano
Quality Assurance
Manager, Reliability Operations

Conclusion

The MAX8934AETI+ 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 MAX8934_ dual-input Li+/Li-Poly linear battery chargers with Smart Power Selector(tm) safely charge a single Li+/Li-Poly cell in accordance with JEITA recommendations. The MAX8934_ monitors the battery temperature (TBATT) while charging, and automatically adjusts the fast-charge current and charge termination voltage as the battery temperature varies. The MAX8934_ also monitors the battery temperature while the battery is discharging, and provides a warning flag (active-low OT) to the system in the event that the battery is over temperature. Two safety profiles are supported (see the *Charging Profiles* section for details). An ultra-low IQ, always-on LDO provides an additional 3.3V supply for system power. The MAX8934_ operates with either separate inputs for USB* and AC adapter power, or from a single input that accepts both. All power switches for charging and switching the load between battery and external power are included on-chip. No external MOSFETs are required. The MAX8934_ features a Smart Power Selector to make the best use of limited USB or adapter power. Input current limit and battery charge current limit are independently set. Input power not used by the system charges the battery. Charge current limit and DC current limit can be set up to 1.5A and 2A, respectively, while USB input current can be set to 100mA or 500mA for the MAX8934A/MAX8934B/MAX8934C/MAX8934E and up to 1.5mA (max) for the MAX8934D. Automatic input selection switches the system load from battery to external power. The MAX8934A provides a SYS output voltage of 5.3V, while the MAX8934B-MAX8934E provides a SYS output voltage of 4.35V. Other features include overvoltage protection (OVP), open-drain charge status and fault outputs, power-OK monitors, charge timers and battery thermistor monitor. Additionally, on-chip thermal limiting reduces battery charge-rate to prevent charger overheating. The MAX8934_ is available in a 28-pin, 4mm x 4mm TQFN package.

II. Manufacturing Information

A. Description/Function:	Dual Input Linear Charger, Smart Power Selector with Advanced Battery Temperature Monitoring
B. Process:	S45
C. Number of Device Transistors:	12940
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:	28-pin TQFN 4x4
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (1.3 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-3778
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:	48°C/W
K. Single Layer Theta Jc:	2.7°C/W
L. Multi Layer Theta Ja:	35°C/W
M. Multi Layer Theta Jc:	2.7°C/W

IV. Die Information

A. Dimensions:	104 X 101 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:	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_2
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 (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 48 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 22.9 \times 10^{-9}$

λ = 22.9 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

The PQ56 die type has been found to have all pins able to withstand a transient pulse of

ESD-HBM:	+/-2500 V per JEDEC JESD22-A114 (lot TYEZBQ001C, D/C 0938)
ESD-MM:	+/- 250V per JEDEC JESD22-A115 (lot TYEZBQ001D, D/C 0938)

Latch-Up testing has shown that this device withstands a current of +/-250 mA, and overvoltage per JEDEC JESD78 (lot TYEZBQ001C, D/C 0938).

Table 1
Reliability Evaluation Test Results

MAX8934AETI+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	48	0	(lot TYEZBQ001C, D/C 0938)

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