RELIABILITY REPORT

FOR

MAX8808XETA+

PLASTIC ENCAPSULATED DEVICES

July 12, 2010

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

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Approved by
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Quality Assurance
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Conclusion

The MAX8808XETA+ 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 MAX8808X/MAX8808Y/MAX8808Z intelligent, stand-alone constant-current/constant-voltage (CCCV), thermally regulated linear chargers are designed for charging a single-cell lithium-ion (Li+) battery. The MAX8808X/MAX8808Y/MAX8808Z integrate the current-sense circuit, MOS pass element, and thermal-regulation circuitry, and eliminate the reverse-blocking Schottky diode to create the simplest and smallest charging solution for handheld equipment. The MAX8808X functions as a stand-alone charger to control the charging sequence from the prequalification state through fast-charge, top-off charge, and fullcharge indication. The MAX8808Y and MAX8808Z eliminate the prequalification state to allow startup into a load without a battery. Proprietary thermal-regulation circuitry limits the die temperature when fast-charging or while exposed to high ambient temperatures, allowing maximum charging current without damaging the IC. The MAX8808X/MAX8808Y/MAX8808Z achieve high flexibility by providing an adjustable fast-charge current with an external resistor. Other features include a battery charging-status indicator (active-low CHG), an active-low control input (EN) for the MAX8808X and MAX8808Z (active-high control input for the MAX8808Y), and an active-low input power-source detection output (active-low ACOK). The MAX8808X/MAX8808Y/MAX8808Z accept a +4.25V to +15V supply, but disable charging when the input voltage exceeds +7V to protect against unqualified or faulty AC adapters. The MAX8808X/MAX8808Y/MAX8808Z operate over the extended temperature range (-40°C to +85°C) and are available in a compact 8-pin thermally enhanced 2mm x 2mm TDFN package with 0.8mm (max) height.

II. Manufacturing Information

A. Description/Function:	1A Linear Li+ Battery Chargers with Integrated Pass FET and Thermal Regulation in 2mm x 2mm TDFN
B. Process:	S45
C. Number of Device Transistors:	
D. Fabrication Location:	California, Texas or Japan
E. Assembly Location:	Malaysia, Thailand
F. Date of Initial Production:	April 23, 2005

III. Packaging Information

A. Package Type:	8-pin TDFN 2x2
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:	#05-9000-1711
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:	n/a
K. Single Layer Theta Jc:	10.8°C/W
L. Multi Layer Theta Ja:	83.9°C/W
M. Multi Layer Theta Jc:	36.6°C/W

IV. Die Information

A. Dimensions:	30 X 54 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:	Don Lipps (Manager, Reliability Engineering) 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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{1000 \times 4340 \times 132 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 1.6 \times 10^{-9}$

λ = 1.6 F.I.T. (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim"s reliability monitor program. Maxim performs quarterly 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. 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 (lot SYU2BZ001A, D/C 0507)

The PN92-2 die type has been found to have all pins able to withstand a HBM transient pulse of +/-1000V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250mA.

Table 1
Reliability Evaluation Test Results

MAX8808XETA+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)				
	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	132	0
Moisture Testing (Note 2)				
HAST	Ta = 130°C RH = 85% Biased Time = 96hrs.	DC Parameters & functionality	77	0
Mechanical Stress (Note 2)				
Temperature Cycle	-65°C/150°C 1000 Cycles Method 1010	DC Parameters & functionality	77	0

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