RELIABILITY REPORT

FOR

MAX4981ETA+

PLASTIC ENCAPSULATED DEVICES

August 4, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
Ken Wendel
Quality Assurance
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Conclusion

The MAX4981ETA+ 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 MAX4978-MAX4981 overvoltage-protection devices protect low-voltage systems against voltage faults up to +28V and feature a low 85m RON FET, an active current limiter, and lithium-ion battery overcharge protection (MAX4980/MAX4981). These devices are used to protect the charger input port on a portable device. The overvoltage protector feature protects against voltages up to 28V with two different trip thresholds: 5.7V (MAX4978/MAX4980/MAX4981) and 6.8V (MAX4979). There is an undervoltage protector with two different trip thresholds: 4.4V (MAX4978) and 2.63V (MAX4979/MAX4980/MAX4981). The overcurrent limiter and battery voltage monitor features provide a second layer of protection for a lithium-ion battery charger. The overcurrent limiter is available in two different thresholds: 0.9A (MAX4978/MAX4979/MAX4980) and 1.95A (MAX4981). Once current reaches the threshold, it is held for a 20ms blanking time. If the current is still at the limit after the blanking time, the FET is turned off, and the device restarts the cycle after 160ms. The battery voltage monitor measures the voltage of a lithium-ion battery and disables the FET if the battery voltage reaches 4.4V (MAX4980/MAX4981). The MAX4978-MAX4981 are available in a small 8-pin TDFN (2mm x 3mm) package and are specified over the extended -40°C to +85°C temperature range.

II. Manufacturing Information

A. Description/Function:	Overvoltage Protector with Active Current Limit
B. Process:	S4
C. Number of Device Transistors:	6675
D. Fabrication Location:	California, Texas or Japan
E. Assembly Location:	Thailand
F. Date of Initial Production:	April 26, 2008

III. Packaging Information

A. Package Type:	8-pin TDFN 2x3
B. Lead Frame:	Copper Alloy
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:	#05-9000-3006
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1
J. Multi Layer Theta Ja:	60°C/W
K. Multi Layer Theta Jc:	10.8°C/W

IV. Die Information

A. Dimensions:	73 X 57 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al 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:	Ken Wendel (Director, 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:

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

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

$\lambda = 22.4 \times 10^{-9}$

$\lambda = 22.4$ 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 S4 Process results in a FIT Rate of 4.6 @ 25C and 79.2 @ 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 AJ27-3 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 +/-250 mA.

Table 1
Reliability Evaluation Test Results

MAX4981ETA+

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	48	0
Moisture Testing (Note 2)				
85/85	Ta = 85°C RH = 85% Biased Time = 1000hrs.	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