RELIABILITY REPORT

FOR

MAX14676DEWO+T

WAFER LEVEL DEVICES

September 28, 2014

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

Approved by
Eric Wright
Quality Assurance
Reliability Engineering

Conclusion

The MAX14676DEWO+T successfully meets the quality and reliability standards required of all Maxim Integrated products. In addition, Maxim Integrated's continuous reliability monitoring program ensures that all outgoing product will continue to meet Maxim Integrated's quality and reliability standards.

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I. Device Description

A. General

The MAX14676D is a battery charge management solutions ideal for low-power wearable applications. This device includes a linear battery charger with a smart power selector, ModelGauge™ fuel gauge, and several power optimized peripherals. They feature an ultra-low power buck regulator with a quiescent current of 900nA (typical) and 74% efficiency with 10µA output. The battery charger features a smart power selector operation allowing operation with dead battery. It limits input current based on a register setting. If the charger power source is unable to supply the entire system load, the smart power control circuit will supplement the system load with current from the battery. The MAX14676D embeds a Maxim proprietary ModelGauge fuel gauge to provide an accurate estimate of the available capacity for rechargeable lithium batteries. The MAX14676D includes a synchronous high-efficiency step-down converter. The device features a fixed-frequency PWM mode for tighter regulation and a burst mode for increased efficiency during light-load operation. The MAX14676D has a boost regulator and three programmable current sinks that can be used to drive a variety of LED configurations. The boost converter is controlled independently from the current sinks, and they can be also used separately. The MAX14676D features a power switch controller that allows the device to be turned on and off. This controller also provides a delayed reset signal and voltage sequencing. This device is available in a 42-bump, 0.5mm pitch, 3.497mm x 3.118mm WLP package.

II. Manufacturing Information

A. Description/Function:	Wearable Charge Management Solution
B. Process:	S18
C. Number of Device Transistors:	184056
D. Fabrication Location:	USA
E. Assembly Location:	USA
F. Date of Initial Production:	September 16, 2014

III. Packaging Information

A. Package Type:	42-bump WLP
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:	None
G. Assembly Diagram:	#05-9000-5389
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°C/W
K. Single Layer Theta Jc:	N/A°C/W
L. Multi Layer Theta Ja:	36°C/W
M. Multi Layer Theta Jc:	N/A°C/W

IV. Die Information

A. Dimensions:	124.0157 X 138.9763 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:	0.23 microns (as drawn)
F. Minimum Metal Spacing:	0.23 microns (as drawn)
G. Bondpad Dimensions:	
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 (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 (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)

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

$\lambda = 22.9$ F.I.T. (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim Integrated's reliability monitor program. Maxim Integrated performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at http://www.maximintegrated.com/qa/reliability/monitor. Cumulative monitor data for the S18 Process results in a FIT Rate of 0.05 @ 25°C and 0.93 @ 55°C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing

The AL69-2 die type has been found to have all pins able to withstand an HBM transient pulse of +/-1000V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250mA and overvoltage per JEDEC JESD78.

Table 1

Reliability Evaluation Test Results

MAX14676DEWO+T

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

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