

RELIABILITY REPORT  
FOR  
MAX15088EWL+T  
WAFER LEVEL PRODUCTS

September 27, 2011

**MAXIM INTEGRATED PRODUCTS**

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<b>Approved by</b>
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Quality Assurance
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## Conclusion

The MAX15088EWL+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 MAX15088 high-efficiency, current-mode, synchronous step-down switching regulator with integrated power switches delivers up to 3A of output current. The device operates from 2.7V to 5.5V and provides an output voltage from 0.6V up to 94% of the input voltage, making the device ideal for distributed power systems, portable devices, and preregulation applications. The MAX15088 uses a current-mode control architecture with a high gain transconductance error amplifier. The current-mode control architecture facilitates easy compensation design and ensures cycle-by-cycle current limit with fast response to line and load transients. The MAX15088 offers selectable skip-mode functionality to reduce current consumption and achieve a higher efficiency at light output load. The low RDS(ON) integrated switches ensure high efficiency at heavy loads while minimizing critical inductances, making the layout design a much simpler task with respect to discrete solutions. Using a simple layout and footprint assures first-pass success in new designs. The MAX15088 features a 1MHz, factory-trimmed, fixed-frequency PWM mode operation. The high switching frequency, along with the PWM current-mode architecture, allows for a compact, all-ceramic capacitor design. The MAX15088 offers an external reference input that can be used for tracking the device startup into a PREBIAS output and offers a PGOOD open-drain output that can be used as an interrupt for power sequencing. The MAX15088 is available in a 9-bump (3 x 3 array), 1.5mm x 1.5mm WLP package and is specified over the -40°C to +85°C temperature range.

**II. Manufacturing Information**

A. Description/Function:	High-Efficiency, 3A, Step-Down Switching Regulator with Tracking Feature
B. Process:	S18
C. Number of Device Transistors:	10543
D. Fabrication Location:	California
E. Assembly Location:	Japan
F. Date of Initial Production:	June 3, 2011

**III. Packaging Information**

A. Package Type:	9 bmp, WLP HC
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:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-4044 / B
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	1
J. Single Layer Theta Ja:	N/A
K. Single Layer Theta Jc:	N/A
L. Multi Layer Theta Ja:	71°C/W
M. Multi Layer Theta Jc:	N/A

**IV. Die Information**

A. Dimensions:	60.24 X 60.24 mils
B. Passivation:	Si <sub>3</sub> N <sub>4</sub> /SiO <sub>2</sub> (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	0.18µm
F. Minimum Metal Spacing:	0.18µm
G. Bondpad Dimensions:	
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 Engineering)  
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 biased (static) life test are shown in Table 1. Using these results, the Failure Rate ( $\lambda$ ) is calculated as follows:

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

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

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

$$\lambda = 22.9 \text{ F.I.T. (60\% confidence level @ } 25^{\circ}\text{C)}$$

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 S18 Process results in a FIT Rate of 0.40 @ 25C and 6.96 @ 55C (0.8 eV, 60% UCL)

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

The NQ48-3 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 +/-250mA and overvoltage per JEDEC JESD78.

**Table 1**  
Reliability Evaluation Test Results

**MAX15088EWL+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	48	0	N/A

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