

RELIABILITY REPORT
FOR
MAX15058EWL+
WAFER LEVEL PRODUCTS

February 10, 2012

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.
SUNNYVALE, CA 94086

Approved by
Richard Aburano
Quality Assurance
Manager, Reliability Engineering

Conclusion

The MAX15058EWL+ 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.

Table of Contents

I.Device Description	V.Quality Assurance Information
II.Manufacturing Information	VI.Reliability Evaluation
III.Packaging Information	IV.Die Information
.....Attachments	

I. Device Description

A. General

The MAX15058 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 MAX15058 utilizes 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 MAX15058 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. Utilizing a simple layout and footprint assures first-pass success in new designs.

The MAX15058 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 MAX15058 offers a capacitor-programmable soft-start reducing inrush current, startup into PREBIAS operations, and a PGOOD open-drain output that can be used as an interrupt and for power sequencing. The MAX15058 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, Current-Mode Synchronous, Step-Down Switching Regulator
B. Process:	S18
C. Number of Device Transistors:	10543
D. Fabrication Location:	USA
E. Assembly Location:	Japan
F. Date of Initial Production:	December 7, 2010

III. Packaging Information

A. Package Type:	9-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:	#05-9000-4044
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:	°C/W
K. Single Layer Theta Jc:	°C/W
L. Multi Layer Theta Ja:	71°C/W
M. Multi Layer Theta Jc:	°C/W

IV. Die Information

A. Dimensions:	60.24 X 60.24 mils
B. Passivation:	Si ₃ N 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 = 0.23 / Metal2-3 = 0.28 / Metal 4 = 2.6 microns (as drawn)
F. Minimum Metal Spacing:	Metal1 = 0.23 / Metal2-3 = 0.28 / Metal 4 = 3.0 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: 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 135C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{228 \times 4340 \times 48 \times 2} \text{ (Chi square value for MTTF upper limit)}$$

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

$$\lambda = 19.3 \times 10^{-9}$$

$$\lambda = 19.3 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 S18 Process results in a FIT Rate of 0.06 @ 25C and 1.04 @ 55C (0.8 eV, 60% UCL)

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

The NQ48-1 die type has been found to have all pins able to withstand a transient pulse of:

- ESD-HBM: +/- 2500V per JEDEC JESD22-A114 (lot SG1ZAQ001B, D/C 0951)
- ESD-CDM: +/- 750V per JEDEC JESD22-C101 (lot SG1ZDA020C, D/C 1129)

Latch-Up testing has shown that this device withstands a current of +/- 250mA and overvoltage per JEDEC JESD78 (lot SG1ZAQ001B, D/C 0951).

Table 1
Reliability Evaluation Test Results

MAX15058EWL+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135C Biased Time = 228 hrs.	DC Parameters & functionality	48	0	SG1ZAQ001C, D/C 0951

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