

RELIABILITY REPORT
FOR
MAX15303AA00+CM
PLASTIC ENCAPSULATED DEVICES

April 20, 2015

MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

Approved by
Eric Wright
Quality Assurance
Reliability Engineering

Conclusion

The MAX15303AA00+CM 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.

Table of Contents

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

I. Device Description

A. General

The MAX15303 is a full-featured, flexible, efficient, 6A digital point-of-load (PoL) controller with integrated switching MOSFETs. It contains advanced power-management and telemetry features. Unlike PID-based digital power regulators, the device uses Maxim's patented InTune(tm) automatically compensated, state-space control algorithm. The InTune control law is valid for both the small- and large-signal response and accounts for duty-cycle saturation effects. These capabilities result in fast loop transient response and reduce the number of output capacitors compared to competing digital controllers. . To help maximize system efficiency and reduce overall parts count, the device uses Maxim's BabyBuck regulator. The BabyBuck eliminates the need for an external bias supply. The BabyBuck can be configured in two different modes to maximize system flexibility. The device is designed to minimize the end custom's design time. Automatic compensation eliminates the need for external compensation circuitry and allows changes to the output inductor and capacitor, without the need to manually redesign the compensation circuitry. An on-board PMBus(tm)-compliant serial bus interface enables communication with a supervisory controller for monitoring and fault management. A full suite of power-management features eliminates the need for complicated and expensive sequencing and monitoring ICs. Basic DC-DC conversion operation can be set up through pin strapping and does not require user-configuration firmware. This allows for rapid development of the power-supply subsystem before board-level systems engineering is completed. Maxim provides support hardware and software for configuring the device. The MAX15303 is available in a 40-pin, 6mm x 6mm TQFN package with an exposed pad and operates over the -40°C to +85°C temperature range.

II. Manufacturing Information

A. Description/Function:	6A Digital PoL DC-DC Converter with InTune Automatic Compensation
B. Process:	S18
C. Fabrication Location:	USA
D. Assembly Location:	Thailand
E. Date of Initial Production:	September 9, 2014

III. Packaging Information

A. Package Type:	40-pin TQFN
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:	#31-4887
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:	38°C/W
K. Single Layer Theta Jc:	1°C/W
L. Multi Layer Theta Ja:	27°C/W
M. Multi Layer Theta Jc:	1°C/W

IV. Die Information

A. Passivation:	Si ₃ N ₄ /SiO ₂ (Silicon nitride/ Silicon dioxide)
B. Interconnect:	Al/0.5%Cu with Ti/TiN Barrier
C. Backside Metallization:	None
D. Minimum Metal Width:	23 microns (as drawn)
E. Minimum Metal Spacing:	23 microns (as drawn)
F. Bondpad Dimensions:	
G. Isolation Dielectric:	SiO ₂
H. 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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 79 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 13.9 \times 10^{-9}$$

$$\lambda = 13.9 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 LC15-0 die type has been found to have all pins able to withstand an HBM transient pulse of +/-2500V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-100mA and overvoltage per JEDEC JESD78.

With the following exceptions:

LXSNS/ INSNS pins pass +100mA/-30mA per JEDEC JESD78

Table 1
Reliability Evaluation Test Results

MAX15303AA00+CM

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	79	0	

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