



RELIABILITY REPORT
FOR MAX15034BAUI+T
PLASTIC ENCAPSULATED DEVICES

May 28, 2009

MAXIM INTEGRATED PRODUCTS

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Approved by
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Conclusion

The MAX15034BAUI+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.

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 MAX15034 two-phase, configurable single- or dual-output buck controller has an input voltage range of 4.75V to 5.5V or 5V to 28V. A mode select input allows for a dual-output supply or connecting two phases together for a single-output, high-current supply. Each output channel of the MAX15034 drives n-channel MOSFETs and is capable of providing more than 25A of load current. The MAX15034 uses average current mode control with a switching frequency up to 1MHz per phase where each phase is 180° out of phase with respect to the other. Out-of-phase operation results in significantly reduced input capacitor ripple current and output voltage ripple in dual-phase, single-output voltage applications. Each controller has its own high-performance current and voltage-error amplifier that can be compensated for optimum output filter L-C values and transient response. The MAX15034 offers two enable inputs with accurate turn-on thresholds to allow for output voltage sequencing of the two outputs. The device's switching frequency can be programmed from 100kHz to 1MHz with an external resistor. The MAX15034 can be synchronized to an external clock. Each output voltage is adjustable from 0.61V to 5.5V. Additional features include thermal shutdown and hiccup-mode, short-circuit protection. Use the MAX15034 with adaptive voltage positioning for applications that require a fast transient response or accurate output voltage regulation. The MAX15034 is available in a thermally enhanced 28-pin TSSOP package capable of dissipating 2.1W. The device is rated for operation over the -40°C to +125°C automotive temperature range.

II. Manufacturing Information

A. Description/Function:	Configurable, Single-/Dual-Output, Synchronous Buck Controller for High-Current Applications
B. Process:	B12
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Philippines, Thailand
F. Date of Initial Production:	July 24, 2008

III. Packaging Information

A. Package Type:	28-pin TSSOP
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Gold (0.001 in mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-3156
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:	45°C/W
K. Single Layer Theta Jc:	2°C/W
L. Multi Layer Theta Ja:	37°C/W
M. Multi Layer Theta Jc:	2°C/W

IV. Die Information

A. Dimensions:	106 X 153 mils
B. Passivation:	Si ₃ N ₄ /SiO ₂ (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Aluminum/0.5% Cu
D. Backside Metallization:	None
E. Minimum Metal Width:	1.2 microns (as drawn)
F. Minimum Metal Spacing:	1.2 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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 46 \times 2} \text{ (Chi square value for MTTF upper limit)}$$

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

$$\lambda = 23.9 \times 10^{-9}$$

$$\lambda = 23.9 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

This 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 B12 Process results in a FIT Rate of 0.09 @ 25C and 1.48 @ 55C. (0.8eV, 60% confidence).

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 NQ18-1 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2000V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250mA.

Table 1
Reliability Evaluation Test Results

MAX15034BAUI+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	46	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