RELIABILITY REPORT

FOR

MAX15000AEUB+/MAX15000BEUB+

PLASTIC ENCAPSULATED DEVICES

June 24, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Quality Assurance
Director, Reliability Engineering

Conclusion

The MAX15000A/BEUB+ 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

A. General

The MAX15000/MAX15001 current-mode PWM controllers contain all the control circuitry required for the design of wide-input-voltage isolated and nonisolated power supplies. The MAX15000 is well suited for universal input (rectified 85VAC to 265VAC) or telecom (-36VDC to -72VDC) power supplies. The MAX15001 is well suited for low input voltage (9.5VDC to 24VDC) power supplies. The MAX15000/MAX15001 contain an internal error amplifier that regulates the tertiary winding output voltage which is used in primary-side regulated isolated power supplies. Primary-side regulation eliminates the need for an optocoupler. An input undervoltage lockout (UVLO) is provided for programming the input-supply start voltage and to ensure proper operation during brownout conditions. An open-drain UVLO flag output, with 210µs internal delay, allows the sequencing of a secondary-side controller. The input-supply start voltage is externally programmable with a voltage divider. A UVLO/EN input is used to shutdown the MAX15000/MAX15001. Internal digital soft-start eliminates output voltage overshoot. The MAX15000 has an internal bootstrap UVLO with large hysteresis that requires a minimum 23.6V for startup. The MAX15001 does not have the internal bootstrap UVLO and can be biased directly from a minimum voltage of 9.5V. The switching frequency for the MAX15000/MAX15001 is programmable with an external resistor. The MAX15000A/MAX15001A provide a 50% maximum duty-cycle limit, while the MAX15000B/MAX15001B provide a 75% maximum duty-cycle limit. These devices are available in 10-pin µMAX® packages and are rated for operation over the -40°C to +85°C temperature range.

II. Manufacturing Information

A. Description/Function:	Current-Mode PWM Controllers with Programmable Switching Frequency
B. Process:	B8
C. Number of Device Transistors:	
D. Fabrication Location:	Texas
E. Assembly Location:	Thailand, Malaysia
F. Date of Initial Production:	January 21, 2006

III. Packaging Information

A. Package Type:	10-pin uMAX
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive Epoxy
E. Bondwire:	Gold (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-2148
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:	180°C/W
K. Single Layer Theta Jc:	41.9°C/W
L. Multi Layer Theta Ja:	113.1°C/W
M. Multi Layer Theta Jc:	41.9°C/W

IV. Die Information

A. Dimensions:	62 X 87 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide
C. Interconnect:	Al/0.5%Cu
D. Backside Metallization:	None
E. Minimum Metal Width:	0.8 microns (as drawn)
F. Minimum Metal Spacing:	0.8 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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 94 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 11.4 \times 10^{-9}$

$\lambda = 11.4$ F.I.T. (60% confidence level @ 25°C)

The 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 B8 Process results in a FIT Rate of 1.86 @ 25C and 22.5 @ 55C (0.8 eV, 60% UCL)

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 NP94/NP94-1 die types have been found to have all pins able to withstand a HBM transient pulse of +/-2500 V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250 mA, 1.5x VCCMax Overvoltage per JESD78.

Table 1
Reliability Evaluation Test Results

MAX15000BEUB+

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	94	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