RELIABILITY REPORT

FOR

MAX8720EEI+

PLASTIC ENCAPSULATED DEVICES

June 29, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
Ken Wendel
Quality Assurance
Director, Reliability Engineering

Conclusion

The MAX8720EEI+ 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 MAX8720 step-down controller is intended for core CPU DC-DC converters in notebook computers. It features a dynamically adjustable output, ultra-fast transient response, high DC accuracy, and the high efficiency needed for leading-edge CPU core power supplies. Maxim's proprietary Quick-PWM™ quick-response, constant-on-time, PWM control scheme handles wide input/output voltage ratios with ease and provides 100ns "instant-on" response to load transients while maintaining a relatively constant switching frequency. The output voltage can be dynamically adjusted through the 6-bit digital-to-analog converter (DAC) over a 0.275V to 1.850V range in 25mV steps. The MAX8720 has independent four-level logic inputs for setting the suspend voltage (S0-S1). Precision slew-rate control provides "just-in-time" arrival at the new DAC setting, minimizing surge currents to and from the battery. The internal DAC of the MAX8720 is synchronized to the slew-rate clock for improved operation under aggressive power management of newer chipsets and operating systems that can make incomplete mode transitions. Remote feedback and ground-sense inputs allow easy compensation for IR drops in PC board traces. Single-stage buck conversion allows these devices to directly step down high-voltage batteries for the highest possible efficiency. Alternatively, two-stage conversion (stepping down the 5V system supply instead of the battery) at a higher switching frequency allows the minimum possible physical size. The MAX8720 is available in a 28-pin QSOP or 36-pin 6mm x 6mm thin QFN package.

II. Manufacturing Information

A. Description/Function:	Dynamically Adjustable 6-Bit VID Step-Down Controller
B. Process:	B12
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon, California or Texas
E. Assembly Location:	Malaysia, Philippines, Thailand
F. Date of Initial Production:	June 16, 2004

III. Packaging Information

A. Package Type:	28-pin QSOP
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive Epoxy
E. Bondwire:	Gold (1.3 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-2301-0015
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:	93°C/W
K. Single Layer Theta Jc:	27°C/W
L. Multi Layer Theta Ja:	79.3°C/W
M. Multi Layer Theta Jc:	27°C/W

IV. Die Information

A. Dimensions:	141 X 86 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:	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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 80 \times 2} \quad \text{(Chi square value for MTTF upper limit)}$$

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

$\lambda = 13.4 \times 10^{-9}$

λ = 13.4 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 B12 Process results in a FIT Rate of 3.13 @ 25C and 54.16 @ 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 PY03-6 die type has been found to have all pins able to withstand a HBM transient pulse of +/-1000 V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-250 mA.

Table 1

Reliability Evaluation Test Results

MAX8720EEI+

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	80	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