RELIABILITY REPORT

FOR

MAX5094CASA+ / MAX5094CAUA+

PLASTIC ENCAPSULATED DEVICES

July 11, 2011

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Conclusion

The MAX5094CASA+ / MAX5094CAUA+ 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 MAX5094A/B/C/D/MAX5095A/B/C BiCMOS, high-performance, current-mode PWM controllers have all the features required for wide input-voltage range isolated/nonisolated power supplies. These controllers are used for low- and high-power universal input voltage and telecom power supplies.

The MAX5094/MAX5095 contain a fast comparator with only 60ns typical delay from current sense to the output for overcurrent protection. The MAX5094 has an integrated error amplifier with the output at COMP. Softstart is achieved by controlling the COMP voltage rise using external components.

The oscillator frequency is adjustable from 20kHz to 1MHz with an external resistor and capacitor. The timing capacitor discharge current is trimmed allowing for programmable dead time and maximum duty cycle for a given frequency. The available saw-toothed waveform at RTCT can be used for slope compensation when needed.

The MAX5095A/MAX5095B include a bidirectional synchronization circuit allowing for multiple controllers to run at the same frequency to avoid beat frequencies. Synchronization is accomplished by simply connecting the SYNC of all devices together. When synchronizing with other devices, the MAX5095A/MAX5095B with the highest frequency synchronizes the other devices. Alternatively, the MAX5095A/MAX5095B can be synchronized to an external clock with an open-drain output stage running at a higher frequency.

The MAX5095C provides a clock output pulse (ADV_CLK) that leads the driver output (OUT) by 110ns. The advanced clock signal is used to drive the secondary-side synchronous rectifiers.

The MAX5094A/B/C are available in the 8-pin SO and 8-pin µMAX® packages. The MAX5094D and MAX5095A/B/C are available in the 8-pin µMAX package. All devices operate over the automotive temperature range of -40°C to +125°C.

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II. Manufacturing Information

A. Description/Function:	High-Performance, Single-Ended, Current-Mode PWM Controllers
B. Process:	B8
C. Number of Device Transistors:	
D. Fabrication Location:	California or Texas
E. Assembly Location:	Malaysia, Philippines and Thailand
F. Date of Initial Production:	October 13, 2006

III. Packaging Information

A. Package Type:	8-pin SOIC (N)	8-pin uMAX
B. Lead Frame:	Copper	Copper
C. Lead Finish:	100% matte Tin	100% matte Tin
D. Die Attach:	Conductive	Conductive
E. Bondwire:	Au (1 mil dia.)	Au (1 mil dia.)
F. Mold Material:	Epoxy with silica filler	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-1106	#05-9000-1104
H. Flammability Rating:	Class UL94-V0	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1	Level 1
J. Single Layer Theta Ja:	170°C/W	221°C/W
K. Single Layer Theta Jc:	40°C/W	42°C/W
L. Multi Layer Theta Ja:	132°C/W	206.3°C/W
M. Multi Layer Theta Jc:	38°C/W	42°C/W

IV. Die Information

A. Dimensions:	62 X 85 mils
B. Passivation:	Si_3N_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:	0.8 microns (as drawn)
F. Minimum Metal Spacing:	0.8 microns (as drawn)
G. Bondpad Dimensions:	
H. Isolation Dielectric:	SiO_2
I. Die Separation Method:	Wafer Saw

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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 135°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 144 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 7.6 \times 10^{-9}$

$\lambda = 7.6$ 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 B8 Process results in a FIT Rate of 0.06 @ 25C and 0.99 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot SZV5AQ002B, D/C 0610)

The NP69-5 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.

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Table 1
Reliability Evaluation Test Results

MAX5094CASA+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)					
	Ta = 135°C	DC Parameters	48	0	DRY4DA005B, D/C 0819
	Biased	& functionality	48	0	SRY2BQ003C, D/C 0631
	Time = 192 hrs.		48	0	SRY0AQ003B, D/C 0448

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

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