RELIABILITY REPORT

FOR

MAX16963SATEC+T

PLASTIC ENCAPSULATED DEVICES

January 18, 2013

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

Approved by
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Conclusion

The MAX16963SATEC/V+T 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
II. .....Manufacturing Information
III. .....Packaging Information
.....Attachments
IV. .....Die Information
V. .....Quality Assurance Information
VI. .....Reliability Evaluation

I. Device Description

A. General

The MAX16963 is a high-efficiency, dual synchronous step-down converter that operates with a 2.7V to 5.5V input voltage range and provides a 0.8V to 3.6V output voltage range. The device delivers up to 1.5A of load current per output. The low input/output voltage range and the ability to provide high output currents make this device ideal for on-board point-of-load and postregulation applications. The device achieves Q3% output error over load, line, and temperature ranges. The device features a 2.2MHz fixed-frequency PWM mode for better noise immunity and load transient response, and a skip mode for increased efficiency during light-load operation. The 2.2MHz frequency operation allows for an all-ceramic capacitor design and small-size external components. An optional spread-spectrum frequency modulation minimizes radiated electromagnetic emissions due to the switching frequency. On-board low RDSON switches help minimize efficiency losses at heavy loads and reduce critical/parasitic inductance, making the layout a much simpler task with respect to discrete solutions. Following a simple layout and footprint ensures first-pass success in new designs. The device is offered in a factory-preset output voltage or adjustable output-voltage version (see the Selector Guide for options). Factory-preset output-voltage versions allow customers to achieve Q3% output-voltage accuracy without using external resistors, while the adjustable output-voltage version provides the flexibility to set the output voltage to any desired value between 0.8V and 3.6V using an external resistive divider. Additional features include 8ms fixed soft-start, 16ms fixed power-good delay, overcurrent, and overtemperature protections. The MAX16963 is available in thermally enhanced 16-pin TSSOP-EP and 4mm x 4mm, 16-pin TQFN-EP packages, and is specified for operation over the -40NC to +125NC automotive temperature range.

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II. Manufacturing Information

A. Description/Function:	Dual 2.2MHz, Low-Voltage Step-Down DC-DC Converter
B. Process:	S18
C. Number of Device Transistors:	18210
D. Fabrication Location:	California
E. Assembly Location:	China, Thailand
F. Date of Initial Production:	September 29, 2012

III. Packaging Information

A. Package Type:	16-pin TQFN 4x4
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:	#05-9000-4839
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:	59.3°C/W
K. Single Layer Theta Jc:	5.7°C/W
L. Multi Layer Theta Ja:	40°C/W
M. Multi Layer Theta Jc:	5.7°C/W

IV. Die Information

A. Dimensions:	64.96X86.22 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	0.18um
F. Minimum Metal Spacing:	0.18um
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:

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

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

$\lambda = 13.7 \times 10^{-9}$

$\lambda = 13.7$ 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 0.40 @ 25C and 6.96 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (ESD lot SAHC0Q003C D/C 1232, Latch-up lot SAHC0Q003A D/C 1225)

The AP28-1 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250mA and overvoltage per JEDEC JESD78.

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Table 1

Reliability Evaluation Test Results

MAX16963SATEC/V+T

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	80	0	SAGC3Q003C, D/C 1232

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

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