RELIABILITY REPORT

FOR

MAX16962xAUEx/V+T / MAX16962xATEx/V+T

PLASTIC ENCAPSULATED DEVICES

December 6, 2012

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

Approved by
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Quality Assurance
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Conclusion

The MAX16962xAUEx/V+T / MAX16962xATEx/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.

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I. Device Description

A. General

The MAX16962 is a high-efficiency, 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 wide input/output voltage range and the ability to provide up to 4A to load current make this device ideal for on-board point-of-load and post-regulation applications. The MAX16962 achieves -3.7%/+2.6% output error over load, line, and temperature ranges. The MAX16962 features a 2.2MHz fixed-frequency PWM mode for better noise immunity and load transient response, and a pulse frequency modulation mode (SKIP) for increased efficiency during light-load operation. The 2.2MHz frequency operation allows for the use of all-ceramic capacitors and minimizes external components. The optional spread-spectrum frequency modulation minimizes radiated electromagnetic emissions. Integrated low RDSON switches improve efficiency at heavy loads and make the layout a much simpler task with respect to discrete solutions. The MAX16962 is offered with factory-preset output voltages or with an adjustable output voltage. Factory-preset output voltage versions allow customers to achieve -3.7%/+2.6% 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 to 3.6V using an external resistive divider. Additional features include 8ms soft-start, 16ms power-good output delay, overcurrent, and overtemperature protections. The MAX16962 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 -40°C to +125°C automotive temperature range.

II. Manufacturing Information

A. Description/Function:	4A, 2.2MHz, Synchronous Step-Down DC-DC Converter	
B. Process:	S18	
C. Number of Device Transistors:	18210	
D. Fabrication Location:	USA	
E. Assembly Location:	Thailand	China and Thailand
F. Date of Initial Production:	June 29, 2012	

III. Packaging Information

A. Package Type:	16-pin TSSOP	16-pin TQFN 4x4
B. Lead Frame:	Copper	Copper
C. Lead Finish:	100% matte Tin	100% matte Tin
D. Die Attach:	Conductive	Conductive
E. Bondwire:	Au (2 mil dia.)	Au (2 mil dia.)
F. Mold Material:	Epoxy with silica filler	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-4377	#05-9000-4376
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:	47°C/W	59.3°C/W
K. Single Layer Theta Jc:	3°C/W	6°C/W
L. Multi Layer Theta Ja:	38.3°C/W	40°C/W
M. Multi Layer Theta Jc:	3°C/W	6°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/0.5%Cu with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	Metal1 = 0.23 / Metal2-3 = 0.28 / Metal 4 = 2.6 microns (as drawn)
F. Minimum Metal Spacing:	Metal1 = 0.23 / Metal2-3 = 0.28 / Metal 4 = 3.0 microns (as drawn)
G. Bondpad Dimensions:	
H. Isolation Dielectric:	SiO_2
I. Die Separation Method:	Wafer Saw

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 135C 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)

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

λ = 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 0.06 @ 25C and 1.05 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot SAGC3Q003B, D/C 1224)

The AP28 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.

Table 1

Reliability Evaluation Test Results

MAX16962xAUEx/V+T / MAX16962xATEx/V+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)					
	Ta = 135C Biased Time = 192 hrs.	DC Parameters & functionality	80	0	SAGC3Q003C, D/C 1232

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