

RELIABILITY REPORT FOR MAX16910 PLASTIC ENCAPSULATED DEVICES

March 15, 2012

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR. SUNNYVALE, CA 94086

Approved by	
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Quality Assurance	
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Conclusion

The MAX16910 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
- II.Manufacturing Information
- III.Packaging Information
-Attachments

- V.Quality Assurance Information VI.Reliability Evaluation
- IV.Die Information

I. Device Description

A. General

The MAX16910 ultra-low quiescent current, high-voltage linear regulator is ideal for use in automotive and battery-operated systems. The device operates from a +3.5V to +30V input voltage, delivers up to 200mA of load current, and consumes only 20µA of quiescent current at no load. The device consumes only 1.6µA current when in shutdown. The input is +45V transient tolerant and is designed to operate under load-dump conditions. The MAX16910 can be configured as either fixed output voltage (+3.3V or +5V) or adjustable output voltage using an external resistive divider. The MAX16910 features an open-drain, active-low RESET output with fixed thresholds offered at 92.5% and 87.5% of the output voltage. The active-low RESET output remains low for a fixed period of 60µs after the output voltage exceeds its threshold. The active-low RESET delay can be extended with an external capacitor. The MAX16910 includes an enable input, short-circuit protection, and thermal shutdown. The MAX16910 operates over the -40°C to +125°C automotive temperature range. The device is available in a space-saving, thermally enhanced, 3mm x 3mm, 8-pin TDFN package and 5mm x 4mm, 8-pin SO package.



II. Manufacturing Information

- A. Description/Function:
- B. Process:
- C. Number of Device Transistors:
- D. Fabrication Location:
- E. Assembly Location:
- F. Date of Initial Production:

III. Packaging Information

A. Package Type:	8-pin TDFN 3x3	8-pin SOIC (N)
B. Lead Frame:	Copper	Copper
C. Lead Finish:	100% matte Tin	100% matte Tin
D. Die Attach:	Conductive	Conductive
E. Bondwire:	Au (1.3 mil dia.)	Au (1.3 mil dia.)
F. Mold Material:	Epoxy with silica filler	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-3659	#05-9000-3610
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:	54°C/W	66°C/W
K. Single Layer Theta Jc:	8°C/W	5°C/W
L. Multi Layer Theta Ja:	41°C/W	53°C/W
M. Multi Layer Theta Jc:	8°C/W	5°C/W

S45

2013

Thailand

July 25, 2009

California, Texas or Japan

200mA, Automotive, Ultra-Low Quiescent Current, Linear Regulator

IV. Die Information

A. Dimensions:	40 X 45 mils
B. Passivation:	Si ₃ N 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 = 0.5 / Metal2 = 0.6 / Metal3 = 0.6 microns (as drawn)
F. Minimum Metal Spacing:	Metal1 = 0.45 / Metal2 = 0.5 / Metal3 = 0.6 microns (as drawn)
G. Bondpad Dimensions:	
H. Isolation Dielectric:	SiO ₂
I. Die Separation Method:	Wafer Saw



V. Quality Assurance Information

Α.	Quality Assurance Contacts:	Richard Aburano (Manager, Reliability Engineering)			
		Don Lipps (Manager, Reliability Engineering)			
		Bryan Preeshl (Vice President of QA)			
В.	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:

 $\lambda = \underbrace{1}_{\text{MTTF}} = \underbrace{\frac{1.83}_{192 \times 4340 \times 48 \times 2}}_{(\text{where } 4340 = \text{Temperature Acceleration factor assuming an activation energy of 0.8eV})$ $\lambda = 22.9 \times 10^{-9}$ $\lambda = 22.9 \text{ F.I.T. (60\% confidence level @ 25°C)}$

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 S45 Process results in a FIT Rate of 0.49 @ 25C and 8.49 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot TULZCQ001B, D/C 1151)

The AP13 die type has been found to have all pins able to withstand a transient pulse of

ESD-HBM:	+/- 1500V per JEDEC JESD22-A114
ESD-CDM:	+/- 750V per JEDEC JESD22-C101

Latch-Up testing has shown that this device withstands a current of +/- 100mA and overvoltage when pin SETOV is limited to AMR.



Table 1 Reliability Evaluation Test Results

MAX16910

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note	e 1) Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	48	0	SULZBQ001E, D/C 0927

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