RELIABILITY REPORT

FOR

MAX9921AUB+

PLASTIC ENCAPSULATED DEVICES

June 8, 2011

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Quality Assurance
Reliability Engineer

Conclusion

The MAX9921AUB+ 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 MAX9921 provides a single chip solution to interface two 2-wire Hall-effect sensors to a low-voltage microprocessor (µP). This device supplies and monitors the current drawn by two Hall-effect sensors, filters the sensed current level, and outputs the corresponding logic level. The MAX9921 includes input diagnostics and fault protection. These features allow the device to determine fault conditions such as open inputs, inputs shorted to the battery, and inputs shorted to ground. If the MAX9921 detects any of these conditions at either IN1 or IN2, the device shuts off the current to the corresponding input. The MAX9921 protects the Hall sensors from supply transients up to 60V at the BAT supply. Normal operating supply voltage ranges from 6V to 18V. If the battery voltage is out of range, the MAX9921 shuts off the current to the Hall sensors. The MAX9921 provides an 80µs blanking time following Hall sensor power-up or restart. The open-drain logic outputs are compatible with logic levels up to 5.5V. The MAX9921 is available in a small 10-pin µMAX® package and is specified over the -40°C to +125°C automotive temperature range.

II. Manufacturing Information

A. Description/Function:	Dual, 2-Wire Hall-Effect Sensor Interface with Diagnostics
B. Process:	BCD8
C. Number of Device Transistors:	1480
D. Fabrication Location:	Oregon
E. Assembly Location:	Texas, Thailand
F. Date of Initial Production:	April 25, 2008

III. Packaging Information

A. Package Type:	10-pin uMAX
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-4030
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:	180°C/W
K. Single Layer Theta Jc:	42°C/W
L. Multi Layer Theta Ja:	113.1°C/W
M. Multi Layer Theta Jc:	42°C/W

IV. Die Information

A. Dimensions:	62 X 87 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:	3.0 microns (as drawn)
F. Minimum Metal Spacing:	3.0 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:	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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{1000 \times 4340 \times 235 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 0.9 \times 10^{-9}$

$\lambda = 0.9$ 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 BCD8 Process results in a FIT Rate of 0.06 @ 25C and 1.08 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot JFFZCA004A D/C 1102)

The OY24 die type has been found to have all pins able to withstand a HBM transient pulse of +/-1000V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-100mA and overvoltage per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results

MAX9921AUB+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)					
	Ta = 135°C	DC Parameters	80	0	JFFZZQ002B, D/C 1010
	Biased	& functionality	80	0	JFFZBQ001L, D/C 1009
	Time = 1000 hrs.		75	0	JFFZBQ003A, D/C 1014

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