RELIABILITY REPORT

FOR

MAX5922BEUI+

PLASTIC ENCAPSULATED DEVICES

March 26, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Quality Assurance
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Conclusion

The MAX5922BEUI+ 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 MAX5922A/B/C is a single-port network power controller with an integrated power MOSFET, operating from a +32V to +60V supply rail. The device is specifically designed for power-sourcing equipment (PSE) in power-over-LAN applications and is fully compliant to the IEEE® 802.3af standard. The MAX5922 provides power devices (PD) discovery, classification, current limit, and other necessary functions for an IEEE 802.3af compliant PSE. The MAX5922 is suitable for PSE function in both switch/router systems where the power is delivered to the load through the signal pairs, and in midspan systems where the power is delivered to the load through the spare pairs. In midspan mode, a detection collision avoidance circuit (MAX5922A/C only) provides the necessary back-off timing to prevent fault detections that happen when two different PSEs try to detect and power the same PD. The MAX5922B/C have a detection disable input that can be connected high to disable the detection/classification functions or connected low to enable them. The MAX5922 features a programmable undervoltage lockout (UVLO) that keeps the device in shutdown until the input voltage exceeds a certain threshold, set to 38V (MAX5922A) or 28V (MAX5922B/C) internally. After successfully discovering and classifying a PD, the MAX5922 enters startup mode. During startup, the MAX5922 limits the output voltage and current slew rate to minimize EMI (electromagnetic interference). The MAX5922 has an integrated 0.45 N-channel power MOSFET that provides efficient operation and simplified system design. The MAX5922 monitors and provides current-limit protection to the load at all times. The current limit is programmable using an external current-sensing resistor. The MAX5922 features current-limit foldback and duty-cycle limit to ensure robust operation during load-fault and short-circuit conditions. Fault management allows the part to either latch-off or autorestart after a fault. The MAX5922 provides POK, active-low ZC, and active-low FAULT status signals to indicate output power is good, zero-current fault, and other faults (overcurrent, overtemperature), respectively. The MAX5922 is available in a 28-pin TSSOP package and is rated over the extended -40°C to +85°C temperature range.

II. Manufacturing Information

A. Description/Function:	+48V, Single-Port Network Power Switch For Power-Over-LAN
B. Process:	BCD8
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Carsem Malaysia, ATP Philippines, UTL Thailand
F. Date of Initial Production:	April 15, 2003

III. Packaging Information

A. Package Type:	28-pin TSSOP
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive Epoxy
E. Bondwire:	Gold (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-0448
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:	78°C/W
K. Single Layer Theta Jc:	12.5°C/W
L. Multi Layer Theta Ja:	71.6°C/W
M. Multi Layer Theta Jc:	13°C/W

IV. Die Information

A. Dimensions:	108 X 175 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide
C. Interconnect:	Aluminum/Si (Si = 1%)
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:	Ken Wendel (Director, Reliability Engineering) Bryan Preeshl (Managing Director 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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 180 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 6.0 \times 10^{-9}$

$\lambda = 6.0$ F.I.T. (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly 1000 hour life test monitors on its processes. This data is published in the Product Reliability Report found at http://www.maxim-ic.com/. Current monitor data for the BCD8 Process results in a FIT Rate of 2.3 @ 25C and 39.6 @ 55C (0.8 eV, 60% UCL)

B. Moisture Resistance Tests

The industry standard 85°C/85%RH or HAST testing is monitored per device process once a quarter.

C. E.S.D. and Latch-Up Testing

The NP38-2 die type has been found to have all pins able to withstand a HBM transient pulse of +/-400 V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-250 mA.

Table 1
Reliability Evaluation Test Results

MAX5922BEUI+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)				
	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	180	0
Moisture Testing (Note 2)				
85/85	Ta = 85°C RH = 85% Biased Time = 1000hrs.	DC Parameters & functionality	77	0
Mechanical Stress (Note 2)				
Temperature Cycle	-65°C/150°C 1000 Cycles Method 1010	DC Parameters & functionality	77	0

Note 1: Life Test Data may represent plastic DIP qualification lots.
Note 2: Generic Package/Process data