RELIABILITY REPORT

FOR

MAX5952

PLASTIC ENCAPSULATED DEVICES

May 21, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
Richard Aburano
Quality Assurance
Manager, Reliability Operations

Conclusion

The MAX5952 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

A. General

The MAX5952 is a quad -48V power controller designed for use in IEEE® 802.3af-compliant/pre-IEEE 802.3at-compatible power-sourcing equipment (PSE). This device provides powered device (PD) discovery, classification, current limit, DC and AC load disconnect detections in compliance with the IEEE 802.3af standard. The MAX5952 is pin compatible with MAX5945/LTC4258/LTC4259A PSE controllers and provides additional features. The MAX5952 features high-power mode that provides up to 45W per port. The MAX5952 provides instantaneous readout of each port current through the I²C interface. The MAX5952 also provides high-capacitance detection for legacy PDs. The device features an I²C-compatible, 3-wire serial interface, and is fully software configurable and programmable. The class-overcurrent detection function enables system power management to detect if a PD draws more than the allowable current. The MAX5952's extensive programmability enhances system flexibility, enables field diagnosis, and allows for uses in other applications. The MAX5952 provides four operating modes to suit different system requirements. Auto mode allows the device to operate automatically without any software supervision. Semi-automatic mode automatically detects and classifies a device connected to a port after initial software activation, but does not power up that port until instructed to by software. Manual mode allows total software control of the device and is useful for system diagnostics. Shutdown mode terminates all activities and securely turns off power to the ports. The MAX5952 provides input undervoltage lockout (UVLO), input undervoltage detection, a load-stability safety check during detection, input overvoltage lockout, overtemperature detection, output voltage slew-rate limit during startup, power-good status, and fault status. The MAX5952's programmability includes start-up timeout, overcurrent timeout, and load-disconnect detection timeout. The MAX5952 is available in a 36-pin SSOP package and is rated for both extended (-40°C to +85°C) and upper commercial (0°C to +85°C) temperature ranges.

II. Manufacturing Information

A. Description/Function:	High-Power, Quad, PSE Controller for Power-Over-Ethernet
B. Process:	BCD80 and C6Y
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon and Japan
E. Assembly Location:	Carsem Malaysia
F. Date of Initial Production:	August 17, 2007

III. Packaging Information

A. Package Type:	36-pin SSOP
B. Lead Frame:	Copper Alloy
C. Lead Finish:	100% matte Tin
D. Die Attach:	Combination Epoxy
E. Bondwire:	Au (1.0 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1

IV. Die Information

A. Dimensions:	170x230 mil and 120x180 mil mils
B. Passivation:	Si02/Si3N4
C. Interconnect:	Al/Cu
D. Backside Metallization:	None
G. Bondpad Dimensions:	5 mil. Sq.
H. Die Separation Method:	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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 54 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 19.9 \times 10^{-9}$

$\lambda = 19.9$ F.I.T. (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly 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). Current monitor data for the C6Y Process results in a FIT Rate of 0.82 @ 25C and 14.21 @ 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 NP83A (NP86, NP87) die types have been found to have all pins able to withstand a HBM transient pulse of +/-2000 V per JEDEC JESD22-A114-D. Latch-Up testing has shown that this device withstands a current of +/-250 mA.

Table 1
Reliability Evaluation Test Results

MAX5952

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	54	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