RELIABILITY REPORT

FOR

MAX5943AEEE+

PLASTIC ENCAPSULATED DEVICES

March 22, 2010

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Quality Assurance
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Conclusion

The MAX5943AEEE+ 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 MAX5943 is a fully integrated power-management IC for FireWire® applications. This device controls two external power n-channel MOSFETs to regulate current from the input power supply to the load and performs low-voltage-drop, power-supply ORing. The MAX5943 operates over a 7.5V to 37V input range and provides inrush and output current limit in addition to a diode ORing function suitable for FireWire applications. The MAX5943 FireWire/IEEE 1394(tm) protective circuit (Figure 12 of the full data sheet) is UL® recognized. The MAX5943 allows the safe insertion and removal of FireWire peripherals into a live FireWire port by providing inrush current control and an output current-limiting function. The ORing feature provides a very efficient way to protect the FireWire port when connected to another FireWire peripheral that sources a higher voltage. By turning off both external MOSFETS, the MAX5943 provides a true bidirectional load disconnect. A low-current shutdown mode disables the MAX5943, resulting in less than 10µA supply current. A pin-selectable input allows latched or autoretry fault management after a fault. The MAX5943A features a current-limit function that actively limits the current drawn by the load with a programmable timeout. The MAX5943B-MAX5943E do not actively limit the load current but provide a circuit-breaker function. See the *Selector Guide* in the full data sheet for the default and programmable circuit-breaker timeouts. The MAX5943 operates over the -40°C to +85°C extended temperature range and is available in a 16-pin QSOP package.

II. Manufacturing Information

A. Description/Function:	FireWire Current Limiter and Low-Drop ORing Switch Controller
B. Process:	BCD8
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Philippines, Thailand
F. Date of Initial Production:	July 24, 2004

III. Packaging Information

A. Package Type:	16-pin QSOP
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:	#05-9000-1111
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:	120°C/W
K. Single Layer Theta Jc:	37°C/W
L. Multi Layer Theta Ja:	105°C/W
M. Multi Layer Theta Jc:	37°C/W

IV. Die Information

A. Dimensions:	80 X 135 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:	Don Lipps (Manager, 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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 48 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 22.9 \times 10^{-9}$

$\lambda = 22.9$ 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. 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 NP67 die type has been found to have all pins able to withstand a HBM transient pulse of +/-200V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-250mA.

Table 1
Reliability Evaluation Test Results

MAX5943AEEE+

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	48	0
Moisture Testing (Note 2)				
HAST	Ta = 130°C RH = 85% Biased Time = 96hrs.	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