RELIABILITY REPORT

FOR

MAX6962ATH+

PLASTIC ENCAPSULATED DEVICES

December 11, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
Ken Wendel
Quality Assurance
Director, Reliability Engineering

Conclusion

The MAX6962ATH+ 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 MAX6960-MAX6963 are compact cathode-row display drivers that interface microprocessors to 8 x 8 dot-matrix red, green, and yellow (R,G,Y) LED displays through a high-speed 4-wire serial interface. The MAX6960-MAX6963 drive two monocolor 8 x 8 matrix displays, or a single RGY 8 x 8 matrix display with no external components. The driver can also be used with external pass transistors to control red, green, blue (RGB) and other displays at higher currents and voltages. The MAX6960-MAX6963 feature open- and short-circuit LED detection, and provide both analog and digital tile segment current calibration to allow 8 x 8 displays from different batches to be compensated or color matched. A local 3-wire bus synchronizes multiple interconnected MAX6960-MAX6963s and automatically allocates memory map addresses to suit the user's display-panel architecture. The MAX6960-MAX6963s' 4-wire interface connects multiple drivers, with display memory mapping shared and allocated among the drivers. A single global write operation can send a command to all MAX6960s in a panel. The MAX6963 drives monocolor displays with two-step intensity control. The MAX6962 drives monocolor displays with two-step or four-step intensity control. The MAX6961 drives monocolor or RGY displays with two-step intensity control. The MAX6960 drives monocolor or RGY displays with two-step or four-step intensity control.

II. Manufacturing Information

A. Description/Function:	4-Wire Serially Interfaced 8 x 8 Matrix Graphic LED Drivers
B. Process:	S4
C. Number of Device Transistors:	
D. Fabrication Location:	California, Texas or Japan
E. Assembly Location:	China, Thailand
F. Date of Initial Production:	July 23, 2005

III. Packaging Information

A. Package Type:	44-pin TQFN 7x7
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (1.3 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-1003
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:	37°C/W
K. Single Layer Theta Jc:	1°C/W
L. Multi Layer Theta Ja:	27°C/W
M. Multi Layer Theta Jc:	1°C/W

IV. Die Information

A. Dimensions:	168 X 143 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al 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:	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:

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

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

$\lambda = 22.4 \times 10^{-9}$

λ = 22.4 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 S4 Process results in a FIT Rate of 0.05 @ 25C and 0.83 @ 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 DW06 die type has been found to have all pins able to withstand a HBM transient pulse of <+/-500 V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250 mA.

Table 1

Reliability Evaluation Test Results

MAX6962ATH+

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