



RELIABILITY REPORT
FOR MAX8930EWJ+
WAFER LEVEL PRODUCT

March 23, 2010

MAXIM INTEGRATED PRODUCTS

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Approved by
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Conclusion

The MAX8930EWJ+T 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 MAX8930 integrates a charge pump for white LED display backlighting with ambient light control (ALC) feature. The high-efficiency, adaptive-mode 1x/-0.5x charge pump drives up to 11 LEDs (8 WLEDs + RGB LED) with constant current for uniform brightness. The LED current is adjustable from 0.1mA to 25.6mA in 256 linear steps through I²C. High accuracy and LED-to-LED current matching are maintained throughout the adjustment range. The MAX8930 includes soft-start, thermal shutdown, open-circuit, and short-circuit protection. Three 200mA LDOs are provided with programmable output voltages to provide power to external circuitry. These three LDOs can also be configured for a GPO function through the I²C. A step-up converter is also available on the MAX8930 for biasing a PMOLED subpanel. The MAX8930 is available in the 49-bump, 3.17mm x 3.17mm WLP package.

II. Manufacturing Information

A. Description/Function:	WLED Charge Pump, RGB, OLED Boost, LDOs with ALC and CAI in 7x7 0.4mm Pitch WLP
B. Process:	S18
C. Number of Device Transistors:	103736
D. Fabrication Location:	California
E. Assembly Location:	Japan
F. Date of Initial Production:	February 26, 2010

III. Packaging Information

A. Package Type:	49-bump WLP 7x7 array
B. Lead Frame:	NA
C. Lead Finish:	NA
D. Die Attach:	None
E. Bondwire:	NA (NA mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-3690
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:	°C/W
K. Single Layer Theta Jc:	°C/W
L. Multi Layer Theta Ja:	42°C/W
M. Multi Layer Theta Jc:	5°C/W

IV. Die Information

A. Dimensions:	124.80 X 124.80 mils
B. Passivation:	Si ₃ N ₄ /SiO ₂ (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	0.18µm
F. Minimum Metal Spacing:	0.18µm
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 Operations)
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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{1000 \times 4340 \times 138 \times 2} \text{ (Chi square value for MTTF upper limit)}$$

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

$$\lambda = 1.53 \times 10^{-9}$$

$$\lambda = 1.53 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 S18 Process results in a FIT Rate of 0.40 @ 25C and 6.96 @ 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 PR23 die type has been found to have all pins able to withstand a transient pulse of

- ESD-HBM: +/- 2500V per JEDEC JESD22-A114
- ESD-MM: +/- 200V per JEDEC JESD22-C101

Latch-Up testing has shown that this device withstands a current of +/- 250mA and overvoltage per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results

MAX8930EWJ+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)				
	Ta = 135°C Biased Time = 1000 hrs.	DC Parameters & functionality	138	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