



RELIABILITY REPORT
FOR
MAX14515EWA+
PLASTIC ENCAPSULATED DEVICES

October 9, 2008

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.
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Approved by
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Quality Assurance
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Conclusion

The MAX14515EWA+ 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 MAX14515 high-voltage liquid lens driver features a high-voltage differential output controlled through an I²C interface. The MAX14515 uses a charge-pump-based boost converter and integrated H-bridge to provide a compact lens driver solution with minimal external components to achieve a small overall footprint suitable for small space constraints inside camera modules. The MAX14515 features an 8-bit monotonic DAC with a single differential high-voltage output controlled by a 2-wire I²C interface to set the amplitude. The high-voltage outputs are capable of delivering up to 42V RMS (min) into a 220pF liquid lens load at 1.0kHz (min). The MAX14515 also features two power-saving modes (shutdown mode and sleep mode) to minimize power consumption when the device is inactive. Shutdown mode places the device in a low-power state that resets all registers and disables the I²C interface to reduce current below 500nA (max). In sleep mode, the power-on reset circuit remains active. If no activity is detected on the I²C interface, current consumption is less than 3 μ A. The MAX14515 operates over the +2.7V to +5.5V supply voltage range, ideal for portable applications using lithium ion battery sources. The MAX14515 is specified over the -40°C to +85°C extended temperature range and is available in a small (1mm x 2mm) 8-bump WLP package.



II. Manufacturing Information

A. Description/Function:	High-Voltage Liquid Lens Driver
B. Process:	S45US
C. Number of Device Transistors:	10194
D. Fabrication Location:	California, Texas or Japan
E. Assembly Location:	Casio
F. Date of Initial Production:	2008

III. Packaging Information

A. Package Type:	8 Pin Wafer Level Package, Pb-Free
B. Lead Frame:	RDL-UBM6
C. Lead Finish:	SnAgCu Ball (96.5/3/0.5)
D. Die Attach:	Snagcu Ball
E. Bondwire:	Cu Post (75 um Cu Pilar 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:	43 X 83 mils
B. Passivation:	Si ₃ N ₄ /SiO ₂ (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Aluminum/Si (Si = 1%)
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 pending. Using these results, the Failure Rate (λ) is calculated as follows:

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

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

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

$$\lambda = 22.4 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly 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 S45US Process results in a FIT Rate of 0.9 @ 25C and 13.84 @ 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 EL05 die type has been found to have all pins able to withstand a HBM transient pulse of 2500V per JEDEC JESD22-A114-D. Latch-Up testing has shown that this device withstands a current of 250ma.



Table 1
Reliability Evaluation Test Results

MAX14515EWA+

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) 85/85	Ta = 85°C RH = 85% Biased Time = 1000hrs.	DC Parameters & functionality	77	0
Mechanical Stress (Note 2) Temperature Cycle	-40°C/125°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