RELIABILITY REPORT

FOR

MAX17010ETL+
(MAX17010A)

PLASTIC ENCAPSULATED DEVICES

December 17, 2008

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
Ken Wendel
Quality Assurance
Director, Reliability Engineering

Conclusion

The MAX17010ETL+ 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 MAX17010 contains a high-performance step-up switching regulator, a high-speed operational amplifier (op amp), and a high-voltage level-shifting scan driver. The device is optimized for thin-film transistor (TFT) liquid-crystal display (LCD) applications. The step-up DC-DC converter provides the regulated supply voltage for the panel-source driver ICs. The converter is a 1.2MHz current-mode regulator with an integrated 20V n-channel power MOSFET. The high switching frequency allows the use of ultra-small inductors and ceramic capacitors. The current-mode control architecture provides fast transient response to pulsed loads. The step-up regulator features undervoltage lockout (UVLO), soft-start, and internal current limit. The high-current op amp is designed to drive the LCD backplane (VCOM). The amplifier features high output current (±150mA), fast slew rate (45V/µs), wide bandwidth (20MHz), and rail-to-rail inputs and outputs. The high-voltage, level-shifting scan driver is designed to work with panels that incorporate row drivers on the panel glass. Its eight outputs swing from +30V (max) to -10V and can swiftly drive capacitive loads. The MAX17010 is available in a 40-pin thin QFN package with a maximum thickness of 0.8mm for ultra-thin LCD panels. The device operates over the -40°C to +85°C temperature range.

II. Manufacturing Information

A. Description/Function:	Internal-Switch Boost Regulator with Integrated High-Voltage Level Shifter and Op Amp
B. Process:	S4
C. Number of Device Transistors:	
D. Fabrication Location:	Texas, USA
E. Assembly Location:	UTL Thailand
F. Date of Initial Production:	4/21/2007

III. Packaging Information

A. Package Type:	40-pin TQFN 5x5
B. Lead Frame:	Cu Alloy
C. Lead Finish:	100% matte Tin
D. Die Attach:	Non-conductive Epoxy
E. Bondwire:	Gold (1.3 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#31-4825
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:	45°C/W
K. Single Layer Theta Jc:	1.7°C/W
L. Multi Layer Theta Ja:	28°C/W
M. Multi Layer Theta Jc:	1.7°C/W

IV. Die Information

A. Dimensions:	NR mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide
C. Interconnect:	Aluminum/Cu (Cu = 0.5%)
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 listed in table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 50 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 21.5 \times 10^{-9}$

$\lambda = 21.5$ 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 S4 Process results in a FIT Rate of 4.6 @ 25C and 79.2 @ 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 PE26 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500 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

MAX17010ETL+

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	50	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