RELIABILITY REPORT

FOR

MAX17126ETM+

PLASTIC ENCAPSULATED DEVICES

July 31, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Conclusion

The MAX17126ETM+ in currently being qualified. Maxim"s continuous reliability monitoring program ensures that all outgoing product will meet Maxim"s quality and reliability standards.

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I. Device Description

A. General

The MAX17126 generates all the supply rails for TFT LCD (thin-film transistor liquid-crystal display) TV panels operating from a regulated 12V input. It includes a step-down and a step-up regulator, a positive and a negative charge pump, an operational amplifier, a high accuracy high voltage Gamma Reference and a high-voltage switch control block. The MAX17126 can operate from input voltages from 8V to 16.5V and is optimized for LCD TV panel running directly from 12V supplies.

The step-up and step-down switching regulators feature internal power MOSFETs and high-frequency operation allowing the use of small inductors and capacitors, resulting in a compact solution. The step-up regulator provides TFT source driver supply voltage, while the step-down regulator provides system with logic supply voltage. Both regulators use fixed-frequency current-mode control architectures, providing fast load transient response and easy compensation. A current-limit function for internal switches and output-fault shutdown protects the step-up and step-down power supplies against fault conditions. The MAX17126 provides soft-start functions to limit inrush current during startup. In addition, MAX17126 integrated a control block that can drive an external p-channel Mosfet to sequence power to source drivers.

The positive and negative charge-pump regulators provide TFT gate driver supply voltages. Both output voltages can be adjusted with external resistive voltage dividers. A logic-controlled high-voltage switch block allows the manipulation of the positive gate-driver supply.

The MAX17126 includes one high-current operational amplifiers designed to drive the LCD back plane (VCOM). The amplifier features high output current (+/-200mA), fast slew-rate (45V/us), wide bandwidth (20MHz), and rail-to-rail outputs.

Also featured in MAX17126 is a high accuracy high voltage adjustable reference for Gamma-correction .

The MAX17126 is available in a small (7mm x 7mm), ultra-thin (0.8mm), 48-pin QFN package and operates over the -40C to +85C temperature range.

II. Manufacturing Information

A. Description/Function:	Multi-Output Power Supply with VCOM Amplifier and High Voltage Gamma Reference for LCD TVs
B. Process:	S4
C. Number of Device Transistors:	21572
D. Fabrication Location:	Texas
E. Assembly Location:	UTL Thailand
F. Date of Initial Production:	Not Released

III. Packaging Information

A. Package Type:	48-pin TQFN 7x7
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive Epoxy
E. Bondwire:	Au (1.3 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
J. Single Layer Theta Ja:	37°C/W
K. Single Layer Theta Jc:	1.3°C/W
L. Multi Layer Theta Ja:	26°C/W
M. Multi Layer Theta Jc:	1°C/W

IV. Die Information

A. Dimensions:	110 X 110 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide
C. Interconnect:	Aluminum/0.5% Cu
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 the Reliability Monitor results for the S4 Process, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{\text{Quantity} \times \text{Hours} \times Af \times 2}$$ (Chi square value for MTTF upper limit)

Af (135°C/25°C) = 4340 @ Activation Energy = 0.8

$$\frac{1}{MTTF} = \frac{1.83}{1550 \times 192 \times 4340 \times 2}$$

$\lambda = 1.2 \times 10^{-9}$

λ = 1.2 F.I.T. (60% confidence level @ 25°C)

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 PF58-1 die type has been found to have all pins able to withstand a transient pulse of

HBM: +/-2500V per JESD22-A114
MM: +/-200V per JESD22-A115

Latch-Up testing has shown that this device withstands a current of +/-200 mA, 1.5xVCCMax Overvoltage per JESD78, except the LX pin which passes +/-100 mA.

Table 1
Reliability Evaluation Test Results

MAX17126ETM+

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	1550	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 is from Reliability Monitor Program. Note 2: Generic Package/Process data