RELIABILITY REPORT

FOR

MAX17061AETI+

PLASTIC ENCAPSULATED DEVICES

September 28, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Quality Assurance
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Conclusion

The MAX17061AETI+ 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 MAX17061A is a high-efficiency driver for white light-emitting diodes (LEDs). It is designed for large liquid-crystal displays (LCDs) that employ an array of LEDs as the light source. An internal switch current-mode step-up controller drives the LED array, which can be configured for up to eight strings in parallel and 10 LEDs per string. Each string is terminated with ballast that achieves ±1.5% current-regulation accuracy between strings, ensuring even LED brightness. The MAX17061A has a wide input-voltage range from 7.5V to 26V, and provides a fixed 25mA or adjustable 15mA to 30mA full-scale LED current. The MAX17061A internally generates a DPWM signal for accurate WLED dimming control. The DPWM frequency is resistor programmable, while DPWM duty cycle is controlled directly from an external PWM signal or through a control word through the MAX17061A's SMBus(tm) interface. This DPWM control provides a dimming range with 8-bit resolution and supports Intel display-power-saving technology (DPST) to maximize battery life. The MAX17061A has multiple features to protect the controller from fault conditions. Separate feedback loops limit the output voltage under any circumstance, ensuring safe operation. Once an open string is detected, the string is disabled while other strings operate normally. The MAX17061A also features short LED detection. The shorted strings are also disabled after a 2ms fault blanking interval. The controller features cycle-by-cycle current limit to provide stable operation and soft-start capability. If the MAX17061A is in current-limit condition, the step-up converter is latched off after an internal timer expires. A thermal-shutdown circuit provides another level of protection. The MAX17061A's step-up controller features an internal 150m (typ), 45V (max) power MOSFET with local current-sense amplifier for accurate cycle-by-cycle current limit. This architecture greatly simplifies the external circuitry and saves PCB space. Low-feedback voltage at each LED string 625mV (typ) at 25mA LED current helps reduce power loss and improve efficiency. The MAX17061A features selectable switching frequency (500kHz, 750kHz, or 1MHz), which enables a wide variety of applications that can trade off component size for operating frequency. The MAX17061A is available in a thermally enhanced 28-pin, 4mm x 4mm Thin QFN package.

II. Manufacturing Information

A. Description/Function:	8-String White LED Driver with SMBus for LCD Panel Applications
B. Process:	S45
C. Number of Device Transistors:	21800
D. Fabrication Location:	California, Texas or Japan
E. Assembly Location:	
F. Date of Initial Production:	1/26/2008

III. Packaging Information

A. Package Type:	28-pin TQFN 4x4
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:	#05-9000-2856
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:	48°C/W
K. Single Layer Theta Jc:	2.7°C/W
L. Multi Layer Theta Ja:	35°C/W
M. Multi Layer Theta Jc:	2.7°C/W

IV. Die Information

A. Dimensions:	90 X 104 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/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 these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 47 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 22.8 \times 10^{-9}$

$\lambda = 22.8$ 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 S45 Process results in a FIT Rate of 0.49 @ 25C and 8.49 @ 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 PF04-2 die type has been found to have all pins able to withstand a HBM transient pulse of +/-1500 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

MAX17061AETI+

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	47	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