RELIABILITY REPORT

FOR

MAX16826ATJ+

PLASTIC ENCAPSULATED DEVICES

May 20, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Quality Assurance
Director, Reliability Engineering

Conclusion

The MAX16826ATJ+ 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 MAX16826 high-brightness LED (HB LED) driver is designed for backlighting automotive LCD displays and other display applications such as industrial or desktop monitors and LCD televisions. The MAX16826 integrates a switching regulator controller, a 4-channel linear current sink driver, an analog-to-digital converter (ADC), and an I²C interface. The IC is designed to withstand automotive load dump transients up to 40V and can operate under cold crank conditions. The MAX16826 contains a current-mode PWM switching regulator controller that regulates the output voltage to the LED array. The switching regulator section is configurable as a boost or SEPIC converter and its switching frequency is programmable from 100kHz to 1MHz. The MAX16826 includes 4 channels of programmable, fault-protected, constant-current sink driver controllers that are able to drive all white, RGB, or RGB plus amber LED configurations. LED dimming control for each channel is implemented by direct PWM signals for each of the four linear current sinks. An internal ADC measures the drain voltage of the external driver transistors and the output of the switching regulator. These measurements are then made available through the I²C interface to an external microcontroller (µC) to enable output voltage optimization and fault monitoring of the LEDs. The amplitude of the LED current in each linear current-sink channel and the switch-mode regulator output voltage is programmed using the I²C interface. Additional features include: cycle-by-cycle current limit, shorted LED string protection, and overtemperature protection. The MAX16826 is available in a thermally enhanced, 5mm x 5mm, 32-pin thin QFN package and is specified over the automotive -40°C to +125°C temperature range.

II. Manufacturing Information

A. Description/Function:	Programmable, Four-String HB LED Driver with Output-Voltage Optimization and Fault Detection
B. Process:	B8
C. Number of Device Transistors:	19688
D. Fabrication Location:	Texas
E. Assembly Location:	ASAT China, UTL Thailand, Unisem Malaysia
F. Date of Initial Production:	July 3, 2008

III. Packaging Information

A. Package Type:	32-pin TQFN 5x5
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive Epoxy
E. Bondwire:	Au (1.0 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:	47°C/W
K. Single Layer Theta Jc:	1.7°C/W
L. Multi Layer Theta Ja:	29°C/W
M. Multi Layer Theta Jc:	1.7°C/W

IV. Die Information

A. Dimensions:	118 X 118 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide
C. Interconnect:	Aluminum/Si (Si = 1%)
D. Backside Metallization:	None
E. Minimum Metal Width:	0.8 microns (as drawn)
F. Minimum Metal Spacing:	0.8 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:

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

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

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

$\lambda = 22.4$ 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 B8 Process results in a FIT Rate of 1.86 @ 25C and 22.5 @ 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 SP08-1 die type has been found to have all pins able to withstand a ttransient pulse of:

HBM ESD: +/-2500 V per JEDEC JESD22-A114
CDM ESD: +/-750 V Per JEDEC JESD22-C101

Latch-Up testing has shown that this device withstands a current of +/-250 mA, 1.5x VCCMax Overvoltage per JESD78.

Table 1
Reliability Evaluation Test Results

MAX16826ATJ+

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	-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