RELIABILITY REPORT

FOR

MAX16818ATI+

PLASTIC ENCAPSULATED DEVICES

December 23, 2015

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

Approved by
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Quality Assurance
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Conclusion

The MAX16818ATI+ successfully meets the quality and reliability standards required of all Maxim Integrated products. In addition, Maxim Integrated's continuous reliability monitoring program ensures that all outgoing product will continue to meet Maxim Integrated's quality and reliability standards.

Table of Contents

I. Device Description

A. General

The MAX16818 pulse-width modulation (PWM) LED driver controller provides high-output-current capability in a compact package with a minimum number of external components. The MAX16818 is suitable for use in synchronous and nonsynchronous step-down (buck) topologies, as well as in boost, buck-boost, SEPIC, and Cuk LED drivers. The MAX16818 is the first LED driver controller that enables Maxim's technology for fast LED current transients of up to 20A/µs and 30kHz dimming frequency. This device utilizes average-current-mode control that enables optimal use of MOSFETs with optimal charge and on-resistance characteristics. This results in the minimized need for external heatsinking even when delivering up to 30A of LED current. True differential sensing enables accurate control of the LED current. A wide dimming range is easily implemented to accommodate an external PWM signal. An internal regulator enables operation over a wide input voltage range: 4.75V to 5.5V or 7V to 28V and above with a simple external biasing device. The wide switching frequency range, up to 1.5MHz, allows for the use of small inductors and capacitors. The MAX16818 features a clock output with 180° phase delay to control a second out-of-phase LED driver to reduce input and output filter capacitors size or to minimize ripple currents. The MAX16818 offers programmable hiccup, overvoltage, and overtemperature protection. The MAX16818ETE+ is rated for the extended temperature range (-40°C to +85°C) and the MAX16818ATE+ is rated for the automotive temperature range (-40°C to +125°C). This LED driver controller is available in a lead-free, 0.8mm high, 5mm x 5mm 28-pin TQFN package with an exposed pad.

II. Manufacturing Information

A. Description/Function:	1.5MHz, 30A High-Efficiency LED Driver with Rapid LED Current Pulsing
B. Process:	B12
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon, California or Texas
E. Assembly Location:	China, Thailand
F. Date of Initial Production:	October 21, 2006

III. Packaging Information

A. Package Type:	28-pin TQFN 5x5
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-1012
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:	2.1°C/W
L. Multi Layer Theta Ja:	29°C/W
M. Multi Layer Theta Jc:	2.1°C/W

IV. Die Information

A. Dimensions:	108X108 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/0.5%Cu with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	1.2 microns (as drawn)
F. Minimum Metal Spacing:	1.2 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:	Richard Aburano (Manager, Reliability Engineering) Don Lipps (Manager, Reliability Engineering) Bryan Preeshl (Vice President 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)

$\lambda = 22.9 \times 10^{-9}$

λ = 22.9 F.I.T. (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim Integrated's reliability monitor program. Maxim Integrated performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at http://www.maximintegrated.com/qa/reliability/monitor. Cumulative monitor data for the B12 Process results in a FIT Rate of 0.06 @ 25C and 1.06 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing

The NP60 die type has been found to have all pins able to withstand a HBM transient pulse of +/-1000V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250mA.

Table 1

Reliability Evaluation Test Results

MAX16818ATI+

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

Note 1: Life Test Data may represent plastic DIP qualification lots.