

RELIABILITY REPORT
FOR
MAX16804ATP+
PLASTIC ENCAPSULATED DEVICES

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MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

Approved by
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Quality Assurance
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Conclusion

The MAX16804ATP+ 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.

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I. Device Description

A. General

The MAX16804 current regulator operates from a 5.5V to 40V input voltage range and delivers 35mA to 350mA to one or more strings of high-brightness LEDs (HB LEDs). The output current of the MAX16804 is set by using an external current-sense resistor in series with the LEDs. A dual-mode DIM pin and on-board 200Hz ramp generator allow PWM dimming with an analog or PWM input signal. The analog control signal at dimming input DIM allows for a theater-dimming effect to be implemented. Fast turn-on and turn-off times ensure a wide-range PWM operation, while wave-shaping circuitry minimizes EMI. The differential current-sense input increases LED current accuracy and noise immunity. The MAX16804 is well suited for applications requiring high-voltage input and is able to withstand automotive load-dump events up to 45V. An on-board pass element minimizes external components while providing 3% output-current accuracy. Additional features include a 5V regulated output and short-circuit and thermal protection. The MAX16804 is available in a thermally enhanced, 5mm x 5mm, 20-pin TQFN package and is specified over the automotive -40°C to +125°C temperature range.

II. Manufacturing Information

A. Description/Function:	High-Voltage, 350mA, High-Brightness LED Driver with Analog and PWM Dimming Control
B. Process:	Hybrid
C. Number of Device Transistors:	
D. Fabrication Location:	California
E. Assembly Location:	Taiwan, Thailand
F. Date of Initial Production:	July 22, 2006

III. Packaging Information

A. Package Type:	20-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:	#31-4807
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°C/W
L. Multi Layer Theta Ja:	49°C/W
M. Multi Layer Theta Jc:	2°C/W

IV. Die Information

A. Dimensions:	N/A
B. Passivation:	N/A
C. Interconnect:	N/A
D. Backside Metallization:	N/A
E. Minimum Metal Width:	N/A
F. Minimum Metal Spacing:	N/A
G. Bondpad Dimensions:	
H. Isolation Dielectric:	N/A
I. Die Separation Method:	N/A

V. Quality Assurance Information

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|-----------------------------------|---|
| A. Quality Assurance Contacts: | 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 135C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{1000 \times 4340 \times 136 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 1.55 \times 10^{-9}$$

$$\lambda = 1.55 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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

The SP03 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500V per JEDEC. JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-100mA.

Table 1
Reliability Evaluation Test Results

MAX16804ATP+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C	DC Parameters	45	0	JBBTAAC, D/C 0627
	Biased	& functionality	43	0	JBATAAB, D/C 0627
	Time = 1000 hrs.		48	0	JBBTAAC#, D/C 0627

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