RELIABILITY REPORT

FOR

MAX16824AUE+

PLASTIC ENCAPSULATED DEVICES

May 13, 2011

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Conclusion

The MAX16824AUE+ 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 MAX16824/MAX16825 three-channel LED drivers operate over a 6.5V to 28V input voltage range. These devices provide three open-drain constant-current-sinking outputs that are rated to 36V and deliver up to 150mA of current to each string of high-brightness LEDs (HB LEDs). The current at each output is programmable by means of an external current-sense resistor. The MAX16824 features three PWM inputs that control the duty cycle of the output current, allowing a wide LED dimming range to be implemented. The PWM inputs also function as on/off control for each corresponding output. The MAX16825 offers a 4-wire serial interface, a 3-bit shift register, and a 3-bit transparent latch. The serial interface allows a microcontroller to configure the output channels using four inputs (DIN, CLK, LE, active-low OE) and a data output (DOUT). DOUT allows multiple drivers to be cascaded and operated together. The MAX16824/MAX16825's on-board pass elements minimize the need for external components, while at the same time, providing ±5% LED current accuracy. Additional features include a +5V (±5%) regulated output with 4mA output current capability and thermal protection. The MAX16824/MAX16825 are available in a thermally enhanced 16-pin TSSOP-EP package and specified over the -40°C to +125°C temperature range.

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II. Manufacturing Information

A. Description/Function:	High-Voltage, Three-Channel Linear High-Brightness LED Drivers
B. Process:	B8
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Philippines, Thailand
F. Date of Initial Production:	October 27, 2007

III. Packaging Information

A. Package Type:	16-pin TSSOP
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:	#05-9000-2843
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:	3°C/W
L. Multi Layer Theta Ja:	38.3°C/W
M. Multi Layer Theta Jc:	3°C/W

IV. Die Information

A. Dimensions:	74 X 65 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:	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

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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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 96 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 11.5 \times 10^{-9}$

λ = 11.5 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 B8 Process results in a FIT Rate of 0.06 @ 25C and 0.99 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot TGLZBQ001D D/C 0927)

The SP13 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 +/-250mA and overvoltage per JEDEC JESD78.

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Table 1
Reliability Evaluation Test Results

MAX16824AUE+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)					
	Ta = 135°C	DC Parameters	48	0	TGLZBQ001C, D/C 0740
	Biased	& functionality	48	0	TGLYBQ001C, D/C 0740
	Time = 192 hrs.				

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

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