RELIABILITY REPORT

FOR

MAX44004GDT+T

PLASTIC ENCAPSULATED DEVICES

June 4, 2013

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

Approved by
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Conclusion

The MAX44004GDT+T 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 MAX44004 is a wide dynamic range, low-power ambient light sensor (ALS) ideal for many light sensing applications: tablets, displays, accessories, medical devices, and light management systems. The on-chip ambient sensor has the power to measure the exact visible light from 0.03 lux to 65,000 lux and communicate through an I²C digital communication bus. The IC has patented sensors, filters, and circuitry to mimic the human eye response. With on-chip calibration registers, it performs the same in different light conditions (i.e., fluorescent, incandescent). The interrupt pin minimizes the need of constant polling of the device, freeing up microcontroller resources for efficient communication and thus reducing overall power consumption. The part-to-part matching is optimized by proprietary Maxim process to speed up end-product development time. The IC can operate from a VDD of 1.7V to 3.6V, including both supply and I²C times. It consumes just 5µA operating current.

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II. Manufacturing Information

A. Description/Function:	Digital Ambient Light Sensor
B. Process:	S4
C. Number of Device Transistors:	12756
D. Fabrication Location:	USA
E. Assembly Location:	Malaysia and Thailand
F. Date of Initial Production:	June 29, 2012

III. Packaging Information

A. Package Type:	6-pin Opto-DFN 2x2
B. Lead Frame:	Copper
C. Lead Finish:	NiPdAu
D. Die Attach:	Conductive
E. Bondwire:	Au (1 mil dia.)
F. Mold Material:	Clear Epoxy
G. Assembly Diagram:	#05-9000-4288
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 3
J. Single Layer Theta Ja:	83.9°C/W
K. Single Layer Theta Jc:	37°C/W
L. Multi Layer Theta Ja:	°C/W
M. Multi Layer Theta Jc:	°C/W

IV. Die Information

A. Dimensions:	59X38 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:	0.6 microns (as drawn)
F. Minimum Metal Spacing:	0.4 microns (as drawn)
G. Bondpad Dimensions:	
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 105°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 717 \times 230 \times 2}$$ (Chi square value for MTTF upper limit)

(where 717 = Temperature Acceleration factor assuming an activation energy of 0.8eV)

$\lambda = 29 \times 10^{-9}$

λ = 29 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 S4 Process results in a FIT Rate of 0.04 @ 25C and 0.69 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot TAFI1A005G, D/C 1219)

The OY59-1 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

MAX44004GDT+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 105°C Biased Time = 192 hrs.	DC Parameters & functionality	230	0	SU1ZDQ003D, D/C 1131

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

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