

RELIABILITY REPORT  
FOR  
MAX44000GDT+T  
PLASTIC ENCAPSULATED DEVICES

May 13, 2013

**MAXIM INTEGRATED**

160 RIO ROBLES  
SAN JOSE, CA 95134

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## Conclusion

The MAX44000GDT+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

MAX44000 combines a wide-dynamic range ambient light sensor with an integrated infrared proximity sensor, making it a perfect solution for touch-screen portable devices. MAX44000 consumes as little as 11 $\mu$ A (time averaged) in ambient light sensing plus proximity sensing, including external IR LED current. The on-chip ambient light sensor is capable of wide dynamic range 0.03 lux to 65,535 lux measurements. An on-chip IR proximity detector is matched with an integrated IR LED driver. All readings are available on an I<sup>2</sup>C communication bus. A programmable interrupt pin minimizes the need to poll the device for data, freeing up microcontroller resources, reducing system software overhead, and ultimately, reducing power consumption. MAX44000 is designed to drive an external IR LED and can operate from a VDD of 1.7V to 3.6V. It consumes just 5 $\mu$ A operating current when only the ambient light sensor is enabled and 7 $\mu$ A when the proximity receiver and driver are enabled.

## II. Manufacturing Information

A. Description/Function:	Ambient and Infrared Proximity 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:	November 2, 2011

## III. Packaging Information

A. Package Type:	6-pin ODFN 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 <sub>3</sub> N <sub>4</sub> /SiO <sub>2</sub> (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 <sub>2</sub>
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 ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 230 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 4.8 \times 10^{-9}$$

$$\lambda = 4.8 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 TAF11A005G, D/C 1219)

The OY59 die type has been found to have all pins able to withstand a HBM transient pulse of +/- 2000V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/- 250mA and overvoltage per JEDEC JESD78.

**Table 1**  
Reliability Evaluation Test Results

**MAX44000GDT+T**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
<b>Static Life Test</b> (Note 1)	Ta = 135°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.