

RELIABILITY REPORT  
FOR  
MAX44008EDT+T  
PLASTIC ENCAPSULATED DEVICES

June 4, 2013

**MAXIM INTEGRATED**

160 RIO ROBLES  
SAN JOSE, CA 95134

<b>Approved by</b>
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## Conclusion

The MAX44008EDT+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 MAX44006/MAX44008 integrate six sensors in two products: red, green, blue (RGB) sensors; an ambient light (clear) sensor; a temperature sensor; and an ambient infrared sensor with an I<sup>2</sup>C interface. These highly integrated optical sensors include a temperature sensor to improve reliability and performance. The devices compute the light information with six parallel data converters allowing simultaneous light measurement in a very short time. The devices consume only 15 $\mu$ A (MAX44006) and 16 $\mu$ A (MAX44008) separately in RGBC + TEMP + IR mode, and also have the ability to operate at 1.7V to 2.0V (MAX44006) and 2.7V to 5.5V supply voltage (MAX44008). The devices' RGB sensing capability improves the performance of end products by providing robust and precise information for ambient color-sensing and color-temperature measurement. The devices' superior infrared and 50Hz/60Hz rejection provide robust readings. The wide dynamic range light measurement makes these products perfect candidates for many color measurement applications. The on-chip ambient sensor has the ability to make wide dynamic range (0.002–8388.61 $\mu$ W/cm<sup>2</sup>) lux measurements. The devices' digital computation power provides programmability and flexibility for end-product design. A programmable interrupt pin minimizes the need to poll the devices for data, freeing up microcontroller resources, reducing system software overhead, and ultimately reducing power consumption. All these features are included in a tiny 2mm x 2mm x 0.6mm optical package.

## II. Manufacturing Information

A. Description/Function:	RGB Color, Infrared, and Temperature Sensors
B. Process:	S18
C. Number of Device Transistors:	46394
D. Fabrication Location:	USA
E. Assembly Location:	Taiwan and Thailand
F. Date of Initial Production:	June 28, 2012

## III. Packaging Information

A. Package Type:	6-pin Opto-DFN
B. Lead Frame:	Copper
C. Lead Finish:	NiPdAu
D. Die Attach:	Non-conductive
E. Bondwire:	Au (1 mil dia.)
F. Mold Material:	Clear
G. Assembly Diagram:	#05-9000-4865
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:	°C/W
K. Single Layer Theta Jc:	°C/W
L. Multi Layer Theta Ja:	°C/W
M. Multi Layer Theta Jc:	°C/W

## IV. Die Information

A. Dimensions:	44.8819 X 62.9921 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:	0.23 microns (as drawn)
F. Minimum Metal Spacing:	0.23 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 105°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 717 \times 80 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 83 \times 10^{-9}$$

$$\lambda = 83 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 S18 Process results in a FIT Rate of 0.05 @ 25C and 0.93 @ 55C (0.8 eV, 60% UCL)

### B. E.S.D. and Latch-Up Testing (lot SADY9Q001C, D/C 1209)

The OY75-0 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.

**Table 1**  
Reliability Evaluation Test Results

**MAX44008EDT+T**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
<b>Static Life Test</b> (Note 1)	Ta = 105°C Biased Time = 192 hrs.	DC Parameters & functionality	80	0	SADY9Q001C, D/C 1209

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