RELIABILITY REPORT

FOR

MAX44005EDT+

PLASTIC ENCAPSULATED DEVICES

April 24, 2013

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

Approved by
Sokhom Chum
Quality Assurance
Reliability Engineer

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Conclusion

The MAX44005EDT+ 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 MAX44005 integrates 7 sensors in one product: red, green, blue (RGB) sensors; an ambient light (clear) sensor; a temperature sensor; an ambient infrared sensor, and an infrared proximity sensor with an I²C interface. This highly integrated optical sensor includes a temperature sensor to improve reliability and performance. The IC computes all the light information with parallel data converters to make simultaneous light measurement in a very short time. The chip consumes only 15µA in RGBC + IR mode and operates at 1.8V supply voltage. The IC's RGB sensing capability improves the performance of end products by providing robust and precise information for ambient color sensing and color temperature measurement. The integrated proximity sensor uses a single-pulse LED scheme to achieve very low power consumption. This method also improves sunlight rejection and 50Hz/60Hz noise to deliver reliable proximity measurements. With this technology, the IC is a perfect solution for touch-screen portable devices and presence detection applications. The on-chip ambient sensor has the ability to make wide dynamic range 0.002~8388.61µW/cm² measurements. The IC's digital computation power provides programmability and flexibility for end-product design. A programmable interrupt pin minimizes the need to poll the device for data, freeing up microcontroller resources, and reducing system software overhead, and ultimately, power consumption. All these features are included in a tiny, 2mm x 2mm x 0.6mm optical package.

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II. Manufacturing Information

A. Description/Function:	RGB Color, Temperature, and Infrared Proximity Sensor
B. Process:	S18
C. Number of Device Transistors:	41235
D. Fabrication Location:	California
E. Assembly Location:	Thailand or Taiwan
F. Date of Initial Production:	May 2, 2012

III. Packaging Information

A. Package Type:	6L OPTO TDFN
B. Lead Frame:	NiPd
C. Lead Finish:	NiPd
D. Die Attach:	Non-conductive
E. Bondwire:	Au (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-4794
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	3
J. Single Layer Theta Ja:	N/A
K. Single Layer Theta Jc:	N/A
L. Multi Layer Theta Ja:	N/A
M. Multi Layer Theta Jc:	N/A

IV. Die Information

A. Dimensions:	44.8819 X 62.9921 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	0.18um
F. Minimum Metal Spacing:	0.18um
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 135C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{4.04}{500 \times 4340 \times 168 \times 2}$$

(Chi square value for MTTF upper limit)

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

$\lambda = 5.5 \times 10^{-9}$

λ = 5.5 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 SACG7Q002C D/C 1208)

The OY73-0 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.

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Table 1
Reliability Evaluation Test Results

MAX44005EDT+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)					
	Ta = 135°C	DC Parameters	45	0	SAEL1Q001Q, D/C 1249
	Biased	& functionality	44	0	SAEL1Q001Q, D/C 1249
	Time = 500 hrs.		79	1	SAEL1A004Q, D/C 1220

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

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