

RELIABILITY REPORT  
FOR  
MAX16055DAUB+T  
PLASTIC ENCAPSULATED DEVICES

February 6, 2014

**MAXIM INTEGRATED**

160 RIO ROBLES  
SAN JOSE, CA 95134

<b>Approved by</b>
Sokhom Chum
Quality Assurance
Reliability Engineer

## Conclusion

The MAX16055DAUB+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.

## Table of Contents

<b>I. ....Device Description</b>	<b>IV. ....Die Information</b>
<b>II. ....Manufacturing Information</b>	<b>V. ....Quality Assurance Information</b>
<b>III. ....Packaging Information</b>	<b>VI. ....Reliability Evaluation</b>
<b>.....Attachments</b>	

### I. Device Description

#### A. General

The MAX16055 precision hex voltage microprocessor ( $\mu$ P) supervisory circuit monitors up to six system-supply voltages and asserts a single reset when any one supply voltage drops below its preset threshold. The device significantly reduces system size and component count while improving reliability compared to multiple ICs or discrete components. A variety of factory-trimmed threshold voltages are available to accommodate different supply voltages and tolerance with minimal external components. The MAX16055 includes internally fixed threshold options for monitoring 3.3V, 3.0V, 2.5V, 1.8V, 1.5V, 1.2V, 1.1V, 1.0V, and 0.9V supplies with -5% or -10% tolerance. The MAX16055 is also available with one to five adjustable threshold inputs to monitor voltages down to 0.5V. A single active-low, open-drain output asserts when any monitored input falls below its associated threshold. The reset output features a weak internal pullup (typically 70 $\mu$ A) to supply input IN1. The reset output remains low for the reset timeout period (140ms, min) after all voltages rise above the selected thresholds. The reset output remains valid as long as either IN1 or IN2 input voltage is above 1V. The MAX16055 is available in a small 10-pin  $\mu$ MAX® (3mm x 3mm) package. The MAX16055 operates over the -40°C to +125°C automotive temperature range.

## II. Manufacturing Information

A. Description/Function:	Ultra-Small, Hex Voltage, Microprocessor Supervisor
B. Process:	B8
C. Number of Device Transistors:	1230
D. Fabrication Location:	California or Texas
E. Assembly Location:	Philippines, Thailand, Malaysia
F. Date of Initial Production:	December 24, 2008

## III. Packaging Information

A. Package Type:	10-pin uMAX
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-3254
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:	180°C/W
K. Single Layer Theta Jc:	41.9°C/W
L. Multi Layer Theta Ja:	113.1°C/W
M. Multi Layer Theta Jc:	41.9°C/W

## IV. Die Information

A. Dimensions:	62X45 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:	0.8 microns (as drawn)
F. Minimum Metal Spacing:	0.8 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: 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 ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 48 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 22.9 \times 10^{-9}$$

$$\lambda = 22.9 \text{ F.I.T. (60\% confidence level @ 25}^\circ\text{C)}$$

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 B8 Process results in a FIT Rate of 0.01 @ 25C and 0.26 @ 55C (0.8 eV, 60% UCL).

### B. E.S.D. and Latch-Up Testing (lot T0000Q128C, D/C 0842)

The MT11 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

## MAX16055DAUB+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	48	0	T0000Q128C, D/C 0842

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