

RELIABILITY REPORT
FOR
MAX16054AZT+/T
PLASTIC ENCAPSULATED DEVICES

November 19, 2013

MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

Approved by
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Quality Assurance
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Conclusion

The MAX16054AZT+ 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 MAX16054 is a pushbutton on/off controller with a single switch debouncer and built-in latch. It accepts a noisy input from a mechanical switch and produces a clean latched digital output after a factory-fixed qualification delay. The MAX16054 eliminates contact bounce during switch opening and closing. The state of the output changes only when triggered by the falling edge of the debounced switch input; the output remains unchanged on the rising edge of the input. Robust switch inputs handle $\pm 25\text{V}$ levels and are $\pm 15\text{kV}$ ESD protected for use in harsh industrial environments. The MAX16054 features a complementary output, active-low OUT, which is the inverted state of OUT. An asynchronous CLEAR input allows an external signal to force the output flip-flop low. Undervoltage-lockout circuitry ensures that OUT is in the off state upon power-up. The MAX16054 requires no external components, and its low supply current makes it ideal for use in portable equipment. The MAX16054 operates from a +2.7V to +5.5V single supply. The MAX16054 is offered in a 6-pin thin SOT23 package and operates over the -40°C to $+125^{\circ}\text{C}$ automotive temperature range.

II. Manufacturing Information

A. Description/Function:	On/Off Controller with Debounce and $\pm 15\text{kV}$ ESD Protection
B. Process:	B3
C. Number of Device Transistors:	345
D. Fabrication Location:	Oregon
E. Assembly Location:	Thailand, Malaysia, or Philippines
F. Date of Initial Production:	April 26, 2008

III. Packaging Information

A. Package Type:	6-pin TSOT
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:	#05-9000-3273
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:	365.1 °C/W
K. Single Layer Theta Jc:	75 °C/W
L. Multi Layer Theta Ja:	110 °C/W
M. Multi Layer Theta Jc:	50 °C/W

IV. Die Information

A. Dimensions:	35X59 mils
B. Passivation:	$\text{Si}_3\text{N}_4/\text{SiO}_2$ (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/0.5%Cu with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	3.0 microns (as drawn)
F. Minimum Metal Spacing:	3.0 microns (as drawn)
G. Bondpad Dimensions:	
H. Isolation Dielectric:	SiO_2
I. Die Separation Method:	Wafer Saw

V. Quality Assurance Information

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|-----------------------------------|--|
| 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:

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

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

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

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

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 B3 Process results in a FIT Rate of 0.25 @ 25C and 4.22 @ 55C (0.8 eV, 60% UCL).

B. E.S.D. and Latch-Up Testing (lot JNVZAQ001B, D/C 0810)

The MT12 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.

Table 1
Reliability Evaluation Test Results

MAX16054AZT+/T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	48	0	JNVZAQ001B, D/C 0810

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