



RELIABILITY REPORT
FOR
MAX14634EWC+T
WAFER LEVEL PRODUCTS

September 10, 2012

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.
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Approved by
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Quality Assurance
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Conclusion

The MAX14634EWC+T successfully meets the quality and reliability standards required of all Maxim products. In addition, Maxim's continuous reliability monitoring program ensures that all outgoing product will continue to meet Maxim's quality and reliability standards.

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I. Device Description

A. General

The MAX14634 bidirectional battery switch features reverse blocking capability to isolate the battery from the system. The internal switch features ultra-low 7m (typ) on-resistance and operates from a +2.3V to +5.5V input voltage range, making this device ideal as a battery-disconnect switch for high-capacity battery applications. The slew rate controlled switch is also ideal for a large load capacitor as well as high-current load switching applications. The device is available in an ultra-small 12-bump (1.3mm x 1.7mm, 0.4mm pitch) WLP package. The tiny, low-profile package is suitable for space-limited portable device applications. The device operates over the -40°C to +85°C extended temperature range.

II. Manufacturing Information

A. Description/Function:	Ultra-Low On-Resistance and Compact Bidirectional Battery Switch
B. Process:	S18
C. Number of Device Transistors:	512
D. Fabrication Location:	USA
E. Assembly Location:	USA
F. Date of Initial Production:	June 14, 2012

III. Packaging Information

A. Package Type:	12-bump WLP 3x4 array
B. Lead Frame:	N/A
C. Lead Finish:	N/A
D. Die Attach:	None
E. Bondwire:	N/A (N/A mil dia.)
F. Mold Material:	None
G. Assembly Diagram:	#05-9000-4966
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:	°C/W
K. Single Layer Theta Jc:	°C/W
L. Multi Layer Theta Ja:	73°C/W
M. Multi Layer Theta Jc:	°C/W

IV. Die Information

A. Dimensions:	50X65.3543 mils
B. Passivation:	Si ₃ N ₄ /SiO ₂ (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/0.5%Cu with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	Metal1 = 0.23 / Metal2-3 = 0.28 / Metal 4 = 2.6 microns (as drawn)
F. Minimum Metal Spacing:	Metal1 = 0.23 / Metal2-3 = 0.28 / Metal 4 = 3.0 microns (as drawn)
G. Bondpad Dimensions:	
H. Isolation Dielectric:	SiO ₂
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 135C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 80 \times 2} \text{ (Chi square value for MTTF upper limit)}$$

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

$$\lambda = 13.7 \times 10^{-9}$$

$$\lambda = 13.7 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at <http://www.maxim-ic.com/qa/reliability/monitor>. Cumulative monitor data for the S18 Process results in a FIT Rate of 0.06 @ 25C and 1.05 (0.8 eV, 60% UCL).

B. E.S.D. and Latch-Up Testing (lot SAFH1Q001C, D/C 1215)

The AL52-0 die type has been found to have all pins able to withstand a transient pulse of:

- ESD-HBM: +/- 2500V per JEDEC JESD22-A114
- ESD-CDM: +/- 750V per JEDEC JESD22-C101

Latch-Up testing has shown that this device withstands a current of +/- 250mA and overvoltage per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results

MAX14634EWC+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135C Biased Time = 192 hrs.	DC Parameters & functionality	80	0	SAFH1Q001C, D/C 1215

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