RELIABILITY REPORT

FOR

MAX6430EGUS+

PLASTIC ENCAPSULATED DEVICES

January 30, 2015

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

Approved by
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Quality Assurance
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Conclusion

The MAX6430EGUS+ 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 MAX6427-MAX6438 are single/dual-level battery monitors with internal hysteresis. These devices are offered with single (MAX6427/MAX6428/MAX6429, MAX6433/MAX6434/MAX6435) or dual (MAX6430/MAX6431/MAX6432, MAX6436/MAX6437/MAX6438) low-battery output indicators, which can be used to indicate three battery conditions: battery is good (operate system in normal mode), battery is weak (operate system in low-power mode), or battery is empty (disable the system). These devices are ideal for monitoring single lithium-ion (Li+) cells or multicell alkaline/NiCd/NiMH power supplies. When the power-supply voltage drops below the specified low threshold, the low-battery output asserts. When the voltage rises above the specified high threshold, the low-battery output is deasserted following a 140ms minimum timeout period. The timeout period ensures that the supply voltages have stabilized before power-converter or microprocessor activity is enabled. The MAX6427-MAX6438 family is available with several monitoring options. The MAX6427/MAX6428/MAX6429 offer factory-trimmed battery-monitor thresholds, with a single low-battery output. The MAX6430/MAX6431/MAX6432 also feature factory-trimmed thresholds, but have two low-battery outputs. The MAX6433-MAX6438 have user-adjustable threshold voltages permitting the user to select the hysteresis range, and consequently the sensitivity of the system to noise. A wide hysteresis range also prevents chattering that can result due to battery recovery after load removal. Single low-battery outputs are supplied by the MAX6433/MAX6434/MAX6435 and dual low-battery outputs by the MAX6436/MAX6437/MAX6438. The MAX6427-MAX6438 family is available with three output logic options for convenient interface with system power circuitry or microprocessors. The family is offered in small SOT23 and SOT143 packages and is fully specified over temperature.

II. Manufacturing Information

A. Description/Function:	Low-Power, Single/Dual-Level Battery Monitors with Hysteresis
B. Process:	B8
C. Number of Device Transistors:	
D. Fabrication Location:	California or Texas
E. Assembly Location:	Malaysia, Thailand
F. Date of Initial Production:	January 26, 2002

III. Packaging Information

A. Package Type:	4-pin SOT
B. Lead Frame:	Alloy42
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:	#05-1601-0163
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1
J. Single Layer Theta Jb:	N/A
K. Single Layer Theta Jc:	N/A
L. Multi Layer Theta Ja:	290°C/W
M. Multi Layer Theta Jc:	100°C/W

IV. Die Information

A. Dimensions:	44X31 mils
B. Passivation:	Si_3N_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:	0.8 microns (as drawn)
F. Minimum Metal Spacing:	0.8 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:	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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 78 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 14.1 \times 10^{-9}$

$\lambda = 14.1$ 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 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 I0RDBQ002A, D/C 0143)

The MS66-3 die type has been found to have all pins able to withstand a HBM transient pulse of +/-1500V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-250mA.

Table 1

Reliability Evaluation Test Results

MAX6430EGUS+

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	78	0	I0RBQ002A, D/C 0142

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