RELIABILITY REPORT

FOR

MAX20361AEWC+
MAX20361AEWC+T

September 25, 2020

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

Sheena Karlyn Basinang
Engineer, Reliability

Ryan Wall
Manager, Reliability

Conclusion

The MAX20361 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

I. Device Description

A. General

The MAX20361 is a fully integrated solution for harvesting energy from single/multi solar cell sources. The device includes an ultra-low quiescent current (360nA) boost converter that is capable of starting from input voltage as low as 250mV (typ). In order to maximize the power extracted from the source, the MAX20361 implements a proprietary Maximum Power Point Tracking (MPPT) technique that allows efficient harvesting from 15µW to over 300mW of available input power.

The MAX20361 also features an integrated charging and protection circuit that is optimized for Li-ion batteries, but can also be used to charge supercapacitors, thin-film batteries, or traditional capacitors. The charger features a programmable charging cut-off voltage with thresholds programmable through I2C interface as well as temperature shutoff.

The MAX20361 is available in a 12-bump, 0.4mm pitch, 1.63mm x 1.23mm wafer-level package (WLP).

II. Manufacturing Information

A. Description/Function:	Small, Single/Multi-cell Solar Harvester with MPPT and Harvest Counter
B. Process:	S18
C. Device Count:	41490
D. Fabrication Location:	USA
E. Assembly Location:	Taiwan
F. Date of Initial Production:	July 2, 2020

III. Packaging Information

A. Package Type:	WLP
B. Lead Frame:	N/A
C. Lead Finish:	SAC125Ni
D. Die Attach:	N/A
E. Bondwire:	N/A
F. Mold Material:	N/A
G. Assembly Diagram:	05-101465
H. Flammability Rating:	N/A
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1
J. Single Layer Theta Ja:	N/A
K. Single Layer Theta Jc:	N/A
L. Multi Layer Theta Ja:	72.82 °C/W
M. Multi Layer Theta Jc:	N/A

IV. Die Information

A. Dimensions:	65.3543X49.606 mils
B. Passivation:	SiO/SiN

V. Quality Assurance Information

A. Quality Assurance Contacts:	Ryan Wall (Manager, Reliability) Michael Cairnes (Executive Director, Reliability) Bryan Preeshl (SVP 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 125C biased (static) life test are shown in Table 1. Using these results, the Failure Rate λ is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192\ x\ 2454\ x\ 80\ x\ 2}$$ (Chi square value for MTTF upper limit)

(where 2454 = Temperature Acceleration factor assuming an activation energy of 0.8eV)

$$\lambda = 24.3\ x\ 10^{-9}$$

$$\lambda = 24.3\ FITs\ (60\%\ confidence\ level\ @25°C)$$

Maxim Integrated performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at https://www.maximintegrated.com/en/support/qa-reliability/reliability/reliability-monitor-program.html.

S18 cumulative process Fit

$$\lambda = 0.02\ FITs\ (60\%\ confidence\ level\ @25°C)$$

$$\lambda = 0.24\ FITs\ (60\%\ confidence\ level\ @55°C)$$

B. ESD and Latch-Up Testing

The MAX20361 has been found to have all pins able to withstand an HBM transient pulse of ±2500 V per JEDEC / ESDA JS-001. Latch-Up testing has shown that this device withstands ±250 mA current injection and supply overvoltage per JEDEC JESD78.

Table 1

Reliability Evaluation Test Results

MAX20361AEWC+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 125°C Biased Time = 192 hrs.	DC parameters & functionality	80	0	

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