RELIABILITY REPORT

FOR

MAX14747EWA+T
MAX14747EWA+

March 24, 2020

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

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Conclusion

The MAX14747 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 MAX14747 is a USB charger detector with an integrated Smart Power Selector™ linear charger solutions that provides a single-chip solution for charging and charger detection. The MAX14747 charger detector is compliant to USB Battery Charger Detection Rev 1.2* and capable of detecting multiple USB battery-charging methods, including Standard Downstream Ports (SDP), Charging Downstream Ports (CDP), and Dedicated Charger Ports (DCP). The device also detects common proprietary charge adapters, including those from Apple.

The MAX14747 battery charger features Smart Power Selector operation, allowing operation with dead or no battery present. The device limits USB VBUS current based on the detect charger source type. If the charger power source is unable to supply the entire system load, the smart-power control circuit supplements the system load with current from the battery. The device protects against overvoltage faults up to 28V.

II. Manufacturing Information

A. Description/Function:	USB Detection with Smart Power Selector Li+ Chargers
B. Process:	S18
C. Device Count:	77294
D. Fabrication Location:	USA
E. Assembly Location:	Taiwan
F. Date of Initial Production:	January 11, 2018

III. Packaging Information

A. Package Type:	WLP
B. Lead Frame:	N/A
C. Lead Finish:	N/A
D. Die Attach:	N/A
E. Bondwire:	N/A
F. Mold Material:	N/A
G. Assembly Diagram:	05-100114
H. Flammability Rating:	UL-94 (V-0 Rating)
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:	52 °C/W
M. Multi Layer Theta Jc:	N/A

IV. Die Information

A. Dimensions:	81.88 x 81.88 mils
B. Passivation:	SiN / SiO2

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

$$\lambda = 0.02\ FITs\ (60\%\ confidence\ level\ @25°C)$$
$$\lambda = 0.25\ FITs\ (60\%\ confidence\ level\ @55°C)$$

B. ESD and Latch-Up Testing

The MAX14747 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 ±100 mA current injection and supply overvoltage per JEDEC JESD78.

Table 1

Reliability Evaluation Test Results

MAX14747

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.