

RELIABILITY REPORT  
FOR  
MAX77751xEFG+  
MAX77751xEFG+T

August 14, 2020

Revised  
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**MAXIM INTEGRATED**

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## Conclusion

The MAX77751 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 MAX77751 is a standalone, 3.15A charger with integrated USB Type-C® CC detection and reverse boost capability. The fast-charge current and top-off current thresholds are easily configured with resistors. The MAX77751 operates with an input voltage of 4.5V to 14V and has a maximum input current limit of 3A. The IC also implements the adaptive input current limit (AICL) function that regulates the input voltage by reducing input current, to prevent the voltage of a weak adapter from collapsing or folding back.

The USB Type-C Configuration Channel (CC) detection pins on the MAX77751 enable automatic USB Type C power source detection and input current limit configuration. To support a variety of legacy USB as well as proprietary adapters, the IC also integrates BC1.2 detection using the D+ and D- pins. The IC runs the CC pin and BC1.2 detection automatically as soon as the USB plug is inserted without any software.

The IC also offers Reverse-Boost capability up to 5.1V, 1.5A, which can be enabled with the ENBST pin. The STAT pin indicates charging status, while the INOKB pin indicates valid input voltage. Charging can be stopped by pulling the ITOPOFF pin low.

The MAX77751 is equipped with a Smart Power Selector™ and a battery true-disconnect FET to control the charging and discharging of the battery or isolate the battery in case of a fault. The MAX77751 is offered in several variants to support Li-ion batteries with various termination voltages from 4.1V to 4.5V. The IC comes in a 3mm x 3mm, 0.4mm pitch 24-lead FC2QFN package making it suitable for low-cost PCB assembly.

**II. Manufacturing Information**

A. Description/Function:	3.15A USB-C Autonomous Charger for 1-Cell Li+ Batteries
B. Process:	P90
C. Device Count:	471604
D. Fabrication Location:	Taiwan
E. Assembly Location:	China
F. Date of Initial Production:	May 20, 2020

**III. Packaging Information**

A. Package Type:	FC2QFN
B. Lead Frame:	CU194
C. Lead Finish:	Matte Tin
D. Die Attach:	TAC-026 FLUX
E. Bondwire:	N/A
F. Mold Material:	CEL9220HF13C
G. Assembly Diagram:	05-101383
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:	31 °C/W
M. Multi Layer Theta Jc:	7.5 °C/W

**IV. Die Information**

A. Dimensions:	106.2992X106.2 mils
B. Passivation:	SiO <sub>2</sub> /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  $\lambda$  is calculated as follows:

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

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

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

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

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>.

P90 cumulative process Fit

$$\lambda = 0.11 \text{ FITs (60\% confidence level @25°C)}$$

$$\lambda = 1.28 \text{ FITs (60\% confidence level @55°C)}$$

### B. ESD and Latch-Up Testing

The MAX77751 has been found to have all pins able to withstand an HBM transient pulse of  $\pm 2500$  V per JEDEC / ESDA JS-001. Latch-Up testing has shown that this device withstands  $\pm 250$  mA current injection and supply overvoltage per JEDEC JESD78.

**Table 1**  
Reliability Evaluation Test Results  
**MAX77751FEFG+**

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.

Revision History:

Date	Version	Notes/Changes
Aug. 14, 2020	A	Initial Release
Nov. 25, 2020	B	Report covers all root part number MAX77751x