

RELIABILITY REPORT
FOR
MAX77803EWJ+T
WAFER LEVEL PRODUCTS

January 29, 2013

MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

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Conclusion

The MAX77803EWJ+T is currently being qualified. Upon qualification, Maxim's continuous reliability monitoring program ensures that all outgoing product will meet Maxim's quality and reliability standards.

Table of Contents

I.Device Description	IV.Die Information
II.Manufacturing Information	V.Quality Assurance Information
III.Packaging Information	VI.Reliability Evaluation
.....Attachments	

I. Device Description

A. General

The MAX77803 is a high performance companion PMIC for latest 3G/4G SmartPhones and Tablet computers. The PMIC includes Dual Input, Smart Power Path™ 2.5A switch mode charger with reverse Boost capability and adapter input protection up to 25VDC (28Vpk @ 5us) withstand, proprietary Model Gauge™ (mg1) fuel gauge technology, MUIC, 2x safe LDOs, Haptic and a single 1.25A Flash / Torch LED driver. The device is meant to work with main PMICs, including those from competitors. The switch mode battery charger's operating frequency is 4MHz and includes integrated, low loss switches - providing the smallest L/C size, lowest heat and fastest battery charging programmable up to 2.1A. The charger has two inputs which accept Adapter/USB and/or Wireless type inputs. All MAX77803 blocks tied to Adapter/USB pin are protected from input over-voltage events up to 25VDC/28Vpk. The Wireless input can simultaneously charge the battery while powering USB-OTG type accessories. The USB-OTG output provides true-load disconnect and is protected by an adjustable output current limit. The battery charger includes Smart Power Path™ and I2C adjustable settings to accommodate a wide range of battery sizes and system loads. When external power is applied from either input, battery charging is enabled. With a valid input power source (adapter or wireless charger), the BYP pin voltage is equal to the input voltage minus resistive voltage drop. During Battery only reverse Boost operation, the BYP output may be regulated with the reverse Boost feature and provides up to 5V at 1.2A and requires no additional inductor– allowing the MAX77803 to power USB OTG accessories or provide illumination to the Flash LED string. The switching charger is designed with a special CC, CV, and die temperature regulation algorithm. MaxFlash prevents overloading a weak battery, further extending battery life. Model Gauge m1 provides accurate battery fuel gauging without calibration and operates with extremely low battery current. The MUIC interfaces with the system USB interface and provides Adapter detection and battery ID capability. The MUIC multiplexes system data from USB, UART and audio – allowing a single micro-USB system connector. The Haptic motor driver drives both ERM and LRA type actuators. The Safeout LDO drive system USB interface devices. The MAX77803 features a I2C revision 3.0 compatible serial interface consisting of a bidirectional serial data line (SDA) and a serial clock line (SCL).

II. Manufacturing Information

A. Description/Function:	Companion PMIC for Tablets and Smartphones for Samsung
B. Process:	S18
C. Number of Device Transistors:	324889
D. Fabrication Location:	Taiwan
E. Assembly Location:	Taiwan
F. Date of Initial Production:	2013

III. Packaging Information

A. Package Type:	90-bump WLP 9x10 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:	#05-9000-5158
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:	35°C/W
M. Multi Layer Theta Jc:	°C/W

IV. Die Information

A. Dimensions:	161.811X174.4094 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:	0.23 microns (as drawn)
F. Minimum Metal Spacing:	0.23 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 135°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 0 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = \text{tbd} \times 10^{-9}$$

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

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 S18 Process results in a FIT Rate of 0.06 @ 25C and 1.05 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing

The CL03-0 die type has been found to have all pins able to withstand a HBM transient pulse of +/- 2000V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of tbd per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results

MAX77803EWJ+T

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	0	0	

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