

RELIABILITY REPORT
FOR

MAX77711xEWB+
MAX77711xEWB+T

WAFER LEVEL DEVICES

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MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134



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Conclusion

The MAX77711 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 IC integrates a high-efficiency, phase-configurable step-down (buck) regulator with four 3A phases (Φ). Four feedback inputs allow up to four different regulated outputs. Each regulator operates on an input supply between 2.3V and 9.2V. Output voltage is programmable with an I2C serial interface between 0.25V and 5.2V in 5mV or 20mV steps. Each switching phase is capable of supporting 3A each. The phase configurations are user-programmable by strapping programming pins on the PCB. Any multi-phase or single-phase combination can be set: 4 Φ , (3+1) Φ , (2+2) Φ , (2+1+1) Φ , or (1+1+1+1) Φ . Load capability adds linearly as phases are combined (1 Φ supports 3A, 2 Φ supports 6A, etc). Maximum load capability is 12A in the 4 Φ (single output) configuration. Four individual 3A outputs can be regulated in the (1+1+1+1) Φ configuration. Six general-purpose input/outputs (GPIO) add additional flexibility. The GPIOs can be programmed as digital I/O or assigned to special functions: buck enable inputs, buck DVS inputs, buck FPWM mode inputs, or power-OK monitor outputs.

II. Manufacturing Information

A. Description/Function:	4-Phase-Configurable Buck Regulator, FPS,& LDO
B. Process:	P90
C. Device Count:	647826
D. Fabrication Location:	Japan
E. Assembly Location:	Taiwan
F. Date of Initial Production:	November 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:	05-100775
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:	38.20 °C/W
M. Multi Layer Theta Jc:	N/A

IV. Die Information

A. Dimensions:	140.5511X140.5511 mils
B. Passivation:	SiO ₂ /Si ₃ N ₄

V. Quality Assurance Information

A. Quality Assurance Contacts:	Norbert Gerena (Engineer, 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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{1000 \times 2454 \times 79 \times 2} \text{ (Chi square value for MTTF upper limit)}$$

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

$$\lambda = 4.73 \times 10^{-9}$$

$$\lambda = 4.73 \text{ FITs (60\% confidence level @25°C)}$$

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>.

Fab103 P90 Quarterly Process FIT from Q4CY18

$$\lambda = 0.7 \text{ FITs (60\% confidence level @25°C)}$$

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

The MAX77711 has been found to have all pins able to withstand a transient pulse of:

- ESD-HBM ± 2500 V per JEDEC / ESDA JS-001.
- ESD-CDM ± 750 V per JEDEC / ESDA JS-002.

Latch-Up testing has shown that this device withstands ± 150 mA current injection and supply overvoltage per JEDEC JESD78

Table 1
Reliability Evaluation Test Results

MAX77511xEWB+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 125C Biased Time = 1000 hrs.	DC Parameters & functionality	79	0	

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