

RELIABILITY REPORT

FOR

MAX38903AATB+, MAX38903AATB+T,
MAX38903DANLxx+, MAX38903DANLxx+T

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MAXIM INTEGRATED

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Conclusion

The MAX38903A/D 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 MAX38903A/B/C/D are a family of low-noise linear regulators that deliver up to 1A of output current with only 5.5 μ VRMS of output noise from 10Hz to 100kHz.

These regulators maintain $\pm 1\%$ output accuracy over a wide input voltage range, requiring only 100mV of input to-output headroom at full load. The 1200 μ A no-load supply current is independent of dropout voltage.

The MAX38903A has nine pin-selectable output voltages 1.2V, 1.5V, 1.8V, 2.5V, 3.0V, 3.1V, 3.3V, 4.0V, and 5V. The MAX38903B/C output voltage can be adjusted to a value in the range of 0.6V to 5.0V using two external resistors. The MAX38903B also includes an active-high POK signal for trouble-free load startup.

The MAX38903D has factory-preset output voltages over the range of 0.7V to 5V in 50mV steps. All versions include a programmable output soft-start rate, output over-current and thermal overload protection.

The MAX38903A/B are offered in a 10-pin, 3mm x 3mm TDFN package, while the MAX38903C/D are offered in a 9-bump, 0.4mm pitch, 1.4mm x 1.4mm wafer-level package (WLP).

II. Manufacturing Information

A. Description/Function:	1.7V–5.5VIN, 1A Low Noise LDO Linear Regulators in TDFN and WLP
B. Process:	S18
C. Device Count:	5850
D. Fabrication Location:	USA
E. Assembly Location:	Thailand, Taiwan
F. Date of Initial Production:	January 2019

III. Packaging Information

A. Package Type:	10L TDFN-CU	9 Bump WLP
B. Lead Frame:	Cu194	N/A
C. Lead Finish:	Matte Tin	N/A
D. Die Attach:	AB8200T/EN4900G	N/A
E. Bondwire:	1.3 mil CuPd	N/A
F. Mold Material:	G770HCD, G700LA	N/A
G. Flammability Rating:	UL-94 (V-0 Rating)	N/A
H. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1	Level 1
I. Single Layer Theta Ja:	54 °C/W	N/A
J. Single Layer Theta Jc:	9 °C/W	N/A
K. Multi Layer Theta Ja:	41 °C/W	83.98 °C/W
L. Multi Layer Theta Jc:	9 °C/W	N/A

IV. Die Information

A. Dimensions:	55.1181X53.937 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:

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

(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>.

S18 cumulative process data:

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

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

B. ESD and Latch-Up Testing

The MAX38903A/D 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
MAX38903BATB+

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.