

RELIABILITY REPORT

FOR

MAX15162ATG+, MAX15162ATG+T,
MAX15162AATG+, MAX15162AATG+T,
MAX15162AWE+, MAX15162AWE+T,
MAX15162AAWE+, MAX15162AAWE+T,

June 24, 2020

MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134



Ryan Wall
Manager, Reliability

Conclusion

The MAX15162 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.

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 MAX15162/MAX15162A devices are dual-channel, circuit-breaker ICs. The devices integrate a dual-channel controller with dual 140mΩ (in WLP, 180mΩ in TQFN) power MOSFETs and electronic circuit-breaker protection in a single package.

These devices feature constant power control during startup to keep the MOSFET operating under Safe Operating Area (SOA). The devices provide robust overcurrent protection with programmable current-limit level, and adjustable overcurrent shutdown delay for better immunity against system noises and load transient. The current monitoring pins provide a current sense accuracy of ±3% for each channel. When there is short-circuit at the output, a fast current limit comparator turns off MOSFETs within 200ns to isolate the load from the input. During a fault condition, the MAX15162A enters auto-retry mode and the MAX15162 enters latch off mode. For both devices, the ALRT pin asserts a fault indication. The MAX15162/ MAX15162A can be configured as two independent channels or two parallel channels for one common output.

The devices feature a number of protection features including: IN-to-OUT short-circuit protection, output shortcircuit protection, startup watchdog timer, input undervoltage lockout and internal overtemperature protection.

II. Manufacturing Information

A. Description/Function:	8V to 60V Smart Dual 1.5A Circuit Breaker with Accurate Current Monitoring
B. Process:	S18
C. Device Count:	43345
D. Fabrication Location:	Japan
E. Assembly Location:	China, Taiwan
F. Date of Initial Production:	December 2019

III. Packaging Information

A. Package Type:	24L TQFN	16 bump WLP
B. Lead Frame:	CU194	N/A
C. Lead Finish:	Matte Tin	SAC125
D. Die Attach:	EN4900G	N/A
E. Bondwire:	1 mil CuPd	N/A
F. Mold Material:	G700LA	N/A
G. Flammability Rating:	UL-94 (V-0 Rating)	UL-94 (V-0 Rating)
H. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1	Level 1
I. Single Layer Theta Ja:	56 °C/W	N/A
J. Single Layer Theta Jc:	6 °C/W	N/A
K. Multi Layer Theta Ja:	39 °C/W	49.13 °C/W
L. Multi Layer Theta Jc:	6 °C/W	N/A

IV. Die Information

A. Dimensions:	79.53 x 79.53 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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 2454 \times 77 \times 2} \text{ (Chi square value for MTTF upper limit)}$$

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

$$\lambda = 25.2 \times 10^{-9}$$

$$\lambda = 25.2 \text{ FITs (60\% confidence level @25°C)}$$

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 MAX15162 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
MAX15162ATG+

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	77	0	

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