

RELIABILITY REPORT  
FOR  
MAX14922ATE+  
MAX14922ATE+T

August 14, 2020

**MAXIM INTEGRATED**

160 RIO ROBLES  
SAN JOSE, CA 95134



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## Conclusion

The MAX14922 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 MAX14922 is a high-side, n-channel FET controller for implementing industrial high-side switches for switching ground-connected loads. The MAX14922 device controls an external nMOS power transistor, allowing low  $R_{ON}$  high-side switch applications from a +9V to +70V supply range. Fast inductive load turn-off can be achieved with use of a high-voltage TVS diode enabling up to -70V (max) voltage clamping. Ground-connected TVS diodes allow clamping of exceptionally high inductive energies. Load current is limited to a user-defined value through a sense resistor. External FET overload protection is achieved using an auto-retry timing feature, as defined by a user-selected capacitor or optionally using an external timing control. The MAX14922 features an on-chip comparator enabling monitoring of the high-side switch output or the supply input voltage with a user-selected threshold. An integrated charge pump enables high speed switching rates when using low  $R_{ON}$  FETs in the 20kHz to 50kHz range.

## II. Manufacturing Information

A. Description/Function:	High-Side Switch Controller with Current Limiting
B. Process:	DM18
C. Device Count:	23671
D. Fabrication Location:	USA
E. Assembly Location:	Taiwan
F. Date of Initial Production:	May 13, 2020

## III. Packaging Information

A. Package Type:	TQFN
B. Lead Frame:	Cu194
C. Lead Finish:	Matte Tin
D. Die Attach:	EN4900G
E. Bondwire:	1 mil Au
F. Mold Material:	G770HJ
G. Assembly Diagram:	05-101645
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:	68 °C/W
K. Single Layer Theta Jc:	10 °C/W
L. Multi Layer Theta Ja:	43.30 °C/W
M. Multi Layer Theta Jc:	4 °C/W

## IV. Die Information

A. Dimensions:	68.8976X64.960 mil
B. Passivation:	SiN/SiO2

## V. Quality Assurance Information

<b>A. Quality Assurance Contacts:</b>	Ryan Wall (Manager, Reliability) Michael Cairnes (Executive Director, Reliability) Bryan Preeshl (SVP of QA)
<b>B. Outgoing Inspection Level:</b>	0.1% for all electrical parameters guaranteed by the Datasheet. 0.1% for all Visual Defects.
<b>C. Observed Outgoing Defect Rate:</b>	< 50 ppm
<b>D. Sampling Plan:</b>	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)

$$\lambda = 24.30 \times 10^{-9}$$

$$\lambda = 24.30 \text{ FITs (60\% confidence level @25°C)}$$

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>.

DM18 cumulative process FIT

$$\lambda = 0.67 \text{ FITs (60\% confidence level @25°C)}$$

$$\lambda = 8.11 \text{ FITs (60\% confidence level @55°C)}$$

### B. ESD and Latch-Up Testing

The MAX14922 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  
**MAX14922ATE+**

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.