

RELIABILITY REPORT

FOR

MAX14819AATM+  
MAX14819AATM+T

June 23, 2020

**MAXIM INTEGRATED**

160 RIO ROBLES  
SAN JOSE, CA 95134



Ryan Wall  
Manager, Reliability

## Conclusion

The MAX14819A 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

|  |   |
|--|---|
| <b>I. ....Device Description</b>         | <b>IV. ....Die Information</b>              |
| <b>II. ....Manufacturing Information</b> | <b>V. ....Quality Assurance Information</b> |
| <b>III. ....Packaging Information</b>    | <b>VI. ....Reliability Evaluation</b>       |
| <b>.....Attachments</b>                  |   |

### I. Device Description

#### A. General

The MAX14819/MAX14819A low-power, dual-channel, IO-Link® master transceiver with sensor/actuator power-supply controllers is fully compliant with the latest IO-Link and binary input standards and test specifications, IEC 61131-2, IEC 61131-9 SDCI, and IO-Link 1.1.3. This master transceiver also includes two auxiliary digital input (DI\_) channels. The MAX14819/MAX14819A is configurable to operate either with external UARTs or using the integrated framers on the IC. To ease selection of microcontroller, the master transceiver features frame handlers with UARTs and FIFOs. These are designed to simplify time critical control of all IO-Link M-sequence frame types. The MAX14819/MAX14819A also features autonomous cycle timers, reducing the need for accurate controller timing. Integrated establish-communication sequencers also simplify wake-up management.

## II. Manufacturing Information

|                                |   |
|--------------------------------|---|
| A. Description/Function:       | Dual IO-Link Master Transceiver with Integrated Framers and L+ Supply Controllers |
| B. Process:                    | S18   |
| C. Device Count:               | 184828  |
| D. Fabrication Location:       | Japan   |
| E. Assembly Location:          | Taiwan  |
| F. Date of Initial Production: | April 2020  |

## III. Packaging Information

|   |                      |
|---|----------------------|
| A. Package Type:  | TQFN-Cu              |
| B. Lead Frame:  | Cu194                |
| C. Lead Finish:   | Matte Tin            |
| D. Die Attach:  | EN4900G              |
| E. Bondwire:  | CuPd (1.00 mil dia.) |
| F. Mold Material:   | G700LA               |
| G. Assembly Diagram:  | 05-100324            |
| H. Flammability Rating:   | UL-94 (V-0 Rating)   |
| I. Classification of Moisture Sensitivity<br>per JEDEC standard J-STD-020-C | Level 1              |
| J. Single Layer Theta Ja:   | 36 °C/W              |
| K. Single Layer Theta Jc:   | 1 °C/W               |
| L. Multi Layer Theta Ja:  | 25 °C/W              |
| M. Multi Layer Theta Jc:  | 1 °C/W               |

## IV. Die Information

|                 |  |
|-----------------|--|
| A. Dimensions:  | 145.6693 X 145.6693 mils                         |
| B. Passivation: | SiO <sub>2</sub> /Si <sub>3</sub> N <sub>4</sub> |

## V. Quality Assurance Information

|                                   |  |
|-----------------------------------|--|
| A. Quality Assurance Contacts:    | Ryan Wall (Manager, Reliability)<br>Michael Cairnes (Director, Reliability)<br>Bryan Preeshl (SVP of QA) |
| B. Outgoing Inspection Level:     | 0.1% for all electrical parameters guaranteed by the Datasheet.<br>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  $\lambda$  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:

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

$$\lambda = 0.24 \text{ FITs (60\% confidence level @25°C)}$$

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

The MAX14819A 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 +/- 100 mA current injection and supply overvoltage per JEDEC JESD78.

**Table 1**  
Reliability Evaluation Test Results

**MAX14819ATM+**

| TEST ITEM                        | TEST CONDITION                         | FAILURE IDENTIFICATION           | SAMPLE SIZE | NUMBER OF FAILURES | COMMENTS |
|----------------------------------|--|----------------------------------|-------------|--------------------|----------|
| <b>Static Life Test</b> (Note 1) | Ta = 125C<br>Biased<br>Time = 192 hrs. | DC Parameters<br>& functionality | 77          | 0                  |          |

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