

RELIABILITY REPORT  
FOR  
MAX14915AFM+  
MAX14915AFM+T  
PLASTIC ENCAPSULATED DEVICES

April 5, 2019

**MAXIM INTEGRATED**

160 RIO ROBLES  
SAN JOSE, CA 95134



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## Conclusion

The MAX14915 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 MAX14915 has eight high-side switches specified to deliver up to 700mA continuous current. The high-side switches have on-resistance of 250mΩ (max) at 125°C ambient temperature. The SPI interface has a built-in chip addressing decoder, allowing communication with multiple MAX14915s utilizing a common SPI chip select (active-low CS). The SPI interface provides flexibility for global and per-channel configuration and diagnostic, including over and undervoltage detection, open wire/load detection, overload and current limiting reporting, thermal conditions reporting, and more. Open load detection detects both open-wire/open-load conditions with switches in the on and off states. LED drivers provide indication of per-channel fault, status, and supply undervoltage conditions. Internal active clamps allow for fast turn-off of inductive loads. Integrated line-to-ground and line-to-line surge protection only requires a TVS on VDD.

**II. Manufacturing Information**

|                                |  |
|--------------------------------|--|
| A. Description/Function:       | Compact Industrial Octal High-Side Switch with Diagnostics |
| B. Process:                    | S18  |
| C. Device Count:               | 118428   |
| D. Fabrication Location:       | Japan  |
| E. Assembly Location:          | Taiwan   |
| F. Date of Initial Production: | October 2018   |

**III. Packaging Information**

|   |                    |
|---|--------------------|
| A. Package Type:  | Flip Chip QFN      |
| B. Lead Frame:  | C7025              |
| C. Lead Finish:   | Matte Tin          |
| D. Die Attach:  | N/A                |
| E. Bondwire:  | N/A                |
| F. Mold Material:   | G700LA             |
| G. Assembly Diagram:  | 05-100802          |
| 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:   | N/A                |
| K. Single Layer Theta Jc:   | N/A                |
| L. Multi Layer Theta Ja:  | 20.5 °C/W          |
| M. Multi Layer Theta Jc:  | 0.39 °C/W          |

**IV. Die Information**

|                 |  |
|-----------------|--|
| A. Dimensions:  | 172.4409X170.0787 mils                           |
| B. Passivation: | SiO <sub>2</sub> /Si <sub>3</sub> N <sub>4</sub> |

## V. Quality Assurance Information

|                                   |  |
|-----------------------------------|--|
| A. Quality Assurance Contacts:    | Norbert Gerena (Engineer, Reliability)<br>Michael Cairnes (Executive 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:

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

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

$$\lambda = 24.31 \times 10^{-9}$$

$$\lambda = 24.31 \text{ FITs (60\% confidence level @25°C)}$$

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>.

Epson S18 Quarterly Process FIT from Q4CY18

$$\lambda = 0.4 \text{ FITs (60\% confidence level @25°C)}$$

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

The MAX14915 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  
**MAX14915AFM+**

| TEST ITEM                 | TEST CONDITION         | FAILURE IDENTIFICATION        | SAMPLE SIZE | NUMBER OF FAILURES | COMMENTS |
|---------------------------|------------------------|-------------------------------|-------------|--------------------|----------|
| Static Life Test (Note 1) | Ta = 125C              | DC Parameters & functionality | 80          | 0                  |          |
|                           | Biased Time = 192 hrs. |                               |             |                    |          |

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