

RELIABILITY REPORT
FOR
MAX11210EEE+
PLASTIC ENCAPSULATED DEVICES

January 20, 2016

MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

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| Approved by |
| Sokhom Chum |
| Quality Assurance |
| Reliability Engineer |

Conclusion

The MAX11210EEE+ 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 Description

The MAX11200/MAX11210 are ultra-low-power (< 300FA active current), high-resolution, serial output ADCs. These devices provide the highest resolution per unit power in the industry, and are optimized for applications that require very high dynamic range with low power, such as sensors on a 4mA to 20mA industrial control loop. Optional input buffers provide isolation of the signal inputs from the switched capacitor sampling network allowing these converters to be used with high-impedance sources without compromising available dynamic range or linearity. The devices provide a high-accuracy internal oscillator that requires no external components. When used with the specified data rates, the internal digital filter provides more than 100dB rejection of 50Hz or 60Hz line noise. The devices are configurable using the SPI interface and are available in a 16-pin QSOP package.

II. Manufacturing Information

| | |
|----------------------------------|---|
| A. Description/Function: | 24-Bit, Single-Channel, Ultra-Low Power, Delta-Sigma ADCs with GPIO |
| B. Process: | TS18 |
| C. Number of Device Transistors: | 148241 |
| D. Fabrication Location: | Taiwan |
| E. Assembly Location: | Philippines, Thailand |
| F. Date of Initial Production: | June 25, 2010 |

III. Packaging Information

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|--|--------------------------|
| A. Package Type: | 16-pin QSOP |
| B. Lead Frame: | Copper |
| C. Lead Finish: | 100% matte Tin |
| D. Die Attach: | Conductive |
| E. Bondwire: | Au (1 mil dia.) |
| F. Mold Material: | Epoxy with silica filler |
| G. Assembly Diagram: | #05-9000-4018 |
| H. Flammability Rating: | Class UL94-V0 |
| I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C | Level 1 |
| J. Single Layer Theta Ja: | 120°C/W |
| K. Single Layer Theta Jc: | 37°C/W |
| L. Multi Layer Theta Ja: | 103.7°C/W |
| M. Multi Layer Theta Jc: | 37°C/W |

IV. Die Information

| | |
|----------------------------|---|
| A. Dimensions: | 48.5X76.5 mils |
| B. Passivation: | Si ₃ N ₄ /SiO ₂ (Silicon nitride/ Silicon dioxide) |
| C. Interconnect: | Al/0.5%Cu with Ti/TiN Barrier |
| D. Backside Metallization: | None |
| E. Minimum Metal Width: | 0.18um |
| F. Minimum Metal Spacing: | 0.18um |
| G. Bondpad Dimensions: | |
| H. Isolation Dielectric: | SiO ₂ |
| I. Die Separation Method: | Wafer Saw |

V. Quality Assurance Information

| | |
|-----------------------------------|---|
| A. Quality Assurance Contacts: | Don Lipps (Manager, Reliability Engineering) Bryan Preeshl (Vice President 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 135C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 45 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

(where 4340 = Temperature Acceleration factor assuming an activation energy of 0.8eV)

$$\lambda = 24.4 \times 10^{-9}$$

$$\lambda = 24.4 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

The following failure rate represents data collected from Maxim Integrated's reliability monitor program. Maxim Integrated performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at <http://www.maximintegrated.com/qa/reliability/monitor>. Cumulative monitor data for the TS18 Process results in a FIT Rate of 0.11 @ 25C and 1.87 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot QYYZCQ002B, D/C 1013)

The AC84 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250mA and overvoltage per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results

MAX11210EEE+

| TEST ITEM | TEST CONDITION | FAILURE IDENTIFICATION | SAMPLE SIZE | NUMBER OF FAILURES | COMMENTS |
|----------------------------------|---|----------------------------------|-------------|--------------------|----------------------|
| Static Life Test (Note 1) | Ta = 135°C Biased Time = 192 hrs. | DC Parameters & functionality | 45 | 0 | QYYZCQ002J, D/C 1013 |

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