RELIABILITY REPORT

FOR

MAX1076ETC+, MAX1076ETC+T

August 4, 2020

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

Sheena Karlyn Basinang
Engineer, Reliability

Ryan Wall
Manager, Reliability

Conclusion

The MAX1076 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

A. General

The MAX1076/MAX1078 are low-power, high speed, serial output, 10-bit, analog-to-digital coveters (ADCs) that operate at up to 1.8Msps and have an internal reference. These devices feature true-differential inputs, offering better noise immunity, distortion improvements, and a wider dynamic range over a single-ended input. A standard SPI™/QSPI™/MICROWIRE™ interface provides the clock necessary for conversion. These devices easily interface with standard digital signal processor (DSP) synchronous serial interfaces.

The MAX1076/MAX1078 operate from a single +4.75V to +5.25V supply voltage. The MAX1076/MAX1078 include a 4.096V internal reference. The MAX1076 has a unipolar analog input, while the MAX1078 has a bipolar analog input. These devices feature a partial power-down and a full power-down mode for use between conversions, which lowers the supply current to 2mA (typ) and 1µA (max), respectively. Also featured is a separate power-supply (V_L), which allows direct interfacing to +1.8V to V_{DD} digital logic. The fast conversion speed, low power dissipation, excellent AC performance, and DC accuracy (±0.5 LSB INL) make the MAX1076/MAX1078 ideal for industrial process control and base station application.

The MAX1076/MAX1078 come in a 12-pin TQFN package and are available in the extended (-40°C to +85°C) temperature range.

II. Manufacturing Information

A. Description/Function:	1.8Msps, Single-Supply, Low-Power, True Differential, 10-Bit ADCs with Internal Reference
B. Process:	C6
C. Device Count:	N/A
D. Fabrication Location:	Japan
E. Assembly Location:	China, Thailand, Taiwan
F. Date of Initial Production:	April 24, 2004

III. Packaging Information

A. Package Type:	TQFN
B. Lead Frame:	Copper
C. Lead Finish:	Matte Tin
D. Die Attach:	EN4900G, AB8200T
E. Bondwire:	1 mil Au
F. Mold Material:	G770HJ, G770HCD
G. Assembly Diagram:	05-9000-0570
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:	59.30 °C/W
K. Single Layer Theta Jc:	6 °C/W
L. Multi Layer Theta Ja:	41 °C/W
M. Multi Layer Theta Jc:	6 °C/W

IV. Die Information

A. Dimensions:	87X62 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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192\ x\ 2454\ x\ 48\ x\ 2}$$ (Chi square value for MTTF upper limit)

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

$$\lambda = 40.51\ x\ 10^{-9}$$

$$\lambda = 40.51\ FITs\ (60\%\ confidence\ level\ @25°C)$$

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.

C6 cumulative process Fit

$$\lambda = 0.29\ FITs\ (60\%\ confidence\ level\ @25°C)$$

$$\lambda = 3.51\ FITs\ (60\%\ confidence\ level\ @55°C)$$

B. ESD and Latch-Up Testing

The MAX1076 has been found to have all pins able to withstand an HBM transient pulse of ±1500 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

MAX1076ECT+

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	48	0	

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