



RELIABILITY REPORT  
FOR  
MAX19527EXE+  
PLASTIC ENCAPSULATED DEVICES

January 18, 2011

**MAXIM INTEGRATED PRODUCTS**

120 SAN GABRIEL DR.  
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## Conclusion

The MAX19527EXE+ successfully meets the quality and reliability standards required of all Maxim products. In addition, Maxim's continuous reliability monitoring program ensures that all outgoing product will continue to meet Maxim's quality and reliability standards.

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### I. Device Description

#### A. General

The MAX19527 is an octal, 12-bit analog-to-digital converter (ADC), optimized for the low-power and high-dynamic performance requirements of medical imaging instrumentation and digital communications applications. The device operates from a single 1.8V supply and consumes 440mW (55mW per channel), while providing a 69dBFS signal-to-noise ratio (SNR) at a 5.3MHz input frequency. In addition to low operating power, the device features programmable power management for idle states and reduced-channel operation. An internal 1.25V precision bandgap reference sets the full-scale range of the ADC to 1.5VP-P. A flexible reference structure allows the use of an external reference for applications requiring greater gain accuracy or a different input voltage range. A programmable common-mode voltage reference output is provided to enable DC-coupled input applications. Various adjustments and feature selections are available through programmable registers that are accessed through the 3-wire serial peripheral interface (SPI™). A flexible clock input circuit allows for a single-ended, logic-level clock or a differential clock signal. An on-chip PLL generates the multiplied (6x) clock required for the serial LVDS digital outputs. The serial LVDS output provides programmable test patterns for data timing alignment and output drivers with programmable current drive and programmable internal termination. The device is available in a small, 10mm x 10mm x 1.2mm, 144-lead thin chip ball grid array (CTBGA) package and is specified for the extended industrial (-40°C to +85°C) temperature range.

## II. Manufacturing Information

A. Description/Function:	Ultra-Low-Power, Octal, 12-Bit, 50Msps, 1.8V ADC with Serial LVDS Outputs
B. Process:	TS18
C. Number of Device Transistors:	1117174
D. Fabrication Location:	Taiwan
E. Assembly Location:	Taiwan
F. Date of Initial Production:	June 25, 2010

## III. Packaging Information

A. Package Type:	144-ball CTBGA 12x12 array
B. Lead Frame:	N/A
C. Lead Finish:	N/A
D. Die Attach:	Non-conductive
E. Bondwire:	Au (0.8 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-3965
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 3
J. Single Layer Theta Ja:	°C/W
K. Single Layer Theta Jc:	°C/W
L. Multi Layer Theta Ja:	27°C/W
M. Multi Layer Theta Jc:	16°C/W

## IV. Die Information

A. Dimensions:	141.73 X 299.21 mils
B. Passivation:	Si <sub>3</sub> N <sub>4</sub> /SiO <sub>2</sub> (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/0.5%Cu with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	0.18µm
F. Minimum Metal Spacing:	0.18µm
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	SiO <sub>2</sub>
I. Die Separation Method:	Wafer Saw

## V. Quality Assurance Information

A. Quality Assurance Contacts:	Richard Aburano (Manager, Reliability Operations) 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 135°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 48 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 22.9 \times 10^{-9}$$
$$\lambda = 22.9 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at <http://www.maxim-ic.com/qa/reliability/monitor>. Cumulative monitor data for the TS18 Process results in a FIT Rate of 0.24 @ 25C and 4.14 @ 55C (0.8 eV, 60% UCL)

### B. E.S.D. and Latch-Up Testing (lot QB0ZCQ002B, D/C 1020)

The CA29 die type has been found to have all pins able to withstand a HBM transient pulse of 2500 per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of 100.

**Table 1**  
Reliability Evaluation Test Results

**MAX19527EXE+**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
<b>Static Life Test</b> (Note 1)	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	48	0	QB0ZCQ002B, D/C 1020

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