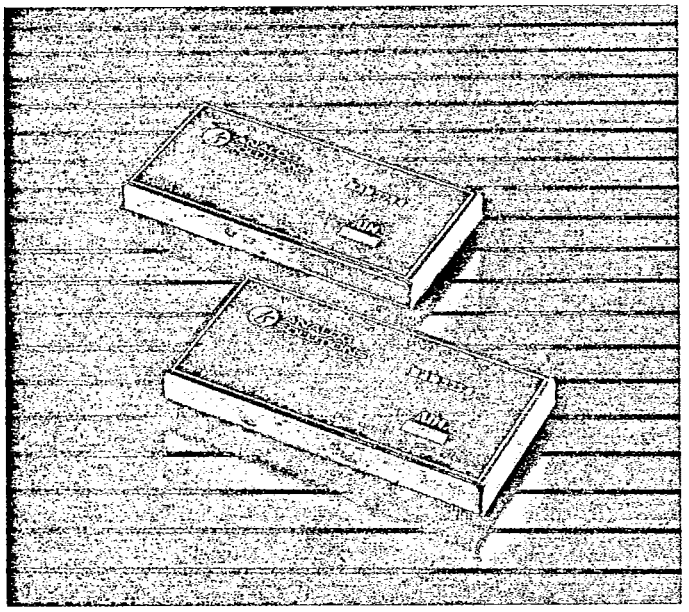
ANALOG SOLUTIONS™
a subsidiary of Silicon General, Inc.

ZAD2744/ZAD2754

14-Bit High-Speed A/D Converters



Applications

- ☐ Wide Band Data Digitizing
- ☐ Multi-Channel Computer Interface
- ☐ High Accuracy Data Acquisition
- ☐ Computed Tomography
- ☐ Seismic Instrumentation

Key Features

- ☐ 14-Bit Resolution and Accuracy
- ☐ Fast 25 μs Conversion Time (ZAD2744)
- ☐ Low 1 ppm/°C Worst Case Differential Linearity T.C. (ZAD2754)
- ☐ User Selectable Input Range
- ☐ No Missing Codes—Guaranteed
- ☐ Monotonicity—Guaranteed
- ☐ Low Supply Current
- ☐ Low Cost
- ☐ AD1130 Pin Compatibility with Enhanced Performance

Solutions for Data Conversion

Analog Solutions' ZAD2744 and ZAD2754 offer premium 14-bit performance for exacting applications. The use of specially selected low temperature-coefficient thin-film resistors insure that no codes are missing over temperature.

The ZAD2744 and ZAD2754 are the solution to your 14-bit A/D conversion needs.

General Description

The ZAD2744 and 2754 are high-speed analog-to-digital converters packaged in small 2.0"×4.0"×0.4" metal cases. They perform complete 14-bit conversions in 25 μs (ZAD2744) or 100 μs (ZAD2754). Utilizing the exclusive mono-bit ladder network, drift and accuracy problems normally associated with binary-weighted networks are virtually eliminated.

Description of Converter

The ZAD2744 and 2754 provide premium 14-bit converter performance. Using the successive approximation technique, these units convert analog input voltages into natural binary, offset binary, or two's complement coded outputs. The use of specially selected low-temperature coefficient thin-film resistors in our proven 16-bit accurate monobit ladder network insures that no codes are missing over temperature.

The combination of the successive approximation technique and the proven monobit ladder provides up to four times more allowance for component variation and drift than conventional 1, 2, 4, 8, ladder designs.

The converters provide four user-selectable analog input ranges: ±5V, ±10V, 0 to +10V and 0 to + 20V.

Analog Input Characteristics:

The input circuit of the ZAD2744 and ZAD2754 is shown in figure 3. No offset current is applied to the comparator input because pin 19 is left open circuit when the converter is connected in the unipolar mode.

A 0 to +4mA output current is developed by the 0 to +10V input signal which is applied to pin 6. The +4mA output is compared to the 0 to −4mA output of the internal D/A converter. (The 0 to +20V input signal is applied to pin 5).

The zero point (offset of the converter) can be adjusted by ±40 LSB by applying to pin 20 any voltage between +15V and −15V from the wiper of a 100 kΩ potentiometer (figure 3).

PERFORMANCE SPECIFICATIONS
ZAD2744/ZAD2754 14-BIT HIGH-SPEED A/D CONVERTERS

	ZAD2744	ZAD2754
ANALOG INPUT		
Full-Scale Range (FSR)	0 to +10V, ±5V, 0 to +20V, ±10V	*
Input Impedance	5 kΩ, 2.5 kΩ	*
REFERENCE		
Reference	+10V, 4 mA max.	*
ACCURACY		
Resolution	14 bits	*
Quantization Error	±0.5 LSB	*
Relative Accuracy[2]		
at 25°C	±0.005% FSR max	±0.003% FSR max
0-50°C	±0.008% FSR max	±0.006% FSR max
Gain Error	±0.05% FSR[3] max	*
Offset Error	±0.05% FSR[3] max	*
Differential Linearity	±0.5 LSB typical ±0.75 LSB max	±0.3 LSB typ ±0.5 LSB max
Monotonicity	Guaranteed	*
Zero Code (0° to 50°C)	Continuous and monotonic through zero	*
Missing Codes	No missing codes	*
STABILITY		
Temperature Coefficient of Differential Linearity	±2 ppm FSR/°C max	±1 ppm FSR/°C max
Temperature Coefficient of Gain	±12 ppm/°C max	*
Temperature Coefficient of Offset		
Unipolar	±3 ppm FSR/°C max	*
Bipolar	±7 ppm FSR/°C max	
Power Supply Sensitivity:		
Gain and Offset	±0.001% for each % change in power supply	*
Warm-up Time	10 minutes	*
AC CHARACTERISTICS		
A/D Conversion Time	25 µs max	100 µs max

	ZAD2744	ZAD2754
DIGITAL CONTROLS		
Control Compatibility[4]	TTL, HCMOS logic levels[5]	*
Trigger (positive pulse):		
Fan In	1 TTL unit load	*
Width	Positive Pulse, 200 ns min 400 ns max	*
	Rising edge resets registers. Falling edge starts conversion. (Refer to Timing Diagram)	*
DIGITAL OUTPUTS		
Compatibility	LSTTL	*
Parallel Data:		
Fan Out	2 TTL unit loads/line	*
Coding	Binary (unipolar) Offset binary, (bipolar) 2's complement	*
End of Conversion (EOC)	High during conversion	*
Fan Out	2 TTL unit loads	*
Serial Data	Positive true	*
Fan Out	2 TTL unit loads	*
POWER		
+15 V ±3%	40 mA typical	*
−15 V ±3%	40 mA typical	*
+ 5 V ±5%	120 mA typical	*
ENVIRONMENTAL		
Temperature Range:		
Rated Performance	0°C to 70°C	*
Storage	−25°C to 85°C	*
Relative Humidity	0 to 85% non-condensing up to 40°C	*
MECHANICAL		
Packaging:		
Dimensions	2"×4"×0.4"	*
Shielding	Electromagnetic 5 sides	*
	Electrostatic 6 sides	*
Case Potential	Analog ground	*

* Same as ZAD2744

NOTES:

1. Specifications typical at 25°C and rated supply voltage unless otherwise specified.
2. Relative accuracy measured by using best-fit straight line.
3. Offset and Full Scale Errors are adjustable to Zero by external potentiometers. Adjust Zero at offset adjust FS @ gain adjust.
4. Digital input circuit contains HCMOS devices and is guaranteed to be free of "LATCH-UP" conditions.
5. Unit contains CMOS devices and should be handled with standard CMOS safety precautions.

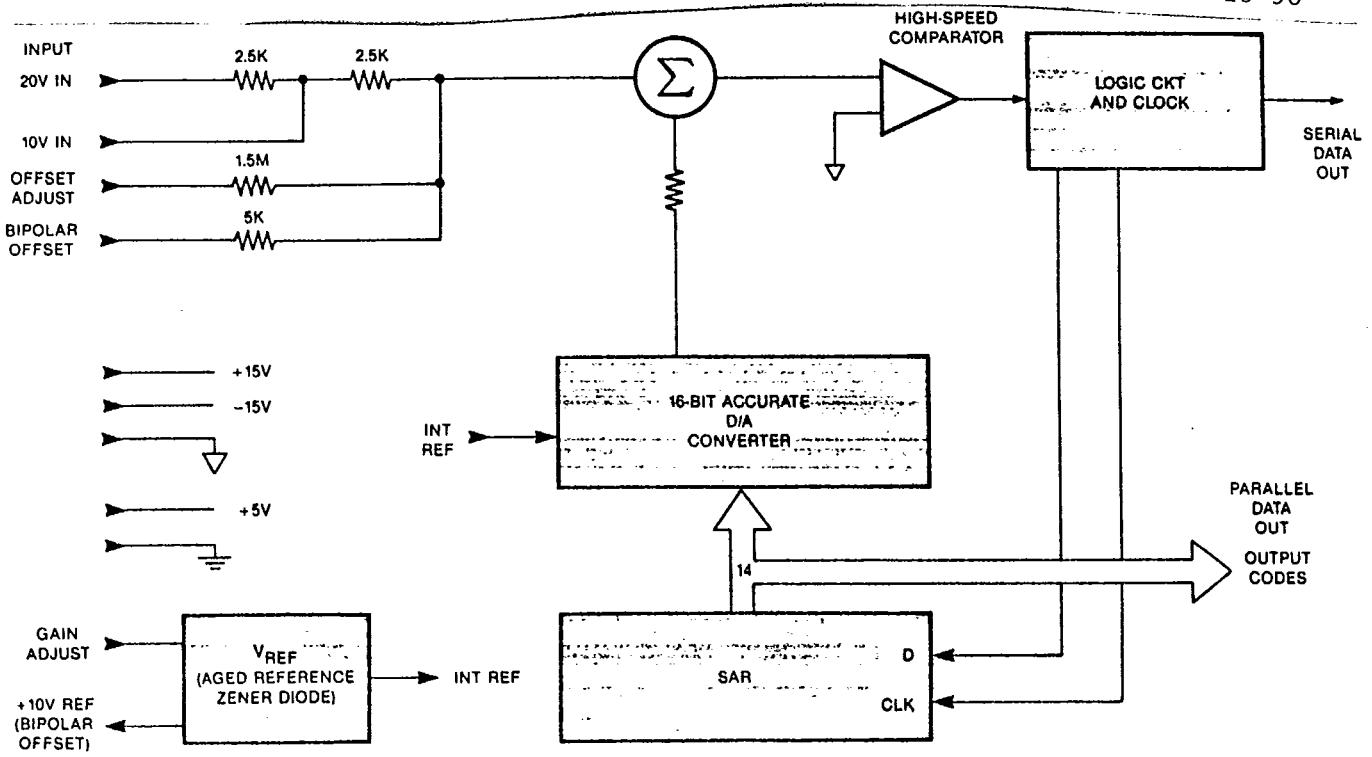


Figure 1 · Block Diagram

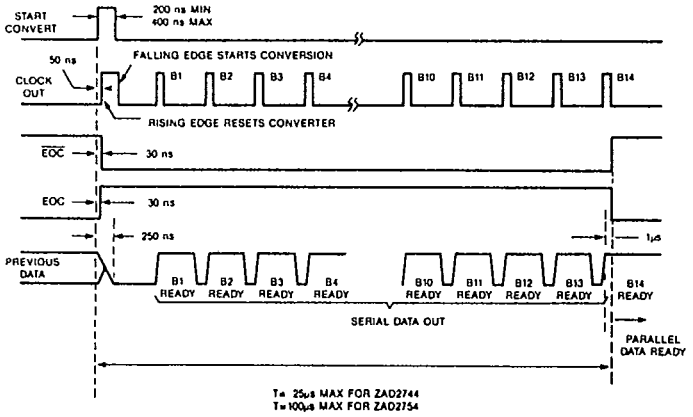


Figure 2 · Timing Diagram

Gain and Offset Adjustments

The ZAD2744 and ZAD2754 are factory calibrated to have less than ±0.05% FSR gain and offset error. External potentiometers may be connected as shown in figure 3 to cancel these errors. Pins 1 and 20 should be left open if external potentiometers are not used.

NOTE - A jumper is connected between PIN 19 and PIN 22 for bipolar operation; PIN 19 must be left open for unipolar operation.

Offset Adjustment Table

	Input PIN	Jumper PIN 19 to	Set Input Voltage to	Adjust External Offset Pot at PIN 20 Until Output Code is at
0 to 10V	6	—	+0.0003	000...00 to 000...01
0 to 20V	5	—	+0.0006	000...00 to 000...01
−5 to +5V	6	22	−4.9997	000...00 to 000...01
−10 to +10V	5	22	−9.9994	000...00 to 000...01

Gain Calibration

For ±10V units, set the input voltage precisely to +9.9982V. For ±5V units set to +4.9991V. Set to +9.9991V for 0 to +10V units and for 0 to +20V units, set to +19.9982V.

Adjust the gain potentiometer until two's complement coded units are nearly switching from 011...10 to 011...11 and binary or offset binary coded units are nearly switching from 11...0 to 11...1.

Range Selection Table

Full Scale Input Rg.	Analog Input PIN	Jumper PIN 19 to
±10V	5	22
0 to +20V	5	—
±5V	6	22
0 to +10V	6	—

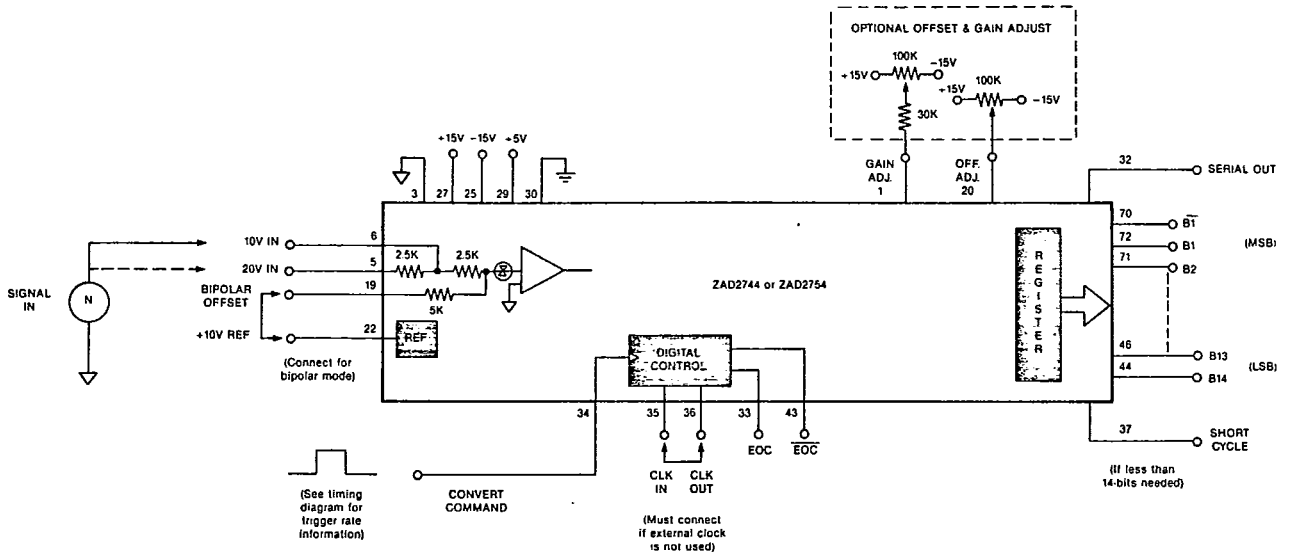
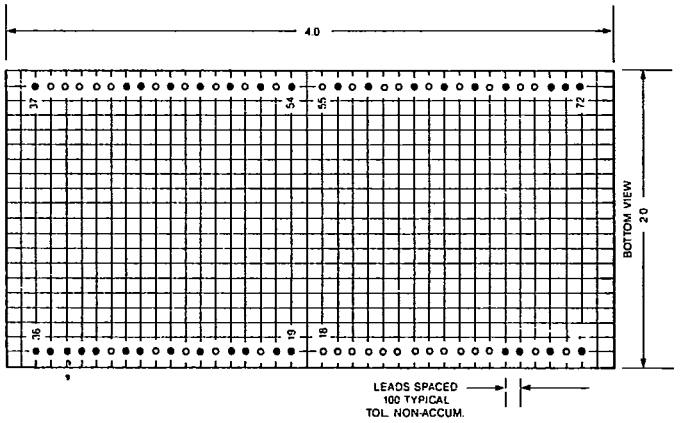


Figure 3 - Typical Configuration

Physical Outline

Contact the factory for mechanical details.



Pin Connections

1.	GAIN ADJUST	37.	SHORT CYCLE
3.	AN GND*	43.	$\overline{EOC}$
5.	AN IN (20V)	44.	BIT 14 (LSB)
6.	AN IN (10V)	46.	BIT 13
19.	BIPOLAR OFFSET	48.	BIT 12
20.	OFFSET ADJUST	50.	BIT 11
22.	+10V REF OUT	52.	BIT 10
23.	AN GND*	54.	BIT 9
25.	−15V	56.	BIT 8
27.	+15V	58.	BIT 7
29.	+5V	61.	BIT 6
30.	DIG. GND	63.	BIT 5
32.	SERIAL OUT	65.	BIT 4
33.	EOC	67.	BIT 3
34.	CONVERT COMMAND	70.	$\overline{MSB}$
35.	CLOCK IN	71.	BIT 2
36.	CLOCK OUT	72.	BIT 1 (MSB)

* NOTE: PIN 3 and PIN 23 must both be connected to analog gnd.

SHORT CYCLE CONDITIONS - When the A/D operates at 14-Bit resolution, leave PIN 37 open: If it is to perform conversions of less than 14-Bits, connect PIN 37 to the N+1-Bit output.

CLOCK - For Internal Clock, jumper PIN 35 to PIN 36. When External Clock is used, connect clock to PIN 35. Synchronize start convert with External Clock.

Custom Products

We invite customers to take full advantage of our custom design capability to provide the optimum product solution. Please contact our sales department for further information.

Ordering Guide

To Order Specify: ZAD2744/ZAD2754
14-Bit High-Speed Sampling A/D Converters

To place your order, contact Analog Solutions

Additional Products from Analog Solutions

Precision A/D and D/A Converters
Precision 16-bit and 18-bit D/A Converters
High-Performance Sample/Hold Amplifiers
Logarithmic, Isolation and Special-Purpose Amplifiers
High-Speed Telecommunications A/D and D/A Systems
Precision Load Cell and Strain-Gage Sub-Systems
High Speed Industrial Control Interfaces

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3M 9/86 Data subject to change without notice.